

## Chemotherapy Administration: Using Simulation Case-Based Scenarios to Assess Chemotherapy Competency

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Ongoing assessment of nursing competency is necessary to ensure that safe care is being delivered to patients. Competency assessments are familiar phenomena among nurses, independent of practice settings. Nurses graduate with basic skills; as skill sets expand, it becomes important to verify that skill and technique accuracy are maintained. As healthcare becomes more specialized, nurses who commit to specific patient populations and become proficient in specialized skill sets also must have those skill sets assessed for continued competency beyond initial training. Chemotherapy regimens can be complex and have been identified as high-alert medications because of the potential for patient safety compromise if an error occurs (Institute for Safe Medication Practices, 2008). When errors occur in the use of high-alert medications, the consequences are debilitating to patients (Institute for Safe Medication Practices, 2008).

The multi-step process for chemotherapy, including ordering, prescribing, transcription, preparation, and administration, provides the medium for multiple errors to occur and patient safety to be compromised (Sheridan-Leos, Schulmeister, & Hartranft, 2006). The Oncology Nursing Society (IONS, 2009) has taken the position that, in an effort to provide quality cancer care to patients with cancer, professional nurses must be competent in the essentials of oncology nursing care. Those competencies include being educated in the administration of oncology therapies as well as regularly updating oncology knowledge and skill sets based on current research and best practice (ONS, 2009). Because of the complexities of chemotherapy delivery and the devastation that can occur if an error happens, chemotherapy competency should be assessed on a regular basis once initial competency has been obtained.

Traditional methods that nurse educators use for assessing competency include

self-learning packets, return demonstration, observation on the job, and skills marathons with nurses moving from station to station in groups, in addition to other assessment options. The issue with many of those skill assessment techniques is that they are not evaluated in their actual context (Allen et al., 2008). For example, chemotherapy competency often is assessed with a self-learning packet or test format rather than being assessed in the context of an administration environment. When competency is not assessed in the actual environmental context, the assessment often can be deceiving as to how the nurse actually performs in a real patient situation (Allen et al., 2008).

Simulation via a human patient simulator allows for competency assessment to be conducted in an environment most like actual clinical scenarios without the stresses of performing in front of a patient (Kuhrik, Kuhrik, Rimkus, Tecu, & Woodhouse, 2008). Nurses not only demonstrate competency in a safe environment, but feel free to ask questions and be remediated as needed without causing patient harm or embarrassment to the nurse (Schreiber, Foran-Lee, & Ross, 2010). Use of simulation technology allows for promotion of communication among participants, development of a heightened skill set, and opportunity for making decisions based in the moment (Ford et al., 2010). Simulation is applicable to all levels of nursing staff, ranging from new graduates to experienced nurses. The educator conducting the session is able to develop scenarios that emulate actual patient experiences using algorithms that can be programmed into the simulator. The simulator mannequin can react to the nurses' actions or lack thereof. Simulations can range from basic scenarios that require very little reaction of the simulator to complex scenarios where the simulator needs to be programmed to react to numerous nursing actions. The complexity of the session is

decided by the educator. Promotion of critical thinking occurs in that type of environment, as nurses must be able to put theory into practice (Kuhrik et al., 2008).

Simulation has been used for all areas of nursing education and specialty fields. Much has been published on its use in critical care and emergency areas, as well as other specialized fields such as psychology and now oncology. Carpenter and Wortham (2008) outlined the annual assessment evaluation that was conducted in the simulation environment for staff nurses on an oncology unit. Staff nurses were presented with three oncology-based scenarios and were asked to react as they would with a real patient. Kuhrik et al. (2008) developed a similar program in which oncology nurses were given scenarios surrounding a patient with sepsis and another involving a patient with anaphylaxis. The algorithm for each scenario was programmed into a simulation mannequin, and nurses were expected to respond appropriately to the patient; correct interventions yielded positive patient outcomes and incorrect interventions were not beneficial to the patient. A pre- and postsimulation evaluation was completed by participants, and positive results were noted regarding staff comfort level and the interpretation of their competency.

### Methodology

The purpose of the current project was to assess chemotherapy competency of inpatient oncology nurses in an environment as close to the actual patient administration setting as possible. The goal of the educator was to use the competency assessments in a nonthreatening simulation setting where the nurse felt safe, comfortable asking questions, and where immediate feedback was provided. Competency was assessed using a scenario-based case in an effort to emulate actual chemotherapy administration.

The educator on the inpatient hematology/oncology unit met with a small group to initiate the planning of the simulation sessions. The group included the coordinator of the simulation center, a hospitalwide staff education specialist, and other staff development specialist colleagues. When designing the competency assessment for the staff nurse, it was decided that two parts would comprise the competency assessment. The first took place in the conference room of the simulation laboratory and was a question-and-answer session with staff to assess competency of chemotherapy orders and safe-handling procedures. The second portion of the assessment was held in the simulation laboratory in the patient room environment using a case-based scenario.

Standard questions and answers were developed for the chemotherapy order and safe-handling portion. Sample chemotherapy orders were created and staff was asked to determine whether or not the orders were accurate. Numerous questions were developed surrounding the exclusive chemotherapy ordering process for the institution, as well as safe-handling policy and procedure questions. The educator created a competency checklist based on hospital policy regarding chemotherapy administration so that consistent behaviors could be expected

from each participant. Hospital practice for chemotherapy administration is based on *Chemotherapy and Biotherapy Guidelines and Recommendations for Practice* (Polovich, Whitford, & Olsen, 2009). For the assessment, the competency checklist was chosen to evaluate performance because of it being one of the preferred assessment tools when nursing staff are demonstrating action (Lockhart, 2004).

The scenario used to assess competency with the patient simulator was developed based on a basic regimen involving premedications, IV push of chemotherapy, and hanging a continuous infusion bag of chemotherapy. A script was written for the chemotherapy administration with specific questions for the educator to ask to elicit specific responses from the nurses. All of the materials that would be needed to administer the chemotherapy were available in the room for the nurses, including personal protective equipment. As the nurses were giving the medications, the educator was outside the room speaking through a microphone as the "patient" asking predetermined questions. Nurses were not stopped or interrupted unless something was happening that would have caused harm to the patient. After the administration and disposal process was complete, a debriefing session was held where the educator and staff re-

viewed what went well and what areas needed improvement. Debriefing and reflection allowed participants to review events of the simulation and better understand key concepts within the session (Sperlazza & Cangelosi, 2009).

Simulation sessions were held on four different days and at various times to accommodate all shifts, allowing for 30 minutes per group to complete both portions of the competency. These sessions were limited to two or three staff members per group in an effort to simulate the real environment of chemotherapy administration. Basic frameworks of simulation for education usually recommend small groups participating in the most lifelike situation possible for the best learning outcomes (Garrett, MacPhee, & Jackson, 2010). A total of 69 RNs participated in the assessment, representing 97% of the RNs on the unit. The educator on the unit facilitated the sessions along with assistance from various members of the unit-based education council.

## Results

A pre- and postsimulation evaluation survey was given to the participants at the beginning of their session with a competency checklist. Prior to review of any material, each nurse was asked to complete the pre-evaluation and place it

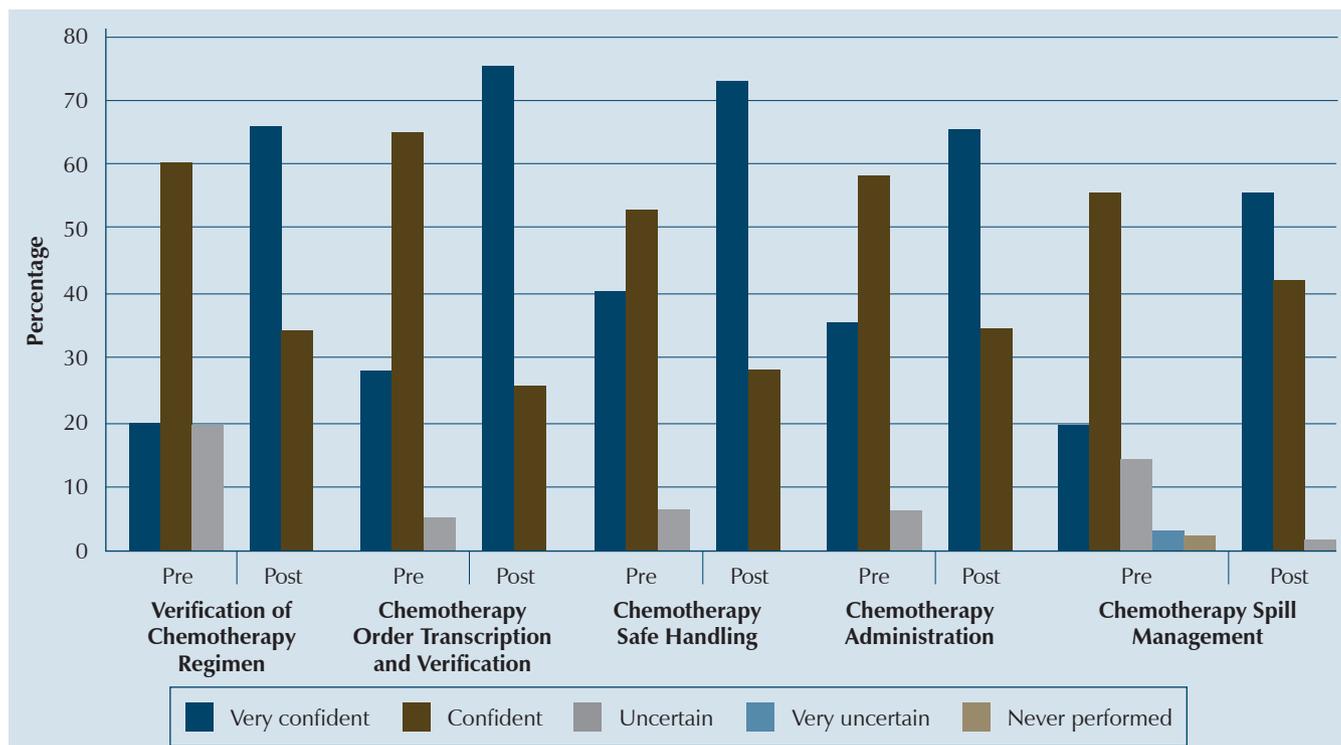


Figure 1. Pre- and Postevaluation Survey Results

in an envelope without any identifiable information. The postevaluation was handled in a similar manner after the assessment was complete, and the nurses put the evaluations in a separate envelope at the end of the activity. Sixty-six pre-evaluation surveys and 64 postevaluation surveys were completed. Nurses were asked similar questions in each survey so that the overall impact of the simulation sessions could be evaluated.

Nurses were asked to rate their level of confidence in five different areas: (a) verification of chemotherapy regimen, (b) chemotherapy order transcription and verification, (c) chemotherapy safe handling, (d) chemotherapy administration, and (e) chemotherapy spill management. Each area could be rated as very confident, confident, uncertain, very uncertain, or never performed. Verification of chemotherapy regimens were evaluated prior to the competency activity with 20% of nurses reporting they were very confident, 60% were confident, and 20% were uncertain; the results of the postevaluation indicated that 66% were very confident and 34% were confident in the verification of the chemotherapy regimen. Initially, chemotherapy order transcription and verification were ranked as 29% very confident, 65% confident, and 6% uncertain; postevaluation results indicated 74% were very confident and 26% were confident. Safe handling of chemotherapy was evaluated prior to the competency activity and 40% of staff reported being very confident, 53% were confident, and 7% were uncertain; postevaluation results revealed 72% of the staff feeling very confident and 28% being confident. Pre-evaluation of chemotherapy administration showed that 36% of staff felt very confident, 59% were confident, and 5% were uncertain; postevaluation demonstrated that 67% of staff felt very confident and 33% were confident. Lastly, 20% of nurses felt very confident in chemotherapy spill management, 55% were confident, 21% were uncertain, 3% were very uncertain, and 1% of participants had never

### Goal

To demonstrate competence in caring for the patient receiving chemotherapy (administration)

Prior to Administration	Competency	
	Yes	No
1. Verifies that "anti-cancer treatment" consent is signed and on the patient's chart.	<input type="checkbox"/>	<input type="checkbox"/>
2. Verbalizes knowledge and skills in assessment, management, and prevention of chemotherapy-related reactions (side effects, allergic reactions, and extravasation).	<input type="checkbox"/>	<input type="checkbox"/>
3. Provides patient and family teaching—treatment plan, symptom management, precautions, mouth care, follow-up and support services, and documents on the plan of care.	<input type="checkbox"/>	<input type="checkbox"/>
4. Verifies IV access for patency. <ul style="list-style-type: none"> <li>a. Assess for blood return, swelling, pain, or discomfort at IV site.</li> <li>b. Instructs patients to report burning, pain, or discomfort at IV site.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
5. Places chemotherapy precaution sign outside patient's room and adds chemotherapy precautions to the nursing profile.	<input type="checkbox"/>	<input type="checkbox"/>
6. Verbalizes where the preprinted chemotherapy order sheets are found.	<input type="checkbox"/>	<input type="checkbox"/>
7. Discusses process of regimen verification when preprinted order sheet is not used.	<input type="checkbox"/>	<input type="checkbox"/>
8. Demonstrates where to find pharmacy notes or citations in POMS.	<input type="checkbox"/>	<input type="checkbox"/>
9. Identifies accurate chemotherapy orders and paper MAR.	<input type="checkbox"/>	<input type="checkbox"/>
10. Verbalizes components of safe-handling policy.	<input type="checkbox"/>	<input type="checkbox"/>
11. Identifies contents of spill kits and appropriate use.	<input type="checkbox"/>	<input type="checkbox"/>
Administration		
12. Assembles appropriate safety equipment for the handling and disposal of chemotherapy to protect patient and self. <ul style="list-style-type: none"> <li>a. Uses chemotherapy gloves and other protective equipment, including goggles, gown, and face shield, as appropriate.</li> <li>b. Disposes of all chemotherapy in chemotherapy bucket.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
13. Administers premedications and hydration as prescribed.	<input type="checkbox"/>	<input type="checkbox"/>
14. Compares original order to delivered drug and has another chemotherapy-certified nurse complete an independent check of the delivered drug as well.	<input type="checkbox"/>	<input type="checkbox"/>
15. Preprimes IV tubing with compatible solution (0.9 NS/D5W).	<input type="checkbox"/>	<input type="checkbox"/>
16. Verifies the patient by using two unique identifiers at the bedside with another chemotherapy-certified nurse.	<input type="checkbox"/>	<input type="checkbox"/>
17. Verifies adequacy of venous access; checks IV patency and flushes line with 5–10 ml of NS, verifying adequate blood return and monitoring for any swelling, pain, or discomfort during the saline flush.	<input type="checkbox"/>	<input type="checkbox"/>
18. Demonstrates safe administration. <ul style="list-style-type: none"> <li>a. Pushes through port closest to patient, checking patency every 3–5 ml.</li> <li>b. Ensures appropriate rate of administration.</li> <li>c. Flushes between drugs.</li> <li>d. Two nurses check IV pump programming and lock pump.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
19. Monitors patient according to specific drug parameters (IV blood return checks, vital signs, and neuro checks).	<input type="checkbox"/>	<input type="checkbox"/>
20. Flushes line with at least 5–10 ml NS after infusion is completed.	<input type="checkbox"/>	<input type="checkbox"/>
21. Disposes of chemotherapy waste according to the chemotherapy CPG.	<input type="checkbox"/>	<input type="checkbox"/>
Post-Administration		
22. Documents medications, education, and patient response in a progress note.	<input type="checkbox"/>	<input type="checkbox"/>
<p>_____ has demonstrated competency in each step above when caring for the patient receiving chemotherapy administration.</p> <p><b>Evaluator:</b> _____ <b>Date:</b> _____</p>		
<p>CPG—clinical practice guideline; MAR—medication administration record; NS—normal saline; NS/D5W—normal saline and dextrose 5% in water; POMS—paperless order management system</p>		

### Figure 2. RN Proficiency Checklist

Note. Courtesy of Christiana Care Health System. Used with permission.

performed spill management; postevaluations demonstrated that 58% of nurses felt very confident in spill management, 41% were confident, and less than 1% were uncertain. Although accuracy was not measured quantitatively, no situations warranted intervention during any of the simulation sessions for actions that would have caused harm to a patient. In addition, discussions took place during debriefing sessions in which items were brought up that may have been missed, such as patient education opportunities. In regard to policy and procedure, accuracy was maintained throughout the simulation scenarios for the majority of nurses. Figure 1 depicts the results.

## Discussion

**Barriers and challenges:** Because of numerous changes in internal policy, it was thought to be beneficial to include the didactic portion of the project at the same time as the simulation experience. In an effort to get all of the material covered in the 30-minute time slot, time in the simulation laboratory was limited. That should not be an issue for future competency assessments because all of the time allotted for the competency training will be spent in the actual simulation environment.

The checklist used to validate competency was developed by the unit educator; therefore, it did not have completed validity or reliability data. The competency checklist (see Figure 2) was developed by the staff educator in accordance with *Chemotherapy and Biotherapy Guidelines and Recommendations for Practice* (Polovich et al., 2009), which is congruent with current hospital policy and practice.

**Facilitators of success:** The current project was successful because of the staff involved. The oncology nurses on the inpatient unit were enthusiastic about having the competency assessment in the simulation laboratory. For many staff, the assessment was their first exposure to that type of environment. The scenario used was designed to be very basic in an effort to assess fundamental administration competency and not to overwhelm staff in a new environment. Multiple comments from staff after the assessment were positive about the experience and asked about the next assessment and the possibility of increasing the complexities of the scenario to expand on other emergency situations.

Having the availability of colleagues who were familiar with simulation scenarios also was pertinent to the success of this endeavor. Although the oncology educa-

tor had ideas about various scenarios, it was the simulation coordinator, as well as fellow educators, who helped to focus the scenario and troubleshoot the experience prior to any staff coming through.

Developing an outline of the entire activity, narrating the scenario, and creating scenario questions and answers allowed consistency in evaluating each nurse and allowed for nursing members of the unit-based councils to facilitate the assessment while still providing consistency. The development of the scenario allowed assessment not only of administration skills, but also patient education. The patient simulator was able to ask questions of the nurse in regard to the chemotherapy regimen in an effort to elicit a certain response. In addition, presenting the staff nurses with a survey also was beneficial for feedback.

## Conclusions

Chemotherapy competency assessment in a simulation environment is valuable to nursing staff. It provides the closest possible environment to the real patient setting without the awkwardness of conducting assessments in front of a patient during administration. The potential to tailor the scenarios to make them specific to oncology, as well as to specific practice areas, make the assessment technique appealing to educators. ONS provides evidence-based practices for chemotherapy administration in *Chemotherapy and Biotherapy Guidelines and Recommendations for Practices* (Polovich et al., 2009). Items such as proper patient identification, measurement of height and weight in centimeters and kilograms, use of calculators, elimination of abbreviations, and involvement of the patient to prevent errors all have been identified as measures to adopt (Schulmeister, 2005). Using simulation as a way to evaluate competency for chemotherapy administration is a valuable form of assessment. Survey results for oncology nurses reinforce the concept of increased confidence after simulation-based learning. Because of its flexibility, simulation has the potential to allow for the most basic assessment up to and including the complexities of the most challenging patient. Educators are able to tailor scenarios to the needs of their learners, making the targeted information more individualized for the adult learner.

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