Minimizing Staff Exposure to Antineoplastic Agents During Intravesical Therapy

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Exposure to chemotherapy is a daily risk for nurses in oncology infusion centers. Although significant advances have been made in developing systems to make IV administration of antineoplastic agents safer, less attention has been given to developing systems to minimize exposure risk during instillation of intravesical chemotherapy. This article describes the use of a closed system developed at a comprehensive cancer center and compares it to two closed systems reported in the literature.

At a Glance

- Safe handling of biohazard medications is important for all healthcare workers involved in the administration of antineoplastic agents.
- Nurses need to advocate for use of chemotherapy administration systems that minimize exposure to staff and patients.
- Infrequently performed procedures need to be supported by clearly specified procedural steps that are readily accessible to the nurse.

The risk for exposure to chemotherapy is a daily occurrence for nurses working in oncology infusion centers. Exposure may occur while handling chemotherapy drugs or when staff comes into contact with aerosols, dust, spills, or contaminated surfaces (Gambrell & Moore, 2006; Polovich, 2011). Exposure to hazardous drugs can cause ill effects in healthcare workers (Polovich, 2011). The National Institute for Occupational Safety and Health (NIOSH, 2004) published an alert to increase healthcare workers' awareness about the risks of working with hazardous drugs. In this alert, NIOSH stated specifically that, “Working with or near hazardous drugs in health care settings may cause skin rashes, infertility, miscarriage, birth defects, and possibly leukemia or other cancers” (p. 1).

Minimizing staff exposure to antineoplastic agents is a safety priority for the Oncology Nursing Society (Polovich, 2011) and the American Society of Health-System Pharmacists (2006). To date, progress has been made on developing tubing and devices that minimize the risk of exposure while administering agents via IV or by IV push. Closed system drug transfer devices (CSTD), for example, have been developed and recommended for use (Polovich, 2011). However, less attention has been paid to developing closed systems for intravesical administration of chemotherapeutic agents. Intravesical therapy is used infrequently, but more commonly used in patients with bladder cancer. This therapy is a procedure in which chemotherapy is instilled into the patients' bladder using a urinary catheter.

In July 2007, medical and nursing administration at the Karmanos Cancer Center decided that intravesical therapy, formerly done by nurses in the urologist's office, should be administered by nurses in the infusion center. The clinical nurse specialist (CNS) for the infusion center was consulted to facilitate this transition. Findings from the assessment of intravesical administration procedures led the team to conclude that an opportunity existed to reduce the risk of exposure to chemotherapy administered in this setting. The open system used in the urologist's office increased risk for chemotherapy spills and exposed staff to chemotherapy by aerosolization. At the time of this practice transition, the literature reflected a growing interest in intravesical therapy (Brassel & Kamat, 2006; Lamm, McGee, & Hale, 2005; Richie, 1992; Thrasher & Crawford, 1992), but no closed systems were described. Consequently, the first author of the current article set out to discover or invent an alternative closed system for intravesical therapy that would mitigate the risk of staff exposure to chemotherapy and reduce or eliminate the risk of chemotherapy spills.

Background and Review of the Literature

Intravesical therapy is used to treat patients with bladder cancer (Washburn, 2007). The procedure typically involves using a Foley catheter to instill chemotherapy and/or biotherapy agents directly.
into the bladder (Washburn, 2007). Intravesical therapy was first described by Herring in 1899, who instilled silver nitrate into the bladder daily through a Coude catheter to treat papillomatous growths. Since this early description, intravesical therapy has been used by urologists as a primary and adjuvant treatment for bladder cancer (Washburn, 2007). Administration of the agents can take place in a variety of places, including the operating room, a urologist’s office, and in infusion centers (Washburn, 2007).

A concern about minimizing the risk of exposure during intravesical therapy was mentioned in Safe Handling of Hazardous Drugs by Polovich (2003). Recommendations from that report cautioned nurses to wear appropriate personal protective equipment (PPE) and to “take care to prevent leaks and sprays from loose connections or excessive pressure during drug delivery” (Polovich, 2003, p. 26). Washburn (2007) was the first to discuss the use of a closed system to administer intravesical chemotherapy; the system uses a Phaseal device connected to a urinary catheter adaptor to prevent exposure during administration. However, nurses were cautioned to use gauze to “absorb any drops that could become airborne or drip during the switch of the plug for the drainage bag” (Washburn, 2007, p. 557). Haifler et al. (2010) described a closed system for intravesical instillation in the operating room during transurethral resection of bladder tumors. This closed system uses four parts, including a one-way screw connector that is compatible with a syringe, a “male” connector for the catheter, a “female” connector for the collection bag, and a bidirectional valve. The use of this system is ideal for the operating room because it not only is a closed system, but also allows the surgeon to control the influx and evacuation of the medication.

Conceptual Framework

Donabedian’s (1980) framework guided this quality improvement initiative. The horizontal relationships among the concepts (see Figure 1) imply that structural components must be in place before introducing process components. Similarly, achievement of quality outcomes depends on the adequacy of the antecedents: structure and process. The vertical relationships represent the intellectual movement from the abstract, broad scope concepts (e.g., structure) to the narrower, context relevant representation of the concept (e.g., administrative and human resources), and finally to the identification of an empirical referent (e.g., written policy and well-prepared staff). The critical, measurable outcome for the authors’ work was the absence of spills and exposures.

Program Implementation

The structural component of the authors’ quality initiative was developed first. The CNS worked with nursing education to develop a closed system to instill intravesical agents. The newly developed closed system uses (a) a pharmacy-prepared IV bag using a CSTD, (b) IV tubing that runs from the medication bag to specimen port of the urinary catheter drainage tubing, and (c) a urinary collection bag.

In July 2007, a policy and procedure for the administration of intravesical therapy was developed and approved by nursing administration and the urologist. Subsequently, selected staff received competency training on performing intravesical administration using the closed system. As part of the training, they were required to give return demonstrations until proficient. In addition, because the procedure is performed infrequently, a reference binder was developed and housed in the infusion center.

The process component was specified as a series of steps taken by the nurse to perform the procedure: (step 1) the nurse asks the patient to empty the bladder, then (step 2) inserts urinary catheter, (step 3) dons appropriate chemotherapy PPE (mask with face shield, gown, and nitrile gloves), and (step 4) uses a crede maneuver by placing manual pressure on the lower abdominal wall to empty the bladder of any residual urine. For step 5, the nurse clamps the collection bag tubing below the specimen port (see Figure 2a), (step 6) hangs the collection bag above the patient’s bladder, (step 7) connects IV tubing to the specimen port on the collection bag tubing (see Figure 2b), and (step 8) opens the roller clamp on IV tubing to instill the agent via gravity into the bladder (see Figure 2c). To complete the procedure, the nurse flushes the IV tubing gently (step 9) using a 10 ml syringe of normal saline attached to the lowest port on the IV tubing (about 4 ml of saline is needed) to instill the remaining agent into the bladder without diluting the medication. The urinary catheter is then removed (step 10). The catheter and IV tubing are disposed of as a single, intact unit in a biohazard waste container; therefore, the system remains closed throughout the entire procedure.

Program Outcomes

The first administration of intravesical therapy using the newly developed
A. Step 5

Clamp the urinary drainage tube below the specimen port using nonserrated clamps prior to administration.

B. Step 7

Connect the IV administration tubing to the specimen port on the drainage tubing.

C. Step 8

Open the roller clamp to instill the medication.

FIGURE 2. Selected Steps of the Administration Process

Note. Photos courtesy of the Karmanos Cancer Center. Used with permission.

closed system was completed in early August 2007. Intravesical therapy has been administered about 270 times using this closed system. In the ensuing eight years, no spills, accidental disconnects, or exposures have been reported.

Discussion

Haifler et al. (2010) and Washburn (2007) described systems that reduce the risk of staff exposure. With Washburn's (2010) system, a chance of exposure to the staff remains with the discontinuation of the device. Haifler et al. (2010) described their system as leak proof but complex. Both systems also described use of a syringe with a staff member administering the medication with the plunger and not via gravity, as was requested by the urologist at the authors' institution. Therefore, a closed system that would allow the staff to administer medication via gravity and remain a closed system warranted a different approach. The system developed in 2007 met the need for a closed system that allowed intravesical therapy to be administered via gravity. Nursing staff has adhered to using the closed system and has stated they could not see doing it any other way.

Safe handling of biohazard medications is important for all healthcare workers involved in the administration of antineoplastic agents. Closed systems have been identified as a preferred type of procedure for administration of chemotherapeutic agents. Using a closed system during the administration of intravesical therapy not only protects the staff administering the medication, but also protects patients. Using the specimen port of the catheter requires fewer steps to connect the patient to the therapy. The use of gravity to instill the medication reduces the risk of trauma to the patient's bladder. The closed system introduced in this quality initiative compares favorably to the system proposed by Washburn (2007) and may be superior in that, once assembled, it remains closed from administration to disposal.

References


