



Safe Chemotherapy

in the Home Environment

The Oncology Nursing Society and the American Society of Clinical Oncology have established guidelines for the safe and effective use of chemotherapeutic medications in the acute and outpatient care settings. A review of literature was performed to determine the safe and effective administration of chemotherapy in the home environment. The administration of oral and intravenous chemotherapy in the home has become a common intervention for patients being treated for cancer based on patient preference, cost-effectiveness of healthcare delivery, and increasing demand for oncology services. Home healthcare nurses can greatly impact the management of adverse effects of chemotherapy in the home, increasing the quality of life and improving patient outcomes.

According to the American Cancer Society (ACS), the estimated number of new cancer cases diagnosed for the year 2014 in the United States will be 1,665,540 (ACS, 2014). The increase in cancer diagnoses will result in an increase in the demand for chemotherapy and other cancer treatments (Lloyd, 2010). Most chemotherapy treatments are administered in free standing clinics, hospital-based ambulatory care clinics, or in the acute care settings. The increased demand on outpatient facilities, patient preferences, increased healthcare costs, and the increased use of oral

chemotherapy have fueled the interest for chemotherapy administration outside the boundaries of hospitals and ambulatory clinics (Depledge, 2012). The chemotherapy administered in the home, whether with oral administration or as an infusion, should meet recommended guidelines for safety and effective patient care (Neuss et al., 2013). There is evidence that caring for cancer patients in the home can improve symptom distress and decrease social dependency. McCorkle et al. (1989) conducted a randomized clinical trial to determine the

effects of home healthcare nursing compared to the usual outpatient care for 166 patients with progressive lung cancer. The patients were randomly assigned to an oncology home care group, a standard home care group, and an office care group. The two home care groups had less symptom distress and greater social independence 6 weeks longer than the office care group.

Oral Chemotherapy

The use of oral chemotherapy has increased dramatically since 2000, and it is now the most

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frequently administered chemotherapy in the home setting (Yagasaki & Komatsu, 2013). Oral chemotherapy has been positively received by hospitals, clinics, and patients. Oral chemotherapy drugs are used for various types of cancers including breast, prostate, nonsmall cell lung cancer, and colorectal cancer. Drugs used include Lapatinib (Tykerb), Abiraterone (Zytiga), Erlotinib (Tarceva), and Enzalutamide (Xtandi). There are many benefits of oral chemotherapy, which include decreased cost of administration and increased exposure of cancers to the chemotherapy agent. Most oral chemotherapy agents are covered by insurance plans. Another benefit is that oral chemotherapy eliminates the transit time required for patients to travel to and from outpatient clinics. In addition to the many benefits of oral chemotherapy, there are drawbacks. Oral chemotherapy shifts the management of therapy and adverse side effects into the hands of patients and caregivers. Nursing presence in the care of the patient receiving oral chemotherapy can diminish and patients can become more isolated in their cancer treatment (Yagasaki & Komatsu). Patients on oral chemotherapy medication

require, and should have, nurse involvement in monitoring and education (Yagasaki & Komatsu). Many oncology nurses practicing in outpatient settings may not be aware of the addition of oral chemotherapy to patients' treatment regimens and oncologists have a limited amount of time to provide adequate education to patients. In a qualitative study, Yagasaki and Komatsu conducted focus group interviews with 18 oncology nurses. The nurses indicated that presence was important, and nurse involvement should be available at the initiation of therapy. The nurses were unaware of patients who were receiving oral chemotherapy if patients had not been treated in the infusion area prior to initiation of oral therapy (Yagasaki & Komatsu). Care coordination was also a concern cited by study participants. Patients receiving chemotherapy may require the services of a dietitian or social worker during treatment, and these needs may go unrecognized without the presence of nurses. Nurses collaborate with other disciplines to coordinate referrals and are able to perform patient assessments, manage adverse side effects, or monitor adherence to medication regimens.



The orders for chemotherapy infusion should include the patient's name, and a second identifier, diagnosis, method for body surface calculations, current height, and weight, drug name, and dose.

Intravenous Chemotherapy

Patients receiving chemotherapy at home benefit from the familiar surroundings and more normal lifestyle (Gavin et al., 2004). Admissions to acute care units within the hospital setting for the infusion of chemotherapy can be minimized along with healthcare costs. The home setting for chemotherapy infusion also decreases costs to patients as well. Travel time, or time spent away from home, family, and work, is decreased substantially. However, thorough assessments of patients must be performed to ascertain ability to manage home infusion as well as their preference for home infusion.

Fluorouracil or, 5FU, is an intravenous chemotherapy drug, which is used in the home setting. 5FU is used most commonly to treat cancers of the head, neck, colon, and rectum. When used in the home setting, 5FU is administered as a continuous infusion over 22 to 48 hours every week, every 2 weeks, or every 3 weeks. 5FU can also be administered as a continuous infusion lasting up to 5 to 8 weeks. There are other chemotherapy agents currently under investigation for home infusion. Lal et al. (2013) performed a study to determine the feasibility of Pemetrexed (Alimta) as a home-based chemotherapy infusion. Pemetrexed has been indicated for second-line treatment or maintenance therapy for patients with advanced nonsquamous cell lung cancer (NSCLC) whose disease has not progressed. The results of two phase III, randomized, double-blind, placebo-controlled studies indicated that Pemetrexed, used as maintenance therapy, improved progression-free survival as well as overall survival rates for patients with NSCLC, nonprogressing (Lal et al.).

In another study, Lüthi et al. (2012) evaluated the feasibility, safety, perception, and cost of administering intensive chemotherapy in the home setting. The study included 46 home-based treatments with the majority of study participants receiving multiple cycles of chemotherapy. According to the study, home care resulted in a

53% decrease in healthcare costs (Lüthi et al.). Medical complications occurred in three of the patients; one experienced heart failure, another experienced angina, and the third patient experienced an allergic reaction to the medication. Eight study participants had unplanned hospitalizations. These patients were admitted for febrile neutropenia, fever without evidence of infection, and pneumonia. No study participant or family requested hospitalization for chemotherapy

administration during the study. Questionnaires completed by study participants indicated a preference for receiving chemotherapy infusions in the home setting. Patients reported benefits of the home setting for chemotherapy included increased comfort, increased freedoms, and the reassurance of a family member's presence (Lüthi et al.).

Patients are required to have a vascular access device such as an implanted vascular access port or peripherally inserted central catheter (PICC) to facilitate chemotherapy in the home, especially with continuous infusions. The chemotherapy infusion may be initiated in an ambulatory clinic setting or in the home. The orders for chemotherapy infusion should include the patient's name, and a second identifier, diagnosis, method for body surface calculations, current height, and weight, drug name, and dose (Jacobson et al., 2009). Other components that should be present in the chemotherapy order are the regimen or protocol name, allergies, route and rate of infusion, and schedule duration. Premedication, pre- and postinfusion hydration, and any medications to be used in the event of hypersensitivity should also be part of the chemotherapy order (Jacobson et al.). Verification of the chemotherapy infusion with the chemotherapy order is a vital component of safe chemotherapy administration. Two clinicians should perform the verification. Staffing challenges may make verification difficult for infusions initiated in the home (Ewen et al., 2012).

The portable infusion pump is programmed to infuse over the desired length of time. It is extremely important to have two clinicians verify the rate of infusion to prevent medication errors. Infusions pumps can be programmed erroneously and deliver chemotherapy too quickly resulting in potential or actual patient harm. Patients need to be educated about the alarms of the pump, which indicate problems or completion of the infusion.

Most infusion pumps have a screen, which will give instructions to correct specific alarms or telephone numbers for 24-hour service contact.

Problems with the infusion of chemotherapy can occur in the home setting. Noncoring needles used to access implanted vascular access ports may become dislodged with leakage of chemotherapy behind the transparent dressing. Infusion tubing may be punctured or inadvertently damaged by pets or small children. The portable infusion machines may be dropped and damaged during a home infusion. Batteries used to power some infusion pumps may lose charge.

Extravasation is a risk most often associated with peripheral vascular access. Extravasation can occur, however, with implanted ports and PICCs in the home and ambulatory care settings during chemotherapy infusions. Risk factors for extravasation with vascular access devices include noncoring needles not secured appropriately, and deeply implanted vascular access ports and PICC lines inadvertently misplaced outside of venous system. The presence of fibrin sheaths at the tip of a PICC line and incomplete insertion of noncoring needle into implanted vascular access port also place the patient at risk for extravasation (Schulmeister, 2014).

Nurses are not typically available in the home throughout the infusion. Patients and caregivers must be educated to observe for and report signs and symptoms of infiltration, extravasation, infection, and air embolism. (Ewen et al., 2012). They must also be educated about changing batteries in infusion pumps, protection of tubing and infusion containers, and steps to take if there is a spill or leak of chemotherapy agents. Even with education, patients and caregivers are not professional clinicians. Access to oncology nurses and knowledgeable home healthcare nurses are necessary to fill these gaps.

Home Healthcare Nurses

Many home healthcare agencies are involved with the care of patients who are receiving chemotherapy in the home setting, specifically those receiving continuous infusions. Home healthcare agencies are contracted by hospitals to provide home healthcare nurses to discontinue chemotherapy infusions when completed. The hospital's case managers usually make the referrals. Home healthcare nurses assess patients as well as the infusion sites. The home healthcare nurses should follow standard protocols for

accessing or disconnecting from an implanted vascular access port or PICC.

All home healthcare nurses involved with the administration of chemotherapy should be educated on safe handling of chemotherapy, but many are not oncology certified nurses (OCNs). The Oncology Nursing Society offers several courses for the certified and nononcology certified nurse including a chemotherapy and biotherapy certification course and a basic chemotherapy course. Any nurse involved with any aspect of chemotherapy administration should have a solid knowledge base for safe handling of chemotherapy (Neuss et al., 2013).

Safe handling of chemotherapy includes proper disposal of hazardous waste and use of personal protection equipment. Patients may contact the home healthcare agency for problems with the home chemotherapy infusion such as leakage or dislodgement of the noncoring needle. The home healthcare nurses should be competent in safe handling of chemotherapy, including potential chemo spills. Chemotherapy drugs can be mutagenic, teratogenic, and carcinogenic. It is important that home healthcare nurses and family members be protected.

ASCO/ONS Guidelines

The American Society of Clinical Oncology (ASCO) in collaboration with the Oncology Nursing Society (ONS) published standards or guidelines for the safe use of chemotherapy in the outpatient setting in 2009 (Jacobson et al., 2009). The standards developed by ASCO/ONS included the prescription, preparation, and administration of chemotherapeutic agents. The guidelines were reevaluated and updated in 2012 to include the administration of chemotherapy in the inpatient setting. With the increased utilization of oral chemotherapy drugs, the standards were once again updated to include the safe administration and management of oral chemotherapy in 2013. Although there are no specific guidelines for the administration of parenteral chemotherapy in the home environment, guidelines that were developed and established in 2009 are applicable to the safe handling and administration of parenteral chemotherapy in the home.

Several guidelines pertinent to the administration of oral chemotherapy in the home refer to the labeling of the medication container. The information on the medication label should be very clear. The label should include the drug name (generic and brand), dose, route, duration, and frequency of

doses (Neuss et al., 2013). The label should also include whether the medication should be taken with or without food or with other medications such as prednisone. The patient should take the least amount of tablets or capsules required for the dosage. Labeling should be consistent throughout treatment unless a dose adjustment is required (Neuss et al.).

Parenteral chemotherapy is usually initiated in the outpatient setting. To avoid calculation or setting errors, two nurses should verify the infusion settings prior to beginning the infusion. The infusion rate will be dependent on the amount of chemotherapy to be infused per hour and total number of hours the chemotherapy is to infuse continuously. Patients go home with an infusion container and a portable infusion pump, which was set in the clinic by the oncology nurses.

In view of the guidelines from ASCO/ONS, home healthcare nurses disconnecting, or connecting infusions in the home should use the appropriate personal protective equipment including impermeable gowns, chemotherapy gloves, face shield, or goggles (Polovich et al., 2014). The equipment should be available in the home or provided by the home healthcare agency. The appropriate equipment for disposal of infusion containers, tubing, and noncoring needles should also be readily available. A spill kit for possible leaks or spills is also a necessary item.

Patient/Family Education

Education is an on-going process for patients receiving chemotherapy. With the diagnosis of cancer, patients often lose a sense of control over their lives. Information and education enable patients to regain control and effectively participate in decisions regarding their healthcare. Prior to the start of treatment, patients should be informed of their diagnosis, treatment goals, whether treatment is palliative, curative, or for stabilization of disease. Patients and family members should be made aware of the duration of treatment, possible adverse effects, and whether the adverse effects are a permanent or temporary result of treatment. Patients and family members need to know when and how to contact the healthcare provider as well as what signs and symptoms warrant a visit to the nearest emergency room. Patients and family members should be educated about what to do if there is a chemotherapy spill or leakage prior to the arrival of assistance. Return demonstration and

feedback should be used to ensure that measures to ensure safety can be performed and the intent of the messages have been received.

The storage of chemotherapy medication is an important aspect of treatment to discuss with patients. There are some chemotherapy medications that should be kept out of direct sunlight. All medications should be kept out of the reach of children. Patients and family members should be instructed on the steps to take if oral medications are accidentally spilled and the course of action needed in the event of dislodgement of the noncoring needle. Patients need instructions on what to do if leakage of chemotherapy occurs on clothing or the skin. Bed linens should be handled with gloves and washed separately from the rest of the household items. The linens should be washed twice in hot water with regular detergent (Kerber, 2014).

Family members and nurses should wear double chemotherapy gloves and disposable gowns when handling body fluids including urine, blood, vomitus, or stool for 48 hours after completion of chemotherapy (Kerber, 2014). Patients who are incontinent and receiving chemotherapy in the home should have their skin cleansed with soap and water with each diaper change. Patients using the toilet should be educated to flush the toilet twice with the lid down. Patients who are sexually active should use condoms for 48 hours after treatment. Patients receiving certain chemotherapy agents should be instructed on drug or food interactions or possible sensitivity to cold or sunlight.

There is a great deal of information that should be provided to patients before, during, and after receiving chemotherapy. Information sheets and notebooks can be useful tools for patients to review and in which to write directions. Patients and family members can also be directed to reputable Web sites for more information (Box 1).

Summary

According to the Centers for Disease Control and Prevention (CDC), in the year 2010, more than 1.45 million people had a diagnosis of cancer (CDC, 2013). That statistic is 4 years old, and the number of people affected by cancer has increased. Cancer is now often called the new chronic disease. It is not possible for all the people being treated for cancer to receive treatment in an inpatient or ambulatory clinic

Box 1. Online Resources for Patients and Families

Organization	Web Address
American Society of Clinical Oncology (ASCO): Brings expertise and resources of ASCO to people living with cancer	http://www.cancer.net
CancerCare: Counseling, support groups, education, and financial assistance	http://www.cancer.org
Penn Medicine: Cancer resources for patients and healthcare professionals	http://www.oncolink.org
Information about chemotherapy for patients, families, caregivers, and friends	http://www.chemocare.com
Break away from cancer: A national initiative to increase awareness of important resources available to people affected by cancer—from prevention through survivorship	http://www.breakawayfromcancer.com
National Cancer Institute: Resources and information on clinical trials	http://www.cancer.gov

setting. The increase in cancer survival and cancer prevalence has resulted in a much greater number of patients who require long-term oncology care (Bordonaro et al., 2014). More and more oncology patients will be treated in the home environment. Home healthcare nurses in collaboration with oncologists, oncology nurses, and pharmacists at medical centers will provide oncology services, specifically chemotherapy administration, in the home. Chemotherapy care in the home should be as effective and safe as the care received in healthcare settings, and education and certification of home care nurses is necessary to provide safe and effective care. ■

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