

Chemotherapy and Safety Measures to Prevent its Hazard

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Abstract

Chemotherapy is the use of Antineoplastic drugs to promote tumor cell destruction by interfering with cellular function and reproduction. It includes the use of various chemotherapeutic agents and hormones. Chemotherapy drugs are highly toxic even in minute quantities and they pose risks to those who handle them. Chemotherapy can be life saving to a cancer patient but unintentional exposure to these powerful agents may be endangering the lives of healthcare workers. Exposure to “secondhand chemo” can confer significant health risks such as immediate nervous system effects, acute and long-term reproductive effects (e.g., infertility and miscarriage) and a subsequent risk for hematological malignancies. The aim of this article is to focus on the safety measures on personal and environmental protection by nurses during chemotherapy preparation and administration.

Introduction

Chemotherapy is a form of cancer treatment that involves taking one or more of a type of drug that interferes with the DNA of fast-growing cells. These drugs are further subdivided into specific classes such as alkylating agents, antimetabolites, anthracyclines, and topoisomerase inhibitors. Unfortunately, these drugs do not exclusively affect malignant cells but also affect normal cells that reproduce rapidly such as the intestinal mucosa, blood cells, and hair follicles. The route and method of administration of a particular agent is influenced by drugs' pharmacology, side effects

classification and type of disease, and the treatment regimen. Routes of administration include intravenous, oral, intramuscular, subcutaneous, intrathecal, and intra-arterial chemotherapy is often contrasted with targeted (biologic) therapy or immunotherapy, which attack specific parts of specific cells instead of all dividing cells. Chemotherapy drugs are highly toxic even in minute quantities, and they pose risks to those who handle them (Gound, Grigaitis, Thomas & Graves, 1998).

Chemotherapy drugs can cause other cancers and/or interfere with fetal development and cause birth defects. Doctors and nurses need to be careful to avoid contact with chemotherapy drugs. It is recommended that health professionals wear gloves, gowns and goggles when handling the medications, either to prepare or administer. Because the waste products of patients treated with chemotherapy can also contain chemotherapy drugs, health professionals should also exercise extreme care in handling urine and stool samples from patients undergoing chemotherapy.

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing occupational exposures to antineoplastic drugs and other hazardous drugs in health care settings. Health care workers who work with or near hazardous drugs may suffer from skin rashes, infertility, miscarriage, birth defects, and possibly leukemia or other cancers. Chemotherapy drugs can be dangerous to others because they are mutagenic, teratogenic and carcinogenic and they may cause skin irritation or damage. Nurses prepare the drugs in areas

with special ventilation systems to avoid spattering and/or inhaling the droplets that can form while mixing (Gound, Grigaitis, Thomas & Graves, 1998).

Study conducted on ‘Nurses protective measures during chemotherapy and administration in Turkey Findings for nurses’ safety behavior and usage of recommended health safety measures showed that, notwithstanding the rules and regulations pertaining to chemotherapeutics, nurses did not comply with them fully. The study expanded that health providers and clinical environment are under threat for contamination of chemotherapeutics. The results clearly point the importance of need for regular education programme. This study also revealed the necessity for improvement of the working environment (Rizalar, Tural & Altay 2012).

People who handle chemotherapy drugs at any point from manufacture to patient dosing and administration are at risk. In a public alert, NIOSH estimates more than five million workers could be exposed through various activities. Nurses and other workers are exposed through prolonged contact with vial exteriors, counting out doses, crushing tablets, priming intravenous sets and handling contaminated clothing or waste, among other practices. Accidental chemotherapy exposure can harm the nervous and reproductive systems and increase the risk of blood cancers. Any unintentional exposure to the skin or eyes could be just as dangerous as a needle stick.

A study conducted at Mansoura University hospital from February 2006 to July 2006 showed that, risky behavior among study nurses included: eating food in drug handling areas (45.7%), use of improper place for preparing and handling Cytotoxic drugs, expelling air from syringes filled with drugs, needle stick injuries, unsafe handling of contaminated material and unsafe cleaning of spills (Elshamy, El-Hadidi, El-Roby & Fouda, 2010).

Different studies finding concluded that need to improve the safety of the work environment; make available protective equipment; develop standard practice guidelines for oncology nurses; implement good planning and design of the workplace; provide adequate specialized equipment such as cytotoxic drug safety cabinets and personal protective equipment; establish clinical pharmacy practice; and integrate health monitoring programs that include the assessment and counseling of prospective nurses before they commence any work involving cytotoxic drugs and related waste.

Nurses should take safety measures on personal and environment protection during chemotherapy preparation and administration.

Safety measures to be taken by nurses are as follows

I. Personal safety to minimize exposure via inhalation

- Chemotherapeutic agents should be prepared in a class II biologic safety cabinet (vertical laminar flow hood).
- Vent vials with filter needle to equalize the internal pressure or use negative – pressure techniques.
- Wrap gauze or alcohol pads around the neck of ampules when opening to decrease droplet contamination
- Wrap gauze or alcohol pads around injection sites when removing syringes or needles from IV injection ports.
- Do not dispose materials by clipping needles or removing needles from syringes
- Use puncture and leak proof containers for non – capped, non – clipped needles.

II. Personal safety to minimize exposure via skin contact:

- Wear powder free latex gloves with at least .007" thickness at all times when preparing

or working with chemotherapeutic agents (Williams & Wilkins, 2010). Individuals with latex allergies should use gloves made from nitrile or double glove with polyvinylchloride (PVC) gloves. Gloves manufacture of latex and nitrile materials are now manufactured in greater thickness and offer more protection.

- Wash hands before putting on and after removing gloves
- Change latex gloves after each use, tear, puncture, or medication spill or after every 30 minutes of wear.
- Wear a long – sleeve, nonabsorbent gown with elastic at the wrists and back closure.
- Eye and face shields should be worn if splashes are likely to occur.
- Use syringes and IV tubing with Luer locks (which have a locking device to hold needle firmly in place).
- Label all syringes and IV tubing containing chemotherapeutic agents as hazardous material.
- Place an absorbent pad directly under the injection site to absorb any accidental spillage.
- If any contact with the skin occurs, immediately wash the area thoroughly with soap and water.
- If contact is made with the eye, immediately flush the eye with water and seek medical attention.
- Spill kits should be available in all areas where chemotherapy is stored, prepared, and administered.

III. Personal Safety to Minimize Exposure Via Ingestion

- Do not eat, drink, chew gum, or smoke while preparing or handling chemotherapy.
- Keep all food and drink away from preparation area.
- Wash hands before and after handling chemotherapy.
- Avoid hand- to mouth or hand –to –eye contact while handling chemotherapeutic agents

or body fluids of the person receiving chemotherapy.

IV. Safe Disposal of Antineoplastic Agents, Body Fluids, and Excreta:

- Discard gloves and gown into a leak-proof container which should be marked as contaminated or hazardous waste.
- Use puncture and leak – proof containers for needles and other sharp or breakable objects.
- Linens contaminated with chemotherapy or excreta from patients who have received chemotherapy within 48 hours should be contained in specially marked hazardous waste bags.
- Wear latex gloves for disposing of body excreta and handling soiled linens within 48 hours of chemotherapy administration.
- In the home, wear gloves when handling bed linens or clothing contaminate with chemotherapy or patient excreta within 48 hours of chemotherapy administration. Place linens in a separate, washable pillow case. Wash separately in hot water and regular detergent.

V. Safe Management of Spills of Chemotherapy:

- Spills of chemotherapeutic agent should be cleaned up immediately by taking special precautions regardless of its amount, Spill management should be done by trained staff by using personal protective equipments and split kit.

Conclusion

Chemotherapy drugs have potentially serious adverse effects for nurses involved with preparation and administration. While not all of the dangers can be completely eliminated, steps can be taken

to prevent exposure. Understanding these dangers and implementing preventative

measures are crucial to ensuring protection against potential short- and long-term consequences.

Proper disposal is paramount in preventing unwanted environmental contamination. All waste containing chemotherapy (e.g., PPE, vials, syringes, and tubing) should be placed in specialized hazardous waste containers, and PPE should be worn by all personnel coming in contact with chemotherapy and the containers.

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