

Chemotherapeutic Drugs

Miss. Madhu Rajput¹, Mr. Raghavendran M²

¹Affiliation of M.Sc. Nursing, ²Associate Professor HOD, Department of Medical Surgical Nursing,
^{1,2}Rama College of Nursing, Rama University, Kanpur, Uttar Pradesh, India

ABSTRACT

Cancer is describes as the disease that results due to cellular changes and these changes cause the uncontrolled growth and division of cells. A cell receives instructions to die so that the body can replace it with a newer cell that functions better. Cancerous cells lack the components that instruct them to stop dividing and to die. Chemotherapeutic drugs (CDs) are the most widespread worldwide modality used in cancer treatment, and other autoimmune diseases. However, their non-selective mechanism of action affects both cancerous and non-cancerous cells, that resulting in well documented side effects. Nurses are at risk of suffering side effects. Little negligence or mistake may lead to adverse unpleasant effects for patients, staff and environment.

KEYWORDS: Chemotherapeutic agents, Safety measures, Staff nurse

INTRODUCTION

Non-Communicable Disease (NCD): (WHO, 2011) also known as chronic diseases, are not passed from person to person. They are of long duration and generally slow progression. Chronic conditions are characterized by the following: – Do not result from an (acute) infectious process – Are “not communicable” – Cause premature morbidity, dysfunction, and reduced quality of life – Usually develop and progress over long periods – Often initially insidious – Once manifested there is usually a protracted period of impaired health. Types of Non communicable disease. Cardiovascular disease (Coronary heart disease, Stroke) • Cancer • Chronic lung disease • Diabetes • Chronic neurologic disorders (Alzheimer’s, dementias) • Arthritis/Musculoskeletal diseases

Cancer is a broad term. It describes the disease that results when cellular changes cause the uncontrolled growth and division of cells. Some types of cancer cause rapid cell growth, while others cause cells to grow and divide at a slower rate. Certain forms of cancer result in visible growths called tumors, while others, such as leukemia, do not. Most of the body’s cells have specific functions and fixed life spans. While it may sound like a bad thing, cell death is part

How to cite this paper: Miss. Madhu Rajput | Mr. Raghavendran M "Chemotherapeutic Drugs" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-5, August 2021, pp.983-986, URL: www.ijtsrd.com/papers/ijtsrd43941.pdf



Copyright © 2021 by author (s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



of a natural and beneficial phenomenon called apoptosis. A cell receives instructions to die so that the body can replace it with a newer cell that functions better. Cancerous cells lack the components that instruct them to stop dividing and to die. They build up in the body, using oxygen and nutrients that would usually nourish other cells. Cancerous cells can form tumors, impair the immune system and cause other changes that prevent the body from functioning regularly. Cancerous cells may appear in one area, then spread via the lymph nodes. These are clusters of immune cells located throughout the body.

Chemotherapy drugs:-

Chemotherapy drugs:-Chemotherapy is a drug treatment that uses powerful chemicals to kill fast-growing cells in your body. Chemotherapy is most often used to treat cancer, since cancer cells grow and multiply much more quickly than most cells in the body. Chemotherapy drugs can be used alone or in combination to treat a wide variety of cancers. Though chemotherapy is an effective way to treat many types of cancer, chemotherapy treatment also carries a risk of side effects. Some chemotherapy side effects are mild and treatable.

Classification:-

- Cell Cycle Specific: mostly affect the S phase & some the M phase. Administered in minimal concentrations by continuous dosing routes.
- Cell Cycle Non-Specific: affects dividing and resting cells in all phases of the cell cycle. Administered in single bolus injection.
- Combination: agents that differ in both cell cycle specificity & their toxicities are combined to maximize tumor cell kill with minimal toxicity. Administered in repeated courses.

Major Chemo Classifications

1. Cell Cycle Specific:

- Antimetabolites-interfere DNA synthesis, S Phase(5FU, MTX ,folic acid)
- Vinca Alkaloids- inhibits spindle formation during mitosis(Vincristine)

2. Cell cycle Non Specific:

- Alkylating- alter DNA (nitrogen mustard, busulfan)
- Antitumor Antibodies DNA & RNA distort
- (Bleomycin)
- Hormonal Agents-
- bind to receptor sites that promote growth
- (Tomoxifen)

Alkylating agents

Alkylating agents are the oldest and most commonly used class of chemotherapy drugs, and work by directly damaging DNA and preventing cancer cells from reproducing. They are used to treat a wide variety of cancers, but have the greatest effect on those that are slow-growing. They are cell-cycle phase non-specific, meaning that they kill cancer cells in any phase of the cell cycle. Some examples of alkylating agents are carboplatin, cisplatin and oxaliplatin.

Alter DNA structure by misreading DNA code, initiating breaks in the DNA molecule, cross-linking DNA strands. Side effects: bone marrow suppression, nausea, vomiting, cystitis (cyclophosphamide, ifosamide), stomatitis, alopecia, gonadal suppression, renal toxicity.

Antimetabolites

Antimetabolites are chemotherapy drugs that interfere with DNA and RNA growth. They are cell-cycle specific, meaning that they kill cancer cells in a specific phase of cell division. Some examples of antimetabolites are capecitabine, gemcitabine, and pemetrexed (Alimta). Interferes with the biosynthesis of metabolites or nucleic acids necessary for RNA and DNA synthesis. Side effects: nausea, vomiting, diarrhea, bone marrow suppression, stomatitis, renal toxicity.

Anthracyclines

Anthracyclines are anti-tumor antibiotics that interfere with enzymes necessary for DNA replication. They are cell-cycle non-specific, and are used to treat a variety of cancers. Some examples of anthracyclines are bleomycin, doxorubicin and mitomycin-C.

Plant Alkaloids

Plant alkaloids are derived from certain types of plants found in nature, and inhibit or prevent mitosis or inhibit enzymes from making proteins necessary for cell reproduction. Most plant alkaloids are cell-cycle specific, but can cause damage in all phases. Some examples of plant alkaloids are the taxanes, docetaxel and paclitaxel, and the vinca alkaloids, vinblastine, vincristine and vinorelbine.

Nitrosoureas

Carmustine, lomustine, semustine, streptozocin similar to the alkylating agents cross the blood-brain barrier

Topoisomerase Inhibitors

Irinotecan (camptosar), topotecan (hycamtin)

Mitotic spindle poisons

Plant alkaloids: etoposide (toposar), teniposide (vumon)

Taxanes: paclitaxel (taxol), docetaxel (taxotere)

Hormonal agents

Androgens and antiandrogens, estrogens and antiestrogens, progestins and antiprogestins,

Miscellaneous agents

Asparaginase (Elspar), procabazine (matulane)

Common side effects:-

Common side effects of chemotherapy drugs include: Nausea, Vomiting, Diarrhea, Hair loss, Loss of appetite, Fatigue, Fever, Mouth sores, Pain, Constipation, Easy bruising, Bleeding.

Safe handling of chemotherapy drugs

- Chemotherapy infusions. Chemotherapy is most often given as an infusion into a vein (intravenously). The drugs can be given by inserting a tube with a needle into a vein in your arm or into a device in a vein in your chest.
- Chemotherapy pills. Some chemotherapy drugs can be taken in pill or capsule form.
- Chemotherapy shots. Chemotherapy drugs can be injected with a needle, just as you would receive a shot.
- Chemotherapy creams. Creams or gels containing chemotherapy drugs can be applied to the skin to treat certain types of skin cancer.

- Chemotherapy drugs used to treat one area of the body. Chemotherapy drugs can be given directly to one area of the body. For instance, chemotherapy drugs can be given directly in the abdomen (intraperitoneal chemotherapy), chest cavity (intrapleural chemotherapy) or central nervous system (intrathecal chemotherapy). Chemotherapy can also be given through the urethra into the bladder (intravesical chemotherapy).
- Chemotherapy given directly to the cancer. Chemotherapy can be given directly to the cancer or, after surgery, where the cancer once was. As an example, thin disk-shaped wafers containing chemotherapy drugs can be placed near a tumor during surgery. The wafers break down over time, releasing chemotherapy drugs. Chemotherapy drugs may also be injected into a vein or artery that directly feeds a tumor.

Drugs administration:

Wear protective equipment, inform patients that drugs are harmful to normal cells, administer drugs in safe and unhurried environment, Place absorbent pad under the tubing during administration to catch leakage .do not dispose of any supplies or unused drugs in patient care areas.

Disposal of supplies and unused drugs:

Do not clip or recap needle or break needles, place all supplies used intact in a leakproof, punctureproof, place all unused drugs in containers with leak proof, puncture proof and labelled container.

Management of chemotherapy spill:

Spill should be identified with warning sign, drugs spill kit contains.

Procedure for spill on heard surface:

Restrict area of spill, put on protectivegloves, gown and goggles, open waste disposal bags, place absorbent pad gently on the spill be careful not to touch the spill, cleanse surface with absorbent towel using solution and wipe with clean tap water.

Spill on linen:

Obtain drugs sill kit ,obtain specially marked and approved laundry bag ,remove contaminated linen from patient, put on gloves ,mask and gown, clean contaminated linen should be washed two times in laundry.

Spill on patient:

Immediately remove contaminated protective graments, wash affected skin area with hot water and soap, eye is exposed: food with water for at least five minutes ,follow procedure, notify physician if drug spill on patient.

Nursing responsibility:-

- Provide direct and individualized nursing care to patients based on the application of scientific nursing principles.
- Collects current symptoms, as well as a detailed patient history and then consults and coordinates with health care team members to assess, plan, implement and evaluate patient care plans.
- Manages basic life support needs and stabilizes based upon nursing standards and protocol
- Starting peripheral intravenous lines.
- Maintenance and care of Central or Peripheral Lines including Assessing line site and patency regularly, keeping infection control and prevention as a priority
- Administering medications including chemotherapy and fluid therapy.
- Safely monitor patients throughout infusion therapy.
- Reports adverse reactions to medications or treatments in accordance with the policy regarding the administration of medications.
- Monitor the patient's response to treatment throughout therapy
- Educate patients and significant others on possible side effects/ adverse effects of therapy, and signs and symptoms of infection to report
- Displays professionalism while completing multiple urgent tasks in a timely manner
- Records all care information concisely, accurately and completely, in a timely manner, in the appropriate format and on the appropriate forms

References:

- [1] https://en.wikipedia.org/wiki/Non-communicable_disease
- [2] <https://en.wikipedia.org/wiki/Cancer>.
- [3] https://www.cancervic.org.au/cancer-information/treatments/treatments-types/chemotherapy/side_effects_of_chemotherapy.
- [4] <https://www.mayoclinic.org/tests-procedures/cancer-treatment>.
- [5] Bouraoui S, Brahem A, Tabka F, Mrizek N, Saad A, et al. (2011) Assessment of chromosomal aberrations, micronuclei and proliferation rate index in peripheral lymphocytes from Tunisian nurses handling

- cytotoxic drugs. *Environ ToxicolPharmacol* 31(1): 250-257.
- [6] <https://www.mayoclinic.org/wiki/chemotherapy>.
- [7] <https://www.healthline.com<health>chemotherapy>.
- [8] Polovich M. Safe handling of hazardous drugs. *Online J Issues Nurs* 2004; 9(3): Manuscript 5 Available from: www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume92004/No3Sept04/HazardousDrugs.aspx
- [9] Rizalar S, Tural E, Altay B. Nurses' protective measures during chemotherapy preparation and administration in Turkey. *Int J NursPract* 2012 Feb; 18(1):91-98.
- [10] Polovich M, Clark PC. Duke oncology network. Durham, NC, USA. Factors influencing oncology nurses' use of hazardous drug safe-handling precautions. *OncolNurs Forum* 2012 May 1; 39(3): E299-E309.
- [11] Jezewski MA. Chemotherapy-handling practices. *OncolNurs Forum* 2006 Jul-Aug; 42(4):276-280.
- [12] Kosgeroglu N, Ayranci U, Ozerdogan N, Demirustu C. Turkish nurses' – information about, and administration of, chemotherapeutic drugs. *J ClinNurs* 2006 Sep; 15(9):1179-1187.
- [13] Martin S, Larson E. Chemotherapy-handling practices of outpatient and office-based oncology nurses. *OncolNurs Forum* 2003; 30(4):575-581.
- [14] Brown CG, Yates P, Dewar et al. Educational certification of chemotherapy administration.

