

Managing Chemotherapy Side Effects

Chemotherapy or “chemo” medications may cure cancer, decrease relapse rates, and shrink tumors that cause pain and other symptoms (National Cancer Institute [NCI], 2022). It achieves this by halting or slowing the division of fast-growing cancer cells. However, chemotherapy also affects normal cells that divide quickly throughout the body and as a result, may lead to numerous side effects.

Normal cells that are typically affected by chemotherapy include (American Cancer Society [ACS], 2020):

- Blood-forming cells in the bone marrow
- Hair follicles
- Oral, gastrointestinal (GI), skin, and reproductive cells
- Cells of major organs such as the heart, kidney, bladder, lungs, and nervous system

Side effects can range in severity from unpleasant to life threatening (e.g., severe infection) and must be weighed against the need to treat the cancer. Common side effects are outlined in the table below.

Managing Side Effects of Chemotherapy (ACS, 2024; NCI, 2022; NCI, n.d.; Lustberg, 2024)		
Side Effect	Cause	Management/Treatment/Patient Education
Anemia	<ul style="list-style-type: none"> • Low red blood cell (RBC) production in the bone marrow 	<ul style="list-style-type: none"> • Encourage patient to: <ul style="list-style-type: none"> ○ Rest between activities. ○ Eat foods high in protein and iron. • Treatment options vary by degree of anemia and etiology and may include: <ul style="list-style-type: none"> ○ Iron supplementation ○ Red blood cell transfusion • Administer erythropoietin-stimulating agents (ESAs) to foster production of RBCs but may increase risk for thromboembolism.
Appetite changes	<ul style="list-style-type: none"> • Mouth and throat sores • Change in sense of taste or smell • Nausea and vomiting 	<ul style="list-style-type: none"> • Advise patient to: <ul style="list-style-type: none"> ▪ Maintain adequate hydration. ▪ Eat a healthy, high-nutrient diet. ▪ Exercise regularly. • Treat oropharyngeal sores. • Provide adequate mouth care.
Bleeding and bruising	<ul style="list-style-type: none"> • Thrombocytopenia 	<ul style="list-style-type: none"> • Instruct patient to: <ul style="list-style-type: none"> ▪ Avoid aspirin or ibuprofen. ▪ Brush teeth gently with a soft toothbrush. ▪ Use an electric shaver; avoid razors.
Constipation	<ul style="list-style-type: none"> • Medications such as opioids • Changes in diet 	<ul style="list-style-type: none"> • Encourage patient to: <ul style="list-style-type: none"> ▪ Eat high fiber foods. ▪ Increase fluid intake. ▪ Increase activity.

		<ul style="list-style-type: none"> Administer stool softeners and/or laxatives as needed.
Dehydration	<ul style="list-style-type: none"> Appetite changes Nausea and vomiting Diarrhea 	<ul style="list-style-type: none"> Instruct patient to increase fluid intake. Administer intravenous (IV) fluids as needed. Manage nausea, vomiting, and diarrhea (see recommendations below).
Diarrhea	<ul style="list-style-type: none"> Chemotherapy effect on the smooth muscles in the GI tract and damage to cells lining the GI tract Infection 	<ul style="list-style-type: none"> Advise the patient to: <ul style="list-style-type: none"> Try the BRAT diet (bananas, rice, applesauce, toast). Avoid milk, alcohol, caffeine, fatty, spicy, and high fiber foods. Eat small, frequent meals. Increase fluid intake (8-12 cups/day) Seek medical attention for refractory dehydration. Administer antidiarrheal medication as needed.
Edema	<ul style="list-style-type: none"> Fluid build-up in the tissues due to chemotherapy or heart, liver, or kidney failure Poor nutrition Blockage of veins or the lymph system 	<ul style="list-style-type: none"> Educate patient to: <ul style="list-style-type: none"> Avoid tight clothing and shoes. Avoid crossing legs when sitting. Wear compression stockings and sleeves as needed. Exercise regularly. Limit salt intake. Administer diuretics for severe swelling.
Fatigue	<ul style="list-style-type: none"> Chemotherapy-induced anemia Vasomotor symptoms that result in sleep difficulties Depression 	<ul style="list-style-type: none"> Advise patient: <ul style="list-style-type: none"> Fatigue typically resolves when chemotherapy is discontinued. To rest between activities. To eat foods high in protein and iron. Assess for anemia, pain, depression, hypoxia, or fluid/electrolyte imbalances.
Flu-like symptoms	<ul style="list-style-type: none"> Some types of chemotherapy can cause flu-like symptoms within a few hours after treatment and may last for 2 to 3 days. 	<ul style="list-style-type: none"> Instruct patient to: <ul style="list-style-type: none"> Hydrate to treat diarrhea. Increase calories and protein. Medicate for chills or body aches; contact provider before medicating to lower a fever. Manage nausea and vomiting (see below).
Hair loss (alopecia)	<ul style="list-style-type: none"> Some types of chemotherapy cause hair to fall out. May begin after the second or third cycle of treatment 	<ul style="list-style-type: none"> Reassure the patient that hair often grows back in 2 to 3 months after treatment has ended. Advise patient to: <ul style="list-style-type: none"> Treat hair gently: use a soft brush; avoid hair dryers, irons, gels, clips; use a mild shampoo and wash less frequently. Apply sunscreen or a hat when outside. Wear head wraps and/or wigs.

		<ul style="list-style-type: none"> Recommend scalp cooling devices; for some patients, when used before, during and after treatment, they may reduce or prevent hair loss.
Hepatotoxicity	<ul style="list-style-type: none"> Elevated bilirubin, alkaline phosphatase (ALK), aspartate transaminase (AST), and alanine transaminase (ALT) levels may result from chemotherapy. 	<ul style="list-style-type: none"> Usually mild Treatment may not be needed, instead adjust dose. If severe, discontinue treatment.
Infection	<ul style="list-style-type: none"> Chemotherapy may decrease white blood cell production leading to neutropenia which increases risk of infection. Neutropenia may occur 10 to 14 days after each cycle and typically resolves prior to the next chemotherapy treatment. 	<ul style="list-style-type: none"> Monitor for signs of infection (fever, cough, sore throat, pain, rash, sores on mouth or tongue, swelling, redness). Educate patient to: <ul style="list-style-type: none"> Practice good hand hygiene. Avoid crowds, people who are sick, and people who recently received a live vaccine. Use a mask when out in public. Follow food safety guidelines.
Memory or concentration changes	<ul style="list-style-type: none"> Exact cause is unknown. Symptoms include forgetfulness, difficulty concentrating, memory issues, trouble multi-tasking or remembering common words. 	<ul style="list-style-type: none"> Advise patient to: <ul style="list-style-type: none"> Exercise the brain with puzzles or take a class to learn something new. Maintain adequate rest and sleep. Participate in regular physical activity. Follow a daily routine Use planners or smart phone applications to set reminders and stay organized.
Mouth and throat problems	<ul style="list-style-type: none"> Chemotherapy may cause a chemical or metallic taste, a change in taste or smell, dry mouth, infections, mouth sores, pain/swelling, sensitivity to hot or cold, dysphagia, cavities, and mucositis. Low platelet count may cause bleeding in the mouth/gums. 	<ul style="list-style-type: none"> Instruct patient to: <ul style="list-style-type: none"> Schedule a dental check-up and cleaning before treatment begins. Maintain good oral hygiene. Swish ice chips around mouth for 30 minutes (may alleviate inflammation and soothe sores). Apply topical diphenhydramine, oral antacids and lidocaine (may relieve symptoms).
Myalgias (muscle pain); arthralgias (joint pain)	<ul style="list-style-type: none"> Muscle and joint pain are associated with chemotherapy drugs such as biologic therapies and growth factors Blood infections can cause muscle aches and fever. 	<ul style="list-style-type: none"> Reassure patient that these symptoms typically resolve when treatment is stopped. Administer medications that alleviate symptoms: <ul style="list-style-type: none"> Nonsteroidal anti-inflammatory drugs (NSAIDs) Gabapentin Glutamine Antihistamines

<p>Nausea and vomiting</p>	<ul style="list-style-type: none"> • Symptoms vary from mild, moderate, or severe depending on the regimen. 	<ul style="list-style-type: none"> • Administer antiemetics/anti-nausea medications as prescribed. • Instruct patient to: <ul style="list-style-type: none"> ▪ Use ice, popsicles, or hard candy to alleviate symptoms during chemo. ▪ Increase fluid intake but avoid drinking with meals, and avoid greasy, fried, sweet, or spicy food. ▪ Sit up for 2 hours after eating. ▪ Avoid strong odors, caffeine, and smoking during therapy.
<p>Peripheral neuropathy</p>	<ul style="list-style-type: none"> • Chemotherapy-induced peripheral neuropathy (CIPN) may cause nerve damage and symptoms such as pain, numbness, weakness, burning, tingling, or unusual sensation in arms and legs. 	<ul style="list-style-type: none"> • Assure patient that symptoms usually resolve after treatment is discontinued. • Administer duloxetine or agent specific to neuropathic pain as prescribed to treat chemotherapy-induced neuropathy.
<p>Pulmonary toxicity</p>	<ul style="list-style-type: none"> • Some medications may cause pneumonitis which leads to dyspnea, cough, malaise, or fever. 	<ul style="list-style-type: none"> • Assure patient that most symptoms resolve after treatment is discontinued. • Administer as needed and prescribed: <ul style="list-style-type: none"> ▪ Oxygen therapy ▪ Glucocorticoids (severe cases)
<p>Sexual health and fertility issues in men</p>	<ul style="list-style-type: none"> • Chemotherapy may lower testosterone levels and libido. • Traces of chemotherapy may be found in semen after treatment. • Chemotherapy can damage sperm in men and germ cells in boys. 	<ul style="list-style-type: none"> • Discuss with patient: <ul style="list-style-type: none"> ▪ Medications and procedures available to treat erectile dysfunction ▪ Fertility preservation options (sperm banking) • Advise patient to use condoms to prevent partner exposure to chemotherapy in semen. • Refer patient to support groups or counseling.
<p>Sexual health and fertility issues in women</p>	<ul style="list-style-type: none"> • Chemotherapy may lower estrogen levels and affect ovarian function causing hot flashes, irregular or no periods, and vaginal dryness that can cause painful intercourse. • Chemotherapy may affect vaginal tissue and cause sores. • Chemotherapy can stop ovaries from releasing eggs and estrogen or lower the 	<ul style="list-style-type: none"> • Discuss with patient: <ul style="list-style-type: none"> ▪ Medications to decrease pain during intercourse (e.g., vaginal gels, creams, lubricants) ▪ Fertility preservation options (egg or embryo cryopreservation) ▪ Condom use to prevent partner exposure to chemotherapy in vaginal fluids • Educate patient to perform Kegel pelvic muscle exercises. • Refer patient to support groups or counseling. • Administer non-estrogen treatments: gabapentin, selective serotonin reuptake inhibitors (SSRI) and

	number of eggs in the ovaries.	selective serotonin norepinephrine reuptake inhibitors (SSNRIs) as prescribed.
Skin and nail changes	<ul style="list-style-type: none"> • Very common with chemotherapy • Cause is unknown but there may be a toxic or allergic etiology. • Severity and duration of allergic skin reactions may be independent of dose and may persist after the drug has been discontinued. 	<ul style="list-style-type: none"> • For dry, itchy, red skin, instruct patient to: <ul style="list-style-type: none"> ▪ Use mild soap, lotions, and creams. ▪ Avoid products with alcohol or perfume. ▪ Apply lotion after bathing. ▪ Avoid hot water. ▪ Keep home temperature cool and humid. • Educate patient to: <ul style="list-style-type: none"> ▪ Seek medical attention for rash to rule out an allergic reaction. ▪ Always use sunscreen when outdoors due to increased susceptibility to sunburn. ▪ Keep nails clean and trimmed, and wear protective gloves for gardening and house cleaning. • Administer anti-pruritic medications as needed.
Urinary and bladder problems	<ul style="list-style-type: none"> • Chemotherapy may affect or damage the bladder and kidneys. • Chemotherapy can cause a change in the color or smell of urine. 	<ul style="list-style-type: none"> • Monitor for signs of urinary tract infection: pain, burning on urination, red or cloudy urine, fever, back or abdominal pain, inability to urinate. • Advise patient to drink a minimum of 8 cups of fluid each day and avoid caffeine, alcohol, and tobacco.
Weight gain	<ul style="list-style-type: none"> • Chemotherapy may induce hormonal changes and alter adipose tissue causing insulin resistance. • Chemotherapy-related edema may increase weight. 	<ul style="list-style-type: none"> • Instruct patient to: <ul style="list-style-type: none"> ▪ Eat a proper diet. ▪ Maintain regular physical activity. ▪ Avoid salt intake and high-calorie foods. • Refer patient to a nutritionist, as indicated.
Weight loss	<ul style="list-style-type: none"> • Poor appetite • Mouth sores, bleeding • Dysphagia • Change in sense of taste, smell • Diarrhea • Vomiting • Dehydration 	<ul style="list-style-type: none"> • Advise patient to: <ul style="list-style-type: none"> ▪ Eat high-calorie and high-protein foods and snacks. ▪ Use liquid food supplements, as needed. ▪ Maintain adequate hydration. • Administer antiemetics and antidiarrheals as needed. • Refer patient to a nutritionist, as indicated.

References:

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