Disaster Nursing in a Ubiquitous Society

Care Package for Cancer Patients In Times of Disaster :Series③

Handbook of Self-Managing Side Effects of Chemotherapy in Times of Disaster

— How to Deal with Infections, Bleeding and/or Anemia —

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Graduate School of Nursing Art and Science / Research Institute of Nursing Care for People and Community (RINCPC)
The 21st Century Center of Excellence Program

< Cancer Nursing Care Development Project >
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**Introduction**

Chemotherapy mainly refers to the treatment of administering orally or intravenously. Methods of chemotherapy have advanced greatly, and its curing effects have also improved much, due to the development of new drugs, supportive psychotherapy, and standard therapy. However, cancer drugs still cannot work selectively on cancer cells only, and they still damage normal cells along with the bad ones. This is the side effect of chemotherapy; myelotoxicity, the slowdown of bone marrow function to produce white blood cells, red blood cells and plasma cells, is caused by almost all anticancer drugs.

A patient hardly realizes that s/he has the myelotoxicity, unless s/he suffers such complications as infections and bleeding. However, once complications occur, the patient will fall into a critical condition and be vitally at risk. If this happens, the patient will be exhausted not only physically but also mentally, which may negatively affect the continuation of cancer treatment.

If you suffer the complications, you could become afraid of going out, due to the fear of infection, or feel forced to lead a restricted daily life for fear of bleeding. These mental changes are quite normal for everyone. However, if such changes do not go away but continue for some time, you should consult a medical expert at the earliest stage, to relax yourself and take appropriate preventive measures.

You can prevent yourself from falling into a critical condition by discovering complications early, and responding to them appropriately. In particular, chemotherapy outpatients should observe their physical changes carefully at home, and look for any subjective symptoms early, to enable quick response to them. This handbook contains self-check sheets to fill in the values of your test data and subjective symptoms. The handbook also explains about myelotoxicity, states the signs and points of attention of leukopenia (decrease in white blood cells), thrombocytopenia (decrease in platelets), and anemia, and provides how to respond to them.
At the same time, this handbook advises on what to prepare for a disaster and what cares to take for living at a shelter should you experience a disaster while you are undergoing chemotherapy. In times of disaster, you will probably not be able to take infection control that you are used to taking in your daily life. Supplies will also run short on disaster occasions. Therefore, it is important that you prepare your requirements for disaster in advance, and think up any possible measures available at a shelter.
Self-Check List

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- Day when anticancer drugs were administered: 

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1. What is myelotoxicity?

Myelotoxicity refers to a state where a patient suffers infections (and fever) due to a decrease in white blood cells and neutrophils, easily bleeds due to a decrease in platelets, and/or anemia due to a decrease in red blood cells. Bone marrow is a vital production factory in the human body, where red blood cells, white blood cells and platelets are produced. Bone marrow is one of the body parts with quick-growing cells, and exists at the center of bones; it is frequently found in the skull, breastbones, ribs, spines, and pelvis. These parts store blood cells until they are mature enough and ready to fulfill their important tasks.

Chemotherapy works on bone marrow cells that multiply quickly. Once chemotherapy starts, therefore, the bone marrow function to produce red blood cells, white blood cells and platelets is inhibited. Myelotoxicity leads to the symptoms of leukopenia, thrombocytopenia, or anemia, which signifies a decrease in white blood cells, platelets, and red blood cells, respectively.

Concerning chemotherapy, the term "nadir" (the lowest point) refers to the state where the bodily blood cell counts become the lowest. The nadir is identified by the drugs used in the chemotherapy, and is predictable. For example, with drug A, you will experience the nadir between 7 and 14 days after administration. This means that your white blood cell, red blood cell and platelet counts hit their lowest levels between 7 and 14 days after the start of chemotherapy. After the nadir, your blood cell counts will gradually return to their normal values. Because the position of the nadir differs by treatment and timeline, be sure to confirm on when this point is with your doctor or nurses.
Figure 1. Neutropenia. Adapted from Watanabe et al. (2002)
2. Leukopenia

White blood cells protect your body from invasion by harmful substances from outside (bad microbes, etc.). Chemotherapy drugs destroy not only cancer cells, but also healthy white blood cells that are necessary for fighting infections. As a result, your resistance to infection goes down. The normal range of white blood cell count for adults is approximately between 2,000 and 8,000 /µl.

The white blood cell count starts to decrease 2 to 3 days after the treatment, and comes to a nadir between 7 and 14 days. If your white blood cell count drops, you become more vulnerable to infections, and are more likely to suffer stomatitis, bronchitis, diarrhea, suppuration (formation or discharge of pus), and fever. If the count stays above 2,000 during the treatment, you will likely be safe from infections. However, since your overall physical condition also includes the risk of infection, your doctor or nurses may tell you a different value for your attention.

Table 1. Cares to take when your white blood cell count is low

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<tr>
<th>WBC: below 2,000</th>
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<td>• Wash your hands before and after meals, after excretion, before and after going outside, etc. Wear a mask.</td>
<td>• Gargle after you get up, before and after meals, and before you go to bed.</td>
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<td>• Refrain from going outside, and avoid crowds. If you continue working, shift your working hours.</td>
<td>• Eat digestible, well-boiled foods, as much as you can. Be careful with hot things or fish bones, so that you won’t burn or scratch inside your mouth. Try to wear gloves when you cook.</td>
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<td>• Don’t take long baths. You can wipe your body or take a shower instead, to save your energy. Keep the bathroom warm.</td>
<td>• You may need injections of a drug to increase white blood cells. (If you have a fever, you may also need to take antibiotics.)</td>
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<td>• Be sure to brush teeth after meals to prevent infection. Use a soft toothbrush and brush gently so as not to scratch inside your mouth during the treatment period.</td>
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You can easily become infected when you are undergoing chemotherapy. This is because the carsinostatic also affect the bone marrow, resulting in fewer white blood cells and weaker physical resistance. White blood cells are a very important ingredient of blood and are necessary for fighting infections. If they decrease, you become more at risk of suffering infections inside your mouth, on your skin, in your lungs, rectum, urinary organs, reproductive system (sexual organs), or elsewhere. To identify your condition, your doctor will take your white blood cell count frequently. If it drops too much, s/he may diminish the amount of your anticancer drug, to provide you more resistance so that the treatment can continue. "Neutropenia" refers to the state where the count drops below the normal range.

If the doctor administers an anticancer drug that tends to cause extreme reduction of white blood cells, s/he may prescribe you an injection of a colony-stimulating factor (CSF), which promotes rapid recovery of white blood cells. G-CSF preparation (granulocyte CSF; filgrastim or lenograstim - genetical recombination), and M-CSF preparation (Leukoprol) are now commonly used in most types of chemotherapy. (Marilyn, J. D.,1998; Onishi, Kazuko., 1998)

The following notes will help you prevent infections, and find out early if you have been infected:

1) If the doctor says your white blood cell count is low

\[1\] Notes for times of disaster

What you should prepare in advance:
- Soft toothbrush, masks, hand soap, skincare goods (including buttock tissues), nutritional supplements, drinking water, gloves, disinfectant, lotion or oil, clinical thermometer, etc.

1. When you live with other people at a shelter, try to stay ventilated as much as possible. Masks and frequent gargling will help you prevent infections.
2. If you have to replace bathing with wiping, be sure that you don't get cold. Apply lotion or oil to your skin to avoid drying.
(3) After defecating, use cleaning cotton to keep your anus clean.
(4) Avoid touching broken or sharp things. If you need to, be sure to wear gloves to prevent injury.
(5) If you do get injured, clean or disinfect the area as a quick fix.
(6) Get as much rest as possible to conserve your energy.
(7) Take your temperature at least once a day, and check for signs of infection.
(8) If you have a slight fever of around 37.0°C, take sufficient fluids. If your fever goes up, consult a doctor quickly.

2 Notes for daily life
(1) Wash your hands carefully, especially before and after going to the toilet, and before meals. First, wash with soap and warm water. Make a lather with the soap, and rub your hands together. Rub your palms facing each other forwards and backwards for thorough cleaning. Don’t forget to clean under your nails and between your fingers.
(2) Avoid crowds when you go out, as much as possible.
(3) Gargle after you return home.
(4) Clean your anus after defecating.
(5) Avoid using a rectal thermometer or suppository, because it might make small tears in the anus and allow infectious substances to enter the bloodstream.
(6) When you have sexual intercourse, do it gently, and (for women) use sufficient lubricant to avoid small tears in the vagina.
(7) Avoid getting cuts or scratches. Don’t tear hangnails, nip or crush acne, or injure yourself with scissors or knives. Wear gloves when you use these utensils.
(8) If you get a cut or scratch, wash it with warm water immediately, make it clean with soap, disinfect it with hydrogen peroxide and cover it with a sterilized bandage if it is not deep. Otherwise, and for further information, consult your doctor.
(9) When you shave, use an electric shaver to avoid hurting your skin.
(10) Use soft toothbrushes to avoid hurting your gums and to keep your mouth clean.
(11) Don’t go near anyone having a cold, measles or chicken pox. Also avoid crowds.
(12) When you take a bath, avoid hot water. Take a bath at a mild temperature, every day. After taking a bath, dry yourself by pushing the towel softly on your skin; avoid rough rubbing.

(13) If your heels are dry, care for them with lotion or oil.

(14) When you do gardening or look after an animal, be sure to wear gloves to protect your hands.

(15) Don’t receive any vaccination without prior consultation with your doctor.

(16) Antiperspirants can block the sweat glands and promote infection. Use a liquid deodorant if you need to use one.

(17) If you feel tired, take a rest even in the middle of the day.

(18) Use a sun block, and avoid sunlight as much as you can.

(19) Don’t tear off your cuts with nail cuticles. Use cuticle peeling cream instead.

(20) If you’re a woman, use sanitary napkins instead of tampons to reduce the risk of infection.

(21) To reduce the risk of pneumonia, while you are awake, frequently breathe deeply for several times consecutively to expand your lungs sufficiently.

2) Signs of infection

(1) Fever (37.8°C or over), chills, perspiration

(2) Soft stools three times or more a day, diarrhea (this may appear as a side effect of the chemotherapy itself)

(3) Sense of burning when urinating, frequent urination, blood in the urine

(4) Severe coughing and sore throat

(5) Abnormal increase in leukorrhea, and (for women) itching in the pubes

(6) Rubefaction (increased redness) or swelling around scratches or pimples

(7) Congestion in the eyes, eye mucus

(8) Stomatitis (oral rubefactions and pains)

If you notice any signs of infection, take your temperature every four hours while you are awake.

If you get infected, take approximately 1,800 to 2,800 ml of fluid per day. If you have a heart or kidney disorder, consult the doctor before drinking.

If you see any of the above signs, don’t take painkillers/antipyretics freely, but contact your doctor immediately. Usually, if patients with low white blood cell count get
infected, they should be hospitalized and receive treatment with antibiotics.

3. Thrombocytopenia

Thrombocytopenia refers to a state where bone marrow, which produces blood essences, is affected by anticancer drugs, resulting in a slowdown of its function to produce blood (i.e., myelotoxicity). In this state, new platelets are not produced any longer, and the number of platelets decreases from the normal value of 200,000 to 250,000/µl. This leads to easy bleeding. A person will easily bleed if their platelet count drops below the normal range. If it drops further to below 30,000/µl, many visible bleedings occur in the nose or under the skin (stigmatic dots under the skin, and, if the condition worsens, stigmatic spots), and they are slow to stop.
Treatment with anticancer drugs usually does not end in one or two sessions. It is repeated many times, resulting in the deterioration of the bone marrow’s function to regenerate, and gives rise to severe myelotoxicity in some cases.

Anticancer drugs may sometimes, though not frequently, cause impaired hepatic functioning as well, which inhibits the production of clotting factors in the liver. This also contributes to easy bleeding.

In daily life, patients may suffer hypodermic bleeding simply by hitting their body lightly on an object, or roughly rubbing something on their skin. They may also bleed in the nose by just wiping their nose, or the gums by rubbing them roughly with a toothbrush, or in the anus by hard stools. If platelets diminish further, patients may even bleed in the brain or digestive tract. Following chemotherapy, you may suffer sores in your mouth or digestive tract, bleed in your mouth and find blood in your saliva, or find your stools black with blood from your digestive tract. If you find any such bleeding, go and see your doctor.

You may bleed from the nose if you wipe roughly. wiping
1) Signs of bleeding

(1) It takes more time than usual for bleeding to stop the cut/scratch is minor.
(2) You bleed from between teeth after meals or brushing your teeth.
(3) You find small bleeding dots (stigmatic dots), similar to pricks by needles, in your mouth, on your limbs and on the surface of other body parts. Bruises are caused by subtle impacts, which you normally experience from harder hits.
(4) You often bleed from your nose, and it takes a while for it to stop.
(5) Your urine becomes reddish, and/or stools becomes blackish.

2) If you bleed easily

① Notes for times of disaster

What you should prepare in advance:
- Soft toothbrush, mouthwash, laxative, sterilized gauze or bandages, cooling bags, etc.

(1) Use a soft toothbrush or mouthwash to prevent bleeding from the gums.
(2) If you suffer constipation due to a lack of dietary fiber in life at a shelter, take a laxative instead of straining yourself.
(3) Avoid manual labor such as lifting heavy objects, and ask for help from other people.
(4) Avoid actions with a risk of injury or of hitting your body.
(5) If you need to have medicines prescribed by other doctors, tell them in advance that you are undergoing anticancer drug treatment, and that your platelets may have decreased due to the side effects.
(6) If bleeding from the injured part or bleeding in the nose don’t stop, cool the part with a cooling bag, and consult a doctor immediately.

② Notes for daily life

(1) Use a soft toothbrush. Avoid using dental floss until your blood cell counts return to normal.
(2) If you wear artificial teeth, be sure that they match your mouth so they won’t
stimulate the gums too much.

(3) After taking off your artificial teeth, rinse your mouth with mouthwash that doesn’t contain too much alcohol, otherwise your mouth can get dry and be more liable to bleed.

(4) If you receive dental treatment, consult your doctor in advance.

(5) When you wipe your nose, wipe gently.

(6) Avoid burdensome actions such as lifting heavy objects, or bending your body at the waist.

(7) When you defecate, don’t strain yourself too much. Control your defecation. It is important that you keep the stools soft, and avoid forced defecation (i.e., hard stools), because it may lead to tearing the capillaries around the rectum, and cause hemorrhoids. Straining yourself also raises the blood pressure in the brain, and could cause bleeding there, too. Try to eat digestible foods every day, keep the stools soft, and ensure regular defecation. Laxative may help you.

(8) Avoid any injections unless it is essential. If you have to get an injection, be sure to tell the nurse or doctor that your platelet count is low.

(9) If your blood has been taken, or you’ve had an IV, press the injected part at least five minutes to prevent any bleeding from the needle mark. When your blood is taken, ask the nurse or doctor not to use the avascularization belt (a rubber belt tied around the arm when injecting).

(10) Avoid using aspirin or drugs containing aspirin. When you take a prescribed steroid preparation, be sure to take it with milk, food or antacid (e.g., Maalox).

(11) Take protein-rich foods and beverages, and avoid uncooked vegetables.

(12) Avoid drinking beer, wine or other alcoholic beverages, because they slow down the clotting of blood.

(13) Take sufficient care not to injure your skin (i.e., avoid intense exercise, use of tools and cutlery, electric shavers and nail clippers, gardening, etc.).

(14) Take care not to hit your body against objects, or falling.

(15) Don’t scratch or rub your skin roughly. Don’t bind yourself tightly with clothes, belts or underwear.
(16) Don’t take oral medicines freely, because some painkillers and antipyretics inhibit the clotting function of platelets.
(17) Be sure not to get burned when you use an iron or when you cook. Wear protective gloves when you put your hands in an oven.
(18) Avoid sports that have a risk of getting injured.
(19) Wear thick gloves when you do gardening, or work near thorny plants.
(20) If you’re a woman, use sanitary napkins instead of tampons to reduce the risk of infection.
(21) When you have sexual intercourse, use appropriate lubricant and avoid thrusting hard.

3) How to stop the bleeding

Bleeding may not stop easily following chemotherapy. If you continue to bleed, consult a doctor or nurse quickly.

e.g., nose bleeding, gum bleeding, injuries

(1) Rest your body and mind.
Moving your body promotes bleeding, by increasing the blood flow throughout the body. Lie as still as you can, and rest your body and mind.

(2) Cool the part to stop bleeding.
Cool the bleeding part with a cooling bag or vinyl bag containing ice and water, to contract vessels and stop the bleeding.

(3) Press the part to stop bleeding.
Press the bleeding part tightly to stop the bleeding. This reduces the blood flow to the bleeding part, and promotes clotting of the blood. Also raise the bleeding part a little higher than the heart, to be more effective.

Normally, the bleeding will stop in about five to fifteen minutes, depending on the cause and situation of the bleeding. When you press the part, remember when you started pressing. For example, if you leave the nearer end of your finger bound tightly with a rubber band or something for a long time,
the blood flow may stop and cause irreversible changes to the bleeding part or the nearby area (i.e., necrosis, or the death of cells).

For an injury on your hand or foot, press the part nearest the heart rather than the bleeding part itself. For example, if the tip of your finger is bleeding, press the nearer end of it. If your palm or the back of your hand is bleeding, press your wrist.

(4) Don’t touch the bleeding part directly with your hand. It should be kept clean.

(5) After your nose has stopped bleeding, avoid rough wiping, strong coughs, or other stimulating actions.

(6) Stop any bleeding immediately. If it doesn’t stop, don’t think what to do by yourself, but consult medical guidance at once.
4. Anemia

Anemia is diagnosed by the value of hemoglobin, an important element of blood. The normal range of the value for adults is between 10 and 15 g/dl. The acceptable level for a patient under chemotherapy is a minimum of 10 g/dl.

Normal cells in the bone marrow, which produces blood cells, is easily affected by anticancer drugs, and its blood cell-production capacity tends to go down. Because red blood cells have a relatively long life of 120 days, they are influenced later. Anemia, which is caused by a decrease in red blood cells, starts to appear gradually one or two weeks after starting chemotherapy with anticancer drugs.

Red blood cells deliver oxygen to all parts of the body. If they decrease in number, bodily organs cannot get sufficient oxygen supply, a state called anemia.

< Symptoms when you have anemia >

<table>
<thead>
<tr>
<th>Anemia with hemoglobin up to 70% of the normal range (Hb 9 to 10 g/dl)</th>
<th>You don’t necessarily have any symptoms of anemia. Chronic anemia develops gradually, and you may not have subjective symptoms. Usually, you’ll have a poor complexion, the backs of your eyelids become pale, and the reddishness inside your mouth fades.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia with hemoglobin up to 59% of the normal range (Hb 8 g/dl)</td>
<td>Your heartbeat increases because the heart is required to send out more blood than usual to make up for the decreased oxygen in the body. You might pant or run out of breath with mild exercise.</td>
</tr>
<tr>
<td>Anemia with hemoglobin up to 40% of the normal range (Hb 7 g/dl)</td>
<td>You will suffer headaches, dizziness, ear ringing, reduced concentration, and/or insomnia. You will also get tired easily, or feel cold in the hands and feet, because oxygen isn’t getting everywhere in the body. You may find a lot of difficulty concentrating.</td>
</tr>
<tr>
<td>Anemia with hemoglobin up to 30% of the normal range (Hb 5 to 6 g/dl)</td>
<td>You will lose appetite, have nausea and queasiness, constipation, etc.</td>
</tr>
</tbody>
</table>
The above extents and symptoms of anemia are only shown as a reference. They will differ by age, sex, causes of anemia, and physical conditions.

1) Signs of anemia

- Fatigue
- Poor complexion
- Out of breath
- Faded color inside the mouth
- Cold limbs
- Pale backs of eyelids
- Chest pain
- Headache
- Dizziness

A drop in hemoglobin and/or hematocrit (the mass percentage of blood cells in the blood) values is identified by a blood test. Anemia can be improved by blood transfusion, and the recovery of blood cell counts.

If you find you have any of the above symptoms, inform a doctor or visit a first-aid station. You may need a transfusion.

2) If you have anemia

① Notes for times of disaster

<table>
<thead>
<tr>
<th>What you should prepare in advance:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional supplements (vitamin C, vitamin B12, iron, protein), pocket warmers, prescribed oral medicines (iron), etc.</td>
</tr>
</tbody>
</table>

(1) Strong and rapid moves can cause dizziness. Do only necessary things with sufficient rest.
(2) If anemia has continued long, your metabolism is probably lower because oxygen isn’t getting to all parts of the body. At a shelter, try to maintain your temperature with pocket warmers.
(3) Take vitamins C and B12, iron and protein as nutritional supplements when you cannot take sufficient nutrition at a shelter.
(4) If bleeding doesn’t stop, consult a doctor as soon as possible.
(5) If you have been taking an iron drug, continue taking it.
② Notes for daily life

Daily life
(1) Get sufficient rest and sleep, and don’t do too much. (Take a nap too, if possible.)
(2) Finish important work early in the day, before your energy runs out.
(3) Limit things to do in a day. (Ask for help from others for shopping, childcare, housework, driving, etc.) Do only essential things, and avoid making yourself too busy.
(4) Never do too much. Ask others to do childcare, shopping, housework, driving, etc. for you, whenever possible.
(5) If you stand up or sit up suddenly from a sitting or lying position, you may suffer dizziness. Move slowly.
(6) Avoid rapid movements (e.g., dashing, running up the stairs).
(7) If your nose bleeds, press your nose upward, with your body upright. Cool it with ice if necessary. If the bleeding doesn’t stop in ten minutes or so, go to a first-aid station.
(8) Bleeding may also occur in the bladder or rectum, and cause bloody urine or stools. If this happens, call a doctor immediately. Also keep your body warm, because your metabolism has probably dropped due to the insufficient oxygen supply around the body.
(9) It isn’t only oxygen but also nutrition that doesn’t get throughout the body. Shortage of nutrition reduces your resistance. Wash your hands and gargle frequently.

Meals
(1) Eat regular meals, three times a day.
(2) Eat digestible foods to minimize burden on

the stomach and intestines.

(3) Eat protein-rich foods.
(4) Eat the five types of food every day, which are eggs, meat, fish, milk and dairy products, and soybean products.
(5) If you suffer iron deficiency anemia, eat more iron-rich foods.
[Examples of iron-rich foods]
Liver, oysters, dried noodles, bonito, shungiku (edible chrysanthemum), spinach, parsley, soba (buckwheat noodles), hijiki (a type of seaweed), shijimi (a type of freshwater clam), prunes, raisins, etc.

(6) Iron is absorbed better in the body when taken with vitamin C. Therefore, you also need to take vitamin C as well every day.

[Examples of vitamin C-rich foods]
Broccoli, lotus root, sweet potatoes, komatsuna (a type of Japanese rape), cauliflower, cabbage, kiwi fruit, lemons, oranges, strawberries, persimmons

(7) Also, vitamin B12 is essential for making healthy red blood cells.

[Examples of vitamin B12-rich foods]
Broccoli, spinach, green asparagus, tomatoes, cauliflower, lettuce, cabbage, onions, carrots, bananas, peanuts, figs, walnuts

(8) Chew well when you eat.

Gastric acid plays an important role in making effective use of iron, protein and other nutrients in foods to produce blood. Gastric acid is contained in gastric juice. If sufficient gastric acid is not secreted, you will lose appetite, and the required nutrients are not thoroughly digested and absorbed. Chewing well promotes the secretion of gastric acid.

3) About iron drugs

In the case of iron deficiency anemia, you need to take iron drugs to make up for the iron shortage. Major oral iron drugs include Slow Fe (ferrous sulfate), Ferrum (ferrous fumarate), and Ferromia (sodium ferrous citrate). Some may suffer nausea, queasiness, diarrhea, etc. when taking iron drugs because they stimulate the
membranes inside the stomach. If you suffer such symptoms, and cannot take the drugs as prescribed, consult your doctor.

Anemia improves in about six weeks if iron drugs are taken properly. However, you should not stop taking them as soon as you feel improvement. Those who are anemic have exhausted all the iron supply in their body, so must continue taking iron drugs until they have built up their iron supply again, and the doctor thinks you have no need to take them any longer. Also get medical checks regularly.

If you cannot take iron drugs orally, or if oral drugs do not turn out to be effective, you can take them by injection.

While you are taking iron drugs, do not drink green tea or coffee for at least one hour after taking the drugs. Iron drugs take around 30 minutes to be absorbed in the body, and the above drinks contain tannin, which inhibits the absorption of iron. While taking an iron drug, you will find your stools to be deep green or black. You don’t need to worry about it, though, because the colors are caused by the iron drug.
Sources


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