

# Nursing Management of Radiation Therapy



**Bimala Shah (Gupta)**  
*MN (Adult Nursing)*  
Assistant Professor  
(MMIHS)

## Abstract

In radiation therapy, mainly ionizing radiation (electromagnetic rays and particles) is used to cure the cancer, as in Hodgkin disease, thyroid carcinomas and cancer of uterine cervix. It may also be used to control malignant disease, and prophylactically to prevent leukemic infiltration to the brain or spinal cord. Clients receiving radiation therapy may have side effects like nausea/vomiting, anemia, thrombocytopenia etc. Nurses those are working in radiation therapy should manage the side effects. Clients and their families often have questions and concerns about radiation therapy safety. To answer questions and allay fears about the effects of radiation on the tumor and on the client's normal tissues and organs, the nurses can explain the procedure for delivering radiation and describe the equipment, the duration of the procedure, the possible need for immobilizing the client during the procedure, and the absence of sensations, including pain, during the procedure. Health team members should follow the principles of time, distance and shielding to minimize exposure of personnel to radiation. Councelling is the most important aspect of the managing the clients receiving radiation therapy.

**Introduction:** Radiation therapy plays a crucial role in the curative and palliative treatment of cancer. It is the use of high- energy radiation (radioactive rays) such as X-ray or Gamma rays

to destroy cancer cells and stop them from growing and multiplying. Approximately 60% of all clients with cancer will be treated with radiation therapy at some point during their illness.

## Types of Radioactive Rays

- *Alpha rays:* Rays which can not penetrate paper and, less powerful.
- *Beta rays:* It has more power to penetrate the material (paper) than alpha rays. But can not penetrate through wood or plastic.
- *Gamma-rays:* Gamma-rays are the most powerful rays. They can not penetrate lead and concrete wall but can penetrate paper, wood, plastic etc.
- *X-rays:* X-rays which have the power to penetrate the paper, wood, plastic and a centimeter thick aluminum sheet. They are used in detecting the condition and situation of the bone and metal inside the body.

## Types of Radiation Therapy

- *Teletherapy:* It is the most commonly used method. The tumor is placed at a

known distance from an external source. Teletherapy can be given by the following ways:

\* Cobalt 60      \* Linear Accelerator  
\* Particle Therapy

- *Brachytherapy*: It is the temporary or permanent placement of a radioactive source either on or within tumor. It can be placed in various sites as:
  - \* Intracavitary                      \* Intraluminal
  - \* Interstitial                      \* Surface mould
- *Radiopharmaceuticals*

### Radiation Dose

Radiation dose is calculated by using the unit-  
Rad 100 Rad=1 Gray (Gy) =100 cGy

## Side Effects and Nursing Management of Radiation Therapy

### General side effects

Regardless of the site of radiotherapy, some effects occur systematically and are common in patients receiving radiotherapy to any sites. They are:

**a. Nausea /Vomiting**: Nausea and vomiting usually occur within the first 6 hours after treatment and may last for 3 to 6 hours.

**b. Anorexia**: Anorexia sometimes is a result of cancer itself but also may be caused of radiation therapy. Contributing factors include inactivity, medication and inability to ingest and digest food

### Management for Anorexia, Nausea/Vomiting

- Provide a small amount and frequent meals.

- Provide low fat, low sugar and easily digested food.
- Discourage in dislike foods.
- Plan dietary modification to minimize nausea and vomiting.
- Using relaxation techniques before and after treatment.
- Intravenous therapy should be maintained if severe nausea and vomiting occur.
- Administer antiemetic drugs before half an hour of meal as ordered.
- Administer appetite stimulants if anorexia is present.
- Monitor intake and output.

**c. Skin Reaction**: Certain skin reaction is normal and expected with radiation therapy. It occurs after 2 weeks of radiation therapy. Skin reaction may range from mild, moderate and severe

**Mild**: light pink to deep and dusky red.

**Moderate**: skin occurs slight edema, dry, itchy and dry desquamation.

**Severe**: skin changes dry desquamation to moist desquamation. Epidural layers of the skin slough, ulceration may arise and bleeding also present.

### Management

- Instruct the patient to protect the skin from irritation and trauma before beginning the radiation therapy.
- Avoid to use cosmetics, lotion and ointments during treatment.
- Cleanse the skin with lukewarm water as needed
- Don't rub the skin with a towel to dry.
- Avoid using soap on the treated area.

- Avoid the use of cornstarch in the folded skin.
- Don't use a razor blade until the treatment over.
- Use electric razor if there is no skin irritation.
- Protect the treated skin from cold, heat and sun light.
- Use an umbrella if head and neck area is treating.
- Only loose fitting cotton clothing should be worn.
- Avoid tight clothing such as bras and belts over the treated area.
- Apply Gention Violet over dry desquamations.
- Normal saline irrigation may be applied to the affected area.
- Apply hydro gel dressing in moist desquamation and sliver sulfadiazine may be applied to the skin.
- Instruct the patient that the skin usually heals within a few weeks or 2 weeks after treatment is completed.

**d. Bone Marrow Suppression:** When large volumes of active bone marrow are treated with radiation, it decreases bone marrow function. If the treatment areas include the pelvis, spine, sternum, ribs and long bones etc, the following side effects may arise due to bone marrow suppression.

### 1. Anemia

The radiotherapy induced anemia may arise during the treatment period. If the hemoglobin level occurs below 10 mg/ dl. The given points have to be followed.

### Management

- Hold the treatment until the hemoglobin will be recovered.
- Transfuse the whole blood as ordered.
- Instruct the patient to intake iron containing diet.
- Provide iron supplementary as ordered.
- Confirm the hemoglobin level before the treatment restart and regular monitor complete blood cells count weekly.

### 2. Thrombocytopenia

When the number of circulating platelets falls below 1,00,000 cells/mm thrombocytopenia becomes clinically significant. It is also mild, moderate and severe.

**Mild:** less than 100,000 cells/mm

**Moderate:** less than 50,000 cells/mm

**Severe:** less than 20,000 cells/mm

### Management

- Assess skin or oral mucous membrane for patches.
- Assess the signs and symptoms of thrombocytopenia.
- Monitor blood count level.
- Avoid use of sharp objects.
- Avoid invasive procedure such as I/M injection.
- Apply direct pressure for 5 minutes to all needle puncture.
- Prevent from constipation.
- Use soft tooth brush and electric razor.
- Avoid NSAIDS.
- Administer platelets as ordered.

### 3. Neutropenia

Reduction in the numbers of circulating neutrophils of less than 1000 of ml. To assess the neutropenia, it is calculated for Absolute Neutrophil Count (ANC).

ANC == (WBC X Neutrophil)/100

### **Risk level**

Normal risk = ANC less than 1500/ml

Moderate risk = ANC less than 1000/ml

Severe risk = ANC less than 500/ml

Extreme risk = ANC less than 100/ml

Short term neutropenia lasts less than a week and long term occur exceeds 1-2 weeks. Nadir (lowest point) occurring 10-14 days after treatment.

### **Management**

- Isolate from the infected area.
- Monitor temperature at least twice a day but blood count regularly.
- Physical assessment, blood culture and chest radiography should be done.
- Administer antibiotic therapy as ordered.
- Practice good personal and skin hygiene especially perineal hygiene.
- Practice for food hygiene with well cooked and boiled.
- Prevent from respiratory infection, trauma, constipation and bed sore.
- Use electric razor.
- Use lubricant jelly during sexual contact.
- Neupogen should be transfuse in severe condition.

### e. **Fatigue**

It may result from the tumor breakdown which releases by products into the blood stream. During radiotherapy, normal tissue also breakdown as well as abnormal tissue resulting fatigue.

### **Management of fatigue**

- Provide rest and assess the length of time and intensity of fatigue.

- Realize that fatigue is expected side effect.
- Instruct to take fluid more than 3000ml per day.
- Maintain optimal nutritional plan.
- Control pain if present.

## **Minimizing the Nurses Exposure to Radiation**

When the nurse works with patient with a radio active plant or systemic radiation, she should anticipate the patient's need and use the fundamental principles of time, distance and shielding to minimize radiation exposure.

**Time:** minimize time spent in close proximity to the patient. Before leaving the patient's room, place personal items within reach of the patient. Encourage the patient to perform self care activities.

**Distance:** maximizing the distance from the radioactive material.

**Shielding:** when appropriate use shielding to decrease exposure to radiation, use lead apron as possible. Don't forget to wear Thermoluminescent dosimeter when the working area is radiation.

## **Counseling the Patient During Radiation Therapy**

Radiation is a localized treatment. Though it is painless and senseless treatment, there may arise some difficulty during the treatment, so the patient undergoing radiotherapy should be counseled well before and during the therapy considering the following points:

- Explain about the radiation therapy that is painless and feeling less and can not be seen. Tell the patient not to worry and that we are ready for his/her care.
- Explain that it is a localized, time consuming and costly treatment.
- Explain about the machine, daily treatment, side effects and counselor visit.
- There is no need for isolation except during radiation exposure time.

### **If Client receiving Radiation therapy has a problem on the skin, s/he has to follow these measures:**

- \* If his/her skin is marked with color dye, do not wash the marks and don't mark by her/him. They are necessary for accurate treatment during treatment over.
- \* If s/he has any objection or concern about the marking, please discuss to the health care team.
- \* Keep the skin dry and exposed to the air when possible.
- \* Gently patted with a powder puff to dry the skin.
- \* Wear loose fitting clothes.
- \* Don't use bras and belt or tight clothes on the treated area.
- \* Don't use adhesive tape including band aids on treated area.
- \* Avoid extreme hot and cold aid like as heating pad, ice pad etc.
- \* Clean the treated area with lukewarm water and dry the soft towel.
- \* Avoid placing any cosmetics into the treating area.

- \* Protect the skin from excessive sun exposure.
- \* Don't shave the skin with razor blade.
- \* As the treatment progress, the physician will prescribe special medication if necessary.

### **\* Post radiation therapy, the client should consider following information about the skin care:**

- The skin changes will usually subside 2-4 weeks after the treatment course is completed.
- The skin may be dry, scaly and slightly darker or lighter than normal after treatment.
- After the treatment has been completed, s/he may wish to apply a moistening lotion or ointment of her/his choice.
- It is permissible to expose the treatment area to limited sun light but it is better to use sunscreen lotion on the area that has been treated.

**\* During treatment,** fatigue may occur due to the body using a lot of energy to fight the cancer and rebuild healthy cells. So s/he may feel tired, weak, malaise or exhausted. It begins during the first week of treatment and may peak in several weeks. It may be worse one to two hours after each treatment. Client **should follow these measures in this condition:**

- S/he has to take rest just before and just after treatment.
- S/he may notice that if s/he doesn't feel tired on the rest days of radiation therapy.
- Ask for assistance in meals, housework, and transportation; don't be afraid to ask health team for help.

- Eat a well balanced diet including vitamin and iron.
- Take more than four liter fluid per day.
- Immediate consult the doctor if s/he has extremely fatigue, shortness of breath and dizziness.
- S/he may have symptoms of frequency of micturation, discomfort and burning sensation on voiding, instruct client to drink sufficient fluids and water and receive treatment with a full bladder because the full bladder helps push small bowel out of the irradiated field.
- \* If client is being treated on the abdomen and pelvis, it may have diarrhea, so take plenty of fluid with oral rehydration solution and inform to health care team.
- \* If client is being treated on the pelvic region on the case of female, the vagina may be dryness and narrow due to tissue irritation decrease on production of mucous.
- \* S/he has to 2-3 times a week sexual contact if possible.
- \* S/he can use additional lubricant such as any jelly for comfort during sexual activities.
- \* Menstruation usually ceases completely by the end of treatment.
- \* Do not expect about the child birth after radiation therapy.
- Don't eat very cold and very hot food.
- Take frequent sips of water to moist the oral cavity.
- If s/he has not diabetic problem, s/he can suck soft sugar or any soft candy.
- If s/he has a serious problem for eating, s/he may consult doctor.
- If hair loss, use of turbans & hats to protect the scalp.
- Wigs can be used to maintain body image.
- \* Due to the radiation side effect, client's blood count may decrease, so s/he has to do blood test weekly as doctors order.
- \* If client is going to treat with combine chemotherapy and radiation therapy, don't forget concurrent chemotherapy day.
- \* If s/he has any problem, consult to medical team and counselor for further planning & treatment.

### **If Client is being treated on the head and neck area, s/he should maintain following**

#### **Measures:**

- Do oral care two hourly and after each meal with soda bicarbonate and clean water.

### **Patient Information after Completion the Radiation Therapy**

**Diet:** Instruct to the patient and visitors to take high protein & high calorie diet.

**Personal hygiene:** Encourage the patient to do daily bath & changes clothes.

**Sexual education:** Sexual contact may assume if she feels comfortable & can use lubricant jelly.

#### **Follow up visit:**

1<sup>st</sup> visit after one month

2<sup>nd</sup> visit after three month

3<sup>rd</sup> visit after 6 month

Then annually

**Family support:** Instruct to family to assist in his/her diet, health care activities and daily living activities as necessary and advice to monitor for delayed effects of radiation.

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\* Thank you\*

