Radioactive Iodine Therapy: Care of In-patients receiving Radioactive Iodine Therapy (I-131) – Clinical Protocol

Site Applicability

All VCH & PHC sites

Practice Level

- RN, LPN: Advanced Skills
  - See Education & Training Requirements (Appendix A)
- Nuclear Medicine Technologist

Need to Know

The specialized *Care of In-Patients Receiving Radioactive Iodine Therapy (I-131) Clinical Protocol* must be followed in order to:

- Ensure the safety of staff, patients, the public and the environment.
- Comply with the Canadian Nuclear Safety Commission (CNSC) regulations and license obligations.

Background

Patients receiving radioactive iodine-131 (I-131) as a treatment for thyroid cancer temporarily emit ionizing radiation and are a source of radioactive contamination. The I-131 administered is excreted mainly in urine, partly in feces, saliva and sweat. After oral administration of the high-dose radioactive iodine (RAI), I-131 patients usually require two to three days of isolation until radiation exposure drops down to a level that minimizes exposure to the public (this depends on the treatment and body response).

Core objectives in managing I-131 radiation risk are to keep levels of exposure as low as reasonably achievable (ALARA). Exposure to nursing staff from these patients has been measured to be well below the annual public exposure limit of 1 milliSievert (1 mSv) as regulated provincially by WorkSafeBC and federally by the Canadian Nuclear Safety Commission (CNSC).

The three concepts recommended by ALARA standards are: time, distance and shielding. Without compromising care, decrease as much as possible the amount of time spent close to the radioactive patient and their body fluids. Distance should be kept from the radioactive patient as much as possible without compromising care, since exposure risk is inversely related to distance. Shielding by lead or concrete blocks radiation emissions, and these materials are used in room construction and free-standing barriers.

Patients admitted for therapy must only stay in designated rooms that have been properly prepared by the nuclear medicine staff. Dedicated therapy room beds must **NOT** be included in automated bed management systems. Designated rooms intermittently used for inpatient therapies must be decommissioned by Nuclear Medicine prior to being used for any other patients. The special procedures outlined here must be followed to prevent unnecessary staff exposures and control contamination. **No pregnant staff, or staff who think they might be pregnant, will be assigned to these patients**.

When providing care for these patients, wear disposable gloves and water-resistant shoe covers to prevent the spread of contamination. A gown and mask with face shield is not normally required unless direct contact or body fluids are involved or reasonably anticipated.

Routine nursing care should be provided as the radiation exposure is very small. See also Assessment & Condition/Disorder Diagnosis.

Definitions (see Appendix B)

Equipment & Supplies

Equipment required in Anteroom/Supply Cart:

- Bucket
- Disposable gloves
- Disposable, water-resistant shoe covers
- Protective gowns (reusable or disposable isolation gown)
- Blue underpads
- Mask with face shield
- Extra linen
- Radiation symbol stickers/tape
- Biohazard labels
- Plastic biohazard bags
- Hospital grade disinfectant wipes
- Radiation Safety Procedures binder

Safety requirements of patient room

Under the guidance of the Nuclear Medicine Site Radiation Safety Officer (SRSO) and RRSO, radiation therapy rooms must be selected, prepared, and managed in compliance with CNSC license requirements so as to limit radiation exposure to adjacent rooms.

- The room is lead lined, or contains portable leaded shielding, or does not share any walls with a regularly occupied room.
- There is a dedicated washroom for the patient.
- Floor and wall materials are washable and easily decontaminated.
- Mattresses and pillows have washable covers.
- A minimum (as required for the expected duration of that patient stay) of equipment and supplies are stocked within the room.
- No Health Authority owned equipment or furniture may be removed from or added to the room without prior approval from Nuclear Medicine.
- A radiation warning sign listing emergency contact information is posted outside the room (typically on the room door) whenever a radioactive thyroid therapy patient or contamination is present.
- Any equipment (e.g. stethoscope/BP cuff) brought into the patient room must not be removed or used for other patients without prior approval from Nuclear Medicine.

Procedure

Assessment & Condition/Disorder Diagnosis

Nurses will complete a full assessment upon admission, including vital signs (temperature, pulse, respirations and blood pressure). After the patient has received radioactive iodine therapy, nurses will complete verbal assessment of patient only unless otherwise ordered by physician, or unless patient condition changes (e.g. patient complains of symptoms including new onset pain or nausea, dizziness; nurse assesses change in skin colour or cognition).

General Patient Care:

1. **Minimize radiation exposure:**
   Without compromising patient care, the most effective way of reducing radiation exposure is to practice the following principles:

   a. **Minimize exposure time:** reduce time spent with patients by planning and working efficiently;
   b. **Maximize distance:** remain as far from patients as possible (for example, speak to the patient from the doorway when not providing direct care).
   c. **Use personal protective equipment (PPE):** when entering the room, wear disposable gloves and water-resistant shoe covers to prevent the spread of contamination. A gown and mask with face shield is not normally required unless direct contact or body fluids are involved. Remember to remove PPE before exiting the room as per section to prevent radioactive contamination.

NOTE:
Lead aprons are not recommended since the small amount of lead in a wearable apron provides very little shielding for the energy from iodine-131. Leaded walls and shields contain large amounts of lead and are effective protection. *Lead aprons can give a false sense of security*. Distance and time precautions are the most effective protection.

2. **Food Delivery:**
   As with all patients under isolation precautions food trays should be delivered to patients by nursing staff, not contracted food service staff, unless they have received hazard specific training.

3. **Use of personal dosimetry:**
   Use of a personal dosimeter while providing routine care is not required. Previous readings show that nursing staff providing routine care to I-131 patients receive very low doses that do not exceed the annual limit of 1 mSv required by WorkSafeBC and CNSC.

   Use of a personal dosimeter for patients requiring more frequent assistance with care (see section below) will be assessed on a case-by-case basis by Nuclear Medicine Radiation Safety Officers and Workplace Health. Instructions on use of a dosimeter and process for recording doses will be provided to staff prior to the start of patient care.

Prevent Radioactive Contamination:

1. Remove disposable PPE before leaving the patient room.
   a. Dispose of them in the waste container within the patient room.
   b. Wash hands immediately after leaving the room. Do not substitute the use of hand sanitizer for handwashing.
2. Urine, feces and other body liquids should be disposed of via the dedicated toilet.
   a. Take care to avoid splashing. The use of standard precautions is recommended.
   b. Flush the toilet 2 or 3 times to provide dilution.
3. Patient garbage, including items such as band aids or wound dressings, must be disposed as contaminated waste within the patient room.
   a. Nuclear Medicine will monitor and dispose of this waste as per their procedures.
4. All linens must be placed in the laundry bag located within the patient room.
   a. Nuclear Medicine will monitor and handle this linen as per their procedures.
5. Urine and blood samples should be taken only if essential. If taken, the samples must be labeled "Radioactive" and the receiving laboratory notified.

   Do not delay urgent testing but notify Nuclear Medicine that samples have been sent to the lab as soon as possible. **NOTE:** Exposures from samples to staff using standard precautions will be very low (below of the annual public limit of 1 mSv). From a waste management perspective, however, any residual sample material and contaminated lab wear must be monitored and disposed of by Nuclear Medicine.

Guidelines for Caring for Dependent Patients requiring Frequent Assistance with Care:

Therapies for higher dependent patients requiring more frequent assistance with care (e.g., using the toilet, taking a shower, assistance with meals, reduced cognitive functions, etc.) should not be cancelled. Radiation exposure to staff can be minimized by following the guidelines below and a personalized care plan developed with Nuclear Medicine Radiation Safety Officers and Advisors, as well as clinical staff.

1. Trained nursing staff should be rotated to provide maximum patient care and minimize radiation exposure to each individual nurse.
2. In the case of medical emergency, **do not delay life saving measures**. Contact the Nuclear Medicine Department as soon as the medical emergency is under control.
3. Follow precautions while providing direct care. Gloves protective gown and water-resistant shoe covers are the required personal protective equipment (PPE). Use double gloves when contact with body fluids is expected.

4. If the patient is moderately or severely incontinent (e.g., uses incontinence briefs and requires frequent changes), a catheter is required (a physician's order will be obtained). The urine collection bag should be frequently emptied into the toilet by trained staff. Special care should be taken to avoid splashes. Use of mask with face shield is required.
5. If patient requires help for personal needs (e.g., limited mobility, using the toilet, etc.), all PPE must be worn while providing care.
6. Contaminated waste:
   a. Disposable PPE must be placed in containers for radioactive waste inside the room after providing care.
   b. Contaminated waste (e.g., surgical dressings, tissues, soiled incontinence briefs), clothes and linen must be stored in appropriate containers for radioactive waste inside the room.
7. Reusable equipment that comes into contact with the patient's body fluids (e.g., surgical instruments, dialysis machines) must be cleaned thoroughly after each use. Before it is returned to general use, Nuclear Medicine staff will monitor the equipment for radioactive contamination and determine whether additional cleaning or temporary storage is advisable.

Radioactive Blood or Body Fluid Spill:

1. When working with I-131 therapy patients, a "spill" is defined as body fluids (i.e. vomit or incontinence) that are uncontrolled (not contained in a receptacle, incontinence pad or linens).
2. **If patient vomits within 4 hours of receiving the therapy**, advise Nuclear Medicine as soon as possible for cleanup. Contact information will be posted on the door.
3. **If patient vomits more than 4 hours after receiving the therapy, promptly clean the spill:**
   a. All personnel not involved in the spill should evacuate the area.
   b. Restrict access to the area.
   c. Wear disposable nitrile **gloves** (double glove), a reusable or disposable isolation **gown** and water-resistant **shoe covers**. A **face shield** is also required.
   d. Cover the spill as quickly and completely as possible with absorbent material (e.g., use a blue underpad to prevent spread).
   e. Wipe up the spill with the absorbent material. Try to minimize spread of the spill by wiping from the outside edge to the inside of the spill material.
   f. Dispose of the absorbent material in a plastic biohazard bag.
   g. Wipe down the spill area with hospital grade disinfectant wipes. Again, wipe from outside edge of the spill area to the inside.
   h. Dispose of the wipe in the plastic biohazard bag.
   i. Once the spill site has been cleaned, tape a blue underpad over the spill site with the absorbent side (white side) down to prevent the spread of any contamination that might be present.
   j. Discard disposable PPE in the garbage container in the patient room (or into the biohazard bag if heavily soiled). If using a reusable water-resistant gown, place in the dedicated laundry bag in the patient's room.
   k. Tie off the biohazard bag and label as radioactive. **Leave it in the patient's room**.
   l. Advise Nuclear Medicine as soon as possible, contact information will be posted on the door.
   Nuclear Medicine staff will be responsible for:
      - Monitoring the spill site for contamination.
      - Monitoring and disposing of the bagged spill cleanup waste.
4. **If personnel have come in contact with the spill, follow the procedure listed below**.
   a. If contamination of **skin** occurs, immediately wash the area thoroughly using soap and warm (not hot) water as per standard hand hygiene guidelines.

b. If contamination of the **eyes** occurs, flush with copious quantities of water.

c. If contamination of **clothing** occurs,
   - Remove the contaminated clothing while in the patient room and place it in a bag labeled "Radioactive". Include name and contact information on the label.
   - Clothing will be stored by Nuclear Medicine until it is no longer radioactive (approximately 80 days).

d. Inform your supervisor **and** contact Nuclear Medicine for assistance.

e. Report to the Workplace Health Call Centre (1.866.922.9464).

f. Complete a PSLS on the incident.

Medical Emergencies

1. In the case of medical emergency, **do not delay life saving measures**. Contact the Nuclear Medicine Department as soon as the medical emergency is under control.
2. Proceed with emergency care while taking precautions against the spread of contamination. PPE must be worn as soon as feasible. **The radiation exposure risk is *very small but it still exists***.
3. Notify all staff involved (attending physician, Nuclear Medicine, operating room staff, etc.).
4. All members of the medical team must follow standard precautions for an emergency situation.
5. Contaminated waste must be collected in bags, labeled "Radioactive", and left for Nuclear Medicine to monitor and dispose of.
6. All body fluids/specimens collected from the patient must be labeled "Radioactive" and the receiving departments notified.
   a. After carrying out analysis, dispose of residual fluids/specimens in a plastic biohazard bag.
   b. Label the bag as "Radioactive" and contact Nuclear Medicine for pick up and disposal.

NOTE: Exposures to staff using standard precautions will be very low (below of the annual public limit of 1 mSv). From a waste management perspective, however, any contaminated materials must be monitored and disposed of by Nuclear Medicine.

Surgery or Death of Therapy Patients

1. Immediately contact Nuclear Medicine. Call the 24-hour emergency contact number if outside of regular department hours.
2. In case of death, leave the patient in the room until the Nuclear Medicine Physician on-call, SRSO, or RRSO arrives to direct activities.

Discharge and Housekeeping Protocol

After patient is discharge as per site protocols, **Nuclear Medicine staff will be responsible for the following**:

1. Remove all waste and laundry from the room.
2. Decontaminate the room and contact housekeeping.
3. Determine and inform nursing staff when the room may be used for the next patient.

Patient Education/Discharge Information

Patient radiation safety education is completed by the Radiation Oncologist and Nuclear Medicine Physician before admission including information pamphlet "Guideline for Inpatients – Receiving Radioactive Iodine (I-131) Treatment". Teaching is also reinforced by the Nuclear Medicine technologist before administering therapy and at discharge. The Nuclear Medicine technologist is to verbally inform nurse that teaching is completed prior to discharge.

Nurse/Nuclear Medicine Technologist to reinforce the following as required:

1. Patients must be considered in radioactive isolation and must not leave their room unless authorized.
2. Encourage patients to drink plenty of fluids to promote urination.
3. Patients must use the toilet within the therapy rooms.
4. Patients should flush the toilet 2 to 3 times after each use.
5. Males should sit when using the toilet to avoid splashing.
6. Patients should be encouraged to wash their hands in plenty of warm, soapy water after each use of the toilet.
7. In the event of nausea, vomiting or incontinence, the patient should inform the nursing staff immediately. Nurse should follow site specific protocol/Prescriber's orders for administering anti-nausea medication.
8. Hospital clothing should be worn to avoid contamination of the patient's personal clothing.
9. Personal items (such as cellphone, computer, books, etc.) that are brought into the room cannot be shared with anyone for the first week after treatment.
10. Food will be brought to the patient on disposable dishes. Food and food trays will not be removed from the room until the patient is discharged.
11. Liquid and semi-liquid food (jello, soup, cereal, mashed potatoes) that is not eaten may be flushed down the toilet.
12. Dispose of all other food waste, and used disposable dishes, tissues and napkins within the room where directed.
13. Leave empty trays in the room.
14. All other garbage can go into the regular garbage bin in the room.
15. **Any radiation safety instructions applicable when the patient returns home are decided on a case-by-case basis by the Nuclear Medicine Physician based on the treatment and home situation. The Nuclear Medicine Physician and technologists review these instructions with the patient before admission.**
16. **If the patient has more detailed radiation safety concerns than those listed here, contact Nuclear Medicine for guidance.**

Visitor Instructions (Provided to the patient by Nuclear Medicine)

Reinforce the following as required:

1. Limit stay to less than one (1) hour each day.
2. Remain a minimum of 2 meters (6 feet) away from the patient.
3. Do not allow children or pregnant visitors.
4. Do not eat or drink in the patient's room.
5. Do not use the bathroom facilities inside the patient room.

Documentation

When the I-131 is given, Nuclear Medicine will record and place in the patient's chart under progress notes or history as per your site practice:

- Activity (Bq) given,
- Date and time administered,
- Results of radiation surveys,
- Specific restrictions, and
- Special instructions.

Clinical Outcomes

Ensure the safety of staff, patients, the public and the environment.

Related Documents

In case of emergencies or questions, contact information for Nuclear Medicine Radiation Safety Officers (RSOs) is available through the Health Authority intranets, VCH Radiation Safety Site Contact List – Nuclear Medicine and PHC Radiation Safety Contact List – Nuclear Medicine. Local emergency contacts are also posted on the door of the therapy room. Workplace Health/Occupational Health & Safety Advisors are also available for questions and consultations as needed.

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Developed by

Developer Lead(s):

Radioactive Iodine Shared Work Team

Regional Radiation Safety Officer, Nuclear Medicine, Lower Mainland Medical Imaging

Regional Practice Lead, Nuclear Medicine, Lower Mainland Medical Imaging

Regional Radiation Safety Advisor, Workplace Health, VCH

Development Team members:

Interim Patient Services Manager, Leukemia/BMT, VGH
Clinical Nurse Educator, Leukemia/BMT, VGH
Nuclear Medicine Supervisor, Nuclear Medicine. VGH/UBCH
Nurse Educator, Surgery, SPH
Nuclear Medicine Supervisor, Nuclear Medicine, SPH
Safety and Hygiene Advisor, Occupational Health & Safety, Providence Health Care
Occupational Hygienist, Workplace Health, VCH

Endorsed by

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Health Authority Professional Specific Advisory Council Chairs (HAPSAC)
Health Authority Interprofessional Advisory Council Chairs (HAIAC)
VCH Operations Directors
VCH Professional Practice Directors

PHC: Professional Practice Standards Committee

Final Sign-off & Approved for Posting by

Vice President, Professional Practice and Chief Clinical Information Officer, VCH

Professional Practice Standards Committee, PHC

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Appendix A: Education & Training Requirements

1. Requires education in basic radiation safety theory and methods of protection applicable to working with radioactive iodine therapy patients.

2. Staff must successfully complete one of the following education options prior to unsupervised work with these patients:
    a. Completion of the online course titled Radiation Safety: *Working with Radioactive Iodine Therapy Patients* and corresponding test available through the LearningHub. A score of 100% (10 out of 10) is required to receive credit for the course.
    b. Participation in an "in person in-service" session and completion of corresponding test. A score of 100% (10 out of 10) is required to receive credit for the course.
    c. An equivalent education session approved by the Workplace Health Regional Radiation Safety Advisor (RRSA) or Nuclear Medicine Regional Radiation Safety Officer (RRSO).

3. Refresher training via one of the methods listed above is required every 3 years. Annual refresher training is recommended for staff that does not regularly care for these patients. Up to date staff lists and corresponding education records must be provided to Nuclear Medicine upon request, as per federal regulations.

Education & Training Requirements: Section 13.1 Education and Training Requirements outlined in the Safe Use of Radioisotopes in Nuclear Medicine manual establishes the minimum requirement for refresher training via one of the methods listed above every 3 years. Annual refresher training is recommended particularly for staff that do not regularly care for these patients. Up to date staff lists and corresponding education records must be provided to Nuclear Medicine upon request, as per federal regulations.

Appendix B: Definitions

Thyroid cancer:	Thyroid cancer is a malignant tumor that originates in the thyroid gland. There are several types of thyroid cancer depending on which cells become malignant, with the two most common types being Papillary and Follicular. According to the Canadian Cancer Society, almost 6000 cases of thyroid cancer were diagnosed in Canada in 2014 (Canadian Cancer Society, 2014a). Women are almost three times more likely to develop thyroid cancer than men. Treatment regimens can include surgery, radioactive iodine therapy, hormonal therapy, external beam radiation therapy, chemotherapy, and biotherapies. Improved prognosis exists for patients whose thyroid cancer is diagnosed in the early stages, who are young at the time of diagnosis, who are healthy and without comorbidities, and in those who do not have metastatic disease.
Radioactive Iodine (called Iodine-I31, I-131, ^{131}Iodine):	Radioactive iodine is an oral agent given to thyroid cancer patients. Radioactive iodine is called ionizing because it has enough energy to damage individual cells. Due to the nature of metastases also being thyroid cells, these tumors will also absorb I-131. Radioactive iodine can be used after surgery to destroy remaining cancer cells (adjuvant therapy) and as a primary treatment strategy.
Nuclear Medicine:	Branch of Medical Imaging that uses radioactive materials to diagnose and treat a variety of diseases.
Radiation exposure:	When a person is exposed to an active source of radiation.
Radiation protection:	The collection of practices that can be put in place to reduce or eliminate radiation exposure.
Radiation safety officer:	Person who oversees the safe use of radioactive materials.