

DEPARTMENT OF THE AIR FORCE  
USAF Medical Center, Wright-Patterson (AFLC)  
Wright-Patterson AFB, Ohio 45433

USAF MC Regulation 160-35

12 September 1974

Medical Services

MANAGEMENT AND CARE OF PATIENTS CONTAINING  
RADIOACTIVE MATERIALS

This regulation establishes procedures for the management and care of patients who receive radioactive materials for diagnostic and therapeutic purposes. It also specifies certain radiation safety criteria applicable to other medical center patients, visitors, and medical center personnel.

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1. Introduction:

a. This regulation applies to all medical center personnel working with patients who have received radioactive materials for diagnostic or therapeutic procedures.

b. The physician will insure that an appropriate entry is made in the patient's medical record for any patient who is administered a radioactive material. The entry for therapeutic procedures shall include the identity, chemical form and quantity of the radionuclide, the date and time of administration, and the method of administration (e.g., parenterally, orally, interstitial or intracavitary implantation, or surface mold application). The consultation request for diagnostic procedures will be sufficient entry.

This regulation supersedes MCR 160-35, dated 25 October 1968.  
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## 2. Explanation of Terms:

a. **Radioactive Material:** A material with a relatively unstable atomic structure that changes over a period of time to some other atomic structure that may or may not be radioactive. This process is accompanied by the emission of one or more types of radiation, such as alpha particles, beta particles, and gamma rays. Terms synonymous with radioactive material are radionuclide, radioisotope, and isotope. A radionuclide is represented by the chemical symbol of the atom and its atomic mass, e.g., Iron-59 is written as  $^{59}\text{Fe}$ .

b. **Activity:** The quantity of a radionuclide referred to in terms of Curies (Ci) or fractions of a curie such as Millicurie (mCi), Microcurie (uCi), or Nanocurie (nCi). Each term is respectively 1/1000th of the preceding term, i.e., 1 mCi = 1/1000 Ci, 1 uCi = 1/1000 mCi, 1 nCi = 1/1000 uCi.

c. **Half-Life:** The time required for the quantity of a radionuclide to decrease to one-half of its initial value (e.g., a radionuclide solution with an initial activity of 20 millicuries and a half-life of 8 days would have 10 millicuries remaining in the solution after 8 days, 5 millicuries remaining after 16 days, etc.).

## 3. Diagnostic Procedures:

a. Diagnostic procedures usually involve the administration of small quantities (less than 10 millicuries) of a radionuclide having a short half-life (less than 30 days). Occasionally, larger quantities of the radionuclide are administered for a diagnostic test, but the half-life is very short (e.g., 15 millicuries of technetium-99m with a 6-hour half-life), or a longer half-life radionuclide is used in a very small quantity (e.g., 0.5 microcurie of cobalt-57 with a 270-day half-life).

b. Patients who receive diagnostic quantities of radionuclides are normally treated on an outpatient basis unless hospitalized for other reasons. Accordingly, the Department of Nuclear Medicine personnel will brief outpatients on the relative hazards, if any, and methods to be used in handling vomitus and excreta.

c. Diagnostic quantities of radionuclides present no nursing problems as long as the radionuclide remains in the patient. Such patients need not be placed in a separate room as long as there are no pregnant patients or patients under the age of 18 in the same room. In those rare instances when a patient is incontinent or vomits, the Hospital Radiation Protection Officer (HRPO) or the Department of Nuclear Medicine will be called to provide advice and assistance.

d. A list of commonly used radionuclides for diagnostic procedures is shown in Table 1.

## 4. Therapeutic Procedures:

a. Patients who have received therapeutic quantities of radionuclides may require special room assignments and restrictions. Special instructions for the care of these patients will be issued to nursing personnel by the physician and/or the HRPO.

c. During interstitial and intracavitary radiotherapy, surgical bandages and dressings will be changed only by the physician or by another individual designated by him and trained in radiation techniques.

d. Perineal care for patients undergoing gynecological radiotherapy will not normally be given during the treatment. The perineal pad may be changed by qualified nursing personnel familiar with the changing procedure. If bathing or other perineal care for gynecological patients is necessary, the physician will be notified and the radioactive sources can be removed by the physician or another individual designated by him prior to rendering the required care.

#### 6. Monitoring of Nursing Personnel:

a. The HRPO will instruct nursing personnel when monitoring of personnel with pocket dosimeters is required. When pocket dosimeters are required, these shall be kept at the nurse's station and will be worn by all personnel (except those personnel already wearing a film badge) whenever they enter the patient's room. A log shall be kept on the use of the dosimeters and shall include the following information: name, rank, social security number, date, dosimeter number, initial readings and final readings of the dosimeter. Readings of a dosimeter shall be made whenever any one individual returns a dosimeter to the nurse's station for use by someone else.

b. If a pocket dosimeter should show a reading in excess of 100 milliroentgens (mR), notify the HRPO immediately.

7. Patient Restrictions: The physician and/or HRPO will provide necessary instructions on any restrictions of the patient's activities to include such items as serving meals to the patient on disposable plates/trays with disposable eating utensils.

#### 8. Protection of Other Patients from Radiation:

a. The National Council on Radiation Protection and Measurements (NCRP) and other federal agencies have recommended the maximum permissible dose (MPD) equivalent for persons not occupationally exposed to be 500 millirems per year. The non-occupational MPD is one-tenth of the MPD for occupational workers.

b. In keeping with this national standard, the NCRP has recommended that the non-radioactive patient shall\* not receive a dose in excess of 500 millirems and should\*\* not exceed 200 millirems. The NCRP also recommends that, if possible, non-radioactive patients should not receive more than 100 millirems from another patient during any one hospital admission.

\* "Shall" indicates a recommendation that is necessary or essential to meet the currently accepted standards of protection.

\*\* "Should" indicates an advisory recommendation that is to be applied when practicable in the interest of minimizing radiation exposure.

c. Thus, the USAF Medical Center W-P will adhere to the limit of no more than 100 millirems to the non-radioactive patient during any one hospital admission of the non-radioactive patient. In most cases, this limit will not require that surrounding rooms be vacated during the course of treatment of the radioactive patient. The selection of specified rooms and the judicious arrangement of patient beds will normally be required to maintain this 100 millirem limit. When necessary, protective shielding may be used to reduce the radiation exposure to other patients, visitors, and medical center personnel.

d. In all cases involving therapeutic procedures with radioactive materials, the physician and/or the HRPO will specify the distance and the time at which other patients, visitors and medical center personnel may spend with or near the radioactive patient.

#### 9. Visitors:

a. Pregnant women, women at risk for pregnancy, and visitors under the age of 18 are not permitted to visit or work near patients undergoing therapy unless otherwise instructed by the physician and/or HRPO.

b. Visitors must limit their stay to the period of time and distance specified by the physician and/or the HRPO.

#### 10. Body Fluids, Other Wastes and Linens:

a. Normally, urine and excreta from patients can be disposed of in the normal manner unless otherwise instructed. The patient should use the same toilet and sink and should flush the toilet and rinse the sink at least three times after each use. If the patient is incontinent or restricted to bed, nursing personnel will wear rubber gloves when handling urine bottles or bed pans. In addition, pillows and mattresses shall be covered with rubber or plastic sheets. The use of disposable urine bottles and bed pans is recommended, and should be restricted to use for that patient. Bottles and bed pans should be rinsed several times after each use and stored in the patient's room for monitoring.

b. Bed linen, towels and clothing are to be collected and stored in the patient's room or bathroom for monitoring unless otherwise directed. Such items will be placed in plastic containers for monitoring.

c. Solid waste materials such as paper cups, eating utensils, rubber gloves, bandages, etc. shall be placed in plastic bags for monitoring for contamination unless otherwise specified.

d. Body fluids to be collected for laboratory analysis will be collected in containers that have been labeled with the patient's name, date and time of collection, radionuclide, and date and time of administration of the radionuclide unless otherwise specified. The physician or HRPO will clear all requests for laboratory analyses of body fluids.

### 11. Special Problems:

a. If intracavitary fluid leaks, or vomitus or urine from the patient given liquid or capsule-form radionuclides spills, put on surgical gloves and contain the liquid without touching it. The liquid can be covered with absorbent material such as towels, sheets, blankets, etc. to prevent spread of contamination. Keep the gloves with other contaminated material for monitoring. Do not attempt cleanup. Notify the physician and the HRPO at once.

b. If the nurse suspects that a radioactive source has been lost or has changed its position, immediately notify the physician and the HRPO. Examples of sources in this group include radium tubes and needles, radon seeds, gold grains or seeds, iridium ribbons or seeds, tantalum wire, cesium needles and cobalt needles.

### 12. Emergency Surgery or Death of Patient:

a. In the event that a patient requires surgery or dies after the administration or implantation of therapeutic quantities of radionuclides, the physician and the HRPO shall be notified immediately. In the event of death, do not remove the body from the room.

b. Briefly, a patient containing less than 5 millicuries of most radionuclides does not present any significant hazard when surgery, autopsy or embalming is required. Nevertheless, advice and/or written instructions will be provided by the hospital radiation protection officer (HRPO) for the management of such cases.

c. Detailed guidelines for the management of patients treated with therapeutic quantities of radionuclides are contained in NCRP Report No. 37, "Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides," National Council on Radiation Protection and Measurements, Washington, DC, 1970. A copy of this report is available to all interested medical center personnel and may be obtained from the hospital radiation protection officer.

### 13. Discharge of the Patient:

a. Patients being treated with implants of radionuclides with a half-life greater than 30 days (e.g., Cobalt-60, Cesium-137, Iridium-192, Tantalum-182, Radium-226) shall remain hospitalized until the sources are removed.

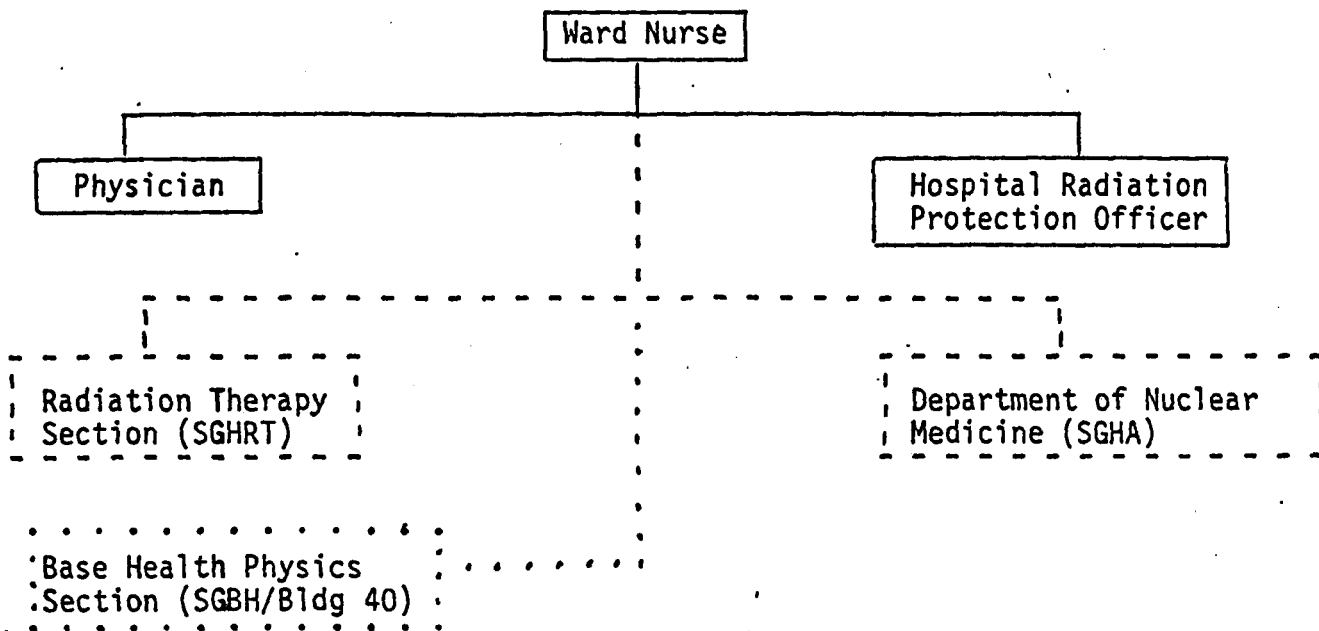
b. Unless otherwise instructed, the patient's room shall not be cleaned or prepared for subsequent use until the room has been monitored by the HRPO or the Department of Nuclear Medicine technicians.

### 14. Special Instructions:

a. Special instructions for the management of the patient will be provided in writing by the physician and/or HRPO.

b. The attached form (attachment 1) will be completed for all inpatients who have been administered radioactive materials for therapeutic procedures. A copy of this form will be posted in the patient's medical chart and on the door of the patient's room or on the bed.

15. Emergency Notification Procedure: In the event of any emergency or problem that arises in the care of a patient undergoing treatment with therapeutic quantities of radioactive materials, the following notification procedure will be followed:



\_\_\_\_\_ Immediate Notification  
 - - - - - Secondary Notification  
 . . . . . Additional Assistance if Immediate and Secondary Notification Cannot be Completed

16. Common Radionuclides for Diagnostic Procedures:

TABLE 1

<u>Radioisotope</u>	<u>Symbol</u>	<u>Half-Life</u>
Cobalt-57	$^{57}\text{Co}$	270 days
Chromium-51	$^{51}\text{Cr}$	27.8 days
Fluorine-18	$^{18}\text{F}$	109 minutes

TABLE 1 (cont'd)

Gallium-67	$^{67}\text{Ga}$	78 hours
Gold-198	$^{198}\text{Au}$	2.7 days
Indium-111	$^{111}\text{In}$	2.8 days
Iodine-125	$^{125}\text{I}$	60 days
Iodine-131	$^{131}\text{I}$	8.1 days
Iron-59	$^{59}\text{Fe}$	45 days
Mercury-197	$^{197}\text{Hg}$	2.7 days
Mercury-203	$^{203}\text{Hg}$	47.9 days
Potassium-42	$^{42}\text{K}$	12.5 hours
Selenium-75	$^{75}\text{Se}$	127 days
Strontium-85	$^{85}\text{Sr}$	65 days
Technetium-99m	$^{99\text{m}}\text{Tc}$	6 hours
Xenon-133	$^{133}\text{Xe}$	5.3 days

17. Common Radionuclides for Therapeutic Procedures:TABLE 2

<u>Radioisotope</u>	<u>Symbol</u>	<u>Half-Life</u>
Cesium-137	$^{137}\text{Cs}$	30 years
Cobalt-60	$^{60}\text{Co}$	5.26 years
Gold-198	$^{198}\text{Au}$	2.7 days
Iodine-131	$^{131}\text{I}$	8.1 days
Iridium-192	$^{192}\text{Ir}$	74.4 days
Phosphorus-32	$^{32}\text{P}$	14.3 days

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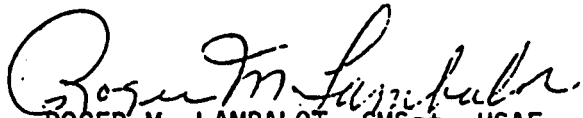
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TABLE 2 (cont'd)

Radium-226	$^{226}\text{Ra}$	1620 years
Radon-222	$^{222}\text{Em}$	3.83 days
Strontium-90	$^{90}\text{Sr}$	28 years
Tantalum-182	$^{182}\text{Ta}$	115 days

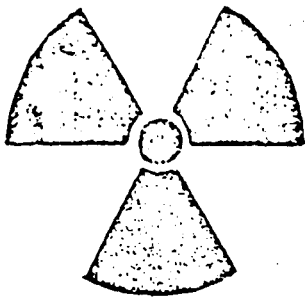
OFFICIAL

JOSEPH E. WESP, Colonel, USAF, MC  
Commander

  
ROGER M. LAMBALOT, CMSgt, USAF  
Administrative Services

1 Atch  
Special Instruction Form





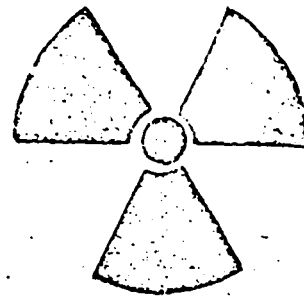
PATIENT \_\_\_\_\_

WARD \_\_\_\_\_ ROOM \_\_\_\_\_

RADIOISOTOPE \_\_\_\_\_

DATE/TIME ADMINISTERED \_\_\_\_\_

PHYSICIAN \_\_\_\_\_



SPECIAL INSTRUCTIONS

1. Patient is restricted to his/her \_\_\_\_\_ until \_\_\_\_\_.
2. Patient is to be served meals on disposable plates/trays with disposable utensils until \_\_\_\_\_.
3. Personnel are required to wear pocket dosimeters or film badges when entering room.
4. You may work at an average distance of 3 feet from the patient for the following time.
5. Linen and clothing are to be monitored before sending to the laundry.
6. Rubber gloves must be worn before handling contaminated objects.
7. Solid wastes such as tissues, bandages, paper cups, etc. are to be collected and stored in the patient's room for monitoring.
8. All excreta can be disposed of in normal manner.
9. Body fluids can be collected and handled in normal manner for laboratory analysis.
10. Room must be monitored before cleaning.
11. Pregnant women and persons under the age of 18 are to be excluded from visiting or working near the patient.
12. Visitors must maintain the following distance from the patient.
13. Visitors may spend the following time with the patient.
14. Other patients must maintain the following distance from the patient.
15. EMERGENCY - Call physician listed above and the Hospital Radiation Protection Officer (HRPO) - Dr. F. J. Connolly, Ext 312 or 74159 or Home: 845-3154.

Yes  No  
 Yes  No  
 Minutes/Day  
 No Limit  
 Yes  No  
 Yes  No  
 Yes  No  
 Yes  No  
 Yes  No  
 Feet or Greater  
 No Restriction  
 Minutes/Day  
 No Restriction  
 Feet or Greater  
 No Restriction

ADDITIONAL INSTRUCTIONS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_