

University of Maryland Baltimore

Radiation Safety Procedure

Procedure Number: 4.3

Title: Radiation Safety During Brachytherapy Procedures

Revision Number: 1

Effective Date: July 25, 2002

Technical Review and Approval:

_____ **Date:** _____
Radiation Safety Officer

Radiation Safety Committee Approval:

_____ **Date:** _____
Chair, Radiation Safety Committee

PROCEDURE 4.3, RADIATION SAFETY DURING BRACHYTHERAPY PROCEDURES

1.0 Purpose:

This procedure describes precautions used during brachytherapy procedures that ensure that radioactive sources are handled in a safe manner and that radiation doses received by staff members, visitors, and the public are maintained as low as reasonably achievable (ALARA).

2.0 Scope:

This procedure applies to all uses of brachytherapy sources under the UMB Radiation Safety Program.

3.0 Procedure:

3.1 *Authorized Users*

Brachytherapy procedures may only be conducted through the oversight of a physician who has been approved as an authorized user by the Radiation Safety Committee under the provisions of COMAR G.68. This physician is responsible for the following:

- Examination of the patients and medical records to determine if radiation procedure is appropriate,
- Preparation of the written directive detailing the radiation dose and how it is to be administered in accordance with the Quality Management Program (QMP) [G.6(c)],
- Actual use of, or direction of other personnel in the use of radioactive material, and
- Interpretation of results of diagnostic procedures and evaluation of results of therapy procedures.

3.2 *Authorized Brachytherapy Sources*

It is the responsibility of the authorized user, assisted by the Medical Physics staff, to ensure that only brachytherapy sources authorized by appropriate regulations and MD-07-014-01 are used [G.13].

3.3 Authorized Handlers of Brachytherapy Sources

Access to brachytherapy sources shall be limited to personnel authorized, in writing, by the RSO. Access to brachytherapy sources is generally limited to radiation oncology physicians approved by the Radiation Safety Committee as Authorized Users, medical physics staff, and radiation safety staff. A letter listing all personnel authorized access to these sources shall be maintained with the Brachytherapy Source Inventory Log. The Radiation Safety Officer (RSO) shall sign this letter.

3.4 Brachytherapy Source Inventory Log

Brachytherapy source inventory log must be maintained in the source storage room(s) and shall include the following items [G.44]:

- The number and activity of sources removed from storage, the patient's name and room number, the time and date they were removed from storage, the number and activity of the sources in storage after the removal, and the initials of the individual who removed the sources from storage.
- The number and activity of sources returned to storage, the patient's name and room number, the time and date they were returned to storage, the number and activity of sources in storage after the return and the individual who returned the sources to storage.
- This log shall be maintained for a minimum of three years, in accordance with COMAR G.44.

3.5 Storage of Brachytherapy Sources

Cs-137 brachytherapy sources shall be shielded and stored in a locked room. Short-lived sources (other than Cs-137) shall be stored in the manufacturer's shipping container within a locked room(s). This room(s) shall be posted as a Restricted Area if short-lived sources are stored in the manufacturer's shipping container.

3.6 Transportation of Radioactive Sources

- 3.6.1 All radioactive sources shall be transported to/from the patient's room in either a shielded cart or the manufacturer's shipping container under constant surveillance and control of Medical Physics or Radiation Oncology personnel. The transportation container must be locked or securely latched to ensure that sources shall not be released if the container is dropped or turned over.
- 3.6.2 Before moving the sources from the source storage area perform a survey to ensure that the sources are adequately shielded.

3.7 Personnel Dosimetry Requirements

All staff members attending to brachytherapy implant patients must wear whole body radiation dosimeters when in the patient's room. All personnel who handle the implant sources must wear a ring dosimeter in addition to a whole body dosimeter. Visitors shall not be issued a dosimeter.

3.8 Requirements For Patient's Room

Normally, designated room(s) shall be used for all brachytherapy procedures. Other rooms may be used at the discretion of the Radiation Safety Officer. The patient's room shall be a private room (this includes a multi-bed room reserved for the exclusive use of the implant patient) as far away from the nursing station and heavy traffic hallways as is consistent with good medical care. Ideally, this would be a corner room on the top or bottom floor. [G.43(a)].

3.9 Radiation Safety Briefing To Patient

The patient shall be briefed on radiation safety procedures for confinement to bed, visitor control, and other items, as appropriate [G.43(a)(5)].

3.10 Personnel In Attendance During Implant

Only those persons needed for medical, safety, or training purposes should be present during the implant procedure.

3.11 Radiation Surveys

- 3.11.1 Immediately after implanting the sources in a patient, medical physics staff shall make a radiation survey of the patient and the area of use to confirm that no sources have been misplaced. A radiation measurement device, such as a Victoreen 450P ion chamber should be used [G.43(a)(4), G.44(c)].
- 3.11.2 Following an implant brachytherapy procedure, measure the exposure rate in mrem/hr at bedside, at one meter from bedside, in the visitors' safe area, at the doorway, and in the surrounding areas. The exposure rates in adjacent uncontrolled areas must conform to the permit requirements and federal regulations [G.43(a)(4), G.44(c)]. Medical Physics staff shall record this and any other necessary information.
- 3.11.3 Immediately after removing the last temporary implant source from a patient, Medical Physics staff shall make a radiation survey of the patient with a radiation detection survey instrument to confirm that all sources have been removed and shall record this survey on the Nursing Instruction form [G.44(c)].
- 3.11.4 All survey records must be retained for at least three years [G.43(a)(4), G.44(d)].

3.12 Posting Of Patient Chart And Room

- 3.12.1 The "Caution Radioactive Material" form for either a Temporary Implant or Permanent Implant shall be completed and attached to the patient's chart.
- 3.12.2 The door to the patient's room shall be posted with "Caution, Radioactive Material" [G.43(a)(2)].
- 3.12.3 A copy of the Nursing Instructions shall be posted on the patient's door and in the front of the patient's chart.
- 3.12.4 A locally prepared sign reminding housekeeping not to enter the room and a sign reminding personnel not to remove trash or linen shall be posted.

3.13 Instructions to Nursing Personnel

- 3.13.1 Nursing staff shall be provided instruction before each brachytherapy patient in the form of written instructions, which shall be posted on the door of the patient's room, and in the patient's chart. These instructions shall include all the items listed in COMAR G.42(b).
- 3.13.2 Pregnant nursing personnel shall not be responsible for the care of patients with appreciable external radiation exposure rates.
- 3.13.3 A special duty nurse should not be assigned to care for a radioactive patient without the approval of the Radiation Safety Officer.
- 3.13.4 Daily attendance time recommendations should normally be calculated so that nurses receive less than 10 mrem per day based on the measured one meter dose rate.
- 3.13.5 During interstitial and intracavitary radiotherapy, surgical bandages and dressings should be changed only by the physician in charge or another individual designated by him/her and trained in the techniques applicable to such cases.
- 3.13.6 For gynecological patients, perineal care is not ordinarily given during treatment, but the perineal pad may be changed when necessary. In this case care must be taken to ensure that radioactive sources or source containers are not disturbed or loosened.
- 3.13.7 Surgical bandages and dressings shall not be removed from the patient room until completion of monitoring by the Radiation Safety Office.
- 3.13.8 Trash and linen shall be held until surveyed and released by the Radiation Safety Office to minimize the possibility of loss of a source.
- 3.13.9 If a source should become free (be dislodged or fall out); it shall immediately be picked up with forceps and placed in the shielded container in the patient's room. The attending physician and the Radiation Safety Officer shall then be immediately notified.

3.14 Visitors

- 3.14.1 Controls on visitors' locations and visit durations shall be established to ensure doses to members of the public are less than 0.1 rem in a year and ALARA [D.301].
- 3.14.2 Visitors shall remain within the established visitors' safe area at all times. Time limits for visits shall be noted on the Nursing Instructions [G.43(a)(2)].
- 3.14.2 Pregnant women and minors shall not normally be allowed to visit patients with an appreciable external radiation exposure rate. Exceptions can be made in the case of urgency, but the AU and RSO shall be consulted prior to allowing these visits [G.37(a)(3)].

3.15 Release Of Patient

- 3.15.1 Any patient who has received a temporary implant shall not be released from the hospital until both a radiation survey of the patient and a count of the implant sources, trains, or ribbons confirms that all sources have been removed from the patient and have been accounted. [G.45(a)] This check shall be performed immediately after the removal of the sources [G.45(a)]. A record confirming the source count and radiation survey shall be kept on the running implant inventory form. For low activity seeds (less than 1 millicurie), an individual seed will be used to check the survey meter to be sure it will easily detect a seed that has not been removed or has been lost.
- 3.15.2 A patient who has received a permanent implant cannot be discharged until it has been determined that the patient meets regulatory release requirements.

3.16 *Emergency Surgery Or Death Of The Radioactive Implant Patient*

- 3.16.1 At no time should emergency medical care be delayed because of the presence of a radioactive implant. The hazard to personnel exposure is very small compared to the risk to the patient if necessary emergency care is delayed.
- 3.16.2 If emergency surgery is required, it should be delayed, if possible, until any temporary implant radioactive sources can be removed. If surgery is being contemplated or is necessary, the attending physician and the Radiation Safety Officer shall be immediately notified [G.43(b)].
- 3.16.3 If the patient should die while the radioactive sources are in place, the attending physician and Radiation Safety Officer shall be notified [G.43(b)]. The body should not be moved until these individuals arrive. If an autopsy is to be performed, it should be carried out only after the radioactive sources have been removed.

3.17 *Radiation Safety Instructions*

- 3.17.1 UMB shall provide oral and written radiation safety instructions to all personnel involved in patient and human research care involving implant therapy [G.42(a)]. UMB shall provide refresher training at intervals not to exceed one year [G.42(a)].
- 3.17.2 At a minimum, the radiation safety instructions shall include information regarding [G.42(b)]:
- The size and appearance of brachytherapy sources;
 - Safe handling and shielding instructions in the event a source becomes dislodged;
 - Procedures for patient/human research subject control;
 - Procedures for notifying the RSO or AU if the patient/human research subject dies or has a medical emergency; and
 - The information listed in COMAR Part J (see Procedure 1.7, *Radiation Safety Training*).

4.0 Records and Reports

4.1 Records

4.1.1 Required records include:

- Records of brachytherapy source receipt, inventory, use, and disposal;
- Records of UMB staff training and refresher training;
- Records of patient instructions;
- Records of radiation surveys after implanting and removing radiation sources and for patient release and visitor control.

4.1.2 Radiation safety records shall be created and maintained consistent with the requirements of Procedure 1.2, *Radiation Safety Records*.

4.2 Reports

Radiation safety reports shall be created and filed consistent with the requirements of Procedure 1.3, *Radiation Safety Reports*.

5.0 References:

Code of Maryland Regulations 26.12.01.01

Maryland License MD-07-014-01

UMB Radiation Safety Program

USNRC Regulatory Guide 10.8, "Guide for the Preparation of Applications for Medical Use Programs"

USNRC Regulatory Guide 8.39, "Release of Patients Administered Radioactive Materials"