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	Effective Date:	09-15-2022
	Document Type:	Policy
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	Department/Section:	Catheterization Laboratory
	Document Title:	<b>RADIATION PROTECTION AND SAFETY</b>

### **PURPOSE:**

To ensure the safety of the Catheterization Laboratory personnel, physicians and patients exposed to the radiation emitted by fluoroscopy machine.

### **LEVEL:**

Catheterization Laboratory Personnel, Physician

### **DEFINITION OF TERMS:**

**Thermoluminescent Dosimeter (TLD)**- is a passive radiation dosimeter that measures ionizing radiation exposure by measuring the intensity of visible light emitted from a sensitive crystal in the detector when the crystal is heated.


**Optically Stimulated Luminescent dosimeter (OSL)**- uses aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) in order to absorb X-ray energy, release it, and measure the precise dose of ionizing radiation that is received.

**Philippine Nuclear Research Institute (PNRI)**- is the sole agency of the government mandated to advance and regulate the safe and peaceful applications of nuclear science and technology in the Philippines. It is one of the research institutes under the Department of Science and Technology (DOST).

**Personal Radiation Dosimeter**- is used to measure external radiation exposures. Personal dosimeters usually record a dose, which is the absorbed radiation energy measured in grays (Gy) or the equivalent dose measured in sieverts (Sv).

**Radiation Protection Officer (RPO)**- supervise the daily activities of radiation technicians and oversee regulatory reporting and quality control, ensuring all data is complete and accurate, generating reports and reviewing content, developing quality control procedures and training staff.




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### **POLICY:**


1. Personnel Monitoring Device such as Thermoluminescent Dosimeter (TLD) or Optically Stimulated Luminescent dosimeter (OSL) shall be provided to all catheterization laboratory (Cath Lab) personnel and physicians that are exposed to ionizing radiation.
2. These personnel monitoring devices shall be derived from Philippine Nuclear Research Institute (PNRI), or any authorized service provider, on a yearly contract, which includes processing and reporting.
3. Personnel and physician shall be assigned one personal radiation dosimeter. The name of the personnel/ physician shall be labeled on each device. Sharing, loaning and borrowing of badges is strictly prohibited. Wear only the badge with your name on it. Do not wear the badge while receiving personal x-rays or undergoing personal nuclear medicine procedures.
4. The badge shall be worn every day while working. Store the OSL dosimeters together with the Control badge in a radiation free area, preferably in a designated office or locker area. The location shall be out of direct sunlight and away from excessive heat or radioactive sources. Do not remove the badge from the workplace and avoid taking it home.
5. The OSL dosimeter shall be worn on a position of the body representative of its exposure, typically between the waist and the neck, on the front of the torso, facing the radioactive source. Dosimeters are usually worn on the outside of clothing, around the chest or torso to represent dose to the "whole body". If a person uses a lead apron, the dosimeter must be worn underneath the lead apron.
6. Personnel and physician radiation protective equipment shall be as follows:
  - 6.1. Lead apron/ gown
  - 6.2. Thyroid shield



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- 6.3. Lead glasses
  - 6.4. Lead cap
  - 6.5. Movable lead shield/ board
7. The Radiologic Technologist on duty shall ensure the completeness and condition of radiation dosimeters and protective equipment daily. He/she shall document the findings and report to the head nurse any alterations observed during inspection. If a dosimeter is lost or damaged (broken clip, lost filter, etc.), notify the head nurse immediately and ask for a replacement.
  8. The badge shall have an exchange frequency of every two (2) months (or more frequent if the risk is high or depending on the exposure level).
    - 8.1. The Head Nurse shall collect all issued dosimeters after the two (2) months monitoring period and send to PNRI for processing and dose evaluation.
    - 8.2. It is the responsibility of the wearer to change his or her dosimeter during the designated change period.
    - 8.3. New badges shall be made available before the last working day of the month or before the start of the new wear period.
    - 8.4. The old badges shall be collected after the start of the new wear period. If the personnel plans on being away from work during that time, ensure that the badge is accessible for exchange.
  9. The Head Nurse shall inform the personnel/ physician of the dose evaluation result and keep the records provided by PNRI.
  10. In the event of exceeded radiation dose, the Head nurse shall notify the personnel/ physician and report to the Radiation Protection Officer (RPO).
    - 10.1. *The head nurse shall reassign the personnel with exceeding radiation dose to other area of the unit that does not require radiation exposure for at least two (2) weeks.*




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- 10.2. Radiologic Technologist shall ensure the following, but not limited to:  
Patient radiation exposure history; notify and report to the head nurse and RPO for exceeded radiation dose.
- 10.3. Documentation of fluoroscopy exposure time and total radiation dose of patient.
- 10.4. Provide patient a radiation protection, as necessary.
11. Radiation signage shall be posted on all point of entry to the procedure room.
  - 11.1. Radiation warning light shall be installed outside the procedure room and turned on during a procedure.
12. **PREGNANCY:**
  - 12.1. A worker shall be considered a Declared Pregnant Worker (DPW) after the worker has given the Radiation Protection Officer (RPO) a written statement indicating she is pregnant. A separate monitoring device shall be provided for the fetus.
  - 12.2. The RPO shall have a short information session with the worker prior to her signing the pregnancy declaration in order to ensure she has received all the necessary information regarding declaration of the pregnancy and has had any questions answered.
  - 12.3. Workers who declare their pregnancy shall receive a "fetal dosimeter" in addition to their regular dosimeters. The fetal dosimeter shall be worn at the waist level. If a lead apron is worn (as for workers using fluoroscopic x-ray equipment), the fetal dosimeter is to be worn under the apron near the fetus, and the regular dosimeter is to be worn outside the apron at the collar level. Ensure that the dosimeters are worn at the correct locations and are not switched.
13. Daily quality check and monitoring of the machine, which includes the preventive/corrective maintenance shall be observed.



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### **DOCUMENTATION:**

New Policy


### **DISSEMINATION:**

1. Surgical Complex- Catheterization Laboratory Policy and Procedure Manual
2. Orientations

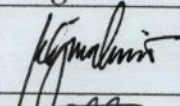
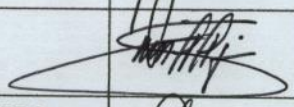
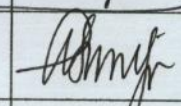
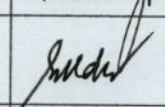


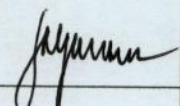
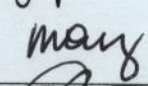

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2. *Radiation protection in the cardiac catheterization laboratory*. (n.d.). PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7212171/>
3. (n.d.). Heart Doctor – Cardiologist Dr. Ben-Zur, Interventional Cardiology, Electrophysiology Encino CA | Dr. Ben-Zur, Encino, California | Heart Doctor.  
<https://www.drbenzur.com/wp-content/uploads/2017/05/Radiation-Safety1.pdf>
4. *Radiation protection in the cardiac catheterization laboratory*. (n.d.). PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7212171/>




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	Document Title:	<b>RADIATION PROTECTION AND SAFETY</b>

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	<b>HANNAH KHAY S. TREYES, RN, MN</b> Chief Nurse		9/13/2022
Reviewed by:	<b>DENNIS C. ESCALONA, MN, FPCHA, FPSQua</b> Quality Assurance Supervisor		9/13/2022
Recommending Approval:	<b>MARIA LIZA C. PERAREN, RN, MAN</b> Nursing Services Division Officer		09/13/2022
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Approved:	<b>GENESIS GOLDI D. GOLINGAN</b> President and CEO		9/14/22



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### **PURPOSE:**

To ensure the safety of the Catheterization Laboratory personnel, physician and patient exposed to the radiation emitted by fluoroscopy machine.

### **SCOPE:**


Applies to all Catheterization Laboratory staff of Dr. Pablo O. Torre Memorial Hospital

### **PERSON RESPONSIBLE:**

Catheterization Laboratory Personnel, Physician, Catheterization Laboratory Head Nurse

### **PROCEDURE:**


1. Personnel and physician are assigned one personal radiation dosimeter. The name of the personnel/ physician shall be labeled on each device.
2. Pin or clip the OSL dosimeter to your body with the front part of the badge facing away from the body.
3. Wear the OSL dosimeters around the chest area to best measure the doses received by the upper torso. If however, one part of the body is most likely to be exposed than the other parts, such as the waist, neck, or back, place the dosimeter on that area. Do not allow clothing, buttons, pens or buckles to shield the front of the badge.
4. If protective clothing is used, wear the dosimeter using the following guidelines
  - 4.1. When dealing primarily with penetrating radiation such as X-rays or gamma-rays, place the OSL dosimeter under the protective clothing
  - 4.2. When a non-penetrating radiation type is expected (e.g. beta radiation, or photon radiation < 20 keV average) and the eyes or substantial areas of skin are unprotected (e.g., the face and neck), then the dosimeter should be

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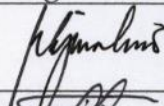
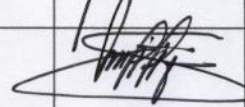
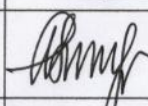
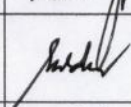
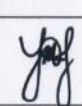

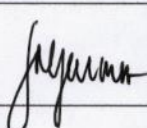
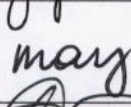
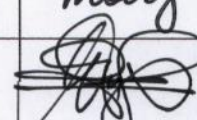
placed on the outside of the protective clothing to ensure proper measurement of shallow dose. However for areas with potential contamination, place the dosimeter in a thin plastic bag before wearing to avoid cross contamination.

- 4.3. When a lead vest / apron is used, place the dosimeter underneath it in order to measure efficiency of the vest / apron in protecting the personnel.
5. At the end of each work in the radiation facility, remove the OSL dosimeter and store it together with the Control dosimeter in a radiation free area, preferably in a designated office or locker area.
6. If a dosimeter is lost or damaged (broken clip, lost filter, etc.), notify the head nurse immediately and ask for a replacement.
7. The Head Nurse shall collect all issued dosimeters after the two (2) months monitoring period and send to PNRI for processing and dose evaluation. New badges shall be issued to replace the previous one.



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Approved:	<b>GENESIS GOLDI D. GOLINGAN</b> President and CEO		9/14/22



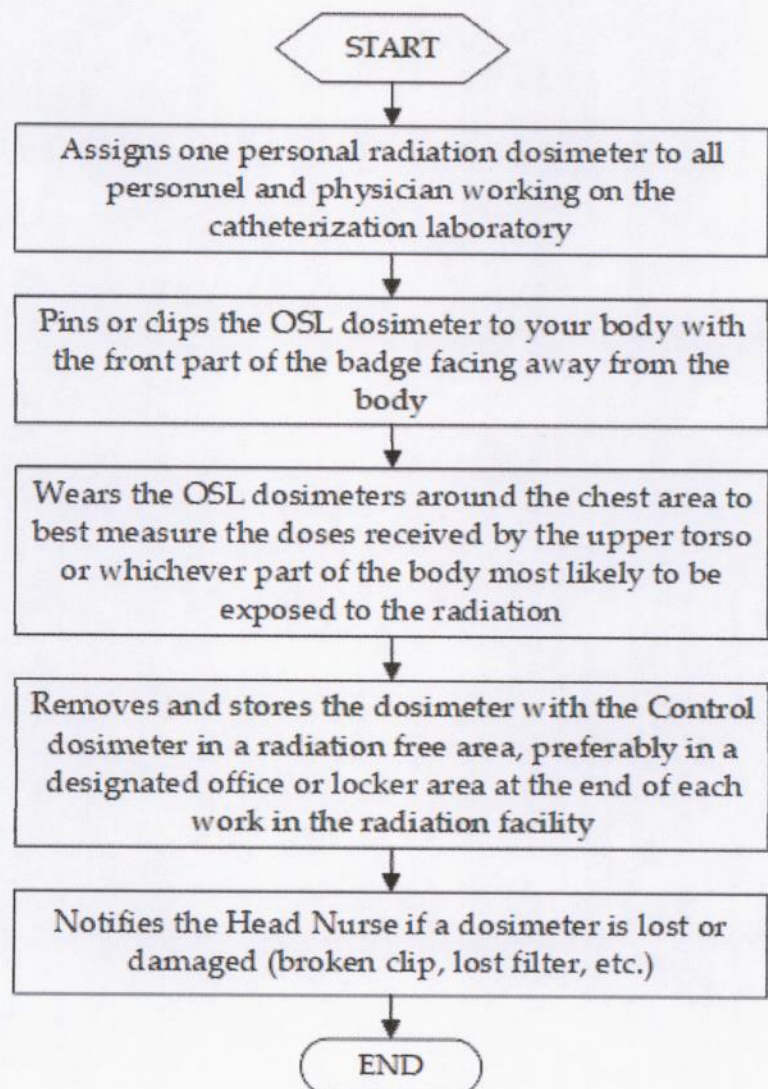


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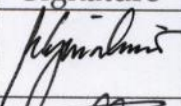

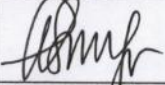
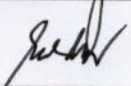


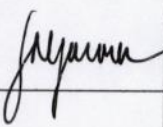
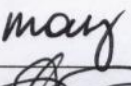

## FLOWCHART






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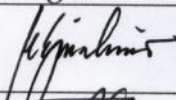
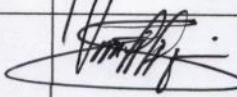
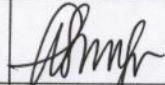
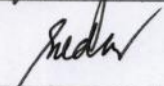


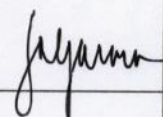
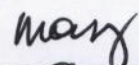

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KEY TASKS	PERSON RESPONSIBLE
1. Assigns one personal radiation dosimeter to all personnel and physician working on the catheterization laboratory	Head Nurse
2. Pins or clips the OSL dosimeter to your body with the front part of the badge facing away from the body	Catheterization Laboratory Personnel and Physicians
3. Wears the OSL dosimeters around the chest area to best measure the doses received by the upper torso or whichever part of the body most likely to be exposed to the radiation	Catheterization Laboratory Personnel and Physicians
4. Removes and stores the dosimeter with the Control dosimeter in a radiation free area, preferably in a designated office or locker area at the end of each work in the radiation facility	Catheterization Laboratory Personnel and Physicians
5. Notifies the Head Nurse if a dosimeter is lost or damaged (broken clip, lost filter, etc.)	Catheterization Laboratory Personnel and Physicians



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