

## **PROFESSIONAL BOARD FOR RADIOGRAPHY AND CLINICAL TECHNOLOGY**

### **GUIDELINES FOR RENDERING OF FORENSIC IMAGING SERVICES IN SOUTH AFRICA**

#### **1. Introduction:**

The Professional Board for Radiography and Clinical Technology of the Health Professions Council of South Africa (HPCSA) is mandated by law to provide regulatory guidelines to the Radiography and Clinical Technology Professions, set minimum standards for the education and training of Radiographers and Clinical Technologists and protect the public through upholding applicable practice standards. This document serves to provide guidelines for the rendering of forensic imaging including post-mortem forensic imaging services by diagnostic radiographers in South Africa. When rendering forensic imaging services, radiographers need to be familiar with and operate strictly within the Scope of the Profession as well as the Scope of Practice for Diagnostic Radiography. This document must be read in conjunction with other applicable laws and regulations as well as the requisite ethical rules for Radiography. These guidelines were written for the local context and were derived from international best practice guidelines<sup>1</sup>.

#### **2. Definitions and Concepts**

##### **2.1 Forensic Radiography**

Forensic radiography is defined as the application of diagnostic imaging and the science thereof to questions of law<sup>1</sup>. Forensic radiography can be performed outside traditional working stations like hospitals and radiology clinics.

##### **2.2 Forensic Radiology**

Comprises the acquisition, interpretation and reporting of radiological examinations and procedures related to courts or processes of law<sup>2</sup>.

The forensic application of diagnostic medical radiology is applied for many reasons such as human identification (particularly in investigations of mass disasters and decomposed bodies), evaluation and documentation of injury or cause of death (accidental or non-accidental), criminal and civil litigation (fatal or non-fatal), administrative proceedings, education, research and administration.

### **2.3 Post-mortem imaging**

Diagnostic image acquisition of a deceased person, body parts or pathological specimen.

### **2.4 Forensic medicine**

Forensic medicine also known as legal medicine is defined as the science that deals with the relation and application of medical facts to health legal matters<sup>2</sup>.

### **2.5 Forensic Pathology**

In South Africa, Forensic Pathology is a sub-specialty of the discipline of Pathology that entails the investigation of unnatural, sudden or unexplained deaths<sup>3</sup>. This profession applies forensic, scientific and pathological techniques in the assessment of unnatural deaths<sup>3</sup>. The role of the Forensic Pathology Service (FPS) in South Africa encompasses requesting and conducting appropriate special investigations to aid in establishing the causes and circumstances of death in unnatural deaths according to The Regulations Regarding the Rendering of Forensic Pathology Service as published in the Government Gazette No. 41524, No. R 359, 23 March 2018<sup>4</sup>.

### **2.6 Unnatural causes of death**

In South Africa, when the cause of death is deemed to be unnatural, the law mandates a medico-legal postmortem examination, which includes an autopsy in accordance with the Inquests Act, (Act No. 58 of 1959)<sup>5</sup>.

In South Africa, unnatural deaths are defined as the following:

- a) any death due to physical or chemical influence, direct or indirect, or related complications according to the National Health Act, No. 61 of 2003<sup>6</sup>
- b) any death, including those deaths which would normally be considered to be a death due to natural causes, which may have been the result of an act of commission or omission which may be criminal in nature
- c) any procedure-related death as contemplated in section 56 of the Health Professions Act, 1974 (Act No. 56 of 1974)<sup>7</sup> and
- d) any death which is sudden and unexpected, or unexplained, or where the cause of death is not apparent according to the Regulations Regarding the Rendering of Forensic Pathology Service<sup>4</sup>.

### **2.7 Natural causes of death**

Natural causes of death are considered as death caused by disease or old age<sup>8</sup>.

### **2.8 Forensic Autopsy**

Forensic autopsies (also known as medico-legal autopsies) are conducted for all unnatural causes of death. The forensic autopsy is mandatory in all deaths apparently occurring from unnatural causes as mandated by the Inquest Act No. 58 of 1959<sup>5</sup> thus no consent is required<sup>9,10</sup>. The primary purpose of the forensic autopsy is, inter alia, to determine the cause and manner death.

During the forensic autopsy, the cranium, thoracic and abdominal cavity are opened, and the internal organs are inspected and dissected to identify trauma and other pathology to determine the cause of death<sup>11</sup>. The forensic autopsy extends beyond the anatomical dissection of the human body and may incorporate specialised supplementary examinations such as histology, microbiology, toxicology, biochemistry, deoxyribonucleic acid (DNA) analysis, dentistry, anthropology, evidence collection and photography, and may include conventional diagnostic imaging, Lodox<sup>®</sup> or fluoroscopy<sup>12</sup>.

## **2.9 Anatomical autopsy**

Anatomical pathology autopsies are conducted for natural deaths in accordance with the National Health Act<sup>6</sup>. Anatomical autopsies can be done for academic reasons, for personal reasons or control and limitation of communicable diseases. These autopsies not only enable the full investigation of the nature and extent of disease, complications and co-morbid conditions, but are useful for teaching health care students and conducting research. These findings can be used to inform clinicians as to the cause of death and are useful for clinico-pathological correlation. Anatomical autopsies therefore enable comparison of the clinical diagnosis with the ultimate cause of death. Unlike the forensic autopsy, permission from the deceased self (prior to death) or next of kin is required to conduct an anatomical autopsy<sup>9,10</sup>. Anatomical autopsies can also be conducted for cremation purposes when relatives would like to know the cause of death, or in cases of suspected communicable diseases in order to establish the cause of death. Anatomical autopsies to determine a cause of death in suspected communicable diseases are usually a limited autopsy and serves to control or prevent the spread of such a disease.

## **3. Applications of Forensic Radiography**

Diagnostic radiography has been used to document injuries for forensic purposes shortly after the discovery of X-rays by Roentgen in 1895 and today forms an indispensable part of post-mortem examinations<sup>13,14,15</sup>. Forensic Radiography (-imaging) can be applied in live individuals as well as part of post-mortem examinations of the deceased. The following are scenarios for both live and deceased individuals:

### **3.1 Investigation of non-fatal injuries:**

This involves imaging to support investigation of injury such as:

- Non accidental injury (NAI) in children, disabled persons and the elderly
- Injuries caused by assault
- Injuries caused by neglect
- Injuries caused by medical negligence
- Industrial injury or disease
- Custodial injury (whether South African Police Services or Correctional Services)
- Torture or systematic abuses of human rights
- Compensation claims<sup>1</sup>

### 3.2 Locating hidden or foreign bodies:

Examples include

- **Human packing** (e.g. drug or diamond smuggling)
- **Animal packing** (e.g. drug or diamond smuggling)
- Ballistic material caused by shotgun pellets, bullets, shrapnel, arrowheads and other projectiles.
- Non-ballistic material such as knives, spear, panga blades, needles<sup>1</sup>

### 3.3 Cause of death determination following:

- Road traffic deaths
- Death following medical intervention (including anaesthesia) or medical care
- Homicide
- Suicide
- Custodial death (police or correctional services)
- Discovery of decomposed human remains
- Mass fatalities incident, genocide or atrocity crime.
- SUDI and Sudden Infant Death Syndrome (SIDS)<sup>1,15</sup>

### 3.4 Human Identification

- Demonstration of dental structures to facilitate identification through comparative techniques<sup>16</sup>
- Demonstration of other anatomical structures, trauma and pathological conditions, to facilitate identification through comparative techniques
- Determination of biological profile (age, stature, sex, socio-economic status etc) through evaluation of skeletal structures<sup>1,9</sup>
- Three-dimensional multi-planar reconstruction (e.g. facial reconstruction)
- Demonstration of personal effects (e.g. jewellery to assist identification)
- Photo-superimposition<sup>1</sup>

## 4. Imaging modalities used for post-mortem forensic imaging

- Projection Radiography (conventional diagnostic imaging)<sup>1</sup>
- Dental radiography<sup>1,17</sup>
- Fluoroscopy
- Post-mortem Computed Tomography (PMCT)
- Post-mortem Magnetic Resonance Imaging (PMMRI)
- Post-mortem Computed Tomography Angiography (PMCTA)<sup>1</sup>
- Virtopsy which uses a combination of PMCT and PMMRI as well as photogrammetry<sup>18</sup>

- Lodox
- Other disciplines include:
  - Ultrasound
  - Nuclear Medicine<sup>1</sup>

## **5. Requests for post-mortem forensic imaging services**

The following medical practitioners may request imaging services on a deceased person:

- Forensic pathologist
- Medical practitioner authorised to conduct a post-mortem examination (as per the relevant Act or regulations)<sup>5,6</sup>
- Forensic odontologist
- Forensic anthropologist
- Forensic physician
- Police and Security services<sup>1</sup>

Imaging may only proceed upon receipt of an appropriate request form, which can be either be digital or in hard copy.

## **6. Role and responsibilities of the employer:**

### **6.1 Standard Operating Procedures**

All employers should have a clear Standard Operating Procedure (SOP) in place for the rendering of post-mortem forensic imaging services. This SOP will assist diagnostic radiographers not familiar with local protocols, to follow the relevant local guidelines. This SOP must be aligned with these guidelines<sup>1</sup>.

### **6.2 Appointing radiographers for post-mortem forensic imaging services**

Post-mortem forensic imaging is essential in determination of cause and/or manner of death, and thereby provides an invaluable contribution to the administration of justice in criminal or maltreatment cases<sup>2,19</sup>. It is acknowledged that the performance of post-mortem forensic imaging may cause emotional distress in some radiographers.

It would be preferable that radiographers who are more comfortable with the performance of post-mortem forensic imaging are allocated to do the imaging in these cases. Radiography departments as an entity, cannot refuse to conduct post-mortem imaging services. In such cases, it is the duty of the employer to ensure that suitably qualified, experienced radiographers are appointed to perform post-mortem examinations<sup>1</sup>.

## **7. Role and responsibilities of the radiographer when conducting post-mortem imaging**

Radiographers undertaking post-mortem forensic imaging must be appropriately educated and trained for the provision of such services<sup>1</sup>. Radiographers need to familiarise themselves with the applicable SOP for conducting post-mortem forensic imaging. Guidelines for Rendering of Forensic Imaging Services in South Africa: 14 March 2023

imaging in their respective hospital or clinic. It is recommended that radiographers conducting post-mortem forensic imaging are rotated to ensure a fair exposure to post-mortem examinations.

### **7.1 Authentication:**

- Radiographers must ensure that all bodies undergoing post-mortem examinations, be properly identified<sup>1</sup>.
- Imaging must include the date and time of the examination and use of correct anatomical markers<sup>20</sup>.

### **7.2 Timing of post-mortem imaging services**

It is critical that requests for post-mortem imaging service be expedited as some post-mortem examinations are subject to religious and other legal considerations<sup>1,20</sup>. Post-mortem forensic imaging examinations conducted in hospitals or clinics, should ideally be performed in a room not used for ordinary diagnostic imaging services. Where such a dedicated room is not available, post-mortem forensic imaging services should be performed in an organised manner in conjunction with the management of living patients.

### **7.3 Continuity of evidence**

Post-mortem forensic imaging studies conducted as part of a medico-legal investigation, is considered sub-judice<sup>7</sup>. No alteration to the body, or removal of clothing, personal effects such as jewellery, catheters or lines used during medical treatment, should occur. In such cases, radiographers must ensure that an audit trail is established for the possession and transfer of evidence from the time it is identified as evidence until presentation in a court of law. Primary evidence (such as a corpse/torso) should not be left unattended when processing images. In such instances an appropriate witness must oversee the evidence<sup>1</sup>. In South Africa an appropriate witness can be a police officer or a forensic pathologist<sup>20</sup>. After imaging, such evidence must be returned to the responsible person or continuity officer<sup>1</sup>.

### **7.4 Integrity of the evidence**

This step entails the prevention of any damage, alteration or unauthorised access to evidence such as radiographic images. Integrity implies that the evidence has been dealt with in an appropriate manner without any interference, either intentionally or accidentally<sup>1</sup>. Radiographers need to ensure that the images are securely stored and not accessible by unauthorised persons. Digital images should preferably be stored in dedicated folders using secure passwords. Integrity of evidence must be upheld at all times during any post-mortem forensic imaging processes.

### **7.5 Original images**

The transition into digital and computed radiography resulted in the production of digital images for most conventional and specialised diagnostic examinations. Digital images must be properly authenticated to serve as primary evidence in a court of law.

## **7.6 Confidentiality**

All details about post-mortem forensic examinations must be treated with strict confidentiality as majority of such requests emanate from medico-legal cases which are sub-judice<sup>21</sup>.

## **8. Health and Safety**

In accordance with the Occupational Health and Safety Act (Act 85 of 1993)<sup>22</sup> all employers should ensure that the work environment for conducting post-mortem forensic examinations are safe and poses no health risk for radiographers. Radiographers should adhere to health and safety protocols when conducting post-mortem forensic imaging services to prevent cross-infection. The following guidelines should be followed:

- All cadavers and human remains should be considered as potentially infectious and should be treated with care.
- Appropriate personal protective clothing must be worn during image acquisition.
- The acquisition of post-mortem forensic imaging within a diagnostic radiography department should be so managed to cause minimum distress to patients and staff.
- Arrival and return of human bodies must be via the most discrete entrance<sup>1</sup>.
- Post-mortem forensic imaging requests on deceased persons must be done by prior arrangement and an established referral system must be in place.
- Where possible routine imaging requests must preferably be conducted within a mortuary.
- If not possible, a dedicated room with appropriate shielding and privacy should be made available for post-mortem forensic imaging services especially in departments where regular post-mortem forensic imaging requests are performed.
- Mortuaries need to be so designed to ensure safe acquisition of post-mortem forensic imaging services<sup>1</sup>.

## **9. Health and welfare of radiographers conducting post-mortem forensic imaging services.**

- It is the employers' responsibility to ensure the welfare of radiographers conducting post-mortem forensic imaging services.
- Due to potential distressing nature of post-mortem forensic imaging on cadavers or human remains, appropriate and regular counselling services or debriefing sessions should be made available for radiographers conducting such imaging services<sup>1,22</sup>.
- A pool of radiographers should be available to conduct post-mortem forensic imaging on cadavers or human remains to ensure a fair spread of the workload amongst available radiographers.

## **10. Record-keeping**

All images and imaging requests related to post-mortem forensic radiography should be kept for a minimum of twenty years.

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