

Introduction to Clinical Radiography Practice

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Designed as a quick-reference guide for students and new practitioners.

1. What Is Clinical Radiography?

Aspect	Description
Definition	The use of ionising (X-ray, gamma) and non-ionising (ultrasound, MRI) imaging modalities to obtain diagnostic images of the human body.
Primary Goal	Produce high-quality images that accurately depict anatomy and pathology while protecting patients from unnecessary radiation.
Key Settings	Hospitals, outpatient imaging centres, mobile units, dental practices, and research facilities.
Professional Title	Clinical Radiographer (also called Radiologic Technologist, X-ray Technologist, or Imaging Technologist, depending on region).

2. Core Principles of Radiographic Practice

1. ALARA (As Low As Reasonably Achievable)

- Minimise exposure time, use appropriate shielding, and optimise technical parameters.

2. Image Quality

- Adequate contrast, sharpness, and anatomical coverage.

3. Patient Safety & Comfort

- Verify identity, explain procedures, respect privacy, and manage pain or anxiety.

4. Legal & Ethical Responsibility

- Informed consent, confidentiality (HIPAA/GDPR), and adherence to local regulations.

5. Radiation Protection

- Use of lead aprons, thyroid shields, gonadal collars, and proper room signage.
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3. Imaging Modalities Overview

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Modality	Radiation Type	Typical Indications	Key Advantages	Main Limitations
Plain Radiography (X-ray)	Ionising	Fractures, chest, abdomen, skeletal surveys	Fast, inexpensive, portable	Limited soft-tissue contrast
Computed Tomography (CT)	Ionising	Trauma, stroke, oncologic staging	Cross-sectional detail, 3D reconstructions	Higher dose, metal artefacts
Mammography	Ionising (low energy)	Breast cancer screening	High spatial resolution, early detection	Compression discomfort
Fluoroscopy	Ionising	Barium studies, interventional procedures	Real-time imaging	Cumulative dose to staff/patient
Ultrasound (US)	Non-ionising	Obstetrics, abdominal, vascular	No radiation, bedside, Doppler flow	Operator dependent, limited penetration
Magnetic Resonance Imaging (MRI)	Non-ionising (magnetic fields)	CNS, musculoskeletal, soft-tissue tumours	Superior soft-tissue contrast	Contraindicated with certain implants, longer scan time
Nuclear Medicine (e.g., PET, SPECT)	Ionising (radioisotopes)	Functional imaging, oncology	Metabolic information	Radiation dose, need for radiopharmacy

4. The Radiographic Workflow

1. Patient Reception & Verification

- Confirm name, DOB, and exam order.
- Check for contraindications (e.g., pregnancy, implants).

2. Preparation

- Positioning aids (sponges, sandbags).

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- Explain the procedure and obtain verbal consent when required.

3. Exposure Settings

- **kVp (kilovoltage peak):** Controls beam energy & contrast.
- **mAs (milliampere seconds):** Controls photon quantity (dose).
- Use exposure charts, automatic exposure control (AEC), or manual calculations.

4. Image Acquisition

- Align anatomy with the central ray.
- Apply appropriate collimation and shielding.
- Perform the exposure and