Escuela Hospital Mompía

UT4 – Protocols and Equipment in Radiodiagnosis and Radiotherapy

1. Introduction to Radiodiagnosis and Radiotherapy

Radiodiagnosis and radiotherapy are two essential areas in modern healthcare. Both use radiation or imaging technologies, but their objectives are different.
Radiodiagnosis is focused on diagnosing diseases, while radiotherapy is used for treating cancer and other conditions.
Radiodiagnosis allows healthcare professionals to obtain images of the inside of the human body. These images help doctors detect injuries, tumors or illnesses. Radiotherapy, on the other hand, uses high-energy radiation to destroy cancer cells or reduce tumor size.
These services are usually located in specialized hospital departments and require trained professionals, advanced equipment and strict safety protocols.

2. Equipment Used in Radiodiagnosis

Radiodiagnosis uses different types of imaging equipment, depending on the clinical purpose.
One of the most common devices is the **X-ray machine**, which produces images of bones and internal organs. X-rays are quick and widely used in emergency and routine examinations.
Another important device is the **CT scanner (Computed Tomography)**. It combines X-rays and computer technology to produce detailed cross-sectional images of the body. CT scans are commonly used to detect internal injuries or tumors.
The **MRI scanner (Magnetic Resonance Imaging)** uses magnetic fields and radio waves instead of ionizing radiation. It provides high-quality images of soft tissues such as the brain, muscles and ligaments.
Ultrasound machines use sound waves to create images. They are frequently used in pregnancy and abdominal examinations. Ultrasound is safe and painless.
Finally, **mammography units** are specialized X-ray systems used to examine breast tissue and detect early signs of breast cancer.

3. Equipment Used in Radiotherapy

Radiotherapy departments use specific equipment designed for cancer treatment.
The most important device is the **linear accelerator (LINAC)**. This machine produces high-energy radiation beams that are directed at the tumor. The goal is to destroy cancer cells while minimizing damage to healthy tissues.
Before treatment, patients are scanned using a **CT simulator**. This device helps professionals plan the treatment accurately.
The **Treatment Planning System (TPS)** is a computer system used by medical physicists to calculate radiation doses and define treatment parameters.
Radiotherapy also uses **immobilization devices** such as masks or molds. These devices help keep the patient in the same position during each treatment session to ensure precision.

4. Safety Protocols and Radiation Protection

Safety is a key aspect in both radiodiagnosis and radiotherapy. Radiation can be harmful if not properly controlled.
All staff must follow **radiation protection protocols**. These protocols aim to reduce radiation exposure to patients, professionals and the public.
Common protective measures include the use of **lead aprons**, **shielding walls** and **controlled areas**. Warning signs indicate areas where radiation is present.
Professionals must monitor radiation doses and follow the ALARA principle (As Low As Reasonably Achievable).

5. Basic Clinical Protocols

Clinical protocols define the steps to follow when performing imaging or treatment procedures.
In radiodiagnosis, the protocol usually includes:

- Patient identification
- Explanation of the procedure
- Correct patient positioning
- Image acquisition

In radiotherapy, protocols are more complex and include:

- Patient preparation
- Verification of treatment parameters
- Radiation delivery
- Session documentation

Clear communication with the patient is essential at all stages.

6. Professional Roles in the Department

Different professionals work together in radiodiagnosis and radiotherapy departments.

- **Radiographers / Radiation therapists** operate the equipment and assist patients.
- **Radiologists** interpret diagnostic images.
- **Radiation oncologists** prescribe radiotherapy treatments.
- **Medical physicists** calculate radiation doses and ensure safety.
- **Nurses** provide patient care and support.

Teamwork is essential to guarantee quality and safety.

7. Communication with the Patient

Effective communication is a fundamental part of professional practice.
Professionals must give clear instructions, reassure patients and explain procedures in simple language. This helps reduce anxiety and improves cooperation.
Common expressions include:

- *Please remain still.*
- *This procedure is painless.*
- *The treatment will only take a few minutes.*

Good communication contributes to patient safety and comfort.