LECTURE 6
MOBILE X-RAY UNITS

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At the end of lesson, the student should be able to:

1. List type of mobile x-ray units.
2. Briefly explain type of generators in mobile x-ray units.
3. List the advantages and limitation of the generators.
4. Briefly explain the principle operation of mobile x-ray units.
5. List the advantages and limitation of mobile x-ray units.
6. Briefly explain the special consideration for mobile x-ray units.
7. Briefly explain the safe handling for mobile x-ray units.
INTRODUCTION

What is mobile x-ray units?

• It is equipment which can be moved from one place to another and used at the patient’s bedside or in operation theatre.

• There are TWO (2) types of mobile x-ray units:-
  A. Mobile Radiography Unit
  B. Mobile C-arm (II) Unit
Where are they commonly used?

• Patient’s Room (Wards)
• Emergency Department
• ICU, CCU, HDW
• Surgery and Recovery Rooms (OT)
• Nursery and Neonatal units
MOBILE X-RAY (RADIOGRAPHY)

MOBILE C-ARM (II)
MOBILE X-RAY (RADIOGRAPHY)
INTRODUCTION

• Used at patient bedsides.
• Requires Radiographer’s skills and expertise.
• Procedures should be performed using as standard a method as possible.
• Manual technique is generally used.
• Ordinary factors such as distance, grids, and technique can become a challenge.
TYPES OF MOBILE X-RAY (RADIOGRAPHY)

• Two types
  – Battery powered
    • Uses two sets of lead-acid, or nickel-cadmium batteries.
      – One set powers driving of the machine.
      – One set provides power to the x-ray tube.
    • Recharging is necessary after a number of exposures.
  – Capacitor discharge
    • Does not operate on batteries. It can produce x-ray from energy stored in, then discharged from a capacitor.
    • Carries two metal plates that hold electrical charge.
Battery Powered

**Advantages:**
1. This machine can be used freely, provides wide range of satisfactory kVp & mAs.
2. This machine could be recharging less frequently that the capacitor one. Some machine allows you to take up to 500 exposures without re-charging.

**Disadvantages:**
1. It needs special care and maintenance.
2. This machine is heavy and hard to control.
Capacitor Discharge

**Advantages**
1. Lightweight, smaller and easier to maneuver.
2. Require much less time to charge than battery units.
3. The production and quality is consistence.
4. No battery usage.

**Disadvantages**
1. Can’t handle thick body parts due to voltage drop during exposure.
2. Must be charged prior to each use.
Preparation Checks

1. Check the battery level.
2. Ensure the Motor driven ability is in good condition.
3. Inspect the braking system to avoid unnecessary injuries.
4. Ensure the ancillary extension is in good condition and available.
5. Check the tube placement before and after use.
Technical Challenges/Considerations

1. Grid
2. Anode Heel-Effect
3. Distance
1. Grid

• Make sure that the grid is level.
• The grid and x-ray beam must be properly centered.
• The correct focal distance must be used.
• The best grids for mobile radiography have ratios of 6:1 or 8:1 and a focal range of 36 - 44 inches.
• Make sure that the grid is fastened to the film properly if a tape-on grid is used.
2. Anode Heel Effect

• Heel effect increases with short SID, larger field sizes, and small anode angles.
• Short SID’s and larger field sizes are more common in mobile radiography.
• Pay attention to the cathode and anode sides of the tube - it is usually marked on the tube housing.
• Correct placement of the anode-cathode with regard to the anatomy is essential.
3. Distance

- Distance is often a variable in mobile radiography.
- As mAs increases, exposure times will increase.
- Most portables operate up to a 100 or 200 mA station.
- Occasionally, OID must be varied.
Radiation Safety

- Mobile radiography is one of the areas in which the radiographer may receive a high exposure.
- Radiographer should stand at a right angle to the tube and scattering object.
- Lead aprons should be worn.
- Maximize distance.
- Lead must be provided to any parties that must hold a patient or cassette.
- Lead shielding must be used for all patients unless it will interfere with the examination.
Before Beginning The Examination

• Check the patient’s chart for the order.
• Let the nurse’s station know of your presence and purpose.
• Obtain assistance when necessary.
• Identify the patient and introduce yourself with your title.
• Explain the examination and ensure it is appropriate and correct.
• Move any interfering equipment carefully.
• Politely ask any visitors to leave.
Patient Care Considerations

• Isolation patients
• Body fluids
• IV, catheter lines, monitors
• Cassettes should be covered
• Immobilization devices
• Patient mobility limitations
• Equipment considerations
Common Mobile Radiographic Procedures

• Chest
  – AP, PA, Decubitus

• Abdomen
  – AP, Decubitus

• Orthopedic
  – May include upper or lower extremities, spine, pelvis
  – Patient may be in traction, or immobilization devices
Example 1: AP Chest

• Elevate head of the bed as pt condition permits.

• Pull patient to head of bed before elevating if condition permits.

• Make sure pt is not rotated.
Example 2: Neonate

- AP projection of chest and abdomen often ordered and shot in one exposure.
- Infant is supine.
- Some bassinets equipped with tray to hold IR.
- **If IR placed directly under infant**- wrap with soft cover.
MOBILE C-ARM (II)
MOBILE C-ARM (II)

• Tube at one end AND II at other end.
• TV Monitor control cart separate from unit.
• Uses Digital Fluoroscopy.
• Last Image Hold, Image Enhancement.
• Save for hard copies from disk, Video.
• Photographic Magnification, Subtraction.
• Static (pulsed) and continuous fluoro.
• Maneuverable and Versatile.
Cont’d..

**Advantages**

- Immediate localization and manipulation.
- Fewer radiographs required as it can view many different parts.
- Reduce operation time and radiation dose.
- More efficient use of operation time and high resolution images.
- Easy to handle as it has simple buttons and flexibility in adjusting the positions.
Disadvantages

• If unskilled personnel handled, it will increase length of fluoroscopic time.
• It is very expensive.
• Limited to certain procedures only.
• It is affected by noises due to object density and thickness that will degrade the image quality.
• Provide high dose and high risk injury to the patient if untrained staff operates it.
~END OF LECTURE 6~