MRAD 240: Specialized Imaging 1

Operating Room Environment & Equipment

MRT Program

Objectives

- OR environment and layout
- Rules in the OR
- Sterile and nonsterile team members
- Sterile Areas
- Sterile Field and image of sterile draping
- Radiography equipment in OR and image of draped C-arm
- Technologist's role in OR
- Communication in the OR
- C-arm features, movements, control panels and introduction to set up

Surgical Environment



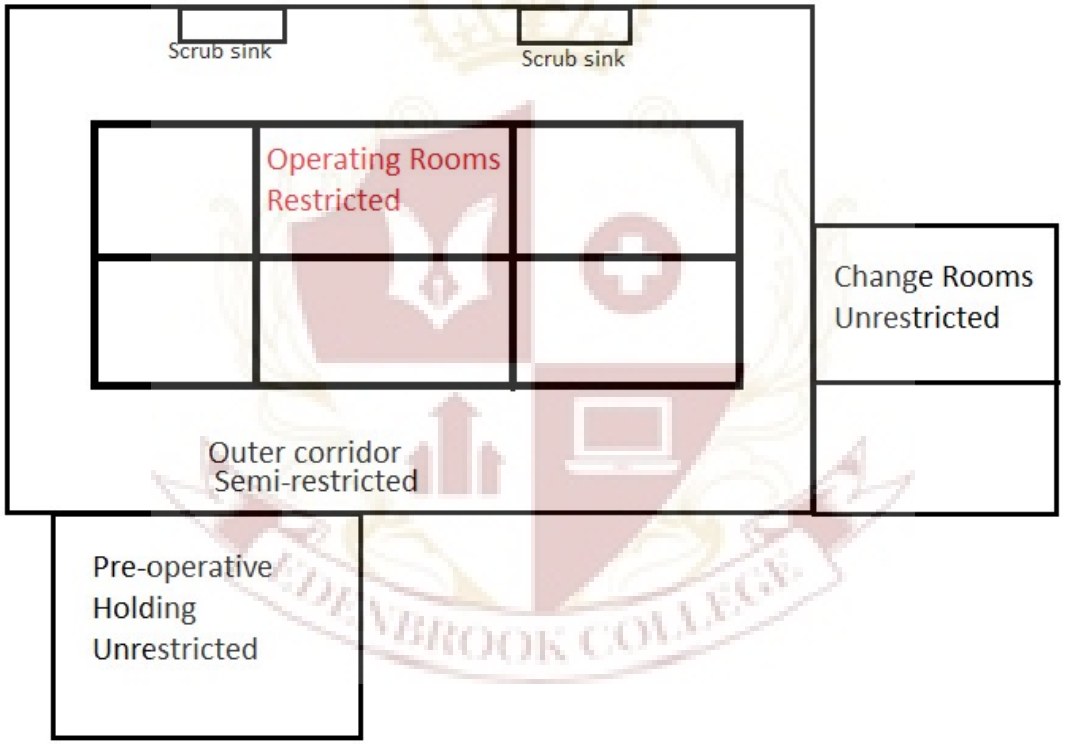
Operating Room Environment

- Every possible effort is made to protect the patient from infection.
- Applies to surgical and special procedure areas in X-ray dept.
  - Cath lab, angio suite, fluoro rooms…
- An environment with established barriers that limit the source of contamination.
- All persons who enter the surgical suite are expected to follow the rules established to maintain these barriers.

Operating Room Environment cont.

- Divided into three areas:
  - Unrestricted zone
    - Street clothing allowed
    - Change room + pre-operative holding area
  - Semi-restricted zone
    - Designated OR scrubs, hair covers, shoe covers
    - Corridor outside operating suites
    - Equipment storage
  - Restricted zone
    - Designated OR scrubs, hair covers, shoe covers, and masks
    - Operating rooms
    - Corridors between rooms

OR Layout


Scrub sink
Scrub sink
Operating Rooms
Restricted
Change Rooms
Unrestricted
Outer corridor
Semi-restricted
Pre-operative
Holding
Unrestricted

Rules in the OR

- Scrubs must be hospital supplied designated surgical scrubs
  - Clean
  - Tops tucked in or tight fitting
- Hair, beards or mustaches must be covered with a surgical cap.
- Shoe covers must be worn to reduce contamination.
- Tie-on surgical masks must be worn in restricted area

Radiographer in Surgical Attire



Rules in the OR cont.

- Dress and behavior protocols are strictly enforced.
- Conversation is kept to a minimum.
- Should wear comfortable, supportive shoes.
- No clogs, sandals, or cloth shoes.
- Meticulous personal hygiene.
  - No nail polish or jewelry
- No colds or open wounds

More Operating Room Rules

- Don't fill your shirt pocket with items that could fall out as you work around the surgical table.
- Be aware of sterile fields.
- Watch for contamination.
- Most facilities have dedicated X-ray equipment in the OR such as mobiles and C-arms
- Pay attention when moving equipment cables in the room. Especially cables on the floor

Sterile Team Members

- The Surgeon
  - Plans and performs the surgical procedure
  - Makes all surgical decisions
- The Surgical Assistant
  - May be a resident surgeon
  - May be several assistants depending on the patient's surgical needs
- The Scrub Nurse
  - Prepares sterile field and works within sterile field
  - Assists surgeons with gowning
  - Prepares and manages sterile instruments and supplies

Non-sterile Team Members

- The Anesthesiologist
  - Induces and monitors anesthesia throughout procedure
  - Makes decisions about patient safety
- Circulating Nurse
  - Charting
  - Tracking and obtaining supplies as needed
- Radiographer

Sterile Areas

- Sterile Corridor
  - Area between the patient drape and instrument table
  - Radiographer is excluded
- Sterile instrument trays
- Radiographic equipment once draped
- Patient draping and surgical area

NOTE-Often the head of the table (with anesthesiologist) usually not included

- Good place to assess situation and work from

Sterile areas cont.

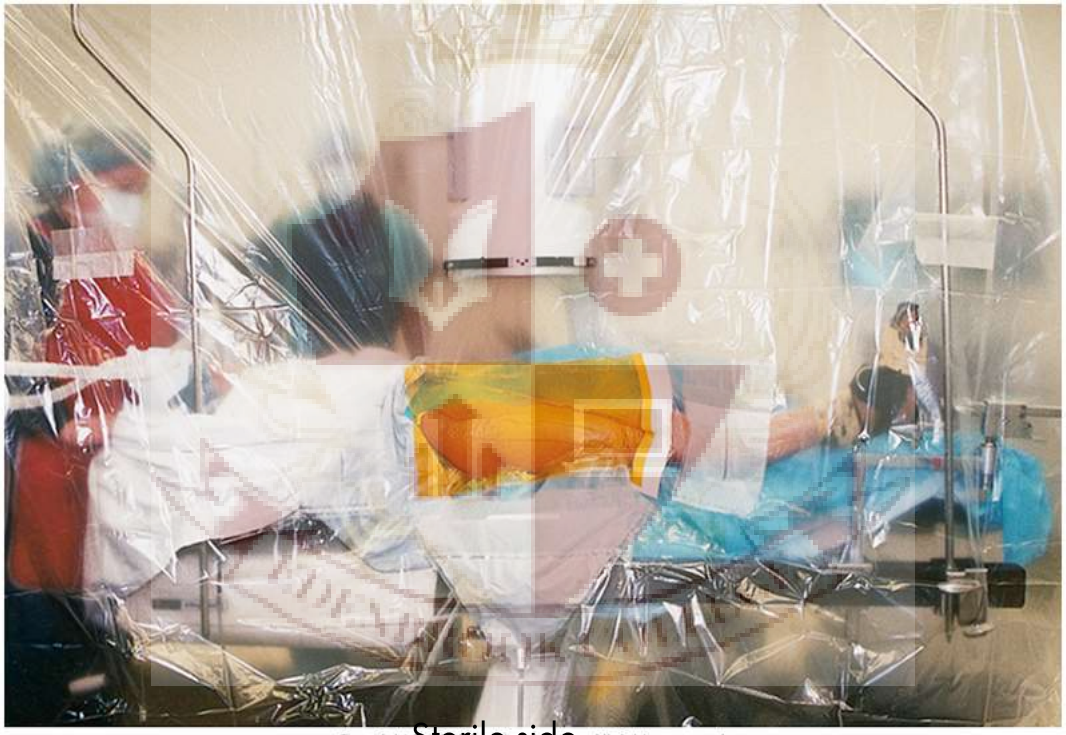
- Non-sterile personnel must not come in contact with sterile personnel
- Any contaminated sterile drape or cover must be reported and replaced
- Sterile gowns considered sterile:
  - From shoulder to level of sterile field (typically waist area)
  - At the sleeve from cuff to just above elbow
  - OR tables are considered sterile only at level of tabletop

Sterile Field



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Shower Curtain Drape



Sterile side

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Shower Curtain Drape



Non-sterile side

Radiography Equipment in the OR

- Before bringing equipment into the operating room, you must wipe it down with a germicidal solution.

- Operational check and inspection

- Proper equipment location:
  - Monitor in clear vision of surgeon
  - Locate power outlet. Think tripping hazard
  - Not in way of traffic
  - Ask for assistance (circulating nurse preferred) if need to move other non-sterile equipment such as chairs or tables.

Draping the C-arm

- Scrub nurse puts sterile plastic cover over image intensifier end of C-arm
  - Technologist can help by reaching up inside and pulling drape down
- Scrub nurse will use adhesive to tighten drape around C-arm
- Communication essential when doing this in tandem



https://www.indiamart.com/proddetail/c-arm-cover-14546134955.html

Technologist's Role

- Radiation Protection
  - Ensure staff is wearing lead aprons, give them enough time and notice to protect themselves
  - Warn entering personnel that radiation is being used
- Set up and operate equipment
- Make sure you **sign** the chart.

Communication in the OR

- The OR is a unique environment. Preparation is the key to success.
- Communication comes in many forms. Example- hand motions, eye contact, verbal.
- *Understanding how to communicate and when to communicate (timing) is essential. Examples are:....

C-arm- *Discuss the components*



Courtesy GE OEC Medical Systems, Salt Lake City, Utah.

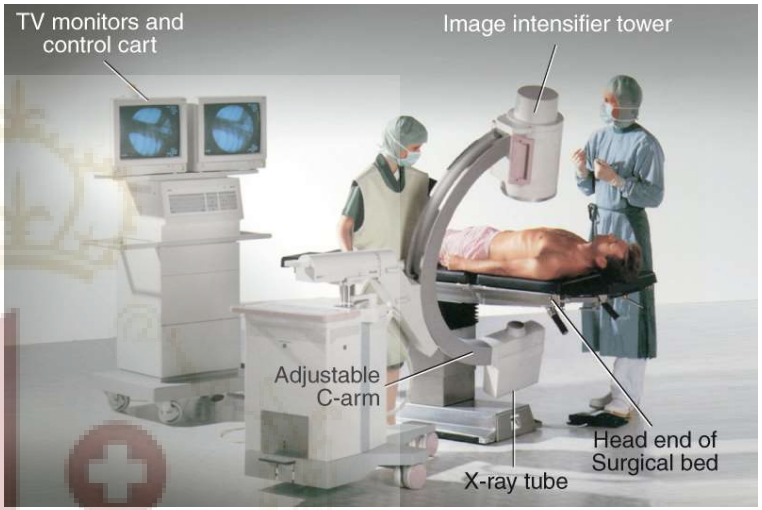
C-arm

Includes

- C-arm with x-ray tube and image intensifier
- TV monitors (2)
- Foot pedal

Features

- Digital imaging and storage
- Image hold feature
- Image enhancement, masking, and subtraction





C-arm Base Movements



Figure 5: C-arm forward and backward movements
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Moves base forwards and backwards



Moves base side to side

Figure 6: C-arm side-to-side Movements
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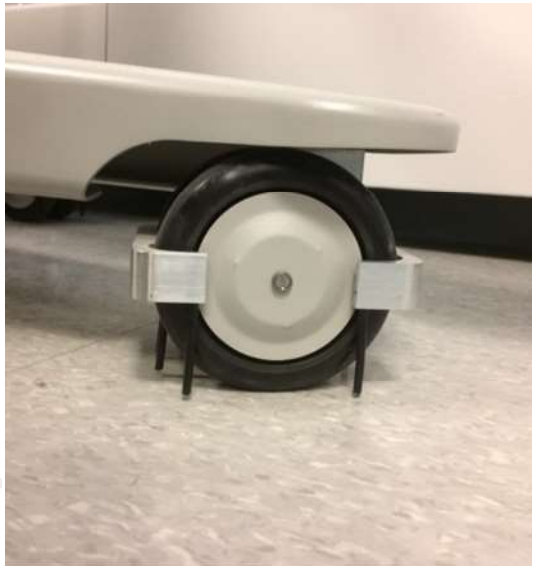
Wheel Locks

Locked



Unlocked





- Wheels with rubber extensions to avoid running over cords

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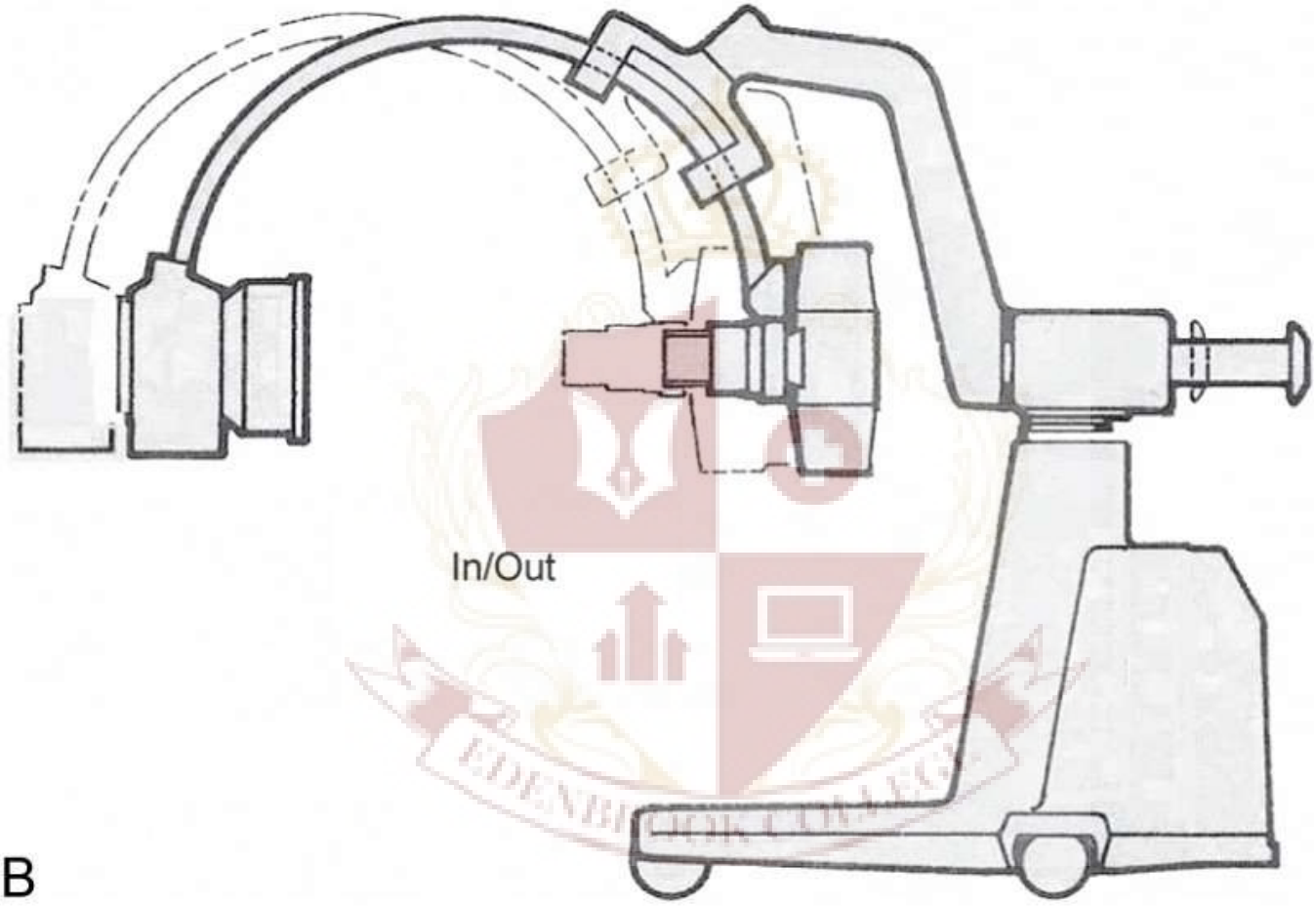
C-arm Movements

- In-Out Lock: Moves the C-arm front and back from the base.

- Wig-Wag: Enables the C-arm to wave side to side from the base.

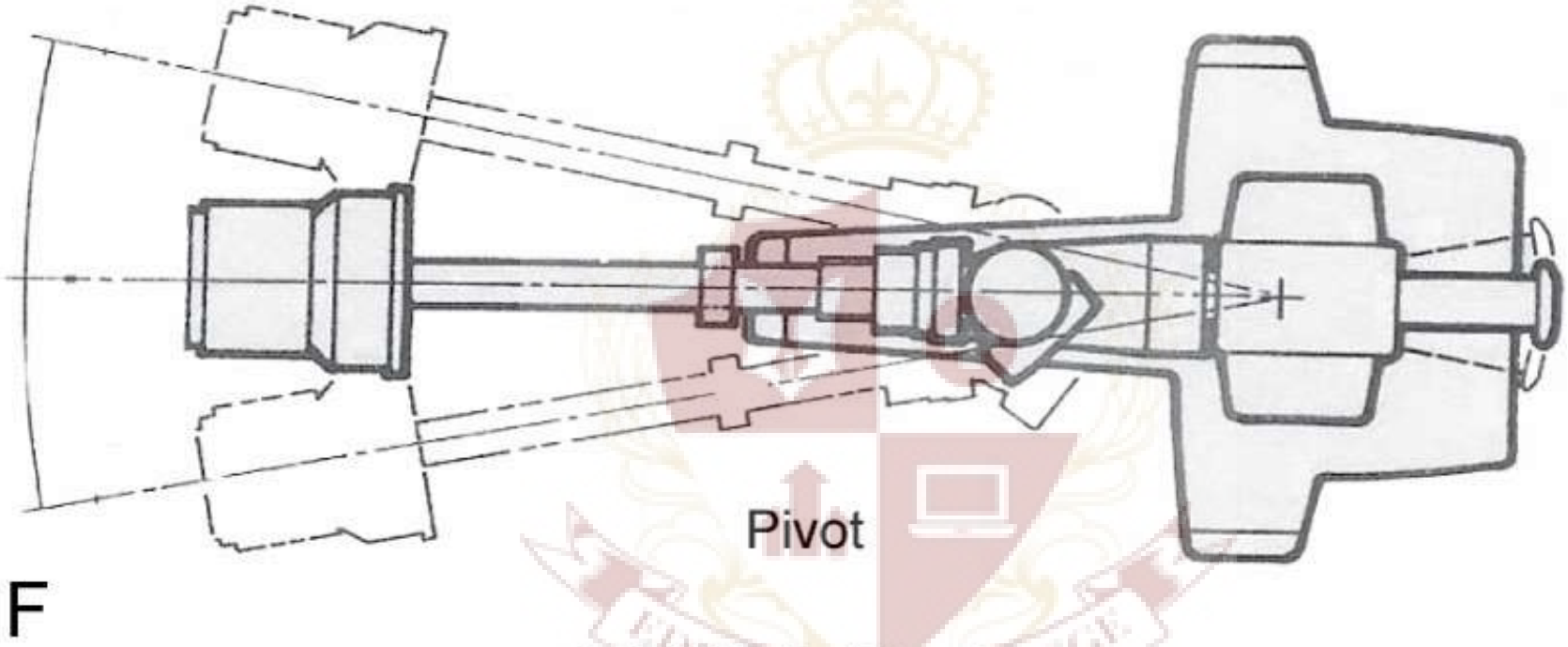


Figure 1: C-arm Movements
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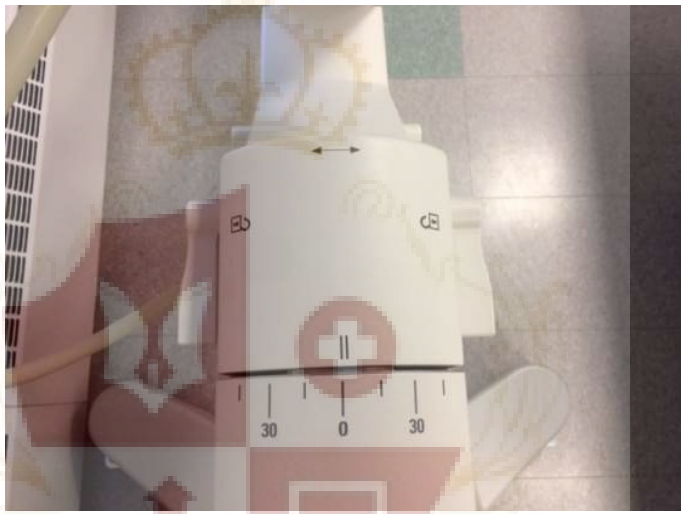
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Wig-Wag

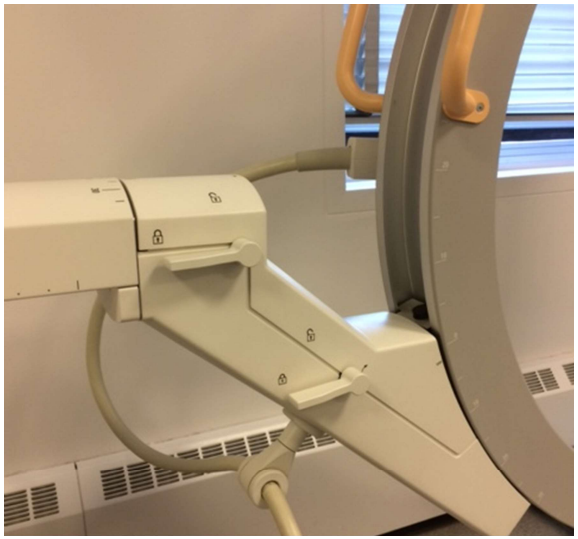
C-arm Movements cont.

- Cephalad/Caudad
  - Allows longitudinal angle

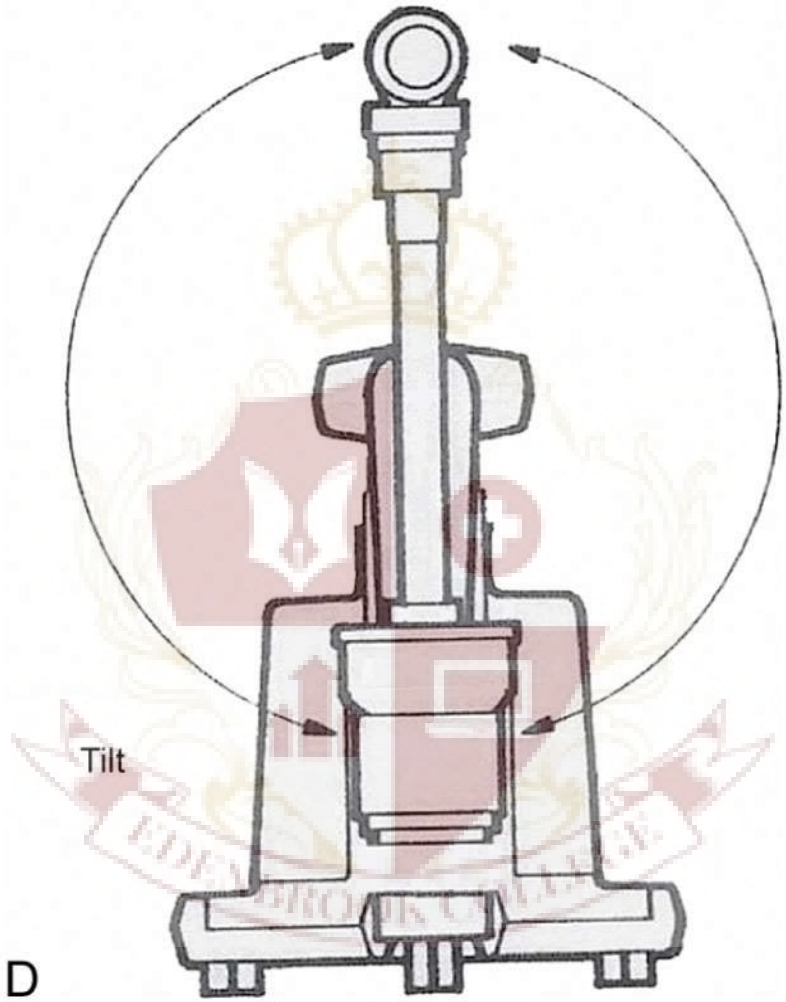
- Rotation
  - C-arm moves from AP to lateral position.



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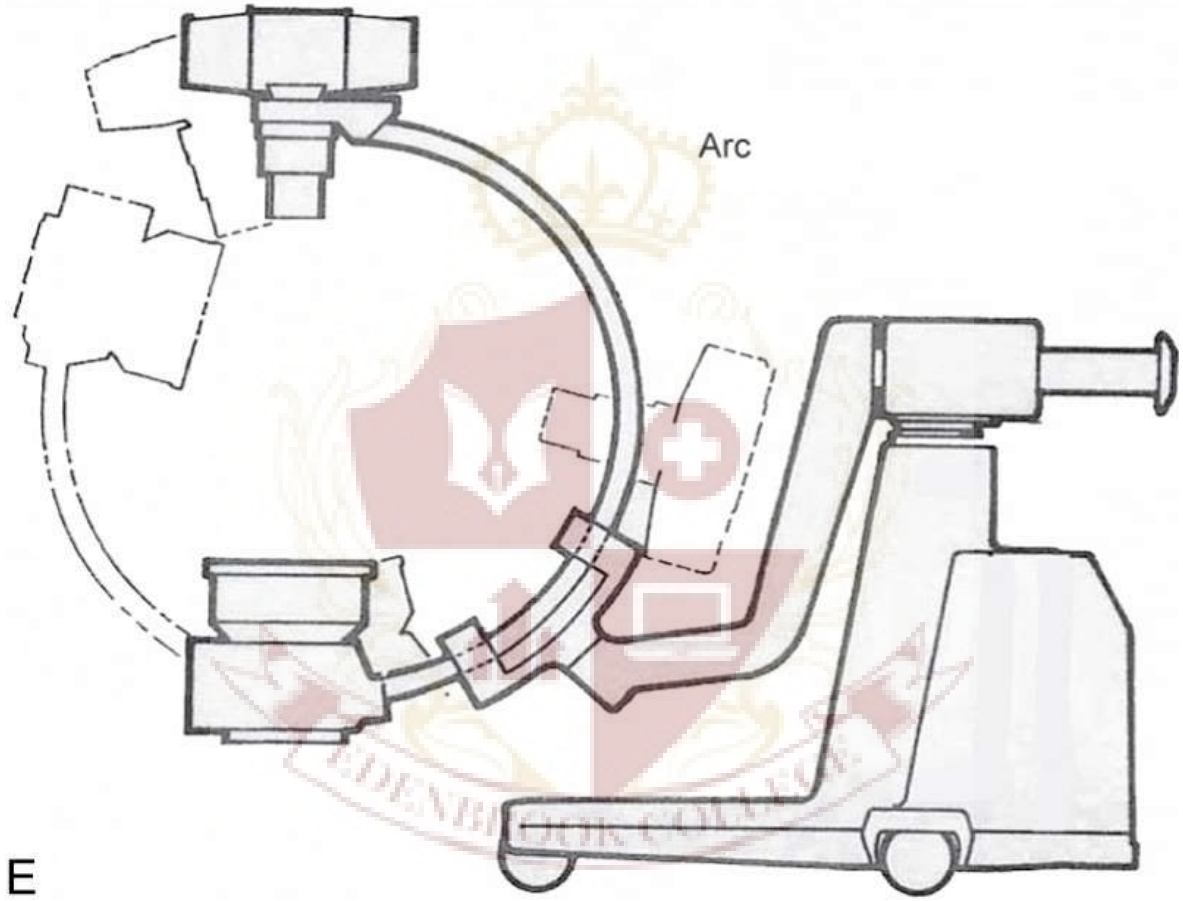


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E

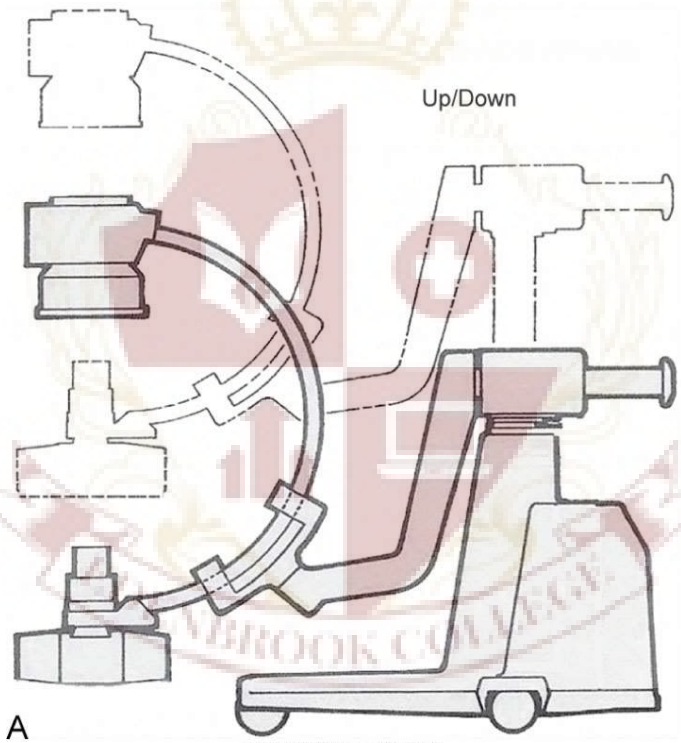
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C-arm Movements

- Up and Down: raises and lowers the "C" of the C-arm.

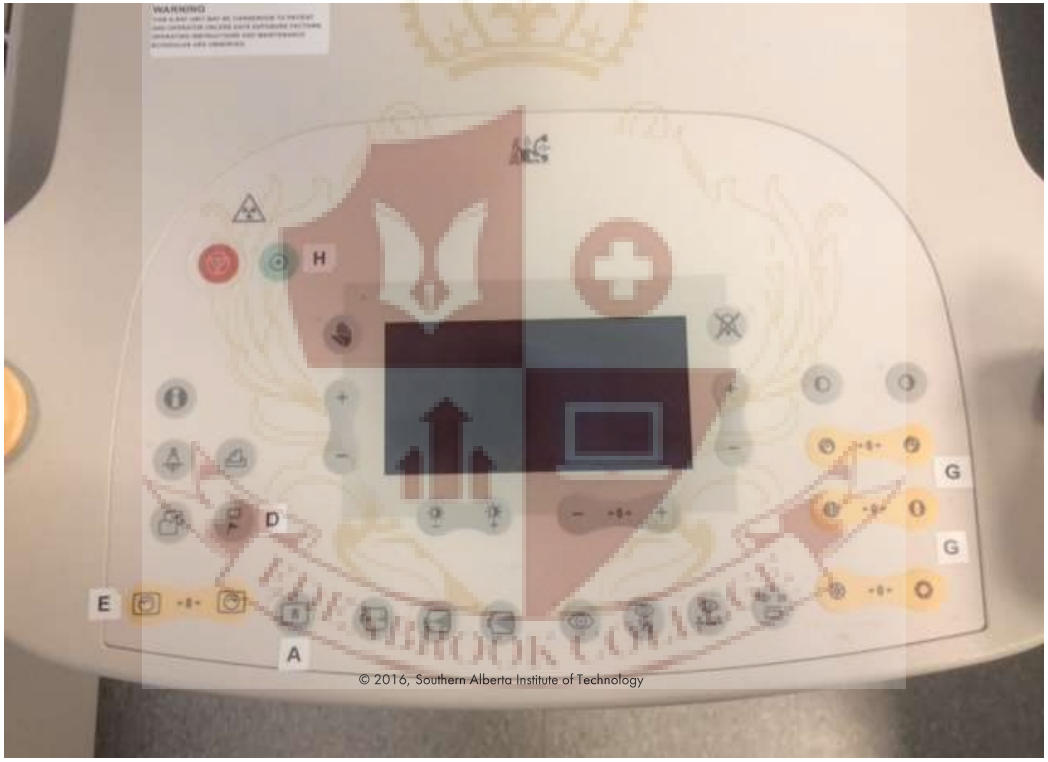


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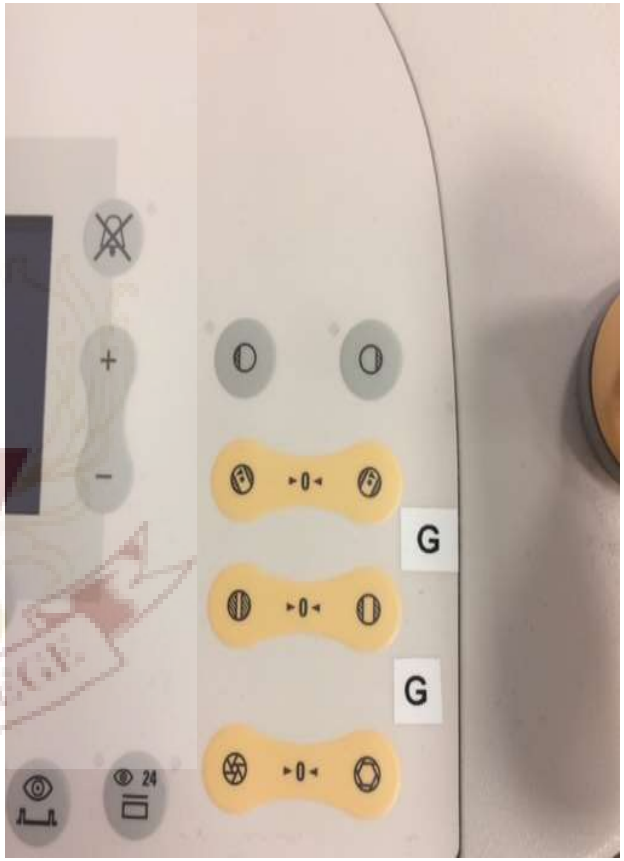
C-arm Control Panel



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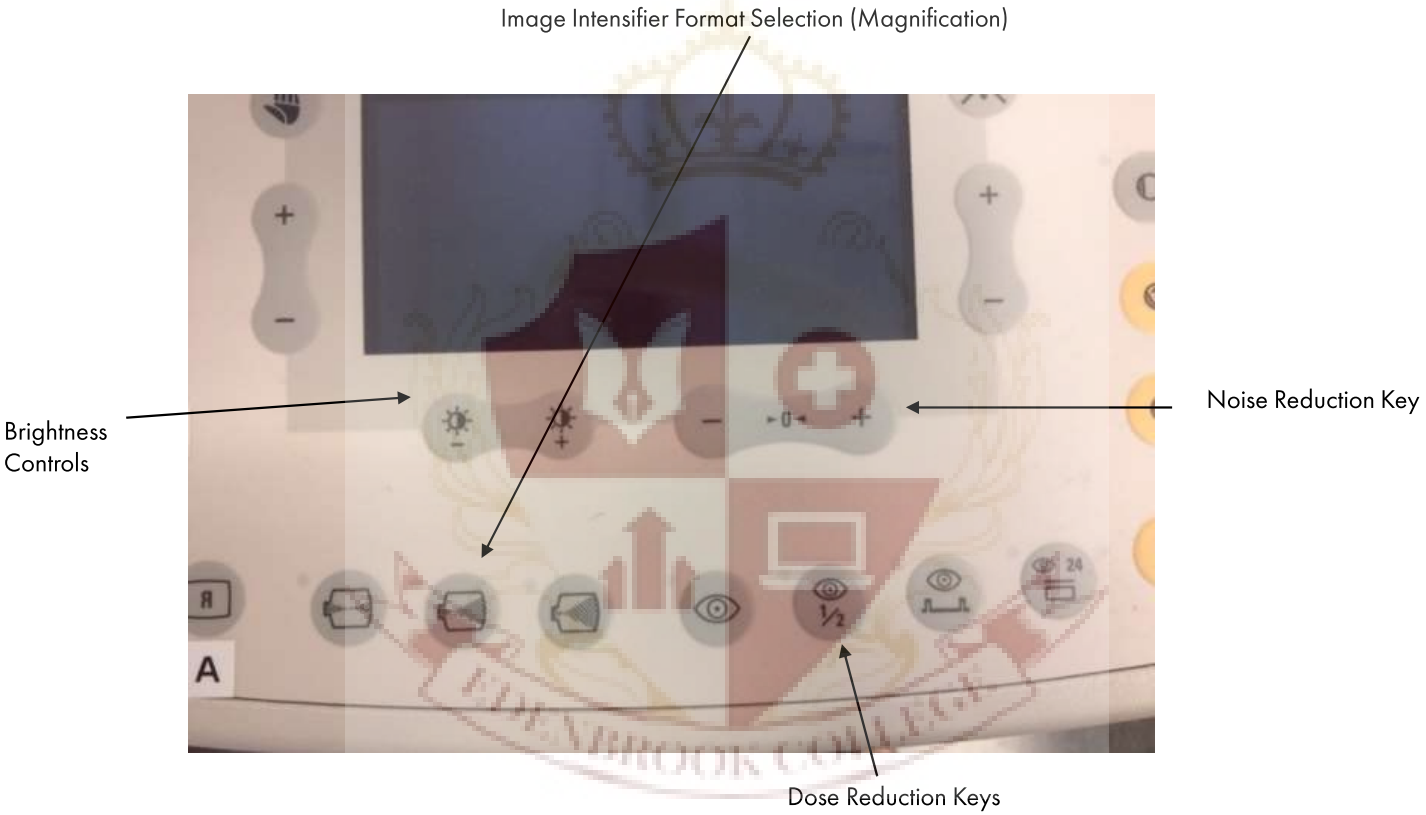
Collimator controls

- Round and side to side collimation
- Can rotate side to side collimation-Benefit?
- Closes shutters to minimize radiation
- Choose shape best suited to current job



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C-arm Control Panel



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C-arm Control Panel



Left/Right Image Monitor

Image Rotate

Left/Right Reverse Image

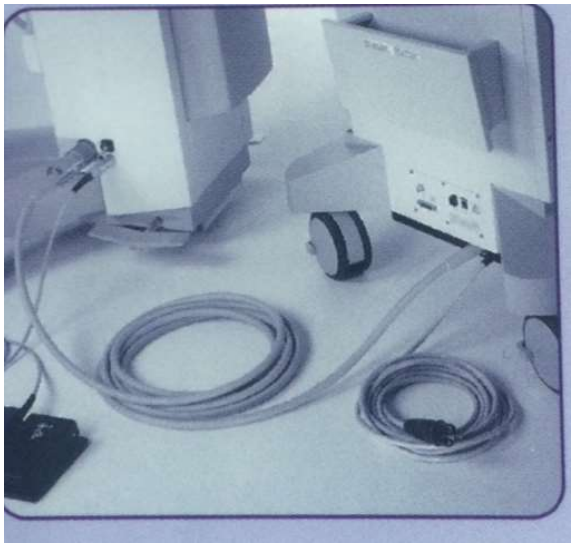
Figure 13: C-arm Control Panel (3)
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Set-up

1. Insert view station plug into the wall outlet.
2. Connect the view station cable into the C-arm stand by aligning the red dots.
3. Connect the foot pedal cable to the C-arm stand by aligning the red dots.
4. Switch on the system at either the C-arm stand or View station.
5. Insert the key at the rear of the C-arm to enable radiation.



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Monitor Input

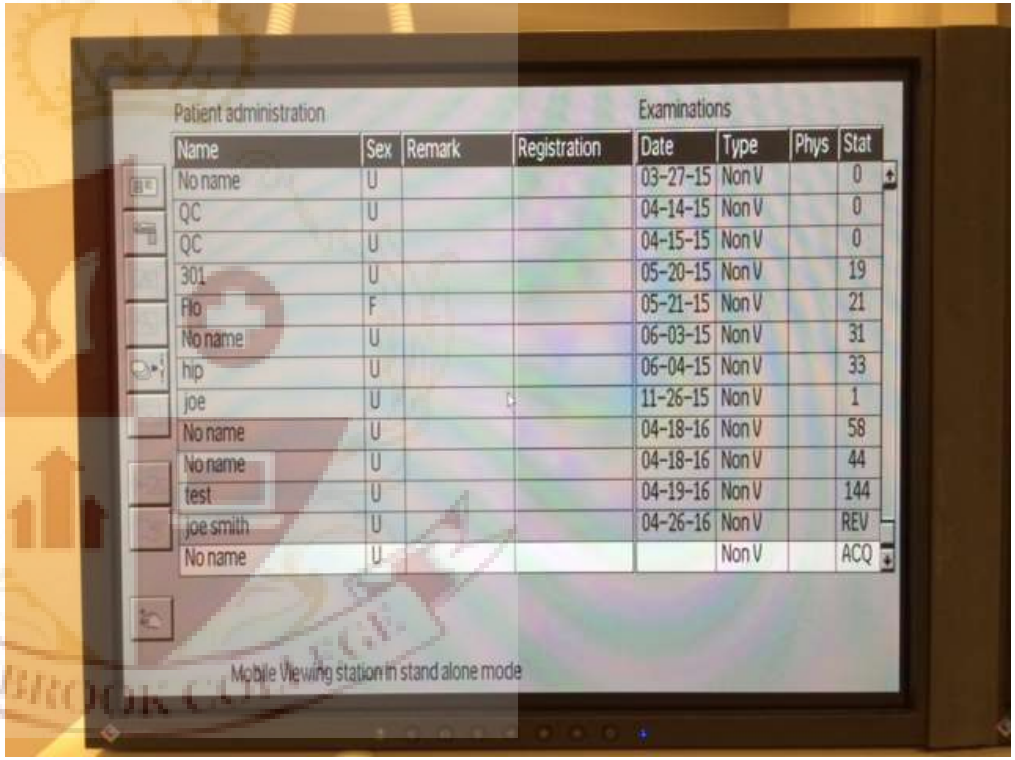
Patient Worklist



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Monitor Work List

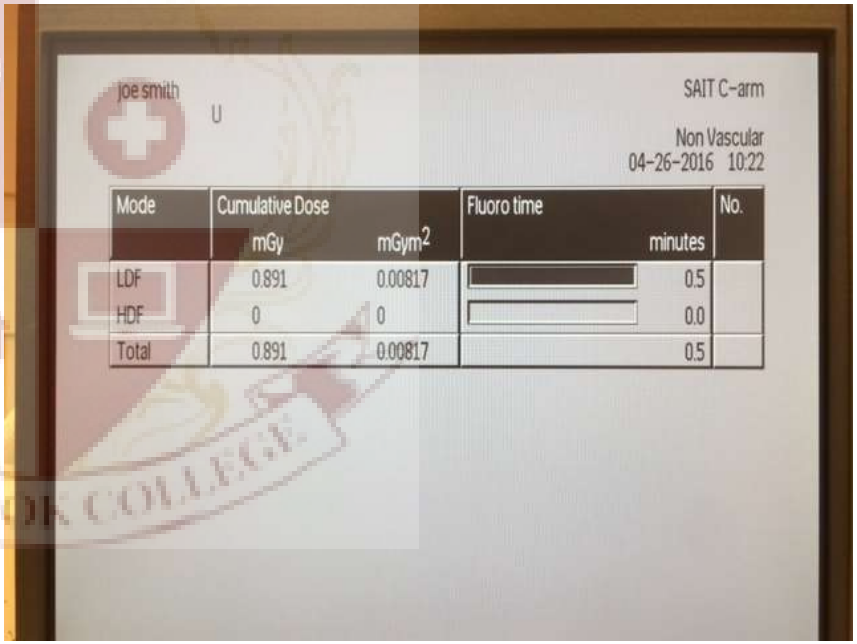
- Access RIS via Ethernet cable or Wi-Fi.
- Manually enter the patient information and send your images later.



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Dose Report

- This image is sent with the patient's images to PACS
  - Dose
  - Demographics
  - Fluoro time



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