Quality control in IR

- ✓ Very complex equipment (different dose modes, zoom, filters, pulse height and frecuency, protocols ...).
- ✓ High workload in labs.
- ✓ Staff have to work inside the X-ray room.

Quality control in IR

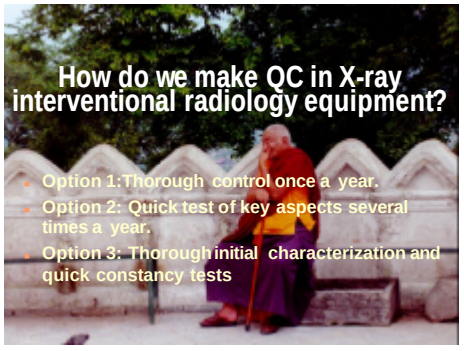
- ✓ QC of the X-ray device: dose + image.
- ✓ QC of the procedure:
  - ➢ patient dose (DAP, skin dose)
  - ➢ staff dose.

⇩

- ✓ Readjustment of the equipment.
- ✓ Training.

Quality control in IR

- ✓ Control of the equipment:
  - ➢ Constancy tests
  - ➢ Initial characterization.
- ✓ Patient dose
- ✓ Staff dose



Quality control in IR

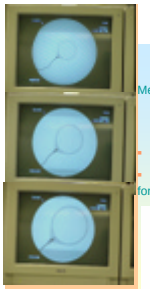
- ✓ Control of the equipment:
  - ➢ Constancy tests
  - ➢ Initial characterization.
- ✓ Patient dose
- ✓ Staff dose

QC equipment

Constancy test

MATERIAL

- Ionisation Chamber
- Cu filters at least 20 cm × 20 cm in area.
- Ruler
- Image quality test TOR(18FG) or equivalent.



QC equipment

Constancy test

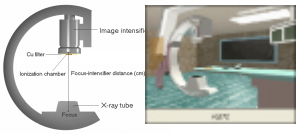
METHOD

Dose rate at the entrance of the Cu sheet

Measurements are made for the most frequently settings used in clinical practice and for 2 mm and 4 mm of Cu:

- dose rate in fluoroscopy modes
- dose/image in protocols of acquisition

for the field sizes used.



QC equipment

Constancy test

METHOD

Dose rate at the Image Receptor entrance surface

For the same modes and filed sizes, but with this configuration:

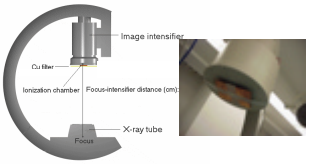


Image quality

Same configuration with the test object instead of the ionisation chamber

QC equipment

Constancy test

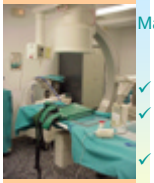
PROBLEMS FOUND

- Ionisation chamber not completely inside the field size.
- Volume of Ionisation chamber affected by the weight of Cu sheets.
- Part of the field is not covered by the Cu sheet (direct irradiation of the image receptor, different AEC setting).
- Image in motion with Iodine contrast is evaluated with a Pb (resolution grate) static image phantom .

Quality control in IR

- ✓ Control of the equipment :
  - ➢ Constancy tests
  - ➢ Initial characterization.
- ✓ Patient dose
- ✓ Staff dose

INITIAL CHARACTERISATION OF THE SYSTEM



QC equipment

Initial Characterisation

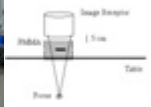
Maximum dose rate at the entrance of the patient (highest skin dose in the worst conditions):

- ✓ 2 mm Pb (or a folded leaded apron)
- ✓ Tube as close as possible to the table.
- ✓ Highest dose rate in fluoroscopy mode and image adquisition mode
- ✓ Maximum magnification available
- ✓ Image receptor as far as possible from the table.

INITIAL CHARACTERISATION OF THE SYSTEM

Image quality assesment

- ✓Image phantom at the isocenter.
- ✓Image receptor at 5 cm the PMMA



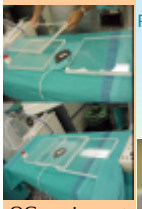
QC equipment

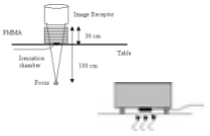
Initial Characterisation

INITIAL CHARACTERISATION OF THE SYSTEM

PMMA entrance dose rate

- ✓Dose rate and radiographic technique for 14, 20, 24, 28 cm of PMMA.
- ✓Repeat for all fluoroscopy modes, image acquisition and field sizes.



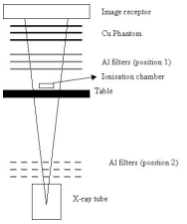


QC equipment

Initial Characterisation

INITIAL CHARACTERISATION OF THE SYSTEM

HVL measurements: Method when manual mode is not available.



QC equipment

Initial Characterisation

Quality control in IR

- ✓ Control of the equipment:
  - ➢ Constancy tests
  - ➢ Initial characterization.
- ✓ Patient dose
- ✓ Staff dose

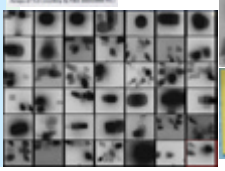
Patient dose

- Reference levels
- Measure of the DAP

Patient dose

Patient deterministic effects

- TLDs
- Slow films
- Radiochromic films



Patient dose

Patient dose

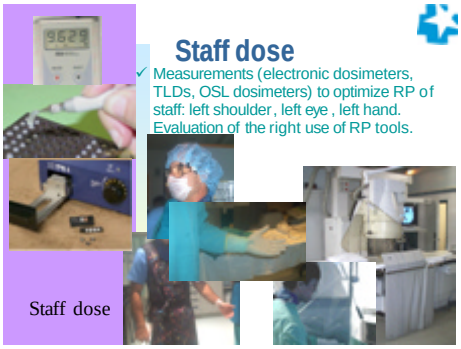
Patient dose

Retrospective analysis of DAP and even the skin dose distribution if the DICOM headers of series contain the relevant information.

GE ADVANTX LCV-DLX (Cardio mode)
(0008,0032) - Acquisition Time : 19:24:33
(0008,103E) - Series Description : CORONARIO
(0018,0060) - KVP : 75
(0018,1110) - Distance Source to Detector : 1060.000
(0018,1111) - Distance Source to Patient : 705
(0018,1149) - Field of View Dimension(s) : 152
(0018,1150) - Exposure Time : 328 (number fr x ms per fr)
(0018,1151) - X-ray Tube Current : 81
(0018,1510) - Positioner Primary Angle : -30 (left is +)
(0018,1511) - Positioner Secondary Angle : 0 (cran is +)
(0019,1018) - 1.2 (this is the focus size)
(0019,101C) - 1 (Dose mode: 0 1 2 and 3 for A,B,C and D)
(0019,101E) - 4 (This is the real pulse time in ms)
(0020,0013) - Image Number : 2 (this is the series number)
(0028,0008) - Number of Frames : 82

Quality control in IR

- ✓ Control of the equipment:
  - ➢ Constancy tests
  - ➢ Initial characterization.
- ✓ Patient dose
- ✓ Staff dose



Staff dose

Staff dose

✓ Measurements (electronic dosimeters, TLDs, OSL dosimeters) to optimize RP of staff: left shoulder, left eye, left hand. Evaluation of the right use of RP tools.

Philips Allura	31	Low	4.1
		Medium	18.9
		High	22.6

INITIAL CHARACTERISATION OF THE SYSTEM. EXAMPLES.

Variation of the entrance surface air kerma with the field size in different fluoroscopy modes

Variation of the entrance surface air kerma with PMMA thickness in different fluoroscopy modes.

Entrance surface air kerma in different PMMA thickness and field sizes