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**College on Medical Physics:
Imaging and Radiation Protection**

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*An International Approach to Dose
Reduction in Diagnostic Radiology*

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AN INTERNATIONAL APPROACH TO DOSE REDUCTION IN DIAGNOSTIC RADIOLOGY

**DIAGNOSTIC RADIOLOGY: HIGHEST CONTRIBUTION
TO COLLECTIVE DOSE OF ALL MAN-MADE
RADIATION SOURCES. (90-95 % OF THE MEDICAL
SOURCES)**

**FOR THE SAME EXAMINATION, DIFFERENCES BY A
FACTOR OF 10 OR EVEN 100, HAVE BEEN REPORTED.
(ICRP-60)**

**GREATEST POTENTIAL FOR DOSE REDUCTION
WITHOUT LOOSING DIAGNOSTIC INFORMATION**

**INEXPENSIVE METHODS FOR DOSE REDUCTION
HAVE BEEN OFTEN REPORTED**

**IN MANY CASES, THE DOSE REDUCTION IS
ASSOCIATED TO A REDUCTION OF THE X-RAY TUBE
LOADING, WHICH MAY RESULT IN LONGER X-RAY
TUBE LIFE**

SOME OF MAJOR CAUSES FOR LARGE DOSE DIFFERENCES

- 1.- PATIENT THICKNESS**
- 2.- SPEED-CLASS OF THE IMAGE SYSTEM
(UP TO F=2 TO 4)**
- 3.- FILM-PROCESSING (UP TO F=2 TO 3).
TEMPERATURE, REPLENISHMENT, (TIME IF MANUAL
PROCESSING)**
- 4.- INADEQUATE BEAM QUALITY (KV, FILTRATION)
LACK OF FILTRATION (F=2 OR HIGHER, IN SKIN
DOSE)**
- 5.- FIELD SIZE (affects the imparted energy to the patient)**

IAEA-CEC
CO-ORDINATED RESEARCH PROGRAMME



1.- INCREASE AWARENESS OF THIS POTENTIAL FOR DOSE REDUCTION

2.- PROMOTE METHODS FOR DOSE REDUCTION. PILOT EXPERIENCE

3.- DRAW CONCLUSIONS. PROPOSALS FOR FURTHER IMPROVEMENTS, DESIGN TRAINING PROGRAMMES BASED ON OWN EXPERIENCE

PILOT PROGRAMME

SELECTED HOSPITALS WILLING TO CO-OPERATE

SELECT SIMPLE, BUT MOST USED X-RAY EXAMINATIONS (CHEST, ABDOMEN)

DEFINE THE PROCEDURE:

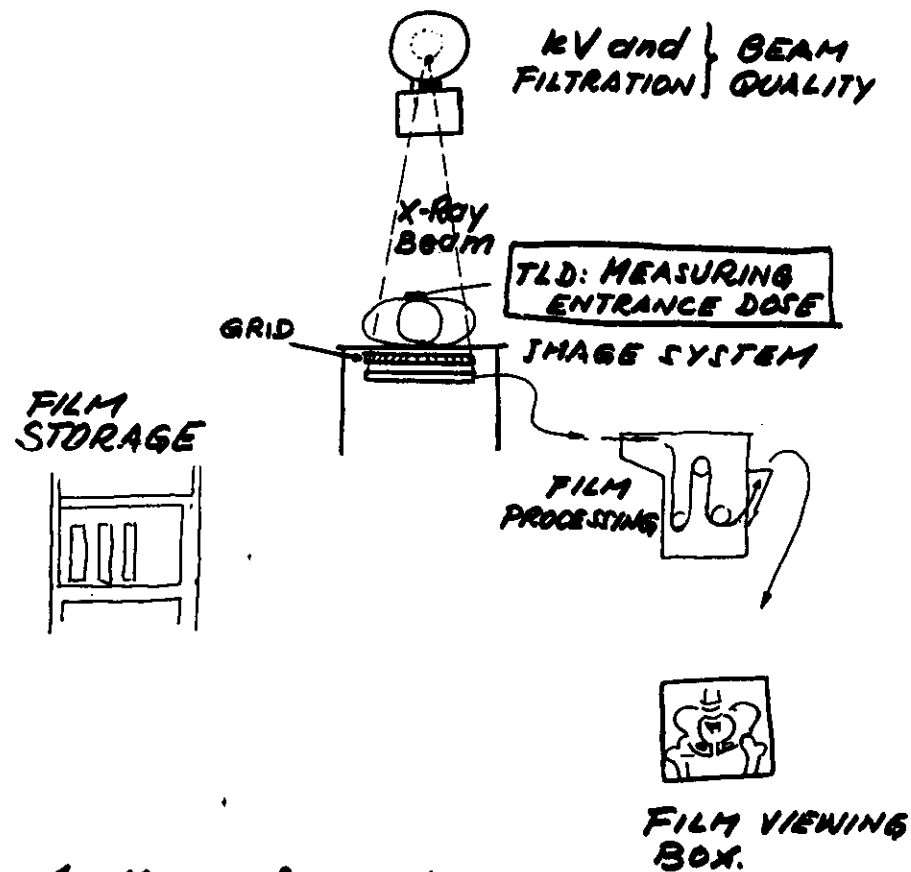
1.- ASSESS DOSES.

DOSE INDICATOR: PATIENT ENTRANCE DOSE
FIRST MEASUREMENT ON A SAMPLE OF PATIENTS.
COLLECTION OF RELEVANT PARAMETERS FOR FURTHER ANALYSIS

2.- DEFINE AND IMPLEMENT A PROGRAMME OF QUALITY ASSURANCE

3.- REASSESS THE ENTRANCE DOSE. LESSONS LEARNED. PROPOSAL FOR FURTHER IMPROVEMENTS.

OPTIMIZING THE PATIENT ENTRANCE DOSE AND IMAGE QUALITY



- 1.- Measuring Entrance Dose
- 2.- Analyse and Controlling all steps (Q. C.)
- 3.- Re-assessing the Entrance Dose

EXAMPLE DATA FOR THE FIRST APPROACH (PILOT PROGRAMME)

- 1.- EQUIPMENT: GENERATOR, X-RAY TUBE Model
Single Phase, Three phase ...
- 2.- IMAGING SYSTEM
Film (Type)
Intensifying screen (Type, S. Class)
Processing...
Grid
- 3.- PATIENT: Age, Sex, Weight, Thickness
- 4.- TECHNICAL FACTORS (or exam. protocol)
Examination type . Projection
Distance: focus-skin, focus-film
Field size (Film size).
kVp
mAs, (or mA and time)