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College on Medical Physics:
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Quality Assurance Concepts and Measurements

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QUALITY ASSURANCE CONCEPTS AND MEASUREMENTS :- ANNA BENINI

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A. THE MEANING OF QUALITY ASSURANCE

THE WORLDS HEALTH ORGANIZATION HAS DEFINED QUALITY ASURANCE IN X-RAY MEDICAL DIAGNOSIS AS "AN ORGANIZED EFFORT BY THE STAFF OPERATING A FACILITY TO ENSURE THAT THE DIAGNOSTIC IMAGES PRODUCED BY THE FACILITIES ARE OF SUFFICIENT HIGH QUALITY SO THAT THEY CONSISTANTLY PROVIDE ADEQUATE DIAGNOSTIC INFORMATION AT THE LOWEST POSSIBLE COST AND WITH THE LEAST POSSIBLE EXPOSURE OF THE PATIENT TO RADIATIONS".

FROM THIS DEFINITION THREE MAIN POINTS ARISE:

1. COST CONTAINMENT
2. REDUCTION IN RADIATION EXPOSURE TO PATIENT
3. IMPROVEMENT OF THE DIAGNOSTIC IMAGING QUALITY

ALL THE ABOVE THREE ARE VALID (SOMETIMES CONTRASTING!) FOR DEVELOPING AS WELL AS INDUSTRIALZED COUNTRIES.

B. QUANTITATION - ASSESSMENT

*IT IS VERY IMPORTANT TO DEFINE:

-WHICH ASPECT OF PERFORMANCE TO ASSESS

-HOW TO PERFORM THE MEASUREMENTS

* A VERY LARGE NUMBER OF RADIOLOGICAL COMPONENTS MERIT ASSESSMENT RANGING FROM X-RAY TUBES AND GENERATORS, CT SCANNER, TO GRIDS AND VIEWING BOXES. ANY SINGLE ITEM MAY HAVE INTERRELATED ASPECTS OF PERFORMANCE TO BE CONSIDERED.

C. IMPORTANT CONSIDERATIONS:

- THERE MUST BE A CONSENSUS OF OPINION BETWEEN THE DIFFERENT VIEW POINTS OF PERFORMANCE AND MEASUREMENTS (RADIOLOGISTS, PHYSICISTS, MANUFACTURERS) QUALITY CONTROL COULD PROVIDE THIS LINK AND IMPROVE THE COLLABORATION

- THE INSTALLATION TESTS MUST BE PERFORMED BY THE MANUFACTURER ENGINEER IN CO-OPERATION WITH THE USERS - THE FIRST SET OF ROUTINE QUALITY CONTROL MEASUREMENTS HAVE TO BE PERFORMED AT THE INSTALLATION.

- QUALITY CONTROL MEASUREMENTS IN GENERAL DO NOT HAVE AN "ABSOLUTE VALUE" THEY ARE AIMED AT MONITORING THE CONSISTENCY OF PERFORMANCE.

- ANY PERFORMANCE CAN ONLY BE SPECIFIED TO WITHIN CERTAIN TOLLERANCE LIMITS WHICH MUST TAKE INTO ACCOUNT THE ACCURACY OF THE MEASUREMENTS .

D. WHO, WHEN, WHAT

THERE ARE DIFFERENT LEVELS OF MEASUREMENTS WHICH MAY BE PERFORMED BY DIFFERENT STAFF.

- SIMPLE MEASUREMENTS BY THE RADIOGRAPHERS

- MORE COMPLEX MEASUREMENTS BY PHYSICISTS ENGINEERS

- SUPERVISION AND PERSONAL INVOLVEMENT OF RADIOLOGIST IS ESSENTIAL

THE TIME SCHEDULE OF THE MEASUREMENTS DEPENDS VERY MUCH ON THE KIND, STATUS AND WORK LOAD OF THE EQUIPMENT. IT IS ADVISABLE TO CHECK EACH PIECE OF EQUIPMENT ONCE A YEAR.

- THE TOLLERANCES TO BE ACHIEVED COST-EFFECTIVELY, SHOULD BE DEFINED (COLLABORATION BETWEEN USERS AND MANUFACTURERS IS ESSENTIAL!)

- IN ANY "CHAIN" OF QUALITY CONTROL PROCEDURES THE ULTIMATE LINK BETWEEN THE EQUIPMENT AND THE PATIENT IS THE OPERATOR.

- QUALITY ASSURANCE PROGRAMMES MUST BE EQUALLY CONCERNED WITH THE HUMAN ELEMENT AND EQUIPMENT CHARACTERISTICS.

- PATIENT DOSE AND IMAGING QUALITY ARE THE FACTORS WHICH MONITOR OVERALL PERFORMANCE (EQUIPMENT PLUS HUMAN ELEMENTS)

- REGULAR CHECKING OF PATIENT'S DOSE IS AN IMPORTANT INDEX OF QUALITY CONTROL.