MAMMOGRAPHY IN PUBLIC HOSPITALS AT RIO DE JANEIRO: A QUALITY ASSURANCE PROGRAM

Claudia Briquet, Celia M. C. Coutinho, Helvécio C. Mota, Eliane Tavares

Instituto de Radioproteção e Dosimetria/ Comissão Nacional de Energia Nuclear
Av. Salvador Allende, s/n^0 CEP:22780-160 - Rio de Janeiro - RJ – Brasil
E-mail: briquet@ird.gov.br eliane@ird.gov.br

Abstract

This paper presents the preliminary results and the methodology followed for the implementation of a Quality Assurance Program in public hospitals at Rio de Janeiro.

We observed that the main problems of image are due to the processing. None facility has a dedicated processor and the processor daily quality control is a concern not yet adopted.

Introduction

Mammography is the method of choice for the early detection of breast cancer. The effectiveness of breast cancer diagnosis depends on the production of high quality mammograms.

Two years ago, we started a quality assurance program in mammography in public hospitals at Rio de Janeiro, under the support of National Commission of Nuclear Energy. The aim of the project was to evaluate the existing situation in public hospitals, with especial reference to patient dose and image quality.

Materials and methods

It was used thermoluminescent dosimeters to evaluate patient entrance skin doses. The dosimeters were fixed to the patient's skin in the center of the radiation field.

To determine HVL, kVp accuracy and reproducibility we used a Victoreen 4000M+. The compression force was evaluated with a bathroom scale (1).

Table 1 summarizes the tests we performed in each hospital and its frequencies.

Table 1. Quality control tests and its frequencies.

Tests	initially	daily	semiannually
Entrance skin doses	X		X
Phantom Image	X		X
HVL	X		X
Tube voltage	X		X
Compression Force	X		X
Safelights	X		X
Processor Sensitometry	X	X	
Darkroom cleanliness	X	X	
Screens cleanliness	X	X	

For each facility we made an assessment of image quality using two methods: phantom and clinical images (1). We used the Mammographic Accreditation Phantom – Victoreen 18-220 to verify the ability to detect small structures similar to those found clinically. A good system should be able to see the 3rd mass (0,75 mm), the 4th fiber (0,75) and the 3rd speck group (0,32 mm).

Results and discussion

Darkroom installations were adequate in all studied hospitals, although all the darkrooms presented inadequate conditions of cleanliness.

During our work we implemented a daily processor sensitometry control. We also demonstrated how the cleanliness of screens and darkroom could improve image quality.

The patient entrance skin doses were in accordance with the levels proposed by the European Commission working document (2), below 10 mGy.

The equipment were adequate for all studied hospitals: HVL (0,30 mm Al equivalent), adequate compression force (16 Kg), kVp accuracy within 5% and reproducible with a coefficient of variation lesser than 0,02 (2,3).

Table 2 summarizes the results of phantom evaluation. As we can see only one of the units – hospital 3 - did not show an acceptable performance.

Table 2. Number of Visible Test Objects in the Phantom Evaluation.

Test Objects	Hospital 1	Hospital 2	Hospital 3	Hospital 4
Mass	4	3	3	3
Fiber	5	4	3,5	4
Speck group	3	3	2	3,5

Table 3 summarizes the main factors that affect images in the studied facilities. In the table yes means that factor was present in at least 25 % of the films. The analysis of film rejection was made monthly.

Table 3. Clinical images evaluation.

Factors	Hospital 1	Hospital 2	Hospital 3	Hospital 4
Handling artifacts	No	No	Yes	No
Screen artifacts	Yes	Yes	Yes	Yes
Noise	Yes	Yes	Yes	Yes
Grid lines	No	No	No	No
Stub lines	No	No	Yes	Yes
Roller marks	No	Yes	Yes	Yes
Other processor artifacts	No	No	Yes	Yes

Conclusions

As yet this study is incomplete, but some preliminary conclusions can be done:

- Quality Assurance Programs allows not the solution, but the identification of problems and how they affect clinical results.
- Simple corrective actions as darkroom and screen cleanliness can improve the image quality.
- A daily processor quality control is fundamental for the image quality, but it is a concern not yet adopted by the technologists. It is important to adopt the attitude that quality control is a continuous process.
- We did not attained the optimal performance conditions, but we made an effort that must be extended to other hospitals, in order to obtain the maximum potential of the imaging techniques.

- We suggest further training of technologist in image quality requirements.

Bibliography

1. *Mammographic Quality Control Manual*, American College of Radiology, 1992

2. *European Protocol on Dosimetry in Mammography*– EUR 16263, European Commission, 1996.

3. Chevalier, M; Moran, P; Vano, E - *Impact of Several Recommended Actions for Improving Image Quality in Mammography*, Rad. Prot. Dosim, vol. 57 (1-4), 1995.