Development and Implementation of a Quality Assurance System in Odontological Radiology

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INTRODUCTION

In Brazil, several published papers have shown the poor quality of radiology equipment leading to low quality images and high rejection rates.

The National Commission of Nuclear Energy (CNEN) has elaborated the programs called RXO and RXD, since 1978 that registered data about technical parameters of X-ray equipment and patient skin entrance dose. These programs identified several problems in diagnostic radiology. More than 80 % of the odontological examinations have been performed with values skin entrance dose higher than the accepted in International Norms and almost all equipment showed variations in at least one of the technical unacceptable parameters.

Trying to revert this situation, in 1992, the implementation of a Quality Assurance Program (QAP) in Radiology Service of the Military Police Hospital of Rio de Janeiro State. The main results attained were reduction of 75 % in the costs, 70 % of film rejection rate and 80 % of skin entrance dose with an affective improvement of image quality. These results motivated us to extend the QAP to other states and possibly in the future to the whole country.

The strategic opportunity appeared with the approval of the technical norm about the use of ionizing radiation in health departments in the state of São Paulo. This technical norm required a QAP among other factors. With the support of the APCD and CETRE DO BRASIL Company, the development of a Quality Assurance System (QAS) in Odontological Radiology has started in the state of São Paulo.

The QAS included all the necessary procedures to implement a QAP in each department of odontological radiology. It is a methodology that allows the implementation and the management the QAP in each department of odontological radiology. The QAP focuses the equipment and the procedures for the best attention of heal the related problems in odontological departments.

OBJECTIVE

Among the objectives of the work was the elaboration and implementation of the acquisition and data control denoted to register its improvement related to the improvement of image quality, of the better performance of the X-ray equipment, the optimization of the dose per examination and costs reduction due to waste. The justification for the urgent need to implement the QAP is clear when to observing that variations of the parameters of interest are 20 to 30 times the maximal permitted limits.

METHODOLOGY

Therefore, the implementation of a QAP from the day to day reality of the dentists and the operations conditions in their offices has to take into account legal requirements of health department and the radiological protection recommendations for operators and general public. To implement a QAS the first step is to know the public, the work atmosphere, the economic situation and its relationship with governmental organizations. The information was obtained from APCD staff, odontology teachers and dentists. Another important information came from literature in the Revista da Associação Paulista dos Cirurgiões Dentistas, the APCD Journal and APCD TV program. These information lead us to define the tripod, which sustain the QAP: quality, variety and economy.

It was also clear that the Resolution SS-625 although unknown in its contents wasn’t well accepted. Therefore it necessary to establish a dialogue to promote behavior changes and clarifies doubts about the QAP. Consequently, we chose to organize open discussions in strategic places of São Paulo State. Using media we tried to spread the news about QAP throughout the State. In this way we could include large regions of the State.

Face a public of around 30.000 dentists within the State of São Paulo it was necessary to train professionals that could visit odontological radiology departments and test all necessary parameters. Twenty graduate professionals were trained to make the Quality Control Tests. Ten people of intermediate level were also trained to perform administrative tasks.

The technical aspects considered doing a typical inspection considered of measuring exposure parameters (kVp, mA, Time, consistency and output) and geometrical parameters (filtration, collimation, alignment and contrast). The control included also processing conditions, general layout of the room and
personal protective equipment. It included as well the evaluation of rejection rate and their causes. All equipment used in the tests was appropriately calibrated.

RESULTS

During the implementation of the QAS more than 42 regional meetings were organized in several cities in the State of São Paulo. Many professionals attended these meetings and agreed to attach to the Program. In two year around 12,000 X-ray equipment were checked. The strategy adopted in the meetings and through the media served to identify problems, putting out solutions and detach the importance of the participation of dentists. In fact, the dose relationship with the dentists and the teamwork was the main reason for the success of the Program. A user manual was also elaborated to guide the dentists how to implement the QAP.

According to figure 1, before implementation of a QAP, we have a large distribution of equipment with an overexposure. We can identify at least three groups in the distribution of equipment before implementation of a QAP, figure 2. After the implementation of the QAP 60 % of the equipment displayed doses lower than 2.5 mGy. The principal causes for the reduction of skin entrance dose were the correct exposure and processing.

With respect to time exposure, before implementation of a QAP, around 40 % of the equipment showed variation greater than 10 %. After the QAP all equipment were within 10 % error.

![Figure 1. Distribution of equipment with respect skin entrance dose](image)

**Figure 1. Distribution of equipment with respect skin entrance dose**

CONCLUSION

The main reason for the success of the QAP was the way it was implemented which lead to the adherence of the professionals involved in the program. The QAS had several steps starting from the training of the technical and administrative team up to its consolidation. The implantation of the QAS allowed us to identify problems in odontological radiology and solve them.

The success of the employed methodology is seen through the quick way we could solve most of the dentist’s expectations and at a low cost. The QAS could improve the technical parameters of the X-ray equipment and also the internal procedures that were the responsible for the improvement of their work. Therefore more modern radiological installations and more precise diagnostic in the prevention of anomalies.

Before the implementation of the QAP more than 90 % of the equipment were out the limits recommended in the international protocols. After its implementation this percentage dropped to 6 %. Before the implementation of the QAP, in the most all the offices inspected at least one of the parameters did not obey norm SS-625. After its implementations the percentage reduced to 10 %.

REFERENCES


