

SOME SAFETY ASPECTS DURING THE REPLACEMENT OF COBALT-60 SOURCES IN TELETHERAPY

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Abstract

Some recent radiation protection problems arised during the replacement of the old Cobalt-60 sources in teletherapy in Romania. There are pointed out the potential radiation risks for the population and the lack of appropriate regulation for the field.

1. Introduction

According to 1993 United Nations Scientific Committee Report on the Effects of Atomic Radiation, in Romania since 1972 there are in operation 20 Cobalt-60 units for teletherapy, most of them of ROKUS-M type (from former USSR). Due to radioactive decay, during the last years was necessary to replace the old Cobalt-60 sources with the new ones.

At the beginning the problems were determined by the impossibility to get sources of original type (ROKUS). They were not any more available in the market.

This situation obliged the potential users to look for similar radioactive sources in the international trade, but two difficulties were noticed at this moment:

- the holder of the Cobalt-60 source in the ROKUS unit has a special design, which do not allow an ease replacement of the source with any new source;
- the expensiveness of a new Cobalt-60 source.

In this situation, they were imposed to order from intermediate suppliers old Cobalt-60 sources (taken from old units) of similar (but not exactly) design and size with ROKUS sources.

2. Results

The radiation protection problems arised during and after placement of the new (from the point of view of the new user) Cobalt-60 source.

In order to be placed in the holder , within the ROKUS head of the unit, due to a different design and size, some mechanical adjustments of the new source were necessary.

During a control performed by the radiation protection expert from the local radiation hygiene laboratory, a **surface contamination with Cobalt-60 of the therapy table was found.** Up to now, it is not very clear if this radioactive contamination was determined by the adjustment operation of the new source, by a previous external contamination of the source, during its consecutive transfer through several places (from " original " Cobalt-60 teletherapy unit to the present user) or by an external contamination of the transport container.

Were measured also ^{238}U (about 885 Bq per 100 cm²) and ^{235}U (about 20 Bq per 100 cm²), which were clear from the head of the Cobalt unit.

An additional surprise was the value of output of the teletherapy installation, measured using the dosimetric facilities of the Secondary Standard Dosimetry Laboratory - Bucharest (in the Institute of Public Health). The real absorbed dose rate in water, for the standard field (10 x

10 cm x cm) was 30 % less the expected value from the certificate provided by the intermediate supplier of the source.

As the source was not accompanied by its original calibration certificate, the supplier's certificate included only a "calculated" value of activity from a (supposed) "original" certificate, the only explanation of this big discrepancy could be (intentionally or not) error in this calculation of the activity of the source. The "intentional" error could be given by the fact that the cost of the source is direct proportional to the stated activity.

A final radiation protection problem of this real story was to find an appropriate storage place for the own old Cobalt-60 source, having enough activity to represent a health risk for the population.

3. Conclusions

The practical consequences of the presented case situation are:

- the need of an international co-operation for establishing an appropriate database and a reporting system for all old used Cobalt-60 sources from teletherapy;
- the need of an agreed methodology for verification, including safety assessment, of the replacement procedure of Cobalt-60 sources in teletherapy.