Risk management in radiotherapy: analysis for total body irradiation

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\section*{ABSTRACT}

Introduction: Management of risk in any technique that is using radiation energy is very important to prevent incidents and accidents. Pretending evaluate the risk in the all process of Total Body Irradiation (TBI), this work present a risk matrix with different possible events than could occur. Methods: SEVRRA-R platform that run in windows is using to build a risk matrix separating the process of TBI in commissioning, prescription, planning and delivering dose. Any stage has a procedure with different errors associated. We build a matrix using all this information to evaluate the kind of risk we have in the technique. Results: It was obtained a template that describes in general the process of TBI with principles events, barriers and consequences. Conclusion: Analyzing the risk in any stage of the process in Total Body irradiation is a useful tool to understand the key points to work in safety for this technique.

\textit{Keywords:} Whole body irradiation, radiotherapy, risk management.
1. INTRODUCTION
Risk analysis is a methodology that let to identify possible problems, events, and its possible barriers to diminish the consequences of an error. This methodology is implemented in radiotherapy as quality management. Different organizations are recommending this methodology and applying in radiotherapy as IAEA, AAPM, etc. those institutions have publications about it. SEVRRRA-R is platform software implemented to do risk analysis in radiotherapy in techniques for 3D with accelerator, cobalt 60, brachytherapy and it is in process some special techniques. Total body irradiation (TBI) or Whole body irradiation is indicated principally for bone marrow transplantation. This technique is a special procedure and the dose is delivering in few sections with different schemes depend of the patient situation and service procedure. It is used the SEVRRRA-R platform for 3D with accelerator and we implemented the necessary changes to apply this methodology for TBI.

2. MATERIALS AND METHODS
SEVRRRA-R platform was used, it was evaluated the initiated events, the consequences, the barriers for 3D radiotherapy with accelerator. The total process it was divided in different stages: commissioning, prescription, planning and delivering dose. It was necessary to use new elements and to add them to the platform, at the same time it was eliminated some points that were not applicable to TBI process. It was reviewed several protocols used around the world for TBI [1,2,3] and it was make a risk template that can be adapt for any protocol in general way.

RESULTS AND DISCUSSION
It was implemented several barriers, frequency reducers and consequences reducers that can be for this technique, also it was necessary to eliminate some of them that are used for 3D are not applicable for whole body irradiation.
We at the end found necessary to implement a check list that consider quality control in planning, position and for in vivo dosimetry it is very important to consider the homogeneity too.

**Figura 1: Scheme for TBI**

**Figura 2: Diode Localization**

**CONCLUSION**

Analyzing the risk in any stage of the process in Total Body irradiation is a useful tool to understand the key points to work in safety for this technique.
REFERÊNCIAS

1. Aplicación del método de la matriz de riesgo a la radioterapia. IAEA –Tecdoc-1685 s. 2012, Vienna, Austria.
2. J. VAN DYK et al. AAPM. Report No. 17. The physical aspects of total and half body photon irradiation. 1986