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OVERVIEW OF RISK MODELS AND RESULTS OBTAINED BY FORO PROJECT SEVRRA 2 FOR IMRT AND DNM TECHNIQUES

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INTRODUCTION

- **Accident prevention in radiotherapy is a priority for regulators and users as confirmed during the Bonn Conference in 2012.**

- **Since 2012, the IAEA and the FORO jointly published the document IAEA-TECDOC-1685/S, which reflect the experience in the application of the Risk Matrix methodology in Ibero-America using the SEVRRA computer tool.**

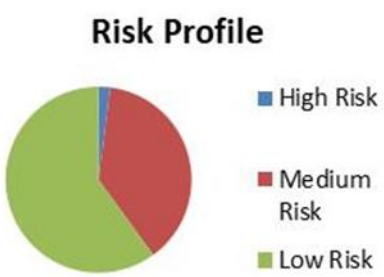
- **SEVRRA has risk models to analyze the possibility of unintentional under and over radiation exposures to patients, workers and public in radiotherapy services that apply radiotherapy techniques such as 3D Conformal, Cobalt-60, Braquitherapy for high and low dose.**

- **The radiotherapy techniques are constantly evolving, hence the FORO decided to expand their risk assessment capabilities to cover new techniques, under the SEVRRA 2 project, such as:**

- **IMRT conventional techniques and DNM that perform diagnostic studies with conventional radiopharmaceuticals (I-131, Tl-201, Tc-99m, etc.) and different techniques for acquiring images in the corresponding hybrid SPECT/CT and PET/CT equipment**

METHODS

- **For each technique, the application of the risk matrix methodology begins with the analysis of the main process followed in a service, in order to understand their processes interactions, looking for sources of potential equipment and human failures as well as to identify the safety elements implemented in the service.**
- **An initial risk model that collects best practices and highest standards identified in the Iberoamerica region is obtained, which model is called the reference facility model. The risk profile (distribution of accident sequences with very high, high, medium and low risk) was obtained and their major risk contributors (safety elements) identified**



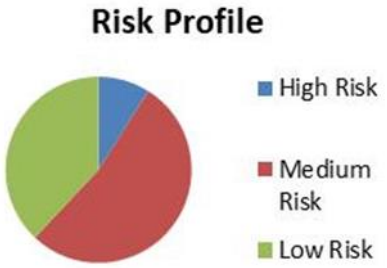
IMRT Reference facility.

DNM Reference facility.

- **The initial model was tested in some facilities (hospitals/radiotherapy services in the Iberoamerica Region) to get feedbacks from the final users over the applicability of the risk models developed.**

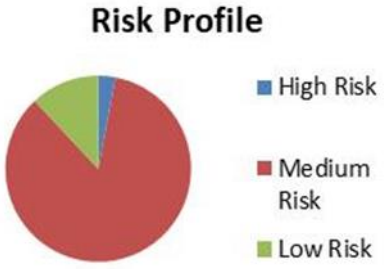
RESULTS

- **The assessment of the 151 equipment failures/human errors capable to initiate accident scenarios conditions identified for a IMRT service along with the 216 safety barriers, frequency and consequences reducers with the capability to prevent, detect and/or stop accident conditions or mitigate their consequences, in an IMRT service shows the following results:**



The "Acceptance and Commissioning", "Treatment Planning" and "Treatment Delivery" process steps concentrate the major number of accident sequences with high risk, mainly because of the lack of the safety barriers "In-vivo dosimetry in initial treatment session", "Redundant verifications" and "Peer review".

For a DNM service the assessment of 96 potential initiator along with their 148 safety elements identified shows the following results:



There were identified accidental sequences with High Risk, The "Radiopharmaceutical Preparation" and "Image Acquisition" stages in DNM include nearly 50% of the Medium Risks sequences identified, so special attention should be paid to compliance with the working procedures established in these two stages.

CONCLUSIONS

- **The risk models developed allows regulators and safety officers to identify the elements (safety barriers and reducers) with the greatest impact on risk reduction and risk increase to look for risk management and radiological safety improvements.**

- **The results obtained facilitates the communication between regulators and users. Examples for regulators are the application of the result for inspection planning and for safety officers to communicate the benefits to implement safety elements or the consequences to lose some of them.**

ACKNOWLEDGEMENTS

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