Conclusions: Preliminary results show an overall equivalence among different techniques in planning of hypofractionated prostatic treatments with concomitant boost. Further analysis will include time of treatments and NTCP calculation. In order to enrich the statistical analysis, plans with both boost doses will be realized on the complete patients cohort. Moreover, plans realized with CyberKnife will be also included in the analysis.

PO-0996
A novel probabilistic risk assessment technique for radiotherapy
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Purpose/Objective: Advances in radiotherapy (RT) offer better treatment options for patients. The evolving technology increases the complexity of the treatment process. The quality control mechanisms used in radiotherapy need to evolve appropriately. Widely publicised incidents such as those seen in New York, Glasgow and Epinal highlight the need to adapt to a more systematic approach to risk assessment in RT. The aviation, nuclear and chemical industries have been developing safety tools for decades. Failure Mode and Effects Analysis (FMEA) and Fault Tree Analysis (FTA) used in these industries have been suggested for RT. The novel methodology presented here integrates human error probability modelling with components of FMEA and FTA and applies them in a clinical setting.

Materials and Methods: This proposed risk assessment method is a hybrid of current techniques. Graphical representation of the RT system demonstrates the relationship between tasks, equipment, software and users involved in the treatment process. Figure 1 shows part of the treatment delivery process and the relevant tasks. A modified version of the process described by Ford et al. (Med Phys. 2012 Dec;39(12):7272-90) was used to evaluate the RT pathway. The components of each process were critically analysed to ascertain their fault potential. The baseline values from the Standardized Plant Analysis Risk-Human Reliability Analysis (SPAR-H) methodology (2005, NRC Report) were used to estimate human error probability. This model was applied to the RT pathway (from patient CT simulation to final treatment) for patients with prostate cancer.

Results: Twenty one error modes and eighteen safety barriers that could affect the patients' treatment were identified. The remaining tasks were classified as (a) irrelevant to patient safety or (b) errors acting as a process inhibitor. In ideal human performance conditions this model estimated an incident rate of 0.17% (excluding commissioning of treatment units). These incidents refer to any unplanned deviation to standard treatment. The incident rate increases dramatically when performance shaping factors such as stress, available time, complexity etc are introduced into the system.

Conclusions: This novel method of risk analysis is highly beneficial in evaluating the effectiveness of the safety system in place in RT. This model can be used to assess the propagation of errors and highlights the areas in the RT process that can be improved. The human error probability is an estimated value which can fluctuate under different conditions. The use of quantitative human errors values allows the utilisation of FTA mathematics. This risk assessment technique can be used to review new processes and their application within the system without compromising patient safety. This is a fluid model that can be constantly updated.

PO-0997
Validation of a multi-layered automatic detection system to improve quality and safety in radiotherapy
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Purpose/Objective: To evaluate a newly-developed automatic system for detecting errors in the planning and delivery of radiotherapy.