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Establishment of an Incident reporting and learning System as a tool for Quality Management in Uganda's radiotherapy services: A case of the low resource setting

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Introduction: The quality and safety of radiotherapy (RT) services in Sub-Saharan Africa has been a subject of major concern, as highlighted in several reports. As for Uganda, it has been delivering 2D treatments since the establishment of radiotherapy services in 1995. In 2016, the only available cobalt-60 teletherapy machine broke down. With the support of IAEA, the service was restored in 2017 with the installation of a new cobalt unit. In a bid to reduce reliance on a single machine, another cobalt unit was installed, and a linear accelerator (linac) ordered. The introduction of the linac will induce a move from 2D treatments to more advanced techniques. In order to make the move safer, it was decided to evaluate the current quality and safety of the RT treatments delivered. The main objective of this study is therefore to identify errors/incidents that happened in the last few years and develop a reporting and learning system -the first step of a broader Quality Management system.
Methodology: To identify the errors/incidents that happened between January 2018 and December 2019, records of 731 patients out of the 3435 treated during this period of time were randomly selected and reviewed. Several parameters were checked: prescribed total and daily doses, number of fractions, normalization depths, treatment times, completeness of treatment charts, setup instructions, etc. Treatment times were recalculated and compared with the values in the treatment chart and in the record and verification system (R&V).

Results: The errors found ranged from under-dosing (potentially leading to recurrences) to overdosing (potentially causing toxicities) of the patients, and were in different categories: dosimetry and procedures.
Dosimetry: Dose errors were mainly due to omission of the block tray factor (43) or of the bolus (10) in the treatment time calculation, incorrect fractionation (15), and incorrect normalization depths (11).
The comparison of the recalculated treatment times with the times used for treatment delivery to the 731 patients in 865 treatment courses, demonstrated that 84.9% of the treatments had been delivered within ±5% of the prescribed dose.
Verification of the 1673 field sizes (FS) used for treatment, compared to the field sizes used for treatment time calculations showed a discrepancy in 11.2% of the cases. When analysed along time, a higher alteration in the field sizes was observed in 2018 with 22.4% of the cases (647), compared to 4.1% of the cases (949 in 2019.
Procedures: Identified issues were: incomplete setup instructions (405), treatment plans not signed by RTT (478), calculations not signed by physicist (386), missing patient data in R&V (328), incomplete chart filling at the treatment stage (14).
Waiting time from planning to start of treatment, considered as a quality index in radiotherapy, was also checked and showed a clear increasing trend: from an average of 8 days in 2018 to 21 days in 2019, with a group of 16 patients waiting for more than 100 days.
Of the 846 total treatment courses, 44.9% were not recorded in the R&V system.

Discussions and Conclusions:
Some of the important differences in error occurrence along time can be explained by staff shortage or equipment problems:
The difference in the number of field size discrepancies between 2018 and 2019 might be resulting from the fact that in 2018, planning was done by direct clinical markings due to the breakdown of the conventional simulator.
The presence of 7 RTTs in 2018 as compared with only 2 in early 2019, could be the reason for a better compliance with procedures: a much higher number of patients'data recorded in the R&V system, a higher agreement between chart records and the R&V system and the highest percentage of chart activities documented.
The increase in waiting time along the years might be attributed to the conjunction of a few factors: the reduction of the number of RTTs, machine breakdowns and the introduction of a $3.2 payment per treatment fraction.
Calculation errors by the physicists might be due to inadequate training, high workload and lack of clear setup instructions.
Analysis of the errors show that they happen at different stages of the radiotherapy process, and that all the professional teams were involved. Improving treatment quality and safety will require changes all along the

process of radiotherapy treatment: prescription, planning, calculation, treatment delivery.
In parallel to the analysis of past treatments, we started to establish a reporting system in our department. This allowed us to identify incidents and near-misses that frequently occur in our radiotherapy practice. In order to address the problems, a series of Quality Management measures were taken: implementation of a weekly chart reviews/planning meetings and the second check of calculated treatment times.
The last years'incident analysis was done as the first step of a process of establishing a quality and safety management system for radiotherapy in Uganda and as a model to low-income countries.

Country or Int. Organization

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