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INCIDENT LEARNING SYSTEM
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CLARITY PSO
A Patient Safety Organization

RO-ILS CASE STUDY 03:
INCORRECT DENSITY FACTOR

BACKGROUND

A vigorous process management approach is necessary to minimize risk. Nevertheless, such processes can be broached by lapses in work or with work arounds. How we manage these lapses, either with additional training or process interlocks, and how we avoid work arounds will ultimately decrease risk. One of the biggest culprits in the radiation oncology clinic is rushed work. Our understanding of how to relate the timing of work and individual (or group) responsibilities drives how the process is built and ultimately used. Without accounting for the timing and sequencing of work and who is responsible, the process can break down, as noted in the following example. What appears to be lapses in work may in fact be a porous process. Therefore, there is a need to establish best practices that can be shared and developed at centers to help mitigate risk.

CASE EXAMPLE

Overview: A typo error by a dosimetrist resulted in the PTV being assigned a density of 0. There was about 80% coverage on the PTV. This error was not appreciated by anyone as the dosimetrist finalized the plan.

Details: The evening before the scheduled start, the dosimetrist worked on transferring the approved plan to the oncology information system (OIS). The dosimetrist notified the medical physicist that the plan was ready for IMRT QA. Standard IMRT measurement-based QA was completed and did not identify the error. Physics was not aware the patient would be starting the next day and therefore did not perform the required second check of the treatment plan that evening. The following morning the plan still was not checked due to several scheduled

special procedures and the lack of realization that the patient was starting that day. The treating therapists were very busy and failed to realize that the physics second check had not been performed, so the patient was treated according to the plan in place at the time. Physics then checked the plan in the evening after the patient's first delivered fraction. Upon this review, the physicist noticed that the PTV had been assigned a density of 0. Physics notified the dosimetrist and physician and the remaining 43 fractions were re-planned with the correct density, accounting for the dose already delivered during the first fraction. While there was only 80% coverage of the PTV for the first fraction, the subsequent re-planned fractions corrected for this deficiency and the patient continued treatment to completion.

CONTRIBUTING FACTORS/ROOT CAUSES

1. Human error related to data entry (i.e., dosimetrist assigning the wrong density value to a treatment volume).
2. Rushed work and compressed timeline (e.g., dosimetrist working on plan the evening before the patient started treatment).
3. Numerous special procedures scheduled on the same morning, preventing the physicist from performing the second check as part of normal work duties (e.g., as they would have done even in a non-rushed situation).
4. Ineffective communication of scheduled treatment start date.
5. Lack of awareness of the ineffective communication of scheduled treatment start date.
6. Failure of staff to perform established process (e.g., failure of busy therapist staff to perform comprehensive initial chart check, assessing all pertinent information that needs to be completed prior to patient start treatment such as, approval of the prescription, signed consent form and verifying physics QA was completed).
7. Lack of a forcing function (e.g., hard stop) to prevent treatment of patient in the absence of a completed second check.

LESSONS LEARNED

Humans are fallible creatures, especially when they must think and act quickly. Quick decisions tend to come from our intuitive brain, rather than our analytic brain, and this can enhance the likelihood of cognitive error[1]. The creation of multiple, well-designed safety nets, in the form of well-designed QA steps, can reduce the probability of errors reaching the patient.

The following actions might help address the multiple contributing factors related to a busy clinic:

- Allow staff the appropriate time to complete a treatment plan and related QA. This typically includes a timeline that allows a certain number of days for each step, and proactive delay of the patient if the timeline is not met[2].
- Review staffing levels and confirm that the clinic is adequately staffed to perform all necessary functions (including QA and performing other safety checks), even during peak load periods.
- Designate a dedicated radiation therapist on a rotation basis to perform the initial chart check for all patient charts within a given period.
- Ensure staff understand their roles and responsibilities during each task, through written and frequently renewed standard operating procedures.
- Implement checklists, timeouts and other checks to ensure quality of work product. For example, a component of therapists QA checklist prior to treatment should include checking that the plan QA has been completed, signed and dated.

- Standardize communication that includes all the key information, such as a patient's start date.
- Host daily morning huddles to review the upcoming clinical activities, such as all patients beginning treatment[3].

An emphasis on staff training regarding existing QA policies, and their importance and value, can help to improve staff compliance with existing policies, but this alone is not sufficient. Data shows that non-compliance will still occur[4], and this can be compounded by an intense clinical environment. Despite the existence of well-designed processes for catching treatment planning errors via a required second check, such an error managed to progress all the way to patient treatment in this case. For error prevention efforts to be robust against the frenetic pace of the typical clinic, facilities should employ forcing functions and other human factors design principles when available and appropriate.

For example, a radiation oncology OIS typically allows for the creation of a hard stop to prevent patient treatment if certain criteria are not met. "Approval" of Treatment Fields, or of the Patient Treatment Plan, are examples of such triggers typically available in an OIS. Such features can be enabled by the clinic's OIS administrator. If the second check process is designed to include the medical physicist's approval of either the TREATMENT FIELDS or the PATIENT TREATMENT PLAN, then if the medical physicist fails to perform the check, the forcing functionality would prevent the therapists from treating the patient. This additional layer can help close up concerning holes in the safety net.

REFERENCES

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