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RADIATION ONCOLOGY  
INCIDENT LEARNING SYSTEM

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## RO-ILS CASE STUDY 07: PRIOR SPINAL RADIATION MISSED

### Background:

Documentation of the three P's – pregnancy, pacemaker, and prior radiation status – is important for safety reasons<sup>i</sup>. Given that there has been an overall 29% decline in the cancer death rate from 1999 to 2018<sup>ii</sup>, re-treatment is becoming increasingly more common. Therefore, accounting for previous radiation is all the more crucial. Gathering detailed information about prior radiation treatment can be impacted and complicated by multiple factors. Challenges include communicating with another practice to receive previous treatment plans, the adoption of newer treatment planning software and sunsetting of prior software within the same practice, accounting for differences in position between the previous and present treatment and much more.

### Case Example:

**Overview:** A patient was planned for treatment to T12-L3 without having previously treated areas taken into consideration for composite planning. In previous years, the patient received radiation to the T9-L1 and L2-sacrum at the same institution. Therefore, there was overlap between the current and past treatment fields.

**Details:** A practice implemented new software, including a new oncology information system (OIS). Due to lack of integration between systems, previous treatment details could not be transferred to the new OIS. The facility developed a process in which PDF documents of previous treatment details were saved in the new system. This was successfully completed for the patient referenced in this case.

A radiation oncologist saw a patient they had previously treated with radiation to the T9-L1 and L2-sacrum and transferred care of the patient to another radiation oncologist within the team. The transferring oncologist did not indicate in the OIS that the patient had previous radiation treatments.

The patient was then consulted for palliative treatment to T12-L3 by a nurse practitioner (NP) and a new treating radiation oncologist. The consulting clinicians did not document any previous radiation treatment, specifically to the spine.

Simulation was performed with no indication of previous treatment and a care path for retreatment was not initiated.

During the planning phase of treatment, the dosimetrist did not notice the previous spinal treatment document that was saved as a PDF in the patient's record. Therefore, the overlap in fields was not dosimetrically evaluated.

Physics staff identified the presence of the previous treatment document during second check procedures. The physicist indicated this history in the new OIS but did not actively report back to the planning dosimetrist or treating physician for a composite plan to be completed.

After the patient started treatment, the current treating radiation oncologist and the transferring radiation oncologist had a conversation about the patient. By chance, they discovered the error during this discussion. The patient was then replanned to account for the previously treated areas.

### Contributing Factors:

1. **Poor, incomplete, unclear or missing documentation:** The transferring and treating oncologists did not document prior radiation as either a positive or negative finding.
2. **Inappropriate assumptions:** Lack of conspicuous documentation led multiple staff to inaccurately assume there was no previous treatment, rather than it had not been addressed.
3. **Policy/procedure inadequate/not followed:**
  - o Previous treatment information was not documented by the NP or the treating radiation oncologist as part of the consultation process.
  - o No independent questioning for prior radiation status was completed during simulation by therapy staff.
  - o While the dosimetrist seemed to be informed as to where to check for previous treatment records PDFs, it appears this was not done sufficiently. Additionally, documentation could also have been poorly labeled which made this task more difficult.
4. **Poor Communication:** While the physicist was the first to identify the error, this person did not actively communicate their finding back to their team members. Had it not been for an off-hand chat between the previous and current treating radiation oncologists, this error would likely have not been acted upon and corrected.
5. **Lack of Interoperability:** Without direct data transfer from the previous OIS into the current OIS, a workaround process was developed that relied on human driven checks.
6. **Lack of Hard Stop:**
  - o There was no hard stop in the OIS to require an answer be entered in a structured data element for prior treatment.
  - o There was no hard stop in the process to require documentation of prior radiation in order to proceed to the next step.

### Lessons Learned/Mitigation Strategies:

The American Association of Physicists in Medicine (AAPM) Task Group 275 lists “unintentional re-irradiation of a previously treated area” as fourth in their list of high-risk failure modes based on a failure modes and effectiveness analysis (FMEA)<sup>iii</sup>. According to AAPM Task Group 275, the three checks which could potentially catch this failure mode occur during:

- 1) the initial patient assessment,
- 2) treatment planning as a check of prescription compared to the consult note, and
- 3) treatment planning as a review of the plan.

Errors in radiation therapy rarely result solely from hardware failures, more commonly they are a combination of computer and human errors.

The availability of historic treatment records for patients previously treated at the same institution, is extremely helpful. Transitions in software can complicate this, especially with limited or no interoperability. Currently, data migration errors in radiation oncology have been identified as emerging issues by the World Health Organization and OIS software upgrades or changes have been identified as imposing high risk.<sup>iv</sup> The International Atomic Energy Agency Human Health Report No.7 recommended that quality control be performed after OIS system upgrades.<sup>iv</sup> Written policies and procedures and staff training enables a clear understanding of how work processes will change and sets new expectations for staff. Staff will need to address any gaps in the new OIS workflow (e.g., lack of prompts for external checks) by adapting their procedures. This could include a hard stop in the process that is accompanied by a checklist to evaluate critical elements (e.g., previous treatments).

Regardless of technology, it is imperative that staff communicate with the patient and treatment team about pertinent health factors. To account for patients previously treated outside of the institution, this evaluation is often a manual process. The treating radiation oncologist must document patient-specific considerations, including the patient's history of previous radiation therapy treatment, as part of required elements of the consultation process. Clear communication begins with standardized and consistent written documentation for positive and negative findings. This expectation and standard process must be recorded in the practice's standard operating procedure and should be engrained in expectations of staff. Vendors can support this effort by providing consistent specifications, requiring this information and prominently displaying prior radiation status in software. Assumptions should not be made about nonexistent documentation. If it is not documented, then it is best to assume it has not been done. All members of the radiation team should confirm documentation of the three P's and redundant checks should be strategically designed within the process to ensure that these are not missed. Building in redundancy for these critical elements by having therapy staff independently ask these same questions is a good error mitigation process. Finally, peer review of the case, especially prior to beginning treatment, would be helpful in identifying the presence of prior treatment through detailed chart review.

As referenced above, with the increasing volumes of patient re-treatment, the entire radiation oncology team should be ever vigilant in the need for documenting and addressing prior treatment.

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<sup>i</sup> American Society for Radiation Oncology. Safety is No Accident: A Framework for Quality Radiation Oncology Care. 2019. [www.astro.org/safetyisnoaccident](http://www.astro.org/safetyisnoaccident)

<sup>ii</sup> Siegel, R.L., Miller, K.D. and Jemal, A. Cancer statistics, 2020. *CA Cancer J Clin.* 2020 70(1): 7-30.

<sup>iii</sup> Ford, E, Conroy, L, Dong L, et al. "Strategies for effective physics plan and chart review in radiation therapy: Report of AAPM Task Group 275." *Medical Physics.* 2020 47(6):e236-72.

<sup>iv</sup> Zhang, B, Chen, S, D'Souza, W.D., Yi, B. "A systematic quality assurance framework for the upgrade of radiation oncology information systems", *Physica Medica.* 2020 69:28-35.