

**August 2022 through March 2023 Therapeutic and Diagnostic Machine
Medical Reportable Events (MRE)**

2023 Meeting

Therapeutic

1.	<p>During a mid-treatment safety check, 13 of 25 fractions received, it was determined that the patient received a weekly fractionated dose that was greater than 30% of the prescribed dose. Due to an error in the custom electron cut out factor, the delivered dose was 3263 cGy compared to 2340 cGy prescribed in 13 fractions. The treatment plan was altered so that the patient would receive the intended prescribed dose in 19 fractions instead of the original 25. New planning procedures were put into place at the center which include:</p> <ul style="list-style-type: none"> o Separate documentation of cut-out factor measurements, monitor unit calculations and isodose treatment plans. o Two separate physics reviews prior to treatment initiation of every patient Oct 22
2.	<p>A patient being treated to the pelvis was treated with a fractional dose that differed by >50% of the intended dose. The patient was leveled, using the room lasers, to 3 skin landmarks. A CBCT image was taken for alignment. Large shifts in the lateral direction were noted. After inspection, the shifts were overridden, and the patient was treated. The attending physician noticed the large shifts and a mismatch during their offline review of the images and notified the on-site physicist. It was determined that the patient's pelvis received <50% of the prescribed dose for this single fraction.</p> <p>Actions to be taken:</p> <ol style="list-style-type: none"> 1. Large shifts (>2cm) determined by imaging should require additional imaging to verify position prior to treatment 2. Thorough inspection of the imaging should be approved by a third party prior to proceeding <p>Oct 22</p>
3.	<p>A patient had one of three treatment fields when the unit went down. Service was called and repair took 5 hours. The patient was unable to retune on the same day for the other 2 treatments. The patient only received one third of the prescribed dose for the day. The patient received the other 2 treatments the next day. The patient completed the full prescribed dose by the end of the treatment course. Oct 22</p>
4.	<p>During the first two fractions of craniospinal irradiation, the longitudinal shift between the two isocenters (brain and spine fields) was not applied properly at the treatment console. The intended shift between the isocenters was 18 cm in the cranio-caudal direction. The actual applied shift was 16cm for these fractions. This created an unplanned overlap between the brain and spine fields of 2 cm at the cervical spine, and an unplanned underdose of the most inferior 2 cm of the spinal cord field. The area of overlap received 3.6Gy per fraction for the first two fractions instead of the planned 1.8Gy. The treatment plan was adjusted to deliver the same effective treatment with a total biological effective dose of 50.3Gy relative to the intended 49.17Gy, a difference of 2.3% for the course of treatment. The remaining eight fractions will be the same as the intended plan. The missed area inferiorly will be treated so that the cumulative delivered dose matches the originally planned dose to this region. The shift error was attributed to the fact that the coordinate system used to describe the isocenters required the therapists to do a calculation to determine the absolute shift needed to correctly move from the brain fields to the spine fields. This calculation introduces a chance for error. To minimize the chance for error in the future, the department will redefine the coordinate system for all Craniospinal Irradiation treatments such that the origin is the same as the first isocenter located at the brain field. Nov 22</p>
5.	<p>A patient was receiving palliative treatment to 4 areas: C7-T6, T11-L1, L5-S1, and Rt humerus. The prescribed dose to the spine areas was 20 Gy in 5 fractions, and to the humerus 30 Gy in 10</p>

	<p>fractions. The scheduled fourth fraction to C7-T6 was treated normally but T11-L1 was treated using the plan for L5-S1 and the actual L5-S1 was not treated. The Rt humerus was treated normally. The field arrangement for each spine area was different. The planned technique for T11-L1 was AP/PA whereas the planned technique for the L5-S1 was PA and two laterals. Organs to the left and right of the T11-L1 target were irradiated with lateral fields that were intended for the L5-S1 area, and thus received a higher than planned dose. The primary cause of the error was insufficient verbal confirmation prior to turning on the beam. The verbal confirmation was adequately done for the first plan treated, but not the second. The therapists will be re-educated on the importance of the verbal confirmation, especially for each plan on a patient with multiple plans. Another potential factor was the plan order on the treatment console. In this case, the third treated plan was actually second in the list. In the future the order of treatment plans on the treatment console will match the order in which plans are to be delivered. Dec 22</p>
6.	<p>On the 24th of 28 treatment fractions, treatment intended for a patient was delivered to the incorrect patient. The patient received 180cGy instead of the planned 250cGy. The therapist selected the incorrect patient for the current prostate patient they were treating. The incorrect plan was also treatment to the prostate region. The patient was identified by name and birth date, but neither of the two treating therapists noticed the incorrect patient plan had been selected. The incorrect patient name was clearly displayed on the treatment console and Tomotherapy gantry. This error was not identified until the other patient's plan was loaded, notifying them that the patient had already been treated on this day. The 180cGy delivered covered the prostate treatment volume 100%. The region of the nodes did receive an unintended dose of 180cGy. The patient continued treatment as planned with no changes. As part of the action plan to correct this incident, the facility added additional verification checks to ensure the proper treatment plan and patient are being treated. A re-education in-service on the updated time-out procedure was conducted with the Radiation therapist on December 12, 2022 to ensure all team members are aware of the proper procedure and added checks. Dec 22</p>
7.	<p>A patient received 2 of 5 fractions to the surgical bed. Cone beam images were reviewed by the physician prior to the 3rd treatment. The physicist reviewed the images post treatment and noted they were off by 11cm laterally. After further investigation he noted the couch position was off 11cm. The patient was given an extra fraction to make up for the incorrect fraction. Corrective actions include therapists are to observe shift limits and inform physicist if shifts are beyond 2 cm. The table tolerance will be edited to prompt an override if shifts are beyond 2 cm from first day table position. A planar MV image taken at initial gantry position of the arc will be examined before initiating treatment. Dec 22</p>
8.	<p>A geographic miss occurred during the second fraction of a boost course of a breast cancer treatment. The patient was imaged by CBCT for alignment. Repositioning shifts were applied by the treating therapist. Upon review of CCT images offline post treatment, the reviewing physician noted the target misalignment. It was surmised that the location of fiducials, hence, the boost volume, were mismatched due to misinterpretation of anatomy at that location by the therapist. It is possible that the therapist, while manually matching the CBCT to the planning CT, had not completely toggled to the CBCT, hence the match occurred in a view window/level where both the CT and CBCT were visible, and the planning CT was more prominent, making it seem to the therapist that the fiducial markers were properly aligned. The area received an underdose of >20%. No further treatment required. Corrective actions include review of policies requiring two therapists to check image matching and applied shifts against expected shifts. 2/2023</p>

9.	<p>A patient was to receive 30 Gy in 10 fractions to the pancreas and L spine for palliative treatment. The CBCT treatment image was misaligned by one vertebral body relative to the planning CT image. A soft tissue match to the pancreatic target treated with the same isocenter was attempted but viewing of the CT coronal and /or sagittal images was not performed to confirm correct vertebral body alignment. The current policy and procedure for imaging fields in the lower thoracic/upper abdominal region necessitates a full field exposure to ensure that bony anatomy is included, thus aiding the inferior to superior placement of fields. This procedure will be adjusted to cover equipment without this functionality and will note to review coronal and/or sagittal images to ensure inferior to superior placement is evaluated as part of the match. 2/2023</p>
----	---