Winter 2019

NSIR-RT BULLETIN

Welcome to the electronic bulletin for the National System for Incident Reporting - Radiation Treatment (NSIR-RT). This Bulletin supports continuous learning from incident data through the presentation of data trends and case studies. It will also provide system users with information on program developments and enhancements.

Highlights

Advances in Understanding Brachytherapy Related Incidents

As a member of the Radiation Oncology Safety and Quality Committee (ROSQC) of the European Society for Radiotherapy and Oncology (ESTRO), CPQR is working with its international counterparts to identify ways to improve the consistency of brachytherapy incident classification.

Changes to the Radiation Oncology Safety Education and Information System (ROSEIS), Europe's NSIR-RT counterpart, are being considered which would improve the consistency of brachytherapy incident classification. Participating centres have been asked to report all incidents, near misses and non-radiation events to the system to help gain a better understanding of potential safety events or issues experienced by centres.

To date, 40 brachytherapy-related incidents have been submitted to NSIR-RT. While the NSIR-RT taxonomy is comprehensive, CPQR will monitor results of ESTRO's work to determine whether modifications to the NSIR-RT taxonomy will improve the opportunity to learn from these events.

NSIR-RT CASE STUDY

Commissioning and Configuring Checks of Software Systems by a Second Medical Physicist

Commissioning and configuration of software systems in radiation therapy, usually undertaken by a medical physicist, should be verified by a second medical physicist in order to minimize the likelihood of errors that have the potential to impact multiple patients.

The field of radiation therapy makes extensive use of computer systems (i.e. patient data record systems, and dosimetric planning systems, control systems for radiotherapy equipment and software build in-house to perform various repetitive calculations or to automate repetitive tasks). The majority of these systems require customization of their configurable settings in order to match the physical data of the various equipment used for treatment and imaging within the radiotherapy department. When commissioning a new system, or updating one, commissioning work is done by medical physicists to characterize, model, and configure the software. Sometimes, measurements are required, sometimes just a single software configuration of the system is necessary.

If, for the benefit of a patient in particular, a task is done in error by a professional, it will only affect this one patient. Alternatively, an error in the commissioning or configuration of a system may have repercussions for multiple patients for whom the erroneous data is used, and for as long as the error is not discovered and corrected.

NSIR-RT Data - By the Numbers

Incident Submitted: 3,164

Actual Incidents: 1,879

Severity: None (1,495), Mild (347), Moderate (33), Severe (4)

Education and Engagement

Improve Your Incident Analysis Skills in a Few Hours!

Did you know that CPQR offers a free, **self-guided course** in incident investigation, analysis and reporting? Join our expert faculty for a virtual tour of classification systems, root cause analysis and the NSIR-RT.

A Physician's Perspective on IMRT Safety

Intensity-modulated radiation therapy (IMRT) is an advanced mode of high-precision radiotherapy that uses computer-controlled linear accelerators to deliver precise radiation doses to a malignant tumour. Errors in treatment delivery can occur at any of the process steps, from calibration, patient imaging, treatment planning and delivery. In April, the International Atomic Energy Agency (IAEA) invited Dr. Bisham Chera, Director of Patient Safety and Quality at the Department of Radiation Oncology, University of North Carolina, School of Medicine, Chapel Hill to discuss the role of incident learning in IMRT QA. **Check out the webinar.**

System Updates

CIHI Completes Changes Following NSIR-RT Pilot

In October 2018 CIHI completed the final system changes identified based on feedback received during system piloting. A full list of changes pertaining to data elements and values can be found **online**.

Examples of events submitted to NSIR-RT

Example One

A dosimetric treatment plan was calculated with a non-validated "convolution" algorithm instead of the standard "superposition" algorithm. This occurred as a result of the installation of a test software environment that likely replaced the standard clinical plan template with a default plan template from the manufacturer. The plan template configures, among other things, the treatment fields, including the beam model and the dose calculation algorithm.

Example Two

Respiratory data recorded for several patients could not be exported to the treatment machine after their CT simulation sessions. A software update occurred between the CT simulations and the start of treatment. As a result, it was impossible to set up the patients' charts at the treatment machine.

Example Three

The activity of a new source of HDR brachytherapy was entered into the treatment planning system with the manufacturer's nominal value and not with the locally-measured dosimetric value.

Example Four

The conversion curves for Hounsfield units into relative electron densities of CT images were discovered to be incorrect in the administration panel of the treatment planning system since the beginning of the clinical use of heterogeneity-corrected dosimetric calculations (spanning several years). Dosimetric calculations performed by the treatment planning system may have been erroneous depending on the density of the tissues.

Recommendations

1. Implement a second-check procedure for all commissioning and configuration of software systems. This second-check will add time during system commissioning, but will decrease the likelihood of systematic errors.

2. All commissioning data should be independently double-checked. In addition, the use of external audits is recommended when commissioning new equipment or specialized techniques (CPQR, 2016).

3. An appropriate subset of acceptance or commissioning tests shall be performed after any hardware or software upgrade on the equipment (CPQR, 2016).

4. The settings of any new configurable fields in the administration of a system should be verified by a second medical physicist.

5. A second qualified medical physicist shall independently verify the implementation, analysis, and interpretation of the quality control tests at least annually. This verification must be recorded. (CPQR, 2016).

Case Study References

CPQR, 2016: Technical Quality Control Guidelines for Canadian Radiotherapy Centers, TQC.2016.05.01
http://www.cpqr.ca/programs/technical-quality-control/