Public Health England

Protecting and improving the nation's health

Safer Radiotherapy

Radiotherapy Newsletter of Public Health England
January 2015 Issue 15

Welcome to the 15th issue of Safer Radiotherapy. The aim of the newsletter is to provide a regular update on the analysis by PHE of radiotherapy error (RTE) reports. These anonymised reports are submitted on a voluntary basis through the National Reporting and Learning System (NRLS) of NHS England or directly to PHE, to promote learning and minimise recurrence of these events.

Safer RT is designed to disseminate learning from RTEs to professionals in the radiotherapy community to positively influence local practice and improve patient safety.

Any comments and suggestions for inclusion in the newsletter would be gratefully received. They should be sent to radiotherapy@phe.gov.uk.

Thanks to all contributors to this issue. The next issue of *Safer RT* will be published in May 2015.

Please note that new publications will appear on **GOV.UK** and some HPA radiotherapy webpages have been moved there: see **https://www.gov.uk/government/collections/medical-radiation-uses-dose-measurements-and-safety-advice**.

Helen Best
Editor

INSIDE THIS ISSUE

Patient Safety in Radiotherapy Steering Group (PSRT)

The PSRT continues to work on the development of the national reporting and learning from RTEs.

Published in 2008, *Towards Safer Radiotherapy* supplies the classification and pathway coding systems currently used by the radiotherapy community. Feedback from the reporting and learning survey has highlighted the need to update the TSRT pathway coding to reflect the rapid evolution in practice and technology within radiotherapy.

This work has begun with a review of the 'other' process codes submitted to PHE to establish where coding is difficult. Consistency checking during PHE analysis has highlighted where in the pathway 'other' process codes are selected. Some of this work is shared on page 3. A PSRT subgroup will be formed to take the development and piloting of the refinement to the pathway coding.

Thanks to those who have already commented and volunteered to participate in this work. If you have any comments on how the process coding can be refined, please email the Radiotherapy Team at **radiotherapy@phe.gov.uk**.

The Radiotherapy Team is based at PHE CRCE Chilton

EDITORIAL HEADLINE

Causative Factors and Detection Methods

UK-wide participation in the national reporting and learning scheme is well established. While work will continue to sustain and further develop this system, the proposed development of the system to learn from RTEs might be enhanced.

It is proposed that the taxonomies for causative factors and detection methods developed in 2011 should be re-evaluated. This will include the following:

1. Updated literature review
2. Review of AAPM and IAEA taxonomies
3. Engagement with the NRLS, National Planning Forum for Radiotherapy and Northern Ireland regarding the potential impact on current reporting systems
4. Development of the PHE database
5. Establishment of an electronic working subgroup to inform this work
6. Re-pilot taxonomies on a user group

This work would culminate in the development of taxonomies for use by the radiotherapy community and a guidance document to support implementation.

A further update will be included in May's newsletter.

RTE Data Analysis: September to November 2014

Quarterly Analysis

Submissions from 52 NHS UK RT departments contributed to this issue's full data analysis, for 1 September to 30 November 2014, which is available at **https://www.gov.uk/government/collections/medical-radiation-uses-dose-measurements-and-safety-advice**. This is a slight increase from 51 at the last analysis, reflecting the strong reporting culture that continues in the UK RT community.

The analysis includes data on primary process coding and severity classification of the RTEs. A breakdown of primary process codes by classification levels is also included.

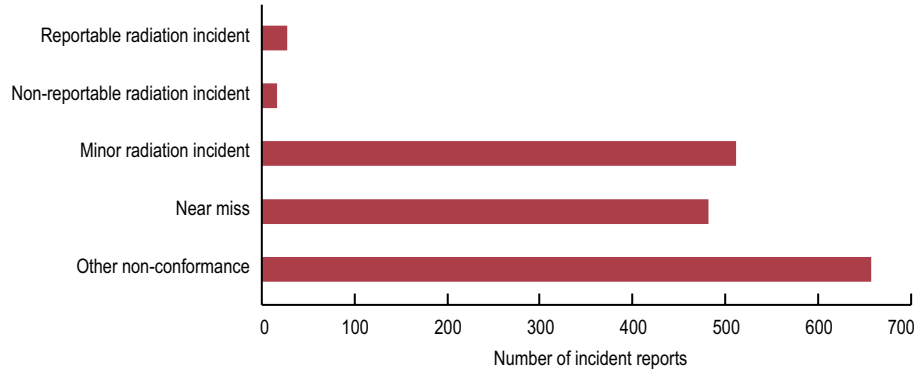
Classification of RTEs

Of those RTEs reported for the period September to November 2014, 1649 out of 1692 reports (97.4%) were classified as minor radiation incidents, near misses or other non-conformances (see Figure 1). This is consistent with previous analyses. These are lower level incidents which would have no significant effect on the planning or delivery of individual patient treatments.

Reportable radiation incidents (level 1) made up 27 (1.6%) of all reports. 'Localisation of intended volume' comprised 5 (18.5%) of these, while 'completion of request for treatment' and 'movements from reference marks' each comprised 3 (11.1%) of all level 1 RTEs reported for this time period. Non-reportable radiation incident reports (level 2) made up 16 (1.0%) of all reports. 'On-set imaging: approval process' comprised 2 (12.5%) of all level 2 RTEs.

Of the 511 minor radiation incidents (level 3) reported, 133 (26.0%) of this subset were related to the 'on-set imaging: production process', making it the most frequently occurring code in this classification. The second most frequently occurring type of incident at 69 (13.5%) was 'use of on-set imaging'.

Figure 1 ***Classification breakdown of RTE reports using the TSRT9 trigger code, September to November 2014 (1692 reports)***



On-treatment imaging is discussed further in issue 12 of *Safer RT*.

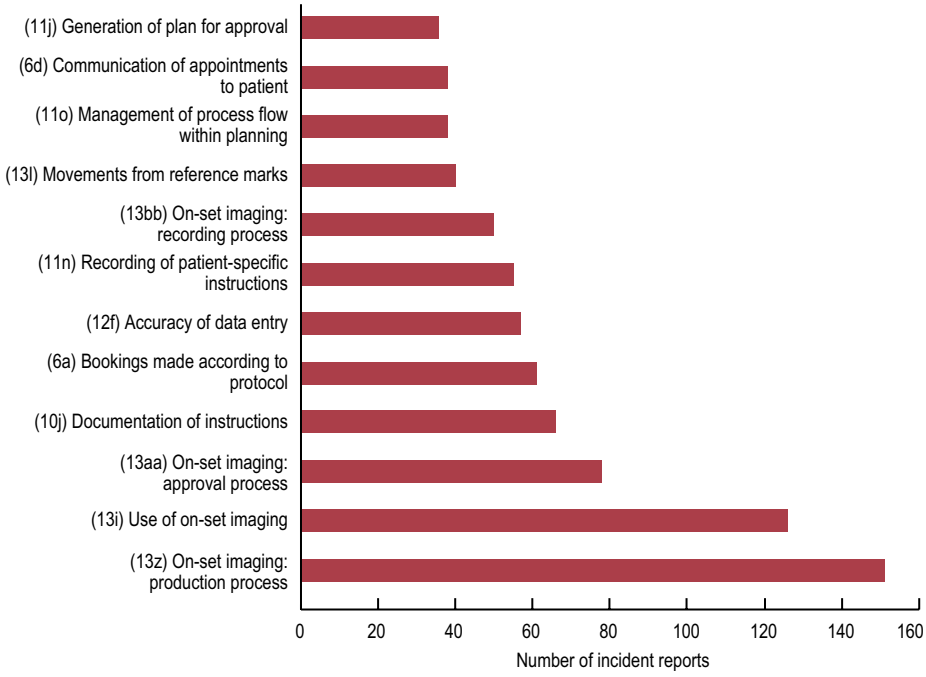
The most commonly occurring RTE process code in the near-miss (level 4) classification was pretreatment 'documentation of instruction', with 39 reports (8.1%).

Within the non-conformance (level 5) classification. 'bookings made according to protocol' had 52 reports (7.9%). making this the most frequently occurring RTE in this classification.

Primary Process Code

The main themes (points in the patient pathway where the majority of reported RTEs occurred) for this dataset are shown in Figure 2. Imaging process codes contributed to 405 of the reports in the main themes (50.9%), making up 23.9% of all reports for this reporting period. Imaging associated RTEs are discussed in issue 12 of *Safer RT*. Of note, 'generation of plan for approval' contributed to 36 of the reports in the main themes (4.5%) – this is discussed further in the *Error of the Month*.

Figure 2 ***RTE main themes (796 out of 1692 reports), for September to November 2014 (with process code indicated)***



The data analysed is submitted by the RT community. If you have any suggestions on how the process coding can be refined, please email the Radiotherapy Team at **radiotherapy@phe.gov.uk**.

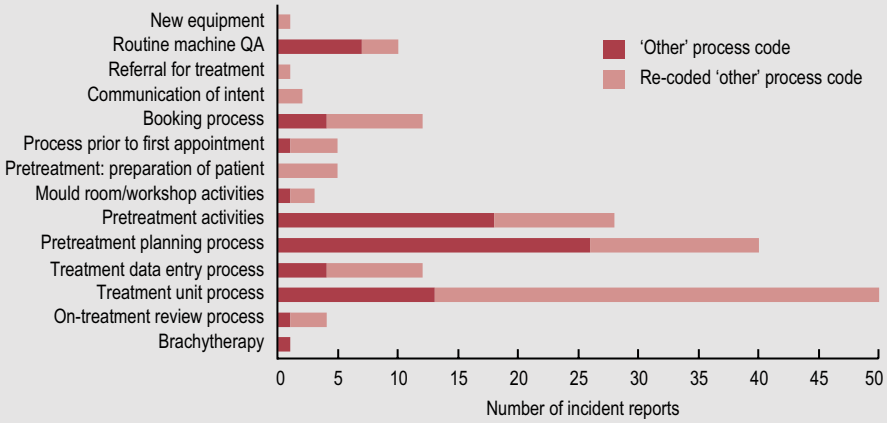
Pathway Coding

The process coding 'other' was used 174 times in this reporting period – 76 remained as 'other' process code and 98 were re-coded during consistency checking.

'Other' process codes

For those RTEs not easily coded, TSRT provides 'other' subcodes for each primary code. There are 17 'other' subcodes, only 10 of which were used in the reports for September to November 2014 (see the figure).

Number of incident reports coded as 'other' and re-coded from 'other'



'Other' subcodes made up 76 (4.5%) of all reports for September to November 2014, of which 44 (57.9%) were associated with pretreatment and pretreatment planning, highlighting areas in the pathway coding that may require review (Table 1).

Table 1 ***Examples of reports coded as 'other'***

Code	Text description
Pretreatment activity (10n)	Extravasation of contrast in cannulation site
Pretreatment planning process (11v)	Mismatch of parameters with plan and oncology management system

Of note, 20 of the 26 pretreatment planning process 'other' codes had a secondary process code, showing the second point in the pathway where the error was picked up. These secondary process codes were all 'end of process checks'.

Consistency checking

Consistency checking is undertaken by PHE staff on the application of the TSRT classification and coding system by RT departments. Of the RTE reports coded by RT departments as 'other', 98 (56.3%) could have been coded using alternative pathway codes. Treatment unit process was where the highest proportion of 'other' codes was re-coded, with 37 (37.8%) of the 'other' process subcodes revised. There were 23 (23.5%) 'other' codes which were re-coded into another primary code group (Table 2).

When coding please consider all TSRT codes.

Table 2 ***Examples of re-coded reports***

'Other' code	Text description	Newly assigned primary code	Newly assigned subcode
Treatment (13jj)	Imaging generator fault mid-cone beam CT, additional dose to patient	Treatment	On-set imaging production process (13z)
Pretreatment planning process (11v)	Lack of protocol for changes to contour for IMRT plans	Document management	Availability of current protocol documentation (19a)

This highlights the need for refinement of the process coding.

ERROR OF THE MONTH

Pretreatment planning process

TSRT Process Code:
Generation of plan for approval (to include DVH etc as appropriate) (11j)

This code accounted for 36 (2.1%) RTEs reported from September to November 2014. This was one of the most commonly occurring RTEs. All of these reports were lower level incidents having little or no effect on the planning or delivery of individual patient treatments. A single report (2.7%) was classified as a minor radiation incident; there were 20 (55.6%) near misses and 15 (41.7%) non-conformances.

This RTE is associated with the incorrect generation of a patient's plan. The main themes highlighted within these reports included the incorrect labelling of fields on plans, inappropriate beam angles selected for treatments and image fields not being set as reference images.

How can we minimise the risk of this RTE occurring?

Points to consider

1 Use primary source data

2 Review working practice for redundant processes, unnecessary transcription and repetition of data to improve process efficiency

3 Create an appropriate environment with minimal distractions for staff

4 Use structure templates and standardised nomenclature within the treatment planning system

5 Indicate competence to undertake tasks in training records

6 Pay special attention when implementing new techniques

7 Monitor locally reported RTEs to identify further preventive action

8 Audit to inform regular review and updating of procedures

Medical Exposures Group
Centre for Radiation, Chemical and Environmental Hazards
Public Health England
Chilton, Didcot, Oxfordshire OX11 0RQ, UK
T: +44 (0)1235 831600
E: radiotherapy@phe.gov.uk
www.gov.uk/phe

PHE publications gateway number: 2014689

GUEST EDITORIAL

Implementing In-vivo Dosimetry

Derek D'Souza

Head of Radiotherapy Physics
University College London Hospitals

In 2008 the joint report *Towards Safer Radiotherapy*[1] recommended that "all radiotherapy centres should have protocols for in-vivo dosimetry and should be in use at the beginning of treatment for most patients". The report goes on to describe that any checking procedures carried out in the pretreatment process do not monitor the overall process and this is only achieved by portal imaging for geometric errors and in-vivo dosimetry (IVD) for dose errors.

At the time only approximately one-third of all UK radiotherapy centres had developed such protocols. A more recent survey[2] shows a greater percentage of centres implementing such techniques with the vast majority using diode-based systems for conformal-based treatments.

Radiotherapy must be delivered safely. For a department which has a comprehensive programme of checks and verification procedures, independent monitor unit calculations, electronic transfer of information and a thorough quality assurance programme the chances of a serious dosimetric error will continue to reduce over time. The implementation of an effective IVD system will introduce further assurances. However, with growing cost pressures placed upon radiotherapy services, the resource to maintain IVD systems must be balanced against the relative gains. An efficient and effective IVD system must be simple and seamless to use in all cases including complex techniques and ideally should also be able to flag any issues rather than require constant monitoring.

With the increasing use of IMRT and VMAT techniques the question now being asked is "Do we need to change the way in which we carry out IVD?" Furthermore as we push the capabilities of available technology we need to assure ourselves that, not only are we delivering the correct dose to the correct location but that the linac can deliver what the treatment planning system is asking of it.

Mijnheer et al[3] provide a comprehensive review of the state of IVD in radiotherapy and also detail the emerging use of electronic portal imaging devices (EPID) in two- and three-dimensional patient dosimetry during advanced treatment techniques. The use of EPIDs for IVD may possibly meet most of the requirements of modern radiotherapy. Commercial, as well as in-house systems[4], are starting to emerge and, though not quite there yet, are showing promise as effective, automated systems. These systems can eventually lead to the improved overall outcome if they can be used to assess the accuracy of treatment delivery for every fraction.

The next question arises: "Is it time to invest in EPIDs for IVD?"

References

1 The Royal College of Radiologists, Society and College of Radiographers, Institute of Physics and Engineering in Medicine, National Patient Safety Agency, British Institute of Radiology. Towards Safer Radiotherapy. London: The Royal College of Radiologists, 2008

2 Macdougall N (Chair) Radiotherapy Board Working Party, Personal communication (2014)

3 Mijnheer B, Beddar S, Izewska J, Reft C. In-vivo dosimetry in external beam radiotherapy. Med Phys, 40(7), 2013

4 Nijsten S, Mijnheer B, Dekker A, Lambin P, Minken A. Routine individualised patient dosimetry using electronic portal imaging devices. Radiother Oncol, 83, 2007

DATES FOR THE DIARY

30 January – 1 February	College of Radiographers annual radiotherapy conference
19 March	SCoR IR(ME)R-Proofing your department: Back to basics in radiation protection
24 March	BIR, The technology and uses of on-treatment imaging in radiotherapy
21 April	IPEM Imaging in Radiotherapy
24–28 April	ESTRO, Barcelona