Safer Radiotherapy
The radiotherapy newsletter of Public Health England

Supplementary Data Analysis
Issue 14 – Full quarterly radiotherapy error data analysis
June 2014 to August 2014
About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.
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Full quarterly radiotherapy error data analysis

June 2014 to August 2014

This analysis has been undertaken by Public Health England (PHE) on radiotherapy errors and near misses (RTEs) reported voluntarily by NHS radiotherapy (RT) departments. Reports are submitted from England and Wales to the National Reporting and Learning System (NRLS) using the TSRT9 trigger code\(^1\), and directly to PHE from Northern Ireland and Scotland.

The classification and coding from *Towards Safer Radiotherapy*\(^2\) (TSRT) was employed for the analysis. Where appropriate, comparisons have been drawn with previous issues of *Safer Radiotherapy*\(^3\) and the PHE supplementary data analyses\(^4\).

The analysis has been reviewed by the Patient Safety in Radiotherapy Steering Group whose comments have been incorporated into this document.

Between June and August 2014, 51 NHS RT departments submitted RTE reports using the TSRT9 trigger code, representing a majority of departments from across the UK. The percentage of participating departments has increased from 83.1\% (n = 49) at the last analysis (March to May 2014) to 86.4\% (n = 51) within this reporting period. This continued increase of departments reporting reflects the commitment of the community to improving patient safety in radiotherapy. However, it is clear that there is some disparity in the regularity of reporting, with wide variance shown when comparing the incident date with the date reported to the national voluntary reporting scheme. This time lag ranges from a minimum of 1 day to a maximum of 281 days, with a mean of 49 days. Issue 13\(^3\) of *Safer Radiotherapy* provides further information on the frequency of reporting.

The number of departments contributing to each issue of *Safer Radiotherapy* and the supplementary data analysis series is illustrated in Figure 1. This will help local departments to compare identified trends against the national picture.

*NB. Departments contributing to the national analysis are allocated a unique identifier in order to anonymise the data shared with PHE.*

*If individual departments can offer further advice in preventing any RTEs please email the RT team at radiotherapy@phe.gov.uk.*
Figure 1. Number of radiotherapy departments contributing to each issue of *Safer Radiotherapy* and the supplementary data analysis

The number of departments submitting RTE reports has increased significantly since 2010, with all NHS departments across the UK having now participated in this initiative (Figure 1). This is mirrored in the steady growth in the total number of RTEs contributing to the national analysis, as seen in Figure 2, when compared with the earliest reporting periods.

Figure 2. Monthly average number of incident reports contributing to each issue of *Safer Radiotherapy* and the supplementary data analysis
A mature reporting culture is reflected by an increase in the average number of reports submitted each month. This has grown over the past 12 months from an average of 394 reports per month to 494 in this reporting period. It should be noted that the vast majority of these reports are lower level incidents having no significant effect on the planning or delivery of individual patient treatments. It is expected that the number of departments submitting to this analysis on a regular basis will increase, leading to an increase in the number of reports.

**Monitoring of TSRT classification and coding by RT departments**

The TSRT classification and coding had been applied by local RT departments to 1355 of the 1495 RTEs received between June and August 2014. This demonstrates a continuation of the high adoption rate in the application of the TSRT classification. All departments are asked to apply classification and coding to their RTE reports to facilitate both local and national analysis.

Consistency checking was undertaken by PHE staff on the application of the TSRT classification and coding system by RT departments. From the 1355 RTE reports classified and coded, an 87.3% level of consistency was achieved (Figure 3). This demonstrates a slight increase from the last analysis (84.4%). The *Good Practice in Radiotherapy Error Reporting – Supplementary Guidance Series* gives examples of the application of the classification and process coding\(^5\). In addition, 129 RTEs were classified and coded by PHE staff using the supporting text supplied by the local departments. Issue 8 of *Safer Radiotherapy* provides top tips for the application of coding and classification\(^6\). PHE is working with departments from Scotland and Northern Ireland to support the application of coding. Future consistency checking of submitted reports will continue to maintain the high quality of data contributing to the national analysis and learning from RTEs.

Non-RTE reports submitted with the TSRT9 trigger code formed 0.7% of the total number of reports for this reporting period. Data and accompanying text indicate that these were patient safety incidents (PSI). This is consistent with previous analyses. Further information on PSI can be found in issue 5 of *Safer Radiotherapy*\(^7\). The non-RTE reports were excluded from the detailed analysis.

In total, 1484 RTEs for the reporting period from June to August 2014 were included for analysis. The analysis is presented here.
Classification of radiotherapy errors

Each of the 1484 reports was classified as ‘other non-conformance’, ‘near miss’, ‘minor radiation incident’, ‘non-reportable radiation incident’ or ‘reportable radiation incident’ (Figure 4). Of the RTE reports, 97.8% (n = 1452) were minor radiation, near miss or other non-conformities with little or no impact on patient outcome. Of the remaining 2.2% (n = 32) of RTE reports, only 1.2% (n = 18) were reportable under IR(ME)R\(^8\) to the appropriate authority.

* NB. IR(ME)R Regulation 4(5) requires all patient exposures deemed much greater than intended be reported to the appropriate authority.
Reportable radiation incident

Reportable radiation incidents as defined in Towards Safer Radiotherapy\textsuperscript{2} fall into the category of reportable under one of two statutory instruments – IR(ME)R\textsuperscript{8} or IRR99\textsuperscript{9}. These incidents will generally be clinically significant, although they may be correctable within the course of treatment. The majority of these higher level incident reports affected only one fraction of treatment. This meant that corrective action could be taken over the remaining treatment fractions so the incident did not have a significant impact on the patient or the outcome of their treatment.

There were 18 reportable radiation incidents submitted to the voluntary system between June and August 2014, comprising 1.2% of the RTEs reviewed. This is a slight decrease from 1.9% (n = 27) at the previous analysis. Eight (44.4%) of these radiation incidents occurred during treatment unit processes (Figure 5).

![Figure 5. Breakdown of reportable radiation incidents (level 1) reported, June to August 2014 (n = 18)](image)

Further analysis of the reports indicates the points in the pathway at which the reportable incidents occurred (Figure 6). Pretreatment ‘localisation of intended volume’ and treatment ‘movements from reference marks’ equally comprised 16.7% (n = 3) of all reportable radiation incidents reported for this time period, with an even distribution across 12 other subcodes.
Figure 6. Breakdown of reportable radiation incidents (level 1) by process subcode reported, June to August 2014 (n = 18)

Non-reportable radiation incident

*Radiation incident not reportable, but of potential or actual clinical significance*

Non-reportable radiation incidents comprised 1.0% (n = 14) of the RTEs reported between June and August 2014 (Figure 7). Of these RTEs, 57.1% (n = 8) occurred during treatment unit processes.

Figure 7. Breakdown of non-reportable radiation incidents (level 2) reported, June to August 2014 (n = 14)
Further analysis indicates the points in the pathway at which non-reportable radiation incidents occurred (Figure 8). ‘On-set imaging: approval process’ at 21.4% (n = 3) was the most frequently occurring event within the non-reportable radiation incidents.

Figure 8. Breakdown of non-reportable radiation incidents (level 2) by process subcode reported, June to August 2014 (n = 14)

Minor radiation incident

*Radiation incident in the technical sense, but of no potential or actual clinical significance*²

Minor radiation incidents comprised 30.1% (n = 447) of the RTEs reported between June and August 2014. Consistent with previously analysed data, the most frequently reported RTEs in this group were associated with treatment unit processes (71.1%, n = 318, Figure 9).

The top 10 most frequently occurring level 3 process subcodes (Figure 10) incorporated mainly treatment unit process, with one subcode from pretreatment ‘documentation of instruction’ (2.9%, n = 13) and one from data entry ‘accuracy of data entry’ (2.9%, n = 13).

A further breakdown of the treatment unit processes indicates the points in the pathway where the minor radiation incidents occurred. The top three most frequently occurring events within this treatment subset of minor radiation incidents were image associated errors. ‘On set imaging: production process’ was the most frequently occurring event (22.9%, n = 73). The second most frequently occurring event within this subset was ‘use of on-set imaging’ (15.7%, n = 50), followed by ‘on-set imaging: approval process’ (10.7%, n = 34). Issue 7 of *Safer Radiotherapy*¹⁰ includes guidance on the application of the on-set imaging process coding.
Figure 9. Breakdown of minor radiation incidents (level 3) reported, June to August 2014 (n = 447)

Figure 10. Breakdown of the top 10 most frequently occurring minor radiation incidents (level 3) by process subcode reported, June to August 2014 (n = 275/447 subset of RTEs)
Near miss

Potential radiation incident that was detected and prevented before treatment delivery

Near misses comprised 27.3% (n = 405) of the RTEs reported between June and August 2014. RTE reports included 17 different codes within this classification (Figure 11).

![Figure 11. Breakdown of the most frequently occurring near misses (level 4) reported, June to August 2014 (n = 405)](image)

![Figure 12. Breakdown of the most frequently occurring near misses (level 4) by process subcode reported, June to August 2014 (n = 150/405 subset of RTEs)](image)
The top most frequently occurring subcodes are presented in Figure 12. The most frequently occurring process subcodes across this level of RTE were ‘accuracy of data entry’ (6.2%, n = 25), followed by pretreatment ‘documentation of instruction’ (4.9%, n = 20).

A total of 30 different treatment unit process subcodes from process code 13 were reported in this classification. Imaging associated errors made up 39.5% (n = 49) of these treatment unit process subcodes.

**Other non-conformance**

*Non-compliance with some other aspect of a documented procedure, but not directly affecting radiotherapy delivery*

‘Other non-conformance’ comprised 40.4% (n = 600) of the RTEs reported between June and August 2014. RTE reports varied across the patient pathway including 18 different codes within this classification.

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**Figure 13. Breakdown of the most frequently occurring non-conformances (level 5) reported, June to August 2014 (n = 600)**

The most frequently occurring process code was the pre-treatment planning processes, accounting for 28.8% (n = 173) of reports in this classification (Figure 13).
The top 10 most frequently occurring subcodes are presented in Figure 14. This non-conformance category consisted of six different codes, the most frequent being pretreatment planning ‘management of process flow within planning’ (11.1%, n = 67) followed by ‘completion of request for treatment’ (4.5%, n = 27).

![Figure 14. Breakdown of the most frequently occurring non-conformances (level 5) by process subcode reported, June to August 2014 (n = 246/600 subset of RTEs)](#)

**Secondary process coding**

A total of 30.9% (n = 458) of RTE reports submitted this quarter contained secondary process coding, indicating a second point in the pathway where the original error had gone undetected. This demonstrates a slight decrease from previous analyses. Some 35.4% (n = 162) of these RTEs were coded as ‘end of process checks’, as shown in Figure 15.

![Figure 15. Breakdown of the top five secondary process codes reported, June to August 2014 (n = 215/458 subset of RTEs)](#)
**End of process checks**

The ‘end of process check’ subcode is repeated across the radiotherapy pathway. A breakdown of the dataset by ‘end of process check’ process subcode was undertaken. It includes process subcodes 10l, 11t, 12g and 13hh (Figure 16). Advice on minimising the occurrence of RTEs related to end of process checking is given in issue 4 of *Safer Radiotherapy*\(^1\). A total of 15.1\% (n = 224) of the RTEs reported were not captured during ‘end of process checks’. This would seem to suggest that the ‘end of process checks’ are failing to detect RTEs in some cases.

![Figure 16. Breakdown of ‘end of process checks’ by point in the radiotherapy pathway reported, June to August 2014 (n = 224)](chart)

**Breakdown of process codes**

The 1484 RTE reports were categorised by process code (Figure 17) according to TSRT irrespective of classification, so that the main themes could be derived. Figure 17 shows 38\% (n = 567) of the RTEs reported were associated with treatment unit processes. This is to be expected as some radiotherapy treatments may span a number of visits providing many opportunities during the treatment unit process for RTEs to occur.

The 10 most frequently reported process subcodes in the radiotherapy pathway are presented in Figure 18. The most commonly occurring RTE reported was ‘on-set imaging: production process’ at 5.8\% (n = 87) of the total number of reports. This was followed by ‘use of on-set imaging’ at 5.4\% (n = 80) and ‘on-set imaging: approval process’ at 4.5\% (n = 67). Of note, eight of these most commonly occurring RTEs included no incidents classified as reportable.
Figure 17. Breakdown of RTE main activity codes reported, June to August 2014 (n = 1484)

Figure 18. Breakdown of RTE main themes by classification level reported, June to August 2014 (n = 554/1484 subset of RTEs)
References


