Public Health England

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Safer Radiotherapy

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The PSRT Team
From L-R Tony Murphy (lay rep), Helen Best (PHE), Maria Murray (SCoR), Martin Duxbury (SCoR clinical rep), Tom Roque (previous RCR representative − now Marianne Illsley), Carl Rowbottom (IPEM) and Úna Findlay (PHE)

Welcome to Safer Radiotherapy (RT). 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 Improvement or directly to PHE, to promote learning and minimise recurrence of these events. Safer RT is designed to disseminate learning from RTE to professionals in the RT community to positively influence local practice and improve patient safety.
Published 3 times a year, Safer RT contains key messages and trends from the analysis of RTE reports. Any comments and suggestions for inclusion in the newsletter can be sent to radiotherapy@phe.gov.uk and would be gratefully received. Thanks to all contributors to this issue. The next issue of Safer Radiotherapy will be published in January 2019 and will be available at www.gov.uk/government/collections/medical-radiation-uses-dose-measurements-and-safety-advice

Helen Best, Editor

Work will shortly be commencing on a risk assessment template

There are a number of new requirements in IR(ME)R 2017 specific to radiotherapy. One of which requires the employer to undertake a study of the risk of accidental or unintended exposures in respect of radiotherapeutic practices. In an endeavour to support radiotherapy providers the PSRT have commenced work on identifying what this might look like in clinical practice. To inform this work the PSRT are reviewing the routine use of risk assessments.

A short questionnaire will be circulated amongst the Heads of Service soon regarding experience and use of risk assessments. This will enable the PSRT to learn more about the approaches already in place within clinical departments. A summary of results will be shared in a future edition of the newsletter and the PSRT will work towards consensus guidance on this requirement.

Publications

The learning from the CSV document has been published and is available for the RT community; it is available at **www.gov.uk/government/publications/radiotherapy-good-practice-in-error-reporting**

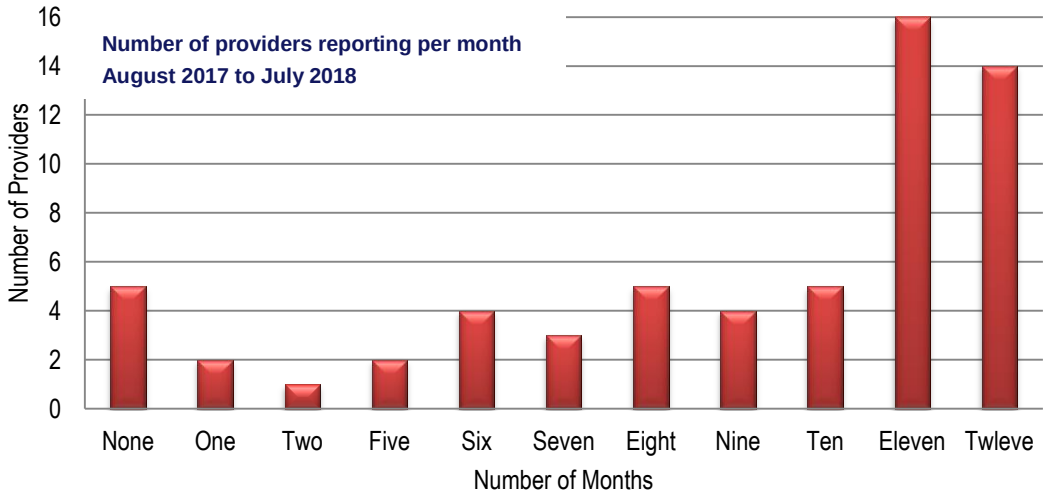
Work has also commenced on the next biennial report; this will contain data for reporting period December 2015 to November 2017.

Content	

Frequency of reporting

To ensure timely feedback and suitable national learning, errors should be reported on a regular basis. The graph below illustrates the number of NHS providers reporting RTE to be included in the national analysis related to the frequency by number of months these are provided. Only 23.0% (n = 14) providers have reported on a monthly basis over the past 12 months; a further 26.2% (n = 16) have only missed 1 month and reported over 11 months. There are still 8.2% (n = 5) RT providers who have not contributed to the national analysis for this year.

PHE or NHSI will be in contact with those providers who have not submitted reports to offer support. To ensure that timely learning from RTEs continues to be shared nationally, please make sure your RTEs are TSRT9 coded and submit as soon as possible. If any departments require support in reporting please contact PHE staff at **radiotherapy@phe.gov.uk**.



IPEM publish results of UK RT survey on planning CT dose indices

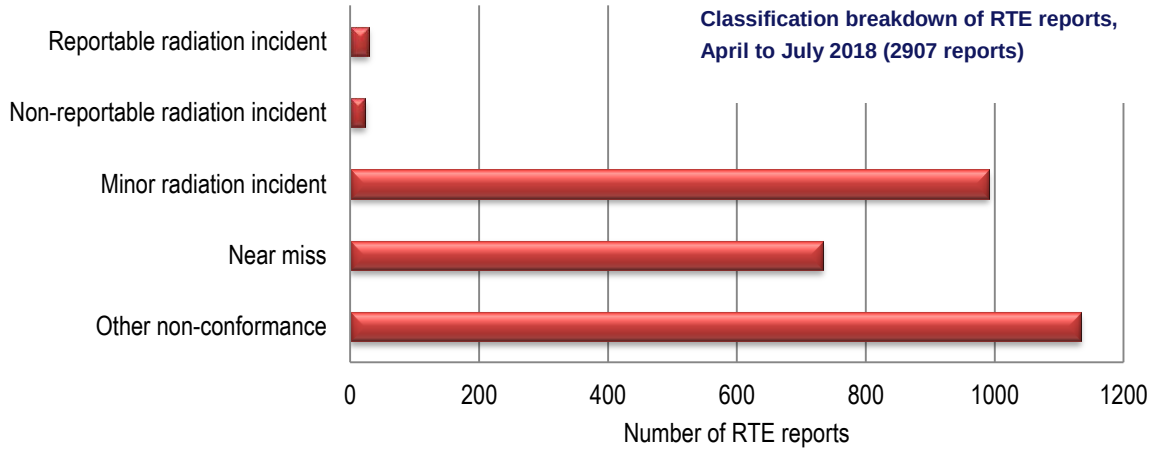
In the guest editorial of Issue 25 of Safer RT, Tim Wood provided an update on an IPEM working party, tasked with auditing imaging doses for a range of common X-ray imaging procedures undertaken in RT departments. IPEM topical report 2: the first UK survey of dose indices from radiotherapy treatment planning computed tomography scans for adult patients has been published, and is available at http://iopscience.iop.org/article/10.1088/1361-6560/aacc87

RTE Data analysis: April to July 2018

Submissions from 55 NHS UK providers out of 61 contributed to this issue's full data analysis, covering April to July 2018. Six providers have not reported or not used the TSRT9 trigger code to report RTE through the NRLS for this reporting period.

The full data analysis is available at www.gov.uk/government/collections/medical-radiation-uses-dose-measurements-and-safety-advice and includes data on primary process coding, safety barriers, causative factors, methods of detection and the severity classification of the RTE.

Classification of RTE



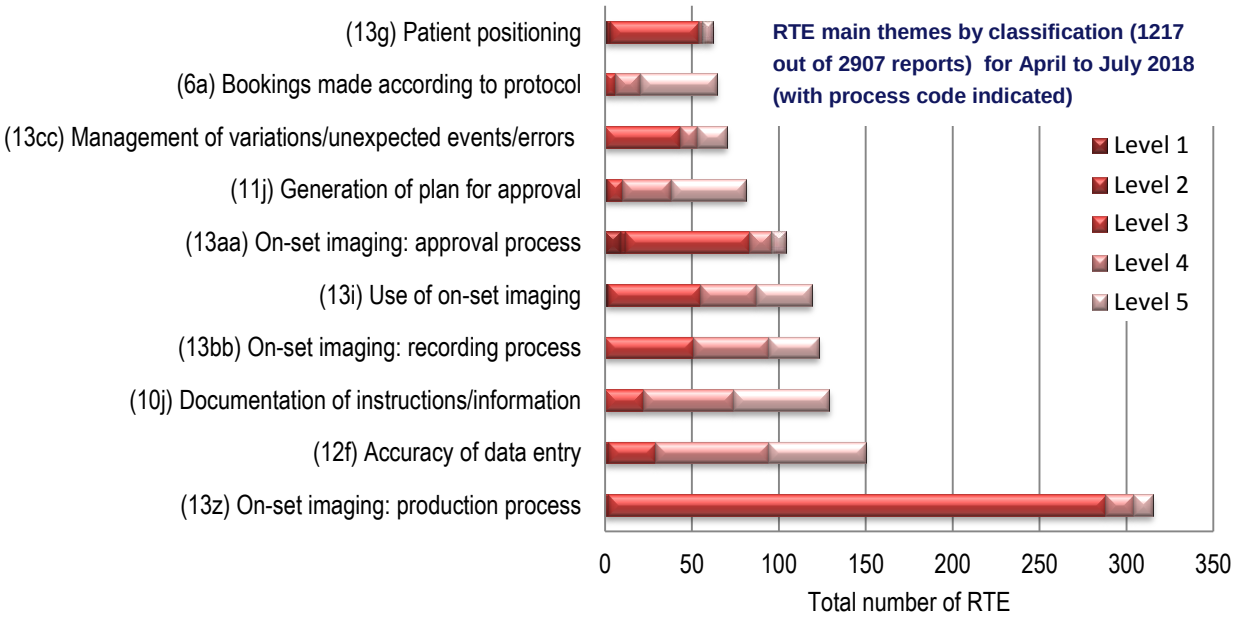
Of those 2,907 RTE reported for the period April to July 2018, 2,856 reports (98.2%) were classified as minor radiation incidents, near misses or other non-conformances. These are lower-level incidents which would have no significant effect on the planning or delivery of individual patient treatments.
Reportable radiation incidents (level 1) made up 28 (1.0%) of all reports. 'On-set imaging: approval process' was the most frequently reported level 1 RTE (32.1%, n = 9). Non-reportable radiation incident reports (level 2) made up 23 (0.8%) of all reports. 'On-set imaging: approval process' comprised 3 (13.0%) of all level 2 RTE. Level 1 and 2 reports made up 51 (1.8%) for this reporting period which is consistent with the previous analysis (1.8%, n = 45).

Of the 990 minor radiation incidents (level 3) reported, 286 (28.9%) of this subset were related to the 'on set imaging: production process', making it the most frequently reported code in this classification, consistent with previous analyses.

The most frequently reported RTE process code in the near miss (level 4) classification was 'accuracy of data entry' with 65 reports (8.9%). Within the non-conformance (level 5) classification 'accuracy of data entry' comprised 56 reports (4.9%) making this the most frequently reported RTE in this classification.

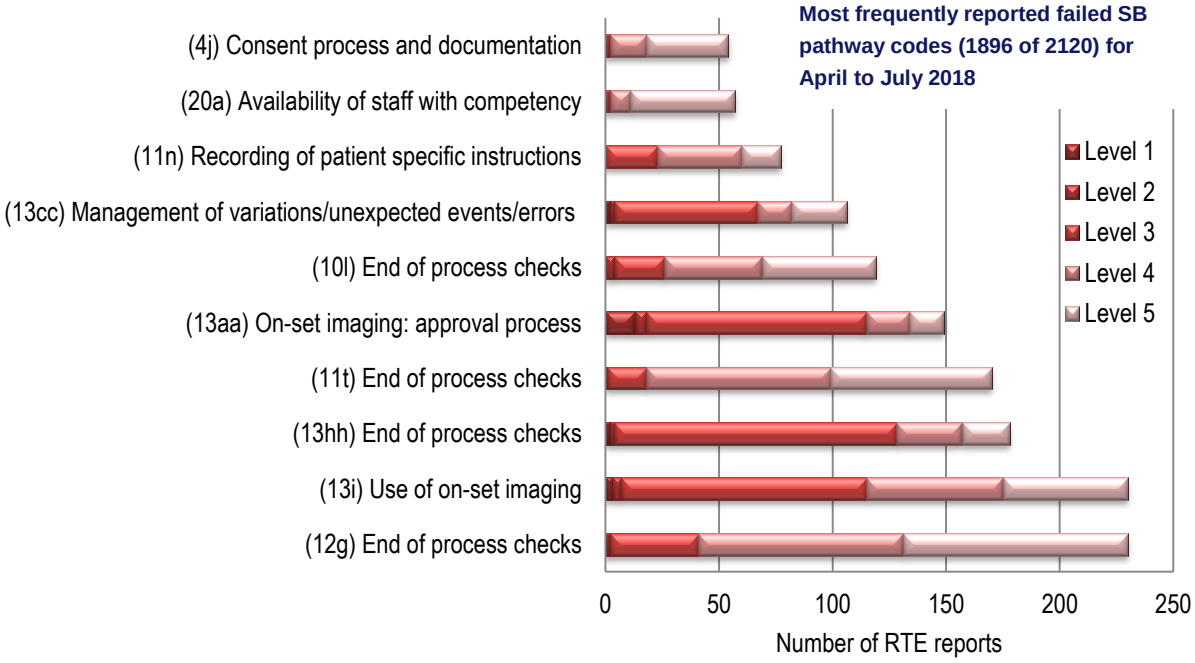
Primary process code

The main themes (points in the patient pathway where the majority of reported RTE occurred) for this dataset are shown below. On-set imaging process codes contributed 22.7% (n = 661) of all reports for this reporting period. Consistent with the previous 12 analyses 'on-set imaging: production process' is the most frequently occurring process code, examples of this include selecting the incorrect pre-set for an exposure. Guidance on this error can be found in issues 7 and 18 of Safer RT.

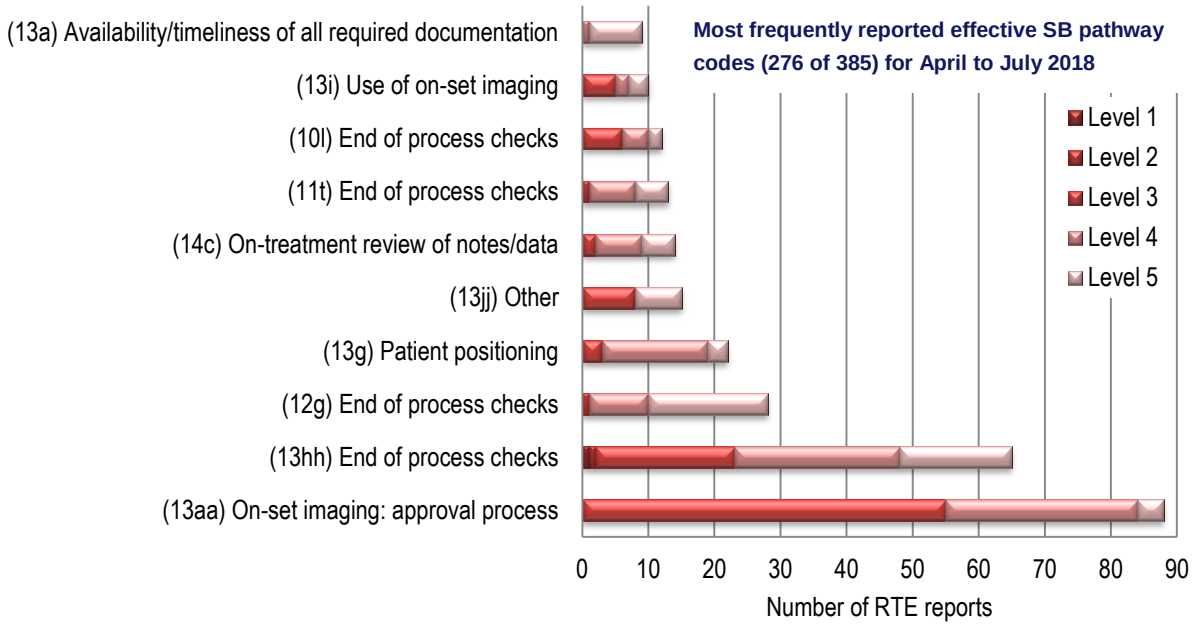


Safety Barriers (SB)

A number of individual pathway codes can be allocated to each RTE report to identify all points in the pathway where the error was not picked up. All subcodes were analysed across the 2,907 RTE reports, a total of 2,120 subcodes were identified as failed safety barriers (SB). Only 72 (3.4%) of these RTE were Level 1 or 2 errors where the SB had failed. The most frequent failed SB reported is represented below and are broken down by classification. Treatment unit process 'end of process checks' is the most frequently reported failed SB (10.8%, n=230). 'End of process checks' across the entire pathway account for 33.3% (n = 705) of all reported failed SB.

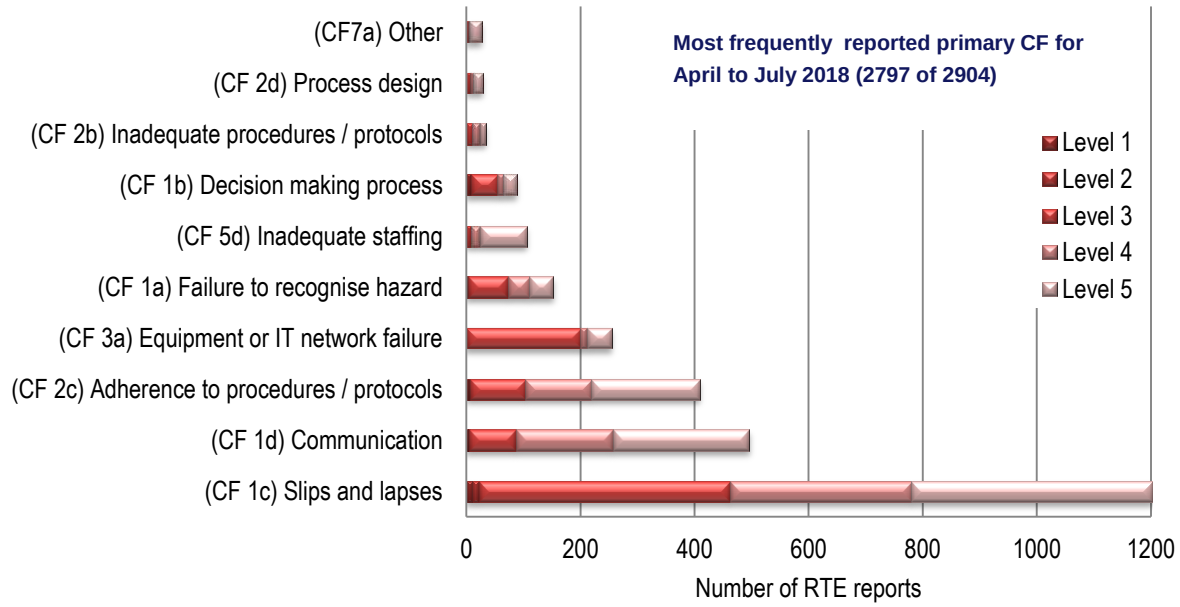


Effective safety barriers or methods of detection (MD) can now be identified utilising the safety barrier taxonomy. For the reporting period April to July 2018, 20 different providers indicated MD across 385 (13.2%) incidents. The most frequently reported effective safety barrier for this reporting period was 'on-set imaging: approval process' (22.9%, n = 88).



Causative Factors (CF)

CF have been applied to 2,904 RTE during the reporting period April to July 2018. The most frequently reported primary CF are shown below; the most frequent was individual 'slips and lapses' (41.4%, n = 1203). Multiple CF can be associated with each RTE; the primary CF is the root cause and the subsequent CF are the contributor factors associated with an incident. Contributory factors were indicated across 850 reports, 156 of these contained multiple CF leading to 1,033 contributory factors. The most frequently reported contributory factor was 'adherence to procedures/protocols' (40.9%, n = 422).



Links to international patient safety resources

ASTRO and AAPM RO-ILS Quarterly report Q4 2017

Autorité De Sûreté Nucléaire (French Nuclear Safety Authority) Publications for Professionals

IAEA, SAFRON Updates on Patient Safety in Radiotherapy

Case note of an unintended overexposure of a patient during contact radiotherapy, in May 2017

On May 16 2017, the university hospital centre (CHU) in Bordeaux told the French nuclear safety authority (ASN) of an incident which constituted overexposure of a patient. Further information on this can be found at www.asn.fr/Controler/Actualites-du-controle/Avis-d-incident-affectant-un-patient-en-radiotherapie/Delivrance-d-une-dose-superieure-a-la-dose-prescrite-lors-d-un-traitement-par-contactherapie

A total dose of 40Gy in 10# was prescribed. The treatment time applied during 8# was 2 minutes 41 seconds instead of 58 seconds **(12f, 13m)** The report states that the incident was due to an error during manual retranscription of the irradiation time in the control software of the device. **(CF1c)** Medical physics concluded that a dose of 9.8Gy was delivered instead of the 4Gy per #. **(Level 1)** The error was detected before the 9th treatment and stopped. **(MD13hh)**
Improvement actions were put in place to prevent this type of incident occurring in the future, including verification of treatment parameters by a medical physicist before the first treatment session and the implementation of a test session. The patient was informed of the incident.
The incident might be coded as follows:

TSRT9/ Level 1/ 12f/ 13m/ MD13hh/ CF1c

How can we minimise the risk of this type of RTE occurring?

- Review working practice for unnecessary transcription
- Reference primary source data when completing checks
- Consider the role of effective in vivo dosimetry
- Create an appropriate working environment with minimal staff distractions
- Complete independent safety critical checks before treatment commences by adequately trained and entitled operators

New legislation and guidance

IR(ME)R 2017 came into force on 6 February 2018. The GB legislation, 2018 amendments and IR(ME)R NI 2018 regulations can be found at:
www.legislation.gov.uk/all?title=ionising%20radiation%20medical%20exposures
The following guidance document has been published

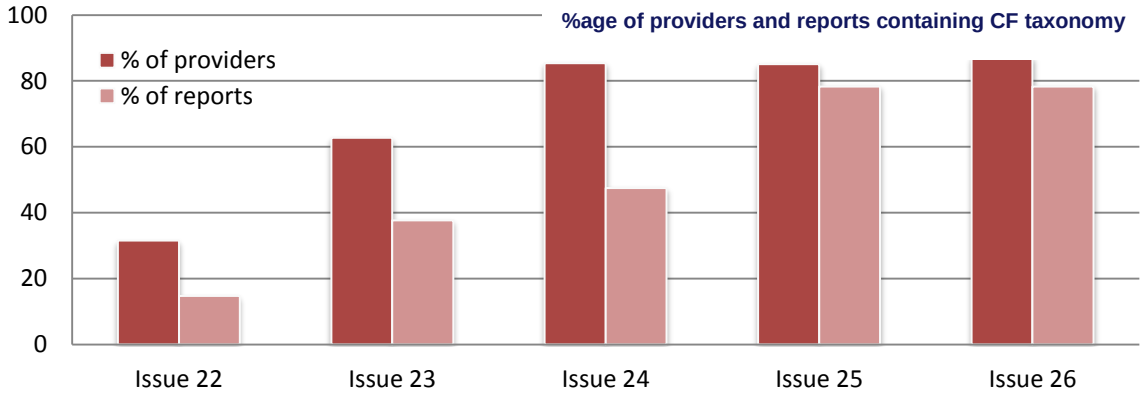
- Department of Health and Social Care Guidance on the IR (ME)R 2017 available at: www.gov.uk/government/publications/ionising-radiation-medical-exposure-regulations-2017-guidance

The following guidance documents are under development to support the community in understanding the clinical implications of these new regulations:

- Radiotherapy Board update to ‘A guide to understanding the implications of IR(ME)R in radiotherapy’ - due summer 2019
- Clinical Imaging Board update to ‘A guide to understanding the implications of IR(ME)R in diagnostic and interventional radiology’ - due summer 2019
- Inspectorate guidance on accidental and unintended exposures - due winter 2018
- IPEM update to ‘Medical and dental guidance notes’ - due summer 2019

Uptake of the refined pathway coding and new taxonomies

In December 2016 the **Development of Learning** document was published with the refinement of the RT pathway coding to include safety barriers (SB) and a proposed causative factor taxonomy (CF).
The uptake in the use of the new CF taxonomy can be seen in the graph below. The % of providers utilising this new taxonomy has increased from 31.5% for issue 22 (reporting period December 2016 to March 2017) to 87.3% for this reporting period. The % of reports containing the new CF taxonomy has also increased from 14.7% for issue 22 to 78.3% within this issue.
The PSRT hosted a workshop on 19 October 2017 on the application of the refined pathway coding and new taxonomies; this may be why there was a marked increase in the uptake of providers utilising the CF taxonomy from issue 23 published in September 2017 to issue 24 published in January 2018.



The utilisation of the SB taxonomy to identify effective SBs or methods of detection was suggested in January 2018. The first analysis of this data indicated that 9 providers shared MD within just 2.5% of the reports; this publication indicates an increase to 20 providers within 13.2% of reports.

To enhance learning all RTE should contain the trigger code, classification, coding, including failed SB, CF and effective SB for example:

TSRT9/ Level 3/ 10c/ 10l/ 11r/ 11s/ 11t/ 20a/ MD13i/ CF1b/ CF1a/ CF5a/ CF5d

Dates for the diary

15 October	BIR, Reflections on the origins of radiotherapy, Webinar
1-2 November	BIR, Annual congress 2018, London
8 November	IPEM, Commissioning a modern radiotherapy centre, Leeds
4 December	CoR, The new UK regulations for ionising radiations in the medical sector, Birmingham
25-27 Jan 19	CoR, Annual radiotherapy conference, Newcastle
January 2019	Safer Radiotherapy Issue 27

Web-based e-learning resource eProton available

An e-learning resource to support education and training of staff in preparation for the opening of the proton beam therapy centres in the UK is now available at www.e-lfh.org.uk/programmes/proton-beam-therapy/

Guest Editorial

Safety considerations of opening a new proton centre

Dr Ed Smith, Clinical Director for Protons
Imran Patel, Lead Physicist for Protons
Hazel Pennington, Operational Lead for Protons
The Christie NHS Foundation Trust

In opening a new proton therapy service we are implementing a new modality of radiation therapy with the intent of treating a wide range of complex and challenging cases. Key safeguards need to, and have been, built into the service to ensure safe treatment of patients. Such considerations started early in the project with a number of senior team members visiting operational proton therapy departments to gather as much information as possible to guide service development. We employed staff early and implemented extensive training packages. Clinical oncologists, senior physicists and therapy radiographers have all undergone an extensive programme of training which has included overseas education programmes and practical placements in established proton centres. This was complemented by bringing expertise to our site to discuss site specific treatment planning solutions, exercises in comparative planning, as well as discussion of the issues and challenges that are particular to proton therapy.

For the physics team, a significant challenge is commissioning treatment delivery equipment whilst, at the same time, commissioning dosimetry devices that are particular to proton therapy. There is no established UK code of practice for calibrating proton beams for therapy. The physics team used the international TRS398 protocol while working with the National Physical Laboratory to develop a new dose to water code of practice. The absolute dose calibration of the system has been independently checked by a physicist from a proton centre in Maryland and the National Physical Laboratory will make measurements prior to treatment to give additional independent assurance.

In almost all areas of practice, proton therapy differs from conventional radiotherapy. For example there are radiation protection issues caused by the neutrons produced in the course of treating patients. Predicting and measuring neutron dose is complex and has required extensive Monte Carlo modelling and the purchase of specialist equipment. For radiographers, overseas experience has been backed up by on site applications training and incorporating a significant amount of time into the commissioning schedule for patient treatment dry runs.

As part of the operational safety considerations the trust invited PHE to carry out a site visit to provide independent support and reassurance on issues surrounding patient safety and process efficiency within the context of IR(ME)R. For a department with a strong background in delivering (and developing) conventional radiotherapy, the implementation of proton therapy has been challenging. Although some aspects have been reassuringly familiar, we have come to appreciate the significant differences that do exist in the operational and technological sphere, as well the unique clinical considerations required to deliver proton therapy safely.