Dose errors were detected in 29 patients. In 9 patients affected more than 1 session (5 patients in 2011, 3 patients in 2012, 1 patient in 2013 and no patients in 2014). The number of corrective actions has increased because of the increasing number of registered events: 2 in 2011, 4 in 2012, 7 in 2013 and 9 in 2014.

Conclusion: Event reporting and learning systems in radiotherapy can provide valuable data for patient safety treatment. An open access event reporting improved identification of areas which needed process and safety improvements. The major indication of the effectiveness is the reduction in dose errors.

EP-1935
Impact of standardised codes of practice and related audit on radiotherapy dosimetry over 20 years
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Purpose or Objective: Reference dosimetry audit measurements in UK radiotherapy centres have been carried out over the last 20 years. This work examines the variation in local dosimetry calibration in a network of radiotherapy centres, draws conclusions on the implementation of an absorbed dose based protocol for MV photon beams and includes the measured effect of a change in the nationally recommended electron code of practice (CoP) from an air kerma based to an absorbed dose based protocol.

Material and Methods: Data from reference dosimetry audits conducted in radiotherapy centres by the National Measurement Institute (NMI) for photon, electron and kV x-rays have been collated, recording the NMI:Centre ratio for reference output measurements, beam quality, and field chamber comparison. A total of 81 MV photon, 98 electron and 30 kV photon beams were measured during 68 visits between June 1994 and February 2015. The change in the national standard deviation has been assessed over time, and differences due to the change between the two electron CoPs during this period has been quantified. The improvement in consistency for MV beams since the adoption of a CoP based electron CoP has decreased the difference between NMI and centre measured outputs. The introduction of the 2003 absorbed dose based electron CoP has decreased the difference between NMI and centre measured outputs. The use of a single absorbed dose based MV CoP, introduced just prior to the start of these audits, has contributed to the improved consistency demonstrated in these results. This not only shows the impact of a rigorous traceability chain developed by close collaboration between NMI and end users but also demonstrates that the NMI audit programme is likely to be a contributing factor to this improvement in consistency in dosimetry nationally.

Results: The mean NMI:Centre difference for radiation output calibration was less than 0.25% for all modalities. A total of 7 measurements were reported to be outside the +/- 2% tolerance. There was a statistically significant difference (p=0.008) in the mean result for the respective air kerma based electron CoP, +0.75% (n=14) with the absorbed dose based protocol giving +0.20% (n=84).

Conclusion: Data has been collated from 20 years of NMI reference dosimetry audits, and key trends and changes have been noted. The introduction of the 2003 absorbed dose based electron CoP has decreased the difference between NMI and centre measured outputs. The use of a single absorbed dose based MV CoP, introduced just prior to the start of these audits, has contributed to the improved consistency demonstrated in these results. This not only shows the impact of a rigorous traceability chain developed by close collaboration between NMI and end users but also demonstrates that the NMI audit programme is likely to be a contributing factor to this improvement in consistency in dosimetry nationally.
Summary: A total of 1847 pts (904 right-sided and 943 left-sided) were treated with either 40 Gy/15 fx (912 pts) or 50 Gy/25 fx (935 pts). 388 of the left-sided pts were treated with gated RT, and 440 without. No information about gating was available for the remaining 115 pts. Dmax(CTV) was less than 110% of the prescription dose in 99.4% of the plans. More than 2 cm3 of the CTV received 107-110% of the dose in 1% of the hypo-fractionated plans. For the normo-fractionated plans, this deviation was observed in 3.5% of the plans. For 92.3% of the hypo-fractionated plans, less than 2% of the CTV was covered with doses above 105%, whereas 3.9% and 3.5% of the plans had minor and major deviations, respectively. For 80.8% of the pts, the part of the CTV covered with at least 95% of the prescription dose was in compliance with the guidelines. Minor and major deviations were observed for 12.6% and 6.6% of the pts, respectively. By taking laterality into consideration, 90.8% of the right-sided pts were in compliance with the guidelines compared to only 71.2% of the left-sided pts. For the left-sided pts with available information about gating, it was found that 87.4% and 59.3% of the pts treated with and without gated RT, respectively, were in compliance, thus indicating that shielding of the heart resulted in CTV under-dosage. This was supported by compliance to the protocol heart dose guidelines for 941 left-sided pts. Only one hypo-fractionated pt showed a major deviation in V35Gy and a minor deviation pt in V17Gy (data missing for one pt). The lung dose satisfied the protocol guidelines for 99.4% of the pts.

Conclusions: A high degree of compliance with protocol guidelines was found for the DBCG HYPO trial. Only a few pts received CTV doses above 107% of the prescription dose. The CTV volume covered with less than 95% dose deviated from protocol guidelines for about 40% of the left-sided pts treated without gated RT. With gated RT this number decreased to about 12%, almost equal to that of right-sided pts. This indicates that gated RT for left-sided pts reduces the necessity of CTV dose compromise due to heart shielding.

EP-1937  
UK stereotactic ablative radiotherapy trials normal tissue dose constraints tolerance consensus  

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Purpose or Objective: Stereotactic ablative radiotherapy (SABR) is routinely used for the treatment of early stage lung cancer and is increasingly used to treat other primary tumour sites. There are currently 6 UK studies (of which 3 are randomised) investigating the utility of SABR in the treatment of oligometastatic disease (breast, lung, prostate), lung, prostate, pancreas and hepatobiliary primary malignancies. These are supported by CRUK and currently open in or set-up to begin recruitment in 2016. In addition, a NHS Commissioning Through Evaluation (CTE) programme was commenced in 2015 to evaluate SABR in situations where clinical trials are not available. In an attempt to standardise protocols and the associated radiotherapy planning we sought to generate consensus normal tissue dose constraints tolerances across these UK studies.

Material and Methods: Members of the various SABR studies’ trial management groups, facilitated by the UK Radiotherapy Trials Quality Assurance Group (RTTQA), met to generate a unified table of normal tissue dose constraints. As a starting point, the UK SABR Consortium Guidelines, the AAPM TG-101 report and other seminal publications were used to define a baseline reference. These initial constraints values were revised, where appropriate, by taking into consideration any updated or more robust data that better informed a given dose constraint value in the opinion of the panel.

Results: Following an iterative process, agreement was reached on all dose constraints covering the central nervous system, thorax, abdomen, pelvis, skin and bone. It was agreed to use a point maximum dose volume of 0.5cc for the purposes of describing the maximum dose for all organs except the spinal cord. For the spinal cord 0.1cc is to be used. The group reached the consensus that for the purposes of these trials single fraction should not be used outside CNS. We recommended the use of 3, 5 and 8 fractions regimes. These dose constraints will be used for the forthcoming SABR studies and for the implementation of the CTE SABR programme for oligometastatic disease and HCC. The group will review the evidence annually to update the guidelines.

Conclusion: A UK national agreement on SABR dose constraints has been successfully achieved. It is hoped that this unified approach will facilitate standardised implementation of SABR across the UK and will permit meaningful toxicity comparisons between SABR studies and further refinement of the constraints. Any further trials developed in the UK will adopt the consensus.

EP-1938  
Evaluation of pre-treatment verification for hyperthermia treatment plans  
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Purpose or Objective: The BSD-2000/30 system (BSD Medical Cooperation, Salt Lake City, USA) is used to treat deep seated tumors with hyperthermia (to temperatures of 41-43°C) in combination with radiotherapy. Treatment planning for this system is done with the software SigmaHyperplan (Dr. Sennewald Medizintechnik GmbH, Munich, Germany). In this study a method and first results for pre-treatment verification of clinical patient treatment plans using a 3D SAR scanning phantom developed at the Kantonsspital Aarau are presented.

Material and Methods: Treatment plans for individual patients were generated with SigmaHyperplan and applied to a saline phantom model. The result is a set of data for the