A Vision for Radiotherapy 2014-2024

Request for written evidence

RESPONSE FROM THE RADIOTHERAPY BOARD[i]

The Radiotherapy Board welcomes this opportunity to contribute to NHS England and Cancer Research UK's development of a vision for radiotherapy services in England over the next ten years.

The Radiotherapy Board feels it is very important to the future delivery of high quality radiotherapy services that there is a focus on innovative radiotherapy and how it can be implemented in the future. The Board firmly supports the objective of developing the best possible radiotherapy service in England and would welcome any opportunity for this to be extended to the devolved nations also, to ensure all cancer patients benefit.

The Radiotherapy Board's views on the questions posed by NHS England and Cancer Research UK in this call for written evidence are set out below and we hope they will be helpful in taking forward this important piece of work.

Definitions

What do you see as being advanced radiotherapy?

Advanced radiotherapy incorporates all appropriate modes of diagnostic imaging into defining treatment targets and related normal tissues, and allows precise delivery of high-dose radiotherapy with minimal doses to normal tissues. The accuracy of this approach is assured through verification processes, as outlined in the 2012 Image Guided Radiotherapy (IGRT) guidance[ii].

Techniques that could be considered advanced include:

- functional imaging guided radiotherapy
- Intensity Modulated Radiotherapy (IMRT)
- 4D-Adaptive radiotherapy
- daily online IGRT
- respiratory motion-managed radiotherapy
- proton therapy
- Stereotactic Body Radiotherapy (SBRT) /Stereotactic Ablative Radiotherapy (SABR) / Fractionated Stereotactic Radiotherapy
- Stereotactic Radiosurgery

What do you see as being innovative radiotherapy?

An innovative radiotherapy service on a national basis is one that facilitates rapid (immediate) provision of proven techniques and allows early UK-based formal evaluation of novel technologies and techniques. The UK has generally not had access to truly novel technologies and techniques until several years *after* these have been adopted in other countries. This limits the UK's ability to lead service change, trials and research.

Innovative solutions would include a collaborative nationwide approach, such that individual centres would lead on different technologies, with referrals from other centres to these leading centres. This would apply particularly to treatment of rarer cancers or for highly specialised techniques.

However, not all innovative radiotherapy approaches involve advanced radiotherapy techniques. They may relate to the development of existing techniques in a more efficient or effective way (for example, heart-sparing breast radiotherapy through development of patient breath-hold) and that can subsequently be adopted on a national basis.

Some specific examples of innovative radiotherapy include:

- improving imaging for planning with co-registration, Magnetic Resonance Imaging (MRI) planning, Positron Emission Tomography–computed tomography (PET-CT)
- automated outlining tools that save time
- adaptive radiotherapy - rapid adaptive re-planning
- targeted boosting (for example, prostate, bladder)
- combining radiotherapy with new drugs, including biological agents and immune-modulating agents
- developing and delivering altered fractionation regimes
- personalised radiotherapy doses based on normal tissue and tumour radiosensitivity
- protons
- MRI linac / MRI cobalt unit

The future of radiotherapy

What specific goals should we be aspiring towards in the future of radiotherapy?

- Appropriate consideration of, and referral for, radiotherapy.

- Delivery of a service that ensures techniques are available so that EVERY patient has access to the most appropriate radiotherapy for their situation.

- Achieving appropriate access rates - it is just as important for patients who need palliative radiotherapy for symptoms etc to have access to that radiotherapy as it is for patients to have access to advanced radiotherapy for potential cure. If advanced technology is to be used in non-curative situations, it is essential to ensure that this does add benefit over conventional palliative radiotherapy and that every patient has access to the most appropriate treatment for their situation.

- Waiting times - achieving the best possible waiting times, taking into account tumour biology.

- Outcomes data - national collection of outcomes data has been discussed for many years as an agreed goal but the Radiotherapy Board is concerned that there has been insufficient progress. Outcomes data are essential for understanding the future direction of service delivery.

- A strategic approach to specialised services – the Radiotherapy Board suggests this is important to avoid any 'postcode lottery' in service delivery.

- Continued expansion in clinical trials and identification of 'Cinderella areas'(such as brachytherapy and molecular radiotherapy)

- Expansion in the number of programme grants in radiotherapy-related research in the UK, including an increase in the number of centres involved in grants.

- Expansion in investment in novel technologies.

- Raising awareness of radiotherapy - radiotherapy is – and needs to be recognised as – an extremely cost-effective cancer treatment compared with many other cancer treatments.

- Capacity - capacity to deliver new technology is at least as important as the equipment. The increased time required by radiographers, physicists and clinical oncologists (uninterrupted outlining, complex planning, complex treatment delivery and multidisciplinary planning meetings) need to be taken into account in job plans and timetables. Capacity should exceed average demand by 15%[iii]

- Individualised radiotherapy - a long-term aim should be to aspire to individualised radiotherapy based on genetic characteristics of tumour and normal tissue.

- Meeting the needs of the ageing population - there is a need to develop and improve radiotherapy for the ageing population. As the cohorts of patients receiving treatment get older, it is essential to develop schedules and techniques for those patients that manage less well with large treatment volumes and long treatment schedules.

What are the best possible patient results which we could be seeing in ten years' time?

- Increased patient selection of radiotherapy as the preferred treatment modality due to better awareness amongst patients and more balanced discussion of options within Multi-Disciplinary Team meetings (MDTs).

- Increased cure rates

- Reduction in both acute and late side-effects of radiotherapy

- Increased choice for patients in all elements of their care pathway, including treatment options and inclusion in trials.

- Increased patient satisfaction

- Individualised radiotherapy to maximise local control, cures and minimise patient side effects and inconvenience.

What possible improvements do you see to the patient experience through adopting advanced and innovative radiotherapy techniques?

Most patients have an excellent patient experience during radiotherapy. The following are some further possible improvements that could be achieved through adopting advanced and innovative radiotherapy techniques:

- Reduced fractionation
- Reduced toxicities
- Shorter treatments
- Fewer visits to hospital / greater convenience for patients
- Improvements in local control
- Reduced short-term and long-term side effects
- Improved survivorship

How do you see radiotherapy contributing to the Nicholson challenging of saving £30biliion form the NHS budget?

As noted above, radiotherapy is – and needs to be recognised as – an extremely cost-effective cancer treatment compared with many other cancer treatments. However, in order to achieve savings in the longer term, there needs to be initial investment in radiotherapy (as demonstrated in 2013 by investment in IMRT through the Radiotherapy Innovation Fund).

Savings can be made by using radiotherapy more appropriately, often instead of using more expensive and less effective systemic treatments.

Radiotherapy is a curative treatment and curing patients is a cost-effective way of preventing their need for expensive life-prolonging but fundamentally palliative systemic therapies.

There is a risk of all centres trying to deliver all novel treatments, and this would not be a cost-effective approach.

What are the current obstacles to these results and what needs to change in order for us to deliver them?

There are a number of obstacles that need to be overcome:

- Lack of national leadership - loss of national leadership following the dissolution of the National Cancer Action Team and the National Radiotherapy Implementation Group and consequent lack of funding/investment.

- Insufficient local leadership–local leadership is key. All departments have had the opportunity to benefit from initiatives delivered through NCAT and NRIG. Some

departments have made huge strides but others have not. Management training and 'learning from success' might help to even this out in the future.

- Profile - radiotherapy needs to be seen as one of the primary treatment choices for cancer patients. The profile of radiotherapy needs to continue to be raised within the NHS/Department of Health (DH), among patients and the general public, and in the media. The support of CR-UK has been particularly helpful in this regard.

- Industry support –there is a lack of industry support for radiotherapy compared with that often seen from the pharmaceutical industry in relation to systemic treatments. This is unlikely to change due to the relative size and business model of manufacturers, so the NHS and charities need to take a comparatively bigger role.

- Funding - this underpins most of the changes required. The Radiotherapy Board acknowledges that progress has been made with part of the tariff being determined according to complexity of the radiotherapy treatment (that is, time taken to plan, deliver and quality assure). Radiotherapy centres should not be discouraged from adopting new hypofractionated approaches as this may cause a loss of revenue (for example, the FAST Forward trial which compares 5 fractions of radiotherapy with the UK standard of 15 fractions). These hypofractionated approaches are ultimately likely to provide more cost-effective radiotherapy. The Radiotherapy Board suggests that the funding structures should be changed to encourage innovative radiotherapy, especially for those techniques with proven benefit.

- Staffing - retention of highly skilled staff, particularly radiographers and physicists, is key to future service delivery and appropriate skills mix will also help to ensure effective service delivery. Clinical Oncologists will need to recognise the increase in time that is required of them to plan complex treatments and this, in turn, has to be recognised in job plans and in the size of the Clinical Oncology workforce. Technology in radiotherapy has developed to such a level that it facilitates doing tasks faster (for example, auto-outlining, computer planning, rotational delivery). Retention of staff also need to be accompanied by an overall increase in the radiotherapy workforce.

- Training - co-ordinated programmes of training, which enable implementation of new radiotherapy techniques in all centres. Much progress has already been made with the recent national training programme for implementation of IMRT.

- Quality Assurance (QA) - a co-ordinated programme of QA is essential for the same reasons as training. The NCRI Radiotherapy Trials QA (RTTQA) Group has made a huge difference in facilitating and promoting high quality trial-related QA[iv]

- Research - centres involved in clinical trials are more likely to implement new radiotherapy technologies for both trial and non-trial patients. In contrast, those centres <u>not</u> involved with clinical trials are less likely to implement new radiotherapy technologies.

What role could NHS data play in the future of radiotherapy service planning and delivery?

- Development of data sources – the Radiotherapy Dataset (RTDS) is the world's only comprehensive and mandatory national radiotherapy database. Thought needs to be given to how we use this properly, which may require investment – for example, though funding clinical and research fellowships.

- Radiotherapy outcomes - there are large amounts of data that could be collected and analysed which should be brought together with new IT systems. This includes the 3D dose distribution for all radically treated patients, but there is also a requirement for collection of clinically-relevant outcomes data – tumour control and normal tissue toxicity. The Radiotherapy Board suggests that remote data capture from patients should be invested in heavily.

- Outcomes data linked to detailed staging and radiotherapy technique (and other cancer treatment offered) will be the long-term key to quality improvement. However, such data collection needs to be part of the core job description of *all* involved in cancer management.

Devices

New devices and developments will be important but more important is how they are used

What new devices to deliver radiotherapy are we expecting to see over the next ten years?

- Increased use of high dose rate treatment delivery (for external beam radiotherapy)
- Radiotherapy treatment machines that are capable of delivering Cranial and Extra-Cranial Stereotactic Radiotherapy
- Increased use of high dose rate brachytherapy
- Increased use of phantoms to QA IMRT planning
- Proton facilities, and perhaps other heavy ions
- Intra-operative and contact brachytherapy
- MRI linac for on-couch verification

What will the developments in imaging technology be?

- Increased use of multi-modality imaging at treatment planning (4DCT, MRI, PET/CT)
- Increased use of Cone Beam (CB) CT image guidance / Integration of MRI into treatment
- Development and early evaluation of MRI image guidance
- Adaptive radiotherapy based on changes in functional imaging (PET) during RT
- Sub-volume boosting based on multi-modality imaging, which will require higher degrees of delivery accuracy
- Incorporation of CBCT dose into treatment planning – reducing concerns over accumulating dose
- Routine use of exit / portal dosimetry
- Functional imaging for boost planning (dose painting)
- Functional imaging to assess tumour response during treatment

Software

What innovations in the field of software are we expecting to see in the next ten years?

- Increased use of deformable registration software to facilitate multi-modality imaging
- Faster and more accurate treatment planning dose calculation algorithms
- More accurate automated contouring tools
- Incorporation of CBCT dose into treatment planning
- Improved auto outlining
- Automatic adaptive re-planning and checking
- Voxel tracking
- Increased use of Monte-Carlo planning
- Automated outlining using PET information according to SUV levels

Radiotherapy techniques

New techniques will be important but more important is how they are evaluated and used, which will require national coordination.

What are the upcoming innovations in the field of external beam radiotherapy?

- Adaptive radiotherapy 4D imaging
- Molecular and imaging biomarker selected patients for different treatment options
- Increased use of molecular agents in combination with optimal radiotherapy
- Sub-volume boosting based on multi-modality imaging, which will require higher degrees of delivery accuracy
- Adaptive radiotherapy based on changes in functional imaging (PET) during radiotherapy
- Adaptive radiotherapy based on physical changes during radiotherapy
- Increased respiratory motion management
- Extreme hypofractionation in the non-curative setting
- Protons

What are the upcoming innovations in the field of brachytherapy?

- High dose rate prostate brachytherapy
- MRI planned gynae brachytherapy (standard in a number of centres)

Delivery

How will we go about delivering these innovations?

The Radiotherapy Board strongly recommends that there is a national clinical multi-professional overview group to stop fragmentation of service delivery. The Radiotherapy Board is addressing key issues of standards of service delivery and workforce requirements but it can only recommend and has no powers to ensure implementation. It would welcome such support at national level. Investment in national workstreams to help support evaluation of new innovations will be essential. This could be in the form of project

funding, which will be required to effectively co-ordinate the implementation of the new innovative technologies into the NHS through an agreed number of centres using commissioning by evaluation, for example. Delivery of new innovations must be supported by an expansion of all elements of the radiotherapy workforce and with appropriate training and skills mix. It will also be essential to put in place some mechanism for continuous monitoring and evaluation of the workforce in order to maintain service delivery. This could be undertaken in conjunction with Health Education England.

What changes in planning and delivery will we need to make?

The Radiotherapy Board suggests the following:

- Ensure that all radiotherapy departments have sufficient capacity to allow rapid adoption of novel techniques – this will include service capacity, research and development trials, and specific QA time

- Delivery of shorter fractionation schedules with higher daily doses(hypofractionation)

- Consider expansion of radiotherapy services through greater out of hours and weekend working, possibly through a 7-day service.

- Regular review of the radiotherapy service specification to ensure it continues to meet demand and is aligned with international standards.

- Consider changes in clinical oncology, medical physics and radiographer training to facilitate the expansion in the number of UK leaders. Regularly review skills mix across the radiotherapy pathway to provide opportunities for career progression and so retain expert skilled resource within UK radiotherapy services.

- Support loco-regional service planning groups to maximise use of resources and ensure efficiency.

Will we need new ways of working to support these innovations? What will these look like?

The Radiotherapy Board agrees that new ways of working will be needed to support these innovations and suggests the following are considered:

- There is a requirement to further develop multi-disciplinary links to ensure there is cross-specialism working at all levels.

- More effective skills mix with non-medical practitioners working at advanced and consultant level will help to free and utilise scarce resource more effectively - for example the implementation of the radiography career development framework with the development of advanced and consultant site specific and technical practitioner roles would help support service development[v]. Similar roles could be developed for medical technologists in supporting clinical scientists in medical physics. The use of the support workforce needs to be fully integrated and explored.

- Development of extended service provision beyond the traditional Monday-to-Friday, 9am to 5pm, model and including weekend working. This will help to maximise the use of expensive capital equipment but must allow for essential maintenance and quality assurance to be undertaken. Extending service provision will require the availability not only of representatives from the whole radiotherapy team – clinical oncologists, physicists and radiographers – but also a wide range of support services that are essential to patient care.

How can staffing and workforce best support these innovations?

The Radiotherapy Board suggests the following:

- Mandatory multi-professional skills mix, with greater use of all resources - for example, new roles and advanced and consultant radiographer levels to support streamlined care for patients and free the clinical oncologist for the complex work.

- Consideration needs to be given to the appropriate balance of service delivery across different centres, with smaller centres becoming affiliated to larger centres to ensure appropriate clinical governance and service delivery.

- All professions within the radiotherapy service will require their skills and competences to be enhanced as new technologies are introduced.

- Effective and open multidisciplinary workforce planning in all centres across all professions and support workforce

- Relevant and required education provision – pre-registration and post registration, stronger service provider and Health Education Institute relationships to plan effectively and to identify changing workforce skills required to deliver and implement the latest technologies

- Explore the role of Local Education and Training Boards to plan education.

How best should we go about training staff to make best use of these innovations?

The Radiotherapy Board offers the following observations and suggestions:

- Evaluation and skills mix - evaluation of new treatment/ technologies/innovations in the NHS should take place initially within a predetermined range of centres. The evaluation of the treatment/technology/innovation will require a skills evaluation. A skills mix review will be required to identify current skills levels (in relation to the use of the innovation), and map to the required skill level in order to identify any additional post-registration education, training and competence requirement. This will be essential in order to evaluate and implement the technology/innovation/technique safely, to a high standard, and both cost effectively and efficiently.

- Training - a multi-professional approach is likely to be the most effective approach to training in the clinical environment and is likely to be a mix of informal learning through applications training, external training programmes from leading centres outside the UK, formal post-registration education and training which can be

delivered through a range of ways from formal programmes, through e-learning, and peer-to-peer support programmes.

- Address attrition rates - there is a high attrition rate amongst student radiographers with over 35% on average leaving pre-registration education programmes. An NCAT funded project was undertaken in 2013 and recommendations made to all the key stakeholders. It is important that the stakeholders review and implement the recommendations in order to reduce this very high attrition rate[vi].

- Include funding for training and release of staff to undertake the training in the commissioning budget.

- Many radiography and physics staff with low pay have the perception that they are undervalued members of the team. There is also a perceived lack of career progression, monotony and stress of working on the radiotherapy machines for radiographers.

- Possible solutions include implementing the radiography career progression model with roles at advanced and consultant level which are both site specific and technically focussed, and which will help to support the work of the whole multi-professional team. Similar roles would help support physics staff too.

- A satisfied, skilled committed and resilient workforce is an essential foundation to a quality radiotherapy service. There should be investment in the development of the entire workforce to support this.

How do you believe that radiotherapy delivery should be planned, for example, should it be done centrally or locally?

The Radiotherapy Board suggests that planning of radiotherapy service delivery requires central oversight supported by local intelligence.

What do you feel the role of regional centres could be in radiotherapy delivery?

Regional centres should continue to support radiotherapy service delivery where there is patient demand.

How much planning and delivery do you believe will be able to be done virtually in the future?

The Radiotherapy Board feels that the use of technology requires careful evaluation and that face-to-face interaction and review is important before, during and after treatment. However, there may be scope for some centralised planning for routine practices. This should be subject to further work and the Board recommends national evaluation and agreement of what is safe.

Research

How can the NHS ensure that there is a vibrant radiotherapy research environment to allow new innovations to be developed over the next ten years?

The Radiotherapy Board recommends continuation of the investment and support that has been provided. It also recommends additional further investment is needed. There are huge opportunities for world-leading research – not only through proton beams, but also from the possibilities arising from 7-day working in terms of (for example) novel new fractionation schemes. There are also significant possibilities through full exploitation of the RTDS.

Particular areas for continuing support include:

- Molecular and imaging biomarkers
- Drug-radiotherapy interactions and early phase trials (UK can be world leader)
- Development of academic career paths for radiographers, medical physicists and clinical oncologists
- Molecular radiotherapy
- Ongoing support for clinical trials through the RTTQA group
- Novel approach to generating high-quality practice-changing commissioner-influencing evidence outside of randomised controlled trials
- Data-mining
- Incorporation of functional imaging into planning (involvement 0f radiologists and standardisation of approach across centres)
- increased access for patients to research trials, leading to improved outcomes, quicker trial recruitment
- more rapid consistent implementation of emerging new evidence into practice
- world class radiotherapy services with capacity to implement evidence-based technologies and treatments
- radiographer-led research - workforce models to ensure this is inherent in all centres perhaps with exception of small/ single linac centres.

Centres involved in clinical trials are more likely to implement new radiotherapy technologies for both trial and non-trial patients. In contrast, those centres not involved with clinical trials are less likely to implement new radiotherapy technologies. Radiotherapy trials need support at a level that reflects trial activity.

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[i] The Radiotherapy Board provides guidance, oversight and support for the continuing development of radiotherapy services in the UK. It was established in April 2013 by The Royal College of Radiologists, the Society and College of Radiographers, and the Institute of Physics and Engineering in Medicine following the closure of the National Radiotherapy Implementation Group and National Cancer Action Team. Its membership includes (inter alia) the Chair of the Radiotherapy Clinical Reference Group.

[ii] *Image Guided Radiotherapy (IGRT): Guidance for implementation and use*. National Radiotherapy Implementation Group Report, National Cancer Action Team. 2012

[iii] *How much surplus capacity is required to maintain low waiting times?* Thomas SJ, Williams MV, Burnet NG, Baker CR. Clin Oncol 2001; 13: 24-28

[iv] *Radiotherapy Quality Assurance: Facilitation of Radiotherapy Research and Implementation of Technology*, E. Miles*, K. Venables, Clinical Oncology 24 (2012) 710-712

[v] https://www.sor.org/learning/document-library/implementing-career-framework-radiotherapy-policy-practice

[vi] http://www.sor.org/learning/document-library/improving-retention-radiotherapy-workforce-role-practice-placements-student-attrition-pre-8