A Call to Action: Next Steps to Improve Radiotherapy Services and Outcomes in England

October 2018

Foreword

The most recent figures estimate that one in two people of us in the UK will suffer from cancer at some point in our lives. Of these people up to 50 per cent will have radiotherapy as part of their treatment. Radiotherapy is a highly cost-effective life-saving cancer treatment. Yet radiotherapy service and investment in the UK lag behind the rest of Europe receiving only 5% of the NHS cancer budget. More investment could see the UK with a world class radiotherapy service. A services that would deliver the best outcomes for patients, improving the quality, extending and, saving lives - no matter where they live.

As the Chair of the All Party Parliamentary Group (APPG) on Radiotherapy I have been impressed by the commitment of MPs, charities, patients, clinicians, professional groups and industry to work together to find solutions and to achieve equal access to high-quality, sustainable radiotherapy services. The recommendations in this report reflect this collaborative approach and set out a blueprint for how we can improve services for people with cancer and their families.

We must now act on these recommendations and build on this momentum.
As is reflected in this report, the APPG for Radiotherapy is calling for increased

investment in radiotherapy services and innovative treatments as well as better use of resources to use the untapped potential of the services, personnel and equipment we do have– the NHS must now consider how it can achieve this as it makes funding decisions to improve cancer care for the next ten years.

In particular, I would like to pay tribute to Rachael Bland, who spoke of her desire to ensure that all cancer patients had access to radiotherapy at an event I hosted last year. She leaves a legacy of dedication to improve the lives of people with cancer, one which we are determined to build upon.

Tim Farron MP
Chair of the All Party Parliamentary Group on Radiotherapy

A Call to Action: Next Steps to Improve Radiotherapy Services and Outcomes in England

Introduction

Current spend on radiotherapy is a small proportion of the cancer budget in the UK although around 50% of cancer patients will need radiotherapy as part of their treatment. Radiotherapy is highly cost-effective, innovative and life-saving but despite national investment in new equipment, there are still significant changes required to increase efficiency and improve patient experience and outcomes and increase survival.

Radiotherapy technology in terms of software, engineering and imaging has moved on rapidly over recent years and to keep up with technology developments and enable UK cancer patients to access the very real benefits now and in the future, a new dynamic, coordinated and more smartly funded approach is needed.

On 25th April 2018, radiotherapy experts from across the NHS, industry, Public Health England and charities came together to consider next steps for radiotherapy. The event was Chaired by Tim Farron MP. This report is a pragmatic and thoughtful approach from a multidisciplinary groups of professionals to improving cancer care and survival rates through modern world-class radiotherapy services.

The All Party Parliamentary Group for Radiotherapy's manifesto proposes a £250 million one-off investment and a 1.5 per cent increase in radiotherapy's share of the annual cancer budget. This would allow for modernisation of radiotherapy services throughout the UK and ensure equal access to radiotherapy for the next 10 years. Though this investment in radiotherapy would be a small percentage of Theresa May's proposed £20 billion boost to improve health care, it would directly and quickly contribute to May's goal to reduce cancer related deaths and improve survival.

This document sets out the group's key recommendations for high-quality, sustainable radiotherapy services. Appendix 1 includes a brief overview of radiotherapy techniques that are currently available.
A full list of attendees is set out in Appendix 2.

Our calls for the development of radiotherapy services

Radiotherapy awareness now: Raising public awareness about radiotherapy as a cutting-edge cancer treatment which saves lives is essential to empower patients and the public to make informed decisions about what treatment they receive and from where.

Patients first: It is vital that cancer patients are given access to the most advanced radiotherapy in the most appropriate location and the NHS should aim to ensure that patients do not have to travel more than around 45 minutes for their radiotherapy appointments and are able to receive such treatments in local centres where possible. This is likely to exclude those for specialised treatments and paediatric treatment. Where longer travel is required, support should be provided. Patients and carers should be involved in decisions about radiotherapy services and supported to inform how they are structured.

Networks for all: A networked-model of care would better enable the delivery of consistent, high-quality radiotherapy closer to patients' homes. Such a model should take account of professional and public concerns that advanced radiotherapy should not be removed from centres where they have the expertise and

capacity to treat complex and rarer cases. This should be supported by national performance targets and satellite centres with telehealth and interoperable systems to ensure appropriate expert input from a distance (with appropriate workforce investment to enable this to happen). NHS England and each Radiotherapy Network Board should ensure regular communication with local radiotherapy providers and embed formal engagement opportunities with the local population.

Software for the future: The NHS must invest in software now and on an ongoing basis to support the delivery of high-quality radiotherapy for all, facilitate expert input from a distance and to ensure maximal, effective and safe use of new equipment.

Payment mechanisms that work: NHS England must undertake an urgent, full review of the tariff for radiotherapy to remove the current perverse incentives of payment being linked to quantity of fractions, rather than quality and innovation. The review should also consider funding arrangements for future software and equipment upgrades so that the NHS can implement a rolling programme of updates and retain cutting-edge radiotherapy capabilities.

Data for improvement: Public Health England should ensure there are sufficient resources to support high-quality, timely analysis of radiotherapy data that it is clinically relevant, liasing with manufacturers to maximise data that is routinely published on radiotherapy. Steps should be taken to provide a more granular level of data to a wider audience in order to support benchmarking of services and drive improvements in outcomes.

Research: Radiotherapy research should be appropriately resourced so that NHS providers can participate in research alongside clinical practice. Research capacity within the NHS will encourage inward investment into the UK.

Sustainable radiotherapy services: Health Education England and professional groups should establish robust mechanisms to project workforce requirements for radiotherapy and facilitate access to services and research opportunities within the NHS. A small increase in spend on radiotherapy can ensure that new networks are fit for purpose and will facilitate effective services for the future.

Background

Radiotherapy services are currently commissioned nationally by NHS England. Having a nationally-led radiotherapy service should enable equal access to the best quality services close to people's homes and contribute to the national ambitions to provide world class cancer treatment services and improved patient outcomes.

The NHS in England is a global leader in some aspects of radiotherapy provision and national investment has significantly improved the availability of cutting-edge technology in the NHS, but attendees at the roundtable also highlighted examples where commissioning decisions made on a national level have had an adverse impact on the use of local equipment and expertise. It is important that there is a balance between national oversight and local autonomy that supports consistent, high quality services that meet the needs of the population. This should be supported by horizon scanning and liaison with equipment providers to ensure the NHS is able to plan proactively for the latest innovative techniques.

Following the publication of the 2014 Vision for Radiotherapy, by Cancer Research UK and NHS England, in October 2017, NHS England opened a consultation on a radiotherapy service

specification, setting out plans for radiotherapy networks and several other measures for radiotherapy services. Networked arrangements are designed to ensure that cancer patients are managed by an experienced multi-professional tumour specific subspecialist team which provides holistic care. The initial consultation period was extended to January 2018 and over 11,000 responses were received. NHS England is in the process of reviewing the responses and considering next steps and an updated service specification is expected in the coming months. This should take account of professional and public concerns when considering appropriate network models to ensure where any centre has the expertise and capacity to treat complex and rarer cases they should continue in order to allow care to be closer to home.

This report is designed to support NHS England and the APPG Radiotherapy Manifesto https://www.actionradiotherapy.org/our-manifesto to deliver on the ambitions and ensure equal access to high quality, sustainable radiotherapy services which provide the best clinical outcomes and experience for patients. We want this Call for Action to drive progress in radiotherapy in the UK and provide a platform for increased awareness.

Our calls for radiotherapy services development

1 | Radiotherapy awareness now

Raising public awareness about radiotherapy as a cutting-edge cancer treatment which saves lives is essential to empower patients and the public to make informed decisions about what treatment they receive and from where.

Although up to half of cancer patients will receive radiotherapy as part of their treatment[i], awareness of radiotherapy techniques is low. Research from Cancer Research UK and YouGov found that 52% of people surveyed had never heard of any of the types of advanced radiotherapy listed and only 4% had heard of Intensity-modulated radiotherapy (IMRT). Perhaps a result of its high-profile in the media and in terms of Government investment, proton beam therapy had relatively high awareness at 24% but this was still less than chemotherapy or surgery interventions for cancer. Even immunotherapy had higher awareness levels at 28%[ii].

Without greater awareness, people are unlikely to demand the highest quality radiotherapy services which may have an impact on service provision and how patients choose to access treatment.

2 | Patients First

It is vital that cancer patients are given access to the most advanced radiotherapy in the most appropriate location and the NHS should aim to ensure that patients do not have to travel more than around 45 minutes for their radiotherapy appointments and are able to receive such treatments in local centres where possible. This is likely to exclude those for specialised treatments and paediatric treatment. Where longer travel is required, support should be provided. Patients and carers should be involved in decisions about radiotherapy services and supported to inform how they are structured.

There is variation in patient access to innovative radiotherapy techniques in England[iii]. This has an impact on patient experience and outcomes and it is

unacceptable that patients might miss out on access to certain radiotherapy techniques such as Stereotactic Radiosurgery (SRS), Stereotactic Body Radiation Therapy (SBRT) or Image guided, Intensity-Modulated Radiation Therapy (IG-IMRT) due to the configuration of services. Patients must be provided appropriate information and support to understand their treatment options and to help them to manage their radiotherapy treatment. Being able to plan appointments in advance may seem like a minimal consideration but this can have a significant impact on cancer patients, trying to balance their cancer treatment with other responsibilities such as family or work commitments.

In certain circumstances, patients must travel significant distances for radiotherapy appointments. This can have a negative impact on patients and their families who must travel several hours each day over a course of several weeks. It may also have an impact on what treatments patients access as they choose between practicality and their possible health outcomes. One participant at the roundtable cited the example of patients who are informed they need to travel for a certain radiotherapy technique but that they opt for more invasive and expensive surgery instead because it is closer to home.

The Government has committed to review data on travel times and outcomes and it is essential that this review is undertaken without delay so that NHS England and new radiotherapy networks can consider its findings to inform the configuration of services. Travel times are a particular issue in certain rural areas and we believe that NHS England should aim for a maximum of 45 minutes travel time for radiotherapy appointments but recognise that accessing more specialised services such as proton beam therapy or radiotherapy for rarer cancers may require a small proportion of patients to travel further. Addressing this issue is complex as it may require satellite centres and appropriate telemedicine, but both these options will be dependent on workforce (which we explore further below).

Advances in radiotherapy provide significant opportunities for improved outcomes and experience for patients and should be closely monitored to enable swift implementation. For example, short course fractionation (known as hypofractionation) could mean that a patient receives a full course of radiotherapy in five visits, rather than having to attend appointments for 30 days.

Patients and their carers should have the opportunity to inform local decisions about the configuration of radiotherapy services and forthcoming Radiotherapy Network Boards should have clear processes in place to ensure that this happens. These can draw from existing approaches undertaken by NHS and health bodies such as the National Institute for Health and Care Excellence (NICE).

3 | Networks for All

A networked-model of care would better enable the delivery of consistent, high-quality radiotherapy closer to patients' homes. Such a model should take account of professional and public concerns that advanced radiotherapy should not be removed from centres where they have the expertise and capacity to treat complex and rarer cases.This should be supported by national performance targets and satellite centres with telehealth and interoperable systems to ensure appropriate expert input from a distance (with appropriate workforce investment to enable this to happen). NHS England and each Radiotherapy Network Board should ensure regular communication with local radiotherapy providers and embed formal engagement opportunities with the local population.

The decision for commissioning responsibility to lie with NHS England provides significant opportunities to improve outcomes and services but communication and engagement with local radiotherapy providers and professionals, directly and via new radiotherapy networks will be essential to ensure that services meet the needs of the local population and take advantage of local expertise. The network model should facilitate this and may allow the NHS to revisit decisions which limit use of certain techniques on a local level, in favour of other NHS providers.

Where possible, networks should support the delivery of radiotherapy closer to patients' homes by having formal communication and oversight between lead providers and satellite centres. This may not always be possible, especially for rarer types of cancer, but the networks should facilitate a shared decision-making and delivery process with high quality and outcomes at its core.

NHS England must set out formal guidelines on the operation of networks and ensure that support is available nationally to help in their establishment and that appropriate resource is available at a network level to ensure that they are effective. This is initially likely to require additional funding but would be extremely well-directed because of the improved outcomes and efficiencies that could be delivered through effective network arrangements.

4 | Software for the Future

The NHS must invest in software systems now and on an ongoing basis to support the delivery of high-quality radiotherapy for all, facilitate expert input from a distance and to ensure maximal, effective and safe use of new equipment.

Radiotherapy is extremely advanced and software systems and technology are a key aspect of delivering the highest quality services in the most efficient way. There are high levels of automation in radiotherapy which means that with the software and equipment in place, patients should be able to access high-quality, personalised treatment plans outside lead radiotherapy centres with sufficient oversight.

Software can facilitate standard protocols, expert oversight and multi-disciplinary decision-making from a distance so will be an essential component of effective radiotherapy networks and flexible radiotherapy services that could enable more patients to have their treatment closer to home. For example, with interoperable systems, treatment plans can be reviewed and edited by a radiotherapy

physicist at a different hospital. Local radiographer networks benefit from the cross-fertilisation of ideas that is possible thanks to software systems. For satellite clinics to work, it is also important that expert-input from a radiographer or oncology consultant is available to review the information in real-time whether that be in person or via video link. This is one of the barriers that has made this kind of approach difficult to implement.

However, when funding was made available for radiotherapy equipment, it was not made available for accompanying software. This means that in some areas, equipment is in place but cannot function as well as it should in the absence of the appropriate software. The Department of Health and Social Care must identify a funding solution so that NHS England can work with local providers to address this disparity. It may be appropriate for funds which had been allocated for equipment to be redirected to software and longer-term funding should be considered to support a rolling programme of investment. If central funding is provided for these upgrades, NHS Supply Chain would be able to work with NHS England and potentially identify ways to make additional savings.

Software also provides opportunities to monitor patient reported outcome measures (PROMs), Patient Reported Experience Measures (PREMs) and collect other real-world data, with appropriate data protection standards in place. Collecting this information provides significant opportunities to drive outcomes, improve quality of life and measure the cost effectiveness of treatments.

There are examples of phone applications which allow patients to flag symptoms between routine appointments. In certain areas, remote appointments are undertaken via secure video link. These systems are easier for patients and providers.

5 | Payment Mechanisms that Work

NHS England must undertake an urgent, full review of the tariff for radiotherapy to remove the current perverse incentives of payment being linked to quantity of fractions, rather than quality and innovation. The review should also consider funding arrangements for future software and equipment upgrades so that the NHS can implement a rolling programme of updates and retain cutting-edge radiotherapy capabilities.

The national investment of £130 million to replace old linear accelerators (LINACs) was welcome but did not provide a long-term solution to funding challenges. This paper has already outlined that investment in software has fallen short. Alongside this, the Payment by Results tariff is no longer supporting investment in innovation because providers are already securing the top tier of reimbursement. One example of the outdated system is that current payment mechanisms focus on the number of fractions which does not necessarily reflect best practice – new approaches can mean reducing fractions which is better for patients, but the tariff provides a perverse incentive for providers to keep using old techniques which have more fractions and thus earn more revenue. This underlines how important it is for the payment mechanism to recognise innovation and new treatment modalities, as well as the software applications that are part of the overall radiotherapy treatment.

NHS England must reform radiotherapy payment mechanisms without delay to support continued innovation in radiotherapy techniques and ensure a rolling programme of investment in equipment and IT – this will require ongoing payment for services and sufficient funding for capital investment costs. A new machine requires a significant investment, if upgrades are undertaken

on time (after 10-years) and aligned between providers, it will provide opportunities for NHS Supply Chain to coordinate bulk purchases and seek a better deal for the NHS by aggregating demand and using the Department of Health and Social Care Capital Equipment Trading Fund to agree on commitment deals with the manufacturers.

6 | Data for Improvement

Public Health England should ensure there is sufficient resource to support high-quality, timely analysis of radiotherapy data that it is clinically relevant, liasing with manufacturers to maximise data that is routinely published on radiotherapy. Steps should be taken to provide a more granular level of data to a wider audience in order to support benchmarking of services and drive improvements in outcomes

Public Health England radiotherapy datasets are available to providers but at present, granular publicly-available data is limited. Public Health England must take steps to increase the data that is available publicly and encourage benchmarking across the service. This will help to drive improvements in services and outcomes.

Due to the automation and use of software in radiotherapy, there is significant data produced which could be provided to Public Health England to increase the available data on radiotherapy. The technology already exists but it could be used more effectively. NHS England, Public Health England and radiotherapy representatives should agree a data road map, setting out aspirations for national radiotherapy data and what information should be provided via software. This will need to take into account patient confidentiality and all relevant safeguards.

7 | Research

Radiotherapy research should be appropriately resourced so that NHS providers can participate in research alongside clinical practice. Research capacity within the NHS will encourage inward investment into the UK.

Research is an essential means to improve outcomes from radiotherapy and support the spread of innovation in the NHS, including exploring incremental changes that can support better outcomes for patients. Participation in research can also support good staff morale and staff retention. The NHS is in a strong position to be a leader in radiotherapy research and development and has the academic expertise to be so, but current challenges in terms of investment and capacity may result in research projects being awarded to different health systems. Protocol approval in the UK, can take three to four months but the process can be much quicker in other countries. Despite being internationally recognised for having the ability to run clinical trials that others cannot, funding for radiotherapy trials has fallen in recent years and there are many barriers to opening new trials, including a significant time gap between funding approval to patient recruitment.

Where pharmaceutical-funded trials have significant investment for the management and execution of a trial, there is less resource for radiotherapy trials. This means that NHS radiotherapy teams must try to accommodate research alongside clinical commitments, which can be hard to justify when it doesn't immediately bring in revenue. Workforce and capacity challenges are the key barrier to research involvement. Cancer Research UK has highlighted significant shortfall in the

radiotherapy workforce across all disciplines and a lack of capacity for research programmes[iv].

NHS-led programmes such as the Commissioning through Evaluation (CtE) initiatives have evaluated some advanced radiotherapy treatments but the reporting on findings is too slow and risks being outpaced by other research studies. This poses challenges because it may limit NHS availability of certain techniques when robust data are available in support of these.

There are notable opportunities with the possible development of combined immunotherapy and radiotherapy techniques. The Clinical and Translational Radiotherapy Research Working Group (CTRad) and the Royal College of Radiologist Academic Committee provide leadership on radiotherapy research, but it is hard to translate strategies into reality within the NHS environment. Ring-fenced funding is required to support research and investment in radiotherapy

8 | Sustainable Radiotherapy Services

Health Education England and professional groups should establish robust mechanisms to project workforce requirements for radiotherapy and facilitate access to services and research opportunities within the NHS. A small increase in spend on radiotherapy can ensure that new networks are fit for purpose and will facilitate effective services for the future.

Central to the delivery of many of the calls in this document is having appropriate workforce in place to meet demand and ensure that all patients can access high-quality radiotherapy. The NHS as a whole is struggling with staffing challenges, but Health Education England must look to future-proof the radiotherapy workforce and fill current gaps to support satellite clinics where appropriate.

Radiotherapy is extremely cost-effective and an excellent use of NHS resources. A small increase in funding initially to ensure availability of appropriate software and effective working arrangements for radiotherapy networks would have a fundamental impact on outcomes and help NHS England to realise its ambition for a high-quality, consistent radiotherapy service for all patients. In the longer-term, appropriate horizon scanning and adoption of new technology should enable the NHS in England to take a position as a leading provider of radiotherapy.

Appendix 1 – types of radiotherapy

3D conformal radiotherapy (3D-CRT) – This common therapy uses sophisticated computers and three-dimensional imaging technology to send radiation beams that are shaped to match the patient's tumour directly into the tumour. The radiation is very targeted, and doctors can use a high dose of radiation that's more likely to kill the cancer cells.

Adaptive Radiotherapy (ART) – A specialised type of IGRT where the pre-treatment imaging is of sufficient quality to enable the shape of the dose distribution to be adapted to conform to the daily shape and position of the target and surrounding healthy tissues.

Brachytherapy – Brachytherapy uses radioactive implants placed inside or near the tumour. Doctors use applicators such as needles, balloons, or catheters to place the implants, which contain radioactive isotopes, into the body. The implants range from tiny seeds the size of a grain of rice to capsules, small rods, and wires.

Image guided radiotherapy (IGRT) – This treatment uses imaging scans, such as a CT, MRI or PET, right before each treatment to pinpoint the tumour. The radiation oncologist compares each scan to previous scans to see if the size or location of the tumour changed. The patient's position or radiation dose is adjusted accordingly for better targeted treatment.

Intensity modulated radiotherapy (IMRT) – A specialised type of 3D-CRT, this treatment also uses radiation beams that conform to the tumour. Beams are not just shaped but the dose within each beam can be increased or decreased (modulated) to give highly conformal treatments. IMRT has been shown to be beneficial for many cancers, including prostate, head and neck, brain and gynaecologic tumours.

Interoperative radiotherapy (IORT) – During surgery, the surgeon moves normal organs away from a tumour and protects them with special shields. Then radiation can be applied directly to the tumour during the surgery minimising the impact on those organs.

MR guided radiotherapy (MRgRT) – This treatment provides real-time imaging while patients are being treated which enables radiation oncologists to automate the beam delivery in relation to the tumour location. It also allows for tighter margins for treatment, sparing healthy tissues and less toxicity to the patient. Most MRgRT treatments can treat with reduced fractions of radiation which often results in patients being treated in five days, reducing the amount of travel for patients.

Proton beam therapy – Instead of using X-rays, this treatment uses protons. After they enter the body, protons release most of their energy within the tumour region and deliver a minimal dose beyond the tumour boundaries.

Stereotactic radiotherapy – Stereotactic radiotherapy is a technique that uses imaging and motion compensation techniques to treat tumours throughout the body with extreme precision. There are two types of this therapy, which are typically used to treat well-defined tumours: stereotactic radiosurgery (SRS) and stereotactic body radiation therapy (SBRT). The radiation dose, which is often given in one to five treatments, can be higher than would be delivered during weekly radiation therapy. SRS is most often used to treat brain or spinal tumours, while SBRT treats tumours outside those areas, such as the lung, liver, and prostate.

Appendix 2 – attendees

Name	Job Title and Organisation
Ms Tracy Bagnall	Senior Buyer, Radiotherapy, Capital Solutions, NHS Supply Chain
Ms Shandi Barney	Vice President and Sector Lead, Radiation Oncology, AdvaMed
Mr Karsten Berndt	Senior Manager Patient Access and Market Development, Accuray Incorporated
Mr Alan Birks	Director, Association of Healthcare Technology Providers for Imaging, Radiotherapy and Care
Mr Kevin Brown	Vice President Research and Innovation, Elekta
Steve Double MP	Conservative MP for St Austell and Newquay
Dr David Eaton	Chair, Radiotherapy Special Interest Group, Institute of Physics and Engineering in Medicine and Head of Dosimetry and Computing, Guy's and St Thomas' NHS Foundation Trust
Mr Tim Farron MP	Liberal Democrat MP for Westmorland and Lonsdale (Chair)
Mr Xavier Franz	Director, Government Affairs - Western Europe, Varian Medical Systems
Ms Rose Gray	Senior Policy Manager, Cancer Research UK
Mr Russell Hart	Radiotherapy Services Manager, Nottingham University Hospitals NHS Trust and Member, NHS England Clinical Reference Group on Radiotherapy
Ms Tessa Hughes	Head of Policy and Public Affairs, MAP MedTech
Mr Steve Laws	Regional Director of Sales, Varian Medical Systems
Ms Adele Lyons	National Sales Director UK and Ireland, Varian Medical Systems
Dr Fiona McDonald	Consultant Clinical Oncologist, Royal Marsden NHS Foundation Trust
Ms Catherine Mercer	Partnership Liaison Icon Group, Planning Radiographer Kent Oncology Centre and Founder of Champions Network, Action Radiotherapy Charity
John Muolo	CEO, Medipass Healthcare Limited
Professor Andrew Nisbet	Head of Medical Physics, Royal Surrey County Hospital NHS Foundation Trust
Professor Pat Price	Visiting Professor of Oncology, Imperial College London and Chair, Action Radiotherapy
Ms Catherine Roe	Radiotherapy Dataset (RTDS) Project Lead, Public Health England
Professor Ricky Sharma	Chair, Radiation Oncology, University College London Cancer Institute
Mr Carsten Sommerfeldt	President, Brainlab
Mr Steve Tomkins	UK, Ireland & Nordics Business Unit Manager, Elekta Limited
Mrs Sarah Walker	Consultant, Policy and Public Affairs, MAP MedTech
Mr Chris Walker	Head of Radiotherapy Physics, Northern Centre for Cancer Care, Freeman Hospital, NHS England Clinical Reference Group on radiotherapy
Mr Mark West	Sales Manager, Brainlab
Mr Kieran Woods	Business & Development Manager for Radiotherapy, The Clatterbridge Cancer Centre NHS Foundation Trust

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[i] Cancer Research UK, *About radiotherapy*, available at: http://www.cancerresearchuk.org/about-cancer/cancer-in-general/treatment/radiotherapy
[ii] Cancer Research UK, *Cancer Research UK Response to NHS England's Consultation on Modernising Radiotherapy Services*, January 2018, available at: http://www.cancerresearchuk.org/sites/default/files/cruk_response_to_nhs_england_radiotherapy_service_review.pdf
[iii] Public Health England, *Radiotherapy activity across England*, June 2017, available at: http://www.ncin.org.uk/view?rid=3426 accessed October 2017
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