

# Strategic Review of Radiotherapy Services in Northern Ireland

Phase One Report

February 2026

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## Background and Context

The prevalence of cancer and the pressures on diagnostic and treatment pathways for patients continues to grow. Radiotherapy plays a vital role in cancer care by using high-energy radiation to destroy cancer cells or shrink tumours. It is a core treatment option for many cancers, often used alongside surgery or chemotherapy and involved in the treatment of 40% of all cancers that are cured. Radiotherapy, personalised to each patient, can be curative, palliative, or used to reduce the risk of recurrence. It is especially important in treating cancers like prostate, breast, and head and neck cancers, and continues to evolve with advances in technology that improve precision, reduce side effects, and shorten treatment times.

### Requirement for a Strategic Review of Radiotherapy Services in Northern Ireland (NI)

The Cancer Strategy for Northern Ireland (NI) 2022–2032 outlines a comprehensive plan for improving cancer services, including radiotherapy. This review contributes to the delivery of Action 20:

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*Introduce and implement new radiotherapy techniques and technology in line with national guidance including staffing and associated training.*

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The strategy recognises radiotherapy is a core component of cancer treatment and that there is a requirement to adopt advanced radiotherapy techniques to improve cancer care. Ensuring equitable access to treatment is a core principle of the cancer strategy, and a key objective of this review.

Several key factors led to the commissioning of this review. These include:

- An imminent requirement to replace a significant proportion of NI’s medical linear accelerator (LINAC) machines
- Proposals by Queen’s University Belfast (QUB) to establish an Advanced Radiotherapy Centre in Northern Ireland aligned with Health and Social Care (HSC) Trusts
- Firm interest from third parties who wish to provide radiotherapy services to HSC patients within NI

### LINAC Replacement

Funding for the replacement of the machines is part of the Department of Health’s normal capital investment programme. The identified cost for equivalent technology is about £2.5m per LINAC. However, with advances in technology, and the need to procure additional equipment to facilitate the delivery of more advanced radiotherapy techniques, both the Trusts that deliver radiotherapy services in NI have indicated that this may not be sufficient to ensure that the technology required to implement new radiotherapy techniques is available.

The typical effective operational life span of a LINAC is considered to be ten years and both sites have equipment approaching end of life which must be replaced. Belfast Trust currently have a Managed Equipment Services contract was for the management and maintenance of LINACs that is due to end in 2030. The current contract will see the replacement of one additional LINAC in 2026. However, a further six LINACs are due for replacement by 2030 and these are not covered by the current contract, meaning additional capital funding will be required.

The North West Cancer Centre (NWCC) was established as a cross-border initiative between NI and the Republic of Ireland (RoI) and was formalised through a Memorandum of Understanding (MOU) between the two jurisdictions. As part of this collaboration, the National Cancer Control Programme in RoI agreed to co-fund radiotherapy equipment at the NWCC.

This arrangement was designed to support cancer patients from both jurisdictions, particularly those living in the border counties of the RoI who now have access to radiotherapy services closer to home. The partnership reflects a shared commitment to improving cancer care across the island and is a key example of cross-border healthcare cooperation under the Good Friday Agreement framework.

The National Cancer Control Programme's contribution helped fund the three linear accelerators used at the NWCC, which began delivering radiotherapy services in 2016. In return, a portion of the centre's capacity is allocated to treating patients referred from RoI, particularly from County Donegal.

This model has been praised for improving access, reducing travel times for patients, and fostering collaboration in cancer care delivery between the two health systems. However, while the MOU commits to an equitable contribution towards the capital funding required to replace these machines as they approach the end of their lifecycle in 2027, there is currently no confirmed funding arrangement in place for the replacement of these machines, particularly if more advanced technology is required.

### **QUB Proposals around Advanced Radiotherapy Centre**

QUB has been working with philanthropic partners to develop proposals to establish an integrated Advanced Radiotherapy Centre (ARC) that aligns discovery and translational research excellence with practice-changing, patient-focused advanced radiotherapy care delivery. While QUB scientific and translational research within the field of radiotherapy is currently delivered in conjunction with the Northern Ireland Cancer Centre (NICC), ambition would be to ensure that the entire population of Northern Ireland could be supported through enhanced links with the NWCC.

Initially, QUB are developing a virtual model, building on the success of the existing partnership between the Johnston Cancer Research Centre at QUB and the NICC. The longer-term goal is to build a new integrated centre that will incorporate patient-centric clinical care and radiation research laboratories, including preclinical radiotherapy and imaging, and radionuclide (Nuclear Medicine) facilities to provide a "bench-to-bedside" environment.

### **Third Party Interest in delivering Radiotherapy Services to the HSC**

The Department of Health has received proposals from providers who are seeking to develop a public-private partnership to build a state-of-the-art radiotherapy and diagnostic centre in Belfast, which could support both clinical services and research. Any decision to partner a third party in the delivery of radiotherapy services in Northern Ireland must be firmly based on an assessment that such a partnership would deliver value for money and improve outcomes for patients.

Given these developments, a comprehensive radiotherapy project is needed to reassess service delivery, infrastructure, partnerships, and research integration across NI.

## **Phase 1**

The report represents the end of Phase 1 of the review. Desktop research, meetings with key stakeholders and a series of workshops have been held over the past six months.

The statistical information referenced in the report was extracted from various sources and includes workforce and service capacity data provided by both Trusts in March 2025. It should be noted that at the time of publication this data may now have changed slightly; however, any variations will be minor and should not affect its interpretation or the overall conclusions drawn in the report.

This report provides an assessment of the following key areas of radiotherapy services in Northern Ireland:

1. Service Model and Regional Integration
2. Workforce Development
3. Integrated Data and Digital Infrastructure
4. Technology and Innovation
5. Service Capacity and Workflow Optimisation
6. Clinical Trials and Research

In addition, the report has identified a number of actions which need to be delivered to maintain and enhance radiotherapy services in NI.

# Radiotherapy Review: Strategic Actions

## Radiotherapy Review: Strategic Actions – Phase Two

This report completes Phase One of the strategic review. The following actions have been identified for progression with the establishment of a regionally integrated radiotherapy service model as the central strategic priority.

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### Primary Strategic Action

#### 1. Establish A Regional Service Model for Radiotherapy Services

In delivering this regional service model:

- We will establish a regionally integrated radiotherapy network with shared clinical protocols, contingency planning, and equitable access to advanced treatments and clinical trials.
- The Network will determine and agree on the delivery of radiotherapy services, and the prioritisation of investment required to deliver radiotherapy services for across Northern Ireland.
- The Network will foster closer operational alignment between NICC and NWCC to streamline service delivery and innovation, enhance peer-to-peer support, and minimise patient travel time.

#### Outcome:

These actions will ensure closer alignment of radiotherapy services at NWCC and NICC. For common tumour sites, consistent radiotherapy techniques will be available across both centres. Greater collaboration will be enabled through joint staff appointments and shared clinical priorities.

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### Enabling Actions to Support Regional Integration

The Radiotherapy Network established under Action 1 above will be responsible for overseeing the implementation of the following enabling actions which will support regional integration of radiotherapy services, and ensure that we have a robust service, capable of meeting the needs of the population of NI to 2040.

#### 2. Radiotherapy Workforce Development

To deliver a regionally integrated model, workforce planning must be aligned. The Network will:

- Develop a regional workforce development plan, with prioritised staff allocation and joint appointments to support collaboration and knowledge exchange.
- Expand training pathways for all clinical roles and support role transformation (e.g. advanced practitioners, non-clinician outliners).
- Leverage opportunities to embed clinical research staff within universities and HSC Trusts to support trial delivery and innovation.

**Outcome:**

A stable, resilient workforce capable of meeting future service needs and supporting regional collaboration.

**3. Service Capacity and Workflow Optimisation**

Operational efficiency is key to sustaining integrated services. The Network, will:

- Use real-time data to optimise scheduling, reduce downtime, and improve appointment adherence.
- Explore options to increase capacity to meet rising demand for radiotherapy. Consideration of extended hours and weekend shifts will be prioritised before options for additional LINACs or new radiotherapy centres.

**Outcome:**

Capacity to meet rising demand for radiotherapy services to 2040 without significant capital investment beyond scheduled equipment replacement.

**4. Integrated Data and Digital Infrastructure**

Shared data systems are essential for regional coordination. The Network will work with key stakeholders, including Digital Health and Care Northern Ireland to:

- Enable both sites to submit data to the NHS Radiotherapy Data Set using consistent definitions and coding.
- Develop SQL-based automation to extract and update data from ARIA® OIS for audits, service evaluation, and research.
- Create real-time dashboards for forecasting, utilisation monitoring, and benchmarking.

**Outcome:**

Improved data-driven planning, benchmarking, and research, with reduced administrative burden on Trust staff.

**5. Technology and Innovation**

Innovation will drive the effectiveness of the regional model. The Network will:

- Prioritise investment in modern radiotherapy techniques such as adaptive radiotherapy platforms, Surface Guided Radiation Therapy (SGRT) and Artificial Intelligence (AI)-driven tools.
- Maximise use of AI for planning and quality assurance through collaboration with the HSC AI Group.

**Outcome:**

Enhanced patient outcomes and improved staff efficiency through targeted technological investment.

**6. Clinical Trials and Research**

Research collaboration is vital to regional service excellence. The Network will:

- Ensure clinical trials are accessible to patients at both NICC and NWCC.
- Collaborate with QUB and academic partners to develop proposals for an Advanced Radiotherapy Centre model for patients across Northern Ireland.

**Outcome:**

Broader access to trials, increased clinician participation in research, and strengthened academic partnerships driving evidence-based practice.

## Service Model and Regional Integration

Radiotherapy services are currently delivered at two centres in Northern Ireland, the Northern Ireland Cancer Centre (NICC) and the North West Cancer Centre (NWCC).

The Northern Ireland Cancer Centre is located at Belfast City Hospital, with a capacity of 10 LINACs and currently has no empty bunkers. It provides radiotherapy services for common malignancies in four HSC Trust areas as well as providing a regional radiotherapy service for other specialised areas such as skin, gynaecology, paediatrics, sarcoma and Central Nervous System cancers.

The centre delivers a variety of radiotherapy treatments such as External Beam Radiotherapy (EBRT), Brachytherapy and Radionuclide Therapy. Stereotactic Ablative Body Radiotherapy (SABR) is used for tumour sites including lung, prostate, pancreas and renal cancer, including a regional oligometastatic SABR service, and Stereotactic Radiosurgery is used primarily to treat brain metastases and meningiomas. The centre also operates a regional Total-Body Irradiation regional service for bone marrow transplants and an all-island Total Skin Electron Beam service to treat mycosis fungoides, a form of T-Cell lymphoma.

The North West Cancer Centre is located at Altnagelvin Hospital with a capacity of 3 LINACs and currently has one empty bunker. It serves the west of the region as well as providing radiotherapy services to around 200 patients per year from the North West region of the Republic of Ireland.

The centre provides EBRT, playing a crucial role in improving access to radiotherapy for patients in the western region. However, it does not currently offer brachytherapy or radionuclide therapy, with these treatments delivered through NICC on a regional basis.

Unlike the NICC, the NWCC does not currently offer SABR and is the only radiotherapy centre in the UK not currently delivering this service. This represents a significant difference between the two centres and means that NWCC patients that could potentially be treated with as few as five fractions using SABR may instead undergo up to 30 fractions of conventional radiotherapy for the same tumour type.

This disparity between the two centres is not due to technical limitations. The NWCC uses the same model of LINACs as the NICC and is currently seeking approval to participate in a clinical trial involving a SABR service. The primary barrier to the implementation of SABR treatment at NWCC is the requirement for additional staffing (both consultant and scientific) that would be required to support the complex contouring, treatment planning and individual patient quality assurance associated with SABR.

As part of the MOU with the Republic of Ireland, the NWCC currently delivers Superficial Radiation Therapy (SRT) on a limited basis to a small number of patients, as an alternative to surgery for patients with skin cancer such as Basal Cell Carcinoma and Squamous Cell Carcinoma. However, the service is not currently commissioned and is only delivered by diverting staff from other services.

SRT is performed on an outpatient basis and is a less invasive treatment, meaning that patients can usually resume normal activities immediately following each session. In contrast, surgery can involve recovery time, wound care, and follow-up visits for suture removal or monitoring. There is clearly potential to utilise SRT to supplement or as a cost-effective alternative to surgery for patients across Northern Ireland.

## Governance Arrangements

These centres currently operate under separate governance structures, managed by the Belfast Trust, and the Western Trust. Throughout the course of the review, the subject of how these services should be managed has been raised with differing views on whether there should be a single radiotherapy service for Northern Ireland, or if the services should remain under the existing governance structures but with enhanced clinical engagement and collaboration across the sites.

The Radiotherapy Clinical Reference Group is comprised of representatives from both services and forms the basis for collaboration to develop regionally agreed pathways, service models and agreement on datasets. Some of this work is already happening but more could be done to bring the two centres into closer alignment.

Operational Delivery Networks (ODNs) for Radiotherapy, commissioned by NHS England, are regional structures designed to coordinate and modernise the delivery of adult radiotherapy services across England. Each of the eleven networks provides system leadership, supports service transformation, and ensures equitable access to high-quality, evidence-based radiotherapy, including advanced modalities like brachytherapy and molecular radiotherapy. The aims and responsibilities of NHS England Radiotherapy Operational Delivery Networks is outlined at Annex C.

In Northern Ireland, the Radiotherapy Clinical Reference Group already seeks to deliver some functions of an ODN but a more formal, mandated Radiotherapy Network bringing together clinicians and senior managers would offer several key benefits to the HSC and patients including:

1. **Improved Patient Outcomes:** By coordinating services across regions, an ODN can help deliver modern, high-quality radiotherapy treatments that contribute to higher cure rates and fewer side effects.
2. **System Leadership and Collaboration:** An ODN would enhance meaningful partnership between the NICC and NWCC and commissioners, enabling consistent service standards and shared clinical governance.
3. **Efficient Resource Use:** It would support the strategic deployment of advanced technologies ensuring equitable access and reducing duplication of services.
4. **Innovation and Modernisation:** An ODN would be tasked with driving the implementation the HSC's vision for radiotherapy, promoting innovation and continuous improvement in treatment delivery.
5. **Workforce and Service Planning:** Through shared oversight and planning, an ODN would help address workforce challenges and ensure services are resilient and future proofed.

During the course of the review, various other potential service delivery models were discussed and assessed with key stakeholders. These included merging services together into one Trust which would then deliver a regional radiotherapy service for NI. Another option that was considered was a 'hub-and-spoke' model, whereby intensive radiotherapy services would be centralised at one hub to support surrounding, lower-resource facilities across the region by sharing expertise, staff and diagnostic equipment.

It was concluded that implementing either of these options would present significant logistical and operational challenges and would not recognise the unique position of the NWCC. The NWCC was established to provide additional radiotherapy services for the Northern Ireland population as well as the provision of such services to the population of the northwest area of RoI. The implementation of these options would also create workforce challenges that would undoubtedly impact other services due to the fact that radiotherapy clinicians also deliver Systemic Anti-Cancer Therapy (SACT) and other disciplines in addition to their radiotherapy portfolio.

An ODN type model is considered to be the most appropriate and would cause minimum disruption whilst delivering some of the main benefits of a hub and spoke model under the same governance structure.

## Radiotherapy Workforce Development

Analysis of the core radiotherapy workforce was conducted as part of this review. This looked at the multi-disciplinary team directly involved in the delivery of radiotherapy at both sites. This analysis was also supplemented by the publication of the Royal College of Radiologists' (RCR) workforce census reports into Clinical Oncology and Clinical Radiology which was published on 18 June 2025.

### Clinical Oncology Workforce in NI

Analysis conducted by the review team in March 2025 identified a head count of 38 clinical oncologists (COs) employed across both the NICC (28 delivering 298.34 PAs) and NWCC (10 delivering 102.2 PAs). It should be noted that although there has been some growth in CO numbers at the NICC in recent years, the NWCC CO staff level is the same as when the service was first commissioned in 2016.

Clinical oncology workforce statistics are provided at Annex D, detailing the tumour sites treated by COs, and the number of COs working multiple tumour sites in the NICC and NWCC at the time the workforce analysis was conducted.

The RCR 2024 workforce census indicates that there is still a 14% shortfall in COs employed in NI (equivalent to 5 consultants). This shortfall in COs is projected to increase by a further 22% (11 consultants) by 2029 should no action be taken to recruit more staff to deal with the potential increased demand on radiotherapy services in Northern Ireland. Another staffing issue that may need to be addressed is the high number of locum clinical oncologists currently employed, with 13% of the CO workforce listed as locum contracts – the second highest level of the four regions within the UK.

It is noted that NWCC currently only have two Medical Oncologists. This means that in addition to delivering radiotherapy, the Clinical Oncologists carry significant proportion of the SACT workload. While this is not unusual in NI, this has a greater impact on capacity within a smaller consultant co-hort. It should also be noted that COs within NICC also provide SACT treatment across other HSC Trusts in the region.

While it is acknowledged that the CO workforce is experiencing a significant shortfall in staff in keeping with other parts of the UK, it has also been noted that other jurisdictions have been faster at adopting workforce diversification to enable the broader multi-disciplinary team to support the delivery of radiotherapy treatment. It is recommended that this approach should be adopted across both centres in NI.

### Medical Physics

Medical Physics teams in Northern Ireland comprise of Medical Physics Experts (MPEs), Clinical and Healthcare Scientists, Clinical Technologists, Radiotherapy Engineers and Mechanical Workshop staff.

The Institute of Physics and Engineering in Medicine (IPEM) has raised serious concerns about the sustainability of the UK's medical physics and clinical engineering workforce. According to IPEM:

- There is an average 10% vacancy rate across UK's medical physics and clinical engineering specialisms, with some areas experiencing up to 22%.
- 24% of the current workforce is approaching retirement age, which is significantly higher than other clinical healthcare professions.
- To meet current and future demands, the workforce needs to grow by 44% on average.

- IPEM recommends increasing the number of trainees entering the workforce by 30% for clinical scientists and 50% for clinical technologists.

There is a significant shortage of MPEs with only 17 WTE in post and two vacancies unfilled, and this shortage is particularly acute in the NICC. According to IPEM recommendations, 27 MPEs are required to meet the service demand in Northern Ireland. Furthermore, the number of MPEs in NWCC would also need to be increased if SABR was adopted as standard of care for prostate and lung patients. Radiotherapy Engineering is another area facing critical staffing shortfalls, particularly at the NICC which currently has six posts. IPEM advises that 11 posts are needed to adequately meet demand in this area.

While both sites had good access to clinical technologists, evidence gathered by the team highlights the role that advanced practice healthcare scientists (planning/dosimetry) are increasingly playing in support of COs to contour tumour volumes. While these plans would need to be reviewed by COs, developing this role can help to address some of the broader work pressures on the wider workforce. The NICC has already proven the benefits of this model of working through the appointment of two Advanced Practice Clinical Technologists, and NWCC would also benefit from the development of these roles.

## **Therapeutic Radiographers**

Allied Health Professionals (AHPs) play a vital and multifaceted role within radiotherapy services, contributing to both the clinical delivery and holistic support of cancer care.

Therapeutic Radiographers are the only healthcare professionals qualified to deliver radiotherapy treatments and are based across both the Northern Ireland Cancer Centre (NICC) and the North West Cancer Centre (NWCC). Over time, the role of the Radiographer has significantly expanded. Many now work in advanced practice, using their expertise to regularly review patients during radiotherapy, prescribe medications to manage treatment-related side effects, and obtain informed consent for radiotherapy treatment, undertaking roles previously performed by medical staff, releasing medical staff to carry out more complex tasks.

A total of 134.1 whole-time equivalent Therapeutic Radiographers are currently employed directly within radiotherapy services in specialist radiographer, clinical site specialist and treatment lead roles. There are three radiographers working across the sites, with two consultants in place at the NICC for head and neck and breast cancers respectively and one in place at the NWCC for urology.

Six of the AHP posts directly involved in the delivery of radiotherapy services are temporary roles, some of which are reliant on charitable funding. This position is also reflected in other AHP roles which support radiotherapy and other cancer services.

## **Development of AHP roles**

In the course of the review, a consistent theme that has arisen through the research carried by the review team has been the need to develop and employ specialist radiographers who support with clinics and on-treatment reviews. These roles have been adopted widely across services in the other UK jurisdictions which play a pivotal role in the delivery of radiotherapy by leading on treatment planning, image review, and patient assessment.

A regional workforce plan should be developed and include proposals for the development of advanced practice and specialist AHP roles as part of the radiotherapy service. This should build on, and update the data collected as part of previous workforce reviews.

## **Radiotherapy Nursing**

Although they represent a small component of the radiotherapy workforce, nurses play a key role in supporting patients throughout their treatment journey. They offer clinical care, supporting the management of skin reactions and pain. They also provide emotional support, and education tailored to individual patient needs. Nurses are integral members of the multidisciplinary team, acting as key points of contact for patients and coordinating care to ensure safety, comfort, and continuity.

Within Northern Ireland, there are currently two Band 7 nurses – one each at the NICC and NWCC. These nurses are supported by a small team (0.81 Band 6, 4.48 Band 5 and 0.84 Band 3 in NICC, and 1.91 Band 5 in NWCC).

While many patients will also have support from a tumour site specific Clinical Nurse Specialist, further assessment of appropriate workloads for this team will be required should patient numbers within the service increase. There is also a need to consider the radiotherapy nursing workforce to ensure that the role is developed in line with emerging best practice.

## **Other AHP Roles Supporting Radiotherapy Services**

In addition to therapeutic radiographers, radiotherapy services are supported by a diverse group of other AHPs, including dietitians, speech and language therapists, physiotherapists, occupational therapists and diagnostic radiographers. These professionals address the broader impacts of cancer and its treatment such as nutritional challenges, swallowing difficulties, mobility issues, and psychological wellbeing to ensure holistic, patient-centred care. For instance, dietitians manage the complex nutritional needs of patients undergoing head and neck radiotherapy, while speech and language therapists support those experiencing dysphagia or voice changes as a result of treatment.

As AHPs also contribute significantly to other areas of cancer care, they have not been specifically captured in the radiotherapy workforce analysis undertaken in the review. It was however clear from the research that they have an essential role in supporting patients throughout all stages of treatment, including radiotherapy. Their contributions are integral to improving patient outcomes and enhancing the overall experience of care.

Some of the additional AHP supporting roles are funded through charitable funds and not through formal commissioning. A full workforce review is required to stabilise this support in the future.

## Service Capacity and Workflow Optimisation

Evidence that has been gathered during the course of the first phase of this review has demonstrated that there remains significant capacity within the two cancer centres' radiotherapy service. Statistics detailing the total courses/episodes of treatment in each of the past five calendar years are provided at Annex E.

In 2024, a total of 5,194 courses, or episodes of treatment were delivered. This includes 218 courses of treatment delivered in NWCC to patients from RoI as part of the MOU.

Both sites are currently operating on average eight hours per day, for five days per week as part of their core service. In addition, both sites have emergency cover for evenings, weekends and all bank and public holidays as well as treating category one patients over the weekend to cover Bank Holiday gaps in service.

In 2024, the 5,194 courses of treatment represented a total of 59,679 fractions delivered. This amounts to almost 5,000 fractions per machine per year.

The NHS England target for LINAC utilisation is currently set at 9,000 attendances per LINAC per year, as outlined in the NHS England Service Specification for Adult External Beam Radiotherapy Services. The target is controversial, and many trusts are reportedly struggling to meet it due to increased complexity of treatments, fewer fractions per patient due to hypofractionation and workforce shortages and machine downtime.

Many radiotherapy services in the other UK jurisdictions, including The Christie in Manchester, are operating a 12-hour, five day per week pattern. Adopting this working pattern would result in a 50% increase in fractions delivered.

However, assuming that all other factors remain the same, adopting the same 12-hour, five day per week shift pattern would likely see both centres coming close to the NHS England target. This demonstrates while both services are currently comfortably meeting demand for radiotherapy in Northern Ireland, there remains significant additional capacity within the physical radiotherapy infrastructure to meet increased demand for radiotherapy services for many years.

It should be noted that moving to a 12-hour day using the current number of LINACs would require significant investment in staff and likely lead to a reduced LINAC utilisation rate due to increased downtime. This may also lead to increased equipment and IT maintenance and infrastructure costs depending on the terms of any contracts that are in place for the management of equipment.

However, there are a number of ways to increase capacity within existing resources to enable the service to continue to meet demand. The current average appointment time is 20 minutes in the NICC, and 19 minutes in the NWCC. Teams at both sites agree that it is feasible to reduce this to closer to 18 minutes. If the 18-minute appointment time could be achieved, and the average number of fractions used per course of treatment was approximately 11 fractions per patient, there would be sufficient capacity to meet demand until 2040.

Another option would be to commission the fourth bunker at the NWCC, bringing the total number of LINACs operating regionally to 14 in total.

## **Increased Demand for Cancer Services**

As the population of Northern Ireland ages, we know that cancer diagnosis will increase with evidence showing that one in two people will be diagnosed with cancer during their lifetime. We also know that it is likely that some types of cancer will become more prevalent than others.

Research conducted by the NI Cancer Registry has predicted the changes that we are likely to see to the average number of cancers diagnosed per year in 2040 compared to 2020. Statistics detailing the predicted number of cancer cases and the types of cancers diagnosed in NI up to the year 2040 are provided at Annex F.

Lung Cancer is likely to see the highest increase in the average number of diagnoses per year, followed closely by breast cancer. This is partly driven by an aging population, but also through roll out/increased engagement in screening programmes which increase early cancer detection and demand for radiotherapy.

Early cancer diagnosis increases the demand for radiotherapy because more cancers are detected at a stage when curative treatment is possible. Radiotherapy is a key component of that treatment. When cancer is found early (typically at stage I or II), patients are more likely to be eligible for radiotherapy as a primary or adjunct therapy, often with curative intent.

Additionally, early-stage cancers often require less extensive surgery or chemotherapy, making radiotherapy a more attractive and effective option. This may be particularly beneficial if/when lung screening is introduced in Northern Ireland. This service is likely to identify many more patients with early-stage cancers, many of which can be effectively treated through lung SABR in place of surgery.

Another factor which is likely to increase demand for radiotherapy is improvements in cancer treatment which increase both life expectancy and survivorship. This in turn increases the number of patients who require re-irradiation following an initial course of radiotherapy. This information should also be used to support workforce planning.

## **Assessment of the Requirement for Independent Sector Support for Radiotherapy Services**

An important consideration when commencing this review was the offer from a major not-for-profit healthcare provider to partner with the HSC to deliver radiotherapy services. The review team are also aware other independent sector providers who have shown an interest in providing radiotherapy services in Northern Ireland.

This must be balanced against an assessment of need within the HSC, and a determination that such a partnership would deliver both value for money and high-quality care.

This review has confirmed that by continuing to invest in the current workforce, and maintaining the current equipment refresh cycles, the HSC will be able to meet demand for radiotherapy services up to 2040. Unless we see evidence of an increase in demand significantly higher than forecasts provided by the Northern Ireland Cancer Registry, or radically different ways of treating cancer patients, there is currently no requirement for additional LINACs in Northern Ireland.

Any involvement of the Independent Sector in radiotherapy would need to be in place of core capacity. In the circumstances, this option would only be considered if performance in the core service dropped significantly.

## **Integrated Data and Digital Infrastructure**

A key theme emerging from phase one of the review is the significant opportunity to enhance collaboration between the NICC and NWCC through better alignment of digital and data infrastructure.

### **Patient Management Systems**

While the rollout of encompass has improved the sharing of patient records, radiotherapy services at both centres are required to operate on separate installations of the ARIA® system. This is the overarching software package that manages the patient pathway through the radiotherapy service. This setup was established as a result of the decision to commission two independent radiotherapy centres and creates a disjointed digital environment. Although remote access between systems is possible, it requires navigating two separate firewall layers, which hampers usability and reduces clinical efficiency. Technical solutions which improve accessibility are available, but the most appropriate solution is likely to differ depending on the service model that is used. Maintaining the status quo with two separate services requires different databases but further work is required with DHCNI and Trust services to determine the most effective way of ensuring that staff from across both sites can appropriately access the other's ARIA system to support service delivery, peer to peer support, planning and care.

### **Datasets and Coding**

Currently, the NICC and NWCC also use different datasets and coding systems for radiotherapy services. Neither site contributes to the UK Radiotherapy Dataset (RTDS), limiting the ability to benchmark performance regionally or against comparable centres in the UK. Participation in national clinical audits is essential to enable meaningful comparisons and drive service improvement. Whilst legislative barriers exist, there are potential workarounds that can be considered such as the sharing of pseudonymous data. While participation in the national audits of radiotherapy data using the RTDS does not incur a direct cost for NHS trusts or providers, there is likely to be an administrative charge for HSC Trusts to participate. Submission of data to the RTDS is a mandatory requirement for all NHS-funded radiotherapy providers in England.

Work that would be required to implement participation in the RTDS would also enable the development of dashboards and other systems that enable data to be extracted much more effectively to support service planning, peer review and audits and benchmarking of services. This functionality would also reduce the amount of time required for staff to extract data to support the whole range of clinical and management functions within the service.

## Technology and Innovation

Radiotherapy is a field which is seeing rapid technological developments, both in terms of equipment and software.

### Artificial Intelligence (AI)

As services develop and expand, AI will become increasingly important to enable services to meet demand. It is rapidly developing and its application within the healthcare setting has the potential to improve staff resources due to less time being spent on manual tasks. AI contouring tools have been tested in both settings, however the potential application of AI within radiotherapy is likely to extend to other elements of service planning and provision.

In 2023 the National Institute for Health and Care Excellence (NICE) issued its first draft guidance on the use of AI in radiotherapy contouring and recommended nine AI technologies which could be used once they had Digital Technology Assessment Criteria approval. Independent clinical advice given to NICE suggested that the use of AI in contouring may save and estimated 10 to 30 minutes per treatment plan, although 'real world' time savings may vary depending on the location within the body being contoured for treatment.

The NICC are currently exploring adding AI contouring through their current Managed Equipment Services contract, however both sites would benefit greatly from these tools, and it is recommended that a regional approach to delivering this is essential to ensure equity across the region.

Other applications where AI may be particularly beneficial include within MR-only planning, and auto-planning of radiotherapy treatment.

Implementation of such technology would require initial capital investment for purchasing of the AI software and relevant IT infrastructure upgrades where required. In some cases, these costs are minimal whilst delivering long-term savings in both costs and staffing resources.

### Radiotherapy Equipment

It is evident that Northern Ireland has the capacity to deliver high quality radiotherapy services, with highly trained staff and close ties to universities with a track record of innovation. For this reason, a clear plan for continuous improvement of the NI radiotherapy equipment should be developed. This procurement plan should ensure that investment in radiotherapy equipment is prioritised in line with the needs of our population, ensuring that the most appropriate and cost-effective treatments are available across the region. Services such as **Online Adaptive Radiotherapy (oART)**, and **Surface Guided Radiation Therapy (SGRT)** are examples of new technologies that must be explored.

### Precision Imaging

As technology advances, it is also essential that Northern Ireland invests in precision imaging technology, including **Surface Guided Radiotherapy (SGRT)**, to ensure that we can maximise the benefits to patients. It should be noted that an MR-SIM has been installed via an upgrade under the existing MES contract within NICC, but further revenue funding is required for this to become fully operational.

## Clinical Trials and Research

Clinical Trials are an essential tool for evaluating and validating new treatment strategies that have been identified through extensive laboratory research. As of July 2025, there were 45 open clinical trials in Northern Ireland for cancer. Of these 45 clinical trials, five (11%) involved radiotherapy for cancers of the head & neck, prostate, breast and lung. All five of the open clinical trials involving radiotherapy were taking place at the NICC. In addition, at time of writing this report, the National Institute for Health Research listed 84 open and recruiting clinical trials that involved radiotherapy, either as part of treatment for cancer or for studying the biological effects of radiotherapy following treatment. Out of the 84 open clinical trials, seven of these listed Belfast as a participating location for the trial.

Ensuring that patients in Northern Ireland have access to the latest clinical trials in radiotherapy is proven to improve treatment options, and support recruitment for those services involved in their delivery. They also play a key role in helping services adopt new standards of treatment – for example trials in the use of SABR in prostate has seen a significant reduction in the fractions for prostate patients from 39 to 5 in the NICC.

However, an increase in radiotherapy clinical trials will require use of the relevant equipment (e.g. LINACs or other specialist equipment for brachytherapy etc.) and staffing resources. While we have sufficient equipment to support this, the impact on staff resources must be taken into consideration.

The close proximity of the NICC to the Johnston Cancer Research Centre at QUB increases the potential for clinical trials to be conducted at the NICC. The Advanced Radiotherapy Group based in the Johnston Cancer Research Centre is a dedicated radiotherapy research group comprised of clinicians, radiologists, physicists, radiation biologists, radiographers, and physiologists, all working collaboratively to develop and refine radiotherapy treatments. Facilitating knowledge exchange and movement of staff between sites would help the NWCC to, more effectively, offer access to clinical trials for those patients who attend the centre.

For clinical trials to be developed, there needs to be translational cancer research undertaken that underpins the fundamental reasoning behind such clinical trials. Attracting the best academic researchers may ultimately benefit the health service in the long term as innovative research can transform the current practices that are in place.

## Development of an Advanced Radiotherapy Centre

The proposal by QUB to develop an advanced radiotherapy centre (ARC), positioning NI as a leader in radiotherapy research, clinical trials and delivery has significant merit. In the short term, the proposals to develop a virtual ARC should be supported, with opportunities for both services in Northern Ireland to contribute and benefit from the proposal.

QUB have indicated that Phase 2 will require a projected investment of £60-100m. The level of investment required means that QUB would require Government support along with significant funding from a range of private, philanthropic and charitable organisations. Opportunities for funding from the Department of Health would be limited at present due to the financial pressures we are facing although it may be possible to leverage funding from the Department for the Economy/NI Executive given the wider economic benefits that this Centre might achieve. It is recommended that further work is taken forward in conjunction with QUB to develop a Strategic Outline Case for the development of the ARC.

## Conclusion

This strategic review has confirmed that radiotherapy services in Northern Ireland are being delivered to a high standard, with sufficient capital infrastructure and capacity to meet projected demand to 2040. However, it has also highlighted regional variation in service delivery and underscored the need for more strategic investment in the radiotherapy service. Sustaining and enhancing current performance will require continued investment, not only in workforce, routine replacement of capital equipment, but also the adoption of new technologies that will increasingly allow for greater precision and more effective radiotherapy treatment.

Equally, there needs to be greater emphasis on developing a resilient, well-supported multidisciplinary workforce supporting both Cancer Centres. Establishing a regionally integrated service model, underpinned by coordinated planning, innovation, and collaboration, will be essential to ensure equitable access, improved patient outcomes, and the continued evolution of radiotherapy services across Northern Ireland.

### ABBREVIATIONS

<b>AHP</b>	Allied Health Professional
<b>AI</b>	Artificial Intelligence
<b>ARC</b>	Advanced Radiotherapy Centre
<b>CO</b>	Clinical Oncologist
<b>EBRT</b>	External Beam Radiotherapy
<b>HSC</b>	Health and Social Care
<b>IPEM</b>	Institute of Physics and Engineering in Medicine
<b>LINAC</b>	Medical Linear Accelerator
<b>MOU</b>	Memorandum of Understanding
<b>MPE</b>	Medical Physics Expert
<b>NICC</b>	Northern Ireland Cancer Centre
<b>NICE</b>	National Institute for Health and Care Excellence
<b>NI</b>	Northern Ireland
<b>NWCC</b>	North West Cancer Centre
<b>ODN</b>	Operational Delivery Network
<b>QUB</b>	Queen's University of Belfast
<b>RoI</b>	Republic of Ireland
<b>RTDS</b>	Radiotherapy Dataset
<b>SABR</b>	Stereotactic Ablative Body Radiotherapy
<b>SACT</b>	Systemic Anti-Cancer Therapy
<b>SGRT</b>	Surface Guided Radiation Therapy
<b>SRT</b>	Superficial Radiation Therapy

### GLOSSARY OF RADIOTHERAPY TREATMENTS

#### **Brachytherapy**

A type of radiotherapy in which radioactive material sealed in needles, seeds, wires, or catheters is placed directly into or near a tumour, cavity or person organ. ([NHS Data Model and Dictionary, November 2025 Release](#))

#### **External Beam Radiotherapy (EBRT)**

The most frequently used form of radiotherapy, where an external source of radiation is pointed at a particular part of the body. ([NHS Data Model and Dictionary, November 2025 Release](#))

#### **Radionuclide Therapy**

Radionuclide therapy uses a radioactive substance called a radionuclide. It is injected into the bloodstream. Cancer cells absorb the radionuclide more than normal cells. ([National Cancer Institute Dictionary of Cancer Terms](#))

#### **Stereotactic Ablative Radiotherapy (SABR)**

Stereotactic Ablative Radiotherapy, also known as Stereotactic Body Radiotherapy (SBRT), is a highly focused radiation treatment that gives an intense dose of radiation concentrated on a tumour, while limiting the dose to the surrounding organs. ([NHS Data Model and Dictionary, November 2025 Release](#))

#### **Stereotactic Radiosurgery**

A type of external radiation therapy that uses special equipment to position the patient and precisely give a single large dose of radiation to a tumour. It is used to treat brain tumours and other brain disorders that cannot be treated by regular surgery. ([National Cancer Institute Dictionary of Cancer Terms](#))

#### **Superficial Radiation Therapy (SRT)**

Superficial radiotherapy is a type of external radiotherapy. It treats cancer on or close to the skin surface. Superficial radiotherapy means that the radiation doesn't travel far into the body. ([Cancer Research UK](#))

#### **Total-Body Irradiation (TBI)**

A type of radiation therapy that is given to the entire body. Total-body irradiation is often used with high-dose anticancer drugs to help prepare a patient for a stem cell transplant. It is done to kill any cancer cells that are left in the body and helps make room in the patient's bone marrow for new blood stem cells to grow. Total-body irradiation may also help prevent the body's immune system from rejecting the transplanted stem cells. ([National Cancer Institute Dictionary of Cancer Terms](#))

### **Total Skin Electron Beam Therapy**

A type of radiation therapy using electrons that is directed at the entire surface of the body. This type of radiation goes into the outer layers of the skin but does not go deeper into tissues and organs below the skin. ([\*National Cancer Institute Dictionary of Cancer Terms\*](#))

### **NHS ENGLAND RADIOTHERAPY OPERATIONAL DELIVERY NETWORKS (ODNS) - AIMS AND RESPONSIBILITIES**

ODNs are hosted by constituent providers and work collaboratively with Cancer Alliances and Specialised Commissioning teams to implement NHS England's strategic vision for radiotherapy, aiming to improve patient outcomes through innovation, standardisation, and shared governance.

The ODN is responsible for the delivery of an agreed annual Network work programme which aims to:

- i. Improve access across the Network to modern, advanced and innovative radiotherapy techniques, enabling more Service Users to benefit from cutting-edge technology and treatments
- ii. Improve the experience of care by ensuring that Service Users will be managed by an experienced multi-professional tumour specific subspecialist team able to provide holistic care
- iii. Increase participation in research and clinical trials by an average of 15% increase over 3 years in England, aiding faster development of new treatments and help drive the development of clinical services
- iv. Reduce variation in quality by adopting standardised best practice protocols thereby improving Service User outcomes including reducing mortality and morbidity from adverse side effects and
- v. Reduce variation in equipment utilisation in England through changing operating arrangements, clinical practice and equipment replacement; an average 15% increase in equipment utilisation for England as a whole is expected over the next 3 year period aligned to the equipment modernisation programme

## CLINICAL ONCOLOGY (CO) WORKFORCE STATISTICS

**# COs working in this area per cancer centre**

<b>Tumour site</b>	<b>NICC</b>	<b>NWCC</b>
Urology/GU	8	4
Breast	7	3
Lung	4	4
Head & Neck	4	3
Lower GI	3	3
Gynae (inc. gynae Brachy)	3	0
Skin	2	1
Upper GI	2	1
Thyroid	2	0
CNS	2	0
Paeds.	2	0
Haem.	2	0
Locum (breast, governance)	2	0
Sarcoma	1	0
AOS	1	0
<b>Total</b>	<b>45</b>	<b>19</b>

**Number of COs working multiple tumour sites per cancer centre**

<b># Tumour sites</b>	<b>NICC</b>	<b>NWCC</b>
1	15	1
2	9	9
3	4	0
<b>Total</b>	<b>28</b>	<b>10</b>

## TOTAL COURSES/EPISODES OF TREATMENT (2020 - 2024)

Calendar Year	Number of Courses/episodes					
	NICC	NWCC	RoI	NWCC - RoI	Combined - RoI	Combined
2020	3695	988	200	788	4483	4683
2021	3753	1084	253	831	4584	4837
2022	3824	1017	236	781	4605	4841
2023	3959	1124	268	856	4815	5083
2024	4106	1088	218	870	4976	5194

### NORTHERN IRELAND CANCER REGISTRY (NICR) PREDICTED CANCER INCIDENCE STATISTICS

