



RADIOTHERAPY: AN ANALYSIS OF HOW RADIOTHERAPY SERVICES IN THE UK COMPARE WITH OTHER COUNTRIES



Overview

Radiotherapy has been systemically underfunded and under-resourced in the United Kingdom (UK) for decades, resulting in a significant lag in the number of patients able to access life-saving treatments, the number of machines delivering radiotherapy per capita, and the ability to adopt technological advances.

This lack of investment has exacerbated the current post-COVID cancer crisis, with record waiting times for treatment due to a lack of capacity, an overburdened workforce, and a lack of strategic leadership.

Without a new cancer plan that includes a fundamental new approach to delivering radiotherapy services, the UK is unlikely to improve its position near the bottom of international cancer survival rankings.

Introduction

1 in every 4 people in the UK will need radiotherapy in their lifetime. Radiotherapy is one of the three main cancer treatments (alongside surgery and drug therapy) and is required in 50% of cancer treatments and 40% of cancer cures.

The radiotherapy industry has developed precise, innovative, and personalized technologies that are revolutionizing treatment for patients worldwide. Shorter treatment courses support more precise treatments, increasing capacity, efficiency, and improving patient access and survival rates.

In the UK, over 100,000 cancer patients receive radiotherapy treatment each year from a small specialist workforce of around 6,400 professionals.

Despite being a technologically advanced and digitally agile service that can treat patients for an incredibly cost-effective £4 – 7k per patient, radiotherapy remains at breaking point due to systemic underfunding.

A 2022 workforce survey undertaken by Radiotherapy UK found that 8 in 10 radiotherapy professionals have considered leaving the profession.

This briefing document compares the delivery of radiotherapy services between the UK and other comparable countries, before examining wider comparisons of overall cancer care services through an analysis of published data and research.

Radiotherapy services

Equality of access

The internationally accepted standard is that 50%^[1] of cancer patients in the UK should have access to radiotherapy as part of their primary treatment.

However, in 2019 only 24-27% of patients in the UK accessed radiotherapy^[2] ^[3].

Extended travel times for radiotherapy are associated with decreased survival and poor uptake of cancer treatments even in curable patients^[4]^[5].

In England, 3.4 million people live further away than the NHS England target of 45 minutes from a radiotherapy centre, as recommended by the Department of Health and NRAG report^[6].

Equipment – Capital and Technology

Linear Accelerators (LINACs) - radiotherapy machines -have a recommended 10-year life span, with software requiring upgrade every 2-3 years.

Older machines lack imaging capabilities for modern treatments and are slower and more prone to breakdowns. Capital funding for machines is lacking with more than half of all NHS Trusts in England using LINACs over the recommended lifespan.

Analysis by Radiotherapy UK estimates that 36 LINACs (13% of total machines) in England currently need replacing. Without immediate action, this number will rise to 55 (20% of total machines) within the next 12 months.

A national central rolling plan for replacement is needed to address this issue and ensure equality of access to modern radiotherapy equipment.

The inadequacy in the number of radiotherapy machines in the UK has been long-established; a 2014 ESTRO-HERO study showed the UK ranked 13 out of 28 European countries with only 5.0 LINACS per million population^[7]

[1] Borrás JM, Lievens Y, Barton M, et al. How many new cancer patients in Europe will require radiotherapy by 2025? An ESTRO-HERO analysis. *Radiotherapy Oncol* 2016; 119: 5-11.

[2] <https://www.cancerdata.nhs.uk/covid-19/rcrd>

[3] [CancerData](#)

[4] Segel JE et al, Rural-urban differences in the association between individual, facility, and clinical characteristics and travel time for cancer treatment. *BMC Public Health* (2020) 20:196

[5] Thomas AA, Gallagher P, O’Céilleachair A, et al. Distance from treating hospital and colorectal cancer survivors’ quality of life: A gendered analysis. *Support Care Cancer*. 2015;23:741-751

[6] [Travel-times-summary-rtuk.pdf \(radiotherapy.org.uk\)](#)

[7] [Radiotherapy equipment and departments in the European countries: Results from the ESTRO-HERO survey - ScienceDirect](#)

Countries of similar population size have many more LINACs available per capita:

Country	Population size	LINACs	LINACs/per Million of population
France	67.3m	576	8.5
Italy	58.8m	410	7.0
England	56.5m	272	4.8

NB. Radiotherapy UK have used most up to date intelligence from FOI and industry on number of LINACS in **England** in the table as of Sept 2022. Information on all devolved nations was not available at this time point. Information on Italy and France collected direct from radiotherapy industry taskforce _ Advamed.

A 2023 review of MV units using IAEA Directory of radiotherapy centres and latest population data available was analysed (Appendix 1) showing the UK fleet of LINACS has not significantly increased since 2014. Of note this IAEA data includes units owned by private healthcare organisations as well as the NHS, and all MV therapy units (not just LINACS).

In a 2022 workforce survey conducted by Radiotherapy UK 35% respondents said they do not have the machine capacity to meet current patient need. Additionally, 65% felt they did not have enough machine capacity for future demand and 93% felt they do not have the workforce required to deal with future demand.[8]

Software is ever evolving, and current bureaucratic NHS systems can struggle to keep pace with developments. AI is being increasingly used but there is no framework for implementation in the NHS.

Implementation of other technology e.g., Surface Guided Radiation Therapy which has been shown to increase clinical radiotherapy capacity in other countries is not being rolled out through departments or budgeted for in NHS expenditure.

Other countries that quickly capitalise on such rapidly developing technology are improving patient care, increasing capacity, and saving money.

[8] <https://radiotherapy.org.uk/wp-content/uploads/2022/11/2022-Flash-Survey-Report-single-page-layout.pdf>

Government Funding

Radiotherapy receives only around 5% of the cancer budget in the UK. Annual expenses for radiotherapy in Europe, including capital investment, represent between 4.3% and 12.3% of the cancer care budget, with an average between 10% and 12% in Western European countries [9]

NHS Scotland has introduced a rolling programme of ringfenced capital funding of £45M to address the replacement of radiotherapy equipment[10].

This removes the constant pressures of applying for funding to replace out of date equipment and IT that is fundamental to the delivery of advanced radiotherapy treatment delivery to cancer patients.

The current approach in NHS England is to devolve responsibility for procurement and monitoring of radiotherapy equipment to local Integrated Care Boards.

This approach does not recognise the specific requirements of radiotherapy services, where a national rolling programme would be much better placed to provide timely replacement of machines over ten years, plan strategically for the 33% increase in cancer patients predicted by 2040 (Appendix 2) and crucially provide equity of access to world-class radiotherapy treatment for cancer patients.

[9] Lievens Y, Defourny N et al, [How public health services pay for radiotherapy in Europe: an ESTRO-HERO analysis of reimbursement - The Lancet Oncology](#).

[10] [Footnotes - National radiotherapy plan - gov.scot \(www.gov.scot\)](#)

Cancer services

Waiting times for treatment

In the UK, a record-breaking number of cancer patients are missing crucial and life-saving cancer treatment targets.

Quarterly cancer waiting times released by NHS England in May 2023 are the worst on record showing that almost 19,000 cancer patients in just three months have waited over 62 days (8 weeks) for treatment following urgent referral[11].

Additionally, waiting times for radiotherapy in the UK have increased since the start of the pandemic. Pre-pandemic, around 96% of patients met the 31-day target from decision to treat to subsequent treatment. The most recent data shows only 88.8% met this target (NHS operational standard is 96%)[12].

International examples illustrate a different approach to treatment targets. In the Netherlands, the target is that no patient should wait more than 6 weeks for treatment after diagnosis. This target has been consistently met due to an approach to cancer treatment that recognizes 'oncology is a life-threatening disease and for that kind of care we do not have waiting lists, even during the pandemic'[13].

Finland has a similar target, stating that the interval between the arrival of a referral concerning a suspected case of cancer and the start of primary treatment should be no more than 6 weeks. In Canada and Australia, this metric is 10 days[14].

[11] [https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(22\)00754-9/fulltext](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(22)00754-9/fulltext)

[12] [Cancer-Waiting-Times-National-Time-Series-Oct-2009-Mar-2023-with-Revisions.xlsx \(live.com\)](#)

[13] [Pandemic exposes sharp divide in European cancer treatment | Financial Times \(ft.com\)](#)

[14] [Canadian Institute for Health Information. Radiation Treatment Wait Times. CIHI, 2021. Accessed from: https://yourhealthsystem.cihi.ca/hsp/inbrief#!/indicators/003/radiation-treatment-wait-times;/mapC1;mapLevel2;overview;/.](#)

Survival rates

The Organisation for Economic Co-operation and Development (OECD) reported that UK death rates from cancer were still much higher than the international average in 2019. Mortality rates from cancer averaged 191 deaths per 100 000 people across OECD countries, the UK stood at 216 deaths per 100,000 in 2019[15] (Appendix 3) and most recently accessed data shows 222 in 2020 [16].

A report published in 2019 from the International Cancer Benchmarking Partnership found improvements in UK cancer survival continue to be much lower than those in Denmark, Ontario (Canada), and New South Wales (Australia) with just New Zealand, Wales, and Northern Ireland faring worse among the assessed jurisdictions[17]

In this report the UK was reported as having the lowest 1-year survival for stomach, colon, rectal, and lung cancer among Australia, Canada, Denmark, Ireland, New Zealand, and Norway.

The UK remains near the bottom of the international league tables for cancer survival.

Countries that have achieved improved outcomes in international comparison have focused on earlier diagnosis, better cancer treatment, and consistent cancer policy[18].

Early diagnosis is currently benefiting from increased investment in the UK, which is welcome, but the treatment pathway needs equal emphasis.

Better, earlier, and faster diagnosis will increase the number of patients to be treated. But if there are not enough treatment options available to treat patients on time, it will automatically increase the patient backlog in the coming years.

[15] [Cancer incidence and mortality | Health at a Glance 2021 : OECD Indicators | OECD iLibrary \(oecd-ilibrary.org\)](#)

[16] [Deaths from cancer | Health status | OECD iLibrary \(oecd-ilibrary.org\)](#) accessed 13/06/2023

[17] [Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 \(ICBP SURVMARK-2\): a population-based study - The Lancet Oncology](#)

[18] [Exploring the link between cancer policies and cancer survival: a comparison of International Cancer Benchmarking Partnership countries - ScienceDirect](#)

Conclusion

A Lancet Oncology editorial described the UK as a “poor performer in cancer care compared with other European countries”[19].

The UK was at the bottom of cancer league tables pre-pandemic and with cancer services now facing record-breaking treatment waiting lists and a growing backlog, there is no evidence that this will change.

Indeed, the current ambition of the NHS is to return to these pre-pandemic levels of performance which are well below what cancer patients in other comparable countries receive.

Cancer treatment in the UK is at a crisis point. We are facing the worst cancer waiting times on record and there are no realistic plans in place to increase treatment capacity in areas like radiotherapy to address them.

Radiotherapy can provide significant short- and long-term solutions to support the delivery of world-class cancer services for patients in the UK and is a key and protected element of successful cancer services across the world.

However, without immediate and recurrent strategic investment this essential treatment is increasingly vulnerable to collapse.

[19] [Still waiting for a UK cancer plan that truly delivers - The Lancet Oncology](#)

Appendix 1

ESTRO-HERO 2014 Study: Radiotherapy equipment and departments in the European countries: Results from the ESTRO-HERO survey. C Grau, N Defourny et al, *J Radiotherapy and Oncology* 112 (2014) 155–164

RTUK update using population data accessed 30th August 2023

[Total Population by Country 2023 \(worldpopulationreview.com\)](https://worldpopulationreview.com)

[Population > Western Europe - Worldometer \(worldometers.info\)](https://worldometers.info)

And MV Therapy unit register accessed 30th August 2023

[Division for Human Health: DIRAC \(Directory of Radiotherapy Centres\) \(iaea.org\)](https://iaea.org)

Country	Number of LINACs/ Million population ESTRO-HERO 2014	Number of MV units/ Million population ESTRO-HERO 2014	Total Number of MV units/ Million population - RTUK update 2023 using IAEA - DIRAC
Denmark	9.5	9.5	9.3
Norway	8.1	8.3	7.7
Belgium	7.9	8.2	7.8
Finland	7.6	8.0	9
Netherlands	7.9	7.9	8.3
Ireland	6.8	7.0	unknown
France	6.4	6.9	8.8
Sweden	6.6	6.7	7.5
Italy	5.7	info not available	7.3
Germany	5.3	5.5	6.8
United Kingdom	4.8	5.0	5.3
Portugal	3.9	4.2	5.6
Hungary	2.6	3.6	4.5
Poland	3.0	3.1	4.2

Appendix 2

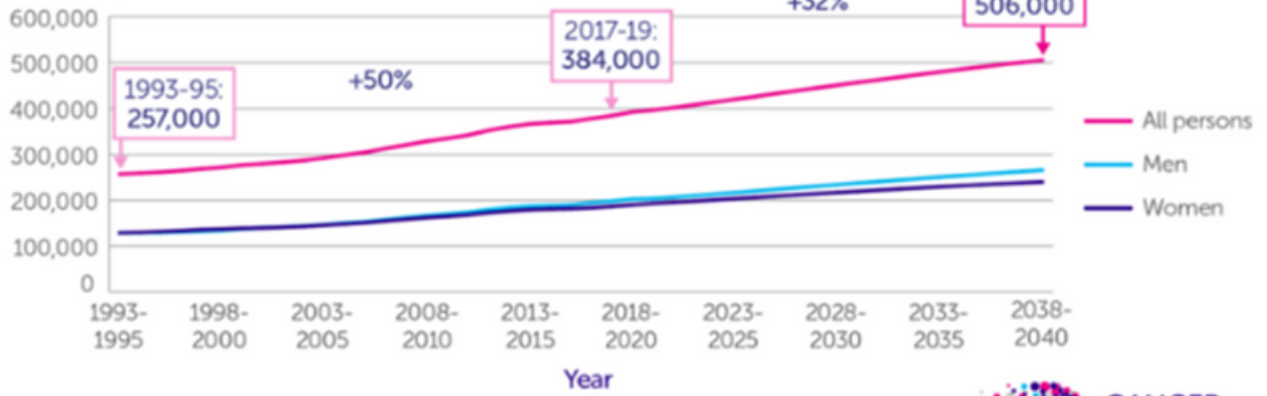
New cancer cases per year in the UK

Annual averages, all ages combined, all cancers excluding non-melanoma skin cancer (ICD-10 C00-C97 excluding C44)



UK

New cancer cases per year



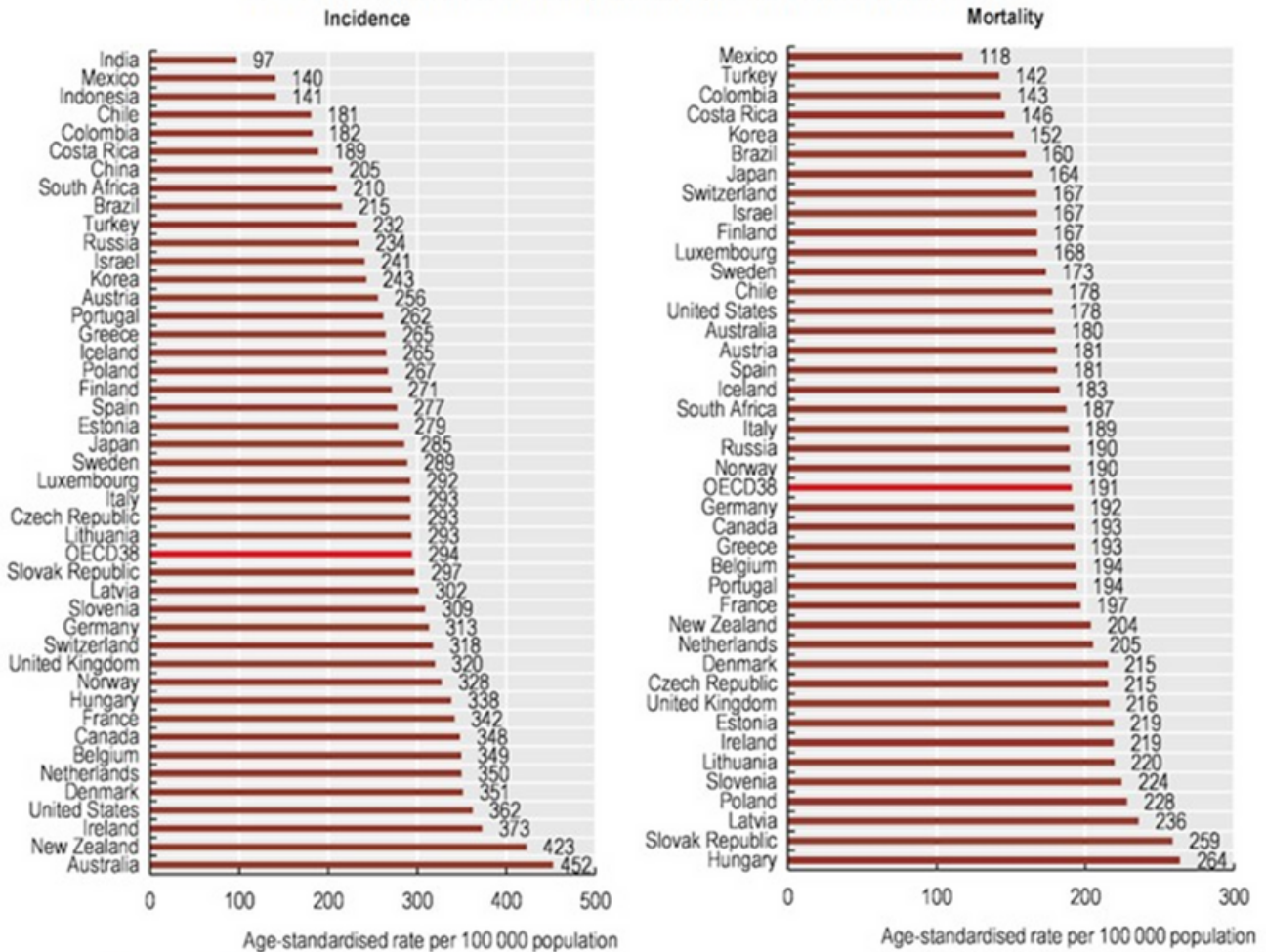
Together we will beat cancer



Appendix 3

Cancer incidence and mortality | Health at a Glance 2021 : OECD Indicators | OECD iLibrary (oecd-ilibrary.org)

Figure 3.14. Cancer incidence (estimated), 2020, and mortality, 2019



Source: IARC GLOBOCAN 2020, OECD Health Statistics 2021.