



Which cancer patients experience long waits to treatment, and why?

Analysis of patients waiting over 104 days from urgent suspected cancer referral to first cancer treatment in England, for 2017/2018, 2020/2021, 2021/2022 and 2022/2023

July 2024

Reference

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About Cancer Research UK

We're the world's leading cancer charity, dedicated to saving and improving lives through research. We fund research into the prevention, detection and treatment of more than 200 types of cancer through the work of over 4,000 scientists, doctors and nurses. In the last 50 years, we've helped double cancer survival in the UK and our research has played a role in more than half of the world's essential cancer drugs. Our vision is a world where everybody lives longer, better lives, free from the fear of cancer.



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Our values

Our values help guide our behaviour and culture in an ever-changing world, building on the best of what we do today and what we aspire to be in the future. They unite and inspire us to achieve our ambitious plans and our mission of beating cancer, together.

Our values are:



Bold

Act with ambition, courage and determination



Credible

Act with rigour and professionalism



Human

Act to have a positive impact on people



Together

Act inclusively and collaboratively

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Executive Summary

Background

- The number of people being referred in England under an urgent GP referral for suspected cancer has been increasing year on year since the pathway was introduced. Around 2,890,000 people were referred under this pathway in the 2022/2023 financial year, up from around 1,950,000 in 2017/2018. Anyone referred on this pathway who goes on to have a diagnosis of cancer is measured on the 62-day pathway. NHS England set out a target that at least 85% of patients should start their first treatment for cancer within 62 days of an urgent GP referral for suspected cancer. However, performance against this target has been deteriorating and it has not been met since December 2015. The number and percentage of patients waiting longer than 104 days has been increasing, with substantial changes seen during and since the pandemic. NHS guidance states that a review should be carried out for every patient who waits longer than 104 days to understand and identify whether delays were avoidable. This project has looked at the demographics and other characteristics associated with patients who waited longer than 104 days, and the reported reasons for delay, to inform efforts to reduce the variation in long-waits and decrease their frequency overall, to ensure all patients receive timely treatment.

Methods

- Cancer Waiting Times data were used to summarise the characteristics of patients who waited over 104 days from urgent suspected cancer referral to starting treatment (termed as 'long waiters') in financial years 2017/2018, 2020/2021, 2021/2022 and April to September 2022/2023. Multivariable regression models were produced to give the likelihood of waiting over 104 days by patient characteristics (e.g. age, deprivation level). Additionally, the time intervals within the patient referral to treatment journey for those waiting over 104 days and the reported reasons for delay were summarised. Analysis was repeated for those waiting over 62 days, which is the stated target waiting time.

Results

- The percentage waiting over 104 days increased by year from 4.1% in 2017/2018 to 11.6% in Q1 & Q2 2022/2023. Patients starting treatment in Q1 & Q2 2022/2023 were over 3 times more likely to have waited 104 days from referral compared to patients starting treatment in 2017/2018 in adjusted analyses.

Patient characteristics

- For Q1 & Q2 2022/2023 the percentage of patients waiting over 104 days was highest for:
 - Those diagnosed with lower gastrointestinal or urological cancer, with the lowest percentage for those diagnosed with breast or skin cancer.

- Those living in the most deprived areas.
- Those aged 60–69, with the lowest percentages for those aged 19–49 or 80+.
- Those diagnosed at stage 3, followed by stage 1 and 2. The percentage was lowest for those diagnosed at stage 4, although 8% of stage 4 patients still waited over 104 days.
- Those with a comorbidity score of one or more, with the lowest percentage for patients with a score of zero (no comorbidities).
- In regression analyses (where variation in the other patient characteristics was accounted for), there were similar patterns of variation in the likelihood of waiting over 104 days by patient characteristic apart from stage, where those diagnosed at stage 1 or 2 were the most likely to wait over 104 days. Those diagnosed at stage 4 were still the least likely to wait over 104 days.
- There were some changes over time in the patterns of likelihood of being a long waiter for these characteristics, such as:
 - A widened deprivation gradient in 2020/2021 compared to 2017/2018, which then narrowed back to the same gradient as 2017/2018 in later years.
 - A narrowing in the variation in likelihood of a long wait between those aged 60–69 compared to other age groups in more recent years.
 - A widened difference in likelihood of a long wait for later stages compared to stage 1 in 2020/2021.
 - A widened difference in likelihood of a long wait for those with a comorbidity score of 1 or more from 2020/2021.
- There was variation by site in the characteristics where long waits are more common. For example:
 - Strong deprivation gradients were seen for several sites, including breast cancer, colon cancer and melanoma.
 - Many different patterns of association were seen in the relationship between long waiters and age.
 - Some sites, such as breast cancer, had little variation by stage in waiting longer than 104 days; bladder and melanoma had increased likelihood with later stage; and other sites, such as colon, lung and rectal, had decreased likelihood at later stage.
 - Some sites did not show a relationship between comorbidity and waiting over 104 days, including prostate cancer.

Referral to treatment time intervals:

- The longest median interval was from referral to a patient being informed of their diagnosis, with a relatively short median interval from decision to treat (DTT) to treatment. The time from DTT to treatment was around 1/7th of the total time from referral to treatment for patients who waited over 104 days.
 - This general pattern was seen for all sites, but the median interval lengths showed variation.

Percentage meeting Cancer Waiting Times standards, and reasons for delay where standard not met:

- The most common recorded reason for delay for patients who waited over 104 days from referral to treatment was “healthcare provider-initiated delay”, which included specific reasons such as inadequate capacity.
 - The most common reasons for delay varied by site, with some sites such as Hodgkin lymphoma having a medical reason for diagnosis delay as the most common delay reason.
- The percentage of patients waiting over 104 days to start treatment who met the Faster Diagnosis Standard of 28 days from referral to being informed of a diagnosis was around 12% in Q1 & Q2 2022/2023, while the percentage who met the standard of 31 days between DTT and starting treatment was around 76% in Q1 & Q2 2022/2023, having decreased from 84% in 2017/2018.
 - In Q1 & Q2 2022/2023 the percentage waiting over 104 days who met the 28-day standard from referral to being informed of diagnosis ranged from 3% for those with prostate cancer, to 33% for those with oesophageal cancer. The percentage who met the 31-day standard from DTT to treatment ranged from 50% for those with kidney cancer to 100% for those with myeloma.

Analysis of those waiting over 62 days

- All analysis was repeated for those waiting over 62 days, which is the stated target waiting time, with similar associations with patient characteristics observed.

Conclusions

- There have been substantial increases in the proportion of patients waiting over 104 days, and 62 days, affecting all patient groups.
- Those living in more deprived areas, aged 60–69, starting treatment for lower GI or urological cancers, diagnosed at stage 1 or 2, or who have a comorbidity score greater than 0 were the most likely to wait over 104 days.
- There was considerable variation in the association between patient characteristics and waiting over 104 or 62 days by site.
- A considerable proportion of delays occurred due to healthcare provider capacity issues.
- The longest time from referral to treatment came from referral to getting a DTT, rather than DTT to treatment.

Background

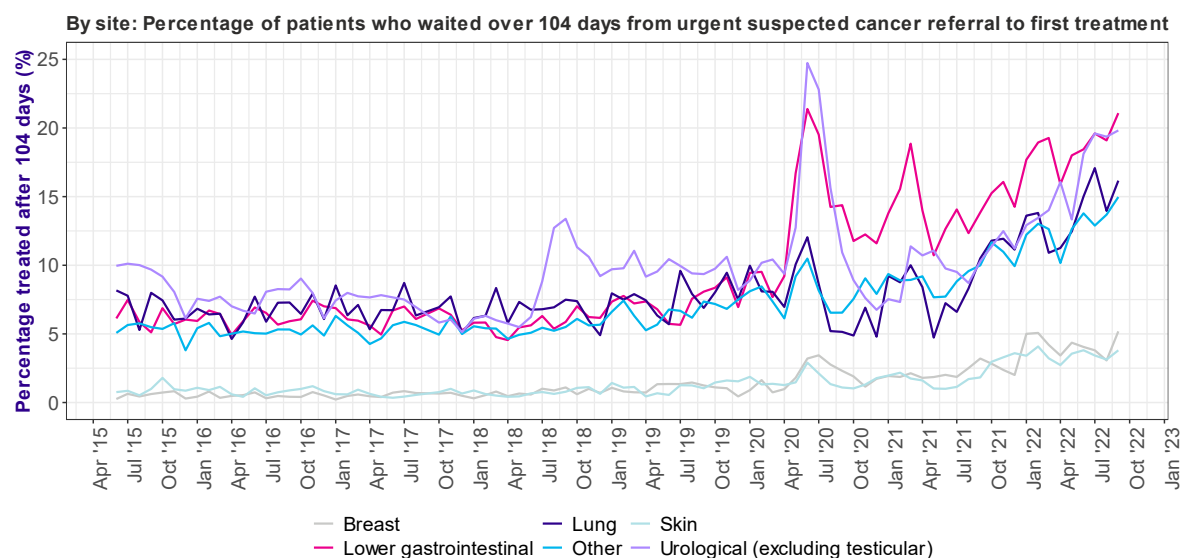
Cancer Waiting Times (CWT) measure the NHS's performance against a set of standards which outline how long patients should expect to wait for the diagnosis and treatment of cancer. One key target for cancer pathways is that at least 85% of patients start their first treatment for cancer within two months (62 days) of an urgent suspected cancer referral. However, this target has not been met nationally since December 2015.

Within the public 62-day wait data (1), the number of patients waiting within sequential intervals is reported (e.g. "within 31 days"; "32 to 38 days"; "39 to 48 days" etc). The maximum reported wait time is "more than 104 days". Any cancer patient waiting more than 104 days (referred to in this report as 'long waiters') from urgent referral to first definitive treatment should be reviewed by clinicians to identify any avoidable delays which may have direct clinical significance or result in poorer outcomes for the patient.

Previous Cancer Research UK (CRUK) analysis of CWT statistics has revealed that the number and percentage of patients waiting more than 104 days increased rapidly in the early months of the COVID-19 pandemic but was also increasing before this, with the first indications of increases in 2018 for urological cancer, likely to be related to the increase in referrals and diagnoses due to the Turnbull and Fry effect (2), and 2019 for other sites (Figure 1). With the number of people referred under an urgent GP referral for suspected cancer increasing every year (1; 3), and the proportions of referrals waiting longer than 104 days increasing, in September 2022 (the latest date used in this current analysis) around 2,000 (12.8%) patients waited more than 104 days to begin cancer treatment after an urgent suspected cancer referral. This was the highest proportion on record and varied by cancer site (Figure 1). This is up from around 430 (4.0%) patients at the beginning of 2017/2018 (1). The increase in patients waiting over 104 days is concerning because, while evidence is limited, studies have suggested that delays of even a few weeks could significantly impact cancer mortality for certain cancer sites (4). In addition, lengthy waits for cancer diagnosis and treatment have implications for patient experience and mental health (5; 6).

CRUK has spoken with clinicians about the potential drivers behind these delays. Reasons are multifactorial, but pressure on diagnostic services was often reported to be a key factor. However, there can be patient-based reasons behind delays, such as longer planning periods for treatment of curative intent, or 'prehabilitation' – where patients undergo rehabilitation prior to cancer treatment to increase their chances of a successful outcome.

Figure 1: Percentage of patients waiting over 104 days by site of suspected cancer (Data source: NHS England Cancer Waiting Times. England only. June 2015 to September 2022).



Older patients have previously been shown to be less likely to meet the 62-day target for colorectal, lung and ovarian cancer, and patients diagnosed at a later stage more likely to meet the target for colorectal and lung cancer but less likely for ovarian cancer (7).

However, little is known about the relationship between patient characteristics and waiting over 104 days.

Given the recent increases observed in the numbers and percentage of long waiters, it is essential to characterise these patients to better understand the potential impact of increased waiting times. Key questions of interest are:

- Are certain groups more likely to be long waiters, indicating potential inequalities?
- What are the reasons for delay and have these changed over time?
- Where in the referral to treatment pathway are patients waiting for the longest time?

In this analysis we have further interrogated the CWT data to understand the breakdown by age, gender, socio-economic deprivation, stage, and comorbidities of these 'long-waiters' and investigate the reason for delays to treatment. These findings identify the length of time of the steps of the patient referral to diagnosis and treatment journey and which contribute the most to delay, reasons for these delays and groups most at risk of a potential 'long-wait'. They can be used to inform efforts to reduce the variation in long-waits and decrease their frequency overall, to ensure all patients receive timely treatment. Findings are also presented by site to present a more nuanced picture of the issues affecting particular site-specific pathways.

While the main focus of this report is on those waiting over 104 days, we have also carried out the same analysis for those waiting over 62 days to identify differences or similarities.

Methods

Datasets

Data were extracted from the CWT dataset for all patients resident in England starting treatment in financial years 2017/2018, 2020/2021, 2021/2022 and the first two quarters of 2022/2023 (data for the last two quarters of 2022/2023 was not available at the time of data extraction). 2017/2018 was chosen as a baseline year as it precedes the increase in long waiters which began in 2018 and data from 2020 onwards included to align with the start of the COVID-19 pandemic. Patients diagnosed following an urgent suspected cancer referral were included, identified as those with a priority type variable within the CWT dataset of 'Two Week Wait' but excluding those referred on the "Exhibited (non-cancer) breast symptoms" referral pathway. All patients starting treatment with a modality that qualifies as 'start of treatment' for the 62-day standard were included. These modalities include systemic anti-cancer therapy, radiotherapy and surgery, but also palliative care and active monitoring among others. Only patients with known age and gender were included. Patients of male gender with gynaecological cancer or female gender with male reproductive cancers were excluded due to the small numbers in these categories, as were patients aged eighteen or under or those referred for suspected children's cancer.

A secondary analysis was conducted linking the CWT dataset to the Rapid Cancer Registration dataset (RCRD), a dataset containing proxy tumour registrations as a quicker, indicative source of cancer data compared to the gold standard registration data (8). This dataset is only available from 2018 so 2018/2019 data was used as a baseline instead of 2017/2018. Linkage was conducted by NHS number and records were matched if the 3-digit ICD-10 diagnosis code from each dataset matched; the date of referral was prior to or within 31 days of RCRD diagnosis date; and date of treatment start was after diagnosis or within 62 days prior. Staging data was only available for a subset of tumours sites (ICD10 codes C15-C16 (Oesophageal, Stomach), C18-C20 (Colon, Rectal), C25 (Pancreatic), C33-C34 (Lung), C43 (Melanoma), C50 (Breast), C54-C57 (Uterine, Ovarian), C61 (Prostate), C64 (Kidney), C67 (Bladder), C81-86 (Hodgkin lymphoma, Follicular lymphoma, Diffuse large B cell lymphoma, Other non-Hodgkin lymphoma) and C88 (Other haematological)) with stage analyses restricted to exclude sites where staging data was unavailable.

Variables

Patient characteristics

Age at treatment start date, cancer site, patient gender, deprivation, modality of first cancer treatment, Cancer Alliance, and trust were taken from the CWT dataset held by the National Disease Registration Service (NDRS). Age at treatment start date was grouped into five broad categories (19-49, 50-59, 60-69, 70-79, and 80+), deprivation quintile was based on the full 2019 Index of Multiple Deprivation for patient area of residence and Cancer Alliance based on patient area of residence. Trust was taken as trust of

organisation where decision to treat (DTT) was made, although a patient may have been under the care of another trust before this. Independent providers were grouped together and any trusts which had fewer than ten cases for each of the relevant overall or site-specific breakdowns were grouped. Two different site groupings were used, the first was broad groupings which reflect the CWT referral type groups and the second with more granular site groupings. Where a more granular cancer site had fewer than 1,000 overall cases, these were grouped together into a designated 'Other' category within the broad site (groupings detailed in Appendix table 1).

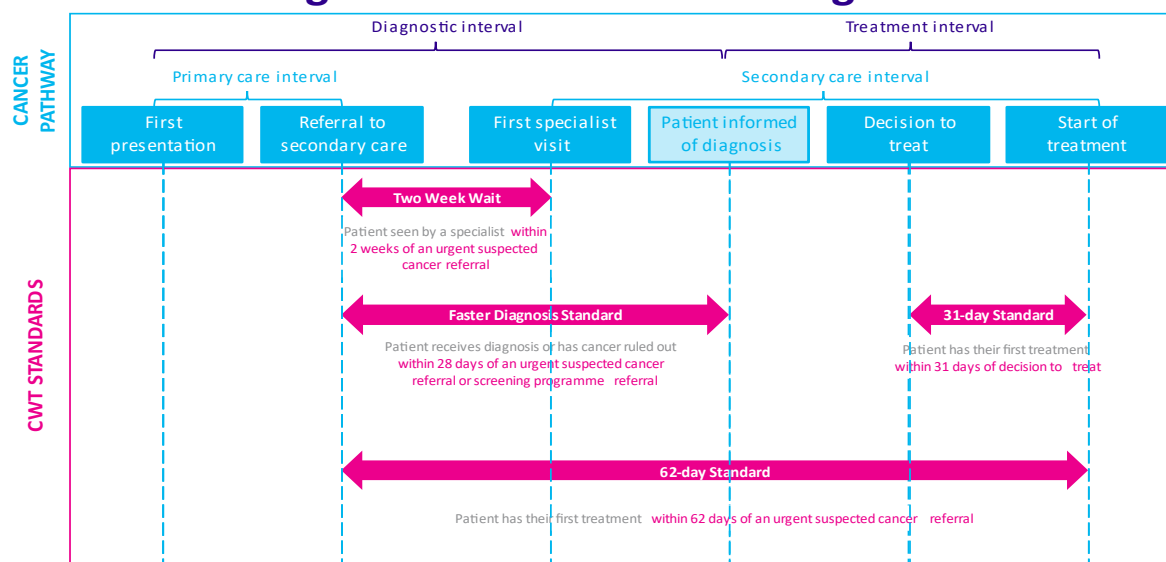
Stage, comorbidity, and ethnicity were taken from the RCRD. TNM stage at diagnosis was grouped to 1, 2, 3, 4 or Unknown, with staging data only available for a subset of cancer sites, as described above. Comorbidity score was recorded using the Charlson comorbidity Index looking at the period from 27 to 3 months prior to diagnosis and grouped as 0, 1, 2 or 3+. Ethnicity (self-reported ethnicity from routine health records) was grouped as for the 2021 census. Comparison between ethnicity from the RCRD with ethnicity from NDRS cancer registry data (where available) indicated substantial discrepancy and so results for ethnicity are not presented, and it was not included as a control variable in models.

Diagnostic and treatment intervals

The diagnostic and treatment intervals investigated (Figure 2) were based on dates within the CWT dataset, including recorded waiting times adjustments where relevant. The intervals considered included those with CWT standards (Two Week Wait interval as time from date of receipt of referral to date first seen by a specialist, Faster Diagnosis interval as time from date of receipt of referral to date of informed of diagnosis, 31-day Wait for first treatment interval as time from date of DTT to date of treatment start and 62-day Wait from referral to treatment as time from date of receipt of referral to date of treatment start) and sub-intervals of the time from referral to treatment derived from these intervals. The time from referral to DTT was calculated as the difference between time from referral to treatment and time from DTT to treatment, time from first seen by a specialist to informed of diagnosis as the difference between time from referral to informed of diagnosis and referral to first seen by a specialist, and the time from informed of diagnosis to DTT calculated as the time from referral to starting treatment minus the time from referral to informed of diagnosis and DTT to starting treatment.

Figure 2: Intervals in the cancer patient diagnostic and treatment pathway, and Cancer Waiting Times standards reported on for England at the time of this analysis (the Two Week Wait standard was retired in October 2023 and the 31- and 62-day standards expanded to cover first and subsequent treatments and a wider range of source of referrals respectively)

Cancer waiting times standards and targets



Long waiters were defined as those with an interval from referral to treatment (inclusive of adjustments where present) of greater than 104 days and those waiting over 62 days as those with an interval of greater than 62 days.

Reasons for delay

Reasons for delay during the various diagnostic and treatment intervals were taken from the CWT dataset. There is not particular guidance on how the reason for delay variable should be completed, and so this is likely to be determined locally. There were 22 different reasons for a delay recorded in the dataset (during either referral to treatment, referral to informed of diagnosis or DTT to treatment). These were grouped into five broad categories for this analysis: healthcare provider-initiated delay, medical reason for treatment delay, medical reason for diagnosis delay (including complex diagnostic pathway), patient-initiated delay, or other reason (not listed). Groupings are detailed in Appendix table 2. For patients waiting more than 104 days from referral to treatment, and repeated for those waiting more than 62 days, reasons for delay were summarised for three intervals: referral to treatment; referral to informed of diagnosis (where a date of informed of diagnosis was available); and DTT to treatment (where a date of DTT was available). Where a patient was informed of diagnosis within 28 days from referral this was classified as "Standard met" from referral to informed of diagnosis and where a patient started treatment within 31 days of DTT this was classified as "Standard met" from DTT to starting treatment. When no reason for delay was recorded, but the patient had waited longer than the relevant standard, the reason for delay was recorded as "Unknown".

Statistical analyses

Which cancer patients experience long waits to treatment, and why?

Descriptive analyses

Univariable tabulations were produced to breakdown the cohorts waiting over 104 days and over 62 days by age, gender, deprivation, site, modality, and financial year of start of treatment (along with stage, and comorbidity for the supplementary analysis) and for each year and site individually. The percentage of the overall cohort who waited longer than 104 days and 62 days were calculated by characteristic. Broad reasons for delay were summarised for each financial year of start of treatment and site. Treatment intervals were summarised as the median time from referral to treatment, referral to first seen, referral to informed of diagnosis, first seen to informed of diagnosis, referral to DTT, informed of diagnosis to DTT and DTT to treatment for each financial year and site. The overall broad sites were also broken down to finer sites to investigate the contribution of different diagnoses, such as breast in situ.

Inferential statistics

The characteristics of those waiting over 104 or 62 days were compared between financial years using the base of 2017/2018 or 2018/2019 as appropriate, with chi-squared tests used to test for significant difference between the two years. Due to small numbers in some categories, p values were produced by Monte Carlo simulation with 100,000 repetitions. Logistic regression models were produced, giving odds ratios of waiting over 104 or 62 days by patient characteristic. Trust was included as a random effect in mixed effect models to account for potential clustering. Several overall models were run; firstly, for the whole cohort controlling for age, gender, deprivation, site and financial year, secondly a sensitivity analysis with the same model but excluding those treated for non-melanoma skin cancer and in situ breast cancer, thirdly for the RCRD linked cohort controlling for age, gender, deprivation, site, financial year and comorbidity and finally for staged sites controlling for age, gender, deprivation, site, financial year, comorbidity and stage. Models were additionally run separately by site and models including interactions between financial year of start of treatment and all other variables were produced. Tables summarising the site specific results are provided in additional sub-reports which can be accessed here: https://www.cancerresearchuk.org/health-professional/our-reports-and-publications#info-gallery-id-3_slide-2

All analyses were carried out in RStudio and a p value of <0.01 was taken as significant due to the large number of comparisons.

Results

Financial year of start of treatment

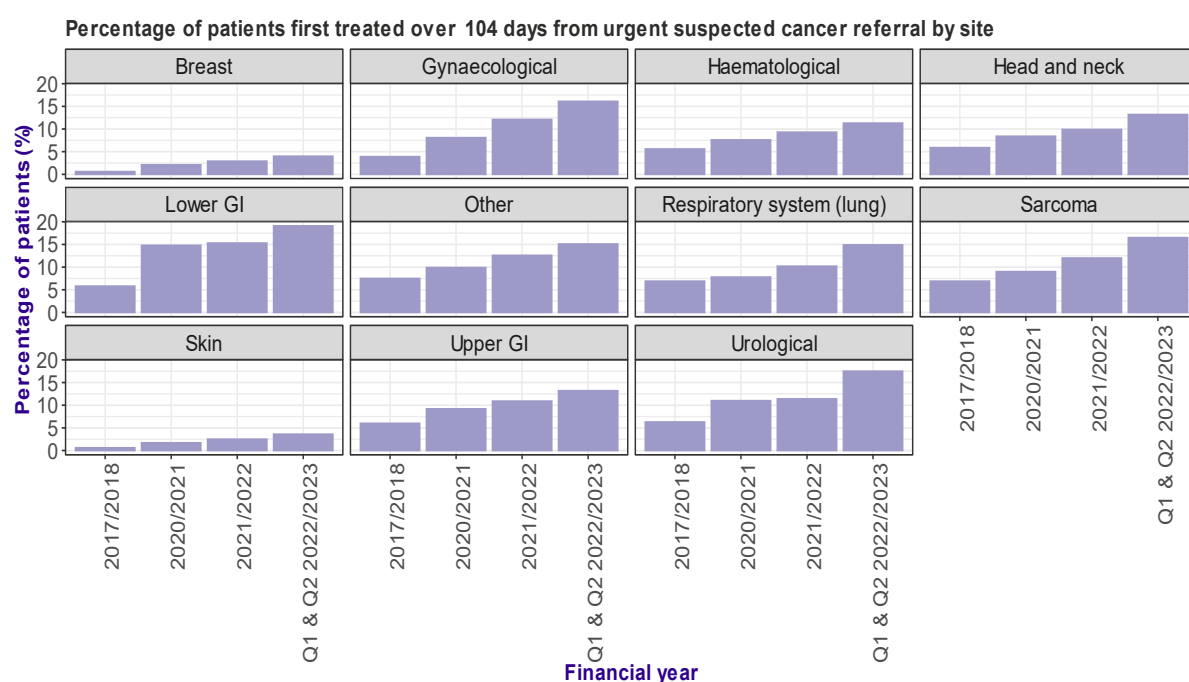
The percentage waiting over 104 days increased in more recent years, from 4.1% in 2017/2018 to 11.6% in Q1 & Q2 2022/2023 (Appendix table 5;Appendix table 6). This association remained in adjusted analyses with adjusted odds ratio (AOR) for waiting over 104 days of 1.93 for patients starting treatment in 2020/2021, 2.28 for 2021/2022 and 3.37 for Q1 & Q2 2022/2023 compared to those starting treatment in 2017/2018 (Appendix table 9). Increasing likelihood of being a long waiter for more recent years was consistent across all sites, but the magnitude of the increase differed, with the largest increase for bladder cancer (28.61 AOR for those starting treatment in Q1 & Q2 2022/2023 compared to 2017/2018) and relatively small increases for oropharyngeal, liver and Hodgkin lymphoma with an AOR for Q1 & Q2 2022/2023 compared to 2017/2018 of less than 2.

Similar findings were seen for the analysis of those waiting over 62 days (Appendix table 14;Appendix table 15;Appendix table 18).

Cancer site

The percentage waiting over 104 days increased with year for each site (Figure 3,Appendix table 5;Appendix table 6); however, the order by site changed from 2017/2018 when lung and sarcoma had the highest percentage waiting over 104 days. In contrast, for each year from 2020/2021 the highest percentage was for lower GI. The percentage waiting over 104 days to start breast and skin cancer treatment increased over time but remained the lowest by site.

Figure 3: Graph showing the percentage of patients who received their first treatment for cancer over 104 days from urgent suspected cancer referral, by financial year of start of treatment and cancer site



Similar results to the percentage by site were found in adjusted regression analyses, with patients diagnosed with skin and breast cancer the least likely to be long waiters and those with lower GI and urological cancer the most likely (Appendix table 9). The results for the RCRD-linked cohort controlling for stage and comorbidity also showed similar associations.

The order of sites was slightly different for logistic regression of likelihood of waiting over 62 days, with patients with skin and breast cancer still the least likely to wait over 62 days and those with lower GI cancer the most likely but patients with respiratory system (lung) cancer, 'other' cancer, sarcoma, gynaecological cancer, upper GI and head and neck cancer were all also more likely to wait over 62 days compared to urological (Appendix table 18).

Specific cancer site

There was also considerable variation in the percentage of patients waiting over 104 days and the adjusted likelihood of waiting over 104 days by specific site within these broad sites (Appendix table 7; Appendix table 8).

Breast cancer

The majority of the breast cancer long waiters cohort were invasive breast cancers (87.7% in Q1 & Q2 2022/2023) but the percentage of patients waiting over 104 days with invasive breast cancer was lower than for those with in situ breast cancer (3.7 vs. 10.4%). The adjusted likelihood of being a long waiter was higher for those with in situ breast cancer compared to invasive breast cancer for all years combined (3.95 AOR). Interaction analyses with financial year indicated that those with in situ breast cancer had a higher likelihood of being long waiters compared to breast cancer across all years, but the effect was smaller in later years.

Gynaecological cancer

The majority of the gynaecological cancer long waiters cohort were uterine cancer patients, and the percentage of long waiters was similar for cervical and uterine cancers in Q1 & Q2 2022/2023 at around 18%, but lower for ovarian (9.7%) and vulval (13.4%) cancers. Ovarian and vulval cancer patients were significantly less likely to be a long waiter compared to uterine cancer patients for all years combined (AOR 0.50 and 0.79 respectively), with similar effect sizes seen for each year individually. However, there was no significant difference in likelihood for cervical cancer patients overall, but there was a significant interaction with year, with cervical cancer patients starting treatment in 2017/2018 significantly more likely to wait over 104 days compared to those with uterine cancer, but this association was not seen in more recent years. These associations remained similar when stage and comorbidity were additionally controlled for.

Haematological cancer

Follicular lymphoma made up the largest percentage of the haematological cancer long waiters cohort (23.9%) in Q1 & Q2 2022/2023, and this site also had the highest percentage

waiting over 104 days at 22.2%. The percentage was lowest for patients with myeloma (4.2%) and chronic lymphocytic leukaemia (5.6%). Patients with follicular lymphoma and Hodgkin lymphoma were significantly more likely to be long waiters compared to those with diffuse large B cell lymphoma (AOR of 2.64 and 2.05 respectively), while patients with chronic lymphocytic leukaemia and myeloma were less likely (AOR of 0.41 and 0.38 respectively) and there was no significant interaction between site and financial year. These associations remained similar when stage and comorbidity were additionally controlled for.

Head and neck cancer

Patients with oropharyngeal cancer made up the largest percentage of the head and neck cancer long waiters cohort in Q1 & Q2 2022/2023 (24.6%), followed by laryngeal (20.2%), thyroid (20.0%) and oral cavity cancer (15.4%). The percentage waiting over 104 days was highest for patients with salivary gland cancer (26.7%) with all other sites ranging from 8.8% to 18.1%. Those with salivary gland, thyroid and laryngeal cancer were more likely to be long waiters compared to those with oropharyngeal cancer for all years combined (AOR of 2.62, 2.20 and 1.62 respectively), while patients with oral cavity cancer were less likely (AOR 0.71). However, the association differed by year with laryngeal, thyroid and salivary gland cancer patients having a greater increase in likelihood of being a long waiter compared to those with oropharyngeal cancer in more recent years than in 2017/2018 and those with oral cavity cancer having less of a reduced likelihood of being a long waiter in more recent years. These associations remained similar when comorbidity was additionally controlled for.

Lower GI cancer

The majority of the lower GI cancer cohort in Q1 & Q2 2022/2023 were patients with colon (53.8%) and rectal (38.3%) cancer, although the percentage waiting over 104 days was highest for patients with anal cancer at 26.2%. Rectal cancer patients had a higher percentage of long waiters compared to colon (21.3% and 17.0% respectively). Those with anal and rectal cancers were more likely to be long waiters compared to those with colon cancer for all years combined (AOR of 1.97 and 1.19 respectively) and the associations were similar for each financial year. These associations remained similar when stage and comorbidity were additionally controlled for.

Respiratory system (lung) cancer

The vast majority of the respiratory system (lung) cancer long waiters cohort were patients with lung cancers in Q1 & Q2 2022/2023 (93.4%), but the percentage of long waiters was higher for mesothelioma patients (14.7% for lung cancer and 18.4% for mesothelioma patients). There was not a significant difference in the likelihood of being a long waiter for patients with mesothelioma compared to those with lung cancer for all years combined, and the interaction between site and financial year was not significant. These findings remained similar when comorbidity was additionally controlled for.

Skin cancer

The majority of the skin cancer cohort in Q1 & Q2 2022/2023 were patients with non-melanoma skin cancer (77.2%), and these patients had a higher percentage waiting over 104 days compared to those with melanoma skin cancer (4.1% and 2.6% respectively). Those with melanoma skin cancer were significantly less likely to be long waiters compared to those with non-melanoma skin cancer for all years combined (0.83 AOR) and there was no significant interaction between site and financial year. The association remained similar when comorbidity was additionally controlled for.

Upper GI cancer

Patients with oesophageal cancer made up the largest percentage of the upper GI cancer long waiters cohort (39.3%) in Q1 & Q2 2022/2023, followed by those with pancreatic (20.1%), liver (16.3%) and stomach (16.2%) cancer. The percentage waiting over 104 days was highest for patients with liver cancer (26.6%) with all other sites ranging from 11.2% to 16.1%. Those with liver and stomach cancer were more likely to be long waiters compared to those with oesophageal cancer for all years combined (AOR of 2.81 and 1.49 respectively), while there was no significant difference for other upper GI sites. However, there was a significant interaction between site and financial year for patients with liver and pancreatic cancer, with a larger increase in likelihood of waiting over 104 days compared to oesophageal cancer in 2017/2018 than in more recent years. These associations remained similar when comorbidity and stage were additionally controlled for.

Urological cancer

Patients with prostate cancer constituted the majority of the urological cancer long waiters cohort (73.5%) in Q1 & Q2 2022/2023, with patients with kidney and bladder cancer representing 11.9% and 11.7% respectively. The percentage waiting over 104 days was highest for those with urinary tract cancer (36.0%), followed by kidney cancer (27.9%), with bladder and prostate cancer at 18.4% and 16.7%. The percentage for patients with testicular cancer was 1.0%.

For male urological cancer patients, those with urinary tract or kidney cancer were significantly more likely to be long waiters compared to those with prostate cancer (AOR of 3.75 and 1.89 respectively), there was no significant difference for those with bladder cancer, and those with testicular cancer were significantly less likely to be a long waiter (0.05 AOR) for all years combined. However, despite not being significant overall, there was a significant interaction with financial year for bladder cancer, with patients diagnosed with bladder cancer far less likely to wait over 104 days compared to those diagnosed with prostate cancer in 2017/2018 but this association reversing in more recent years so that bladder cancer patients were more likely to wait over 104 days in 2021/2022 and Q1 & Q2 2022/2023.

These associations remained similar when stage and comorbidity were additionally controlled for, except for those with bladder cancer who were then significantly less likely to be a long waiter (0.85 AOR).

For female urological cancer patients, those with urinary tract or kidney cancer were significantly more likely to be long waiters compared to those with bladder cancer for all years combined (AOR of 3.39 and 1.87 respectively). However, the association differed by financial year with those with urinary tract or kidney cancer far more likely to be long waiters compared to bladder cancer in 2017/2018 and this discrepancy narrowing for more recent years. These associations remained similar when stage and comorbidity were additionally controlled for.

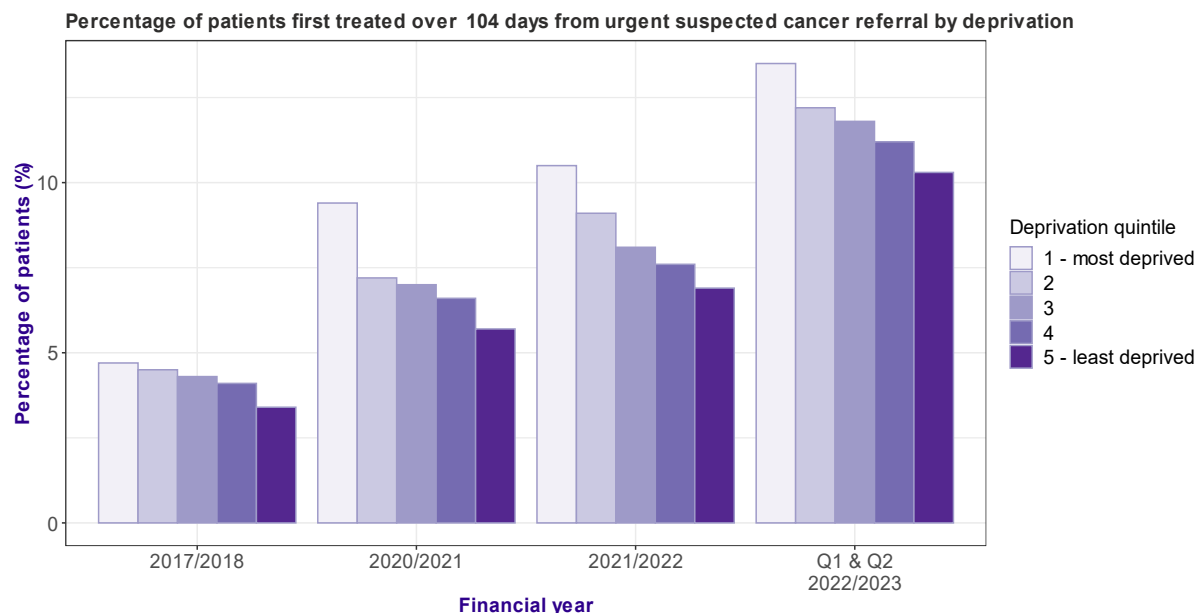
Over 62 days specific site results

The association with waiting over 62 days for specific sites within overall CWT sites was largely the same as that seen for those waiting over 104 days, with notable exceptions including males with bladder cancer being significantly less likely to wait over 62 days compared to those with prostate cancer (0.7 OR) and those with biliary tract and pancreatic cancer being less likely to wait over 62 days compared to those with oesophageal cancer (AOR of 0.50 and 0.60 respectively) (Appendix table 17).

Deprivation

The highest percentage waiting over 104 days by deprivation was for patients in the most deprived quintile, with a deprivation gradient evident (Figure 4, Appendix table 5; Appendix table 6). This was seen across all years, although the percentage waiting over 104 days increased with year for patients in each deprivation quintile.

Figure 4: Graph showing the percentage of patients who received their first treatment for cancer over 104 days from urgent suspected cancer referral, by financial year of start of treatment and deprivation quintile



This deprivation gradient was also seen in adjusted regression analyses, with patients in all deprivation quintiles more likely to wait over 104 days compared to those in the least deprived quintile (AOR of 1.33 for most deprived quintile for the combined study period). A

similar association was also seen for the RCRD results controlling for stage and comorbidity (Appendix table 9).

In interaction analyses with deprivation and financial year of start of treatment, this interaction was statistically significant and indicated that the deprivation gradient increased for 2020/2021 compared to 2017/2018 (AOR of 1.17 for most deprived quintile) but was similar to 2017/2018 in 2021/2022 and Q1 & Q2 2022/2023.

There was significant variation by deprivation quintile for several large sites including bladder (1.49 AOR for most deprived quintile compared to least), breast (1.73 AOR), colon (1.42 AOR), kidney (1.62 AOR), lung (1.22 AOR), melanoma skin (1.60 AOR), non-melanoma skin cancer (NMSC) (1.56 AOR), ovarian (1.66 AOR), prostate (1.17 AOR), rectal (1.21 AOR) and uterine (1.64 AOR) cancer. All of these sites had a consistent trend of increasing likelihood of patients waiting over 104 days with increasing deprivation, except for bladder cancer where only the most deprived quintile had an increased likelihood. A small number of sites, including liver and laryngeal cancer did not have evidence of significant variation by deprivation.

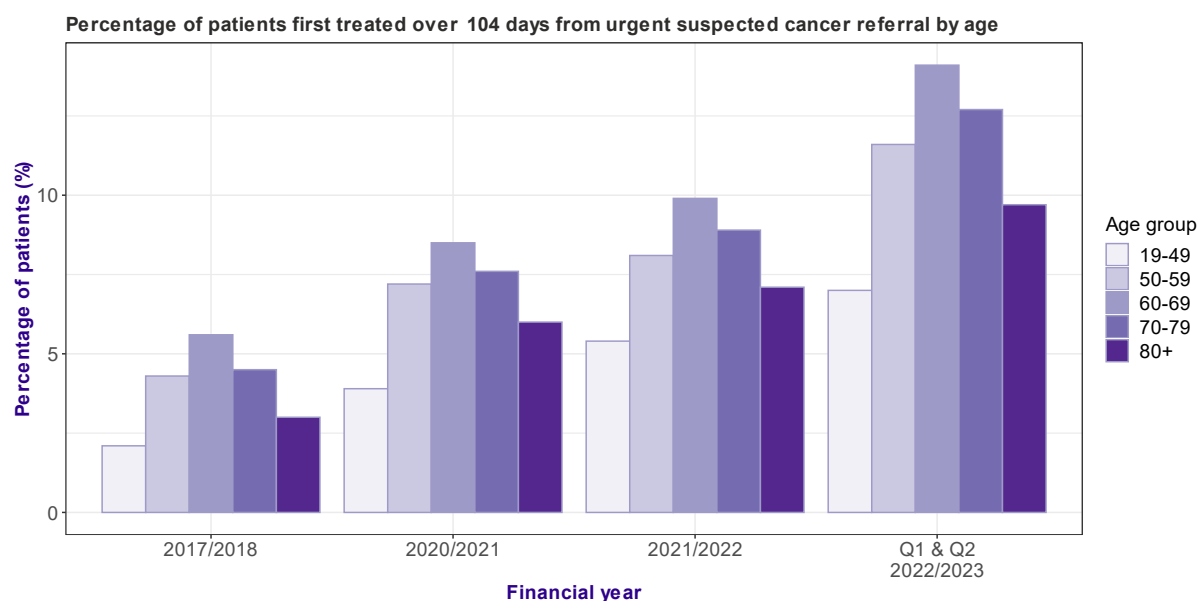
A similar pattern was seen for the association between deprivation and waiting over 62 days, with the highest percentage waiting over 62 days for patients in the most deprived quintile but increases seen for all deprivation quintiles with time. A deprivation gradient was seen in adjusted regression analyses, although the gradient was shallower than that for the likelihood of waiting over 104 days with an AOR of 1.15 for patients in the most deprived quintile compared to those in the least deprived quintile (Appendix table 14; Appendix table 15; Appendix table 18). The interaction term for the 62-day analysis was not overall significant indicating that the relationship between deprivation and likelihood of waiting over 62 days did not alter significantly between financial year of start of treatment.

Age

The most frequent age group among the long waiters cohort was 70–79, followed by 60–69. However, the proportion of the cohort represented by the 60–69 age group decreased in more recent years with a significant difference in the age group composition of long waiters from 2017/2018 to Q1 & Q2 2022/2023 (Appendix table 3; Appendix table 4).

Patients aged 60–69 years old consistently had the highest percentage waiting over 104 days, followed by those aged 70–79, 50–59, 80+ and those aged 19–49 had the lowest percentage, but the percentage increased in more recent years for all age groups (Figure 5; Appendix table 5; Appendix table 6).

Figure 5: Graph showing the percentage of patients who received their first treatment for cancer over 104 days from urgent suspected cancer referral, by financial year of start of treatment and age group



Patients aged 60–69 were the most likely to wait over 104 days in adjusted regression analyses, with those aged 19–49 the least likely (AOR of 0.65 compared to those aged 60–69). Similar results were seen for the RCRD linked cohort when stage and comorbidity were controlled for (Appendix table 9).

In interaction analyses between age group and financial year of start of treatment, the interaction was significant with all odds ratios above 1, indicating that the difference in likelihood of being a long waiter for other age groups compared to those aged 60–69 was narrower in later years.

There were a number of different patterns by age group for different sites. Some sites had no overall significant variation by age group including patients with breast and laryngeal cancer. A number of sites exhibited the inverse U shape that was seen for the overall analyses with lower odds ratios for those aged 19–49 and 80+ compared to the reference group of those aged 60–69, including those with kidney, liver, oesophageal and prostate cancer. A large number of sites had increasing likelihood of being a long waiter with increasing age, including patients with bladder, cervical, colon, lung, melanoma skin, ovarian, rectal, and uterine cancer. Only two sites had a consistent decrease in the likelihood of being a long waiter with increasing age, those with in situ breast and pancreatic cancer.

A similar pattern was seen for the association between age and waiting over 62 days, with the highest percentage waiting over 62 days for those aged 60–69, but increases for all ages with time, and all other ages being less likely to wait over 62 days compared to those aged 60–69 in adjusted regression analyses (Appendix table 14; Appendix table 15; Appendix table 18). The same interaction findings were present.

Gender

The percentage of patients who waited over 104 days to start treatment was consistently higher for those of male gender across all the study years, although the percentage increased with year for both males and females (Appendix table 5).

However, when analyses were adjusted for age, cancer site, deprivation quintile, financial year and trust, those of female gender were slightly more likely to be long waiters compared to those of male gender (AOR of 1.05). There was no significant difference by gender for the RCRD linked cohort when stage and comorbidity were controlled for (Appendix table 9).

In interaction analyses between gender and financial year of start of treatment, the interaction was significant. Those of female gender were less likely to be long waiters compared to those of male gender in 2017/2018 with odds ratios above 1 for the interaction term in later years indicating that those of female gender became more likely to be long waiters compared to those of male gender in the more recent financial years of start of treatment.

Those of female gender were significantly less likely to be a long waiter for liver (AOR 0.70) cancer but there was no significant variation at the $p < 0.01$ significance level for all other sites.

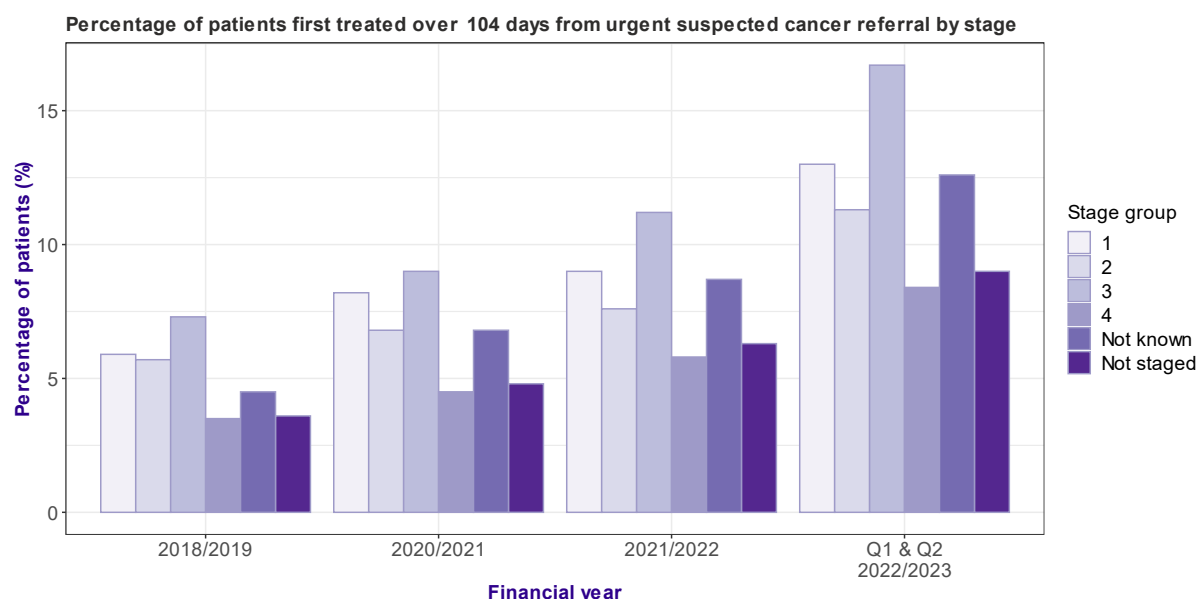
Similar results were seen for the percentage waiting over 62 days by gender, although there was no significant difference in likelihood of waiting over 62 days by gender overall in adjusted analyses (Appendix table 14; Appendix table 15; Appendix table 18). The same interaction by financial year of start of treatment was seen; however, indicating that those of female gender were less likely to wait over 62 days in 2017/2018 but that this gap narrowed and reversed in later years.

Stage

The most frequent stage among those waiting over 104 days for treatment was stage 1 (21.4% of cohort, 2,585 people for 2021/2022) followed by stage 3 (19.5%, 2,351 people), with stage 4 the least frequent (7.6%, 916 people). When patients whose stage was not known, or who had cancers that are not staged in the RCRD were excluded, there was not significant evidence for a significant change in stage distribution by year (Appendix table 4).

Stage 3 had the highest percentage waiting over 104 days for each year (16.7% in Q1 & Q2 2022/2023) and stage 4 the lowest (8.4%), although the percentages for all stages increased for more recent years (Figure 6, Appendix table 6).

Figure 6: Graph showing the percentage of patients who received their first treatment for cancer over 104 days from urgent suspected cancer referral, by financial year of start of treatment and stage



In adjusted regression analyses among the specific sites with staging data in the RCRD, patients diagnosed at stages 1 and 2 had very similar likelihood of being long waiters, while those diagnosed at stage 3 and stage 4 had a lower likelihood of being a long waiter compared to stage 1 (AOR of 0.88 and 0.40 respectively) (Appendix table 9).

The interaction between stage and financial year of start of treatment was significant overall, with adjusted odds ratios lower than 1, although individual odds ratios were only significant for 2020/2021 indicating that the discrepancy between stage 1 and later stages widened for 2020/2021, before largely returning to the association seen for 2018/2019.

There was considerable variation in the associations between stage and waiting over 104 days by site. For patients with bladder cancer, those diagnosed at stages 2–4 all had increased odds of waiting over 104 days compared to those diagnosed at stage 1 (AOR of around 2) and this increased odds with increasing stage was also seen for those with melanoma skin cancer. Patients with breast cancer had similar likelihood of waiting over 104 days for all stages. The majority of sites had reduced odds of waiting over 104 days for later stage at diagnosis compared to stage 1, including those with colon, DLBCL, follicular lymphoma, Hodgkin lymphoma, kidney, lung, oesophageal, pancreas, rectal and stomach cancer. Patients diagnosed with stage 3 ovarian cancer had the highest odds of waiting over 104 days, with the odds for those diagnosed at stages 1, 2 and 4 similar, while patients diagnosed with stage 2 prostate and uterine cancer had the highest odds of waiting over 104 days, and those diagnosed at stage 4 had the lowest.

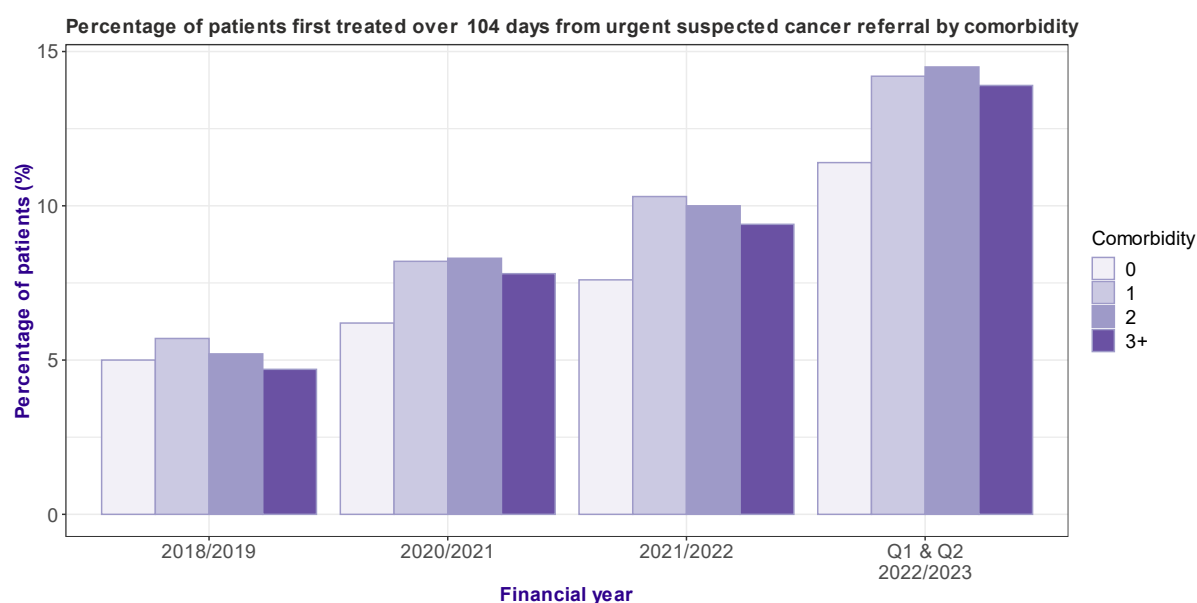
Similar results by stage were found for those waiting over 62 days with reduced likelihood for patients diagnosed at stage 4 compared to stage 1 (0.49 AOR), although those diagnosed at both stages 2 and 3 were slightly more likely to wait over 62 days compared to stage 1 (Appendix table 15; Appendix table 18). The interaction between stage and

financial year was similarly significant but those diagnosed at stage 2 had AORs over 1, indicating that the higher likelihood of being a long waiter at this stage increased in more recent years, while those diagnosed at stage 4 had interaction AORs less than 1 for each year and this discrepancy was larger for Q1 & Q2 2022/2023 compared to previous years indicating those diagnosed at stage 4 were increasingly less likely to be long waiters compared to stage 1 in more recent years. This is in comparison to the analysis of those waiting over 104 days where the discrepancy had largely returned to 2018/2019 levels from 2021/2022.

Comorbidity score

The percentage waiting over 104 days has shown some change from 2018/2019 when it was lowest for those with a comorbidity score of 3+, while in all later years the percentage was lowest for those with a comorbidity score of 0, and similar for those with score of 1, 2 or 3+. All comorbidity scores had an increase in percentage with increasing year (Figure 7, Appendix table 6).

Figure 7: Graph showing the percentage of patients who received their first treatment for cancer over 104 days from urgent suspected cancer referral, by financial year of start of treatment and comorbidity score



Those with a comorbidity score of 0 were the least likely to be long waiters in adjusted analyses. Those with a score of 1, 2 or 3+ had a similar increased likelihood of waiting over 104 days compared to those with a score of 0 (AOR ~ 1.35 in analyses among all sites, stage not controlled for) (Appendix table 9). Similar results were seen in analyses only among staged sites and controlling for stage.

The financial year of start of treatment and comorbidity interaction was significant overall and above 1 for all years, with similar AORs for each year indicating that the discrepancy in the likelihood of waiting over 104 days between a comorbidity score of 0 and higher comorbidity scores widened from 2018/2019 to 2020/2021 and has then remained similar.

Comorbidity score was significantly associated with waiting over 104 days for patients with anal, bladder, breast, cervical, colon, lung, melanoma skin, non-melanoma skin, oesophageal, pancreatic, rectal, and uterine cancers. All of these have a similar relationship between comorbidity score and waiting over 104 days with those with a comorbidity score of 1 and 2 more likely to wait over 104 days compared to those with a score of 0, but some variation for those with a score of 3+ with some sites having reduced likelihood compared to a score of 0, although not significantly so. There was no significant relationship between comorbidity score and waiting over 104 days for some sites, including prostate cancer.

In contrast to the findings for those waiting over 104 days, those with a comorbidity score of 3+ had the lowest percentage waiting over 62 days throughout all time periods, although all comorbidity scores were more likely to wait over 62 days in adjusted regression results compared to those with a score of 0 (Appendix table 15; Appendix table 18). The financial year of start of treatment and comorbidity interaction was significant overall and above 1 for all more recent years, although the AORs are largest for 2020/2021 indicating that the discrepancy between those with a comorbidity score of 0 and 1 or more widened the most in 2020/2021 and has since decreased to closer to 2018/2019 levels.

Treatment modality

The most frequent treatment modality among the long waiters cohort was surgery and there were significant changes in the breakdown by modality over time, with the percentage having active monitoring and hormone therapy increasing, and the percentage having cytotoxic chemotherapy and teletherapy decreasing (Appendix table 3; Appendix table 4).

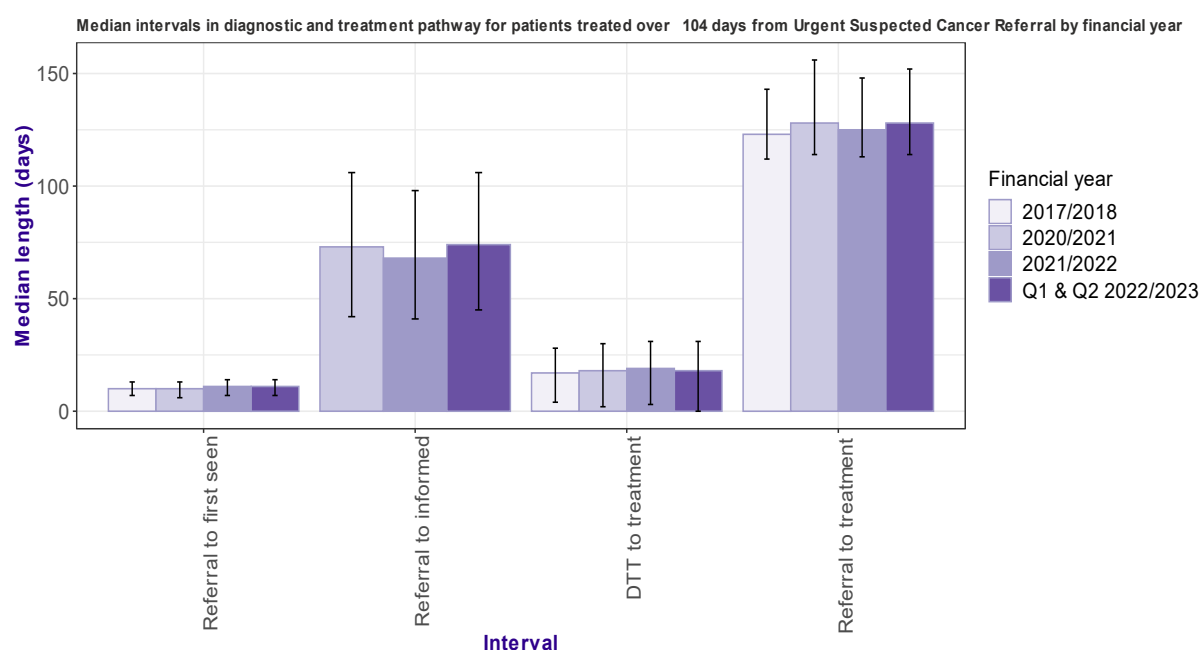
Patients treated with brachytherapy had the highest percentage who waited over 104 days to start treatment. However, brachytherapy has a different pattern over time than other modalities as the percentage waiting over 104 days was highest in 2020/2021 and subsequently decreased almost back to 2017/2018 levels, while the percentage waiting over 104 days increased with time for most other modalities. Patients treated with teletherapy, biological therapies and chemoradiotherapy had the next highest percentages waiting over 104 days while the percentage was low for those starting specialist palliative care (Appendix table 5; Appendix table 6).

Similar results were seen for the percentage waiting over 62 days (Appendix table 12; Appendix table 13; Appendix table 14; Appendix table 15).

Referral to Treatment Time Intervals

Median intervals along the diagnostic and treatment pathway for patients who waited over 104 days from referral to starting treatment remained relatively consistent over the years analysed. The longest median subinterval covered by a CWT standard was from referral to informed of diagnosis, with a shorter median interval from DTT to treatment (Figure 8, Appendix table 10).

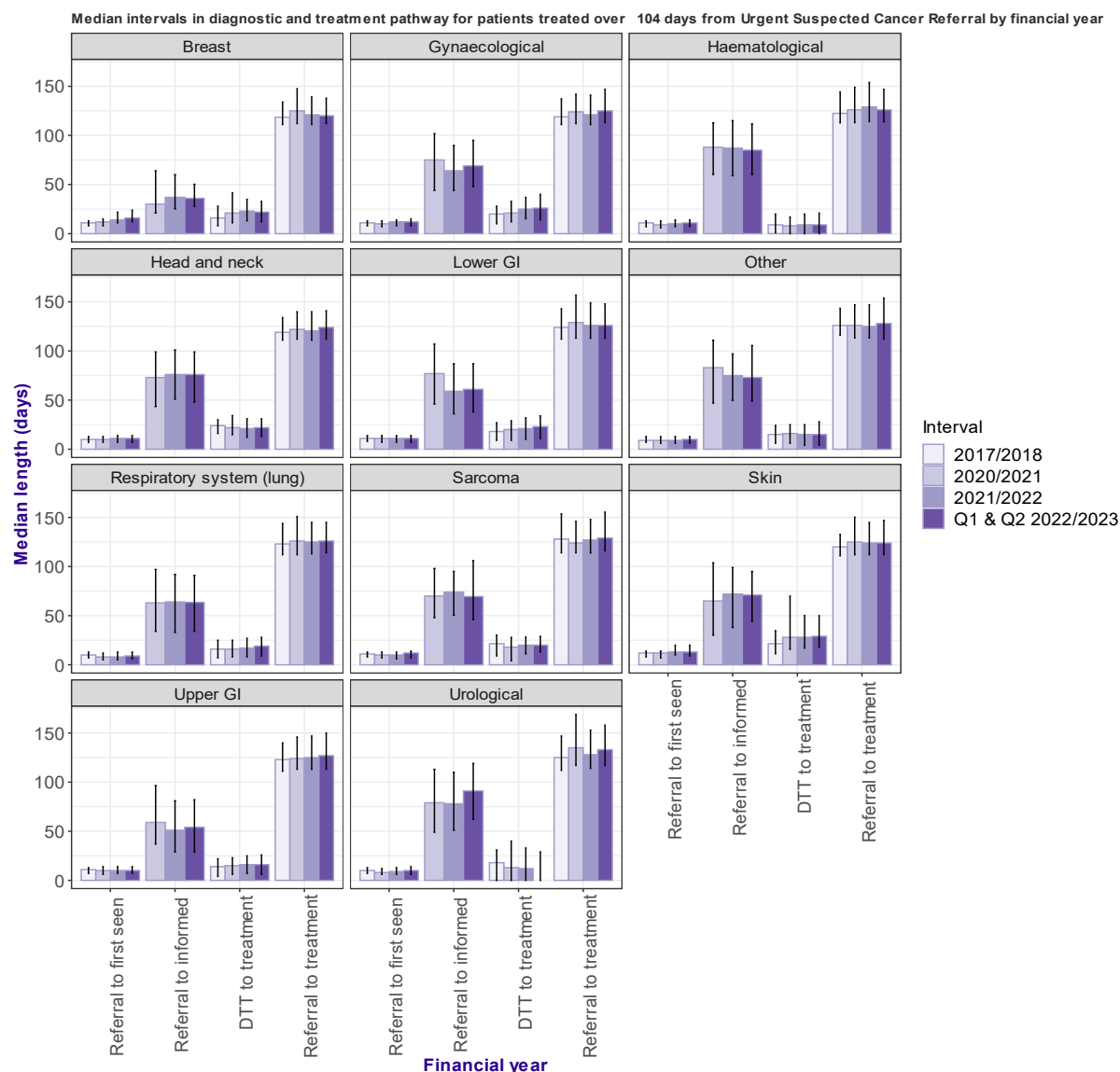
Figure 8: Graph of the median (interquartile range) intervals in the diagnostic and treatment pathways among patients waiting over 104 days to treatment, by financial year of start of treatment



The longest sequential interval was from a patient first being seen by a specialist to being informed of a diagnosis, with the median time from referral to first seen and DTT to treatment falling within the respective 14- and 31-day standards. There was also a median of around 30 days from a patient being informed of diagnosis to a DTT being made.

The pattern of longest interval being from referral to informed of a diagnosis was consistent across sites (Figure 9), although there was some variation in the intervals, with patients with breast cancer having a short median interval from referral to being informed of a diagnosis compared to other sites.

Figure 9: Graph of the median (interquartile range) intervals in the diagnostic and treatment pathways among patients waiting over 104 days to treatment, by financial year of start of treatment and site



Looking by specific site, the shortest median interval from DTT to treatment in Q1 & Q2 2022/2023 was for those with chronic lymphocytic leukaemia and prostate cancer with a median of 0, while the longest median was for those with kidney cancer at 31.5 days. The shortest median time from referral to informed of diagnosis was seen for those with breast cancer at 36 days, while the longest time was 98 days for those with prostate cancer.

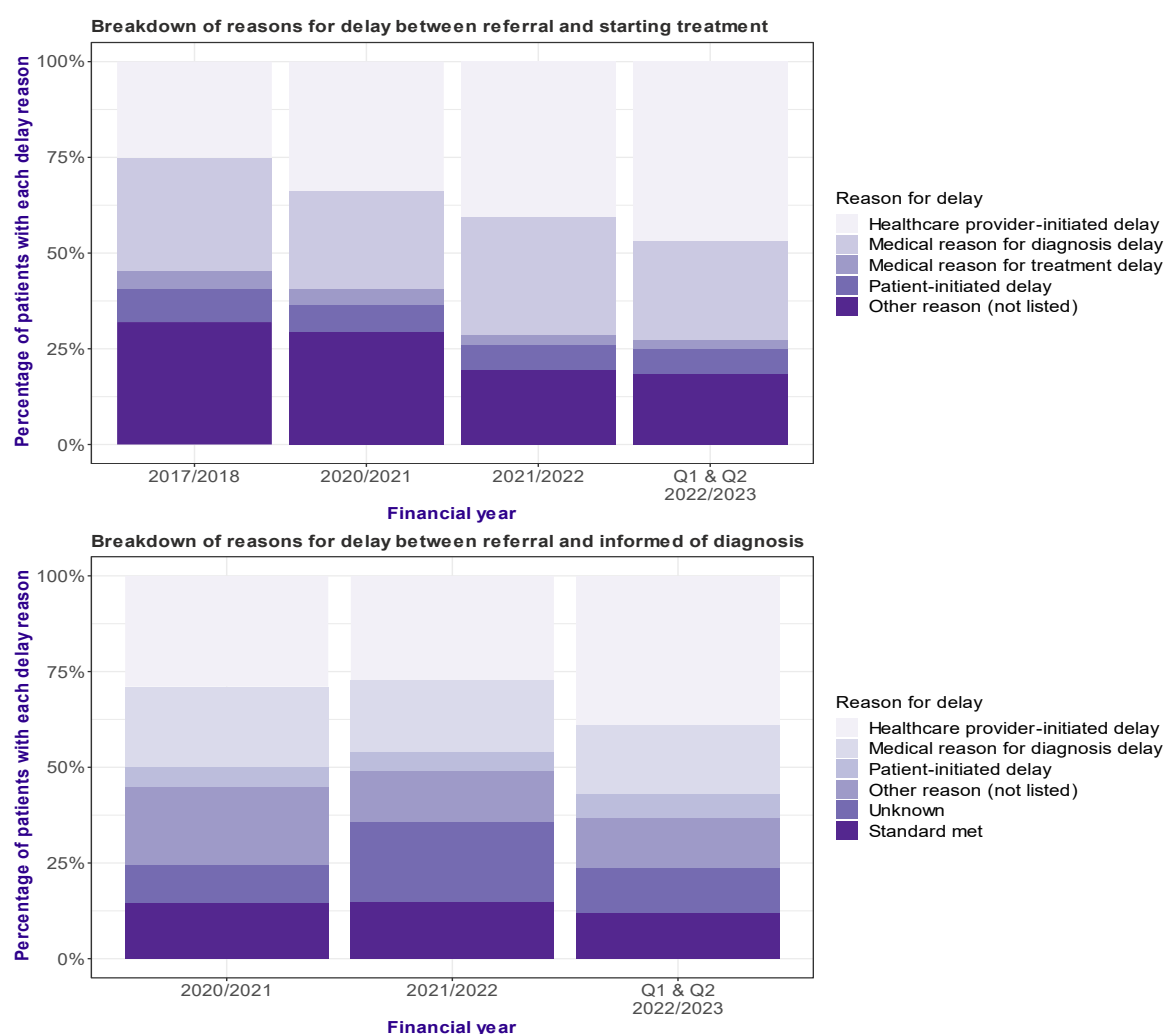
The shortest median interval from referral to DTT was for those with NMSC at 93 days, while the longest median was for those with biliary tract cancer at 128 days, followed by those with prostate cancer (116 days). The median time from informed of a diagnosis to DTT was longest for those with oesophageal and in situ breast cancer (63 days) and shortest for those with thyroid cancer (0 days).

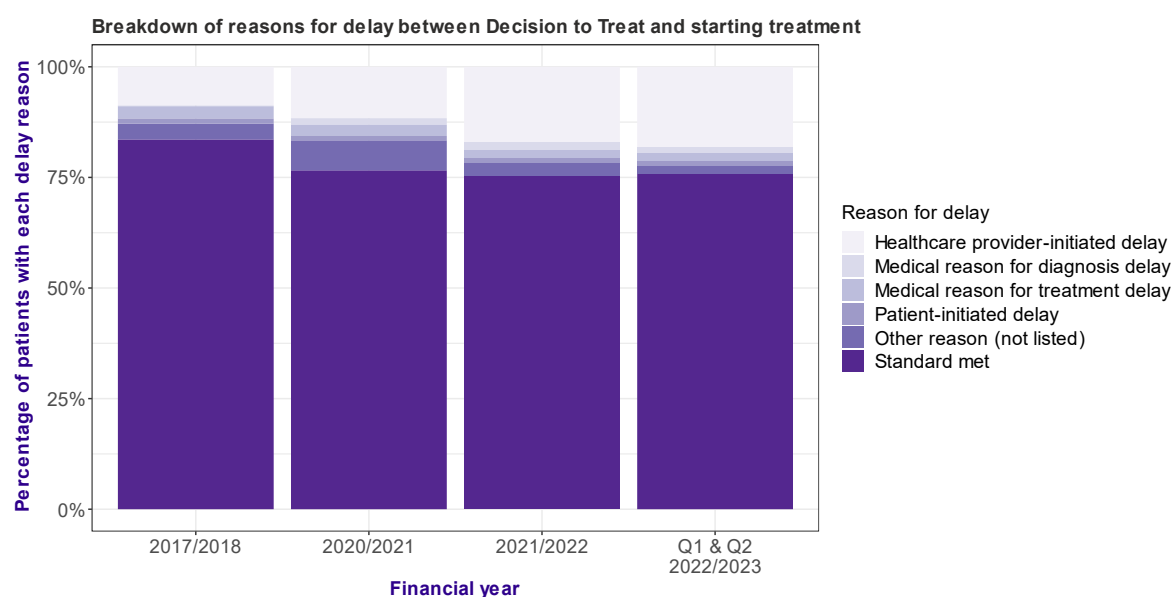
Similar results were seen for those waiting over 62 days, with the longest median interval from referral to informed of diagnosis and a shorter median DTT to treatment interval (Appendix table 19). However, the median intervals from referral to informed of diagnosis and informed of diagnosis to DTT were both substantially shorter for those waiting over 62 days compared to 104 days, while the median time from DTT to treatment only shortened slightly.

Proportions meeting Cancer Waiting Times standards, and reasons for delay where standard not met

Among the long waiters cohort, the most commonly reported reason for delay between referral and treatment in Q1 & Q2 2022/2023 was healthcare provider-initiated delay (46.9%). The percentage who had a healthcare provider-initiated delay between referral and starting treatment increased with increasing year (Figure 10), as did the percentage with a healthcare provider-initiated delay between DTT and starting treatment, although these findings are complicated by the reduction over time in the percentage of patients with the 'Other reason (not listed)' delay. The pattern was less consistent for delay between referral and informed of diagnosis, but healthcare provider-initiated delay was the most frequent reason for delay. In Q1 & Q2 2022/2023, the percentage of patients waiting over 104 days to start treatment who met the standard of 28 days from referral to being informed of diagnosis was 12.1%, while the percentage who met the standard of 31 days between DTT and starting treatment was 75.9%, decreasing from 83.6% in 2017/2018 (Appendix table 11).

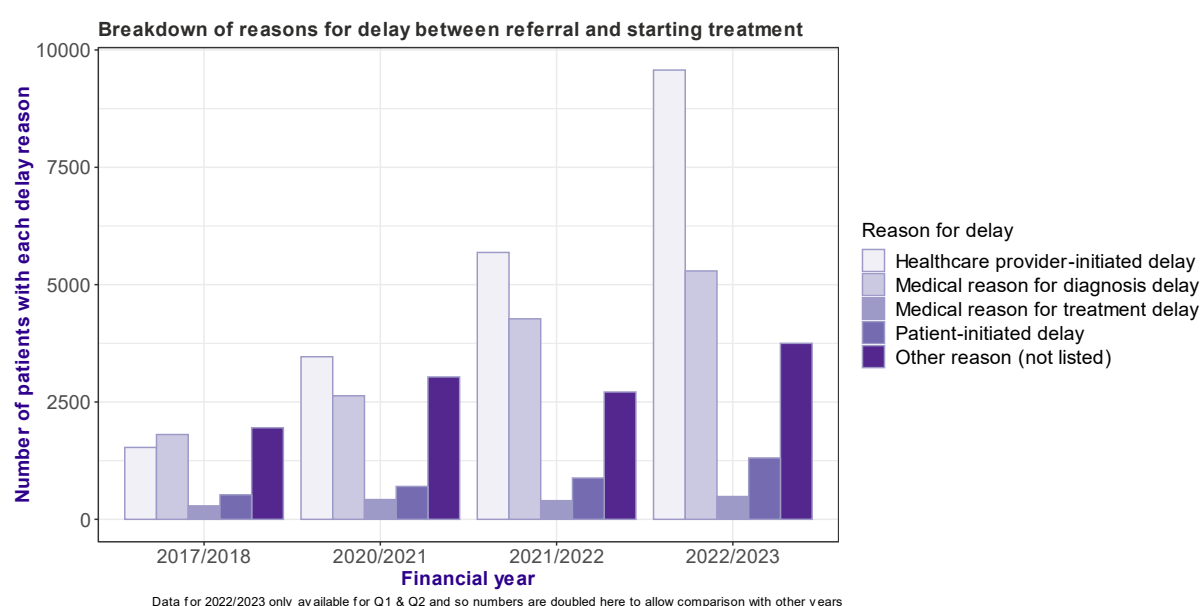
Figure 10: Graphs showing the reasons for delay, among those waiting over 104 days, between: referral and starting treatment, referral and being informed of a diagnosis and DTT and starting treatment





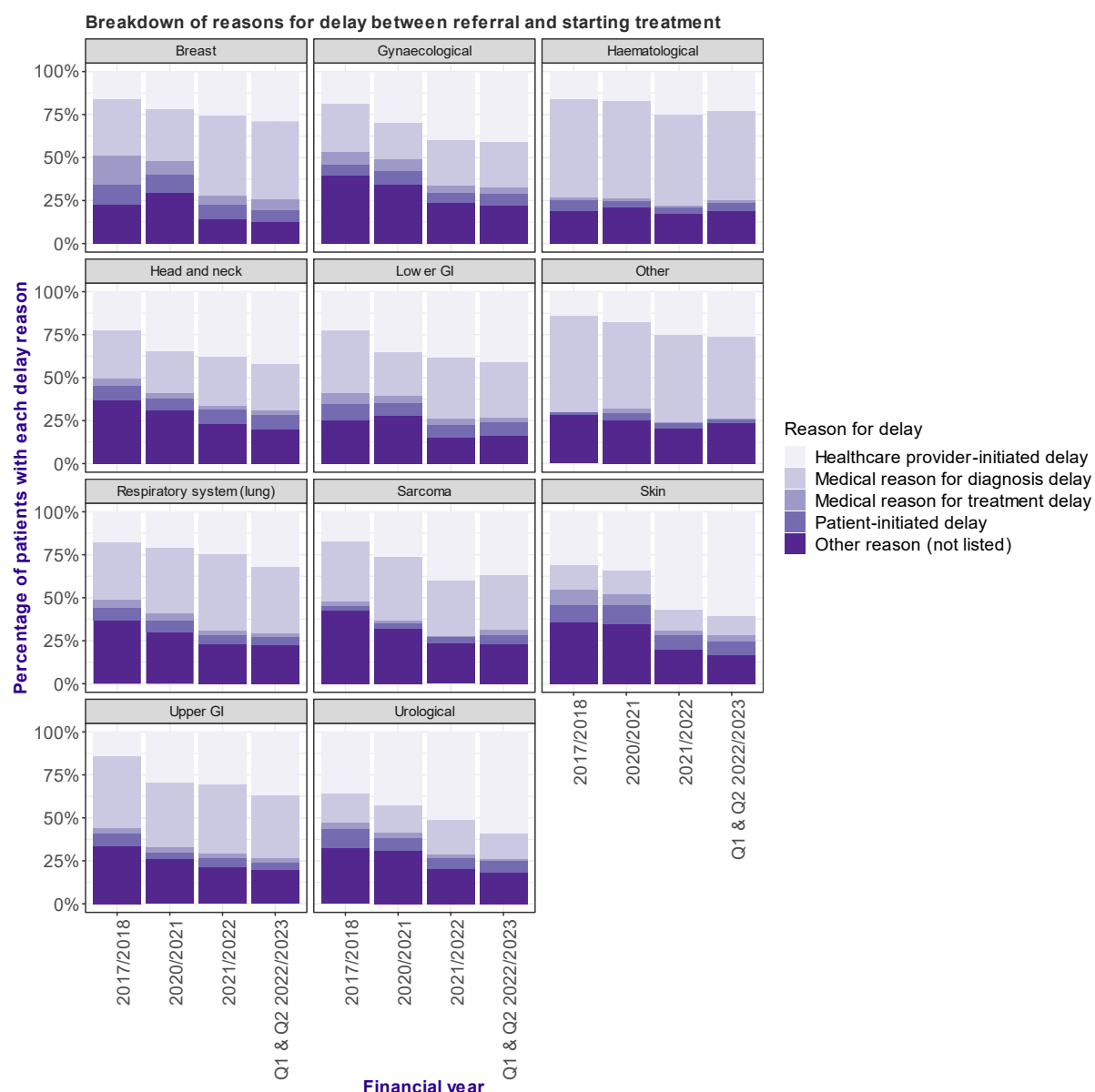
The numbers with each reason for delay from referral to starting treatment (Figure 11) show that there has been a large increase in the number with healthcare provider-initiated delay and medical reason for diagnosis delay, while the numbers with medical reason for treatment delay and patient-initiated delay remain relatively low.

Figure 11: Graph showing the number of patients with each reason for delay between referral and starting treatment, among those waiting over 104 days



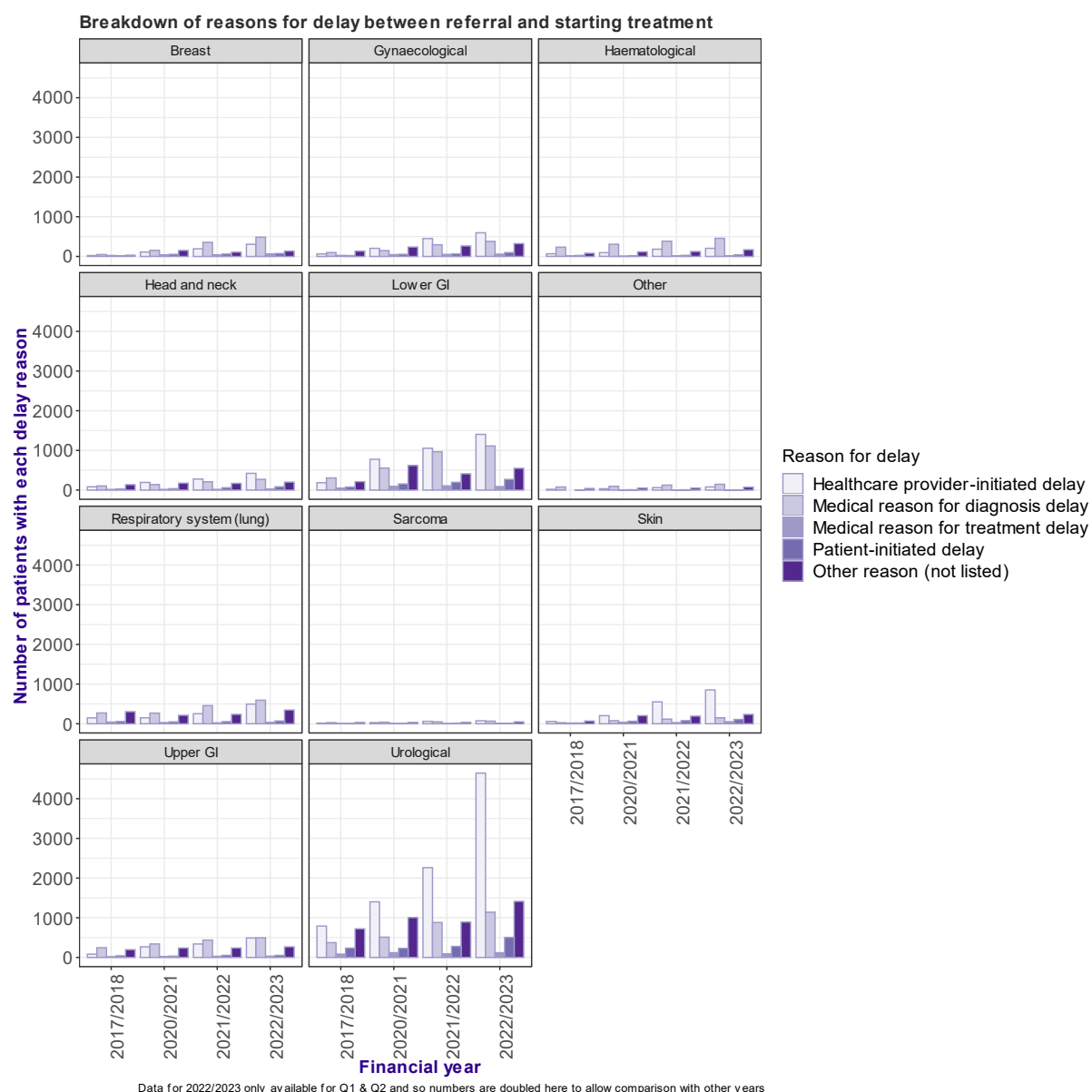
There was variation in the breakdown by reason for delay by site (Figure 12). Healthcare provider-initiated delay represented the largest percentage of the reason for delay for those starting treatment for urological and skin cancer, while medical reason for diagnosis delay was the most common reason for those with breast, haematological and lung cancer.

Figure 12: Graph of the breakdown of reasons for delay between referral and starting treatment, among those waiting over 104 days, by financial year of start of treatment and cancer site



The numbers with each reason for delay between referral and starting treatment by site (Figure 13) indicate that the largest contribution to the number of patients with healthcare provider-initiated delay is from those with urological cancer, largely prostate, with the second largest numbers being seen for lower GI. Lower GI and urological also had the largest numbers with medical reason for diagnosis delay. Although urological cancer had the largest number with healthcare provider-initiated delay, this still remained the most common reason for delay among all other sites combined when urological cancers were excluded (Appendix figure 1, Appendix figure 2).

Figure 13: Graph of the number of patients with each reason for delay between referral and starting treatment, among those waiting over 104 days, by financial year of start of treatment and cancer site



When looking by specific site, the proportion of those waiting over 104 days who had a healthcare provider-initiated delay as the reason for delay from referral to treatment in Q1 & Q2 2022/2023 ranged from 63.5% for those with prostate cancer to 14.7% for those with myeloma and the percentage with medical reason for diagnosis delay ranged from 61.9% for those with Hodgkin lymphoma to 9.1% for those with NMSC. Healthcare provider-initiated delay was the most common reason for delay for anal, bladder, cervical, chronic lymphocytic leukaemia, colon, kidney, laryngeal, liver, melanoma, NMSC, oral cavity, oropharyngeal, ovarian, prostate, rectal, soft-tissue sarcoma, stomach, thyroid, urinary tract, uterine and vulval cancer in Q1 & Q2 2022/2023.

The percentage who met the 28-day standard from referral to informed of diagnosis ranged from 3.3% in Q1 & Q2 2022/2023 for those with prostate cancer to 32.5% for those

with oesophageal cancer. The percentage who met the 31-day standard from DTT to treatment in Q1 & Q2 2022/2023 ranged from 50.0% for those with kidney cancer to 100% for those with myeloma.

Similar results to those for patients waiting over 104 days were also seen for those waiting over 62 days, with an increase in the proportion with healthcare provider-initiated delay and a reduction in the proportion with medical reason for treatment delay and patient-initiated delay between referral and starting treatment in more recent years (Appendix table 20).

A large proportion of those waiting over 62 days met the 31-day standard between DTT and starting treatment, although this proportion decreased in more recent years (from 90.4% in 2017/2018 to 84.4% in Q1 & Q2 2022/2023). 23.3% met the 28-day standard from referral to informed of diagnosis in Q1 & Q2 2022/2023.

Discussion

Summary of results

Our analysis has shown that in Q1 & Q2 2022/2023 nearly 50% of those waiting over 104 days had 'healthcare provider-initiated delay' judged to be the main reason for their delay between referral and starting treatment. Around 76% of those waiting over 104 days met the 31-day DTT to starting treatment standard while around 12% met the 28-day standard from referral to being informed of their diagnosis in Q1 & Q2 2022/2023.

The longest median sub-interval covered by a CWT standard was from referral to informed of diagnosis, with the median time from DTT to treatment falling within the 31-day target. The longest sequential interval was from first seen to being informed of diagnosis. There was some variation in the intervals by site, but a similar pattern of relatively shorter time from DTT to treatment was seen across all sites.

The percentage waiting over 104 days increased by year from 4.1% in 2017/2018 to 11.6% in Q1 & Q2 2022/2023. The percentage of patients waiting over 104 days increased by year across each of the cancer sites, but the degree of increase varied by site with particularly large increases for patients with bladder cancer. The percentage waiting over 104 days to start breast, melanoma and non-melanoma skin cancer treatment increased over time but remained the lowest by site across the years. Increases in the percentage waiting over 104 days were seen among all investigated breakdowns by characteristic with increasing year, but pre-existing variation was maintained, such as the deprivation gradient seen with those in the most deprived quintile the most likely to be long waiters.

This deprivation gradient was also present in overall regression models when the other characteristics and trust were controlled for, with this finding aligning with previous research which has indicated that more deprived cancer patients tend to wait longer from referral to diagnosis (9) and diagnosis to treatment (10), and that those in the most deprived areas are more likely to wait over a year for elective NHS treatment (11). Patients aged 60–69 were the most likely to be long waiters; previous studies have found that patients in older age groups have a lower percentage meeting the 62-day target, although this was only for a subset of cancer sites, unadjusted and for waiting over 62 days (7). Those with a comorbidity score greater than zero had increased likelihood of waiting over 104 days and patients diagnosed at stage 4 were the least likely to wait over 104 days, which is also seen in previous analyses (7; 9). Interaction analysis indicated that the variation identified widened for most characteristics including deprivation, comorbidity, and stage in 2020/2021, but subsequently returned to baseline levels for deprivation and stage from 2021/2022. However, there was considerable variation in these associations by cancer site.

The additional analysis looking at patients waiting over 62 days for treatment found very similar results, with only minor differences in associations.

Interpretations and implications

The longest sequential interval in the diagnosis and treatment pathway for those waiting over 104 days was from first seen to informed of diagnosis with a relatively short interval to treatment once a DTT had been made and around 24% of those waiting over 104 days judged to have had a delay from DTT to treatment. The median time from referral to receiving a DTT was around 6 times as long as the median time to treatment once a DTT had been received. This suggests that time to diagnosis and DTT is usually the main driver of delays for patients, a finding that was also corroborated in discussions with clinicians. Suggested contributing factors to this increase in interval to diagnosis and DTT include increasing numbers of diagnostic tests carried out by the NHS over time (12) with the increase in diagnostic activity and demand not having been matched by increases in the clinical radiology workforce (13); the number of patients on the waiting list for a diagnostic test having increased; and an increase in the percentage of patients waiting 6 or more weeks for a diagnostic test (12). However, the 76% of long waiters meeting the 31-day target from DTT to starting treatment was still far lower than the target of 96% and the overall performance of around 90%, indicating that time to treatment is still an important target for reducing the length of time these patients are waiting. The impact of workforce shortages on delays to both cancer diagnosis and treatment, and the concerns this brings for patient safety and outcomes has also been highlighted in two recent workforce census reports from the Royal College of Radiologists (14; 13).

While the median interval from DTT to treatment was relatively short, the median time from a patient being informed of diagnosis to a DTT being made represented a substantial amount of time for patients waiting over 104 days, especially for those with oesophageal, in situ breast or invasive breast cancer. There are a number of potential investigations that may be required after diagnosis to guide treatment, such as staging, assessing fitness, molecular or genomic testing (15; 16; 17) but the reasons for this lengthy interval could be investigated further.

Healthcare provider-initiated delays represented the most common reason for delay between referral and treatment among those waiting over 104 days from 2021/2022. This indicates that a large number of these delays are potentially not medically warranted but due to health system issues including limited capacity. However, it is possible that appropriate prioritisation in the context of limited capacity may still be occurring with the highest percentage with healthcare provider-initiated delays seen for sites including NMSC and prostate cancer where the impact of a delay may be less of a concern because of the complexity of decision making required or low risk of progression for example. This highlights the importance of site specific results for understanding the reasons behind and potential impacts of these findings. Nonetheless, healthcare provider-initiated delay was the most common reason for delay for a wide range of cancer sites, with particular exceptions being haematological, lung and breast cancers.

The percentage and likelihood of waiting over 104 days has increased in later years, confirming that the increases seen in the routine CWT releases likely cannot solely be explained by changing case-mix. However, there is substantial variation in this increase

by site with by far the largest increase for patients with bladder cancer and relatively modest increases for those with Hodgkin lymphoma, liver, or oropharyngeal cancer. This may reflect the impact of the pandemic on these sites or workforce issues, with bladder cancer diagnostic procedures such as cystoscopy requiring a large number of staff while other diagnostic procedures are less resource intensive.

This analysis has found that there is notable variation in the likelihood of a patient waiting over 104 days from referral to treatment, with long waits more likely for those in the most deprived quintile, those aged 60–69 and those with a comorbidity score greater than 0. Some of this variation may be warranted, such as increased frailty or complexity represented by a higher comorbidity score requiring greater planning pre-treatment or prehabilitation, or due to the type of diagnostics and treatment patients have. However, the deprivation gradient is perhaps reflective of the inverse care law, with it being well established that areas with greater deprivation tend to have relatively underfunded and understaffed services (18; 19), potentially contributing to the inequalities seen in waiting times. However, further analysis, potentially of a qualitative nature, would be required to find out whether these differences are unwarranted in this case. It is also important to highlight that at a population level, shorter times from referral to treatment do not necessarily equate to a better outcome, with people at later stages often more likely to have alarm symptoms and those who are sicker more likely to be seen quickly, start palliative care, decline treatment or die before starting treatment, and so complicating the population-wide analysis of the association between patient survival and meeting waiting times targets (7). However, on an individual level lengthy waits have the potential to negatively impact patients' mental health and could result in disease progression and risk of worse outcome (4). The impact that this has is likely to vary by site, with this unlikely to be a significant issue for many types of NMSC or early-stage prostate cancer but highlighted as a potential issue for sites such as bladder cancer. However, some sites where delay may have less of an impact are the least likely to have patients waiting over 104 days, with skin and breast cancer being the CWT sites with the lowest percentage and likelihood of waiting over 104 days.

There have also been changes in the association between characteristics and likelihood of being a long waiter over time. Interaction analysis indicated that the deprivation and comorbidity gap in particular widened in 2020/2021 which may reflect an unequal impact of the pandemic, although the deprivation gap returned to 2017/2018 levels for 2021/2022 and Q1 & Q2 2022/2023.

The analysis found considerable variation in the association between patient characteristics and waiting over 104 days by site, especially for stage and age, and while most sites have a deprivation gradient, the magnitude of this varies by site. Where there were multiple staged sites within an overall CWT site group, the pattern by stage was generally similar for each site. A notable exception was urological cancer, where those with bladder cancer had increasing likelihood of waiting over 104 days with increasing stage, there was reduced likelihood with increasing stage for those with kidney cancer

and increased likelihood at stages 2 and 3 but reduced likelihood for stage 4 compared to stage 1 for those with prostate cancer. The finding of increased likelihood of waiting over 104 days with later stage compared to stage 1 for those with bladder cancer perhaps reflects the potential use of biopsy techniques such as trans urethral resection of bladder tumour (TURBT) as first treatment for smaller, early-stage tumours but only as part of diagnosis (and so not counted as start of treatment) for later stage tumours (20). The variation by site highlighted by this analysis illustrates the importance of focusing on sites individually to improve specific pathways and understand detailed reasons for waiting over 104 days, potentially at more granular sites than those currently provided by the monthly CWT public data summaries (1).

The findings by site also provide context to the findings from the routine CWT releases, for example indicating that while those with in situ breast cancer are more likely to wait over 104 days from referral to treatment compared to those with invasive breast cancer, the majority of those waiting over 104 days to start breast cancer treatment have invasive cancer rather than in situ. Hence, the increasing numbers seen in recent years do include patients with invasive cancer, where delays may pose more of a risk to progression.

While this analysis found that stage 4 patients had the lowest percentage of long waiters and likelihood of waiting over 104 days by stage, there were still around 8% of patients diagnosed at stage 4 who waited over 104 days to start treatment from April 2022–September 2022. These patients had the shortest median time from DTT to starting treatment by stage, and, similar to all stages combined, a median time from referral to DTT that was longer than 104 days (data not presented), suggesting that the delay for these patients is coming prior to the DTT being made and that once a DTT has been made these patients are treated relatively quickly. In addition, as stage is identified at or post-diagnosis, it is possible that some of these patients progressed during their time waiting from referral to diagnosis.

Limitations and recommendations for future work

These analyses by design only included patients on an urgent suspected cancer referral and those who began treatment. Hence, the results and experience of these patients do not fully capture the experience for all patients diagnosed with cancer in England and patients who died before beginning treatment or were admitted as an emergency for the same condition subsequent to an urgent suspected cancer referral but before being seen by a specialist are not included (21; 20), and these may be the patients where a delay had a very large impact.

In addition, the recording of the reasons for delay variable has some limitations. There is no particular guidance about how to fill this variable out for the CWT dataset and so it is likely that this is determined locally, and subject to interpretation. This variable indicates what was judged to be the ‘main’ reason for delay, and so in many cases is likely to represent an oversimplification of a combination of contributions leading to the delay. Additionally, one of the categories was Other (not listed) and there was a decrease in this

category in more recent years. As there was no further detail about what this category consisted of, it was not possible to determine if patients were shifted from this category to the other defined categories and so interpretation of the analysis over time is complicated. Further analysis of reasons for delay between referral and treatment would be useful to corroborate these findings.

There are also limitations around the results based on the Faster Diagnosis Standard. Data about this standard (intervals and reason for delay) was first mandated for collection in April 2019 but trusts were not expected to meet the standard until October 2021 and there are a substantial proportion of patients who do not have a date of informed of diagnosis, even in the latest year. This meant that Faster Diagnosis Standard related data items were not available for the base years of 2017/2018 or 2018/2019 and data completeness issues limit the comparisons that can be made over time for these measures. There are also some patients who have a date of informed of diagnosis that is later than date of DTT or start of treatment. When the CWT performance against the FDS is calculated, date of DTT is used as the end point for any patients who have a date of DTT that is before the date of informed of diagnosis. However, for this analysis the date of informed of diagnosis was always used as the end point of the faster diagnosis pathway. Hence, the FDS performance calculated in this analysis is not completely comparable with that for the official CWT releases.

The adjusted analyses undertaken in this project did not control for modality. This was considered but decided against due to the likely strong correlations between treatment modality, stage at diagnosis and cancer site. However, further research could split the analysis into major treatment modalities such as surgery, hormone therapy, teletherapy (external beam radiotherapy), cytotoxic chemotherapy and active monitoring to investigate if similar associations between patient characteristics are seen in each sub-group.

A further limitation is due to the use of the RCRD. This was necessary to enable the timely, more detailed characterisation of the cohort with stage and comorbidity, but the dataset does have potential limitations in terms of data completeness and reliability. Concerns around the accuracy of the ethnicity data from RCRD prevented the report of results by ethnicity. It would be useful to produce results by ethnicity once these accuracy concerns have been addressed for future analyses. Using this dataset also required using a different cohort to the original analysis, with the different baseline year of 2018/2019 and the cohort restricted to only those patients who had a record in both CWT treatment datasets and RCRD, that matched sufficiently. This means that the two analyses are not directly comparable, although similar results for the shared variables were seen.

The delay and interval analyses are unadjusted and so present a descriptive picture, but it is possible that the differences identified are due to variation in the other variables. Further investigation of delay reasons and pathway intervals would be helpful, such as how they vary by patient characteristic in adjusted analyses, to investigate the independent contribution of characteristics. There could also be further analysis of the causes of delays

such as the impact of a patient being transferred between trusts or specialties (so called “ping-pong” diagnoses).

Conclusion

In conclusion, the most common reason for delay from referral to treatment for patients waiting over 104 or 62 days in Q1 & Q2 2022/2023 was healthcare provider-initiated delay. The longest interval in the diagnosis and treatment pathway for these patients was from being referred to being informed of diagnosis, while the median time from DTT to treatment was within the 31-day standard. The percentage of patients waiting over 104 days, and 62 days, from referral to treatment increased substantially from 2017/2018, in all patient characteristic breakdowns. Those who were more deprived, female gender, aged 60–69, starting treatment for lower GI or urological cancer, diagnosed at stage 1 or 2, or had a comorbidity score greater than 0 were the most likely to wait over 104 days, although interaction analysis indicated that there were changes in the associations between patient characteristics and likelihood of waiting over 104 days in more recent years. There was considerable variation in the association between patient characteristics and waiting over 62 or 104 days by site. However, the overall picture is of a considerable proportion of delays occurring due to healthcare provider issues, the main delay coming from referral to getting a DTT, rather than DTT to treatment, and of lengthy waits disproportionately affecting those living in the most deprived areas.

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Appendix

Appendix table 1: ICD10 codes for the broad and specific diagnosis groupings used for the analysis

Broad diagnosis group	ICD 10 codes for broad diagnosis group	Specific diagnosis group		
		Specific diagnosis group for analysis	Specific diagnosis group definition	ICD10 codes
Breast	C50, D05	Breast	Breast	C50
		In situ breast	In situ breast	D05
Respiratory system (lung)	C33-C34, C37-C39, C45	Lung	Lung	C33-C34
		Mesothelioma	Mesothelioma	C45
		Other respiratory system (lung)	Heart, mediastinum, and pleura	C38
			Thymus and other intrathoracic organs	C37, C39
Haematological	C81-C86, C88, C90-C96	Chronic Lymphoid Leukaemia (CLL)	Chronic Lymphoid Leukaemia (CLL)	C911
		Hodgkin lymphoma	Hodgkin lymphoma	C81
		Diffuse large B cell lymphoma (DLBCL)	Diffuse large B cell lymphoma (DLBCL)	C833
		Follicular lymphoma	Follicular lymphoma	C82
		Other non-Hodgkin lymphoma	Other non-Hodgkin lymphoma	C830- C832, C834-C839, C84- C86
		Myeloma	Myeloma	C90
		Other haematological	Acute Lymphoblastic Leukaemia (ALL)	C910
			Acute Myeloid Leukaemia (AML)	C920, C924-C925, C930, C940, C942
			Chronic Myeloid Leukaemia (CML)	C921
			Myelodysplasia (MDS)	C946
			Other haematological	C88, C912-C919, C922-C923, C926- C929, C931, C933, C937, C939, C941, C943-C945, C947, C95, C96
Upper GI		Biliary tract	Biliary tract	C221, C240, C248-C249

	C15–C16, C170, C22– C25	Liver	Liver	C220, C222– C224, C227, C229
		Oesophagus	Oesophagus	C15
		Pancreas	Pancreas	C25
		Stomach	Stomach	C16
		Other upper GI	Ampulla of Vater	C241
		Other upper GI	Duodenum	C170
		Other upper GI	Gallbladder	C23
Lower GI	C171– C173, C178– C179, C18– C21, C26	Anus	Anus	C21
		Colon	Colon	C18
		Rectum	Rectum	C19–C20
		Other lower GI	Other lower GI	C171–C173, C178– C179, C26
Skin	C43–C44	Melanoma	Melanoma	C43
		Non-melanoma skin cancer	Non-melanoma skin cancer	C44
Gynaecological	C51– C58	Cervix	Cervix	C53
		Ovary	Ovary	C56, C570– C574
		Uterus	Uterus	C54–C55
		Vulva	Vulva	C51
		Other gynaecological	Other gynaecological	C577– C579, C58
			Vagina	C52
Urological	C60– C68	Bladder	Bladder	C67
		Kidney	Kidney	C64
		Prostate	Prostate	C61
		Testis	Testis	C62
		Urinary tract	Urinary tract	C65–C66, C68
		Other urological	Other male genital	C63
			Penis	C60
Head and neck	C00– C14, C30– C32, C69, C73	Larynx	Larynx	C101, C32
		Oral cavity	Oral cavity	C003– C005, C02–C04, C050, C06
		Oropharynx	Oropharynx	C01, C051–C052, C058–C059, C09, C100, C102– C104, C108–C109
		Salivary glands	Salivary glands	C07–C08
		Thyroid	Thyroid	C73
		Other head and neck	Eye	C69
			Hypopharynx	C12, C13
			Nasal cavity and middle ear	C30

			Nasopharynx	C11
			Sinuses	C31
			Other head and neck	C000, C001, C002, C006, C008, C009, C14
Sarcoma	C40-C41, C46, C48-C49	Soft-tissue sarcoma	Soft-tissue sarcoma	C46, C48-C49
		Other sarcoma	Bone sarcoma	C40-C41
Other	C47, C70-C72, C751-C753, C74, C750, C754-C755, C758-C759, C76-C80, C97	Other	Brain	C71
			Other CNS (Central Nervous System)	C47, C70, C72, C751-C753
			Cancer of unknown primary	C77- C80
			Other	C74, C750, C754-C755, C758-C759, C76, C97

Appendix table 2: Detailed delay reasons within the broad reasons for delay categories

Broad categories	Delay reasons included
Healthcare provider-initiated delay	Clinic cancellation, equipment breakdown, administrative delay, patient care not commissioned by NHS (National Health Service) in England, out-patient capacity inadequate, elective cancellation for non-medical reason, elective capacity inadequate, health care provider-initiated delay to diagnosis test or treatment planning
Medical reason for treatment delay	Treatment delayed for medical reasons (e.g., unfit)
Medical reason for diagnosis delay (including complex diagnosis pathway)	Diagnosis delayed for medical reasons, delay due to recovery after an invasive test, complex diagnostic pathway, inconclusive diagnostic result
Patient-initiated delay	Patient choice (declined or cancelled offered treatment date), patient choice delay relating to first outpatient appointment, Patient choice (declined or cancelled date for follow up appointment), patient initiated delay to diagnostic test or treatment planning, patient did not attend an appointment for diagnostic test or treatment planning, patient failed to attend for elective treatment in admitted care setting, patient did not attend treatment appointment, health care provider unable to make contact with patient by telephone
Other reason (not listed)	Other reason (not listed)

Appendix table 3: Breakdown of the original cohort of patients waiting over 104 days from urgent suspected cancer referral to treatment by characteristics, for each financial year of treatment start

Category		Percentage (2017/2018)	Percentage (2020/2021) (p value*)	Percentage (2021/2022) (p value*)	Percentage (Q1 & Q2 2022/2023) (p value*)
Gender	Female	2,057 (33.7%)	3,965 (38.7%)	5,571 (39.9%)	3,660 (35.9%)
	Male	4,043 (66.3%)	6,288 (61.3%)	8,378 (60.1%)	6,544 (64.1%)
			<0.001	<0.001	0.005
Age group	19-49	287 (4.7%)	520 (5.1%)	783 (5.6%)	520 (5.1%)
	50-59	816 (13.4%)	1,379 (13.4%)	1,746 (12.5%)	1,317 (12.9%)
	60-69	1,861 (30.5%)	2,623 (25.6%)	3,490 (25.0%)	2,651 (26.0%)
	70-79	2,001 (32.8%)	3,458 (33.7%)	4,771 (34.2%)	3,536 (34.7%)
	80+	1,135 (18.6%)	2,273 (22.2%)	3,159 (22.6%)	2,180 (21.4%)
			<0.001	<0.001	<0.001
Deprivation quintile	1 - most deprived	1,115 (18.3%)	2,062 (20.1%)	2,649 (19.0%)	1,758 (17.2%)
	2	1,204 (19.7%)	1,879 (18.3%)	2,725 (19.5%)	1,895 (18.6%)
	3	1,316 (21.6%)	2,158 (21.0%)	2,909 (20.9%)	2,178 (21.3%)
	4	1,349 (22.1%)	2,193 (21.4%)	2,956 (21.2%)	2,247 (22.0%)
	5 - least deprived	1,116 (18.3%)	1,961 (19.1%)	2,710 (19.4%)	2,126 (20.8%)
			0.009	0.147	0.021
Cancer site	Breast	138 (2.3%)	507 (4.9%)	756 (5.4%)	529 (5.2%)
	Gynaecological	336 (5.5%)	685 (6.7%)	1,119 (8.0%)	725 (7.1%)
	Haematological	408 (6.7%)	541 (5.3%)	721 (5.2%)	439 (4.3%)
	Head and neck	369 (6.0%)	560 (5.5%)	732 (5.2%)	499 (4.9%)
	Lower GI	829 (13.6%)	2,198 (21.4%)	2,732 (19.6%)	1,710 (16.8%)
	Other	140 (2.3%)	190 (1.9%)	246 (1.8%)	153 (1.5%)
	Respiratory system (lung)	823 (13.5%)	709 (6.9%)	1,024 (7.3%)	771 (7.6%)
	Sarcoma	80 (1.3%)	109 (1.1%)	152 (1.1%)	103 (1.0%)
	Skin	190 (3.1%)	588 (5.7%)	968 (6.9%)	698 (6.8%)
	Upper GI	584 (9.6%)	900 (8.8%)	1,095 (7.9%)	667 (6.5%)
	Urological	2,203 (36.1%)	3,266 (31.9%)	4,404 (31.6%)	3,910 (38.3%)
			<0.001	<0.001	<0.001
Modality	Active Monitoring	483 (7.9%)	986 (9.6%)	1,197 (8.6%)	1,157 (11.3%)
	All treatment declined	13 (0.2%)	45 (0.4%)	90 (0.6%)	57 (0.6%)
	Biological Therapies	40 (0.7%)	67 (0.7%)	137 (1.0%)	94 (0.9%)
	Brachytherapy	101 (1.7%)	54 (0.5%)	33 (0.2%)	20 (0.2%)
	Chemoradiotherapy	266 (4.4%)	393 (3.8%)	505 (3.6%)	342 (3.4%)
	Cytotoxic Chemotherapy	854 (14.0%)	1,277 (12.5%)	1,749 (12.5%)	1,189 (11.7%)
	Hormone Therapy	444 (7.3%)	848 (8.3%)	1,270 (9.1%)	1,270 (12.4%)
	Non-Specialist Palliative Care	114 (1.9%)	211 (2.1%)	277 (2.0%)	168 (1.6%)
	Other	87 (1.4%)	120 (1.2%)	164 (1.2%)	114 (1.1%)
	Other Anti-Cancer Drug Regimen	27 (0.4%)	35 (0.3%)	35 (0.3%)	35 (0.3%)
	Specialist Palliative Care	100 (1.6%)	180 (1.8%)	255 (1.8%)	170 (1.7%)
	Surgery	2,877 (47.2%)	5,018 (48.9%)	6,889 (49.4%)	4,690 (46.0%)
	Teletherapy	694 (11.4%)	1,019 (9.9%)	1,348 (9.7%)	898 (8.8%)
			<0.001	<0.001	<0.001

* p value for chi squared comparison to 2017/2018 distribution

Appendix table 4: Breakdown of the RCRD linked cohort of patients waiting over 104 days from urgent suspected cancer referral to treatment by characteristics, for each financial year of treatment start

Category		Percentage (2018/2019)	Percentage (2020/2021) (p value*)	Percentage (2021/2022) (p value*)	Percentage (Q1 & Q2 2022/2023) (p value*)
Gender	Female	2,070 (28.2%)	3,232 (38.3%)	4,800 (39.8%)	3,276 (35.1%)
	Male	5,276 (71.8%)	5,214 (61.7%)	7,262 (60.2%)	6,054 (64.9%)
			<0.001	<0.001	<0.001
Age group	19-49	274 (3.7%)	411 (4.9%)	636 (5.3%)	455 (4.9%)
	50-59	1,145 (15.6%)	1,184 (14.0%)	1,534 (12.7%)	1,229 (13.2%)
	60-69	2,466 (33.6%)	2,224 (26.3%)	3,129 (25.9%)	2,477 (26.5%)
	70-79	2,378 (32.4%)	2,862 (33.9%)	4,192 (34.8%)	3,294 (35.3%)
	80+	1,083 (14.7%)	1,765 (20.9%)	2,571 (21.3%)	1,875 (20.1%)
			<0.001	<0.001	<0.001
Deprivation quintile	1 - most deprived	1,193 (16.2%)	1,671 (19.8%)	2,282 (18.9%)	1,631 (17.5%)
	2	1,383 (18.8%)	1,556 (18.4%)	2,354 (19.5%)	1,759 (18.9%)
	3	1,591 (21.7%)	1,785 (21.1%)	2,537 (21.0%)	1,973 (21.1%)
	4	1,594 (21.7%)	1,807 (21.4%)	2,535 (21.0%)	2,034 (21.8%)
	5 - least deprived	1,585 (21.6%)	1,627 (19.3%)	2,354 (19.5%)	1,933 (20.7%)
			<0.001	<0.001	0.533
Stage group	1	1,651 (22.5%)	1,848 (21.9%)	2,585 (21.4%)	2,162 (23.2%)
	2	1,224 (16.7%)	1,323 (15.7%)	1,809 (15.0%)	1,442 (15.5%)
	3	1,544 (21.0%)	1,527 (18.1%)	2,351 (19.5%)	1,906 (20.4%)
	4	555 (7.6%)	639 (7.6%)	916 (7.6%)	663 (7.1%)
	Not known	1,275 (17.4%)	1,578 (18.7%)	2,238 (18.6%)	1,636 (17.5%)
	Not staged	1,097 (14.9%)	1,531 (18.1%)	2,163 (17.9%)	1,521 (16.3%)
			0.043**	0.348**	0.809**
Comorbidity	0	5,875 (80.0%)	6,526 (77.3%)	9,465 (78.5%)	7,433 (79.7%)
	1	751 (10.2%)	978 (11.6%)	1,327 (11.0%)	894 (9.6%)
	2	401 (5.5%)	477 (5.6%)	621 (5.1%)	492 (5.3%)
	3+	319 (4.3%)	465 (5.5%)	649 (5.4%)	511 (5.5%)
			<0.001	0.002	0.007
Cancer site	Breast	145 (2.0%)	388 (4.6%)	592 (4.9%)	446 (4.8%)
	Gynaecological	352 (4.8%)	594 (7.0%)	1,011 (8.4%)	668 (7.2%)
	Haematological	414 (5.6%)	444 (5.3%)	617 (5.1%)	393 (4.2%)
	Head and neck	320 (4.4%)	473 (5.6%)	634 (5.3%)	459 (4.9%)
	Lower GI	838 (11.4%)	1,893 (22.4%)	2,479 (20.6%)	1,621 (17.4%)
	Other	74 (1.0%)	79 (0.9%)	112 (0.9%)	89 (1.0%)
	Respiratory system (lung)	692 (9.4%)	612 (7.2%)	931 (7.7%)	733 (7.9%)
	Sarcoma	82 (1.1%)	83 (1.0%)	113 (0.9%)	74 (0.8%)
	Skin	197 (2.7%)	361 (4.3%)	598 (5.0%)	453 (4.9%)
	Upper GI	562 (7.7%)	808 (9.6%)	1,004 (8.3%)	633 (6.8%)
	Urological	3,670 (50.0%)	2,711 (32.1%)	3,971 (32.9%)	3,761 (40.3%)
			<0.001	<0.001	<0.001
Modality	Active Monitoring	636 (8.7%)	761 (9.0%)	1,023 (8.5%)	1,118 (12.0%)
	All treatment declined	12 (0.2%)	38 (0.4%)	76 (0.6%)	49 (0.5%)

Biological Therapies	34 (0.5%)	54 (0.6%)	123 (1.0%)	87 (0.9%)
Brachytherapy	195 (2.7%)	50 (0.6%)	29 (0.2%)	19 (0.2%)
Chemoradiotherapy	242 (3.3%)	348 (4.1%)	449 (3.7%)	314 (3.4%)
Cytotoxic Chemotherapy	872 (11.9%)	1,113 (13.2%)	1,577 (13.1%)	1,093 (11.7%)
Hormone Therapy	792 (10.8%)	700 (8.3%)	1,164 (9.7%)	1,247 (13.4%)
Non-Specialist Palliative Care	71 (1.0%)	160 (1.9%)	237 (2.0%)	154 (1.7%)
Other	94 (1.3%)	99 (1.2%)	139 (1.2%)	103 (1.1%)
Other Anti-Cancer Drug Regimen	30 (0.4%)	25 (0.3%)	32 (0.3%)	32 (0.3%)
Specialist Palliative Care	88 (1.2%)	139 (1.6%)	215 (1.8%)	153 (1.6%)
Surgery	3,578 (48.7%)	4,084 (48.4%)	5,806 (48.1%)	4,167 (44.7%)
Teletherapy	702 (9.6%)	875 (10.4%)	1,192 (9.9%)	794 (8.5%)
		<0.001	<0.001	<0.001

* p value for chi-squared comparison to 2018/2019 distribution

** p value for chi-squared comparison only among those where stage was known

Appendix table 5: The percentage of patients waiting over 104 days from urgent suspected cancer referral to treatment among the full original cohort by characteristics, for each financial year of treatment start

Category		Percentage (2017/2018)	Percentage (2020/2021)	Percentage (2021/2022)	Percentage (Q1 & Q2 2022/2023)
Total	Total	4.1%	7.0%	8.2%	11.6%
Gender	Female	3.0%	5.7%	7.2%	9.4%
	Male	5.1%	8.1%	9.1%	13.3%
Age group	19-49	2.1%	3.9%	5.4%	7.0%
	50-59	4.3%	7.2%	8.1%	11.6%
	60-69	5.6%	8.5%	9.9%	14.1%
	70-79	4.5%	7.6%	8.9%	12.7%
	80+	3.0%	6.0%	7.1%	9.7%
Deprivation quintile	1 - most deprived	4.7%	9.4%	10.5%	13.5%
	2	4.5%	7.2%	9.1%	12.2%
	3	4.3%	7.0%	8.1%	11.8%
	4	4.1%	6.6%	7.6%	11.2%
	5 - least deprived	3.4%	5.7%	6.9%	10.3%
Cancer site	Breast	0.6%	2.1%	2.9%	4.0%
	Gynaecological	3.9%	8.1%	12.1%	16.1%
	Haematological	5.6%	7.6%	9.3%	11.3%
	Head and neck	5.9%	8.4%	9.9%	13.2%
	Lower GI	5.8%	14.8%	15.3%	19.1%
	Other	7.5%	9.9%	12.6%	15.1%
	Respiratory system (lung)	6.9%	7.8%	10.2%	14.9%
	Sarcoma	6.9%	9.0%	12.0%	16.5%
	Skin	0.6%	1.7%	2.5%	3.6%
	Upper GI	6.0%	9.2%	10.9%	13.2%
	Urological	6.3%	11.0%	11.4%	17.5%
Modality	Active Monitoring	4.1%	8.5%	7.4%	11.7%
	All treatment declined	8.3%	13.8%	20.3%	19.9%
	Biological Therapies	10.2%	10.7%	17.1%	23.7%
	Brachytherapy	46.3%	65.1%	57.9%	50.0%
	Chemoradiotherapy	7.9%	13.4%	16.2%	22.2%
	Cytotoxic Chemotherapy	4.8%	7.6%	9.5%	12.5%
	Hormone Therapy	2.4%	5.0%	6.3%	11.2%
	Non-Specialist Palliative Care	3.6%	5.8%	6.9%	8.5%
	Other	8.0%	7.8%	9.1%	13.1%
	Other Anti-Cancer Drug Regimen	5.4%	8.0%	9.0%	14.7%
	Specialist Palliative Care	2.0%	3.8%	5.2%	6.9%
	Surgery	3.5%	6.1%	7.4%	10.1%
	Teletherapy	13.8%	17.9%	23.2%	29.9%

Appendix table 6: The percentage of patients waiting over 104 days from urgent suspected cancer referral to treatment among the full RCRD linked cohort by characteristics, for each financial year of treatment start

Category		Percentage (2018/2019)	Percentage (2020/2021)	Percentage (2021/2022)	Percentage (Q1 & Q2 2022/2023)
Total	Total	5.0%	6.6%	8.1%	11.9%
Gender	Female	3.2%	5.2%	6.9%	9.4%
	Male	6.5%	7.8%	9.0%	13.9%
Age group	19-49	2.0%	3.3%	4.7%	6.5%
	50-59	5.9%	6.6%	7.7%	11.5%
	60-69	7.3%	7.8%	9.5%	14.0%
	70-79	5.2%	7.1%	8.7%	13.0%
	80+	3.3%	6.0%	7.3%	10.5%
Deprivation quintile	1 - most deprived	5.2%	8.5%	10.1%	13.6%
	2	5.2%	6.8%	8.8%	12.6%
	3	5.2%	6.6%	8.0%	11.9%
	4	4.8%	6.2%	7.4%	11.4%
	5 - least deprived	4.8%	5.5%	6.9%	10.6%
Stage group	1	5.9%	8.2%	9.0%	13.0%
	2	5.7%	6.8%	7.6%	11.3%
	3	7.3%	9.0%	11.2%	16.7%
	4	3.5%	4.5%	5.8%	8.4%
	Not staged	3.6%	4.8%	6.3%	9.0%
	Not known	4.5%	6.8%	8.7%	12.6%
Comorbidity	0	5.0%	6.2%	7.6%	11.4%
	1	5.7%	8.2%	10.3%	14.2%
	2	5.2%	8.3%	10.0%	14.5%
	3+	4.7%	7.8%	9.4%	13.9%
Cancer site	Breast	0.7%	1.8%	2.5%	3.6%
	Gynaecological	4.1%	7.6%	11.6%	15.7%
	Haematological	5.9%	6.7%	8.5%	10.7%
	Head and neck	5.2%	7.9%	9.4%	13.2%
	Lower GI	5.8%	13.5%	14.5%	18.7%
	Other	8.3%	9.2%	12.6%	19.0%
	Respiratory system (lung)	6.2%	7.0%	9.7%	14.6%
	Sarcoma	9.1%	8.5%	11.2%	14.7%
	Skin	0.8%	1.5%	2.2%	3.3%
	Upper GI	6.0%	8.7%	10.5%	13.0%
	Urological	8.8%	9.6%	10.6%	17.3%
Modality	Active Monitoring	4.7%	7.0%	6.6%	11.7%
	All treatment declined	8.2%	13.1%	19.0%	19.1%
	Biological Therapies	7.1%	9.5%	16.5%	23.5%
	Brachytherapy	67.2%	64.9%	54.7%	48.7%
	Chemoradiotherapy	7.5%	12.9%	15.6%	21.6%
	Cytotoxic Chemotherapy	5.1%	7.0%	9.0%	12.1%

	Hormone Therapy	3.7%	4.3%	5.9%	11.3%
	Non-Specialist Palliative Care	2.4%	4.9%	6.4%	8.4%
	Other	6.5%	7.2%	8.6%	13.0%
	Other Anti-Cancer Drug Regimen	7.3%	6.2%	8.7%	14.0%
	Specialist Palliative Care	2.0%	3.3%	4.8%	6.8%
	Surgery	4.8%	6.1%	7.5%	10.7%
	Teletherapy	14.9%	17.0%	22.5%	29.4%

Appendix table 7: The number and percentage breakdown of patients waiting over 104 days from referral to treatment by specific site within each broad site, and the percentage of all patients in the full cohort who waited over 104 days, in the latest full year (2021/2022) and Q1&Q2 2022/2023

CWT Site	Specific site	Number waiting over 104 days (2021/2022) and % of those waiting over 104 days	Number waiting over 104 days (Q1&Q2 2022/2023) and % of those waiting over 104 days	% of all patients waiting over 104 days (2021/2022)	% of all patients waiting over 104 days (Q1&Q2 2022/2023)
Breast	Breast	630 (83.3%)	464 (87.7%)	2.6%	3.7%
	In situ breast	126 (16.7%)	65 (12.3%)	9.6%	10.4%
Gynaecological	Cervix	97 (8.7%)	66 (9.1%)	13.2%	18.1%
	Other gynaecological	41 (3.7%)	32 (4.4%)	14.0%	21.5%
	Ovary	159 (14.2%)	100 (13.8%)	7.2%	9.7%
	Uterus	742 (66.3%)	489 (67.4%)	13.7%	18.4%
	Vulva	80 (7.1%)	38 (5.2%)	13.4%	13.4%
Haematological	Chronic Lymphoid Leukaemia (CLL)	27 (3.7%)	23 (5.2%)	3.4%	5.6%
	Diffuse large B cell lymphoma (DLBCL)	107 (14.8%)	86 (19.6%)	7.8%	12.3%
	Follicular lymphoma	214 (29.7%)	105 (23.9%)	21.1%	22.2%
	Hodgkin lymphoma	113 (15.7%)	63 (14.4%)	13.7%	16.2%
	Myeloma	47 (6.5%)	34 (7.7%)	3.1%	4.2%
	Other haematological	52 (7.2%)	38 (8.7%)	5.9%	8.7%
	Other non-Hodgkin lymphoma	161 (22.3%)	90 (20.5%)	12.1%	13.5%
Head and neck	Larynx	142 (19.4%)	101 (20.2%)	12.8%	16.8%
	Oral cavity	106 (14.5%)	77 (15.4%)	6.2%	8.8%
	Oropharynx	184 (25.1%)	123 (24.6%)	7.7%	10.1%
	Other head and neck	60 (8.2%)	54 (10.8%)	8.6%	14.9%
	Salivary glands	64 (8.7%)	44 (8.8%)	18.6%	26.7%
	Thyroid	176 (24.0%)	100 (20.0%)	14.9%	18.1%
Lower GI	Anus	173 (6.3%)	85 (5.0%)	23.9%	26.2%
	Colon	1,510 (55.3%)	920 (53.8%)	14.2%	17.0%
	Other lower GI	67 (2.5%)	50 (2.9%)	23.2%	30.5%
	Rectal	982 (35.9%)	655 (38.3%)	15.8%	21.3%
Other	Cancer of unknown primary	178 (72.4%)	108 (70.6%)	12.1%	14.1%
	Other	68 (27.6%)	45 (29.4%)	14.3%	18.1%
Respiratory system (lung)	Lung	965 (94.2%)	720 (93.4%)	10.2%	14.7%
	Mesothelioma	45 (4.4%)	35 (4.5%)	12.1%	18.4%
	Other respiratory system (lung)	14 (1.4%)	16 (2.1%)	8.0%	15.7%
Sarcoma	Other sarcoma	23 (15.1%)	16 (15.5%)	12.0%	15.4%
	Soft-tissue sarcoma	129 (84.9%)	87 (84.5%)	12.0%	16.7%
Skin	Melanoma	191 (19.7%)	159 (22.8%)	1.7%	2.6%
	Non-melanoma skin cancer	777 (80.3%)	539 (77.2%)	2.8%	4.1%
Upper GI	Biliary tract	47 (4.3%)	32 (4.8%)	9.3%	14.6%
	Liver	171 (15.6%)	109 (16.3%)	21.9%	26.6%
	Oesophagus	425 (38.8%)	262 (39.3%)	9.3%	11.2%
	Other upper GI	43 (3.9%)	22 (3.3%)	10.8%	11.2%

	Pancreas	226 (20.6%)	134 (20.1%)	9.4%	11.2%
	Stomach	183 (16.7%)	108 (16.2%)	13.2%	16.1%
Urological	Bladder	710 (16.1%)	458 (11.7%)	13.6%	18.4%
	Kidney	663 (15.1%)	464 (11.9%)	20.6%	27.9%
	Other urological	32 (0.7%)	15 (0.4%)	10.9%	9.9%
	Prostate	2,839 (64.5%)	2,874 (73.5%)	10.0%	16.7%
	Testis	8 (0.2%)	6 (0.2%)	0.7%	1.0%
	Urinary tract	152 (3.5%)	93 (2.4%)	29.6%	36.0%

Appendix table 8: Table of the likelihood of waiting over 104 days for each specific site in a regression model looking at the CWT site groupings. Odds ratios are presented for the original cohort unadjusted and adjusted for gender, age group, deprivation and financial year. Odds ratios for the RCRD linked cohort are presented for all sites adjusted for gender, age group, deprivation, comorbidity and financial year, and for staged sites with full adjustment.

CWT site	Specific site	Original cohort		RCRD linked cohort	
		Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs) (all sites, minimal adjustment + comorbidity)	Adjusted odds ratio (95% CIs) (staged sites, full adjustment)
Breast	Breast	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	In situ breast	3.95 (3.48–4.49)*	3.95 (3.45–4.51)*	Not included in cohort	Not included in cohort
Gynaecological	Cervix	1.03 (0.90–1.18)	1.17 (1.01–1.36)	1.08 (0.92–1.27)	Not staged
	Other gynaecological	1.22 (1.00–1.49)	1.17 (0.95–1.45)	1.24 (0.99–1.55)	0.76 (0.54–1.08) ^a
	Ovary	0.48 (0.43–0.54)*	0.50 (0.45–0.56)*	0.49 (0.43–0.55)*	0.47 (0.41–0.53)*
	Uterus	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Vulva	0.93 (0.79–1.09)	0.79 (0.67–0.93)*	0.78 (0.65–0.92)*	Not staged
Haematological	Chronic Lymphoid Leukaemia (CLL)	0.43 (0.34–0.54)*	0.41 (0.32–0.52)*	0.38 (0.29–0.49)*	Not staged
	Diffuse large B cell lymphoma (DLBCL)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Follicular lymphoma	2.53 (2.20–2.91)*	2.64 (2.29–3.04)*	3.04 (2.62–3.54)*	3.22 (2.76–3.75)*
	Hodgkin lymphoma	1.69 (1.44–1.98)*	2.05 (1.72–2.44)*	2.20 (1.82–2.64)*	2.34 (1.94–2.83)*
	Myeloma	0.41 (0.33–0.49)*	0.38 (0.32–0.47)*	0.40 (0.32–0.49)*	Not staged
	Other haematological	0.76 (0.63–0.92)*	0.74 (0.61–0.9)*	0.79 (0.64–0.97)	2.46 (1.93–3.14)* ^a
	Other non-Hodgkin lymphoma	1.51 (1.31–1.74)*	1.47 (1.27–1.7)*	1.40 (1.19–1.64)*	1.45 (1.23–1.70)*
Head and neck	Larynx	1.63 (1.42–1.86)*	1.62 (1.41–1.86)*	1.71 (1.48–1.98)*	Not staged
	Oral cavity	0.73 (0.63–0.84)*	0.71 (0.61–0.82)*	0.76 (0.65–0.89)*	Not staged
	Oropharynx	1 (ref)	1 (ref)	1 (ref)	Not staged
	Other head and neck	1.32 (1.12–1.56)*	1.33 (1.12–1.57)*	1.63 (1.39–1.90)* ^b	Not staged
	Salivary glands	2.53 (2.10–3.04)*	2.62 (2.16–3.18)*	Other head and neck ^b	Not staged
	Thyroid	2.12 (1.87–2.41)*	2.2 (1.90–2.56)*	2.10 (1.79–2.46)*	Not staged
Lower GI	Anus	1.71 (1.53–1.91)*	1.97 (1.75–2.22)*	1.98 (1.75–2.25)*	Not staged
	Colon	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Other lower GI	1.85 (1.58–2.16)*	1.97 (1.67–2.33)*	1.72 (1.43–2.08)*	Not staged

	Rectal	1.12 (1.06-1.18)*	1.19 (1.13-1.26)*	1.23 (1.16-1.30)*	1.20 (1.13-1.27)*
Respiratory system (lung)	Lung	1 (ref)	1 (ref)	1 (ref)	Staged
	Mesothelioma	1.10 (0.92-1.32)	1.18 (0.98-1.41)	1.23 (1.01-1.50)	Not staged
	Other respiratory system (lung)	0.99 (0.77-1.29)	1.01 (0.78-1.32)	0.86 (0.63-1.18)	Not staged
Sarcoma	Other sarcoma	0.92 (0.69-1.23)	0.90 (0.67-1.22)	0.70 (0.47-1.04)	Not staged
	Soft-tissue sarcoma	1 (ref)	1 (ref)	1 (ref)	Not staged
Skin	Melanoma	0.66 (0.60-0.73)*	0.83 (0.74-0.93)*	0.80 (0.71-0.90)*	Staged
	Non-melanoma skin cancer	1 (ref)	1 (ref)	1 (ref)	Not staged
Upper GI	Biliary tract	1.02 (0.85-1.22)	1.04 (0.87-1.26)	1.02 (0.83-1.24)	Not staged
	Liver	2.81 (2.52-3.14)*	2.81 (2.50-3.16)*	2.61 (2.31-2.96)*	Not staged
	Oesophagus	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Other upper GI	1.04 (0.85-1.27)	1.10 (0.89-1.35)	1.07 (0.86-1.32)	Not staged
	Pancreas	0.97 (0.88-1.07)	1.04 (0.94-1.16)	1.00 (0.90-1.11)	0.97 (0.86-1.08)
	Stomach	1.47 (1.32-1.63)*	1.49 (1.34-1.67)*	1.45 (1.29-1.62)*	1.36 (1.21-1.53)*
Urological (male)	Bladder	0.83 (0.78-0.88)*	1.01 (0.95-1.08)	0.89 (0.83-0.95)*	0.85 (0.79-0.91)*
	Kidney	1.86 (1.75-1.99)*	1.89 (1.76-2.03)*	1.55 (1.44-1.67)*	1.68 (1.56-1.81)*
	Other urological	0.83 (0.66-1.04)	0.55 (0.44-0.70)*	0.46 (0.35-0.59)*	Not staged
	Prostate	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Testis	0.05 (0.03-0.07)*	0.05 (0.03-0.08)*	0.04 (0.02-0.06)*	Not staged
	Urinary tract	3.07 (2.68-3.51)*	3.75 (3.24-4.35)*	3.08 (2.60-3.64)*	Not staged
Urological (female)	Bladder	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Kidney	1.95 (1.71-2.22)*	1.87 (1.62-2.17)*	1.88 (1.61-2.2)*	1.95 (1.65-2.31)*
	Urinary tract	3.19 (2.59-3.93)*	3.39 (2.70-4.25)*	3.83 (3.01-4.87)*	Not staged

*Significant at <0.01 level.

^aOnly a small subsection of cases which contribute to these 'Other' sites are staged within RCRD and so the staged Odds Ratios do not relate to the same ICD10 codes as the other analyses.

^bWhen the original cohort was linked to the RCRD the number of salivary gland patients was below the threshold for combining into Other, due to small number concerns, and so for the RCRD linked analyses 'Other head and neck' also includes 'Salivary gland'

Appendix table 9: Regression analysis for likelihood of waiting over 104 days by characteristic. Results presented for both the original and RCRD linked cohort. The results for the original cohort are presented unadjusted, adjusted for all sites and with in situ breast and NMSC excluded. The results for the RCRD linked cohort are presented unadjusted, with minimal adjustment to align with the original cohort analysis, adjusted but without controlling for stage, and with full adjustment but only for staged sites.

Category		Original cohort			RCRD linked cohort			
		Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs) (all sites)	Adjusted odds ratio (95% CIs) (in situ breast and NMSC excluded)	Unadjusted odds ratio (95% CIs) (all sites)	Adjusted odds ratio (95% CIs) (all sites, minimal adjustment)	Adjusted odds ratio (95% CIs) (all sites, minimal adjustment + comorbidity)	Adjusted odds ratio (95% CIs) (staged sites, full adjustment)
Gender	Female	0.70 (0.68–0.71)*	1.05 (1.02–1.07)*	1.07 (1.04–1.10)*	0.64 (0.63–0.66)*	1.05 (1.02–1.08)*	1.05 (1.02–1.08)*	1.00 (0.97–1.04)
	Male (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Age group	19–49	0.45 (0.43–0.48)*	0.65 (0.62–0.68)*	0.63 (0.60–0.66)*	0.40 (0.38–0.42)*	0.59 (0.56–0.62)*	0.61 (0.57–0.64)*	0.65 (0.61–0.69)*
	50–59	0.81 (0.78–0.84)*	0.87 (0.84–0.91)*	0.87 (0.84–0.90)*	0.80 (0.78–0.83)*	0.89 (0.86–0.92)*	0.91 (0.87–0.94)*	0.91 (0.88–0.95)*
	60–69 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	70–79	0.88 (0.86–0.90)*	0.95 (0.92–0.98)*	0.95 (0.92–0.98)*	0.86 (0.84–0.89)*	0.91 (0.88–0.93)*	0.89 (0.86–0.91)*	0.87 (0.84–0.90)*
	80+	0.66 (0.64–0.68)*	0.92 (0.89–0.95)*	0.87 (0.84–0.90)*	0.67 (0.65–0.69)*	0.85 (0.83–0.88)*	0.81 (0.78–0.84)*	0.8 (0.77–0.83)*
Deprivation quintile	1 – most deprived	1.51 (1.46–1.56)*	1.33 (1.28–1.38)*	1.32 (1.27–1.37)*	1.38 (1.33–1.43)*	1.25 (1.21–1.30)*	1.22 (1.18–1.27)*	1.24 (1.19–1.30)*
	2	1.29 (1.25–1.33)*	1.21 (1.17–1.25)*	1.19 (1.15–1.23)*	1.21 (1.17–1.26)*	1.17 (1.13–1.22)*	1.16 (1.12–1.20)*	1.15 (1.11–1.20)*
	3	1.2 (1.17–1.24)*	1.15 (1.11–1.19)*	1.14 (1.11–1.18)*	1.15 (1.11–1.19)*	1.12 (1.08–1.16)*	1.11 (1.07–1.15)*	1.11 (1.07–1.15)*
	4	1.13 (1.10–1.17)*	1.10 (1.07–1.14)*	1.09 (1.06–1.13)*	1.08 (1.04–1.11)*	1.06 (1.02–1.09)*	1.05 (1.02–1.09)*	1.06 (1.02–1.10)*
	5 – least deprived (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Financial year of start of treatment	Base year (ref) ^a	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	2020/2021	1.74 (1.69–1.80)*	1.93 (1.87–2.00)*	1.91 (1.85–1.98)*	1.33 (1.29–1.37)*	1.46 (1.42–1.51)*	1.47 (1.42–1.52)*	1.48 (1.43–1.54)*
	2021/2022	2.08 (2.02–2.15)*	2.28 (2.21–2.36)*	2.22 (2.15–2.30)*	1.65 (1.60–1.70)*	1.80 (1.74–1.85)*	1.81 (1.75–1.87)*	1.79 (1.73–1.85)*
	Q1 & Q2 2022/2023	3.05 (2.95–3.15)*	3.37 (3.26–3.48)*	3.29 (3.17–3.40)*	2.54 (2.46–2.62)*	2.78 (2.69–2.87)*	2.80 (2.71–2.89)*	2.79 (2.69–2.89)*
Site	Breast	0.19 (0.18–0.20)*	0.18 (0.17–0.19)*	0.16 (0.15–0.17)*	0.16 (0.15–0.17)*	0.16 (0.15–0.17)*	0.16 (0.15–0.17)*	0.14 (0.14–0.15)*
	Gynaecological	0.83 (0.80–0.87)*	0.72 (0.68–0.75)*	0.70 (0.67–0.74)*	0.8 (0.77–0.84)*	0.66 (0.63–0.70)*	0.66 (0.63–0.70)*	0.63 (0.59–0.67)*
	Haematological	0.71 (0.68–0.75)*	0.72 (0.68–0.75)*	0.71 (0.68–0.75)*	0.67 (0.64–0.71)*	0.67 (0.64–0.71)*	0.67 (0.63–0.70)*	1.13 (1.06–1.20)*
	Head and neck	0.80 (0.76–0.84)*	0.66 (0.63–0.70)*	0.66 (0.63–0.69)*	0.75 (0.71–0.79)*	0.61 (0.58–0.64)*	0.60 (0.57–0.63)*	Not staged
	Lower GI	1.25 (1.21–1.29)*	1.24 (1.20–1.28)*	1.24 (1.20–1.28)*	1.18 (1.14–1.21)*	1.15 (1.12–1.19)*	1.15 (1.11–1.19)*	1.13 (1.09–1.17)*

	Other	0.98 (0.91-1.06)	0.89 (0.82-0.97)*	0.89 (0.82-0.97)*	1.05 (0.93-1.17)	0.92 (0.82-1.03)	0.91 (0.81-1.02)	Not staged
	Respiratory system (lung)	0.82 (0.79-0.86)*	0.74 (0.71-0.77)*	0.74 (0.70-0.77)*	0.77 (0.74-0.80)*	0.66 (0.63-0.69)*	0.65 (0.62-0.68)*	0.75 (0.72-0.79)*
	Sarcoma	0.94 (0.85-1.04)	0.81 (0.73-0.90)*	0.81 (0.73-0.90)*	0.94 (0.84-1.06)	0.81 (0.72-0.91)*	0.80 (0.71-0.90)*	Not staged
	Skin	0.17 (0.16-0.17)*	0.16 (0.16-0.17)*	0.12 (0.11-0.13)*	0.15 (0.14-0.16)*	0.15 (0.14-0.16)*	0.15 (0.14-0.16)*	0.09 (0.09-0.10)*
	Upper GI	0.84 (0.81-0.87)*	0.76 (0.73-0.79)*	0.76 (0.72-0.79)*	0.82 (0.78-0.85)*	0.72 (0.69-0.75)*	0.71 (0.68-0.74)*	0.77 (0.73-0.81)*
	Urological (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Stage	1 (ref)							1 (ref)
	2							1.01 (0.97-1.05)
	3							0.88 (0.85-0.91)*
	4							0.40 (0.38-0.42)*
	Unknown							0.70 (0.67-0.72)*
Comorbidity	0 (ref)				1 (ref)		1 (ref)	1 (ref)
	1				1.28 (1.24-1.33)*		1.33 (1.28-1.38)*	1.30 (1.25-1.35)*
	2				1.24 (1.18-1.30)*		1.34 (1.28-1.41)*	1.30 (1.23-1.37)*
	3+				1.18 (1.13-1.24)*		1.36 (1.30-1.44)*	1.33 (1.26-1.41)*

*Significant at the <0.01 level

^aThe base year is 2017/2018 for the original cohort and 2018/2019 for the RCRD linked cohort

Appendix table 10: Median and interquartile range for the intervals in the diagnostic and treatment pathway for patients who waited over 104 days from referral to treatment in each financial year of start of treatment

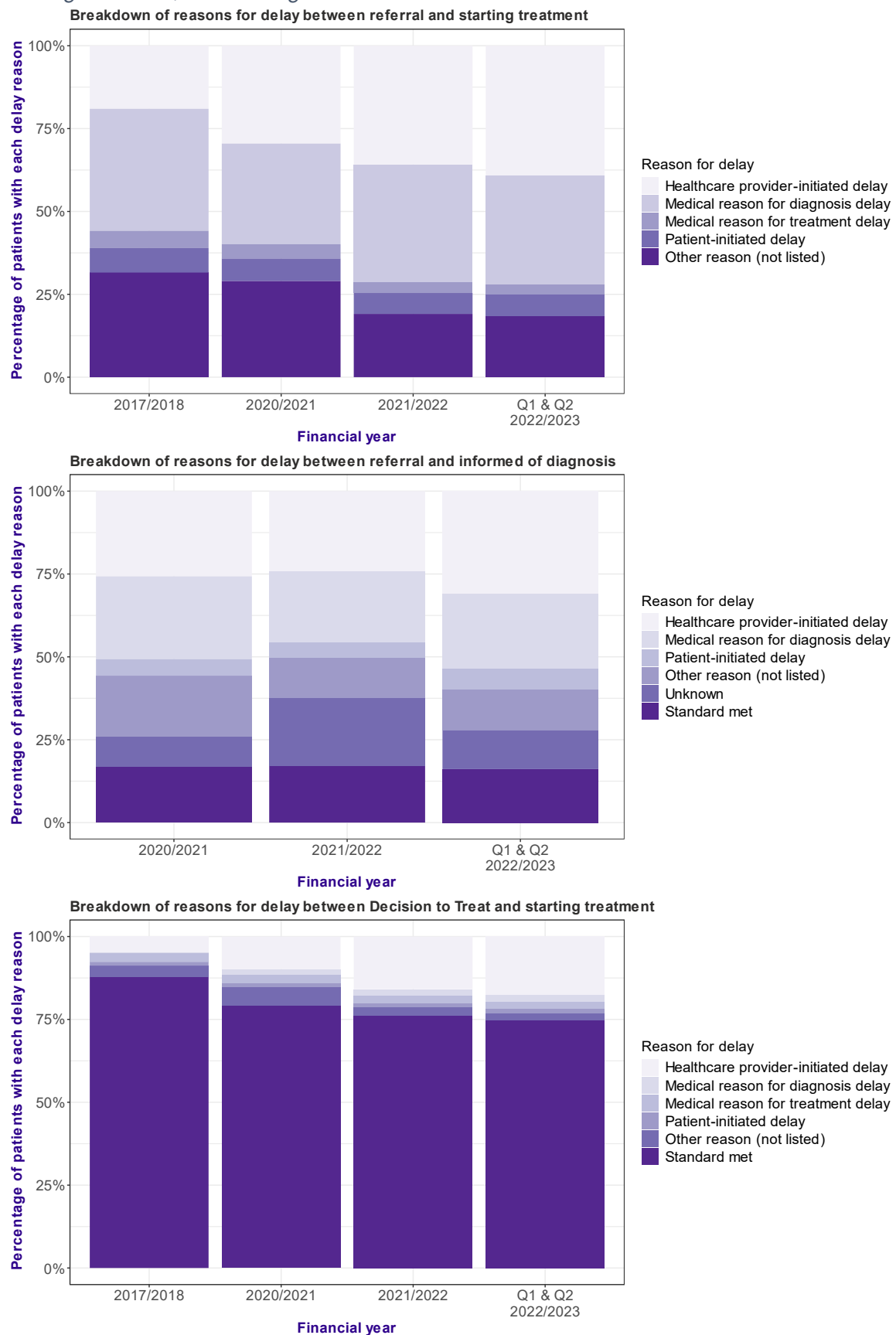
Interval	2017/2018 (Median and IQR)	2020/2021 (Median and IQR)	2021/2022 (Median and IQR)	Q1 & Q2 2022/2023 (Median and IQR)
Referral to first seen	10 (7 - 13)	10 (6 - 13)	11 (7 - 14)	11 (7 - 14)
First seen to informed of diagnosis	Data not available	61 (29 - 96)	56 (28 - 86)	61 (32 - 94)
Informed of diagnosis to decision to treat	Data not available	28 (6 - 59)	34 (10 - 63)	32 (8 - 61)
Decision to treat to treatment start	17 (4 - 28)	18 (2 - 30)	19 (3 - 31)	18 (0 - 31)
Referral to informed of diagnosis	Data not available	73 (42 - 106)	68 (41 - 98)	74 (45 - 106)
Referral to decision to treat	108 (92 - 127)	110 (91 - 134)	108 (90 - 128)	111 (92 - 133)
Referral to treatment start	123 (112 - 143)	128 (114 - 156)	125 (113 - 148)	128 (114 - 152)

Appendix table 11: Breakdown of the reasons for delay in each financial year of start of treatment among patients who waited over 104 days from referral to treatment, with delay overall between referral and treatment, from referral to informed of diagnosis or from decision to treat to treatment

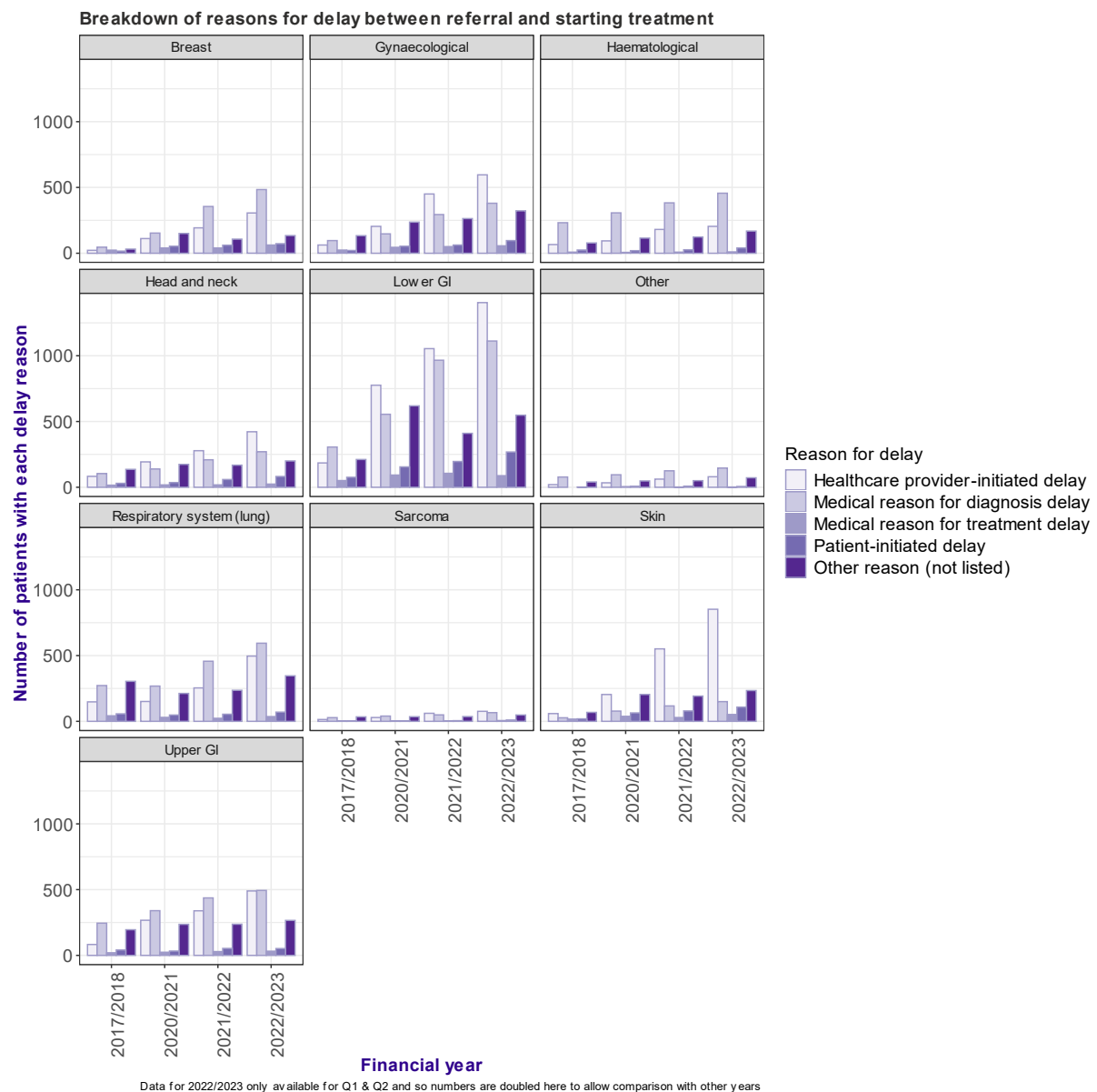
Delay interval	Reason for delay	2017/2018 (Number and %)	2020/2021 (Number and %)	2021/2022 (Number and %)	Q1 & Q2 2022/2023 (Number and %)
Referral to treatment start	Healthcare provider-initiated delay	1,532 (25.1%)	3,464 (33.8%)	5,686 (40.8%)	4,786 (46.9%)
	Medical reason for diagnosis delay	1,807 (29.6%)	2,633 (25.7%)	4,272 (30.6%)	2,646 (25.9%)
	Medical reason for treatment delay	287 (4.7%)	421 (4.1%)	398 (2.9%)	243 (2.4%)
	Patient-initiated delay	523 (8.6%)	701 (6.8%)	880 (6.3%)	654 (6.4%)
	Other reason (not listed)	1,951 (32.0%)	3,034 (29.6%)	2,713 (19.4%)	1,875 (18.4%)
Referral to informed of diagnosis	Healthcare provider-initiated delay	Data not available	1,858 (28.9%)	2,558 (27.3%)	2,748 (38.9%)
	Medical reason for diagnosis delay	Data not available	1,358 (21.1%)	1,773 (18.9%)	1,288 (18.2%)
	Patient-initiated delay	Data not available	319 (5.0%)	442 (4.7%)	433 (6.1%)
	Other reason (not listed)	Data not available	1,325 (20.6%)	1,261 (13.4%)	921 (13.0%)
	No delay (standard met)	Data not available	934 (14.5%)	1,410 (15.0%)	852 (12.1%)
	Unknown	Data not available	627 (9.8%)	1,936 (20.6%)	827 (11.7%)
Decision to treat to treatment start	Healthcare provider-initiated delay	533 (8.7%)	1,191 (11.6%)	2,380 (17.1%)	1,859 (18.2%)
	Medical reason for diagnosis delay	11 (0.2%)	154 (1.5%)	249 (1.8%)	148 (1.5%)
	Medical reason for treatment delay	170 (2.8%)	258 (2.5%)	267 (1.9%)	168 (1.6%)

Delay interval	Reason for delay	2017/2018 (Number and %)	2020/2021 (Number and %)	2021/2022 (Number and %)	Q1 & Q2 2022/2023 (Number and %)
	Patient-initiated delay	68 (1.1%)	101 (1.0%)	137 (1.0%)	115 (1.1%)
	Other reason (not listed)	219 (3.6%)	695 (6.8%)	388 (2.8%)	170 (1.7%)
	No delay (standard met)	5,097 (83.6%)	7,854 (76.6%)	10,528 (75.5%)	7,744 (75.9%)

Appendix figure 1: Graphs showing the reasons for delay, among those waiting over 104 days, between: referral and starting treatment, referral and being informed of a diagnosis and DTT and starting treatment, when urological cancers are excluded



Appendix figure 2: Graph of the number of patients with each reason for delay between referral and starting treatment, among those waiting over 104 days, by financial year of start of treatment and cancer site, excluding urological cancers



Appendix table 12: Breakdown of the original cohort of patients waiting over 62 days from urgent suspected cancer referral to treatment by characteristics, for each financial year of treatment start

Category		Percentage (2017/2018)	Percentage (2020/2021) (p value*)	Percentage (2021/2022) (p value*)	Percentage (Q1 & Q2 2022/2023) (p value*)
Gender	Female	10,190 (38.7%)	16,743 (44.1%)	23,920 (44.9%)	14,203 (42.1%)
	Male	16,110 (61.3%)	21,241 (55.9%)	29,346 (55.1%)	19,560 (57.9%)
			<0.001	<0.001	<0.001
Age group	19-49	1,691 (6.4%)	2,721 (7.2%)	3,989 (7.5%)	2,565 (7.6%)
	50-59	3,784 (14.4%)	5,470 (14.4%)	7,401 (13.9%)	4,695 (13.9%)
	60-69	7,446 (28.3%)	9,434 (24.8%)	12,947 (24.3%)	8,346 (24.7%)
	70-79	8,561 (32.6%)	12,623 (33.2%)	17,865 (33.5%)	11,336 (33.6%)
	80+	4,818 (18.3%)	7,736 (20.4%)	11,064 (20.8%)	6,821 (20.2%)
			<0.001	<0.001	<0.001
Deprivation quintile	1 - most deprived	4,748 (18.1%)	6,662 (17.5%)	8,998 (16.9%)	5,557 (16.5%)
	2	5,039 (19.2%)	7,054 (18.6%)	9,883 (18.6%)	6,125 (18.1%)
	3	5,597 (21.3%)	8,074 (21.3%)	11,304 (21.2%)	7,216 (21.4%)
	4	5,715 (21.7%)	8,309 (21.9%)	11,886 (22.3%)	7,507 (22.2%)
	5 - least deprived	5,201 (19.8%)	7,885 (20.8%)	11,195 (21.0%)	7,358 (21.8%)
			0.012	<0.001	<0.001
Cancer site	Breast	1,421 (5.4%)	3,698 (9.7%)	6,182 (11.6%)	3,870 (11.5%)
	Gynaecological	1,871 (7.1%)	3,229 (8.5%)	4,589 (8.6%)	2,583 (7.7%)
	Haematological	1,482 (5.6%)	1,858 (4.9%)	2,496 (4.7%)	1,438 (4.3%)
	Head and neck	2,139 (8.1%)	2,686 (7.1%)	3,478 (6.5%)	2,064 (6.1%)
	Lower GI	3,866 (14.7%)	7,353 (19.4%)	9,310 (17.5%)	5,172 (15.3%)
	Other	526 (2.0%)	667 (1.8%)	793 (1.5%)	483 (1.4%)
	Respiratory system (lung)	3,305 (12.6%)	2,919 (7.7%)	3,859 (7.2%)	2,489 (7.4%)
	Sarcoma	366 (1.4%)	427 (1.1%)	556 (1.0%)	339 (1.0%)
	Skin	1,275 (4.8%)	2,719 (7.2%)	4,666 (8.8%)	2,900 (8.6%)
	Upper GI	2,548 (9.7%)	3,468 (9.1%)	4,011 (7.5%)	2,290 (6.8%)
	Urological	7,501 (28.5%)	8,960 (23.6%)	13,326 (25.0%)	10,135 (30.0%)
			<0.001	<0.001	<0.001
Modality	Active Monitoring	1,935 (7.4%)	3,106 (8.2%)	4,708 (8.8%)	3,999 (11.8%)
	All treatment declined	54 (0.2%)	102 (0.3%)	195 (0.4%)	133 (0.4%)
	Biological Therapies	146 (0.6%)	263 (0.7%)	436 (0.8%)	246 (0.7%)
	Brachytherapy	183 (0.7%)	74 (0.2%)	46 (0.1%)	33 (0.1%)
	Chemoradiotherapy	1,608 (6.1%)	1,730 (4.6%)	2,144 (4.0%)	1,179 (3.5%)
	Cytotoxic Chemotherapy	4,550 (17.3%)	5,839 (15.4%)	7,977 (15.0%)	4,885 (14.5%)
	Hormone Therapy	2,263 (8.6%)	3,237 (8.5%)	5,080 (9.5%)	3,895 (11.5%)
	Non-Specialist Palliative Care	368 (1.4%)	705 (1.9%)	921 (1.7%)	568 (1.7%)
	Other	233 (0.9%)	402 (1.1%)	582 (1.1%)	340 (1.0%)
	Other Anti-Cancer Drug Regimen	120 (0.5%)	118 (0.3%)	119 (0.2%)	104 (0.3%)
	Specialist Palliative Care	477 (1.8%)	756 (2.0%)	952 (1.8%)	565 (1.7%)
	Surgery	11,936 (45.4%)	18,387 (48.4%)	26,250 (49.3%)	15,610 (46.2%)
	Teletherapy	2,427 (9.2%)	3,265 (8.6%)	3,856 (7.2%)	2,206 (6.5%)
			<0.001	<0.001	<0.001

* p value for chi squared comparison to 2017/2018 distribution

Appendix table 13: Breakdown of the RCRD linked cohort of patients waiting over 62 days from urgent suspected cancer referral to treatment by characteristics, for each financial year of treatment start

Category		Percentage (2018/2019)	Percentage (2020/2021) (p value*)	Percentage (2021/2022) (p value*)	Percentage (Q1 & Q2 2022/2023) (p value*)
Gender	Female	10,998 (35.3%)	14,760 (43.9%)	21,602 (45.1%)	12,942 (41.7%)
	Male	20,200 (64.7%)	18,825 (56.1%)	26,318 (54.9%)	18,079 (58.3%)
			<0.001	<0.001	<0.001
Age group	19-49	1,851 (5.9%)	2,392 (7.1%)	3,556 (7.4%)	2,340 (7.5%)
	50-59	4,634 (14.9%)	4,935 (14.7%)	6,787 (14.2%)	4,419 (14.2%)
	60-69	9,390 (30.1%)	8,567 (25.5%)	12,002 (25.0%)	7,860 (25.3%)
	70-79	10,392 (33.3%)	11,299 (33.6%)	16,347 (34.1%)	10,589 (34.1%)
	80+	4,931 (15.8%)	6,392 (19.0%)	9,228 (19.3%)	5,813 (18.7%)
			<0.001	<0.001	<0.001
Deprivation quintile	1 - most deprived	5,145 (16.5%)	5,901 (17.6%)	8,118 (16.9%)	5,166 (16.7%)
	2	5,884 (18.9%)	6,288 (18.7%)	8,922 (18.6%)	5,670 (18.3%)
	3	6,718 (21.5%)	7,100 (21.1%)	10,193 (21.3%)	6,602 (21.3%)
	4	6,918 (22.2%)	7,352 (21.9%)	10,615 (22.2%)	6,869 (22.1%)
	5 - least deprived	6,533 (20.9%)	6,944 (20.7%)	10,072 (21.0%)	6,714 (21.6%)
			0.009	0.476	0.158
Stage group	1	6,372 (20.4%)	6,207 (18.5%)	9,289 (19.4%)	6,630 (21.4%)
	2	4,652 (14.9%)	5,153 (15.3%)	7,921 (16.5%)	5,108 (16.5%)
	3	6,356 (20.4%)	6,232 (18.6%)	9,081 (19.0%)	6,006 (19.4%)
	4	3,017 (9.7%)	3,425 (10.2%)	4,387 (9.2%)	2,778 (9.0%)
	Not known	5,372 (17.2%)	6,186 (18.4%)	8,330 (17.4%)	5,068 (16.3%)
	Not staged	5,429 (17.4%)	6,382 (19.0%)	8,912 (18.6%)	5,431 (17.5%)
			<0.001**	<0.001**	<0.001**
Comorbidity	0	25,343 (81.2%)	27,109 (80.7%)	39,439 (82.3%)	25,702 (82.9%)
	1	2,925 (9.4%)	3,362 (10.0%)	4,384 (9.1%)	2,584 (8.3%)
	2	1,635 (5.2%)	1,579 (4.7%)	2,021 (4.2%)	1,384 (4.5%)
	3+	1,295 (4.2%)	1,535 (4.6%)	2,076 (4.3%)	1,351 (4.4%)
			<0.001	<0.001	<0.001
Cancer site	Breast	1,803 (5.8%)	3,211 (9.6%)	5,498 (11.5%)	3,498 (11.3%)
	Gynaecological	2,153 (6.9%)	2,947 (8.8%)	4,286 (8.9%)	2,418 (7.8%)
	Haematological	1,558 (5.0%)	1,654 (4.9%)	2,284 (4.8%)	1,340 (4.3%)
	Head and neck	2,214 (7.1%)	2,378 (7.1%)	3,132 (6.5%)	1,899 (6.1%)
	Lower GI	4,246 (13.6%)	6,821 (20.3%)	8,801 (18.4%)	4,960 (16.0%)
	Other	263 (0.8%)	280 (0.8%)	353 (0.7%)	235 (0.8%)
	Respiratory system (lung)	3,097 (9.9%)	2,734 (8.1%)	3,674 (7.7%)	2,407 (7.8%)
	Sarcoma	302 (1.0%)	331 (1.0%)	433 (0.9%)	270 (0.9%)
	Skin	1,073 (3.4%)	1,752 (5.2%)	3,037 (6.3%)	1,924 (6.2%)
	Upper GI	2,703 (8.7%)	3,259 (9.7%)	3,763 (7.9%)	2,191 (7.1%)
	Urological	11,786 (37.8%)	8,218 (24.5%)	12,659 (26.4%)	9,879 (31.8%)
			<0.001	<0.001	<0.001
Modality	Active Monitoring	3,040 (9.7%)	2,784 (8.3%)	4,410 (9.2%)	3,901 (12.6%)
	All treatment declined	38 (0.1%)	87 (0.3%)	169 (0.4%)	113 (0.4%)

Biological Therapies	180 (0.6%)	232 (0.7%)	401 (0.8%)	231 (0.7%)
Brachytherapy	265 (0.8%)	69 (0.2%)	42 (0.1%)	32 (0.1%)
Chemoradiotherapy	1,661 (5.3%)	1,596 (4.8%)	1,966 (4.1%)	1,117 (3.6%)
Cytotoxic Chemotherapy	4,775 (15.3%)	5,365 (16.0%)	7,458 (15.6%)	4,581 (14.8%)
Hormone Therapy	4,003 (12.8%)	3,036 (9.0%)	4,899 (10.2%)	3,839 (12.4%)
Non-Specialist Palliative Care	354 (1.1%)	601 (1.8%)	830 (1.7%)	527 (1.7%)
Other	317 (1.0%)	349 (1.0%)	522 (1.1%)	306 (1.0%)
Other Anti-Cancer Drug Regimen	105 (0.3%)	102 (0.3%)	110 (0.2%)	99 (0.3%)
Specialist Palliative Care	495 (1.6%)	662 (2.0%)	849 (1.8%)	520 (1.7%)
Surgery	13,450 (43.1%)	15,774 (47.0%)	22,761 (47.5%)	13,770 (44.4%)
Teletherapy	2,515 (8.1%)	2,928 (8.7%)	3,503 (7.3%)	1,985 (6.4%)
		<0.001	<0.001	<0.001

* p value for chi-squared comparison to 2018/2019 distribution

** p value for chi-squared comparison only among those where stage was known

Appendix table 14: The percentage of patients waiting over 62 days from urgent suspected cancer referral to treatment among the full original cohort by characteristics, for each financial year of start of treatment

Category		Percentage (2017/2018)	Percentage (2020/2021)	Percentage (2021/2022)	Percentage (Q1 & Q2 2022/2023)
Total	Total	17.8%	25.9%	31.4%	38.4%
Gender	Female	15.0%	24.2%	31.1%	36.6%
	Male	20.1%	27.3%	31.7%	39.9%
Age group	19-49	12.4%	20.2%	27.5%	34.4%
	50-59	20.1%	28.4%	34.4%	41.4%
	60-69	22.5%	30.6%	36.7%	44.3%
	70-79	19.1%	27.8%	33.3%	40.6%
	80+	12.9%	20.5%	24.9%	30.5%
Deprivation quintile	1 - most deprived	20.1%	30.3%	35.8%	42.6%
	2	18.8%	27.1%	32.9%	39.4%
	3	18.1%	26.1%	31.5%	39.0%
	4	17.3%	24.9%	30.5%	37.3%
	5 - least deprived	15.6%	22.9%	28.4%	35.6%
Cancer site	Breast	6.3%	15.5%	23.8%	29.2%
	Gynaecological	21.9%	38.3%	49.6%	57.5%
	Haematological	20.3%	25.9%	32.3%	36.9%
	Head and neck	34.3%	40.5%	46.8%	54.7%
	Lower GI	27.2%	49.5%	52.0%	57.7%
	Other	28.2%	34.9%	40.7%	47.6%
	Respiratory system (lung)	27.8%	32.3%	38.6%	48.0%
	Sarcoma	31.4%	35.4%	43.9%	54.2%
	Skin	4.3%	7.9%	11.9%	15.0%
	Upper GI	26.1%	35.5%	40.0%	45.5%
	Urological	21.6%	30.2%	34.4%	45.4%
Modality	Active Monitoring	16.6%	26.8%	29.2%	40.6%
	All treatment declined	34.6%	31.3%	43.9%	46.5%
	Biological Therapies	37.1%	42.0%	54.5%	62.1%
	Brachytherapy	83.9%	89.2%	80.7%	82.5%
	Chemoradiotherapy	48.0%	59.2%	68.8%	76.6%
	Cytotoxic Chemotherapy	25.6%	34.6%	43.1%	51.3%
	Hormone Therapy	12.3%	19.2%	25.0%	34.5%
	Non-Specialist Palliative Care	11.8%	19.5%	23.1%	28.7%
	Other	21.6%	26.0%	32.5%	39.0%
	Other Anti-Cancer Drug Regimen	24.1%	27.1%	30.5%	43.7%
	Specialist Palliative Care	9.6%	16.1%	19.5%	23.1%
	Surgery	14.7%	22.5%	28.2%	33.6%
	Teletherapy	48.3%	57.3%	66.3%	73.4%

Appendix table 15: The percentage of patients waiting over 62 days from urgent suspected cancer referral to treatment among the full RCRD linked cohort by characteristics, for each financial year of start of treatment

Category		Percentage (2018/2019)	Percentage (2020/2021)	Percentage (2021/2022)	Percentage (Q1 & Q2 2022/2023)
Total	Total	21.4%	26.2%	32.0%	39.5%
Gender	Female	16.9%	24.0%	31.2%	37.1%
	Male	25.0%	28.3%	32.7%	41.5%
Age group	19-49	13.8%	19.1%	26.3%	33.6%
	50-59	23.7%	27.7%	33.9%	41.3%
	60-69	27.7%	30.2%	36.6%	44.5%
	70-79	22.6%	28.2%	33.9%	41.8%
	80+	15.0%	21.8%	26.2%	32.5%
Deprivation quintile	1 - most deprived	22.5%	30.0%	35.8%	43.2%
	2	22.3%	27.3%	33.3%	40.5%
	3	21.8%	26.3%	32.1%	40.0%
	4	21.0%	25.3%	31.1%	38.4%
	5 - least deprived	19.9%	23.5%	29.3%	37.0%
Stage group	1	22.7%	27.6%	32.2%	39.8%
	2	21.6%	26.5%	33.4%	40.2%
	3	30.1%	36.6%	43.2%	52.5%
	4	18.9%	23.9%	27.6%	35.0%
	Not staged	17.6%	20.1%	25.9%	32.2%
	Not known	19.0%	26.7%	32.4%	39.2%
Comorbidity	0	21.4%	25.9%	31.9%	39.4%
	1	22.3%	28.4%	34.1%	41.0%
	2	21.2%	27.6%	32.5%	40.8%
	3+	18.9%	25.6%	30.0%	36.8%
Cancer site	Breast	8.1%	14.5%	22.9%	28.5%
	Gynaecological	25.2%	37.6%	49.0%	56.9%
	Haematological	22.3%	24.9%	31.6%	36.6%
	Head and neck	36.3%	39.6%	46.4%	54.4%
	Lower GI	29.5%	48.7%	51.5%	57.3%
	Other	29.5%	32.4%	39.7%	50.1%
	Respiratory system (lung)	27.6%	31.5%	38.2%	48.0%
	Sarcoma	33.4%	33.8%	43.0%	53.6%
	Skin	4.6%	7.5%	11.1%	14.1%
	Upper GI	29.0%	35.0%	39.4%	45.1%
	Urological	28.3%	29.1%	33.8%	45.4%
Modality	Active Monitoring	22.3%	25.6%	28.5%	40.9%
	All treatment declined	25.9%	30.1%	42.1%	44.0%
	Biological Therapies	37.4%	40.7%	53.8%	62.4%
	Brachytherapy	91.4%	89.6%	79.2%	82.1%
	Chemoradiotherapy	51.2%	59.3%	68.2%	76.8%
	Cytotoxic Chemotherapy	28.1%	33.8%	42.6%	50.8%

	Hormone Therapy	18.5%	18.8%	24.8%	34.8%
	Non-Specialist Palliative Care	11.8%	18.3%	22.5%	28.7%
	Other	21.8%	25.3%	32.1%	38.5%
	Other Anti-Cancer Drug Regimen	25.4%	25.3%	30.1%	43.2%
	Specialist Palliative Care	11.0%	15.6%	19.1%	23.1%
	Surgery	17.9%	23.5%	29.4%	35.3%
	Teletherapy	53.2%	56.7%	66.2%	73.4%

Appendix table 16: The number and percentage breakdown of patients waiting over 62 days from referral to treatment by specific site within each broad site, and the percentage of all patients in the full cohort who waited over 62 days, in the latest full year (2021/2022) and in Q1&Q2 2022/2023

CWT Site	Specific site	Number waiting over 62 days (2021/2022) and % of those waiting over 62 days	Number waiting over 62 days (Q1&Q2 2022/2023) and % of those waiting over 62 days	% of all patients waiting over 62 days (2021/2022)	% of all patients waiting over 62 days (Q1&Q2 2022/2023)
Breast	Breast	5,664 (91.6%)	3,602 (93.1%)	23.0%	28.5%
	In situ breast	518 (8.4%)	268 (6.9%)	39.6%	42.9%
Gynaecological	Cervix	454 (9.9%)	240 (9.3%)	61.8%	65.8%
	Other gynaecological	166 (3.6%)	97 (3.8%)	56.8%	65.1%
	Ovary	874 (19.0%)	491 (19.0%)	39.8%	47.4%
	Uterus	2,799 (61.0%)	1,590 (61.6%)	51.5%	59.7%
	Vulva	296 (6.5%)	165 (6.4%)	49.4%	58.3%
Haematological	Chronic Lymphoid Leukaemia (CLL)	130 (5.2%)	78 (5.4%)	16.2%	19.0%
	Diffuse large B cell lymphoma (DLBCL)	546 (21.9%)	314 (21.8%)	39.8%	44.8%
	Follicular lymphoma	521 (20.9%)	246 (17.1%)	51.3%	52.0%
	Hodgkin lymphoma	383 (15.3%)	212 (14.7%)	46.4%	54.5%
	Myeloma	249 (10.0%)	177 (12.3%)	16.6%	21.7%
	Other haematological	178 (7.1%)	108 (7.5%)	20.2%	24.7%
	Other non-Hodgkin lymphoma	489 (19.6%)	303 (21.1%)	36.8%	45.5%
Head and neck	Larynx	594 (17.1%)	363 (17.6%)	53.7%	60.3%
	Oral cavity	733 (21.1%)	453 (21.9%)	42.9%	51.8%
	Oropharynx	1,059 (30.4%)	626 (30.3%)	44.3%	51.7%
	Other head and neck	284 (8.2%)	190 (9.2%)	40.6%	52.3%
	Salivary glands	214 (6.2%)	115 (5.6%)	62.2%	69.7%
	Thyroid	594 (17.1%)	317 (15.4%)	50.3%	57.2%
Lower GI	Anus	498 (5.3%)	234 (4.5%)	68.7%	72.2%
	Colon	5,014 (53.9%)	2,796 (54.1%)	47.0%	51.7%
	Other lower GI	162 (1.7%)	111 (2.1%)	56.1%	67.7%
	Rectal	3,636 (39.1%)	2,031 (39.3%)	58.5%	66.2%
Other	Cancer of unknown primary	613 (77.3%)	380 (78.7%)	41.6%	49.6%
	Other	180 (22.7%)	103 (21.3%)	37.9%	41.4%
Respiratory system (lung)	Lung	3,668 (95.1%)	2,355 (94.6%)	38.8%	48.1%
	Mesothelioma	138 (3.6%)	91 (3.7%)	37.1%	47.9%
	Other respiratory system (lung)	53 (1.4%)	43 (1.7%)	30.3%	42.2%
Sarcoma	Other sarcoma	84 (15.1%)	57 (16.8%)	43.8%	54.8%
	Soft-tissue sarcoma	472 (84.9%)	282 (83.2%)	43.9%	54.0%
Skin	Melanoma	1,000 (21.4%)	679 (23.4%)	9.0%	11.1%
	Non-melanoma skin cancer	3,666 (78.6%)	2,221 (76.6%)	13.0%	16.8%
Upper GI	Biliary tract	139 (3.5%)	87 (3.8%)	27.4%	39.7%
	Liver	376 (9.4%)	229 (10.0%)	48.2%	55.9%
	Oesophagus	2,003 (49.9%)	1,142 (49.9%)	44.0%	48.7%
	Other upper GI	131 (3.3%)	63 (2.8%)	32.8%	32.1%
	Pancreas	722 (18.0%)	417 (18.2%)	30.1%	34.8%

	Stomach	640 (16.0%)	352 (15.4%)	46.3%	52.4%
Urological	Bladder	1,649 (12.4%)	986 (9.7%)	31.6%	39.6%
	Kidney	1,678 (12.6%)	1,014 (10.0%)	52.1%	60.9%
	Other urological	111 (0.8%)	57 (0.6%)	37.9%	37.5%
	Prostate	9,544 (71.6%)	7,880 (77.8%)	33.7%	45.9%
	Testis	25 (0.2%)	24 (0.2%)	2.1%	4.0%
	Urinary tract	319 (2.4%)	174 (1.7%)	62.1%	67.4%

Appendix table 17: Table of the likelihood of waiting over 62 days for each specific site in a regression model looking at the CWT site groupings. Odds ratios are presented for the original cohort unadjusted and adjusted for gender, age group, deprivation and financial year. Odds ratios for the RCRD linked cohort are presented for all sites adjusted for gender, age group, deprivation, comorbidity and financial year and for staged sites with full adjustment.

CWT site	Specific site	Original cohort		RCRD linked cohort	
		Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs) (all sites, minimal adjustment + comorbidity)	Adjusted odds ratio (95% CIs) (staged sites, full adjustment)
Breast	Breast	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	In situ breast	2.26 (2.11–2.42)*	2.33 (2.16–2.52)*	Not included in cohort	Not included in cohort
Gynaecological	Cervix	1.33 (1.22–1.44)*	1.53 (1.38–1.68)*	1.55 (1.40–1.71)*	Not staged
	Other gynaecological	1.36 (1.19–1.55)*	1.25 (1.08–1.45)*	1.40 (1.20–1.64)*	0.91 (0.73–1.13) ^a
	Ovary	0.67 (0.63–0.71)*	0.63 (0.59–0.67)*	0.63 (0.59–0.67)*	0.58 (0.54–0.63)*
	Uterus	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Vulva	0.98 (0.89–1.08)	0.80 (0.72–0.89)*	0.81 (0.73–0.90)*	Not staged
Haematological	Chronic Lymphoid Leukaemia (CLL)	0.30 (0.27–0.34)*	0.28 (0.25–0.32)*	0.28 (0.24–0.32)*	Not staged
	Diffuse large B cell lymphoma (DLBCL)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Follicular lymphoma	1.63 (1.49–1.78)*	1.68 (1.52–1.84)*	1.81 (1.64–2.00)*	1.83 (1.66–2.02)*
	Hodgkin lymphoma	1.46 (1.33–1.61)*	1.73 (1.55–1.93)*	1.75 (1.56–1.96)*	1.75 (1.56–1.97)*
	Myeloma	0.33 (0.30–0.37)*	0.30 (0.27–0.33)*	0.29 (0.26–0.32)*	Not staged
	Other haematological	0.42 (0.37–0.47)*	0.39 (0.35–0.44)*	0.38 (0.34–0.43)*	1.15 (0.97–1.37) ^a
	Other non-Hodgkin lymphoma	1.04 (0.95–1.13)	0.99 (0.90–1.08)	0.95 (0.86–1.05)	0.98 (0.89–1.08)
Head and neck	Larynx	1.28 (1.18–1.38)*	1.29 (1.19–1.41)*	1.33 (1.22–1.45)*	Not staged
	Oral cavity	0.84 (0.79–0.91)*	0.86 (0.79–0.93)*	0.83 (0.76–0.90)*	Not staged
	Oropharynx	1 (ref)	1 (ref)	1 (ref)	Not staged
	Other head and neck	1.04 (0.95–1.14)	1.09 (0.99–1.20)	1.18 (1.08–1.29)* ^b	Not staged
	Salivary glands	1.57 (1.38–1.79)*	1.76 (1.53–2.02)*	Not included ^b	Not staged
	Thyroid	1.17 (1.08–1.27)*	1.31 (1.20–1.45)*	1.25 (1.14–1.38)*	Not staged
Lower GI	Anus	2.31 (2.11–2.52)*	2.60 (2.36–2.87)*	2.76 (2.50–3.05)*	Not staged
	Colon	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Other lower GI	1.40 (1.23–1.59)*	1.43 (1.25–1.64)*	1.49 (1.29–1.72)*	Not staged

	Rectal	1.48 (1.43-1.53)*	1.55 (1.49-1.61)*	1.59 (1.52-1.65)*	1.58 (1.52-1.65)*
Respiratory system (lung)	Lung	1 (ref)	1 (ref)	1 (ref)	Staged
	Mesothelioma	0.88 (0.78-0.98)	0.94 (0.83-1.06)	0.89 (0.78-1.01)	Not staged
	Other respiratory system (lung)	0.79 (0.67-0.93)*	0.77 (0.65-0.91)*	0.74 (0.61-0.89)*	Not staged
Sarcoma	Other sarcoma	1.02 (0.86-1.22)	1.06 (0.88-1.29)	0.92 (0.73-1.17)	Not staged
	Soft-tissue sarcoma	1 (ref)	1 (ref)	1 (ref)	Not staged
Skin	Melanoma	0.66 (0.63-0.69)*	0.78 (0.74-0.83)*	0.79 (0.75-0.84)*	Staged
	Non-melanoma skin cancer	1 (ref)	1 (ref)	1 (ref)	Not staged
Upper GI	Biliary tract	0.50 (0.44-0.56)*	0.50 (0.44-0.56)*	0.47 (0.42-0.54)*	Not staged
	Liver	1.28 (1.18-1.39)*	1.35 (1.23-1.47)*	1.21 (1.11-1.33)*	Not staged
	Oesophagus	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Other upper GI	0.60 (0.53-0.68)*	0.64 (0.56-0.73)*	0.66 (0.58-0.75)*	Not staged
	Pancreas	0.57 (0.54-0.61)*	0.60 (0.56-0.64)*	0.59 (0.55-0.63)*	0.64 (0.60-0.68)*
	Stomach	1.04 (0.98-1.11)	1.07 (0.99-1.15)	1.08 (1.00-1.16)	1.10 (1.02-1.19)
Urological (male)	Bladder	0.58 (0.56-0.61)*	0.70 (0.66-0.73)*	0.60 (0.57-0.63)*	0.56 (0.53-0.58)*
	Kidney	1.83 (1.74-1.92)*	2.02 (1.91-2.14)*	1.77 (1.68-1.88)*	1.89 (1.79-2.00)*
	Other urological	0.95 (0.83-1.10)	0.66 (0.56-0.77)*	0.58 (0.49-0.68)*	Not staged
	Prostate	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Testis	0.04 (0.04-0.05)*	0.04 (0.03-0.05)*	0.03 (0.02-0.04)*	Not staged
	Urinary tract	2.71 (2.40-3.06)*	3.73 (3.26-4.26)*	2.96 (2.56-3.42)*	Not staged
Urological (female)	Bladder	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Kidney	2.63 (2.40-2.88)*	2.66 (2.39-2.96)*	2.78 (2.49-3.11)*	2.85 (2.53-3.20)*
	Urinary tract	3.65 (3.08-4.33)*	4.16 (3.44-5.03)*	5.09 (4.16-6.22)*	Not staged

*Significant at <0.01 level.

^a Only a small subsection of cases which contribute to these 'Other' sites are staged within RCRD and so the staged Odds Ratios do not relate to the same ICD10 codes as the other analyses.

^b When the original cohort was linked to RCRD the number of salivary gland patients was below the threshold for combining into Other, due to small number concerns, and so for the RCRD linked analyses 'Other head and neck' also includes 'Salivary gland'

Appendix table 18: Regression analysis for likelihood of waiting over 62 days by characteristic. Results presented for both the original and RCRD linked cohort. The results for the original cohort are presented unadjusted, adjusted for all sites and with in situ breast cancer and NMSC excluded. The results for the RCRD linked cohort are presented unadjusted, with minimal adjustment to align with the original cohort analysis, adjusted but without controlling for stage, and with full adjustment but only for staged sites.

Category		Original cohort			RCRD linked cohort			
		Unadjusted odds ratio	Adjusted odds ratio (95% CIs) (all sites)	Adjusted odds ratio (95% CIs) (in situ breast and NMSC excluded)	Unadjusted odds ratio (95% CIs) (all sites)	Adjusted odds ratio (95% CIs) (all sites, minimal adjustment)	Adjusted odds ratio (95% CIs) (all sites, minimal adjustment + comorbidity)	Adjusted odds ratio (95% CIs) (staged sites, full adjustment)
Gender	Female	0.86 (0.85-0.87)*	0.99 (0.97-1.00)	1.03 (1.01-1.04)*	0.80 (0.79-0.81)*	0.99 (0.97-1.01)	0.99 (0.98-1.01)	0.96 (0.94-0.98)*
	Male (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Age group	19-49	0.60 (0.59-0.62)*	0.75 (0.73-0.77)*	0.73 (0.71-0.75)*	0.55 (0.54-0.57)*	0.71 (0.69-0.73)*	0.72 (0.70-0.74)*	0.83 (0.81-0.86)*
	50-59	0.90 (0.88-0.92)*	0.92 (0.90-0.94)*	0.91 (0.89-0.93)*	0.87 (0.85-0.89)*	0.91 (0.89-0.93)*	0.91 (0.89-0.93)*	0.91 (0.89-0.94)*
	60-69 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	70-79	0.87 (0.85-0.88)*	0.94 (0.92-0.95)*	0.93 (0.92-0.95)*	0.87 (0.85-0.88)*	0.91 (0.89-0.93)*	0.9 (0.89-0.92)*	0.89 (0.87-0.91)*
	80+	0.57 (0.56-0.58)*	0.76 (0.74-0.77)*	0.67 (0.66-0.69)*	0.59 (0.58-0.60)*	0.70 (0.69-0.72)*	0.69 (0.68-0.70)*	0.64 (0.63-0.66)*
Deprivation quintile	1 - most deprived	1.36 (1.34-1.39)*	1.15 (1.12-1.17)*	1.13 (1.10-1.16)*	1.29 (1.26-1.31)*	1.10 (1.08-1.13)*	1.09 (1.07-1.12)*	1.09 (1.06-1.12)*
	2	1.21 (1.19-1.24)*	1.11 (1.09-1.13)*	1.10 (1.07-1.12)*	1.18 (1.16-1.20)*	1.10 (1.07-1.12)*	1.09 (1.07-1.12)*	1.09 (1.06-1.11)*
	3	1.16 (1.14-1.18)*	1.1 (1.08-1.12)*	1.09 (1.06-1.11)*	1.13 (1.11-1.16)*	1.08 (1.06-1.10)*	1.07 (1.05-1.10)*	1.07 (1.05-1.09)*
	4	1.10 (1.08-1.12)*	1.06 (1.04-1.08)*	1.05 (1.03-1.07)*	1.08 (1.06-1.10)*	1.04 (1.02-1.06)*	1.04 (1.02-1.06)*	1.04 (1.02-1.06)*
	5 - least deprived (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Financial year of start of treatment	Base year (ref) ^a	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	2020/2021	1.61 (1.58-1.64)*	1.82 (1.78-1.85)*	1.82 (1.79-1.86)*	1.30 (1.28-1.33)*	1.42 (1.39-1.45)*	1.42 (1.39-1.45)*	1.47 (1.44-1.51)*
	2021/2022	2.12 (2.08-2.15)*	2.47 (2.43-2.52)*	2.43 (2.39-2.48)*	1.73 (1.70-1.76)*	1.95 (1.91-1.98)*	1.95 (1.92-1.99)*	1.99 (1.95-2.03)*
	Q1 & Q2 2022/2023	2.88 (2.83-2.94)*	3.50 (3.43-3.57)*	3.47 (3.40-3.55)*	2.4 (2.35-2.45)*	2.80 (2.74-2.86)*	2.81 (2.75-2.87)*	2.89 (2.82-2.95)*
Site	Breast	0.46 (0.45-0.47)*	0.46 (0.45-0.47)*	0.43 (0.41-0.44)*	0.43 (0.42-0.44)*	0.42 (0.41-0.44)*	0.42 (0.41-0.44)*	0.38 (0.37-0.39)*
	Gynaecological	1.43 (1.39-1.47)*	1.33 (1.29-1.37)*	1.28 (1.24-1.32)*	1.37 (1.33-1.40)*	1.23 (1.19-1.27)*	1.23 (1.19-1.27)*	1.14 (1.10-1.18)*
	Haematological	0.83 (0.80-0.85)*	0.85 (0.82-0.88)*	0.84 (0.81-0.87)*	0.79 (0.76-0.81)*	0.79 (0.77-0.82)*	0.79 (0.77-0.82)*	1.38 (1.33-1.44)*
	Head and neck	1.62 (1.58-1.67)*	1.40 (1.36-1.44)*	1.38 (1.34-1.42)*	1.54 (1.50-1.59)*	1.30 (1.26-1.34)*	1.30 (1.26-1.34)*	Not staged
	Lower GI	1.82 (1.79-1.86)*	1.96 (1.92-2.01)*	1.96 (1.91-2.00)*	1.72 (1.69-1.76)*	1.82 (1.78-1.86)*	1.82 (1.78-1.86)*	1.73 (1.68-1.77)*

	Other	1.24 (1.18-1.30)*	1.19 (1.13-1.26)*	1.18 (1.12-1.25)*	1.16 (1.08-1.25)*	1.08 (1.00-1.16)	1.07 (0.99-1.16)	Not staged
	Respiratory system (lung)	1.15 (1.12-1.17)*	1.08 (1.05-1.11)*	1.07 (1.04-1.10)*	1.07 (1.05-1.10)*	0.97 (0.94-0.99)	0.96 (0.93-0.99)*	1.11 (1.07-1.14)*
	Sarcoma	1.40 (1.32-1.49)*	1.28 (1.20-1.37)*	1.28 (1.19-1.37)*	1.32 (1.23-1.42)*	1.20 (1.11-1.29)*	1.19 (1.11-1.29)*	Not staged
	Skin	0.22 (0.22-0.23)*	0.22 (0.22-0.23)*	0.15 (0.14-0.16)*	0.20 (0.19-0.20)*	0.20 (0.19-0.20)*	0.19 (0.19-0.20)*	0.12 (0.12-0.13)*
	Upper GI	1.19 (1.16-1.22)*	1.13 (1.10-1.17)*	1.13 (1.10-1.16)*	1.15 (1.12-1.18)*	1.07 (1.04-1.10)*	1.06 (1.03-1.09)*	1.24 (1.21-1.28)*
	Urological (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Stage	1 (ref)							1 (ref)
	2							1.06 (1.04-1.09)*
	3							1.06 (1.04-1.08)*
	4							0.49 (0.47-0.50)*
	Unknown							0.74 (0.73-0.76)*
Comorbidity	0 (ref)				1 (ref)		1 (ref)	1 (ref)
	1				1.07 (1.05-1.10)*		1.14 (1.12-1.17)*	1.12 (1.09-1.15)*
	2				1.01 (0.98-1.04)		1.14 (1.11-1.18)*	1.10 (1.06-1.14)*
	3+				0.91 (0.88-0.94)*		1.11 (1.07-1.15)*	1.05 (1.01-1.09)

*Significant at the <0.01 level.

^a The base year is 2017/2018 for the original cohort and 2018/2019 for the RCRD linked cohort

Appendix table 19: Median and interquartile range for the intervals in the diagnostic and treatment pathway for patients who waited over 62 days from referral to treatment in each financial year of start of treatment

Interval	2017/2018 (Median and IQR)	2020/2021 (Median and IQR)	2021/2022 (Median and IQR)	Q1 & Q2 2022/2023 (Median and IQR)
Referral to first seen	10 (7 - 13)	10 (6 - 13)	11 (7 - 14)	11 (7 - 14)
First seen to informed of diagnosis	Data not available	35 (16 - 59)	34 (15 - 57)	38 (16 - 63)
Informed of diagnosis to decision to treat	Data not available	20 (2 - 37)	21 (1 - 39)	21 (0 - 40)
Decision to treat to treatment start	14 (3 - 24)	15 (3 - 26)	16 (2 - 26)	15 (0 - 26)
Referral to informed of diagnosis	Data not available	46 (28 - 70)	46 (28 - 69)	50 (30 - 75)
Referral to decision to treat	71 (58 - 89)	70 (56 - 90)	70 (56 - 90)	73 (58 - 95)
Referral to treatment start	84 (73 - 103)	85 (72 - 107)	85 (73 - 106)	88 (74 - 111)

Appendix table 20: Breakdown of the reasons for delay in each financial year of start of treatment among patients who waited over 62 days from referral to treatment, with delay overall between referral and treatment, from referral to informed of diagnosis or from decision to treat to treatment

Delay interval	Reason for delay	2017/2018 (Number and %)	2020/2021 (Number and %)	2021/2022 (Number and %)	Q1 & Q2 2022/2023 (Number and %)
Referral to treatment start	Healthcare provider-initiated delay	7,916 (30.1%)	15,244 (40.1%)	25,671 (48.2%)	17,657 (52.3%)
	Medical reason for diagnosis delay	6,517 (24.8%)	9,252 (24.4%)	13,382 (25.1%)	7,590 (22.5%)
	Medical reason for treatment delay	~1250	1,361 (3.6%)	1,313 (2.5%)	686 (2.0%)
	Patient-initiated delay	2,362 (9.0%)	2,312 (6.1%)	3,315 (6.2%)	2,131 (6.3%)
	Other reason (not listed)	8,255 (31.4%)	9,806 (25.8%)	9,580 (18.0%)	5,690 (16.9%)
	Unknown	<5	9 (0.0%)	5 (0.0%)	9 (0.0%)
Referral to informed of diagnosis	Healthcare provider-initiated delay	Data not available	6,959 (26.9%)	10,312 (26.8%)	8,650 (35.5%)
	Medical reason for diagnosis delay	Data not available	4,791 (18.5%)	5,686 (14.8%)	3,672 (15.1%)
	Patient-initiated delay	Data not available	941 (3.6%)	1,464 (3.8%)	1,162 (4.8%)
	Other reason (not listed)	Data not available	4,224 (16.4%)	4,250 (11.0%)	2,999 (12.3%)
	No delay (standard met)	Data not available	6,607 (25.6%)	9,956 (25.9%)	5,674 (23.3%)
	Unknown	Data not available	2,308 (8.9%)	6,817 (17.7%)	2,210 (9.1%)
Decision to treat to treatment start	Healthcare provider-initiated delay	1,302 (5.0%)	2,899 (7.6%)	5,973 (11.2%)	4,107 (12.2%)
	Medical reason for diagnosis delay	~30	317 (0.8%)	520 (1.0%)	275 (0.8%)

Delay interval	Reason for delay	2017/2018 (Number and %)	2020/2021 (Number and %)	2021/2022 (Number and %)	Q1 & Q2 2022/2023 (Number and %)
	Medical reason for treatment delay	497 (1.9%)	553 (1.5%)	602 (1.1%)	319 (0.9%)
	Patient-initiated delay	157 (0.6%)	~265	~315	~220
	Other reason (not listed)	528 (2.0%)	1,379 (3.6%)	757 (1.4%)	348 (1.0%)
	No delay (standard met)	23,784 (90.4%)	32,573 (85.8%)	45,099 (84.7%)	28,494 (84.4%)
	Unknown	<5	<5	<5	<5