

Supplementary analysis for patients starting treatment for respiratory system (lung) cancer

Patients waiting over 104 days from urgent suspected cancer referral to starting treatment for respiratory system (lung) cancer

There was no significant variation by gender for lung cancer (Table 1). Those aged 19–49 were less likely and those aged 70–79 more likely to be long waiters compared to those aged 60–69 in the original analysis for lung cancer, although this association was not significant in the rapid cancer registration dataset (RCRD) linked cohort with adjustment for stage and comorbidity. A slight deprivation gradient was seen for those with lung cancer in the original analysis, but this was not significant for the RCRD linked cohort. There was a large reduction in the likelihood of being a long waiter with increasing stage for lung cancer (those diagnosed at stage 4 had adjusted odds ratio (AOR) of 0.23 compared to those diagnosed at stage 1). Those with a comorbidity score of 1 or 3+ were more likely to be long waiters for lung cancer compared to those with a score of 0. There was an increase in the likelihood of being a long waiter by financial year with AOR of 2.35 for Q1 & Q2 2022/2023 in original analyses and 2.65 for RCRD linked.

In Q1 & Q2 2022/2023, the longest median subinterval for lung cancer patients who waited over 104 days (Table 2) was from referral to informed of diagnosis, at 63 days. The median interval from informed of diagnosis to decision to treat (DTT) was 48 days and from DTT to treatment was 19 days.

The most common reason for delay between referral and treatment in the latest year for lung cancer patients who waited over 104 days to start treatment (Table 3) was medical reason for diagnosis delay, although there was also a high percentage with healthcare provider-initiated delay. Around 23% of patients met the 28-day referral to informed of diagnosis standard in Q1 & Q2 2022/2023 and there was a decrease in the percentage who met the 31-day DTT to treatment target from 90% in 2017/2018 to 82% in Q1 & Q2 2022/2023.

Patients waiting over 62 days from urgent suspected cancer referral to starting treatment for respiratory system (lung) cancer

The regression findings for likelihood of waiting over 62 days were similar to those for the likelihood of waiting over 104 days, with no significant variation by gender or deprivation. There was also a strong reduction in likelihood of waiting over 62 days with later stage and increased likelihood with more recent year (Table 4). However, in all analyses both those aged 19–49 and 80+ were less likely to wait over 62 days compared to those aged 60–69 and there were no significant differences by comorbidity.

The interval findings were similar to those for patients who waited over 104 days, with the longest median intervals from referral to informed of diagnosis and informed to DTT, and a shorter median interval from DTT to treatment (Table 5). However, the median time from referral to informed of diagnosis and informed of diagnosis to DTT were both substantially shorter, while the median time from DTT to treatment only shortened slightly.

The most common reason for delay between referral and treatment for those with lung cancer who waited over 62 days from referral to treatment (Table 6) was healthcare provider-initiated delay, although medical reason for diagnosis delay also represented a high percentage. The percentage who met the standards from referral to informed of diagnosis and DTT to treatment were higher than for those waiting over 104 days.

Table 1: Regression analysis for likelihood of waiting over 104 days by characteristic for lung cancer. Results presented for both the original and Rapid Cancer Registration Dataset (RCRD) linked cohort. The results for the original cohort are presented unadjusted and adjusted and results for the RCRD linked cohort are presented unadjusted, with minimal adjustment to align with the original cohort analysis and with full adjustment

		Original cohort		RCRD linked cohort		
Characteristic	Category	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs)	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs) (minimal adjustment)	Adjusted odds ratio (95% CIs) (fully adjusted)
Gender	Female	1.04 (0.97-1.12)	1.04 (0.96-1.12)	1 (0.93-1.09)	0.99 (0.92-1.07)	0.93 (0.86-1.01)
	Male (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Age group	19-49	0.58 (0.42-0.82)*	0.55 (0.39-0.77)*	0.6 (0.43-0.84)*	0.58 (0.42-0.82)*	0.66 (0.47-0.92)
	50-59	0.86 (0.74-1)	0.86 (0.74-0.99)	0.89 (0.77-1.04)	0.9 (0.77-1.05)	0.96 (0.82-1.12)
	60-69 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	70-79	1.14 (1.04-1.25)*	1.18 (1.08-1.3)*	1.12 (1.02-1.24)	1.17 (1.06-1.29)*	1.11 (1-1.23)
	80+	1.02 (0.92-1.14)	1.11 (0.99-1.24)	1.02 (0.91-1.15)	1.1 (0.98-1.23)	0.98 (0.87-1.11)
Deprivation quintile	1 - most deprived	1.1 (0.97-1.24)	1.22 (1.07-1.38)*	1.01 (0.89-1.15)	1.11 (0.97-1.27)	1.08 (0.94-1.23)
	2	1.13 (1-1.28)	1.21 (1.06-1.37)*	1.03 (0.91-1.17)	1.1 (0.96-1.26)	1.07 (0.93-1.22)
	3	1.09 (0.96-1.23)	1.13 (1-1.29)	1.03 (0.91-1.17)	1.08 (0.95-1.24)	1.06 (0.93-1.22)
	4	0.97 (0.86-1.11)	1 (0.88-1.14)	0.94 (0.83-1.08)	0.98 (0.85-1.12)	0.97 (0.85-1.11)
	5 - least deprived (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)

		Original cohort		RCRD linked cohort		
Characteristic	Category	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs)	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs) (minimal adjustment)	Adjusted odds ratio (95% CIs) (fully adjusted)
Financial year	Base year (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	2020/2021	1.15 (1.03-1.28)	1.16 (1.04-1.3)*	1.15 (1.03-1.3)	1.18 (1.05-1.33)*	1.22 (1.08-1.37)*
	2021/2022	1.53 (1.39-1.69)*	1.54 (1.39-1.7)*	1.63 (1.47-1.81)*	1.66 (1.5-1.85)*	1.68 (1.51-1.87)*
	Q1 & Q2 2022/2023	2.33 (2.09-2.59)*	2.35 (2.11-2.63)*	2.57 (2.29-2.88)*	2.65 (2.36-2.97)*	2.65 (2.36-2.98)*
Stage	1 (ref)			1 (ref)		1 (ref)
	2			0.9 (0.79-1.02)		0.88 (0.77-1.01)
	3			0.47 (0.42-0.52)*		0.48 (0.43-0.53)*
	4			0.22 (0.2-0.25)*		0.23 (0.21-0.26)*
	Not known			0.41 (0.35-0.49)*		0.41 (0.34-0.49)*
Comorbidity	0 (ref)			1 (ref)		1 (ref)
	1			1.36 (1.21-1.52)*		1.23 (1.1-1.39)*
	2			1.31 (1.13-1.52)*		1.17 (1-1.37)
	3+			1.42 (1.23-1.65)*		1.24 (1.06-1.44)*

*significant at the $p < 0.01$ level

Table 2: Median and interquartile range for the intervals in the diagnostic and treatment pathway for lung cancer 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)	8 (5 - 12)	8.5 (5 - 13)	9 (6 - 13)
First seen to informed of diagnosis	Data not available	53 (22 - 89)	52.5 (22 - 82)	51.5 (21.75 - 78)
Informed of diagnosis to decision to treat	Data not available	42 (16 - 76)	43 (19 - 74)	48 (21.25 - 74)
Decision to treat to treatment start	16 (7 - 26)	16 (9 - 26)	18 (8 - 27)	19 (9 - 28)
Referral to informed of diagnosis	Data not available	63 (34 - 97)	63 (33 - 91)	63 (33 - 90)
Referral to decision to treat	109 (97 - 127)	107 (94 - 133)	109 (95 - 126)	108 (92 - 129.25)
Referral to treatment start	123 (112 - 144)	125 (112 - 151)	125 (113 - 145)	126 (113 - 144.25)

Table 3: Breakdown of the reasons for delay in each financial year of start of treatment among lung cancer 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	141 (18.2%)	143 (21.6%)	239 (24.8%)	232 (32.2%)
	Medical reason for diagnosis delay	250 (32.3%)	243 (36.8%)	430 (44.6%)	278 (38.6%)
	Medical reason for treatment delay	42 (5.4%)	28 (4.2%)	22 (2.3%)	18 (2.5%)
	Patient-initiated delay	55 (7.1%)	47 (7.1%)	50 (5.2%)	34 (4.7%)
	Other reason (not listed)	287 (37.0%)	200 (30.3%)	224 (23.2%)	158 (21.9%)
Referral to informed of diagnosis	Healthcare provider-initiated delay	Data not available	78 (17.7%)	115 (17.4%)	81 (16.3%)
	Medical reason for diagnosis delay	Data not available	151 (34.2%)	188 (28.4%)	188 (37.8%)
	Patient-initiated delay	Data not available	27 (6.1%)	24 (3.6%)	19 (3.8%)
	Other reason (not listed)	Data not available	60 (13.6%)	57 (8.6%)	47 (9.4%)
	No delay (standard met)	Data not available	99 (22.4%)	146 (22.1%)	113 (22.7%)
	Unknown	Data not available	26 (5.9%)	131 (19.8%)	50 (10.0%)
Decision to treat to treatment start	Healthcare provider-initiated delay	27 (3.5%)	39 (5.9%)	94 (9.7%)	93 (12.9%)
	Medical reason for diagnosis delay	<5	<10	12 (1.2%)	<10
	Medical reason for treatment delay	13 (1.7%)	12 (1.8%)	~10	11 (1.5%)

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	<10	<10	<5	<5
	Other reason (not listed)	28 (3.6%)	17 (2.6%)	16 (1.7%)	10 (1.4%)
	No delay (standard met)	700 (90.3%)	581 (87.9%)	829 (85.9%)	593 (82.4%)

Table 4: Regression analysis for likelihood of waiting over 62 days by characteristic for lung cancer. Results presented for both the original and RCRD linked cohort. The results for the original cohort are presented unadjusted and adjusted and results for the RCRD linked cohort are presented unadjusted, with minimal adjustment to align with the original cohort analysis and with full adjustment

		Original cohort		RCRD linked cohort		
Characteristic	Category	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs)	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs) (minimal adjustment)	Adjusted odds ratio (95% CIs) (fully adjusted)
Gender	Female	1.05 (1-1.1)	1.04 (0.99-1.09)	1.05 (1-1.1)	1.04 (0.99-1.09)	0.99 (0.94-1.04)
	Male (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Age group	19-49	0.69 (0.58-0.81)*	0.64 (0.53-0.76)*	0.68 (0.58-0.8)*	0.65 (0.55-0.78)*	0.7 (0.59-0.84)*
	50-59	0.89 (0.82-0.97)*	0.88 (0.81-0.96)*	0.92 (0.84-1)	0.92 (0.84-1)	0.95 (0.87-1.04)
	60-69 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	70-79	1.03 (0.97-1.09)	1.05 (0.99-1.12)	1.03 (0.98-1.1)	1.08 (1.01-1.14)	1.04 (0.98-1.11)
	80+	0.72 (0.67-0.76)*	0.77 (0.72-0.83)*	0.73 (0.68-0.78)*	0.79 (0.74-0.85)*	0.72 (0.67-0.78)*
Deprivation quintile	1 - most deprived	0.98 (0.91-1.05)	1.04 (0.96-1.13)	0.97 (0.9-1.04)	1.02 (0.94-1.11)	1 (0.92-1.09)
	2	1.01 (0.94-1.09)	1.04 (0.96-1.13)	1 (0.93-1.08)	1.04 (0.96-1.13)	1.01 (0.93-1.1)
	3	1.04 (0.97-1.12)	1.07 (0.99-1.16)	1.04 (0.97-1.13)	1.08 (0.99-1.17)	1.06 (0.98-1.15)
	4	1.01 (0.94-1.09)	1.02 (0.95-1.11)	1.03 (0.95-1.11)	1.05 (0.96-1.14)	1.04 (0.96-1.13)
	5 - least deprived (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)

		Original cohort		RCRD linked cohort		
Characteristic	Category	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs)	Unadjusted odds ratio (95% CIs)	Adjusted odds ratio (95% CIs) (minimal adjustment)	Adjusted odds ratio (95% CIs) (fully adjusted)
Financial year	Base year (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	2020/2021	1.24 (1.17-1.32)*	1.29 (1.21-1.37)*	1.21 (1.14-1.29)*	1.26 (1.18-1.34)*	1.31 (1.23-1.4)*
	2021/2022	1.63 (1.54-1.73)*	1.69 (1.59-1.79)*	1.62 (1.53-1.72)*	1.69 (1.59-1.8)*	1.73 (1.62-1.84)*
	Q1 & Q2 2022/2023	2.39 (2.23-2.56)*	2.53 (2.36-2.72)*	2.41 (2.24-2.58)*	2.58 (2.39-2.77)*	2.65 (2.46-2.86)*
Stage	1 (ref)			1 (ref)		1 (ref)
	2			0.96 (0.88-1.06)		0.96 (0.87-1.06)
	3			0.56 (0.53-0.61)*		0.57 (0.53-0.61)*
	4			0.25 (0.24-0.27)*		0.26 (0.24-0.28)*
	Not known			0.37 (0.33-0.41)*		0.37 (0.33-0.41)*
Comorbidity	0 (ref)			1 (ref)		1 (ref)
	1			1.09 (1.02-1.17)		1.01 (0.93-1.09)
	2			1 (0.91-1.09)		0.93 (0.84-1.04)
	3+			0.96 (0.88-1.06)		0.93 (0.83-1.03)

*significant at the $p < 0.01$ level

Table 5: Median and interquartile range for the intervals in the diagnostic and treatment pathway for lung cancer 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	9 (7 - 13)	7 (5 - 11)	7 (5 - 11)	8 (5 - 12)
First seen to informed of diagnosis	Data not available	33 (14 - 53)	32 (14 - 50)	32 (13 - 52)
Informed of diagnosis to decision to treat	Data not available	26 (10 - 47.75)	28 (13 - 47)	29 (13 - 50)
Decision to treat to treatment start	14 (6 - 22)	15 (7 - 22)	16 (8 - 24)	16 (8 - 25)
Referral to informed of diagnosis	Data not available	41 (22 - 61)	41 (22 - 59)	41 (21 - 63)
Referral to decision to treat	71 (61 - 91)	70 (58 - 88)	70 (57 - 90)	72 (59 - 93)
Referral to treatment start	86 (74 - 104)	84 (72 - 103)	86 (74 - 106)	89 (74.5 - 111)

Table 6: Breakdown of the reasons for delay in each financial year of start of treatment among lung cancer 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	767 (24.4%)	777 (28.3%)	1248 (34.0%)	859 (36.5%)
	Medical reason for diagnosis delay	920 (29.3%)	905 (33.0%)	1198 (32.7%)	738 (31.3%)
	Medical reason for treatment delay	~160	141 (5.1%)	~90	~50
	Patient-initiated delay	207 (6.6%)	~135	186 (5.1%)	109 (4.6%)
	Other reason (not listed)	1087 (34.6%)	786 (28.6%)	945 (25.8%)	597 (25.4%)
	Unknown	<5	<5	<5	<5
Referral to informed of diagnosis	Healthcare provider-initiated delay	Data not available	316 (15.8%)	404 (14.9%)	295 (17.1%)
	Medical reason for diagnosis delay	Data not available	569 (28.5%)	611 (22.6%)	480 (27.8%)
	Patient-initiated delay	Data not available	66 (3.3%)	75 (2.8%)	56 (3.2%)
	Other reason (not listed)	Data not available	225 (11.3%)	231 (8.5%)	173 (10.0%)
	No delay (standard met)	Data not available	659 (33.0%)	912 (33.7%)	594 (34.4%)
	Unknown	Data not available	159 (8.0%)	472 (17.4%)	129 (7.5%)
Decision to treat to treatment start	Healthcare provider-initiated delay	56 (1.8%)	83 (3.0%)	208 (5.7%)	186 (7.9%)
	Medical reason for diagnosis delay	<5	~10	26 (0.7%)	17 (0.7%)

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	37 (1.2%)	34 (1.2%)	26 (0.7%)	18 (0.8%)
	Patient-initiated delay	~20	~10	10 (0.3%)	10 (0.4%)
	Other reason (not listed)	47 (1.5%)	42 (1.5%)	34 (0.9%)	19 (0.8%)
	No delay (standard met)	2980 (94.9%)	2566 (93.5%)	3364 (91.7%)	2105 (89.4%)