THE LANCET
Oncology

Supplementary appendix 1

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Sud A, Torr B, Jones ME, et al. Effect of delays in the 2-week-wait cancer referral pathway during the COVID-19 pandemic on cancer survival in the UK: a modelling study. *Lancet Oncol* 2020; published online July 20. http://dx.doi.org/10.1016/S1470-2045(20)30392-2.

Supplementary Table 1: Assumptions and parameters

	Parameterisation, assumptions and justification	Ref
	Cancer survival	
1	Predicted baseline 10-year survival for patients diagnosed with cancer during 2020 is accurately represented by available data from PHE NCRAS on cancer survival collected 2008-2017. **Justification:** PHE NCRAS cancer data for 2008-2017 represent the best available estimates for 10-year cancer survival in England for each tumour type under standard management in the NHS in England. We recognise nevertheless that these baseline survival figures will have changed due to evolutions in practice and the emergence of new treatments.	[1]
2	Net 10-year survival reflects cancer-specific mortality. **Justification:** Net survival is based on crude survival with adjustment for background age-specific population-level death rates. Thus, this is a reasonable approximation to cancer-specific mortality. **Notes:** Net survival is censored at 100%. Generating these estimates requires that at least 10 patients are alive at the time of estimation and there are at least 2 deaths in the time either side of estimation. Where net survival could not be generated for a particular age-specific, stage-specific stratum, we utilise the stage-specific survival for the adjacent age-band (younger preferential to older) and indicate this in the respective tables.	[1]
3	The age-stage-specific 10-year survival can be approximated to the age-specific 10-year survival adjusted for the ratio of 5-year stage-specific survival. **Justification:** Since cure rates for most cancers are only known 5-10 years post-diagnosis, we wanted to use 10-year stage-specific survival data in our calculations. NCRAS only routinely generated stage-specific survival from 2013. Hence, to obtain stage-specific 10-year survival, re applied established methods of applying the ratio of stage-specific to all stage survival at 5 years to all-stage survival at 10-years. **Notes:** For brain cancers, all tumours are included as Staging as 1-4 is not performed.	[2]
4	Cancer survival estimates are well reflected by the sex-average for all cancer types except for prostate, testicular, endometrial, ovarian, cervical and breast cancers.	[1]
5	Life expectancy is that for the mid-age of the age-band, averaged for both sexes. For those age 80+, average life expectancy is that of the midpoint of age 80-90 band. Those who succumb to their cancer are not ascribed any life-years gained.	[3]
6	All patients <60 years for Stage 1-3 disease have treatment with curative intent (definitive treatment). The stage-specific ratio of definitive treatment [major resection: other] in those >60 years is uniform across age groups and is the average of that in age groups <60.	
7	The impact of systemic pathway delays consequent from COVID-19-related disruption can be modelled from observational studies in which long-term survival has been correlated with different durations of delay to treatment. **Justification:** Experimentally-derived estimates to quantify the impact of delay on survival would have constituted the optimal type of evidence to inform assumptions in the model, but those do not exist as randomised trials comparing non-delayed versus dramatically delayed surgery would be clearly unethical. Although there is a multitude of mathematical models of cancer growth and spread, it remains unclear how faithfully these model correspond to surgical intervention, clinical staging, metastasis and outcome. We reviewed the literature to identify studies of delay in treatment for which: (i) there was follow up for ≥ 5 years comprising either hazard ratios or % survival, (ii) longer durations of delay, (ii) long-term follow-up to evaluate the impact on long-term survival (≥5 years) (iii) stage-specific data enabling partition of stage1-3 from stage 4. We restricted the analysis to tumour types for which multiple survival comparisons were available and multiple stages were included. We identified 11 suitable studies relating to colorectal cancer, breast cancer and bladder cancer. Although the majority of these studies are based on crude survival (*i.e.* all-cause) rather than net (*i.e.* cancer-specific), because they have been used to derive ratios in survival between groups experiencing different delays, we assume the effects due to background mortality rates are largely 'cancelled out' in the ratio.	[4-12]
8	Survival decrement due to delay can be modelled as a constant hazard ratio (delay-HR) applied across the subsequent 10 years. **Justification:** Whilst this likely oversimplifies the temporal, spatial and tumour-type specific patterns of cancer progression, the observational data available are insufficient to afford a more intricate model than a linear regression. **Notes:** Observational studies did not present trend HRs, so we estimated by linear regression a per-day HR, using the median delay associated with each HR, or if medians were not presented we used the mid-point, except for the first (baseline) group where we assumed the median occurred at 2/3 the width of the interval (which was consistent with studies that reported a median and interval), and for the last open-ended group we assumed the median occurred at the lower boundary plus half the width of the previous strata. This per-day delay-HR is applied to the underlying NCRAS 10-year survival as follows: • Per_year_Hazard_Rate_under_standard_conditions=-LN(100%-(100%-(10-year_survival)))/10 •Delay-HR_for_specified_period_of_delay =EXP(number_of_days_delay*per_day_delay-HR) •Per_year_Hazard_Rate_POST-DELAY=Per_year_Hazard_Rate_under_standard_conditions* Delay-HR_for_specified_period_of_delay •10-year_fatality_POST-DELAY= (1-EXP(-1*_Per_year_Hazard_Rate_POST-DELAY_*10)) •10-year_survival_POST-DELAY=100%-10-year_fatality_POST-DELAY •10-year_survival_CURRENT_COVID-ADJUSTED=10-year_survival_STANDARD*(100%-_likelihood_of_per-surgical_COVID_death)*(100%-_likelihood_of_community_COVID_death) •10-year_survival_POST-DELAY_COVID-ADJUSTED=_10-year_survival_POST-DELAY*(100%_-_likelihood_of_peri-surgical_COVID_death)* (100%-_likelihood_of_community_COVID_death) •average%delay-related_survival_reduction=10-year_survival_CURRENT_COVID-ADJUSTED - 10-year_survival-POST-DELAY_COVID-ADJUSTED	[13]

9	The 'delay-HRs' capture tumour progression that is applicable more broadly by category for tumours of low, medium and high progressiveness, **Justification:** Our useable observational studies from 3 tumour types reveal clear differences between breast cancer compared to colorectal and bladder cancers. There are no relevant observational data available for the majority of tumour types, in particular those of poor outcomes. We classified cancers as being of low (5-year survival >90%), moderate (90-50%) or high (<50%) progressiveness based on 5-year survival. We calculated a weighted average for the HR per day delay in treatment (the 'delay-HR') based on the number of patients in each study for (i) breast cancer (ii) colorectal and bladder cancer. We apply the per-day delay-HR from breast cancer to tumours of low progressiveness, and the weighted average for bladder and colorectal for tumours of moderate progressiveness. Because we have no observational data upon which to base a per-day hazard ratio for high progressiveness tumours (*e.g.* oesophageal, gastric), we use the same delay-HR from the moderate group; this is likely to be a conservative assumption. The 5-year survival metric used as a proxy for overall tumour aggressiveness/progressiveness is that for Stage 2 disease as this approach (i) excludes the indolent entities which may be included in stage 1 and (ii) disregards artefactual bias of the distribution of asymmetric stage-at-ascertainment.	[1]
10	The per-day 'delay-HR' for tumour progression is independent of disease stage. **Justification:** Review of reported observational studies revealed no evidence of inter-stage heterogeneity on per-day delay-HRs.	[4-12]
11	There are no impact additional impacts on treatment outcomes consequent from COVID19-related short-staffing, under-experienced, or redeployed staff.	
	Cancer diagnosis	
12	The diagnostic-conversion-rate is uniform across tumour-types within a tumour-referral-group, and uniform across age groups **Justification:** data are not available specifying the diagnostic-conversion-rate by age- group and/or tumour-type specific referral category.	
13	There is no impact of delay to survival on cancers diagnosed via 2WW referral that are outside of the tumour-referral-group. **Justification:** data are not available specifying the details of the cancer diagnoses made outside of the tumour-referral-group, nor the stage at which they are diagnosed.	
14	Cancer investigations with negative results ordered directly by GPs do not impact on resource availability for 2WW investigatory referral. **Justification:** There is wide variation across primary care in the availability of direct access to first-line investigations, for example, USS for symptoms of gynaecological cancer and CT for symptoms of pancreatic cancer. Although they compete for the same resources, negative cases are not accounted for in routes-to-diagnosis datasets	
15	The risk of death associated with technical complications from specific invasive investigatory procedures is the product of the risk of complication and the fatality associated with the complication (Supplementary Table 11), for example colonic preformation. This is uniform across age groups.	[14-17]
	COVID-19-related mortality in cancer patients	
16	Likelihood of nosocomial COVID-19 infection is a function of a per-day rate of infection of 2% that is stable and uniform across healthcare facilities. **Justification:** There have been multiple reports of high rates of nosocomial infection [18, 19] and high rates of infection amongst healthcare workers. Healthcare workers acquire immunity but the prevalence of infection in the community will fluctuate, so nosocomial infection rates will likely be dynamic [20]. To date, there has been no published per-day rate of infection in a hospital setting. We examined in our sensitivity analysis, daily nosocomial infection rates of 1%, 2%, 5% and 10%. In our sensitivity analysis, variation in the rate of nosocomial infection displays an inverse relationship with the impact of delay on survival i.e. the higher risk of nosocomial infection cancels out the health benefit of non-delay (Supplementary Table 2). Following estimate of infection rate of 1-2% per day from unpublished clinical data from a UK surgical oncology centre, as our default, we used an estimate of 2%, which may be conservatively high.	[18-22]
17	Mortality from nosocomial COVID-19 is at rates equivalent to those reported in Wuhan for 44,672 molecularly-confirmed COVID-19 cases for patients acquiring infection nosocomially at surgery. **Justification:** The best UK data currently available capturing case fatality rates are from a UK series of 20,133 hospitalised COVID-19 patients (Docherty et al. 2020). However, these case fatality rates pertain only to hospitalised (severe) COVID-19 cases, not all-comers. Current CFR estimates from Lombardy/elsewhere in Europe are also for hospital cases only. Therefore, acknowledging that mild/asymptomatic individuals are still likely under-represented in the Wuhan dataset of 44,672 molecularly-confirmed COVID-19 cases, these data currently represent the most comprehensive and largest dataset from which to estimate a CFR for all-comers with COVID-19.	[23, 24]
18	Stage 1-3 patients cured of their disease are at a cancer-related elevation of ***fatality*** from community-acquired COVID-19 mortality for 1-year post-diagnosis and the elevation is a standard 'multiplier' of 2. They are not at elevated risk of ***contracting*** COVID-19 outside of their peri-surgical period. **Justification:** We hypothesise that the main contributors to the cancer-related elevation of case fatality rates would be from progressive metastatic disease and therapy thereof. However, we hypothesise that, following their peri-surgical exposure to nosocomial infection, those who achieve cure from Stage 1-3 disease (the subjects of our analysis) would experience some immunocompromise from surgery, SACT (systemic anti-cancer therapy) and/or radical radiotherapy but primarily in the first year of treatment. The estimates for elevation in case fatality rates due to cancer vary widely, with little detail of the heterogeneity of the 'cancer population' to which refer. UK data suggested a RR of 1.19, which is much lower than that estimated in China or Italy (RR>5). We used a low-intermediate RR estimate of 2 to reflect a likely lower risk sub-population of cancer patients, but undertook sensitivity testing for a higher value of 5.	[23-26]
19	The cancer-related elevation of risk of community-acquired COVID-19 mortality is predicated on the risk of community COVID-19 infection in the year following definitive treatment of 20%. **Justification:** The likelihood of infection is highly unpredictable and depends on the local and national prevalence of community infection. Initially, PHE considered community infection rates of up to 80%. We examined in our sensitivity analysis, community infection rates of 5%, 20% and 50%. These have a modest ***inversely related*** effect on the impact of the delay. As our default, we used an estimate of 20%, which may be conservatively high.	[27]

	Cancer Therapy	
20	All patients with a given tumour stage have a single standard open operation. ICU stay and ward stay are standard for a given operation as per the median of values from 3 large surgical oncology centres. In regard of nosocomial exposure, day-case surgery is counted as a half-day of hospital admission. For a specified tumour stage, the duration of inpatient say is equivalent for surgical and non-surgical definitive treatments (for example radicle radiotherapy versus major resection).	[28]
21	Adjuvant chemo-radiotherapy is continued using standard/modified protocols, as per clinical judgment. The additional specific risk of nosocomial infection from these treatments is encompassed in 1 year of cancer-related elevation of case fatality rates.	

Supplementary Table 2: Route to cancer diagnosis with distribution by age and stage.

Data from NHS England Clinical Commissioning Groups (2013-2016). 2WW, two week wait."

				Proportion by age group						Proportion by stage					Conversion to cancer		Cancer diagnoses per year total
Tumour Type	Tumour Referral Group	Route	Proportion by route	30-39	40-49	50-59	60-69	70-79	80+	1	2	3	4	st1-3	% Cancer diagnosis	% Cancer in Tumour Referral Group	
Bladder	Urology (exc. Testicular)	2WW	42.9%	0.32%	2.10%	7.36%	23.40%	36.24%	30.58%	51.92%	29.09%	6.74%	12.26%	87.74%	16.90%	98.20%	
		Emergency	18.0%	0.6%	1.5%	3.9%	12.9%	26.5%	54.6%	23.02%	30.21%	9.43%	37.35%	62.65%			8,524
		Routine	39.1%	0.45%	2.02%	6.31%	19.57%	34.55%	37.10%	51.51%	25.95%	6.99%	15.55%	84.45%			
Brain	Brain	2WW	1.73%	8.72%	8.39%	16.44%	31.21%	25.17%	10.07%						1.00%	100.00%	
		Emergency	44.56%	15.35%	7.63%	13.49%	20.60%	22.92%	20.00%								8,102
		Routine	53.72%	20.1%	11.8%	16.9%	25.6%	19.5%	6.2%								
Breast	Breast	2WW	54.20%	6.10%	19.14%	16.22%	16.25%	20.53%	21.76%	31.22%	50.86%	12.97%	4.95%	95.05%	4.90%	99.30%	
		Screening	29.46%	0.03%	5.38%	33.16%	45.87%	14.24%	1.31%	68.19%	27.02%	3.90%	0.89%	99.11%			41,845
		Emergency	4.01%	1.93%	5.72%	8.90%	12.40%	21.06%	50.00%	17.47%	24.45%	10.36%	47.71%	52.29%			
		Routine	12.34%	6.36%	19.59%	19.72%	19.68%	17.78%	16.88%	44.27%	36.57%	8.95%	10.22%	89.78%	1.30%	96.20%	
Cervix	Gynaecology	2WW	22.12%	16.55%	15.84%	18.12%	19.74%	17.32%	12.43%	29.29%	40.12%	14.97%	15.62%	84.38%	3.10%	97.40%	
		Screening	34.03%	63.75%	22.66%	9.97%	3.56%	0.06%		90.36%	7.24%	1.48%	0.91%	99.09%			2,128
		Emergency	9.57%	18.05%	13.80%	14.63%	16.60%	18.26%	18.67%	11.15%	21.19%	21.35%	46.31%	53.69%			
		Routine	34.28%	44.59%	22.09%	12.71%	8.31%	6.49%	5.82%	67.35%	17.93%	6.68%	8.04%	91.96%			
Colorectal	Lower GI	2WW	32.20%	0.84%	3.13%	13.04%	21.54%	32.98%	28.47%	15.37%	28.20%	32.52%	23.90%	76.10%	2.80%	78.40%	
		Screening	9.79%			0.63%	62.47%	35.67%	1.23%	36.88%	25.96%	29.15%	8.01%	91.99%			32,979
		Emergency	24.19%	4.77%	4.17%	9.12%	15.91%	24.45%	41.58%	7.03%	24.97%	26.00%	41.99%	58.01%			
		Routine	33.81%	2.88%	4.87%	13.72%	19.08%	30.18%	29.27%	22.63%	26.03%	28.33%	23.02%	76.98%			
Kidney	Urology (exc. Testicular)	2WW	28.06%	2.29%	8.14%	17.67%	27.75%	27.47%	16.68%	45.25%	11.40%	21.75%	21.60%	78.40%	16.90%	98.20%	
		Emergency	22.09%	3.60%	5.52%	11.00%	19.25%	24.10%	36.54%	33.09%	7.10%	13.42%	46.39%	53.61%			8,764
		Routine	49.86%	3.79%	8.11%	17.05%	28.32%	27.60%	15.12%	54.59%	8.66%	18.03%	18.71%	81.29%			
Larynx	Head & Neck	2WW	47.98%	0.49%	5.17%	19.35%	33.30%	28.25%	13.43%	36.59%	19.35%	17.76%	26.31%	73.69%	2.90%	74.00%	
		Emergency	10.05%	1.24%	4.14%	13.79%	29.24%	28.00%	23.59%	5.44%	6.60%	19.61%	68.35%	31.65%			1,850
		Routine	41.98%	1.32%	4.75%	15.91%	31.43%	30.37%	16.21%	39.97%	19.00%	18.27%	22.76%	77.24%			
Liver	Upper GI	2WW	14.50%	0.74%	1.86%	10.09%	25.21%	34.34%	27.75%	7.63%	10.65%	15.61%	66.12%	33.88%	5.70%	85.90%	
		Emergency	42.68%	1.77%	2.71%	9.68%	20.66%	27.73%	37.45%	7.73%	9.14%	11.90%	71.23%	28.77%			4,712
		Routine	42.82%	2.20%	4.29%	14.57%	27.34%	32.09%	19.52%	17.86%	21.06%	14.18%	46.90%	53.10%			
Lung	Lung	2WW	28.21%	0.27%	2.19%	10.22%	30.21%	35.77%	21.34%	15.39%	9.90%	27.93%	46.78%	53.22%	10.90%	93.70%	
		Emergency	34.73%	0.35%	1.90%	7.56%	20.89%	32.17%	37.13%	9.32%	4.71%	14.43%	71.54%	28.46%			36,668
		Routine	37.06%	0.54%	2.13%	9.82%	27.90%	37.01%	22.60%	26.57%	10.00%	21.71%	41.71%	58.29%			
Melanoma	Skin	2WW	63.10%	10.44%	14.18%	17.82%	23.00%	20.31%	14.25%	71.49%	20.45%	6.46%	1.60%	98.40%	4.40%	98.10%	
		Emergency	2.07%	5.62%	5.91%	10.54%	18.52%	24.04%	35.37%	46.45%	21.69%	9.07%	22.79%	77.21%			12,110
		Routine	34.83%	9.37%	9.77%	13.32%	20.73%	24.64%	22.17%	69.82%	20.82%	6.21%	3.16%	96.84%			
Oesophagus	Upper GI	2WW	44.95%	0.37%	2.98%	12.86%	28.97%	31.01%	23.81%	7.37%	16.10%	41.20%	35.33%	64.67%	5.70%	85.90%	
		Emergency	19.91%	0.57%	2.24%	8.74%	19.52%	27.15%	41.78%	7.22%	12.37%	27.08%	53.33%	46.67%			7,427
		Routine	35.14%	0.60%	3.02%	13.02%	29.56%	32.43%	21.38%	20.66%	16.47%	33.92%	28.95%	71.05%			

Oral cavity	Head & Neck	2WW	44.14%	2.93%	9.66%	22.36%	29.43%	20.87%	14.76%	27.27%	15.79%	10.40%	46.54%	53.46%	2.90%	74.00%	2,629
		Emergency	4.77%	3.25%	8.52%	18.86%	22.52%	23.53%	23.33%	13.85%	8.82%	8.06%	69.27%	30.73%			
		Routine	51.08%	3.49%	8.21%	20.53%	28.64%	22.20%	16.93%	37.03%	13.39%	8.23%	41.36%	58.64%			
Oropharynx	Head & Neck	2WW	58.86%	1.35%	12.10%	34.70%	33.82%	14.18%	3.84%	2.84%	6.10%	13.42%	77.65%	22.35%	2.90%	74.00%	2,905
		Emergency	6.30%	2.06%	9.34%	28.32%	31.96%	19.94%	8.39%	3.17%	5.74%	10.10%	80.99%	19.01%			
		Routine	34.84%	1.46%	11.95%	33.23%	32.66%	15.67%	5.03%	6.51%	8.89%	14.61%	69.98%	30.02%			
Ovary	Gynaecology	2WW	33.49%	4.20%	8.42%	20.97%	28.94%	25.44%	12.03%	31.94%	7.81%	41.66%	18.59%	81.41%	3.10%	97.40%	6,398
		Emergency	28.03%	6.86%	7.36%	12.16%	19.96%	25.38%	28.29%	15.72%	3.20%	42.44%	38.64%	61.36%			
		Routine	38.48%	13.01%	13.53%	18.81%	22.22%	19.54%	12.89%	51.11%	6.48%	27.67%	14.74%	85.26%			
Pancreas	Upper GI	2WW	19.29%	0.24%	2.10%	9.44%	26.04%	36.07%	26.09%	5.79%	14.72%	13.72%	65.77%	34.23%	5.70%	85.90%	8,260
		Emergency	46.13%	0.62%	2.42%	8.34%	18.71%	29.72%	40.20%	6.21%	11.57%	8.32%	73.90%	26.10%			
		Routine	34.58%	1.31%	4.05%	11.79%	27.96%	32.31%	22.58%	8.14%	18.71%	12.35%	60.80%	39.20%			
Prostate	Urology (exc. Testicular)	2WW	47.20%	0.01%	0.94%	9.63%	32.95%	38.22%	18.24%	27.95%	21.59%	25.96%	24.50%	75.50%	16.90%	98.20%	40,834
		Emergency	7.82%	0.04%	0.43%	4.26%	16.52%	28.84%	49.91%	17.43%	7.92%	9.40%	65.25%	34.75%			
		Routine	44.99%	0.02%	1.26%	11.83%	36.53%	35.77%	14.59%	43.50%	25.13%	19.23%	12.14%	87.86%			
Stomach	Upper GI	2WW	31.03%	0.37%	2.98%	12.86%	28.97%	31.01%	23.81%	8.26%	18.47%	27.16%	46.11%	53.89%	5.70%	85.90%	5,332
		Emergency	31.65%	1.91%	3.20%	7.66%	13.97%	26.96%	46.31%	7.44%	14.78%	15.77%	62.02%	37.98%			
		Routine	37.33%	1.96%	4.93%	10.50%	20.45%	32.98%	29.18%	20.14%	20.58%	21.86%	37.42%	62.58%			
Testis	Testis	2WW	61.21%	61.68%	22.44%	10.93%	3.42%	1.17%	0.37%	86.62%	7.82%	3.08%	2.48%	97.52%	9.00%	75.00%	1,355
		Emergency	9.11%	65.41%	19.04%	7.99%	3.05%	2.62%	1.89%	52.88%	12.33%	17.30%	17.50%	82.50%			
		Routine	29.68%	60.87%	19.86%	11.16%	5.22%	1.92%	0.98%	81.75%	8.24%	5.56%	4.46%	95.54%			
Thyroid	Head & Neck	2WW	23.20%	28.27%	19.01%	18.14%	15.08%	12.24%	7.26%	44.39%	9.96%	18.97%	26.67%	73.33%	2.90%	74.00%	2,673
		Emergency	6.36%	11.86%	9.79%	12.55%	18.76%	19.45%	27.59%	31.41%	7.67%	10.55%	50.36%	49.64%			
		Routine	70.44%	27.79%	21.33%	20.17%	15.95%	10.21%	4.56%	58.67%	11.17%	17.02%	13.15%	86.85%			
Uterus	Gynaecology	2WW	57.73%	0.24%	2.28%	19.08%	35.80%	29.16%	13.44%	75.67%	7.47%	11.00%	5.86%	94.14%	3.10%	97.40%	7,604
		Emergency	7.61%	1.63%	6.45%	13.74%	19.75%	25.59%	32.83%	42.18%	7.50%	20.01%	30.31%	69.69%			
		Routine	34.66%	2.82%	10.05%	23.45%	26.99%	22.78%	13.91%	75.70%	7.36%	10.54%	6.41%	93.59%			

Supplementary Table 3 - Impact on 10-year net survival of differing periods of diagnostic delay to cancer treatment

20 common cancer types.

	2 month delay						4 month delay						6 month delay					
Tumour Type	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**
Bladder	10.11%	9.53%	9.08%	9.91%	11.18%	11.62%	21.78%	20.75%	19.91%	21.37%	23.19%	21.91%	34.24%	33.07%	32.01%	33.62%	34.77%	29.48%
Brain (all)	7.38%	8.98%	11.64%	12.27%	11.53%	11.44%	16.59%	19.73%	24.04%	23.83%	21.06%	21.41%	27.56%	31.82%	35.84%	33.11%	27.44%	28.59%
Breast (all hormone marker statuses)	3.14%	2.09%	1.59%	1.36%	2.38%	5.02%	6.75%	4.53%	3.47%	2.98%	5.15%	10.50%	10.86%	7.38%	5.67%	4.87%	8.34%	16.38%
Cervix	3.44%	5.62%	7.67%	10.08%	12.01%	10.88%	8.06%	12.89%	17.19%	21.67%	23.68%	19.43%	14.15%	21.99%	28.38%	33.95%	33.45%	24.77%
Colorectal	6.38%	7.13%	6.77%	6.63%	8.29%	10.65%	14.53%	16.08%	15.33%	15.02%	18.33%	22.17%	24.51%	26.82%	25.70%	25.20%	29.76%	33.41%
Kidney	3.08%	4.01%	5.30%	6.59%	8.29%	11.59%	7.24%	9.35%	12.20%	14.94%	18.32%	23.00%	12.76%	16.30%	20.90%	25.08%	29.77%	32.73%
Larynx	6.93%	9.07%	8.51%	9.53%	10.21%	11.02%	15.67%	19.91%	18.83%	20.71%	21.75%	22.54%	26.22%	32.04%	30.62%	32.87%	33.69%	33.26%
Liver	11.66%	11.97%	11.37%	10.48%	8.74%	10.45%	20.92%	21.90%	20.17%	18.00%	14.20%	18.33%	26.79%	28.56%	25.56%	22.13%	16.67%	22.97%
Lung	10.90%	12.41%	11.71%	10.89%	8.67%	5.23%	23.07%	23.62%	21.15%	19.02%	14.05%	7.58%	35.45%	32.11%	27.25%	23.75%	16.47%	8.25%
Melanoma of skin	1.92%	2.43%	3.01%	3.49%	4.53%	7.94%	4.55%	5.74%	7.07%	8.16%	10.50%	17.59%	8.13%	10.20%	12.46%	14.30%	18.14%	28.67%
Oesophagus	11.75%	11.40%	11.33%	10.77%	8.99%	3.70%	21.19%	20.21%	20.09%	18.75%	14.73%	5.06%	27.26%	25.58%	25.43%	23.33%	17.42%	5.35%
Oral cavity	8.09%	10.98%	12.05%	12.16%	12.03%	11.43%	18.02%	23.18%	24.41%	24.18%	23.34%	21.23%	29.57%	35.53%	35.58%	34.51%	32.39%	28.14%
Oropharynx	7.40%	9.20%	10.82%	12.22%	11.75%	9.84%	16.64%	20.16%	22.93%	24.13%	21.77%	16.80%	27.64%	32.36%	35.26%	34.14%	28.77%	20.54%
Ovary	4.48%	8.79%	11.29%	12.23%	11.74%	11.04%	10.39%	19.38%	23.59%	24.05%	21.81%	19.99%	18.00%	31.37%	35.71%	33.88%	28.90%	25.81%
Pancreas	9.40%	8.70%	8.92%	6.85%	5.58%	7.98%	15.43%	13.95%	14.43%	10.40%	8.16%	12.71%	18.26%	16.22%	16.89%	11.64%	8.92%	14.71%
Prostate	0.43%	0.43%	0.20%	0.00%	0.00%	2.36%	0.94%	0.94%	0.44%	0.00%	0.00%	5.11%	1.56%	1.56%	0.73%	0.00%	0.00%	8.28%
Stomach	12.45%	12.44%	12.29%	11.93%	11.24%	6.72%	24.37%	24.29%	23.23%	22.11%	20.26%	10.26%	34.17%	33.93%	31.34%	29.22%	26.05%	11.53%
Testis	0.37%	0.23%	0.48%	0.23%	0.40%	1.03%	0.81%	0.50%	1.06%	0.50%	0.88%	2.25%	1.34%	0.82%	1.75%	0.82%	1.46%	3.70%
Thyroid	0.07%	0.40%	0.85%	0.14%	1.64%	0.00%	0.16%	0.88%	1.86%	0.31%	3.58%	0.00%	0.26%	1.44%	3.06%	0.52%	5.84%	0.00%
Uterus	1.48%	3.25%	3.73%	5.39%	7.44%	9.22%	3.53%	7.62%	8.70%	12.39%	16.66%	19.96%	6.34%	13.40%	15.22%	21.19%	27.51%	31.56%

Supplementary Table 4 - Impact on 10-year net survival of 3 months diagnostic delay

All diagnoses; 20 common tumour types (England 2007-2017), stratified by stage/subtype of cancer diagnosis.

Red indicates the highest tertile of survival decrement; green indicates the lowest tertile of survival decrement.

* low confidence 5-year survival estimate for age-specific/stage-specific stratum; N/A: no cases in this age stratum.

Tumour Type	Stage	Age Group					
		30-39	40-49	50-59	60-69	70-79	80+
Bladder	1	9.70%*	10.09%	10.31%	9.54%	7.98%	5.09%
	2	18.35%*	17.95%	18.23%	18.23%	17.29%	12.06%
	3	18.41%*	18.04%*	18.42%	18.04%	16.44%	10.03%
Breast (ER+, HER2-)	1	1.18%	0.80%	0.35%	0%	0%	2.05%
	2	4.49%	3.03%	2.90%	2.29%	2.95%	6.80%
	3	8.53%	7.30%	7.94%	8.10%	8.33%	9.36%
Breast (ER-, HER2-)	1	3.04%	2.34%	3.19%	2.58%	2.24%	3.67%
	2	6.79%	6.23%	6.20%	7.15%	8.23%	7.37%
	3	10.02%*	10.03%	9.99%	9.83%	9.21%	8.92%*
Breast (HER2+)	1	0.43%	0.86%	1.10%	1.52%	1.67%	4.18%
	2	3.66%	2.83%	2.91%	3.67%	5.04%	8.17%
	3	8.57%	5.39%	7.15%	7.37%	9.30%	9.42%
Breast (all hormone marker statuses)	1	1.65%	1.03%	0.56%	0.31%	0.03%	4.10%
	2	4.87%	3.46%	3.14%	3.13%	4.54%	8.02%
	3	8.90%	7.38%	7.80%	8.08%	9.38%	9.20%
Breast (other combination of hormone markers)	1	2.04%	1.41%	0.30%	0.43%	0%	5.25%
	2	4.26%	3%	3.09%	2.96%	4.77%	8.11%
	3	9.06%	7.16%	7.54%	7.56%	9.23%	9.30%
Cervix	1	2.25%	3.23%	3.34%	11.33%	12.22%	12.82%*
	2	15.28%	16.61%	16.76%	15.38%	17.91%	16.52%
	3	17.65%*	16.76%*	16.2%*	16.16%*	16.82%*	15.39%*
Colorectal	1	0.75%	2.71%	2.95%	3.27%	5.26%	12.67%
	2	8.17%	8.42%	7.95%	8.88%	10.90%	13.59%
	3	14.31%	15.17%	14.72%	15.05%	17.07%	16.78%
Kidney	1	1.23%	2.45%	5.02%	7.74%	10.84%	17.17%
	2	9.92%*	10.35%	7.89%	11.77%	15.06%	15.63%
	3	14.65%	13.71%	15.03%	14.95%	16.01%	17.18%
Larynx	1	3.64%*	5.23%	10.65%	8.81%	6.96%	10.22%
	2	13.57%*	16.61%	12.25%	16.28%	17.84%	17.21%
	3	15.12%*	17.73%	17.26%	18.26%	17.31%	17.03%*
Liver	1	18.59%*	18.53%*	18.45%	17.97%	15.98%	17.11%*
	2	17.05%*	17.59%*	16.58%	15.94%	14.26%	16.3%*
	3	7.34%*	8.48%*	6.67%*	6.35%	6.78%*	8.06%*
Lung	1	3.55%	10.66%	16.55%	17.74%	17.52%	13%
	2	18.54%*	18.57%	18.25%	16.75%	11.74%	5.49%
	3	12.85%*	11.94%	9.44%	6.71%	3.54%	1.08%
Melanoma of skin	1	0.42%	1.10%	0.56%	0.19%	0%	1.16%
	2	12.03%	12.40%	14.26%	14.48%	15.28%	17.20%
	3	16.97%	16.41%	17.41%	17.64%	17.86%	17.04%
Oesophagus	1	18.25%*	18.41%	16.71%	17.75%	17.84%	12.87%
	2	16.74%*	16.09%	18.05%	16.41%	14.03%	3.85%
	3	15.3%*	14.48%	11.74%	11.22%	7.54%	1.52%
Ovary	1	2.77%	3.93%	5.92%	5.45%	6.39%	3.26%
	2	14.7%*	14.40%	16.07%	15.75%	16.97%	17.42%
	3	17.13%	17.77%	15.26%	13.12%	9.95%	6.72%

Pancreas	1	17.34%*	16.72%*	16.87%*	16.71%	11.35%	14.38%*
	2	13.05%*	11.95%*	12.30%	9.73%	8.47%	11.96%*
	3	3.92%*	3.14%*	3.4%*	3.39%*	3.36%*	6.35%*
Prostate	1	1.06%*	1.06%	0.04%	0%	0%	1.89%
	2	0%*	0%	0%	0%	0%	1.78%
	3	1.34%*	1.34%	1.32%	0.70%	1.01%	6.75%
Stomach	1	13.3%*	13.42%	15.93%	15.53%	15.53%	15.20%
	2	18.35%*	18.28%*	18.19%	17.40%	15.35%	8.05%
	3	15.12%*	14.90%	15.72%	13.62%	11.21%	3.95%
Testis	1	0.19%	0.06%	0.30%	0%	0%*	0.31%*
	2	0.61%	1.30%	1.26%*	2.22%*	2.22%*	N/A
	3	5.46%*	5.7%*	5.56%*	8.13%*	9.66%*	N/A
Thyroid	1	0.05%	0%	1.18%	0%	1.38%	0.67%*
	2	2.39%*	3.67%	0%	0.04%	1.42%	0.69%*
	3	0.52%*	0.83%	2.35%	0.73%	3.90%	1.05%
Uterus	1	1.34%	2.83%	3.30%	5.12%	7.08%	8.66%
	2	9.6%*	8.88%	9.76%	13%	16.19%	17.32%
	3	16.73%*	16.04%	17.82%	18.26%	16.27%	13.68%

Supplementary Table 5 is provided as a separate XLSX file.

Supplementary Table 6 - Absolute survival benefit from investigatory referral.

Absolute survival benefit describes referral (and subsequent management of cancer) versus no referral.

Per patient referred (by age group and nosocomial infection rate).

Different age groups and differing levels of nosocomial infection rates (0.5%, 1%, 2.5%, 5%) considered.

Green indicates net survival advantage for investigatory referral per referred patient; Red indicates net survival diasadvantage for investigatory referral

Nosocomial Infection Rate (for investigatory referral)	0.50%						1%						2.50%						5%					
Age (years)	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**
Bladder	9.70%	10.10%	10.33%	9.57%	8.03%	5.17%	9.70%	10.09%	10.31%	9.54%	7.98%	5.09%	9.69%	10.08%	10.28%	9.46%	7.82%	4.86%	9.68%	10.07%	10.23%	9.33%	7.57%	4.48%
Brain	0.78%	0.72%	0.55%	0.41%	0.28%	0.27%	0.78%	0.71%	0.55%	0.39%	0.24%	0.20%	0.78%	0.71%	0.53%	0.34%	0.12%	-0.03%	0.77%	0.70%	0.49%	0.25%	-0.09%	-0.41%
Breast	3.81%	4.10%	4.21%	4.21%	3.83%	2.77%	3.80%	4.09%	4.20%	4.19%	3.79%	2.69%	3.80%	4.09%	4.18%	4.13%	3.66%	2.46%	3.80%	4.08%	4.14%	4.03%	3.45%	2.08%
Cervix	2.31%	2.14%	1.95%	1.64%	1.11%	0.64%	2.31%	2.14%	1.94%	1.62%	1.07%	0.57%	2.31%	2.13%	1.92%	1.56%	0.94%	0.34%	2.30%	2.12%	1.88%	1.47%	0.74%	-0.03%
Colorectal	1.36%	1.31%	1.32%	1.30%	1.13%	0.83%	1.35%	1.31%	1.31%	1.28%	1.09%	0.75%	1.35%	1.30%	1.29%	1.21%	0.95%	0.51%	1.35%	1.29%	1.25%	1.12%	0.73%	0.12%
Kidney	11.95%	11.59%	11.03%	10.33%	9.20%	5.76%	11.95%	11.59%	11.01%	10.29%	9.14%	5.67%	11.94%	11.58%	10.98%	10.19%	8.94%	5.41%	11.93%	11.56%	10.92%	10.04%	8.64%	4.99%
Larynx	1.26%	1.13%	1.15%	1.05%	0.93%	0.73%	1.26%	1.13%	1.15%	1.03%	0.89%	0.65%	1.26%	1.12%	1.12%	0.97%	0.75%	0.40%	1.25%	1.11%	1.09%	0.87%	0.54%	0.01%
Liver	0.50%	0.55%	0.47%	0.38%	0.25%	0.35%	0.50%	0.55%	0.46%	0.36%	0.21%	0.27%	0.50%	0.54%	0.44%	0.31%	0.09%	0.05%	0.50%	0.53%	0.41%	0.22%	-0.12%	-0.32%
Lung	3.37%	2.16%	1.69%	1.41%	0.90%	0.38%	3.37%	2.16%	1.68%	1.39%	0.85%	0.30%	3.37%	2.15%	1.66%	1.32%	0.73%	0.08%	3.36%	2.14%	1.62%	1.23%	0.51%	-0.30%
Melanoma of skin	4.03%	3.97%	3.89%	3.78%	3.55%	2.89%	4.03%	3.97%	3.88%	3.76%	3.50%	2.81%	4.03%	3.96%	3.86%	3.70%	3.37%	2.57%	4.02%	3.95%	3.82%	3.60%	3.16%	2.18%
Oesophagus	0.99%	0.91%	0.90%	0.80%	0.55%	0.10%	0.99%	0.90%	0.89%	0.78%	0.50%	0.02%	0.98%	0.90%	0.87%	0.72%	0.38%	-0.20%	0.98%	0.89%	0.83%	0.62%	0.17%	-0.57%
Oral cavity	0.87%	0.70%	0.59%	0.53%	0.44%	0.31%	0.87%	0.70%	0.58%	0.51%	0.40%	0.24%	0.86%	0.70%	0.56%	0.45%	0.28%	0.01%	0.86%	0.69%	0.53%	0.36%	0.07%	-0.36%
Oropharynx	0.37%	0.34%	0.29%	0.20%	0.12%	0.03%	0.37%	0.34%	0.28%	0.19%	0.08%	-0.04%	0.37%	0.33%	0.26%	0.13%	-0.04%	-0.26%	0.37%	0.32%	0.23%	0.04%	-0.24%	-0.64%
Ovary	2.16%	1.78%	1.44%	1.10%	0.81%	0.66%	2.16%	1.78%	1.43%	1.08%	0.77%	0.58%	2.15%	1.78%	1.41%	1.02%	0.64%	0.35%	2.15%	1.76%	1.38%	0.92%	0.43%	-0.03%
Pancreas	0.32%	0.28%	0.29%	0.18%	0.11%	0.18%	0.32%	0.28%	0.28%	0.16%	0.07%	0.11%	0.32%	0.27%	0.26%	0.11%	-0.05%	-0.11%	0.31%	0.26%	0.23%	0.02%	-0.25%	-0.49%
Prostate	12.25%	12.23%	12.32%	12.31%	12.08%	10.09%	12.24%	12.23%	12.31%	12.28%	12.02%	10.02%	12.24%	12.22%	12.26%	12.18%	11.87%	9.79%	12.23%	12.20%	12.20%	12.02%	11.62%	9.41%
Stomach	1.19%	1.17%	1.01%	0.90%	0.75%	0.24%	1.19%	1.17%	1.00%	0.88%	0.71%	0.16%	1.19%	1.16%	0.98%	0.82%	0.57%	-0.06%	1.18%	1.15%	0.94%	0.72%	0.36%	-0.43%
Testis	6.45%	6.50%	6.38%	6.39%	6.19%	5.76%	6.45%	6.49%	6.37%	6.37%	6.15%	5.68%	6.45%	6.49%	6.35%	6.31%	6.01%	5.43%	6.44%	6.47%	6.31%	6.21%	5.79%	5.03%
Thyroid	1.57%	1.54%	1.49%	1.52%	1.34%	1.40%	1.56%	1.53%	1.48%	1.50%	1.30%	1.32%	1.56%	1.53%	1.46%	1.44%	1.17%	1.08%	1.56%	1.52%	1.43%	1.34%	0.96%	0.68%
Uterus	2.73%	2.59%	2.54%	2.36%	2.08%	1.74%	2.73%	2.59%	2.53%	2.34%	2.03%	1.65%	2.73%	2.58%	2.51%	2.27%	1.90%	1.41%	2.72%	2.57%	2.47%	2.17%	1.68%	1.01%

Supplementary Table 7: Survival benefit per referred patient of prompt investigatory refferal versus 2-, 4-, and 6-month delay.

Per patient referred (by age group and nosocomial infection rate).

Different age groups and differing levels of nosocomial infection rates (0.5%, 1%, 2.5%, 5%) considered.

Red indicates net survival advantage for investigatory referral compared to delay; Green indicates net survival diasadvantage for investigatory referral compared to delay.

Nosocomial COVID-19 Infection Rate (for investigatory referral)	0.50%						1%						2.50%						5%					
2 month delay																								
	30-39	40-49	50-59	60-69	70-79	80+	30-39	40-49	50-59	60-69	70-79	80+	30-39	40-49	50-59	60-69	70-79	80+	30-39	40-49	50-59	60-69	70-79	80+
Bladder	1.47%	1.38%	1.31%	1.12%	0.82%	0.09%	1.46%	1.38%	1.30%	1.10%	0.78%	0.02%	1.46%	1.37%	1.28%	1.05%	0.65%	-0.21%	1.46%	1.36%	1.25%	0.95%	0.45%	-0.58%
Brain	0.07%	0.09%	0.11%	0.10%	0.08%	0.04%	0.07%	0.09%	0.10%	0.09%	0.04%	-0.03%	0.07%	0.08%	0.08%	0.03%	-0.09%	-0.26%	0.06%	0.07%	0.05%	-0.06%	-0.29%	-0.63%
Breast	0.14%	0.09%	0.07%	0.05%	0.07%	0.06%	0.14%	0.09%	0.06%	0.03%	0.03%	-0.01%	0.14%	0.09%	0.04%	-0.03%	-0.09%	-0.23%	0.14%	0.08%	0.01%	-0.12%	-0.29%	-0.60%
Cervix	0.09%	0.14%	0.19%	0.17%	0.09%	-0.02%	0.09%	0.14%	0.18%	0.15%	0.05%	-0.09%	0.08%	0.13%	0.16%	0.10%	-0.07%	-0.31%	0.08%	0.12%	0.13%	0.01%	-0.27%	-0.68%
Colorectal	0.10%	0.11%	0.10%	0.08%	0.09%	0.06%	0.09%	0.11%	0.09%	0.06%	0.05%	-0.02%	0.09%	0.10%	0.07%	0.01%	-0.07%	-0.24%	0.09%	0.09%	0.04%	-0.08%	-0.28%	-0.62%
Kidney	0.40%	0.52%	0.68%	0.78%	0.81%	0.45%	0.40%	0.52%	0.68%	0.76%	0.77%	0.38%	0.40%	0.51%	0.66%	0.71%	0.64%	0.15%	0.39%	0.50%	0.62%	0.61%	0.43%	-0.22%
Larynx	0.11%	0.14%	0.13%	0.12%	0.11%	0.09%	0.11%	0.14%	0.12%	0.10%	0.07%	0.01%	0.10%	0.13%	0.10%	0.05%	-0.05%	-0.21%	0.10%	0.12%	0.07%	-0.04%	-0.25%	-0.59%
Liver	0.19%	0.20%	0.18%	0.12%	0.06%	-0.02%	0.19%	0.19%	0.18%	0.10%	0.02%	-0.10%	0.19%	0.19%	0.16%	0.05%	-0.11%	-0.32%	0.18%	0.18%	0.12%	-0.04%	-0.31%	-0.69%
Lung	0.59%	0.67%	0.63%	0.46%	0.27%	-0.01%	0.59%	0.67%	0.62%	0.44%	0.22%	-0.08%	0.58%	0.66%	0.60%	0.38%	0.10%	-0.30%	0.58%	0.65%	0.56%	0.29%	-0.10%	-0.68%
Melanoma of skin	0.08%	0.10%	0.12%	0.13%	0.15%	0.26%	0.08%	0.10%	0.11%	0.11%	0.11%	0.19%	0.08%	0.09%	0.10%	0.06%	-0.01%	-0.03%	0.07%	0.08%	0.06%	-0.03%	-0.21%	-0.41%
Oesophagus	0.37%	0.36%	0.35%	0.29%	0.13%	-0.06%	0.37%	0.36%	0.35%	0.27%	0.09%	-0.14%	0.37%	0.35%	0.33%	0.21%	-0.04%	-0.36%	0.36%	0.34%	0.29%	0.12%	-0.24%	-0.73%
Oral cavity	0.09%	0.12%	0.13%	0.11%	0.08%	0.02%	0.09%	0.12%	0.13%	0.09%	0.04%	-0.05%	0.09%	0.12%	0.11%	0.04%	-0.08%	-0.28%	0.08%	0.11%	0.07%	-0.05%	-0.28%	-0.65%
Oropharynx	0.03%	0.04%	0.05%	0.03%	0.00%	-0.05%	0.03%	0.04%	0.04%	0.01%	-0.04%	-0.12%	0.03%	0.03%	0.02%	-0.04%	-0.16%	-0.34%	0.03%	0.02%	-0.01%	-0.13%	-0.36%	-0.71%
Ovary	0.11%	0.21%	0.27%	0.25%	0.18%	0.06%	0.11%	0.21%	0.26%	0.23%	0.13%	-0.01%	0.11%	0.21%	0.24%	0.18%	0.01%	-0.24%	0.10%	0.20%	0.21%	0.09%	-0.19%	-0.61%
Pancreas	0.16%	0.14%	0.14%	0.07%	0.01%	-0.05%	0.16%	0.14%	0.14%	0.05%	-0.03%	-0.13%	0.15%	0.14%	0.12%	-0.01%	-0.15%	-0.35%	0.15%	0.13%	0.08%	-0.10%	-0.35%	-0.72%
Prostate	0.05%	0.05%	0.02%	-0.02%	-0.04%	-0.06%	0.05%	0.05%	0.01%	-0.04%	-0.08%	-0.14%	0.05%	0.04%	-0.01%	-0.09%	-0.20%	-0.36%	0.04%	0.03%	-0.04%	-0.18%	-0.40%	-0.73%
Stomach	0.33%	0.33%	0.32%	0.26%	0.19%	-0.02%	0.33%	0.32%	0.31%	0.24%	0.15%	-0.09%	0.32%	0.32%	0.29%	0.19%	0.03%	-0.31%	0.32%	0.31%	0.26%	0.10%	-0.18%	-0.68%
Testis	0.02%	0.01%	0.03%	0.00%	-0.01%	-0.01%	0.02%	0.01%	0.02%	-0.02%	-0.05%	-0.09%	0.02%	0.00%	0.00%	-0.08%	-0.17%	-0.31%	0.01%	-0.01%	-0.03%	-0.17%	-0.37%	-0.68%
Thyroid	0.00%	0.00%	0.01%	-0.02%	-0.01%	-0.07%	0.00%	0.00%	0.00%	-0.03%	-0.05%	-0.15%	0.00%	0.00%	-0.02%	-0.09%	-0.17%	-0.37%	-0.01%	-0.01%	-0.05%	-0.18%	-0.37%	-0.74%
Uterus	0.04%	0.09%	0.10%	0.14%	0.17%	0.17%	0.04%	0.09%	0.09%	0.12%	0.13%	0.09%	0.04%	0.08%	0.07%	0.06%	0.01%	-0.13%	0.03%	0.07%	0.04%	-0.03%	-0.19%	-0.51%
4 month delay																								
Bladder	3.17%	3.02%	2.89%	2.45%	1.75%	0.24%	3.16%	3.01%	2.88%	2.43%	1.71%	0.16%	3.16%	3.01%	2.86%	2.36%	1.58%	-0.06%	3.16%	2.99%	2.82%	2.26%	1.37%	-0.43%
Brain	0.16%	0.20%	0.23%	0.22%	0.17%	0.14%	0.16%	0.19%	0.23%	0.20%	0.13%	0.07%	0.16%	0.19%	0.21%	0.15%	0.01%	-0.16%	0.16%	0.18%	0.17%	0.06%	-0.19%	-0.53%
Breast	0.31%	0.21%	0.15%	0.12%	0.19%	0.21%	0.31%	0.21%	0.15%	0.10%	0.15%	0.14%	0.31%	0.20%	0.13%	0.05%	0.03%	-0.09%	0.30%	0.19%	0.10%	-0.04%	-0.17%	-0.46%
Cervix	0.20%	0.33%	0.43%	0.39%	0.21%	0.03%	0.20%	0.32%	0.42%	0.37%	0.17%	-0.05%	0.20%	0.32%	0.40%	0.31%	0.05%	-0.27%	0.20%	0.31%	0.37%	0.22%	-0.15%	-0.64%
Colorectal	0.23%	0.26%	0.24%	0.22%	0.26%	0.21%	0.23%	0.25%	0.23%	0.20%	0.22%	0.14%	0.23%	0.25%	0.21%	0.15%	0.09%	-0.09%	0.22%	0.24%	0.18%	0.06%	-0.11%	-0.47%
Kidney	0.94%	1.21%	1.58%	1.80%	1.84%	0.97%	0.94%	1.21%	1.57%	1.78%	1.79%	0.89%	0.94%	1.21%	1.55%	1.72%	1.66%	0.66%	0.93%	1.20%	1.52%	1.61%	1.43%	0.28%
Larynx	0.25%	0.31%	0.29%	0.28%	0.28%	0.26%	0.25%	0.31%	0.28%	0.26%	0.24%	0.18%	0.24%	0.30%	0.26%	0.21%	0.12%	-0.05%	0.24%	0.29%	0.23%	0.12%	-0.09%	-0.43%
Liver	0.35%	0.36%	0.33%	0.22%	0.12%	0.01%	0.35%	0.36%	0.32%	0.20%	0.08%	-0.06%	0.34%	0.35%	0.30%	0.15%	-0.05%	-0.28%	0.34%	0.34%	0.27%	0.06%	-0.25%	-0.65%
Lung	1.25%	1.28%	1.14%	0.81%	0.46%	0.02%	1.25%	1.27%	1.13%	0.79%	0.42%	-0.05%	1.24%	1.27%	1.11%	0.74%	0.29%	-0.27%	1.24%	1.26%	1.07%	0.64%	0.09%	-0.64%
Melanoma of skin	0.19%	0.24%	0.29%	0.33%	0.41%	0.67%	0.19%	0.24%	0.29%	0.31%	0.37%	0.60%	0.19%	0.23%	0.27%	0.26%	0.24%	0.37%	0.18%	0.22%	0.23%	0.17%	0.04%	0.00%
Oesophagus	0.67%	0.64%	0.63%	0.52%	0.23%	-0.06%	0.67%	0.64%	0.62%	0.50%	0.19%	-0.13%	0.67%	0.63%	0.60%	0.44%	0.07%	-0.36%	0.66%	0.62%	0.57%	0.34%	-0.13%	-0.73%

Oral cavity	0.21%	0.26%	0.27%	0.24%	0.20%	0.10%	0.20%	0.26%	0.27%	0.22%	0.16%	0.03%	0.20%	0.26%	0.25%	0.17%	0.04%	-0.20%	0.20%	0.25%	0.21%	0.08%	-0.17%	-0.57%
Oropharynx	0.08%	0.09%	0.10%	0.07%	0.04%	-0.03%	0.08%	0.09%	0.10%	0.06%	0.00%	-0.10%	0.07%	0.09%	0.08%	0.00%	-0.12%	-0.32%	0.07%	0.08%	0.04%	-0.09%	-0.32%	-0.69%
Ovary	0.25%	0.47%	0.57%	0.51%	0.36%	0.17%	0.25%	0.47%	0.57%	0.49%	0.32%	0.09%	0.25%	0.47%	0.55%	0.43%	0.20%	-0.13%	0.25%	0.46%	0.51%	0.34%	-0.01%	-0.50%
Pancreas	0.26%	0.23%	0.24%	0.11%	0.04%	-0.04%	0.26%	0.23%	0.23%	0.09%	0.00%	-0.12%	0.25%	0.22%	0.21%	0.04%	-0.13%	-0.34%	0.25%	0.21%	0.18%	-0.05%	-0.33%	-0.71%
Prostate	0.12%	0.12%	0.05%	-0.02%	-0.04%	-0.05%	0.12%	0.11%	0.04%	-0.04%	-0.08%	-0.13%	0.11%	0.11%	0.02%	-0.09%	-0.20%	-0.35%	0.11%	0.10%	-0.01%	-0.18%	-0.40%	-0.72%
Stomach	0.64%	0.64%	0.61%	0.50%	0.38%	0.01%	0.64%	0.64%	0.60%	0.48%	0.34%	-0.06%	0.64%	0.63%	0.58%	0.42%	0.21%	-0.28%	0.63%	0.62%	0.54%	0.33%	0.00%	-0.66%
Testis	0.05%	0.03%	0.06%	0.01%	0.02%	0.06%	0.05%	0.03%	0.06%	0.00%	-0.02%	-0.02%	0.05%	0.02%	0.04%	-0.06%	-0.14%	-0.24%	0.04%	0.01%	0.00%	-0.15%	-0.34%	-0.61%
Thyroid	0.00%	0.01%	0.02%	-0.01%	0.02%	-0.07%	0.00%	0.01%	0.02%	-0.03%	-0.02%	-0.15%	0.00%	0.00%	0.00%	-0.09%	-0.14%	-0.37%	-0.01%	-0.01%	-0.04%	-0.18%	-0.34%	-0.74%
Uterus	0.10%	0.21%	0.24%	0.33%	0.43%	0.45%	0.10%	0.21%	0.23%	0.32%	0.39%	0.37%	0.10%	0.21%	0.21%	0.26%	0.27%	0.14%	0.09%	0.20%	0.18%	0.17%	0.07%	-0.23%
6 month delay																								
Bladder	4.98%	4.81%	4.65%	3.86%	2.64%	0.35%	4.98%	4.81%	4.64%	3.84%	2.60%	0.27%	4.97%	4.80%	4.62%	3.77%	2.47%	0.05%	4.97%	4.78%	4.58%	3.67%	2.25%	-0.32%
Brain	0.27%	0.32%	0.35%	0.31%	0.24%	0.21%	0.27%	0.31%	0.35%	0.30%	0.19%	0.14%	0.27%	0.31%	0.33%	0.24%	0.07%	-0.09%	0.27%	0.30%	0.29%	0.15%	-0.13%	-0.47%
Breast	0.50%	0.34%	0.26%	0.21%	0.34%	0.37%	0.50%	0.34%	0.25%	0.19%	0.30%	0.30%	0.50%	0.33%	0.23%	0.14%	0.18%	0.07%	0.49%	0.32%	0.20%	0.04%	-0.02%	-0.30%
Cervix	0.36%	0.56%	0.72%	0.61%	0.32%	0.06%	0.36%	0.56%	0.71%	0.60%	0.28%	-0.02%	0.36%	0.55%	0.69%	0.54%	0.16%	-0.24%	0.35%	0.54%	0.66%	0.45%	-0.04%	-0.61%
Colorectal	0.40%	0.44%	0.41%	0.39%	0.45%	0.36%	0.40%	0.43%	0.41%	0.37%	0.41%	0.28%	0.39%	0.43%	0.39%	0.32%	0.28%	0.05%	0.39%	0.42%	0.35%	0.23%	0.07%	-0.33%
Kidney	1.66%	2.12%	2.71%	3.03%	3.01%	1.41%	1.66%	2.12%	2.71%	3.01%	2.96%	1.33%	1.65%	2.11%	2.68%	2.94%	2.81%	1.10%	1.65%	2.10%	2.64%	2.83%	2.58%	0.72%
Larynx	0.41%	0.50%	0.48%	0.46%	0.46%	0.42%	0.41%	0.50%	0.47%	0.44%	0.42%	0.34%	0.41%	0.50%	0.45%	0.38%	0.29%	0.11%	0.40%	0.49%	0.42%	0.29%	0.08%	-0.28%
Liver	0.44%	0.47%	0.42%	0.28%	0.14%	0.04%	0.44%	0.47%	0.41%	0.26%	0.10%	-0.04%	0.44%	0.46%	0.39%	0.20%	-0.02%	-0.26%	0.43%	0.45%	0.36%	0.11%	-0.22%	-0.63%
Lung	1.92%	1.74%	1.47%	1.02%	0.55%	0.03%	1.92%	1.74%	1.46%	1.00%	0.50%	-0.04%	1.92%	1.73%	1.44%	0.94%	0.38%	-0.26%	1.91%	1.72%	1.40%	0.84%	0.17%	-0.63%
Melanoma of skin	0.34%	0.43%	0.52%	0.59%	0.73%	1.15%	0.34%	0.43%	0.52%	0.57%	0.69%	1.07%	0.34%	0.42%	0.50%	0.52%	0.57%	0.84%	0.34%	0.41%	0.46%	0.43%	0.37%	0.46%
Oesophagus	0.86%	0.81%	0.80%	0.65%	0.29%	-0.06%	0.86%	0.81%	0.79%	0.63%	0.24%	-0.13%	0.86%	0.80%	0.77%	0.57%	0.12%	-0.35%	0.85%	0.79%	0.74%	0.47%	-0.08%	-0.72%
Oral cavity	0.34%	0.41%	0.40%	0.35%	0.29%	0.16%	0.34%	0.40%	0.40%	0.33%	0.25%	0.08%	0.33%	0.40%	0.38%	0.28%	0.13%	-0.14%	0.33%	0.39%	0.34%	0.19%	-0.08%	-0.51%
Oropharynx	0.13%	0.15%	0.16%	0.11%	0.07%	-0.02%	0.13%	0.15%	0.16%	0.10%	0.02%	-0.09%	0.13%	0.15%	0.14%	0.04%	-0.10%	-0.31%	0.12%	0.14%	0.10%	-0.05%	-0.30%	-0.68%
Ovary	0.44%	0.77%	0.87%	0.73%	0.49%	0.24%	0.44%	0.77%	0.86%	0.71%	0.45%	0.16%	0.44%	0.76%	0.84%	0.65%	0.32%	-0.06%	0.43%	0.75%	0.81%	0.55%	0.12%	-0.44%
Pancreas	0.31%	0.27%	0.28%	0.13%	0.04%	-0.04%	0.30%	0.27%	0.27%	0.11%	0.00%	-0.11%	0.30%	0.26%	0.25%	0.05%	-0.12%	-0.34%	0.30%	0.25%	0.22%	-0.04%	-0.32%	-0.71%
Prostate	0.19%	0.19%	0.09%	-0.02%	-0.04%	-0.04%	0.19%	0.19%	0.08%	-0.04%	-0.08%	-0.11%	0.19%	0.18%	0.06%	-0.09%	-0.20%	-0.34%	0.18%	0.17%	0.03%	-0.18%	-0.40%	-0.71%
Stomach	0.90%	0.89%	0.82%	0.67%	0.50%	0.02%	0.90%	0.89%	0.81%	0.65%	0.46%	-0.05%	0.90%	0.88%	0.79%	0.59%	0.33%	-0.27%	0.89%	0.87%	0.76%	0.49%	0.12%	-0.65%
Testis	0.09%	0.05%	0.11%	0.04%	0.05%	0.14%	0.09%	0.05%	0.10%	0.02%	0.01%	0.06%	0.08%	0.04%	0.08%	-0.04%	-0.11%	-0.16%	0.08%	0.03%	0.05%	-0.13%	-0.31%	-0.53%
Thyroid	0.00%	0.02%	0.04%	-0.01%	0.05%	-0.07%	0.00%	0.02%	0.04%	-0.03%	0.01%	-0.15%	0.00%	0.01%	0.02%	-0.08%	-0.11%	-0.37%	-0.01%	0.00%	-0.02%	-0.17%	-0.31%	-0.74%
Uterus	0.18%	0.38%	0.43%	0.58%	0.74%	0.75%	0.18%	0.38%	0.42%	0.57%	0.70%	0.68%	0.18%	0.37%	0.40%	0.51%	0.58%	0.44%	0.17%	0.36%	0.37%	0.42%	0.37%	0.06%

Supplementary Table 8: Life-years lost per patient referred from 2-, 4-, and 6-month delay (by age group).

Nosocomial infection rate: 0.5% per investigatory referral.

Red indicates values above median and blue values below the median

	2 month delay						4 month delay						6 month delay					
	30-39	40-49	50-59	60-69	70-79	80+	30-39	40-49	50-59	60-69	70-79	80+	30-39	40-49	50-59	60-69	70-79	80+
Bladder	0.69	0.52	0.37	0.22	0.10	0.01	1.49	1.13	0.82	0.48	0.21	0.02	2.34	1.80	1.32	0.77	0.32	0.02
Brain	0.03	0.03	0.03	0.02	0.01	0.00	0.08	0.07	0.07	0.04	0.02	0.01	0.13	0.12	0.10	0.06	0.03	0.01
Breast	0.07	0.04	0.02	0.01	0.01	0.00	0.15	0.08	0.04	0.02	0.02	0.01	0.24	0.13	0.07	0.04	0.04	0.02
Cervix	0.04	0.05	0.05	0.03	0.01	0.00	0.10	0.12	0.12	0.08	0.03	0.00	0.17	0.21	0.20	0.12	0.04	0.00
Colorectal	0.04	0.04	0.03	0.02	0.01	0.00	0.11	0.10	0.07	0.04	0.03	0.01	0.19	0.16	0.12	0.08	0.06	0.02
Kidney	0.19	0.19	0.19	0.16	0.10	0.03	0.44	0.46	0.45	0.36	0.22	0.06	0.78	0.79	0.77	0.60	0.37	0.09
Larynx	0.05	0.05	0.04	0.02	0.01	0.01	0.12	0.12	0.08	0.06	0.03	0.02	0.19	0.19	0.14	0.09	0.06	0.03
Liver	0.09	0.07	0.05	0.02	0.01	0.00	0.16	0.14	0.09	0.04	0.01	0.00	0.21	0.18	0.12	0.06	0.02	0.00
Lung	0.28	0.25	0.18	0.09	0.03	0.00	0.59	0.48	0.32	0.16	0.06	0.00	0.90	0.65	0.42	0.20	0.07	0.00
Melanoma of skin	0.04	0.04	0.03	0.03	0.02	0.02	0.09	0.09	0.08	0.07	0.05	0.04	0.16	0.16	0.15	0.12	0.09	0.07
Oesophagus	0.17	0.13	0.10	0.06	0.02	0.00	0.31	0.24	0.18	0.10	0.03	0.00	0.41	0.30	0.23	0.13	0.03	0.00
Oral cavity	0.04	0.05	0.04	0.02	0.01	0.00	0.10	0.10	0.08	0.05	0.02	0.01	0.16	0.15	0.11	0.07	0.04	0.01
Oropharynx	0.02	0.02	0.01	0.01	0.00	0.00	0.04	0.04	0.03	0.01	0.00	0.00	0.06	0.06	0.05	0.02	0.01	0.00
Ovary	0.05	0.08	0.08	0.05	0.02	0.00	0.12	0.18	0.16	0.10	0.04	0.01	0.21	0.29	0.25	0.14	0.06	0.02
Pancreas	0.07	0.05	0.04	0.01	0.00	0.00	0.12	0.09	0.07	0.02	0.00	0.00	0.14	0.10	0.08	0.03	0.01	0.00
Prostate	0.02	0.02	0.01	0.00	0.00	0.00	0.06	0.04	0.01	0.00	0.00	0.00	0.09	0.07	0.02	0.00	0.00	0.00
Stomach	0.15	0.12	0.09	0.05	0.02	0.00	0.30	0.24	0.17	0.10	0.05	0.00	0.42	0.33	0.23	0.13	0.06	0.00
Testis	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.02	0.00	0.00	0.00	0.04	0.02	0.03	0.01	0.01	0.01
Thyroid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00
Uterus	0.02	0.03	0.03	0.03	0.02	0.01	0.05	0.08	0.07	0.07	0.05	0.03	0.08	0.14	0.12	0.12	0.09	0.05

Supplementary Table 9: Multivariate sensitivity analysis.

Lives lost and life-years lost per year from 2 month delay, by variation in Fatality HRs, COVID-19 annual population infection rate, COVID-19 per day nosocomial infection rate, and ""cancer multiplier"" for COVID-19 case fatality rate.

Highlighted in dark grey are the lives lost and life years lost per year from 2 month delay at default parameter estimates.

Progressiveness/Per Day Transition Rate	Baseline Fatality HR		Fatality HR -2CI		Fatality HR +2CI		Increased Fatality HR for High Progressiveness	
	LOW	0.0030	LOW	0.0025	LOW	0.0035	LOW	0.0030
	MOD	0.0056	MOD	0.0047	MOD	0.0065	MOD	0.0056
	HIGH	0.0056	HIGH	0.0047	HIGH	0.0065	HIGH	0.0105
IMPACT OF 2 MONTH DELAY	Lives Lost (year)	Life-Years lost (year)	Lives Lost (year)	Life-Years lost (year)	Lives Lost (year)	Life-Years lost (year)	Lives Lost (year)	Life-Years lost (year)
Cancer Multiplier: 2-fold								
Population infection rate: 0.05								
Nosocomial rate: 10%	2,909	53,203	2,426	44,313	3,398	62,227	3,788	72,170
Nosocomial rate: 5%	2,932	53,492	2,445	44,554	3,425	62,562	3,818	72,568
Nosocomial rate: 2%	2,949	53,707	2,460	44,734	3,445	62,812	3,840	72,877
Nosocomial rate: 1%	2,956	53,787	2,465	44,801	3,452	62,905	3,849	72,994
Population infection rate: 0.2								
Nosocomial rate: 10%	2,853	52,565	2,379	43,780	3,332	61,482	3,721	71,361
Nosocomial rate: 5%	2,875	52,847	2,398	44,016	3,359	61,810	3,750	71,751
Nosocomial rate: 2%	2,892	53,057	2,412	44,192	3,378	62,055	3,772	72,053
Nosocomial rate: 1%	2,898	53,136	2,417	44,257	3,385	62,146	3,780	72,168
Population infection rate: 0.5								
Nosocomial rate: 10%	2,740	51,288	2,285	42,714	3,201	59,992	3,587	69,741
Nosocomial rate: 5%	2,762	51,558	2,303	42,939	3,226	60,305	3,614	70,115
Nosocomial rate: 2%	2,777	51,759	2,316	43,108	3,244	60,540	3,635	70,406
Nosocomial rate: 1%	2,783	51,834	2,321	43,171	3,251	60,627	3,643	70,517
Cancer Multiplier: 5-fold								
Population infection rate: 0.05								
Nosocomial rate: 10%	2,881	52,884	2,402	44,046	3,365	61,854	3,754	71,765
Nosocomial rate: 5%	2,904	53,169	2,422	44,285	3,392	62,186	3,784	72,159
Nosocomial rate: 2%	2,921	53,382	2,436	44,463	3,412	62,434	3,806	72,465
Nosocomial rate: 1%	2,927	53,461	2,441	44,529	3,419	62,526	3,814	72,581
Population infection rate: 0.2								
Nosocomial rate: 10%	2,740	51,288	2,285	42,714	3,201	59,992	3,587	69,741
Nosocomial rate: 5%	2,762	51,558	2,303	42,939	3,226	60,305	3,614	70,115
Nosocomial rate: 2%	2,777	51,759	2,316	43,108	3,244	60,540	3,635	70,406
Nosocomial rate: 1%	2,783	51,834	2,321	43,171	3,251	60,627	3,643	70,517
Population infection rate: 0.5								
Nosocomial rate: 10%	2,459	48,096	2,050	40,049	2,873	56,266	3,252	65,692
Nosocomial rate: 5%	2,477	48,334	2,066	40,249	2,894	56,544	3,276	66,028
Nosocomial rate: 2%	2,491	48,513	2,077	40,398	2,910	56,751	3,294	66,289
Nosocomial rate: 1%	2,496	48,579	2,081	40,454	2,915	56,829	3,301	66,389

Supplementary Table 10: Surgical intervention (major resections only) and duration of admission (days), by stage.

Cancer	Stage	Major resection	ICU (days)	Ward (days)
Bladder	1	Cystectomy	2	7
Bladder	2	Cystectomy	2	7
Bladder	3	Cystectomy	2	7
Breast (all hormone marker statuses)	1	Wide Local Excision	0	1
Breast (all hormone marker statuses)	2	Wide Local Excision	0	1
Breast (all hormone marker statuses)	3	Wide Local Excision	0	1
Brain (all)	1-3 combined	Neuro Resection	1	3
Brain (malignant)	1-3 combined	Neuro Resection	1	3
Brain (non-malignant)	1-3 combined	Neuro Resection	1	3
Cervix	1	Open Hysterectomy+/- Bilateral Salpingo-oophrectomy	0	3
Cervix	2	Open Hysterectomy+/- Bilateral Salpingo-oophrectomy	0	3
Cervix	3	Open Hysterectomy+/- Bilateral Salpingo-oophrectomy	0	3
Colorectal	1	Open Resection/AP resection	1	5
Colorectal	2	Open Resection/AP resection	1	5
Colorectal	3	Open Resection/AP resection	1	5
Kidney	1	Partial Nephrectomy	0	5
Kidney	2	Open Nephrectomy	1	5
Kidney	3	Open Nephrectomy	1	5
Larynx	1	Laryngectomy	1	6
Larynx	2	Laryngectomy	1	6
Larynx	3	Laryngectomy + neck dissection	1	6
Liver	1	Liver resection	1	7
Liver	2	Liver resection	1	7
Liver	3	Liver resection	1	7
Lung	1	Lobectomy	1	7
Lung	2	Lobectomy	1	7
Lung	3	Lobectomy	1	7
Melanoma of skin	1	Simple skin resection	0	1
Melanoma of skin	2	Complex skin resection	0	2
Melanoma of skin	3	Complex skin resection	0	2
Oesophagus	1	Oesophagectomy	2	10
Oesophagus	2	Oesophagectomy	2	10
Oesophagus	3	Oesophagectomy	2	10
Oral cavity	1	Wide local excision	0	3
Oral cavity	2	Wide local excision	0	3
Oral cavity	3	Wide local excision	0	3
Oropharynx	1	Resection	0	3
Oropharynx	2	Resection	0	3
Oropharynx	3	Resection	0	3
Ovary	1	Uni-/Bilateral Salpingo-oophrectomy	0	2
Ovary	2	Uni-/Bilateral Salpingo-oophrectomy	0	2
Ovary	3	Bilateral Salpingo-oophrectomy/Omentectomy/Peritoneal clearance	1	7
Pancreas	1	Pancreatectomy/ Whipples Procedure	2	10
Pancreas	2	Pancreatectomy/ Whipples Procedure	2	10
Pancreas	3	Pancreatectomy/ Whipples Procedure	2	10

Prostate	1	Radical Prostatectomy	1	5
Prostate	2	Radical Prostatectomy	1	5
Prostate	3	Radical Prostatectomy	1	5
Stomach	1	Partial Gastrectomy	2	7
Stomach	2	Gastrectomy	2	9
Stomach	3	Gastrectomy	2	9
Testis	1	Orchidectomy	0	1
Testis	2	Orchidectomy	0	1
Testis	3	Orchidectomy + RPLN dissection	0	3
Thymus	1-3 combined	Thymectomy	0	4
Thyroid	1	Thyroidectomy/lobectomy	0	3
Thyroid	2	Thyroidectomy/lobectomy + clearance	0	3
Thyroid	3	Thyroidectomy/lobectomy + clearance	0	3
Uterus	1	Open Hysterectomy+/- BSO	0	3
Uterus	2	Open Hysterectomy+/- BSO	0	3
Uterus	3	Open Hysterectomy+/- BSO	0	3

Supplementary Table 11: 'Technical' risk of death per investigatory referral, by tumour type.

Cancer Type	Procedure-related technical risk
Colorectal	0.010%
Lung	0.005%
Bladder	0.005%

Supplementary Table 12: Criteria for Urgent (2WW) investigatory referral from Primary Care

Tumour Group	Criteria for urgent referral/urgent investigation in primary care	Criteria for non urgent referral
Brain and CNS	Adults with: • Progressive, sub-acute loss of central neurological function • New onset seizures – focal or interictal focal deficit • Rapid personality change or behavioural disturbance / slowness confirmed by witnesses with no reasonable explanation • Headache with sinister features suggestive of raised intracranial pressure including nausea, vomiting, drowsiness, pulse-synchronous tinnitus, worse on supine position, awakens sleep, behavioural slowness, cognitive decline • Isolated new onset daily headache duration	
Breast	Women of any age (particularly age ≥ 30) with the following symptoms • Suspicious breast lump • Persistent or unexplained lump in axilla • Unilateral nipple discharge (blood-stained/serous), retraction, ulceration, distortion, eczema resistant to topical steroids, other changes of concern • Skin changes that suggest breast cancer including nodules, ulceration, peau d'orange or dimpling • Unilateral non-cyclical breast pain persisting beyond one menstrual cycle (higher suspicion if aged ≥ 30) • Previous history of breast cancer plus suspicious symptoms • Men aged ≥ 50 and over with a sub-areolar lump	The following patients do not usually need urgent referral to a breast clinic - consider a non-urgent referral for the following: • Bilateral nipple discharge • Sebaceous cysts • Bilateral gynaecomastia • Bilateral breast pain • Asymptomatic patients with a family history of breast cancer. (Please note there may be a special 'family history breast clinic' in your area)
Gynae	**Ovarian Cancer** Carry out tests in primary care (see below) if a woman (especially if aged 45 or over) reports having any of the following symptoms on a persistent or frequent basis – particularly more than 12 times per month: • Persistent abdominal distension or 'bloating' • Feeling full (early satiety) and/or loss of appetite • Pelvic or abdominal pain • Increased urinary urgency and/or frequency. (CG122, 2011)	
	Endometrial Cancer Women aged 45 and over with unexplained symptoms of vaginal discharge* who: • Are presenting with these symptoms for the first time • Have thrombocytosis • Report haematuria or • Have visible haematuria and o Low haemoglobin level o Thrombocytosis o High blood glucose levels	
	Cervix • Appearance of cervix consistent with cervical cancer	
	Vagina • Unexplained palpable mass in or at entrance to vagina	
	Vulva • Unexplained vulval lump, ulceration or bleeding	

Head and Neck	**Laryngeal/Pharyngeal Cancer**
	• Unexplained lump or mass in the neck / throat
	• ≥ 40 years old with:
	  ○ Persistent unexplained hoarseness (≥ 3 weeks)
	  ○ ≥ 4 weeks of persistent, particularly unilateral, discomfort in the throat or throat pain
	• ≥ 40 years old with
	  ○ ≥ 3 weeks of dysphagia
	  ○ ≥ 3 weeks of odynophagia
	  ○ ≥ 3 weeks of otalgia	

	Salivary Cancer • ≥ 40 years old with unexplained or persistent parotid orsubmandibular swelling • Firm sub-mucosal swelling in the oral cavity	
	Ear/Nose/Sinus Cancer • Persistent unilateral otalgia • Serosanguinous nasal discharge which persists for more than three weeks • Unilateral nasal obstruction associated with a purulent discharge • Facial palsy / cranial neuropathies • Orbital masses • Severe facial pain	
	Thyroid Cancer • Unexplained solitary thyroid lump • Ultrasound suggestive of thyroid cancer	
	Oral/Lip Cancer • ≥ 3 weeks unexplained ulceration in the oral cavity • Suspicious lump/mass on the lip or in the oral cavity • A red or red and white patch in the oral cavity suggestive of leukoplakia or erythroleukoplakia • Tooth mobility not associated with periodontal disease • Poor healing ≥ 3 weeks post tooth extraction	

Lower GI	• Abnormal lower GI investigations (colonoscopy/flexible sigmoidoscopy) suggestive of cancer
	• Positive FIT (Faecal Immunochemical Test) suggestive of cancer
	• Any age with unexplained rectal or abdominal mass
	• Any age with unexplained anal mass or unexplained anal ulceration
	• ≥40 years and over with unexplained weight loss and abdominal pain
	• ≤50 years with rectal bleeding and any of the following unexplained symptoms:
	  ○ Abdominal pain
	  ○ Change in bowel habit
	  ○ Weight loss
	  ○ Iron deficiency anaemia (attach results)
	• ≥50 years with unexplained rectal bleeding
	• ≥60 years with iron deficiency anaemia
	• ≥60 years with changes in their bowel habit	

Lung and Pleural	• Age ≥ 40 years with UNEXPLAINED haemoptysis • Abnormal chest x-ray suggestive of lung cancer or mesothelioma (such as a slowly resolving consolidation or pleural effusion) • Abnormal CT scan suggestive of lung cancer or mesothelioma • Features suggestive of lung cancer metastasis including bone pain, paraneoplastic signs or history of cancer • Normal chest x-ray but high suspicion of lung cancer	
Melanoma	Refer patients with a suspicious pigmented skin lesion with a weighted 7-point checklist score of 3 or more. Each major feature scores 2 points. Each minor feature scores 1 point. Major Features of the legions (scoring 2 points each): • Change in size • Irregular shape • Irregular colour Minor Features of the legions (scoring 1 point each): • Largest diameter 7 mm or more • Oozing • Inflammation • Change in sensation	
Upper GI	**Oesophagus/Stomach** • Dysphagia • Weight loss with any of the following: ○ Upper abdominal pain (also consider pancreatic cancer) or reflux ordyspepsia • Abnormal upper GI endoscopy suggestive of cancer (or high grade dysplasia of oesophagus) • Upper abdominal mass consistent with stomach cancer • Suspicious symptoms or signs but no GP direct access to urgent upper GI endoscopy	
	Pancreas • People aged 60 and over with weight loss and any of the following: ○ diarrhoea, back pain, abdominal pain, nausea, vomiting, constipation, or new-onset diabetes • Abnormal abdominal CT or ultrasound scan suggestive of pancreatic cancer • ≥ 40 years old with jaundice (consider a referral for same day assessment if appropriate) • Suspicious symptoms or signs but no GP direct access to urgent pancreatic CT scan	
	Liver/Gall Bladder • Upper abdominal mass consistent with an enlarged gall bladder or liver • Abnormal abdominal ultrasound scan suggestive of liver/gallbladder cancer • Upper abdominal mass consistent with an enlarged liver/gall bladder • Suspicious symptoms or signs but no GP direct access to urgent ultrasound scan	

Urology	**Testicular Cancer** Refer men if they have: • A solid intra-testicular lump • Non-painful enlargement or change in shape or texture of the testis • Abnormal ultrasound scan suggestive of testicular cancer	
	Prostate Cancer Refer men if: • Prostate feels malignant on digital rectal examination • PSA levels are above the age-specific reference range. For patients with a slightly elevated PSA, a suspected cancer referral is still recommended.	

	Bladder Cancer
	• Adults aged ≥45 with:
	  ○ UNEXPLAINED visible haematuria without urinary tract infection
	  ○ Visible haematuria that persists or recurs after successful treatment of urinary tract infection
	• Adults aged ≥60 with:
	  ○ UNEXPLAINED non-visible haematuria and either dysuria or a raised white cell count
		Blood Cancer GPs should consider non-urgent referral for bladder cancer in people aged 60 and over with recurrent or persistent UNEXPLAINED urinary tract infection. 'Non-visible' or 'trace' haematuria is determined by dipstick urinalysis of a fresh urine sample. Dipstick testing is preferable to microscopy as it is more reliable and not compromised by haemolysis; the test should be repeated twice.

	Renal Cancer
	• Abnormal ultrasound scan suggestive of renal cancer
	• Adults ≥45 with:
	  ○ UNEXPLAINED visible haematuria without urinary tract infection
	  ○ Visible haematuria that persists or recurs after successful treatment of urinary tract infection
	• Asymptomatic renal cysts described as simple in the radiology report do not require referral.	

	Penile Cancer • Penile mass or ulcerated lesion, where a sexually transmitted infection has been excluded as a cause • Persistent penile lesion after treatment for a sexually transmitted infection has been completed • Unexplained or persistent symptoms affecting the foreskin or glans	

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