

A review of current and future demand and capacity for cancer diagnostic services in the Thames Valley

Gynaecology, Urology, Lung, Colorectal, Upper GI

Modelling future demand
for cancer diagnostics

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Introduction

This report is one of a number of reports produced by Solutions for Public Health (SPH) as part of a project commissioned by the Thames Valley Strategic Cancer Network (TVSCN) to review the current and future demand for cancer diagnostic capacity across the Thames Valley. The project reviewed the following cancer specialties;

- gynaecology (specifically ovarian, cervical, vulvar, and endometrial cancers)
- colorectal
- upper GI (specifically oesophageal, pancreas and stomach cancers)
- lung
- urological cancers (specifically bladder, kidney and prostate cancers).

The reports resulting from this project are:

- Guidance summary of national reports focussed on cancer published between 2014-15
- Trends in cancer data
- Modelling future demand for cancer diagnostics
- Trust reports – one for each of the six provider Trusts within the Thames Valley Strategic Clinical Network including:
 - Oxford University Hospitals NHS Foundation Trust
 - Royal Berkshire NHS Foundation Trust
 - Buckinghamshire Healthcare NHS Trust
 - Frimley Park NHS Foundation Trust (Frimley North Hospital)
 - Milton Keynes NHS Foundation Trust
 - Great Western Hospitals NHS Foundation Trust

This report estimates the future demand for cancer diagnostics in each of the five cancer specialties for each health economy and hospital provider in the Thames Valley SCN area. Health economy was considered to be a more realistic commissioning level than individual CCG where a number of CCGs looked towards the same provider for cancer diagnostics and treatment. In addition some cancer diagnoses were very low (<5) for the smaller CCGs.

Table 1: Thames Valley CCGs and their equivalent health economy and main provider for referral for suspected cancer

CCG Name	Health Economy Name	Main provider for suspected cancer referral
NHS Bracknell and Ascot	East Berkshire	Frimley Park NHS Foundation Trust (Frimley North Hospital)
NHS Slough		
NHS Windsor, Ascot & Maidenhead		
NHS Newbury and District	West Berkshire	Royal Berkshire NHS Foundation Trust
NHS North and West Reading		
NHS South Reading		
NHS Wokingham		
NHS Aylesbury Vale CCG	Buckinghamshire	Buckinghamshire Healthcare NHS Trust
NHS Chiltern CCG		
NHS Milton Keynes	Milton Keynes	Milton Keynes NHS Foundation Trust
NHS Oxfordshire	Oxfordshire	Oxford University Hospitals NHS Foundation Trust
NHS Swindon	Swindon	Great Western Hospitals NHS Foundation Trust

The report provides future estimates to the year 2021 for each of the five cancer specialties including:

- The number of patients referred with suspected cancer for the 6 health economies and 6 provider Trusts in the Thames Valley SCN.
- The number of tests carried out related to cancer for the 6 health economies and six providers in the Thames Valley SCN.

A detailed breakdown of the estimated and projected numbers of each type of test (colonoscopy, hysteroscopy, CT scan etc.) for each health economy (and provider Trust) is provided in the Modelling Data.xls Excel file which accompanies this report. Commissioners and providers are able to import their own testing data and run the model to produce results relevant to their own trust.

1 Methodology

SPH developed an Excel spreadsheet model to estimate the future number of referrals and diagnostic tests for each of the five cancer specialties to 2021. These estimates were modelled separately from Thames Valley health economies and Thames Valley provider Trusts

1.1 Model Inputs and Outputs

The model uses the following inputs in estimating future numbers of referrals and tests:

- The estimated change in the population size between now and 2021.
- The expected impact of the 2015 NICE guidance on suspected cancer referrals.
- Historical trends in the number of cancer referrals from the two week wait, national cancer screening programmes and cancers diagnosed from other routes.

The model produces the following outputs:

- Annual estimates of the number of referrals with suspected cancer for each cancer specialty for each health economy and provider Trust in the Thames Valley up to 2021.
- Annual estimates of the number of diagnostic tests relating to cancer for each cancer specialty for each health economy and provider Trust in the Thames Valley up to 2021.

1.2 Description of Model Inputs

1.2.1 Populations

Population data for the years 2009 to 2014 for each Thames Valley CCG was obtained from mid-year population estimates produced annually by the Office for National Statistics (ONS). The population data are available by CCG broken down by gender and five year age bands. As none of the cancers of interest for this project are paediatric cancers the population aged 20 and over has been used for modelling purposes.

For years beyond 2014, 2012-based sub-national population projections for the aged 20 and over population for each Thames Valley CCG, also produced by the ONS, were obtained. These population projections are also available for each CCG broken down by both gender and five year age bands. For East Berkshire, West Berkshire and Buckinghamshire, CCG populations were combined to health economy level.

For providers, it was necessary to identify appropriate hospital catchment populations for each Trust in the Thames Valley. Such data are not routinely published by the ONS or similar bodies. However, some projections originally published by the Association of Public Health Observatories (APHO) and updated by Public Health England (PHE) last year¹ were identified. These provided an estimated catchment population for each Trust for the years 2011, 2012 and 2013. These estimates were produced by analysis of Hospital Episode Statistics (HES) data at super output area level.

¹ Available from: <http://www.apho.org.uk/RESOURCE/VIEW.ASPX?RID=178644>

For example, if Super Output Area A had a population of 5,000 and in 2011 Trust 1 received 40 admissions and Trust 2 received 60 admissions, then Trust 1 would be allocated a population of 2,000 (based on 40% of the annual admissions) and Trust 2 would be allocated a population of 3,000 (based on 60% of the annual admissions).

Separate Trust catchment populations were produced for elective, emergency and total admissions. The total admissions catchment populations have been used for modelling Trust data.

The APHO/PHE projections only covered three calendar years; 2011, 2012 and 2013 and it was necessary to project these catchment populations forward to 2021 and backwards to 2009 in order to calculate referral rates per head of population. To do this:

- It was assumed that the catchment population for each Trust would be most strongly influenced by the population change in the CCG in which it was located, or in the CCGs which were in the immediate surrounding area.
- Each Trust catchment population was projected for future years according to the year on year percentage change projected by the ONS for these CCGs.
 - For example, to estimate the catchment population of Milton Keynes NHS Foundation Trust in 2014, the 2013 catchment population figure provided by the APHO/PHE Trust catchment estimates was used.
 - The ONS indicated the projected change in population in Milton Keynes CCG between 2013 and 2014.
 - The ONS percentage change was applied to the Trust catchment population.
- For other Trusts, such as the Royal Berkshire NHS Foundation Trust, the year on year percentage change for the four CCGs in the ONS projections was calculated and this percentage applied to the APHO/PHE Trust catchment population estimates.

1.2.2 Referrals

Historical trend data of numbers of referrals for suspected cancer for CCGs and Trusts in the Thames Valley were another input into the model. Quarterly data on the number of two week wait referrals for suspected cancer for each of the five cancer specialties for the Thames Valley CCGs and Thames Valley Trusts from Q4 2008/09 to Q2 2015/16 was downloaded from the NCIN Cancer Commissioning Toolkit. These data were aggregated into calendar years from 2009 to 2014 and where applicable individual CCG level data was aggregated into the health economies shown in Table 1 above.

Prior to Q1 2013/14, the two week wait referral data held by the Cancer Commissioning Toolkit related to Primary Care Trusts (PCTs) and not to CCGs. Therefore, to translate historical PCT numbers of two week wait referrals into a number for each CCG, a spreadsheet produced by the ONS for calculating pre-2013 populations for CCGs from PCT populations was used. The spreadsheet indicated what proportion of each PCTs population had transferred in 2013 to each CCG. These proportions were applied to the PCT two week

wait referral data to estimate the number of two week wait referrals for each CCG, and hence each health economy in the Thames Valley.

Having estimated the number of two week wait referrals for each cancer specialty for the Thames Valley CCGs and Trusts for the calendar years 2009 to 2014, these numbers were applied to the annual CCG population estimates and the Trust catchment populations for each year to generate a crude annual referral rate for each CCG and each cancer provider for each year between 2009 and 2014

Then the same process was carried out with a number of cancers diagnosed and treated within 31 days from routes other than the two week wait for each of the five cancer specialties (from the NCIN toolkit). There was a marked difference in the number of annual diagnoses for 2013 and 2014 compared to 2009 to 2012. It is not clear to us what the cause of this variation is, but it was felt most likely to be a reflection of a change in the service and/or data recording.

The commissioner data matched the equivalent Trust data most closely in 2011 and 2012 so average referral rates for these years for each health economy and specialty were used to calculate estimated 2013 and 2014 numbers of health economy referrals.

The historical number of cancers diagnosed and treated in 31 days via routes other than the two week wait for the Thames Valley CCGs was much higher than the numbers of cancers diagnosed and treated in 31 days for the Thames Valley Trusts. SPH raised this as a query with the NCIN and are waiting for a response.

For cervical and colorectal cancer additional data was sourced from the NHS Bowel Cancer Screening Programme and the NHS Cervical Cancer Screening Programme.

Trust referral data was available from Health and Social Care Information Centre (HSCIC) for the years from 2008/09 to 2014/15 for cervical screening but not by CCG. Steps to calculate CCG estimates:

- Worked out the percentage of all gynaecological referrals from screening and from all other routes – for each Trust and for each year 2008/9 to 2014/15.
- Allocated each Trust to a health economy e.g. Buckinghamshire Healthcare to Buckinghamshire.
- Applied the percentages of Trust referrals from screening versus all other routes to the total referrals of their associated health economy. See worked example in Table 2.

Table 2: Example of calculating screening referrals for CCGs from known numbers of referrals from providers

Organisation	Referral Type	Number of Referrals	% of Total
Provider	Non screening	120	38.7 %
	Screening	190	61.3 %
	Total	310	100 %
CCG Health Economy	Non screening	110	
	Screening	$110 / .387 \times .613 = 174$	
	Total	284	

The Southern Bowel Cancer Screening Hub provided data on the number of referrals with suspected bowel cancer for both Thames Valley CCGs and Thames Valley Trusts from 2008/09 to mid-February 2015/16.

Referrals from the cervical and bowel cancer screening programmes were added to the two week wait referrals and cancers diagnosed by other routes to give a total number of referrals for each specialty by health economy and Trust.

The number of referrals for each specialty each year was applied to the health economy population projections and the Trust catchment population projections to produce a crude referral rate per 100,000 population per year for each year from 2009 to 2014.

1.2.3 Diagnostic Tests

Trusts were asked to send SPH anonymised patient level events data where available i.e.; all diagnostic and outpatient events listed by anonymised patient for the five specialties for 2014/15. For most Trusts this was not feasible because information was kept in separate unlinked IT systems (pathology, patient administration, cancer information, radiology).

Milton Keynes NHS Foundation Trust was able to submit a full set of data, a second Trust submitted data about one specialty and a third sent a sample of data in a format which was unfortunately unreadable.

1.2.4 NICE estimates of changes to referrals as a result of new guidance

NICE provided cancer networks with a spreadsheet tool to aid their planning as part of the implementation of the NICE guideline on suspected cancer (NG12). The spreadsheet tool contained estimates of the impact on urgent GP referrals of implementing NG12 partially or in full. The minimum and maximum estimates are in Table 3 below.

Table 3: Estimates of changes to GP 2 week wait cancer referrals from NICE

Cancer Specialty	Lower Estimate	Upper Estimate
Gynaecology	0%	0%
Colorectal	5%	15%
Upper GI	-40%	-80%
Lung	10%	15%
Urological	5%	10%

Source: NICE NG12 Suspected Cancer - Recognition and Referral

The reduction in 2 week wait cancer referrals for Upper GI of between -40% to -80% is predicated on the assumption that primary care will have direct access to endoscopy services commissioned by the CCG and this diagnostic test will identify those patients who are highly unlikely to have cancer prior to a 2 week wait cancer referral. A much smaller proportion of patients will therefore require a 2 week wait cancer referral to the hospital Trust. **It is important to note that the overall number of referrals will not be impacted by this change. The only change will be whether they are referred as a 2 week wait cancer pathway referral to the hospital Trust or urgent 2 week wait direct access referral to an endoscopy service.** The assumed benefit of this change in pathway is a significant reduction in the number of outpatient appointments required in the hospital Trust and associated costs. The number of tests carried out will not be affected.

1.3 Modelling Approach

Using the referral and test data by health economy and Trust, the model estimates activity in future years using the following approaches and scenarios.

1.3.1 For future referrals with suspected cancer

The model uses the historical trend data from 2008/09 to 2014/15 for two week wait, screening programme and other referrals to calculate a referral rate per 100,000 population per annum for each cancer specialty for each Thames Valley health economy and Trust.

The combined numbers of referrals for the five cancer specialties for the health economies are shown in Figure 1 below.

Figure 1: Aggregate number of referrals for the five cancer specialties for health economies in the Thames Valley SCN for the years 2009 to 2014

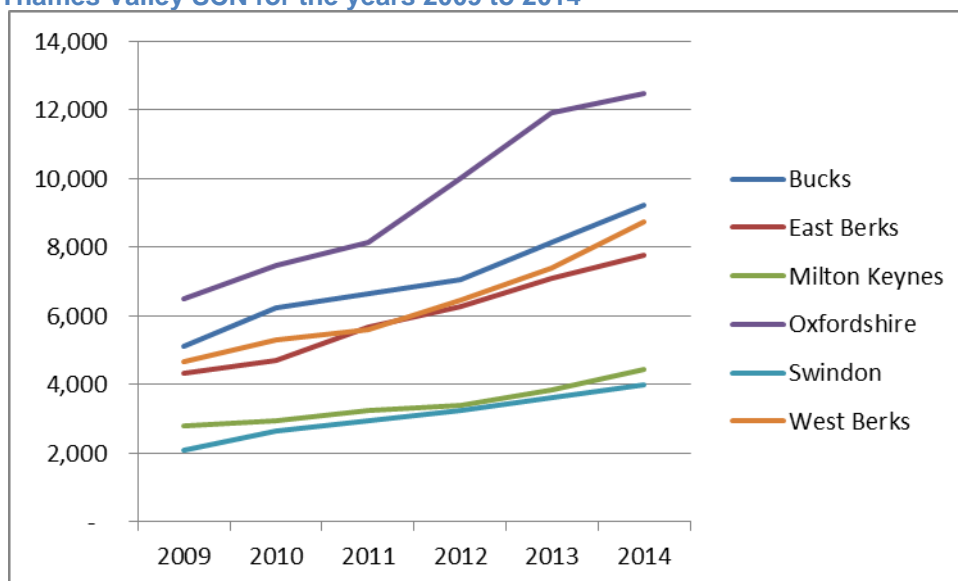


Figure 1 shows that the total number of referrals for the five cancer specialties has increased since 2009 for all of the Thames Valley health economies. Figure 2 shows the number of referrals for the five cancer specialties combined for each health economy as a rate per 1,000 adult (aged 20+) population.

Figure 2: Referrals per 1,000 population aged 20 and over for Thames Valley health economies 2009 to 2014

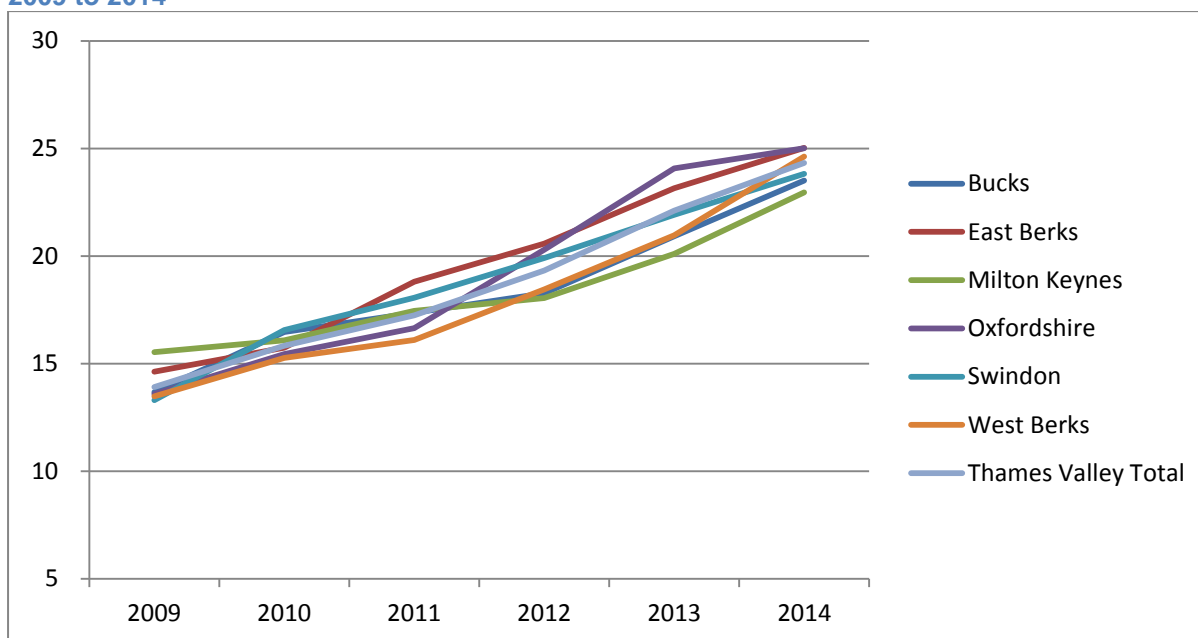


Figure 2 shows that there has been a steady increase in the referral rate per 1,000 population aged 20 and over for each of the health economies since 2009.

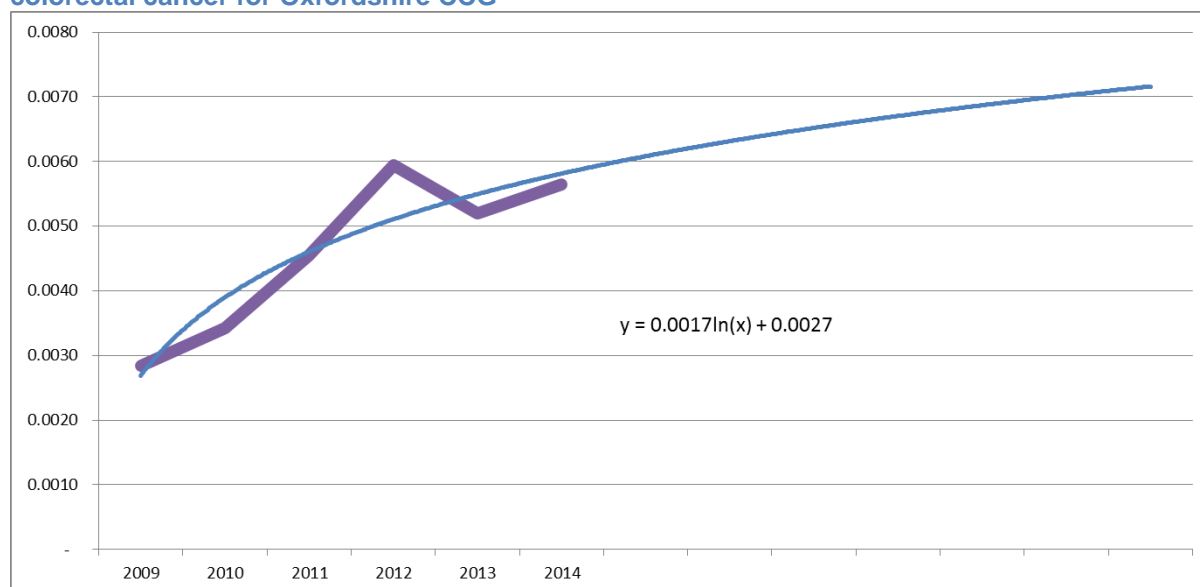
Estimating numbers of referrals for each year 2015 to 2021 inclusive for each health economy, Trust and cancer specialty was done separately for;

- 2 week wait referrals,
- non-2 week wait referrals diagnosed with cancer
- screening referrals,

The process was to chart historic referral rates, and add a logarithmic trend line to the data. This trend line was forecast forward for seven periods (the 7 years 2015 – 2021), and the coefficients of the trend line recorded. These coefficients were applied to formulae to give projected future rates for each year. These rates were applied to projected populations for the relevant year to give projected numbers of referrals. This was the baseline scenario.

Figure 3 shows an example of applying a logarithmic trend line to referral data, in this case the rate per 100,000 population of two week wait referrals for colorectal cancer for Oxfordshire CCG.

Figure 3: Example of logarithmic trend line applied to historical 2ww referral rates for colorectal cancer for Oxfordshire CCG



The anticipated changes to two week wait referrals from the NICE guidance (Table 4) were accounted for by separately adding the:

- lower NICE estimate of the change in referrals (Scenario 1)
- mid-point NICE estimate of the change in referrals (Scenario 2)
- upper NICE estimate of the change in referrals (Scenario 3).

It was assumed that the impact of the NICE guidance will not apply as a step-change in one year, but will be applied incrementally and evenly over the years 2016 – 2020 inclusive. Therefore a 10% increase will apply at 2% per year over the 5 years. Any change predicted by NICE will apply to 2 week wait referrals only and not to screening referrals or referrals via other routes.

The results for the different types of referrals were then added together to give total figures for all referrals.

1.3.2 *Cancer Diagnostic Tests*

Milton Keynes NHS Foundation Trust provided data that enabled calculation of the number of diagnostic tests per referral by cancer tumour site for the year 2014/15. An average number of each type of test per referral was applied to referral data from the other five Trusts. It is recognised that other Trusts may use diagnostic tests differently along the cancer pathway so the results may not reflect accurately their pattern of demand.

2 Results for Health Economies

The historical and projected numbers of referrals under each of the scenarios described above are shown in the tables below.

As noted in section 1.2.4 above, the NICE Guidance estimates a significant reduction if Upper GI cancer 2 week wait referrals (a lower limit of -40% and an upper limit of -80%), but the expected change is for an increase in direct diagnostic testing by GPs and subsequent changes in referral routes, rather than absolute changes in numbers of referrals and tests. For Upper GI therefore only the Baseline scenario has been calculated. Further detail of this, and a worked example of the impact of modelling the upper and lower limits given by NICE, is included in the accompanying Modelling Data.xls Excel file.

2.1 Referrals and Tests Baseline

Table 4: Baseline scenario - Actual and projected numbers of referrals, without NICE estimated changes applied

Number of Referrals - Baseline	Actual						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy													
Bucks	5,123	6,229	6,627	7,041	8,124	9,208	8,692	8,987	9,245	9,506	9,741	9,967	10,170
East Berks	4,328	4,714	5,680	6,252	7,111	7,765	7,614	7,920	8,186	8,436	8,683	8,909	9,131
Milton Keynes	2,797	2,958	3,261	3,399	3,842	4,442	4,125	4,261	4,392	4,511	4,628	4,736	4,844
Oxfordshire	6,505	7,465	8,126	10,005	11,912	12,456	12,099	12,564	12,994	13,385	13,741	14,083	14,393
Swindon	2,097	2,647	2,931	3,259	3,627	4,005	3,975	4,142	4,293	4,434	4,558	4,687	4,805
West Berks	4,660	5,311	5,611	6,471	7,399	8,754	8,144	8,442	8,733	8,990	9,229	9,451	9,657
Thames Valley Total	25,510	29,324	32,235	36,426	42,015	46,631	44,648	46,316	47,844	49,263	50,580	51,833	53,000

Table 6: Baseline scenario – Estimated and projected numbers of tests, without NICE estimated changes applied.

Number of Tests - Baseline	Actual						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy	7,283	8,794	9,303	9,922	11,540	13,038	12,291	12,708	13,074	13,444	13,777	14,097	14,386
Bucks	7,283	8,794	9,303	9,922	11,540	13,038	12,291	12,708	13,074	13,444	13,777	14,097	14,386
East Berks	6,225	6,742	8,127	8,913	10,159	11,087	10,868	11,304	11,681	12,037	12,389	12,710	13,025
Milton Keynes	4,003	4,226	4,647	4,848	5,488	6,332	5,883	6,078	6,265	6,435	6,601	6,756	6,909
Oxfordshire	9,264	10,565	11,416	14,070	16,969	17,657	17,121	17,780	18,390	18,943	19,447	19,932	20,371
Swindon	2,988	3,764	4,159	4,615	5,142	5,681	5,630	5,866	6,081	6,280	6,455	6,636	6,804
West Berks	6,625	7,520	7,950	9,147	10,477	12,453	11,547	11,971	12,385	12,750	13,088	13,404	13,697
Thames Valley Total	36,388	41,611	45,603	51,516	59,776	66,247	63,341	65,708	67,876	69,889	71,758	73,536	75,193

2.2 Referrals and Tests Scenario 1

Table 7: Scenario 1 - Baseline scenario with lower NICE estimated change applied- actual and projected numbers of referrals

Number of Referrals - Scenario 1	Actual						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy	5,123	6,229	6,627	7,041	8,124	9,208	8,692	9,035	9,344	9,659	9,951	10,236	10,445
Bucks	4,328	4,714	5,680	6,252	7,111	7,765	7,614	7,954	8,255	8,543	8,832	9,100	9,327
East Berks	2,797	2,958	3,261	3,399	3,842	4,442	4,125	4,282	4,435	4,577	4,718	4,852	4,963
Milton Keynes	6,505	7,465	8,126	10,005	11,912	12,456	12,099	12,634	13,140	13,611	14,051	14,481	14,801
Oxfordshire	2,097	2,647	2,931	3,259	3,627	4,005	3,975	4,162	4,335	4,498	4,646	4,800	4,922
Swindon	4,660	5,311	5,611	6,471	7,399	8,754	8,144	8,485	8,822	9,128	9,418	9,693	9,905
West Berks	25,510	29,324	32,235	36,426	42,015	46,631	44,648	46,550	48,331	50,017	51,615	53,162	54,363
Thames Valley Total													

Table 8: Scenario 1 - Baseline scenario with lower NICE estimated change applied- actual and projected numbers of tests

Number of Tests - Scenario 1	Estimated						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy	7,283	8,794	9,303	9,922	11,540	13,038	12,291	12,774	13,209	13,653	14,063	14,463	14,760
Bucks	6,225	6,742	8,127	8,913	10,159	11,087	10,868	11,349	11,775	12,183	12,591	12,970	13,293
East Berks	4,003	4,226	4,647	4,848	5,488	6,332	5,883	6,106	6,323	6,524	6,724	6,913	7,070
Milton Keynes	9,264	10,565	11,416	14,070	16,969	17,657	17,121	17,875	18,587	19,249	19,868	20,472	20,925
Oxfordshire	2,988	3,764	4,159	4,615	5,142	5,681	5,630	5,893	6,137	6,367	6,574	6,790	6,962
Swindon	6,625	7,520	7,950	9,147	10,477	12,453	11,547	12,029	12,505	12,937	13,345	13,733	14,033
West Berks	36,388	41,611	45,603	51,516	59,776	66,247	63,341	66,026	68,537	70,913	73,164	75,341	77,043
Thames Valley Total													

2.3 Referrals and Tests Scenario 2

Table 9: Scenario 2 - Baseline scenario with mid-point between lower and upper NICE estimated changes applied- actual and projected numbers of referrals

Number of Referrals - Scenario 2	Actual						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy	5,123	6,229	6,627	7,041	8,124	9,208	8,692	9,067	9,410	9,760	10,089	10,413	10,626
Bucks	4,328	4,714	5,680	6,252	7,111	7,765	7,614	7,979	8,307	8,625	8,944	9,245	9,477
East Berks	2,797	2,958	3,261	3,399	3,842	4,442	4,125	4,295	4,463	4,621	4,778	4,929	5,041
Milton Keynes	6,505	7,465	8,126	10,005	11,912	12,456	12,099	12,681	13,238	13,763	14,259	14,749	15,076
Oxfordshire	2,097	2,647	2,931	3,259	3,627	4,005	3,975	4,175	4,363	4,542	4,706	4,878	5,001
Swindon	4,660	5,311	5,611	6,471	7,399	8,754	8,144	8,514	8,883	9,222	9,546	9,858	10,073
West Berks	25,510	29,324	32,235	36,426	42,015	46,631	44,648	46,711	48,663	50,532	52,323	54,071	55,294
Thames Valley Total													

Table 10: Scenario 2 - Baseline scenario with mid-point between lower and upper NICE estimated changes applied- actual and projected numbers of tests

Number of Tests - Scenario 2	Estimated						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy	7,283	8,794	9,303	9,922	11,540	13,038	12,291	12,817	13,298	13,790	14,251	14,704	15,006
Bucks	6,225	6,742	8,127	8,913	10,159	11,087	10,868	11,383	11,846	12,294	12,744	13,167	13,496
East Berks	4,003	4,226	4,647	4,848	5,488	6,332	5,883	6,124	6,361	6,583	6,805	7,017	7,177
Milton Keynes	9,264	10,565	11,416	14,070	16,969	17,657	17,121	17,939	18,721	19,456	20,151	20,837	21,298
Oxfordshire	2,988	3,764	4,159	4,615	5,142	5,681	5,630	5,912	6,175	6,426	6,656	6,896	7,071
Swindon	6,625	7,520	7,950	9,147	10,477	12,453	11,547	12,069	12,588	13,064	13,519	13,956	14,262
West Berks	36,388	41,611	45,603	51,516	59,776	66,247	63,341	66,244	68,989	71,614	74,126	76,576	78,309
Thames Valley Total													

2.4 Referrals and Tests Scenario 3

Table 11: Scenario 3 - Baseline scenario with upper NICE estimated changes applied- actual and projected numbers of referrals

Number of Referrals - Scenario 3	Actual						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy	5,123	6,229	6,627	7,041	8,124	9,208	8,692	9,099	9,475	9,862	10,228	10,590	10,807
Bucks	4,328	4,714	5,680	6,252	7,111	7,765	7,614	8,004	8,359	8,706	9,057	9,390	9,626
East Berks	2,797	2,958	3,261	3,399	3,842	4,442	4,125	4,309	4,491	4,664	4,838	5,005	5,120
Milton Keynes	6,505	7,465	8,126	10,005	11,912	12,456	12,099	12,728	13,336	13,914	14,468	15,017	15,351
Oxfordshire	2,097	2,647	2,931	3,259	3,627	4,005	3,975	4,189	4,391	4,586	4,767	4,955	5,081
Swindon	4,660	5,311	5,611	6,471	7,399	8,754	8,144	8,543	8,943	9,315	9,674	10,022	10,241
West Berks	25,510	29,324	32,235	36,426	42,015	46,631	44,648	46,871	48,996	51,048	53,031	54,980	56,226
Thames Valley Total													

Table 12: Scenario 3 - Baseline scenario with upper NICE estimated changes applied- actual and projected numbers of tests

Number of Tests - Scenario 3	Estimate						Projected						
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Health Economy	7,283	8,794	9,303	9,922	11,540	13,038	12,291	12,860	13,387	13,928	14,439	14,945	15,252
Bucks	6,225	6,742	8,127	8,913	10,159	11,087	10,868	11,417	11,917	12,405	12,897	13,364	13,699
East Berks	4,003	4,226	4,647	4,848	5,488	6,332	5,883	6,143	6,399	6,642	6,886	7,121	7,284
Milton Keynes	9,264	10,565	11,416	14,070	16,969	17,657	17,121	18,003	18,854	19,662	20,435	21,201	21,672
Oxfordshire	2,988	3,764	4,159	4,615	5,142	5,681	5,630	5,930	6,213	6,486	6,738	7,001	7,179
Swindon	6,625	7,520	7,950	9,147	10,477	12,453	11,547	12,108	12,670	13,191	13,693	14,180	14,490
West Berks	36,388	41,611	45,603	51,516	59,776	66,247	63,341	66,462	69,441	72,315	75,088	77,812	79,575
Thames Valley Total													

3 Assumptions/Limitations

A number of significant assumptions were made in developing the model. Where these relate to issues with data, these have been described under section 2.2 Description of Model Inputs. Other assumptions and limitations are:

Expected increases in numbers of referrals and tests

Between 2009 and 2014, there has been a notable and consistent increase in the number of referrals and hence number of tests carried out across all health economies. This has been driven in part by increases in population, and in part by changes in practice. These changes in practice have themselves been driven by a variety of factors, including the introduction of screening programmes, the continued embedding and improving of 2 week wait processes and national patient information campaigns.

It has been assumed that the changes in practice will continue to have an effect and that given the current national focus on improving outcomes relating to cancer, current practices will continue and/or new targets, campaigns etc. will be instigated, therefore there will continue to be a rise in referrals and tests.

NICE estimates of changes to numbers of referrals

In their Guidance, NICE provided lower and upper estimates of the potential impact of implementing the Guidance on the numbers of referrals. These have been applied in the model, along with a calculated mid-point. It has been assumed that these estimates are applicable locally and that the impact on referrals will be equally phased over the five years from 2016 to 2020.

Impact of more 2 week wait referrals on other referrals

It could be expected that as 2 week wait referrals increase, referrals through emergency routes would decline. No estimate of this potential decrease in referrals through emergency routes has been made in the model as it is not possible to predict what this decrease may be if any.

4 Discussion

Over the 6 years between 2009 and 2014 there were consistent year on year increases in the numbers of referrals and subsequent tests. The Baseline scenarios demonstrate an expected continuation of this trend, albeit a logarithmic rather than linear trend and therefore generally showing a slowing down of the rate of increase.

Overall the rate of increase in referrals and tests modelled is driven largely by population increases and historic trends rather than estimated impact of the NICE guidance. The Thames Valley population increased by 4.6% between 2009 and 2014, from 1,832,991 to 1,917,400, and is projected to increase by a further 5.9% between 2014 and 2021, to reach

2,029,900 in 2021. There was an increase in referrals from 25,510 in 2009 to 46,631 in 2014, an increase of 83%. Under the Baseline scenario, when projecting forward to 2021, based on changes in population and continuing historic trends of referrals, the projected total number of referrals for Thames Valley is 53,000 in 2021, a 14% increase on 2014, and 108% increase on 2009. This in turn influences the projected number of diagnostic tests, which are expected to increase from 66,247 in 2014 to 75,193 in 2021.

When the NICE predictions from changes in referral practice are overlaid the numbers of referrals projected in 2021 are 54,363 referrals under Scenario 1, 55,294 under Scenario 2 and 56,226 under Scenario 3.

5 Conclusions

A number of datasets were used to create this model. Some of these datasets were difficult to obtain whilst others are in the public domain. Baseline referral projections based on nationally collected data are likely to be the most accurate of the predictions. It is unclear how the NICE guidance will be implemented and the subsequent impact on referrals although the upper, mid and lower implementation rates have been used to show a possible range. The diagnostic test projections to 2021 are likely to be the least accurate of the predictions, as the data available on the ratio of referrals to tests was limited to information from one Trust, and this was used to project likely test numbers for all the other Trusts and health economies. For some tests, for example EBUS, the Trust providing the data had only recently implemented the procedure so rates per referral are likely to be much lower than in other Trusts where the procedure has been carried out for some time.

A large volume of data was collected for this project and the modelling has been carried out for all the combinations of specialties, health economies, CCGs and Trusts with the four scenarios (baseline, scenario 1, scenario 2, scenario 3) projecting referrals and tests. While some summary data is presented here, users are referred to the Modelling Data.xls Excel spreadsheet for further detail. Trusts and health economies can use the methodology set out in this report to develop their own model using their own data to more accurately reflect the estimates for diagnostic tests requested between now and 2021. Further, users can input their own local data into the Modelling Data.xls Excel spreadsheet. Instructions to support this are included in the spreadsheet.



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