Public Health England

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National Cancer Registration and Analysis Service

Be Clear on Cancer: Regional and national lung cancer awareness campaigns 2011 to 2014

Final evaluation results

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Published February 2018
PHE publications
gateway number: 2017795

PHE supports the UN
Sustainable Development Goals

Public Health England (PHE)
National Cancer Registration and Analysis Service (NCRAS)
Be Clear on Cancer: Regional and national lung cancer awareness campaigns 2011 to 2014

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1. Foreword

It gives me great pleasure to introduce this evaluation report on the impact of the Be Clear on Cancer lung campaigns which ran from 2011 to 2014. It represents the culmination of a huge amount of work by staff in PHE, the Department of Health (DH) and NHS England (NHSE), together with significant contributions from partner organisations, particularly Cancer Research UK. I would like to thank all involved in making a success of this innovative programme. A complex range of analyses and interpretations of data from a large number of sources provide us with insight into the potential impact of the lung campaigns across the patient pathway, from awareness of symptoms in the general public, through to GP attendance and survival.

This document examines the evaluation metrics published on the NCRAS website and takes a close look at the findings in the wider context of what we know about lung cancer and early diagnosis. The results are of great interest, though not straightforward to interpret. However, what is clear is that these campaigns have raised awareness of the symptoms of lung cancer prompting people to see their GPs, triggering increases in referrals for suspected cancer. This has led to a shift in the proportion of patients diagnosed with earlier stage disease, allowing them the possibility of securing more effective treatment. This is balanced against the fact that we have not been able to demonstrate a significant improvement in survival directly as a result of the campaigns.

Be Clear on Cancer is now in its eighth year, and has become a well-established, award-winning brand, working to improve cancer outcomes and reduce health inequalities. The Independent Cancer Taskforce supported our work in the 2015 Strategy for England, recognising how Be Clear on Cancer is making a real difference to people's lives by improving outcomes and increasing awareness of the fact that many cancers are treatable if caught early. Early diagnosis is crucial to improving outcomes from cancer and other serious diseases. Be Clear on Cancer is part of the national drive to tackle cancer, contributing towards making earlier diagnosis a reality for the thousands of people diagnosed with cancer each year.

The Be Clear on Cancer programme is run by PHE in partnership with DH and NHSE, working closely with Cancer Research UK, clinical colleagues and the wider academic and charity sectors.

PHE has been responsible for the development, marketing and evaluation of all campaigns run since April 2013. They have carried out careful evaluation, often using bespoke analyses of complex datasets in order to establish as best they can the impact of the campaigns.

Professor Chris Harrison, National Clinical Director for Cancer, NHS England
Chair of the Be Clear on Cancer Steering Group

Note: Structure of report

This report is written with a wide range of audiences in mind and includes many sets of individual results and analyses. If read in full, is very long. It has therefore been divided into several clear sections, not all of which will be of interest to all readers. The Executive Headlines summarise all the major findings, followed by the Summary Report which presents the findings with the most important elements of the analyses. Appendices 1 and 2 provide a greater depth of detail on the methodology and evidence and are intended more as reference sources.

2. Executive headlines

2.1 The problem

Lung cancer kills more people than any other cancer. In 2015 it accounted for 21% of all cancer deaths in England with 28,565 deaths and 36,637 new patients being diagnosed with the disease. Late presentation is a major problem and in 2015 over 70% of patients had essentially incurable disease by the time they reached specialist care. Patients diagnosed with the earliest stage disease (stage 1A) have a much better prognosis with as many as 90% living to 5 years in some studies. Survival rates in England are worse than many other parts of the developed world and this is, in part at least, because a higher proportion of patients have advanced disease by the time they are diagnosed.

2.2 Aim of the Be Clear on Cancer campaigns

The objective of the Be Clear on Cancer campaigns is to encourage more people to recognise symptoms that might be an early indication of cancer and to see their GP sooner, leading to earlier diagnosis and ultimately improved outcomes.

The ambitions from the Independent Cancer Taskforce are an additional 30,000 patients per year surviving cancer for ten years or more by 2020, of which almost 11,000 will be through earlier diagnosis. Alongside other actions, the Cancer Taskforce's recommendation is that there should be a minimum of two national Be Clear on Cancer campaigns per year to support the overall ambition.

2.3 History of campaigns

A regional pilot of the Be Clear on Cancer campaign to raise public awareness of persistent cough as a symptom of lung cancer ran in the East and West Midlands in 2011. Based on the early findings from the pilot, the first national campaign in 2012 was commissioned, and then two further national campaigns in 2013 and 2014. Campaigns were targeted at people over the age of 50 and people in the lower social class groups known as C2DE. As a result of the initial evaluation of the four 'cough' campaigns discussed in this report, a broader respiratory symptoms campaign was carried out

nationally in 2016 and a reminder campaign launched in May 2017. These use both breathlessness and cough as target symptoms and attempts will be made to assess their impact on the diagnosis of other conditions such as chronic obstructive pulmonary disease (COPD) and heart failure, as well as lung cancer.

2.4 Campaign recognition and public awareness

Three out of four of the Be Clear on Cancer lung cancer campaigns were evaluated by tracking surveys among the general public before and after the campaigns. The three campaigns achieved a high level of public recognition of persistent cough as a possible symptom of lung cancer. Across the campaigns almost one in five people surveyed said they had taken action as a result of the campaign.

2.5 Attendance at GP practices

There were significant increases in the number of people seeing their GP for cough as a result of the regional and first national campaigns, but the numbers involved were not generally overwhelming for GPs, the typical impact being around three additional attendances per pratice per week. No GP practice attendance data was available for the second and third national campaigns.

2.6 Urgent GP referrals for suspected lung cancer

Between 2011 and 2015 the number of urgent GP referrals (also known as two week wait referrals) for suspected lung cancer doubled. There were short-term faster rates of increase after each of the campaigns, the increases were largest after the first national campaign (32%) and became less in subsequent campaigns.

2.7 Lung cancer diagnosis information from the Cancer Waiting Times (CWT) data

The number of lung cancers diagnosed after an urgent GP referral for suspected lung cancer and the total number of lung cancers recorded in the CWT database both increased after the first national campaign, with no evidence of an increase after the second and third campaigns. There were no significant changes in detection rates or conversion rates.

2.8 Numbers of new lung cancers

The numbers of new lung cancers detected overall increased significantly in the periods following the regional and first national campaign. No significant increases were seen after the second and third campaigns except for a modest increase in numbers of female cases after the third campaign.

2.9 Emergency presentation rates

There was a long-term decreasing trend in the proportion of patients diagnosed as a result of an emergency presentation. This was paralleled by an increase in the proportion referred electively from GPs over the time period of the campaigns, making it difficult to interpret any specific impact of the campaigns.

2.10 Stage at diagnosis

There is evidence of a significant and positive stage shift (towards earlier stage disease) in patients diagnosed after all three of the national campaigns, and a trend towards such a shift after the regional campaign.

2.11 Performance status

Performance status is a measure of how the cancer is affecting the daily living abilities of the patient, overall fitness and if impaired, impacts on suitability for treatment. Since it can deteriorate over a period of delay in diagnosis, it is of relevance when considering treatment rates. It was only available for the regional pilot and first national campaign.

2.12 Treatment rates

The proportion of patients undergoing surgery increased after the regional and first national campaign. These two campaigns were also followed by an increase in the overall proportion of patients receiving any active anticancer treatment and a fall in the proportion receiving only palliative care.

2.13 Diagnostic imaging

Following the first national campaign there were significant increases in requests for chest X-rays and CT scans both by GPs and consultants. The impact was less clear for the second and third campaigns though overall use of thoracic imaging increased over

the period. There was evidence of an increase in requests for chest X-rays by GPs over the period of the third national campaign.

2.14 Survival

No statistically significant increases were observed in proportions of patients surviving to 1 year post diagnosis in the first, second or third national campaigns.

2.15 Changes in impact over time

The greatest changes in most of the variables evaluated were seen after the regional and first national campaigns, with evidence to suggest a lesser effect after the second and third national campaigns. However, the baseline levels of many indicators (especially urgent GP referrals for suspected cancer and emergency presentation rates) had also changed over the period of observation, making assessment difficult. The regional and first national campaigns were delivered with a heavier weight of media coverage, meaning that the campaign messages will have been more visible to the target audience. It is likely that the lower weight of media coverage may have had some bearing on the impact of the later campaigns.

2.16 Overall conclusions

There is evidence of what might best be described as a ‘whole system response’. This response starts with increased public recognition of the messages, to increases in attendance at GP practices, then increases in urgent suspected cancer referrals from GPs to secondary care. Following on from that, there is some evidence of an increased number of cases and more use of diagnostic tests, a shift to earlier stage disease with better performance status at the time of diagnosis and increased numbers of patients undergoing surgery; but no evidence of a statistically significant improvement in 1-year survival directly related to the campaigns.

All of these results have been studied against a background of general improvements in many of the process and outcome indicators relating to lung cancer in England over the last 10-12 years. These improvements are almost certainly a result of a wide variety of changes in how lung cancer is managed in the English NHS and how it is perceived as a disease both by the public and healthcare professionals. The Be Clear on Cancer

lung cancer campaigns have been one part of this environmental change and ascribing direct cause and effect is not possible. Whilst the marketing impact appears to have been sustained over the three campaigns in which it was measured, there is evidence of a progressive fall in indicators of clinical impact and outcome over the course of the four campaigns. This may, in part, be related to reduced levels of spend on marketing or diminishing returns against continuing background improvement. However, the overall short-term evaluation of these campaigns presented in this document suggests that they appear to have had a significant and positive impact on outcomes for lung cancer patients in this country.

3. Summary report

3.1 Background: scale and nature of lung cancer as a public health issue

Lung cancer is very common with 36,637 new incident cases being diagnosed in 2015 (ONS, 2017). It is also the commonest cause of death from cancer in England with 28,586 deaths being recorded in 2015, this representing 21% of all cancer deaths in that year (ONS, 2017).

Although survival rates for lung cancer have been improving in England in recent years (Walters et al, 2015), they remain poor compared with many other cancers. 39.5% of patients diagnosed in 2012 survived to 1 year post diagnosis and only 11.0% of those diagnosed in 2008 were alive 5 years later. In addition, survival rates in England (and the UK in general) are worse than those reported from a number of other countries with equivalent expenditure on healthcare (Francisci et al, 2015 and Coleman et al, 2011). This can be explained, at least in part, by a combination of late diagnosis and poorer stage-specific survival suggesting lower treatment rates (Walters et al, 2013), and perhaps higher rates of comorbidity (Imperatori et al, 2006 and 2016). In England, the large majority of patients have advanced and currently largely incurable cancers by the time they reach secondary care. In 2014, for example, 70% had stages 3 and 4 disease at the time of diagnosis (Royal College of Physicians, 2015). There is little robust data comparing stage distribution between countries, but the International Cancer Benchmarking Partnership reported that in England between 2004 and 2007, only 13.5% of patients presented with stage 1 disease compared with 20% in Canada and 19.6% in Sweden (Coleman et al, 2011).

Supporting evidence of late diagnosis comes from a study comparing excess death rates for lung cancer 5 years from diagnosis in England, Norway and Sweden between 2001 and 2004 (Holmberg et al, 2010). Virtually all the excess deaths in England were confined to the first year after diagnosis. Since there is no screening programme for lung cancer in any of these three countries, a reasonable assumption is that patients with symptoms are being diagnosed and treated earlier in Sweden and Norway. In England, around 40% of lung cancer patients first come to the attention of secondary

care via an emergency presentation and only around 12% of such patients are alive 1 year after diagnosis, compared with 35% of those referred electively by their GPs (Elliss-Brookes et al, 2012).

The long term survival rates of patients treated with early stage disease are very much better than those diagnosed with advanced cancer; 83% of patients diagnosed with stage 1 lung cancer in England in 2014 survived to 1 year compared with only 17% of those diagnosed at stage 4 (ONS and PHE 2017). Equivalent international current 5-year survival rates are not yet available but international studies report that 5-year survival for stage 1A disease can be as high as 92% and that for stage 4 disease this is around 6% (Goldstraw et al, 2015).

In January 2011, *Improving Outcomes: A Strategy for Cancer* (DH, 2011) set out the government's ambition to save an additional 5,000 lives by 2014/15. One estimate is that if England were to improve its lung cancer survival to match the best in Europe, around 1,300 deaths from lung cancer 5 years from the date of diagnosis could be avoided annually (Abdel-Rahman et al, 2009). The Improving Outcomes Strategy stated that this was to be achieved through earlier diagnosis (through increased awareness of symptoms and earlier presentation) and better access to optimal treatments.

Low awareness of cancer symptoms is likely to contribute to patient delays in presenting to medical professionals (Smith et al, 2009), and in turn contribute to later stage diagnosis. This is likely to be compounded by a negative attitude to the value of early detection and worries that treatment is often worse than the disease. A systematic review by Austoker et al (2009) found limited evidence of the effectiveness of community-level interventions to promote cancer awareness, with some evidence they can promote earlier stage at diagnosis, but only one study demonstrated a sustained effect of the campaign over several years. The review did not find any studies on lung cancer symptom awareness interventions (including publications up to 2008).

Lung cancer in the Western world is strongly linked to tobacco smoking. It has been estimated that, in the UK, personal cigarette smoking accounts for 85% of all cases of

lung cancer (Parkin et al, 2011) which conversely means that, in England, around 5,500 cases of lung cancer occur in people who have never smoked. Lung cancer is commoner in older people, with the average age at diagnosis being 72 years. It is strongly associated with socio-economic deprivation and it has been estimated that, in England between 1996 and 2011, there was an average annual excess of 11,700 incident cases of, and 9,900 deaths from lung cancer, associated with socio-economic deprivation (National Cancer Intelligence Network (NCIN), 2014).

Lung cancer survival is dependent on a number of factors, the most important of which are:

- stage at diagnosis
- morphology (cell type) – crudely broken down as Small Cell Lung Cancer (SCLC) and Non-Small Cell Lung Cancer (NSCLC), though the morphological and molecular sub-types of NSCLC have very different patterns of behaviour
- fitness for treatment – which includes performance status (the extent of limitation of functional activity related to the effects of the cancer), presence and severity of co-morbidities and age
- tumour biology (including racial factors and molecular biomarker status)

In the context of public awareness campaigns, it is the stage of the disease at diagnosis that is probably the most important of these. However, fitness for treatment may also deteriorate rapidly over a period of diagnostic delays, which can significantly limit the proportion of patients fit enough to be able to undergo potentially curative treatment. Surgical resection is the mode of treatment most likely to result in long term survival and is very largely limited to patients with early stage disease (stages 1A to 2B NSCLC). NSCLC accounts for almost 89% of lung cancers in the UK (NLCA report) with the other 11% being SCLC. SCLC is a rapidly progressive cancer which is rarely amenable to surgery and has poor long term survival. Even in SCLC however, diagnostic and treatment delays can significantly impact on medium term survival rates, including 1-year survival.

3.2 History and aims of lung cancer awareness campaigns

The first reported lung cancer awareness campaign in the UK was carried out in Doncaster in 2008. This was a relatively small-scale, community-based project which used a range of approaches to raise public and primary care awareness of persistent cough as a sign of lung cancer (Athey et al, 2012). The project resulted in enhanced public recall of cough as an important symptom; behavioural change with more patients visiting their GP; a change in GP behaviour with a 20% increase in chest X-ray requests; and an increase in lung cancer diagnoses. There was a trend towards a stage shift, in that more patients were diagnosed with early-stage disease. It is particularly notable that the impact was greatest in areas of the town where there was a combined approach, targeting primary care professionals as well as the public. The project was too small in scale to allow for the identification of any major and statistically significant improvements in other outcomes.

3.3 Creative development of campaign materials

In 2010, PHE commissioned a creative agency to produce an overarching proposition for a series of new cancer awareness campaigns which would enable the target audience to:

- become clear about the symptoms
- understand the action that they need to take (ie visiting their GP)
- understand the benefit of doing so (cancer is treatable if caught early)

Following qualitative research, which assessed a number of creative propositions, Be Clear on Cancer was chosen because it was felt to be authoritative, avoided skirting around the issue of cancer and the ‘stamp’ was seen as direct and conveying seriousness, while also highlighting the positive news that early diagnosis could make cancer more treatable. The brand was also seen to stand on its own and was clearly about cancer when seen in isolation.

Following this initial assessment stage, refinements were made to the Be Clear on Cancer creative materials and the first Be Clear on Cancer regional pilot campaign,

which focused on bowel cancer, ran from January 2011 to March 2011, moving on to lung cancer later that year.

In 2010/11, the DH had funded a series of 53 local-level projects as part of their NAEDI programme (National Awareness and Early Diagnosis Initiative), 39 of which targeted lung cancer; 18 of these used Be Clear on Cancer branded materials. Therefore, at the same time as developing a bowel cancer campaign, a version for lung cancer was created. Experts from different clinical settings as well as public health and the voluntary sector helped to develop the key messages.

3.3.1 The choice of persistent cough as the target symptom and local pilot projects

There are many symptoms of lung cancer, none of which are highly specific for the disease (Shim et al, 2014), but in a number of studies cough emerges as the most common symptom, being recorded as a presenting symptom at the time of diagnosis in well over half of cases (Hamilton et al, 2005; Smith et al, 2009). In their 'Referral Guidelines for Suspected Cancer', National Institute for Health and Clinical Excellence (NICE) identified cough persisting for more than three weeks as one of its major trigger symptoms (NICE, 2005). From a clinical standpoint, cough is more likely to be associated with treatable disease than symptoms such as breathlessness and chest pain, which are more often seen in advanced disease.

Whilst there is one small retrospective case-cohort study (Hamilton et al, 2005), there are no prospective, population-based studies examining the predictive value of symptoms or symptom clusters in lung cancer. For many reasons, not least of which is the huge size and cost of such studies, there is no prospect of such evidence becoming available. On the basis of this evidence, the DH took the pragmatic view that, whilst the symptom profile of lung cancer is obviously complex, the public 'message' had to be kept simple, so the single symptom of cough persisting for three or more weeks was chosen as the basis of the Be Clear on Cancer lung campaigns.

Figure 1. An example of one of the advertisements from a local pilot

Initial feedback at the end of 2010 and early 2011 from the local NAEDI projects suggested that the Be Clear on Cancer approach for lung cancer was working, but minor refinements would be appropriate before a wider roll-out. When moving to a regional pilot, TV advertising would also be introduced and it was important to understand what would motivate the audience to act and how to make the most of the 30-second TV advert. Therefore in August 2011 further qualitative research was commissioned to ensure the messaging was as clear as possible.

3.3.2 Local to regional

Following the assessment that the local pilot campaigns had demonstrated feasibility and a good level of acceptance, a regional lung cancer awareness pilot, again based on the symptom of persistent, unexplained cough, was funded and ran in the Central TV region (predominantly East and West Midlands) from 10 October to 13 November 2011.

The campaign, and subsequent campaigns, was generally targeted at those who were aged over 50 years and from lower socio-economic groups (categorised as C2DE). This target audience was selected because of incidence, mortality, survival and staging data that were available at the time for England. However, for some elements of the campaign, such as buying media, a slightly older demographic of over 55 years was

selected. This is a standard age band for buying media and would hopefully minimise the influence on younger people.

The campaign consisted of various activities, including TV, radio and press adverts, ten face-to-face events and out-of-home advertising eg on pharmacy bags and screens in GP practices. It was delivered in partnership with the former Cancer Networks, clinical leads in local hospitals, general practice and public health teams.

The primary objectives of the campaign were to:

- raise the awareness of the signs and symptoms of lung cancer among the target audience
- encourage people with symptoms of potential lung cancer to see their GP promptly, focusing on the target audience

The hope was that by raising awareness and encouraging people with the promoted symptoms to present to their GP promptly, more cancers would be diagnosed at an earlier stage and may therefore lead to better overall outcomes. In addition, DH was mindful that it needed a campaign mechanism that was manageable and would not cause unnecessary pressures on the NHS, therefore the impact on NHS services was also assessed.

Figure 2. Examples of the posters for the Regional Campaign

3.3.3 Regional to national

An assessment of this first regional campaign concluded that a) it was feasible, b) that its messages were recognised by the public and c) that it did not cause unbearable pressure on GPs or secondary care. It was therefore decided to run a national

campaign in 2012 which was repeated as national reminder campaigns in 2013 and 2014.

The first national Be Clear on Cancer lung cancer campaign ran from 8 May to 30 June 2012 and the primary target audience was those aged 50 and over from lower socio-economic groups based on lung cancer statistics such as incidence and mortality. The campaign's objectives were the same as for the regional campaign and the key message again was: "Been coughing for 3 weeks? Tell your doctor".

The campaign activity included advertising, public relations and face-to-face events in shopping centres. Advertising to communicate the key messages ran nationally on TV, radio, in the press, on pharmacy bags and online. Posters and leaflets were displayed in GP practices and in other community settings. There was also some activity targeted at older Black African and Caribbean and South Asian men and women as cultural, religious and language barriers can reduce the likelihood of people from these communities seeing their GP promptly.

The second national Be Clear on Cancer lung cancer campaign ran for 6 weeks from 2 July to 11 August 2013 and used the same channels for advertising as the first campaign (TV, radio, press, on pharmacy bags and online). The campaign had the same objectives and key messages however the Public Relations (PR) activity included a launch based on key statistics around lung cancer survival, the support of well-known people who had a connection with the disease, case studies and a range of spokespeople, as well as promotion of the face-to-face events. The campaign website was updated and posters and leaflets were displayed, as for the first campaign.

The third national lung cancer awareness campaign ran in England for 8 weeks from 10 March until the end of April 2014 using the same materials as those used in the second national campaign.

All four campaigns were timed to avoid the peak winter seasonal increases in respiratory tract infections, to avoid undue overloading of primary care services.

3.3.4 Campaign weights

The weight of media varied between campaigns, meaning that there were differences between the percentage of the target audience who saw the advertising and the number of times that they would have seen it. There were also differences in the use of supporting activities such as face-to-face events and PR.

Table 1. Dates, duration, TVRs, reach and frequency, and media costs for the regional and national campaigns.

Timing	Campaign	Adult TVRS*	Reach and frequency**	Duration	Media budget	Non-media activity
10 October 2011 to 13 November 2011	Regional	856	94.5% @ 9.1OTS	5 weeks	£1.4m	PR; Events
8 May 2012 to 1July 2012	First National	654	88.4% @ 7.4OTS	8 weeks	£2.87m	PR; Events (door drop in Yorkshire only)
2 July 2013 to 11August 2013	Second National	496	75.2% @ 6.6OTS	6 weeks	£1.45m	PR; Events
10 March 2014 to 30 April 2014	Third National	564	71.5% @ 7.3OTS	8 weeks	£1.92m	PR (minimal)

*TVR (television rating) is the measure of the popularity of a programme, daypart, commercial break or advertisement by comparing its audience to the population as a whole. One TVR is numerically equivalent to one per cent of a target audience.

**Reach is the term used to express the total percentage of a target audience who are exposed to a commercial at least once throughout a campaign period. This figure represents unduplicated audience exposure. Frequency describes the average number of times that a person within the target audience has had the opportunity to see an advertisement over the campaign period. OTS stands for opportunity to see.

3.4 Evaluation metrics

The range of metrics and indicators used to evaluate these various campaigns is large and the analyses have been carried out by many different individuals and groups who are acknowledged at the front of this report. The regional pilot and the first national

campaign were analysed by Cancer Research UK and the second and third national campaigns by NCRAS in PHE.

The main areas of evaluation covered:

- marketing evaluation – public recognition of the featured symptom pre- and post-campaign and the need for action (ie seeing their GP) (details of methods set out in the section 5.1)
- attendance at a GP practice with cough
- urgent GP referrals for suspected lung cancer – number of referrals, related cancers, and conversion and detection rates
- numbers of new lung cancer cases diagnosed during and shortly after the period of the campaigns
- stage of lung cancers at diagnosis
- performance status of lung cancer patients at the time of diagnosis
- proportion of patients undergoing surgical resection
- proportion of patients alive at 1 year post-diagnosis

3.5 Public awareness and campaign recognition

3.5.1 Demographics

With regards to the demographics of the surveyed populations, the results of the later campaigns were similar to the regional pilot. Of the pre- and post-campaign survey respondents, 54% were female, 42% were aged 55 to 64 years, and approximately 60% were from lower socio-economic groups in both the pilot and control areas. These findings are illustrated graphically in table 4 in section 5.2.

3.5.2 Campaign recognition, first national campaign

When asked to describe the signs and symptoms of lung cancer, spontaneous mentions of a cough increased from 54% pre-campaign to 65% post-campaign ($p<0.001$), with specific mentions of a persistent/prolonged cough increasing from 12% to 15% ($p=0.048$). Prompted knowledge of a cough for three or more weeks was the symptom with the largest increase in recognition, rising from 18% pre-campaign to 33% after ($p<0.001$).

Similar trends were seen in the regional pilot area following the regional campaign (Ironmonger et al, 2015). For instance, prompted knowledge of a cough for three or more weeks increased from 19% to 34% ($p<0.001$) (TNS-BMRB, 2013). For comparison, changes in the control area were generally not statistically significant.

3.5.3 Campaign recognition, second national campaign

The second national campaign was well recognised, with eight in ten people aware of one or more Be Clear on Cancer lung marketing materials. While there was probably some residual awareness from the first national campaign, this was a significant result given the lower spend levels in this second campaign. As expected, awareness was driven largely by the TV advertisement (71%) and this was higher among the target C2DE group (77%). One in four recalled hearing the radio advertisement (27%) and seeing the print advertisement (25%), while 15% recognised the leaflet.

3.5.4 Campaign communication, second national campaign

After being shown the campaign adverts, almost three quarter of respondents thought that the main message of the advertisement was to see their GP (73%), a significant increase from the first national campaign (68%), indicating the call to action had the intended consequences.

As seen with previous Be Clear on Cancer campaigns, almost all respondents agreed that it was important that adverts like these were shown (91%) and that the adverts were clear and easy to understand (91%). There was evidence that the second national campaign strengthened agreement with these statements, with movement from people agreeing slightly to agreeing strongly. Around half agreed that the advertising was relevant to them (53%) and 44% thought the advertising told them something new, in line with the first national lung cancer campaign.

3.5.5 Knowledge of symptoms, second national campaign

Four out of five (83%) spontaneously mentioned a correct symptom of lung cancer after the second campaign, this was a significant increase from the pre-campaign level of 73%. Particularly encouraging was the fact that spontaneous knowledge of the key campaign symptom of a persistent cough increased significantly following this

campaign to a higher level than after the first national campaign (22% after the second campaign, up from 15% after the first campaign).

The campaign had a positive effect on confidence in knowledge of signs and symptoms of lung cancer, increasing from 42% to 52% after the second campaign, which was in line with the results seen after the first campaign.

The second campaign also had a positive impact on prompted knowledge of signs and symptoms with an increase in the proportion stating a cough for 3 weeks or more that doesn't go away was definitely a warning sign of cancer (from 22% pre- campaign to 30% post-campaign).

3.5.6 Attitudinal questions, second national campaign

There were positive shifts on a range of attitudinal measures related to early diagnosis and barriers to visiting the GP with a potential symptom of lung cancer. This is particularly encouraging as it is harder to change attitudes than knowledge or confidence and there is often little or no movement in these measures. These shifts may be partially attributed to the cumulative effect of the broad range of Be Clear on Cancer activity seen to date and partially attributed to the impact of the repeat airing.

3.5.7 Campaign impact, second national campaign

Three quarters (76%) agreed the advertising would make them more likely to see the GP if they had symptoms and felt concerned. This was in line with the results from the first campaign, but strength of agreement with this measure had deepened. Sixteen percent of those who had recognised one of the advertisements said they had taken action as a result of seeing the advertisements, slightly less than the 19% who did so following the first campaign. Respondents said they were as likely to have made an appointment with their GP as they were to have talked to friends or family about the advertisements (4%).

There was no marketing evaluation of the third national campaign.

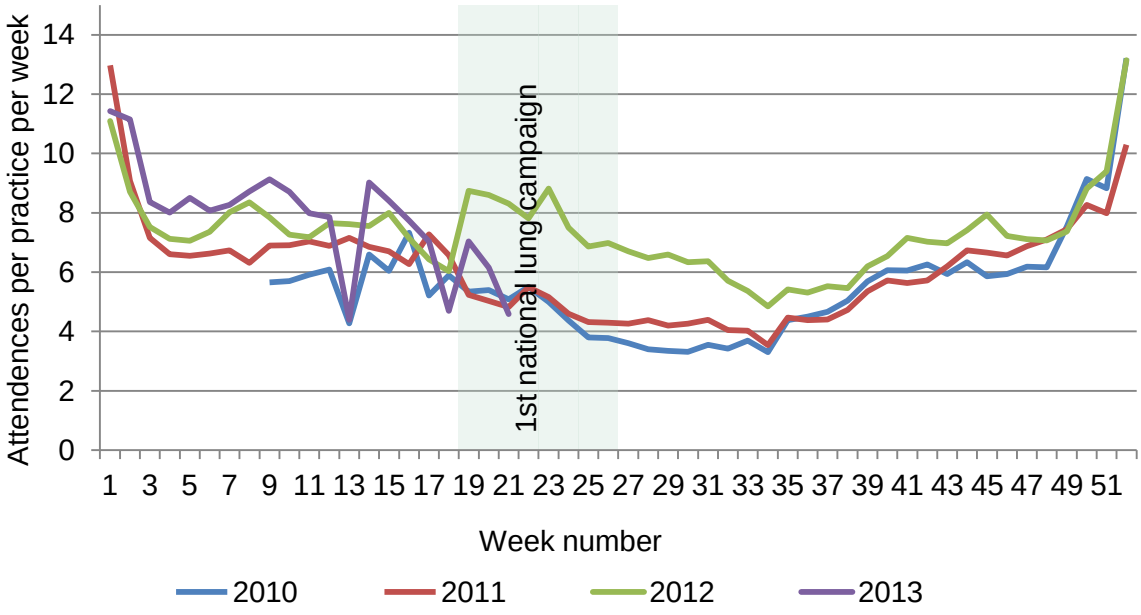
3.5.8 Summary of marketing and campaign recognition

These were very successful campaigns in terms of recognition. Public awareness of the target symptom increased after all the campaigns that were evaluated. Spontaneous recognition of persistent cough as a possible symptom of lung cancer increased progressively across the campaigns starting prior to the regional pilot at between 38% and 50% (control and pilot areas, respectively) to 83% after the second national campaign. Between 16% and 19% of respondents reported that they had taken action as a result of seeing the campaigns.

3.6 Attendances at GP practices

There were significant increases in attendance at GP practices with the symptom of cough after both the regional and first national campaigns. The overall increase during the first national campaign was 67% compared with the same time in the previous year, equivalent to three additional visits per practice per week. Whilst the largest actual increases (ie in terms of number of patients) were seen in those aged over 50, significant increases were seen across all age groups. The increase in presentations appeared to continue for at least eight weeks after the campaign ended. This is illustrated in figure 3, below.

Figure 3. First national campaign: number of GP presentations for a cough per week adjusted for bank holidays, patients aged 50+, data from 486 practices January 2010 to May 2013. (Figure S1 from Ironmonger et al, 2015)



More detail of the analysis and results relating to GP attendances are given in Appendix 5.4.

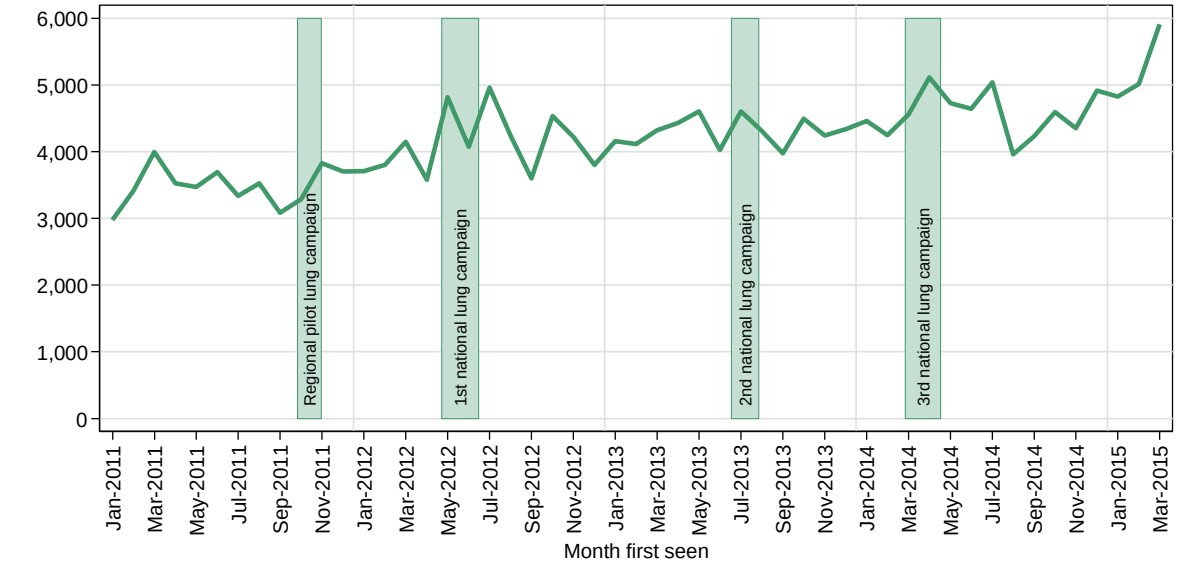
3.7 Analysis of CWT Data

Full details of methodology and results are given in section 5.5.

3.7.1 Urgent GP referrals for suspected lung cancer

There is a strong long-term increasing trend in the number of urgent GP referrals for suspected lung cancer, also known as Two Week Wait referrals (TWW), reflecting a more general trend for all suspected cancer referrals. It is important to consider this trend when comparing the number of referrals following any of the lung campaigns and the number of referrals one or two years earlier. Between 2011 and 2015 the number of two week wait referrals for suspected lung cancer doubled; a summary of that trend in relation to the timing of the four campaigns is illustrated in figure 4 below.

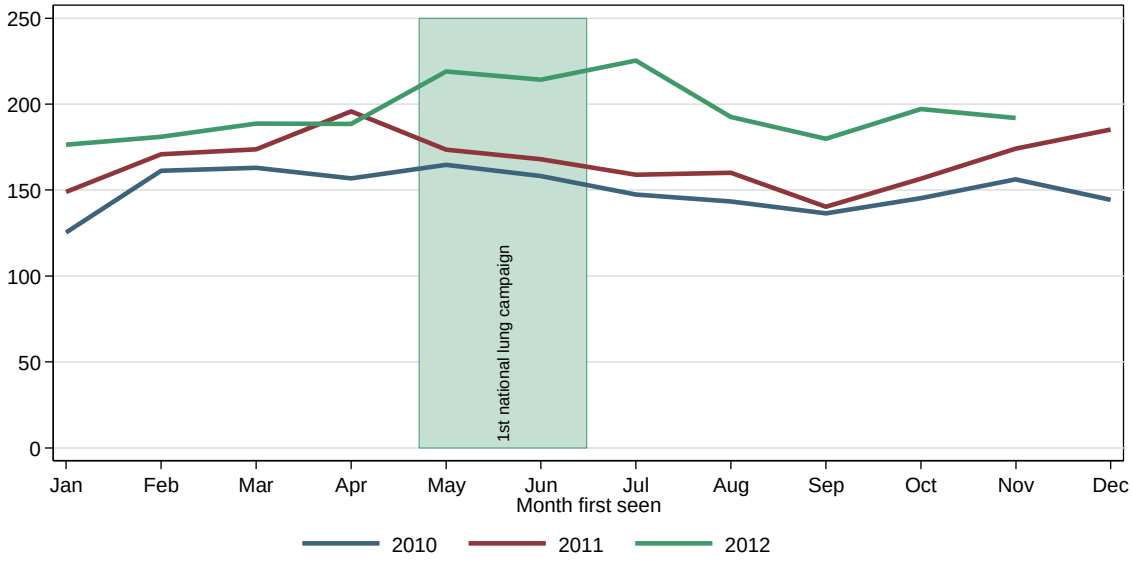
Figure 4. Number of urgent GP referrals for suspected lung cancer between January 2011 and March 2015 (not adjusted for working days)



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Following the first national lung cancer campaign, there was a significant 32% increase in the number of urgent GP referrals for suspected lung cancer, when comparing the period May to July 2011 with May to July 2012 (see figure 5), in comparison to a 12% increase in urgent GP referrals for other suspected cancers.

Figure 5.First National Campaign: urgent GP referrals, England January 2010 to November 2012 (monthly average number of urgent GP referrals for suspected lung cancer per working day)



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Following the second and third national lung cancer awareness campaigns, there were smaller increases in urgent GP referrals for suspected lung cancer, which were particularly smaller relative to increases in referrals for other suspected cancers. When comparing the period July to September 2011 with July to September 2013, there was a 30% increase in referrals for suspected lung cancer, compared to a 26% increase for other suspected cancers. When comparing the period March to May 2013 with March to May 2014, there was an 8% increase in referrals for suspected lung cancer, compared to a 15% increase for suspected head and neck cancers (the control).

For all three campaigns, the largest percentage increases in urgent GP referrals for suspected lung cancer were seen for those aged under 50 and 50 to 59, although the referral rates remained considerably lower for these age-groups than for the older age-groups. Increases in urgent GP referrals for suspected lung cancer were slightly larger for women than for men for all three campaigns.

3.7.2 Cancer diagnoses resulting from an urgent GP referral for suspected lung cancer

Following the first national lung cancer campaign, there was a significant 18% increase in the number of lung cancer diagnoses resulting from an urgent GP referral for

suspected lung cancer from May to July 2012 when compared with the same months in the previous year.

When comparing the period May to July 2011 with May to July 2012, the largest increase in lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer was seen for those aged under 50 (43%, but based on small numbers), with similar increases for most of the other age groups.

The increase in lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer for the period May to July 2011 when compared with the same months in 2012 was statistically significant for both men and women, although slightly larger for men than for women.

In general, the second and third national lung cancer awareness campaigns did not appear to have an impact on the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer.

There were no statistically significant changes for England overall or by age group following either the second or third national campaigns. However, the third national lung cancer awareness campaign appears to have had an impact on the number of lung cancer diagnoses resulting from an urgent GP referral for women, with an 8.6% statistically significant increase for the period March to May 2014 compared with March to May 2013.

3.7.3 Conversion rate

In general, the lung cancer awareness campaigns did not appear to have an impact on the conversion rate for urgent GP referrals for suspected lung cancer.
Although there were statistically significant decreases in the conversion rates following the first campaign (between May to July 2011 and May to July 2012) and the second campaign (between July to September 2011 and July to September 2013), these changes appeared in line with the long-term decreasing trend rather than as a particular effect following these campaigns.

By age and sex, there were some statistically significant decreases following the first and second national campaigns, but these appeared to reflect the long-term trend. There were no statistically significant changes in the conversion rates following the third national campaign (between March to May 2013 and March to May 2014), neither nationally nor by age or sex.

3.7.4 Lung cancer diagnoses recorded in the CWT dataset

When comparing the period June to August 2011 with June to August 2012, there was a statistically significant 4.5% increase in the total number of lung cancers recorded in the CWT database, potentially an impact of the first national lung cancer awareness campaign.

For the same period, increases in the number of lung cancers recorded in the CWT database for those aged 80 and over and for women were statistically significant. However, these changes do not appear to reflect a particular impact of the campaign, as the trend in numbers for these groups are similar to those for the other age-groups and for men.

The second and third national campaigns do not appear to have an impact on the number of lung cancers recorded on the CWT dataset, with no significant changes in the number of these cancers following either of these campaigns, either overall or by age or sex.

3.7.5 Detection rate

In general, the national lung campaigns do not appear to have a specific impact on the detection rate, with no significant changes in the national lung cancer detection rate following any of the three campaigns. By age-group, there were some statistically significant changes in the detection rate following the second national campaign, but these appear to reflect natural variations rather than a specific impact of the campaign. There were no statistically significant changes in the detection rate for either men or women following any of the three campaigns.

3.8 Emergency presentation rate

For the period of the first national campaign, there was an increase in the proportion of patients recorded in the National Lung Cancer Audit (NLCA) database diagnosed via GP referral (3.0 percentage point increase from 47.9% to 50.9%; p<0.001) and a decrease in the proportion diagnosed after an emergency admission or A&E attendance (1.9 percentage point decrease from 21.5% to 19.6%; p=0.004). For the second and third campaigns, emergency presentation was defined in line with the proxy for emergency presentations methodology. There were no significant differences in the proportions of lung cancers diagnosed through emergency presentation for the year the campaign ran compared with the previous year. Over the time period of all the campaigns, however, there was a slow but consistent fall in the proportion of patients diagnosed as an emergency presentation, in parallel with an increase in the proportion referred electively from GPs, making interpretation of the specific impact of the campaigns difficult. Details can be found on the NCRAS website.

3.9. Number of cases of lung cancer diagnosed

3.9.1 Number of new lung cancers, regional and first national campaign

Cancer Research UK analysed data from the NLCA database (data on confirmed lung cancer patients from all English NHS trusts involved in the care of lung cancer) for the evaluation of the regional and first national campaigns. They found that the number of lung cancers diagnosed increased after the launch of the regional campaign by 12.3% in the campaign area compared to 3.1% in the control area (table 2), (Ironmonger et al, 2015).

Table 2. Regional campaign: number of lung cancers diagnosed comparing the campaign months of October to December 2011 with October to December 2010 for the pilot and control areas (Table S7 from Ironmonger et al, 2015)

Control Area (n=141 trusts)				Pilot Area (n=32 trusts)			
Number diagnosed		% change (adjusted[1])	p-value	Number diagnosed		% change (adjusted[1])	p-value
October to December 2010	October to December 2011			October to December 2010	October to December 2011		
5,226	5,473	+3.1%	0.117	1,446	1,649	+12.3%*	0.001

[1]Adjusted for a five day working week excluding bank holidays (eg includes Easter, early May, spring bank holidays and Queen's Diamond Jubilee bank holiday for 2012)

*Statistically significant difference between 2011 and 2012 (likelihood ratio test of significance p<0.05)

Similarly, they found a 9.1% increase in lung cancers diagnosed during the period of the first national campaign (adjusted for working days; p<0.001), whilst there was a small non-significant 1.5% increase during the control period (p=0.373) (table 3).

Table 3. First national campaign: number of lung cancers diagnosed for the campaign and control periods (Table 5 from Ironmonger et al, 2015)

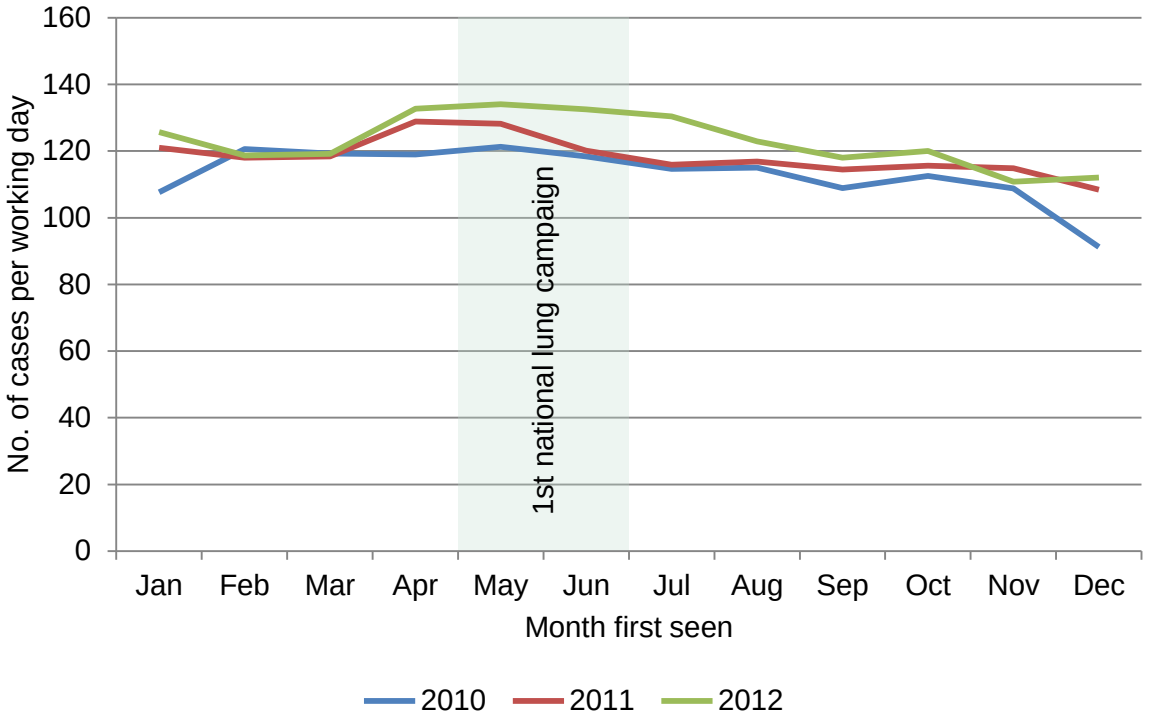
Control Period				Campaign period (First national)			
Number diagnosed		% change (adjusted[1])	p-value	Number diagnosed		% change (adjusted[1])	p-value
February to April 2011	February to April 2012			May to July 2011	May to July 2012		
7,404	7,636	+1.5%	0.373	7,639	8,335	+9.1%*	<0.001

[1]Adjusted for a five day working week excluding bank holidays (eg includes Easter, early May, spring bank holidays and Queen's Diamond Jubilee bank holiday for 2012)

*Statistically significant difference between 2011 and 2012 (likelihood ratio test of significance p<0.05)

Figure 6 suggests that the uplift in diagnoses surrounding the timing of the campaign began to return to pre-campaign levels from around August 2012.

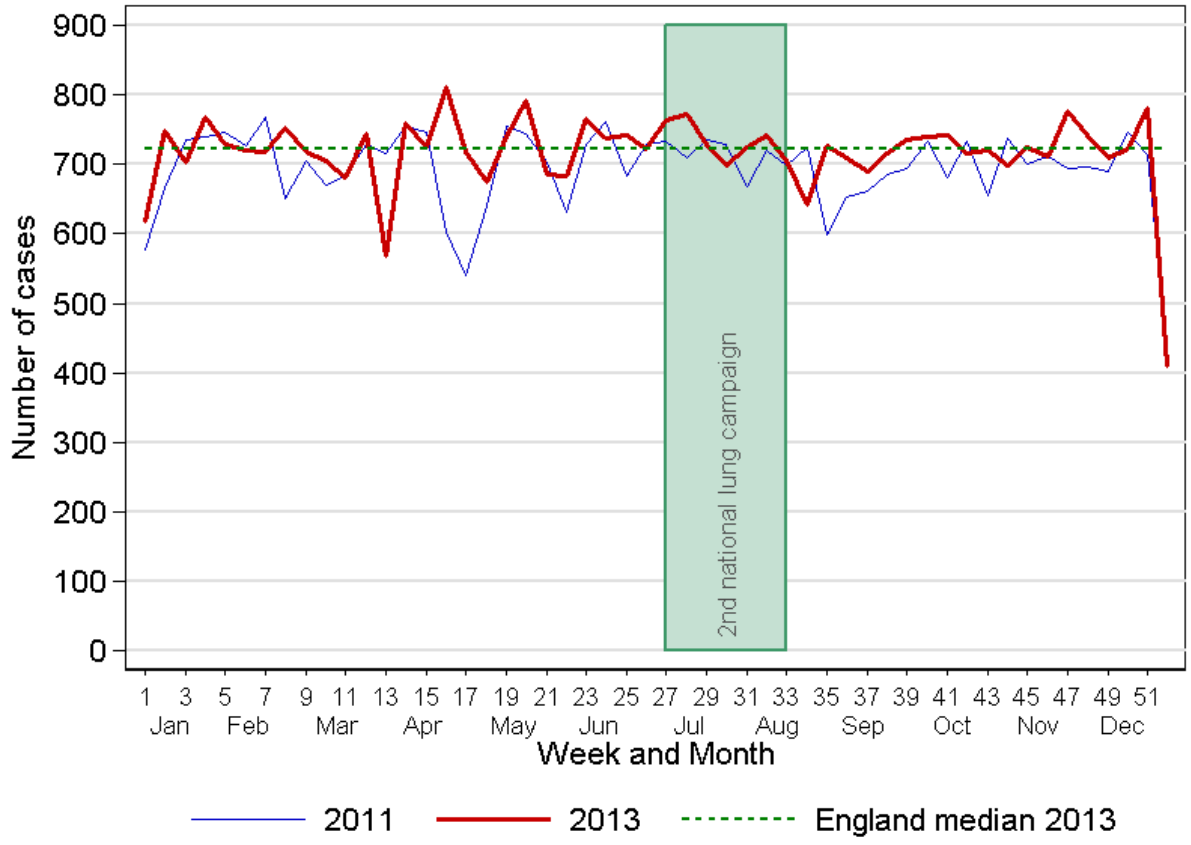
Figure 6. Monthly average number of lung cancers diagnosed per working day, England Jan 2010 to Dec 2012 (by month first seen for lung cancer) (Figure S3 from Ironmonger et al, 2015)



3.9.2 Number of new lung cancers, second and third national campaigns

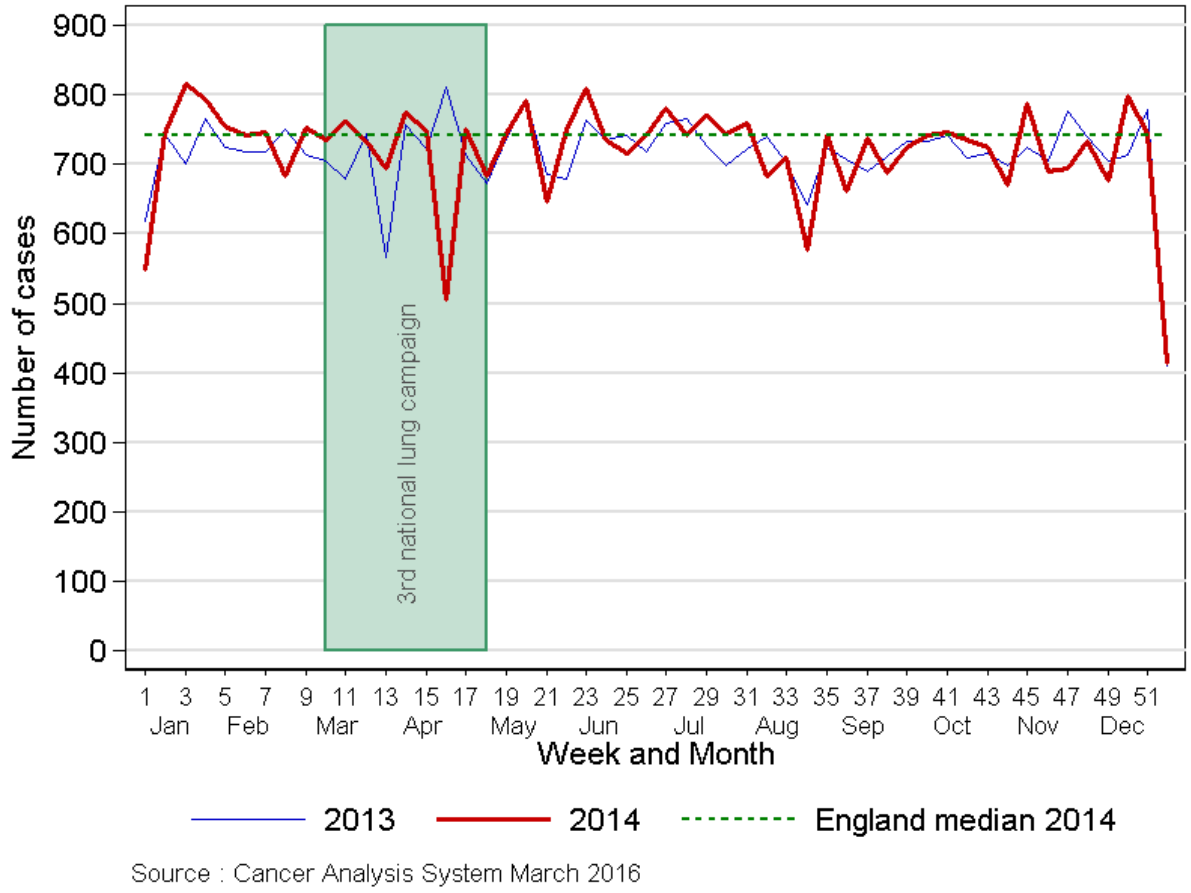
Using data extracted from the Cancer Analysis System (CAS), the numbers of lung cancers diagnosed during or post-campaign in the second and third national campaigns of 2013 and 2014 were not always more than those for the same periods in 2011 (2011 being chosen as the comparator for the second campaign to avoid the influence of the first national campaign in 2012) and 2013 (figure 7 and 8). This is reflected in the finding that there was no period of five or more consecutive weeks where there were more lung cancers diagnosed in 2013 compared with 2011, or in 2014 compared with 2013.

Figure 7. Second national campaign: the number of lung cancer cases (C33-34) by week, comparing 2011 with 2013 and the median for England for 2013



Source : Cancer Analysis System February 2017

Figure 8. Third national campaign: the number of lung cancer cases (C33-34) by week, comparing 2013 and 2014



Source : Cancer Analysis System March 2016

3.9.3 Demographics of new cases

There has been no evidence of a difference in the age or sex distribution of new cases of lung cancer following any of the campaigns (more detail in appendix 5.7).

3.10 Impact on stage at diagnosis

There is evidence of a stage shift in patients diagnosed around and in the weeks following the campaigns. The analyses relating to the regional and first national campaigns were carried out by Cancer Research UK using NLCA data. Those for the second and third national campaigns were carried out by NCRAS analysts using the CAS and slightly different analytical methods (including slight differences in how the stages were grouped) and different time periods have been used. However, there is evidence of a statistically significant and positive stage shift (towards earlier stage disease) in patients diagnosed after all three national campaigns (see figure 9 for first national campaign and figure 10 for the second national campaign); there was also a

trend towards such a shift after the regional campaign. With regards the second national campaign in 2013, there were eight consecutive weeks (weeks 42 to 49) where the proportions of early staged 1 and 2 cases were above the median (see figure 10); this corresponded with five consecutive weeks (weeks 45 to 49) where the proportions of stage 3 cancers were below the median. There was no change in the proportion of stage 4 cancers during 2013.

These results relate to all cases of lung cancer irrespective of their morphology. Stage in SCLC patients was analysed separately for the regional campaign and first national campaign; a significant shift towards earlier stage (previously called 'limited') disease was observed for the regional campaign, but although there was a trend towards a similar positive shift in the national campaign, it was not statistically significant.

Figure 9. First national campaign: percentage changes in stage distribution of cases of NSCLC diagnosed pre and post campaign

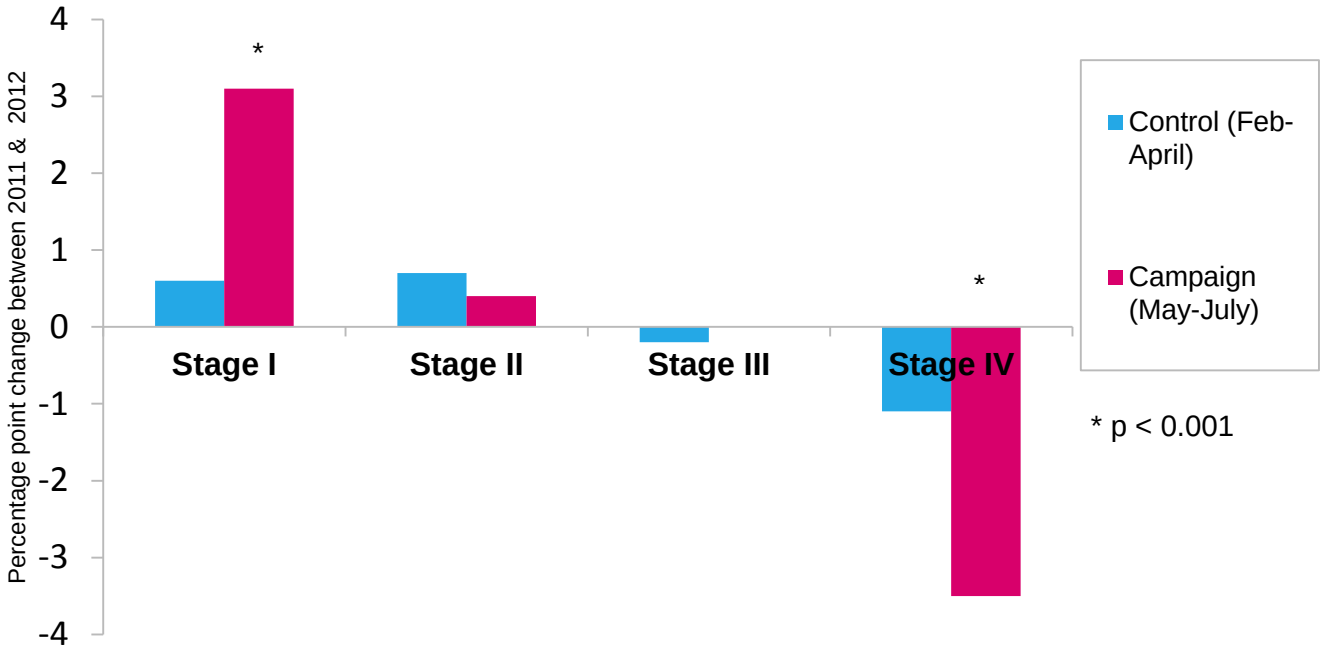
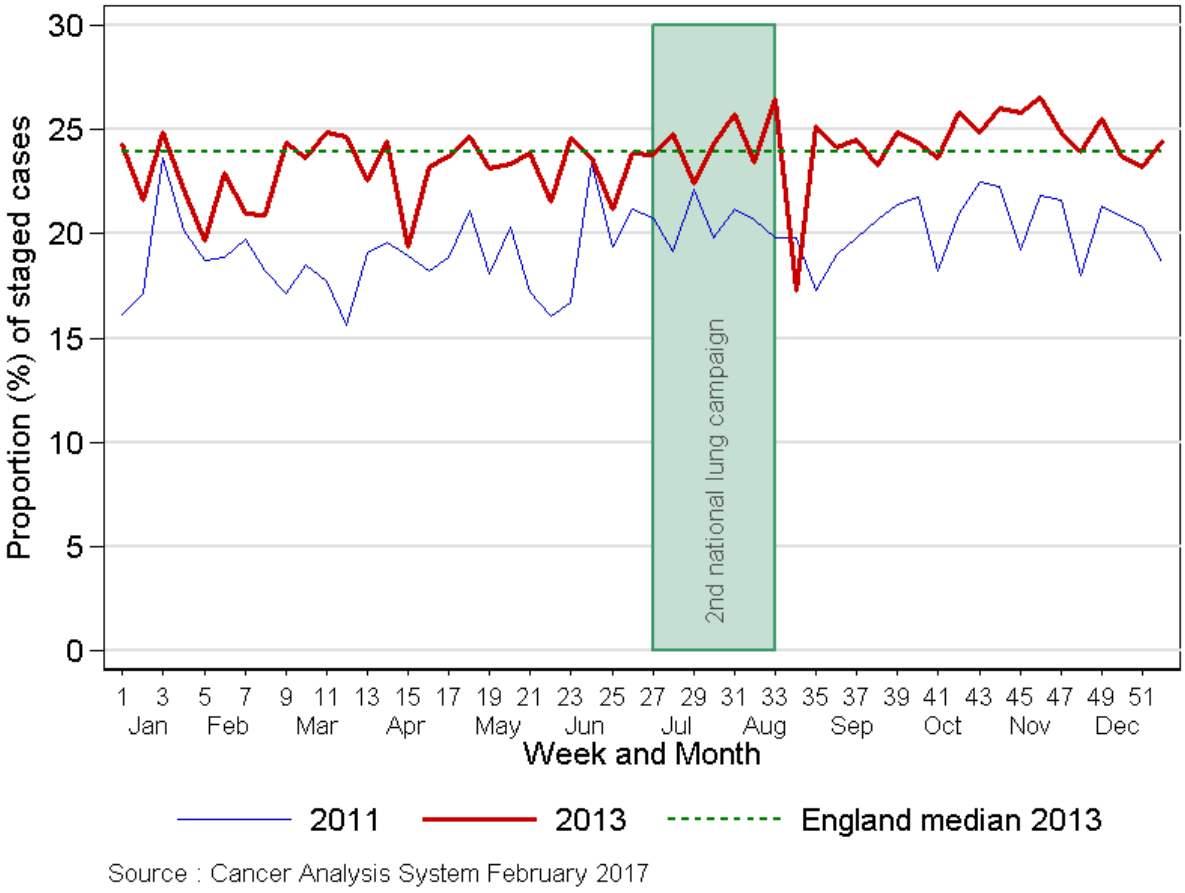


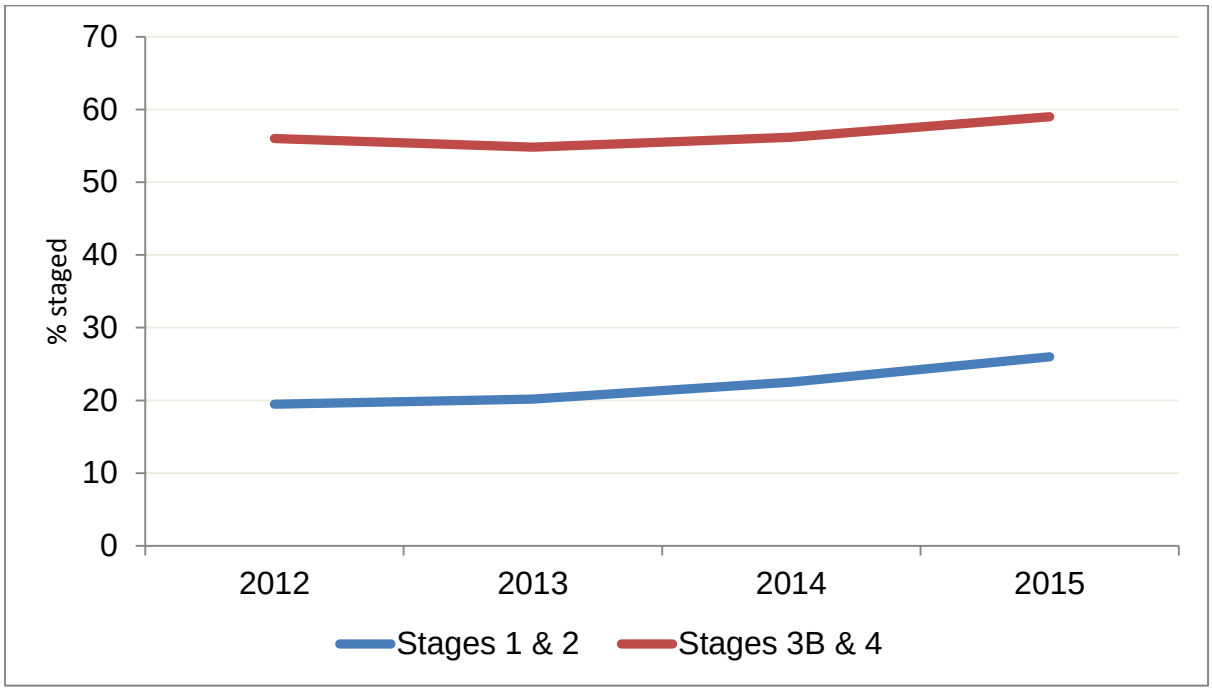
Figure 10. Proportion of lung cancers diagnosed at stage 1 and 2 in England by week following the second national campaign (2013), against the weekly median for 2013



Source : Cancer Analysis System February 2017

It is worth noting that there has been a gradual increase in the proportion of patients being diagnosed with early stage lung cancer in England over the period of the campaigns, as illustrated in figure 11 using data from the NLCA. The proportion of patients being staged has also increased over that time period, but the proportion of staged patients diagnosed with stage 1 and 2 disease has increased from 19.5% to 26% compared with that for stages 3B and 4 which has increased from 56% to 59%.

Figure 11. Distribution (%) of early and late stage lung cancer in England 2012 to 2015 (source: NLCA)



3.11 Impact on performance status at diagnosis

Performance status is a clinical assessment of the impact of the cancer on the patient's ability to carry out the normal activities of daily living. It is a powerful prognostic factor and can deteriorate quite quickly during the latter part of the course of disease. It has a major impact on fitness for treatment, meaning that delays in diagnosis not only impact on stage of disease, but also the feasibility of active treatment. Performance status was analysed with respect to the regional and first national campaigns. There was a non-statistically significant trend towards better performance status at diagnosis after the regional campaign. There was also a trend towards a better performance status in patients diagnosed in the period following the first national campaign.

3.12 Diagnostic imaging

Since the collection of the Diagnostic Imaging Dataset (DID) only began in 2012, no data is available to evaluate the impact of the regional campaign on imaging. The quality and completeness of the DID is likely to have changed over the period of analysis presented here and results should therefore be considered as provisional. The analysis of the first national campaign was carried out by Cancer Research UK and the second and third by analysts in NCRAS; slightly different groups of CT scan codes

were used by the two groups, which makes direct comparison difficult, however it is unlikely that any major effect has gone undetected.

Following the first national campaign there were significant increases in requests for chest X-rays and CT scans both by GPs and consultants, the most notable was an increase in the number of GP requested chest X-rays of 18.6% ($p<0.001$) and an overall increase of 12.3% in CT scan requests. Since CTs are mostly only carried out where there was an abnormality on the chest X-rays, this implies a high detection rate of patients with clinically significant problems, whether cancer or not. Over 2013 to 2014, the period that covered the second and third national campaigns, there was a steady increase in the number of CT scans requested by consultants and GPs, though the number requested by GPs was very small. However, there were no statistically significant changes in any of the imaging test numbers directly related to the second national campaign, either those requested by GPs or by consultants.

With respect to the third national campaign, the overall volume of imaging in 2014 was compared to the median for the year 2013 and there was a statistically significant increase in the volume of images when comparing the period March to May 2013 with March to May 2014. The increase was only seen for GP chest X-ray referrals, which increased by 23% during the campaign period in 2014 compared with the rest of that year. There was no period of sustained increase in the volume of CT scans that appeared to be directly related to the timing of the campaign (over and above the generally increasing trend over time).

3.13 Impact on treatment

There is good evidence of a statistically and clinically significant increase in surgical resection rate associated with both the regional and first national campaigns. In absolute terms, the increase after the first national campaign was 2.3%, a relative increase of 17%. These analyses were largely based on the NLCA data, confirmatory evidence was seen using OPCS4 codes (classified as interventions or surgical procedures) from Hospital Episode Statistics (HES) analysed independently by DH. Further analysis using HES linked to cancer registry data suggests that there was an

increase in surgical resections after the first and third national campaigns, but not after the second national campaign.

Treatments other than surgery were examined after the regional and first national campaigns. and there is evidence that those campaigns were associated with statistically significant increases in overall active treatment rates and a fall in the proportion of people receiving only palliative treatments.

3.14 Impact on survival

Analysis of the age-standardised 1-year crude survival rates over the period of the regional campaign and the 6 week period following the campaign, compared with the same time period 1 year earlier, revealed that in the campaign area there was a 4.0 percentage point increase (from 35.2% to 39.2%; p=0.024) compared to a 2.0 percentage point increase (from 37.3% to 39.3%; p=0.034) in the control area. There was however no statistically significant difference (p=0.425) in these improvements between the campaign and control areas (Ironmonger et al, 2015).

The period chosen for the survival analysis following the first, second and third national campaigns was the survival of patients diagnosed during the period of the campaign plus one month post-campaign, compared to the survival of patients diagnosed during the rest of the same year. Analysed in this way, there was no evidence of any difference of 1-year survival as a result of the first national campaign in 2012.
The 1-year survival of patients aged over 50 diagnosed in the period of the second national campaign was numerically higher (41.1%) than those diagnosed in the rest of the year (40.2%) but this was not statistically significant. Females had a significantly higher 1-year survival than males. This difference was seen during and outside the campaign period.

The 1-year survival of patients aged over 50 diagnosed in the period of the third national campaign was not significantly different (41.0%) from that of patients diagnosed in the rest of the year (41.2%). Females had a significantly higher 1-year survival rate than males during and outside the campaign period.

Survival data was re-analysed extending the time window to include three months post the national campaigns and, analysed in this way, there were again no statistically significant differences in survival rates of patients diagnosed over those extended periods compared with those diagnosed during the rest of the same years.

3.15 Cost-effectiveness

Based on the stage shift in NSCLC seen after the regional and first national campaigns, a cost-effectiveness analysis was carried out in partnership with colleagues from the Centre for Health Economics at York University (Hinde et al, 2015). These included measures such as Quality of Life Years (QALY) and incremental cost-effectiveness ratios (ICERs). They concluded that: “the base-case theoretical model found the regional and national early awareness campaigns to be associated with QALY gains of 289 and 178 QALYs and ICERs of £13,660 and £18,173 per QALY gained, respectively” and that: “subject to the available evidence, the analysis suggests that early awareness campaigns in lung cancer have the potential to be cost-effective.”

3.16 Relationship of campaign impact with age and socio-economic status

As was highlighted in section 3.1, lung cancer is much more common in people of lower socio-economic status and it is likely that the main reason for that is the higher smoking rates in these groups. It is also very much more common in people over the age of 50, hence the fact that these campaigns have been targeted at people over the age of 50 and from socio-economic group C2DE. However, it is well recognised that attempts to change health behaviour for the better have a greater impact on those from higher socio-economic groups, increasing the deprivation gap (the Inverse Care Law (Tudor Hart, 1971)).

Moffat et al (2015) used data from the evaluation of the bowel and lung cancer awareness campaigns to assess the extent to which the campaign messages had reached the target group. There were no significant differences in the magnitude of shift in symptom awareness between ABC1 *vs* C2DE socio-economic groups. They concluded that the national lung campaigns had reached their target audience but had also influenced younger and more affluent groups.

3.17 Limitations of data and analysis

One major weakness is that we have been very limited in our access to primary care data. Access to such data at a national level would significantly improve our ability to assess the impact on primary care and to better target work on public awareness campaigns in future. It would also allow us to examine the impact of the campaigns on non-cancer diagnoses, improvements in which could be a significant added benefit.

Detailed data on treatments other than surgery have only become available during the course of these campaigns and so the impact on the use of non-surgical treatments such as radiotherapy and systemic therapies has not been studied in any detail. This limits our ability to assess the impact of treatment that may also prolong life (eg to 1 year) without necessarily leading to long term survival benefits.

The methods and datasets used in the analysis of stage have varied significantly between campaigns. The fact that the findings on this metric have been inconsistent may well be a result of the use of different datasets (NLCA and CAS), different analytical methods (including slight differences in how the stages were grouped) and different time periods that have been used. This also applies to the DID, which only began collecting data in 2012 and the quality and completeness of which has improved over the period of study. So the ability to reliably detect meaningful and comparable changes over time using these datasets is limited.

Most of the analyses on the ‘clinical’ impact have been carried out defining the period of analysis as the period of the campaign itself plus one month post campaign. This is an arbitrary cut-off point and will have undoubtedly missed some new patients with lung cancer whose trigger to seek advice was the campaign but who only received their diagnosis after the end of the period chosen for analysis. It is unknown whether extending the period of analysis would have made any significant impact on the results.

The completeness of data on performance status has, in contrast to that of most other data items, deteriorated over the latter 2 years of the national campaigns as a result of changes in how the NLCA database has been operating. It has therefore not been

possible to analyse changes in performance status for the second and third national campaigns.

3.18 Summary, discussion and conclusions

3.18.1 Overall summary

Whilst the findings have varied both between campaigns and for the different variables that have been examined, there have been examples of positive changes in most of the metrics that one would hope for after a series of national initiatives such as these. There is evidence of what might best be described as a 'whole system response'. From public recognition of the messages to increases in attendance at GP practices, increases in urgent GP referrals for suspected cancer to secondary care, some evidence of an increased number of cases and more use of diagnostic tests, a shift to earlier stage disease with better performance status at the time of diagnosis and increased numbers of patients undergoing surgery. However there was no evidence of a statistically significant improvement in 1-year survival rates in patients diagnosed during and immediately after the campaign periods.

All of these metrics have been studied against a background of general improvements in many of the process and outcome indicators relating to lung cancer in England over the last 10 to12 years. These are almost certainly a result of a wide variety of changes in how lung cancer is managed in the English NHS and how it is perceived as a disease both by the public and healthcare professionals. Some of these changes, in particular increases in urgent GP referrals for suspected cancer and a fall in emergency presentation rates, have also been seen in other cancer types. The Be Clear on Cancer lung campaigns have been one part of this environmental change and ascribing direct cause and effect is not possible. The overall evaluation of these campaigns presented in this document suggests that they are likely to have made a significant contribution to the positive improvements seen in outcomes for lung cancer patients in this country over recent years.

3.18.2 Changing impact over time

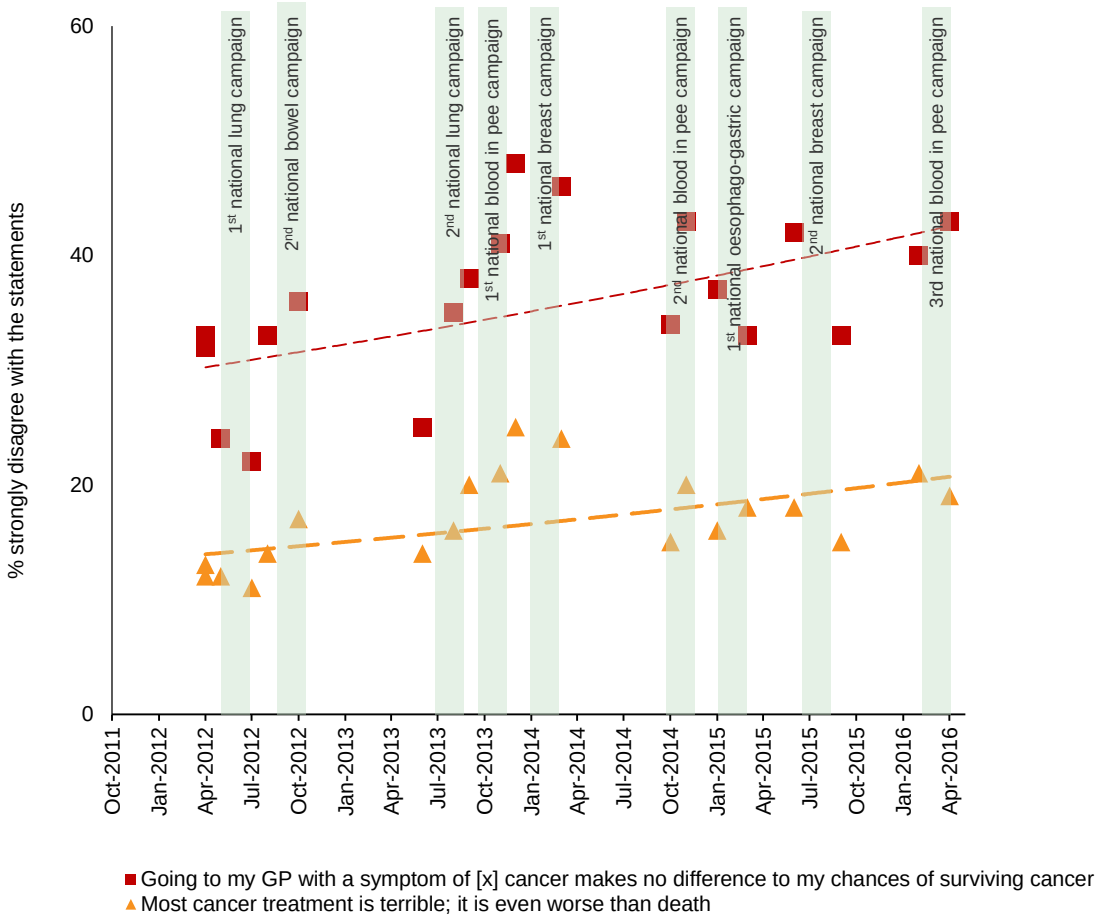
There is evidence from a number of the metrics used in the evaluation that the impact has diminished to a varying extent over the course of the four campaigns, with almost

universally the greatest effect being detectable after the regional and first national campaigns. The weight of media coverage in the regional and first national campaigns was significantly higher, taking account of limited geographical coverage of the regional campaign, than in the second and third national campaigns, with varying use of supporting channels, so it is likely that this was a major factor. The four campaigns also ran for different durations and there was a relatively short interval of no more than a year between each of them. From a combination of tracking research and modelling, the campaign was planned to ensure maximum impact for the budget. We know the rate at which we expect campaign awareness to decay and based on this, the campaign ran for an extended period to maximise the impact of the campaign and ensure efficiency of media spend.

3.18.3 Wider impact

There is unequivocal evidence of the positive impact of the campaigns on the level of knowledge of some lung cancer symptoms in the general population and this has resulted in many more patients visiting their GPs with cough. Other questions included in the population based surveys, not reported here, have confirmed important changes in people's attitude to cancer in general, specifically: a) there has been an increase in the proportion of people who agree that early diagnosis of cancer can improve outcomes and b) a fall in the proportion of people who believe that treatment is worse than the disease. These changes are illustrated in figure 12, below.

Figure 12. Responses over time to telephone survey questions relating to broader issues of attitudes to cancer (TRNS BRMB)



These general messages form part of the wider range of issues raised in the Be Clear on Cancer campaigns and intuitively would be expected to lead to the earlier detection of disease. We have not measured the impact on other serious but benign diseases such as COPD, asthma, interstitial lung disease and tuberculosis etc, but it is likely that the people at higher risk of such diseases would also be more likely to visit their GPs as a result of these campaigns, and thus receive effective treatment earlier than they might have done otherwise.

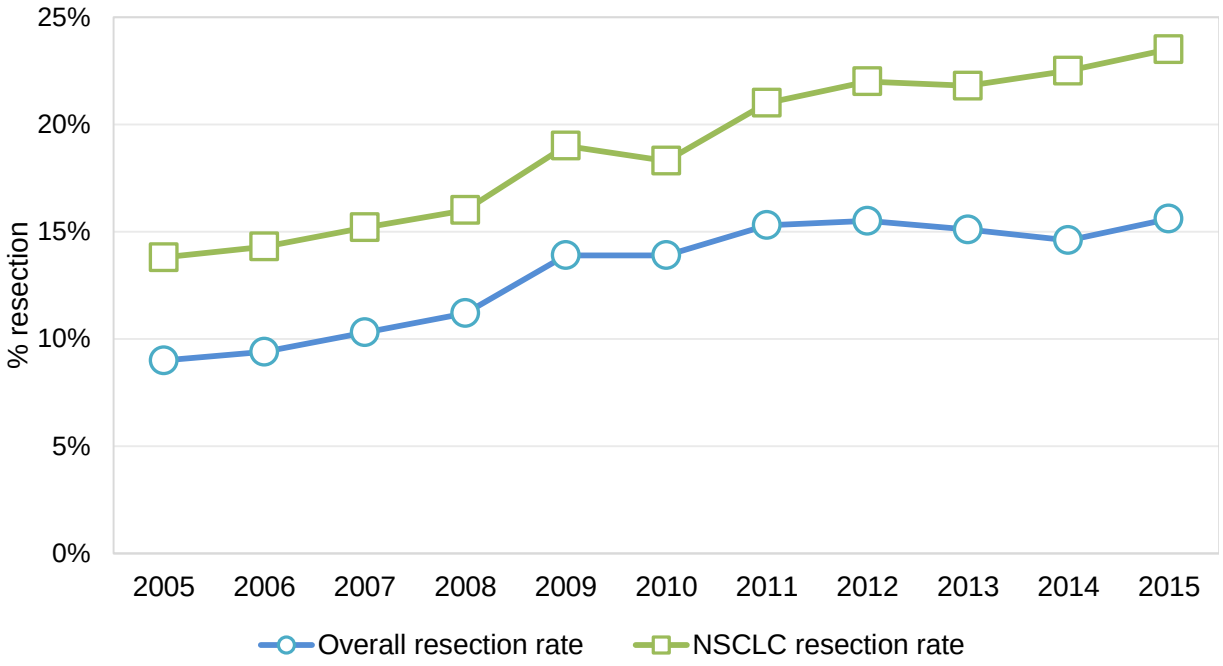
We have not formally assessed the impact of the lung cancer campaigns on GP awareness and attitudes, but there is general anecdotal agreement that GPs have responded positively, especially as evidenced by the doubled number of urgent GP referrals for suspected lung cancer over the period of the campaigns. The campaigns

may have given GPs ‘permission’ to refer patients at a lower threshold. The new NICE guidelines on referral for suspected cancer (NICE, 2015) have been introduced since the end of these campaigns; they promote a lower threshold for referral but will have not impacted on referrals over the period of these analyses.

3.18.4 Survival as an endpoint

Improvements in short term survival are a very poor indicator of the real impact of such interventions since lead time bias (patients who would die anyway but are simply being diagnosed a little earlier in the course of their otherwise unaltered disease trajectory) is very likely to play a part. An increase in the numbers of new cases being detected during and shortly after a campaign, that do not fall back below baseline immediately, is the hallmark of a really effective intervention; there is no clear evidence that has been seen in the course of these campaigns. The increase in the rates of active treatment seen after the regional and first national campaigns, especially the significant increase in surgical treatment rates, is very encouraging and could result in a longer term survival benefit. It is a fall in the mortality rate from lung cancer that would be the ultimate hallmark of success, but it is too soon to expect to be able to detect this. Even a fall in mortality would, (over the long period that it would take to look for such an effect) be difficult to attribute directly to one factor such as a programme of public awareness campaigns. Changes in patterns of clinical practice, service configuration and the emergence of new treatments could all have (positive) confounding effects. For example, there has been a slow but continuing fall in smoking rates in recent years, a factor which would reduce incidence and therefore mortality rates. Another change has been a dramatic increase in the surgical resection rate in England over the period since 2005, as illustrated by data from the NLCA shown in figure 13. There has also been the introduction of Stereotactic Radiotherapy, a new modality of potentially curative treatment applicable to older and less fit patients with limited stage disease, which, in the Netherlands, has been linked with a fall in population mortality (Palma et al, 2010).

Figure 13. Crude surgical resection rates in England and Wales between 2005 and 2015. Overall = patients with lung cancer of any description; NSCLC = patients with a confirmed diagnosis of Non-Small Cell Carcinoma (source; NLCA)



In addition, over the time period of the regional and first national campaigns there was a gradual increase in both 1- and 2-year survival in lung cancer patients in England (figure 14) which is part of a longer term trend (figure 15).

Figure 14. 1 and 2 year survival (%) 2011 to 2012 derived from the Cancer Analysis System

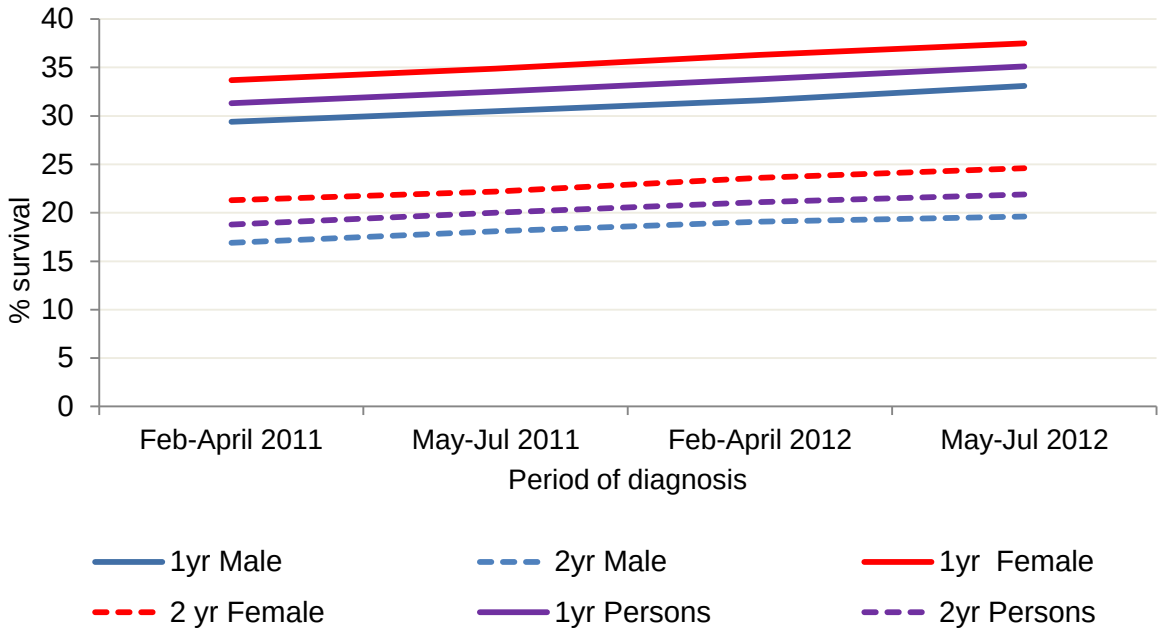
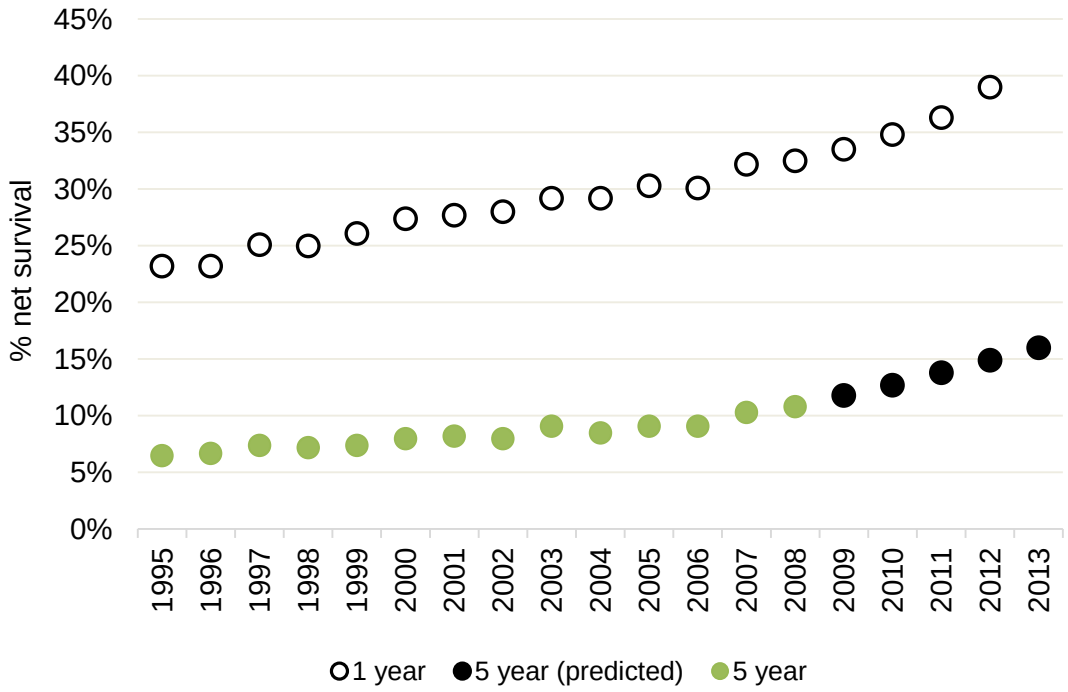


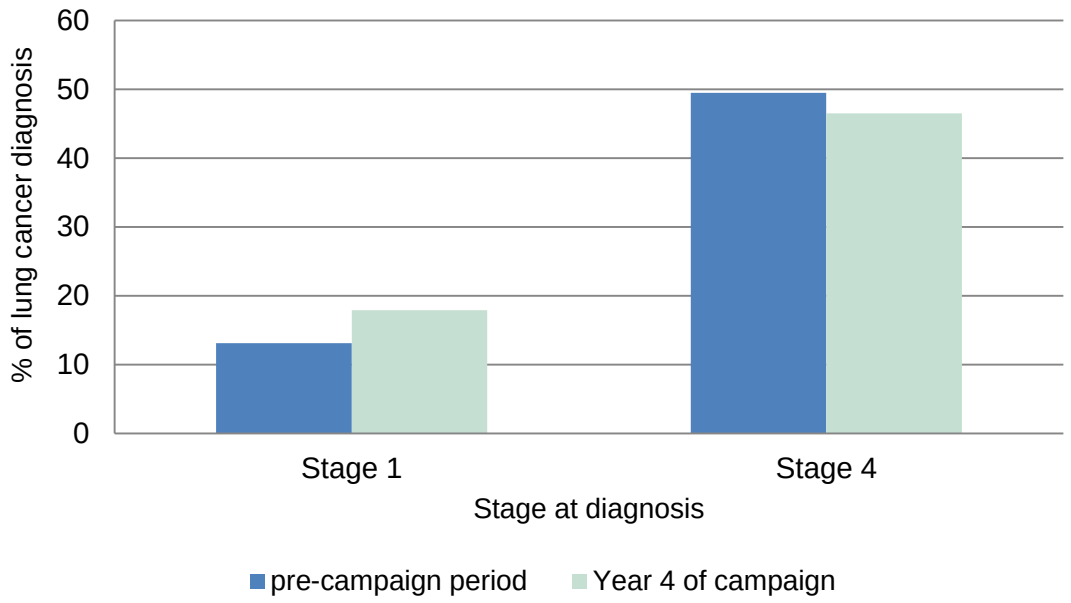
Figure 15. Net actual and predicted) 1 and 5 year survival rates for lung cancer in England 1995 to 2013 (adapted from Walters et al., 2015)



3.18.5 Findings elsewhere in the UK – the example of Scotland

It is worth considering the comparison of what has been observed in Scotland as a result of their 'Detect Cancer Early' programme. This ran between 2011 and 2015 aiming to increase public awareness across a number of cancer sites, of which lung was a high priority. Their major finding was of shift towards earlier stage at diagnosis in the lung cancer population in the period following the campaigns (figure 16), a very similar change seen after the regional and first national campaigns in England is described in section 3.10. However the Scottish campaigns ran to a variable level over a period of 3 to 4 years as opposed to the few weeks that they ran in England.

Figure 16. Stage distribution (%) pre and post the Scottish 'Detect Cancer Early' lung campaigns (Black et al. 2016).



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5. Appendices 1 – additional details of methods and results

5.1 Marketing evaluation – methods

For the regional and first national campaigns, pre- and post-campaign random location quota surveys were undertaken by TNS BMRB, an independent market research agency specialising in social research (TNS BMRB, 2014), to evaluate the impact of the campaign on measures including public awareness of symptoms of lung cancer for those aged 55 and over. Although the target age group of the whole campaign was 50 and over, data for the surveys were only collected for the population aged 55 and over to match the media buying (the TV adverts were shown at times and on channels most watched by those aged over 55 years, as that was the age group closest to the target group). The surveys were informed by the general Cancer Awareness Measure (Stubbings et al, 2009) and the lung-specific version (Simon et al, 2012). Questions were added to the in-home, face-to-face omnibus survey which is carried out across England, with ad-hoc face-to-face fieldwork in the Central England pilot area. The survey took approximately 15 to 20 minutes. TNS BMRB also carried out surveys to assess GPs' views on numbers of patients presenting with symptoms of lung cancer, numbers of suspected lung cancer referrals made, and GPs' views on the campaign's communications.

Pre-regional campaign interviews took place between 12 September and 9 October 2011, and post-campaign interviews between 14 November and 11 December 2011. Just over 500 interviews were carried out in the pilot region (571 pre-campaign and 536 post campaign) and around 450 interviews were available for the rest-of-England control (452 pre-campaign and 451 post-campaign). Further details surrounding the sampling methods can be found in the Supplementary Materials and Methods of the paper by Ironmonger et al (2015).

For the second national campaign, as previously, a representative sample of adults in England were surveyed and approximately 1,570 people aged 50 and over were interviewed at both pre- and post-campaign stages.

Results of the national campaign awareness surveys include embedded regional results, which can be considered as an assessment of the longer-term impact on awareness (around six and eight months after the regional campaign), compared with the weeks immediately following the regional campaign (as assessed by the post-campaign survey).

There was no marketing evaluation of the third national campaign which ran for 8 weeks between 10 March 2014 and 30 April 2014.

5.2 Public awareness – demographics of respondents

The demographics of the survey respondent were similar across all campaigns, a typical example from the regional campaign being shown in figure 4 below.

Table 4. Survey respondent demographics pre- and post-regional campaign for pilot and control areas

		Control		Pilot	
		Pre-campaign	Post-campaign	Pre-campaign	Post-campaign
Gender	Male	46%	46%	46%	46%
	Female	54%	54%	54%	54%
Age in years	55 - 64	42%	41%	42%	42%
	65 - 74	31%	33%	32%	31%
	75 - 84	21%	22%	23%	22%
	85+	7%	5%	4%	6%
Socio-demographic group	ABC1	40%	39%	43%	42%
	C2DE	60%	61%	57%	58%

5.3 Detailed results of public awareness

When survey participants were asked to name as many symptoms of lung cancer as possible (‘spontaneous awareness’), the proportion mentioning a cough increased from 54% pre-campaign to 65% post-campaign ($p<0.001$), with specific mentions of a persistent or prolonged cough increasing from 12% to 15% ($p=0.048$). Details of pre- and post-campaign results for the first national campaign are shown in Table 5. When shown a list of lung cancer symptoms and asked how much of a lung cancer warning sign each was (’prompted awareness’), a cough for three or more weeks was the symptom with the largest increase in recognition, rising from 18% pre-campaign to 33% after ($p<0.001$). Additionally, post-campaign awareness was higher amongst participants recognising at least one campaign advertisement than those saying they did not recognise any. For example, spontaneous awareness of cough was 69% for those who recognised the campaign compared with 48% for those who didn’t ($p<0.001$).

Table 5. First national campaign: public awareness pre- and post-campaign survey results (Table 1, Ironmonger et al, 2015)

Survey question		Pre N (%)	Post N (%)	p-value	Non-recognisers	Campaign recognisers	p-value
Weight base		1153	1121	-	235	886	-
There are many signs and symptoms of lung cancer. Please name as many as you are aware of (*Spontaneous awareness)*	*Cough/ hoarseness*	478 (41%)	560 (50%)*	<0.001	92 (39%)	468 (53%)**	<0.001
	Persistent/ prolonged cough	140 (12%)	168 (15%)*	0.048	21 (9%)	147 (17%)**	0.004
	TOTAL cough	618 (54%)	728 (65%)*	<0.001	113 (48%)	615 (69%)**	<0.001
	Shortness of breath	239 (21%)	223 (20%)	0.621	39 (17%)	184 (21%)	0.154
	Coughing up blood	224 (19%)	179 (16%)*	0.031	25 (11%)	154 (17%)**	0.012
	Chest pain	97 (8%)	77 (7%)	0.166	12 (5%)	65 (7%)	0.23
	Weight loss	95 (8%)	100 (9%)	0.562	11 (5%)	89 (10%)**	0.01
How confident are you that you know the signs and symptoms of lung cancer? *(Those 'very confident' or 'fairly confident')*		514 (45%)	571 (51%)*	0.002	91(39%)	480 (54%)**	<0.001
I'm going to list some symptoms that may or may not be warning signs for lung cancer. For each one can you tell me the extent to which you think it is a warning sign for lung cancer *(those saying definitely a warning sign) (Prompted awareness)*	*A cough for three weeks or more that doesn't go away*	206 (18%)	373 (33%)*	<0.001	45 (19%)	328 (37%)**	<0.001
	Breathlessness	256 (22%)	278 (25%)	0.144	45 (19%)	233 (26%)**	0.024
	Coughing up blood	619 (54%)	637 (57%)	0.132	109 (46%)	529 (60%)**	<0.001
	A persistent pain in your chest or shoulder	147 (13%)	155 (14%)	0.449	21 (9%)	134 (15%)**	0.015
	Losing weight for no obvious reason	264 (23%)	315 (28%)*	0.004	45 (19%)	270 (30%)**	<0.001
	A cough which has got worse or changes	231 (20%)	332 (30%)*	<0.001	46 (20%)	286 (32%)**	<0.001

*Statistically significant difference between pre- and post-campaign surveys (two-sample test of proportions; p<0.05)
**Statistically significant difference between those recognising any campaign advertisement to those not recognising one (two-sample test of proportions; p<0.05)

Similar trends were seen in the pilot area following the regional campaign (results available in Supplementary Table S1, Ironmonger et al, 2015), for instance, prompted awareness of a cough lasting for three or more weeks increased from 19% to 34% ($p<0.001$). For comparison, any changes in the control area were generally not significant. In the first national campaign's pre-campaign survey, prompted awareness of a cough for three or more weeks had decreased for those in the pilot region since the post-regional campaign survey, but remained higher than for those in the control area (25% compared with 16%; $p=0.002$). Post campaign, prompted awareness was similar for the national campaign in both areas (33% vs. 34%), and was also similar to post-campaign awareness in the regional area following the regional campaign (34%).

With the potential for the campaign's focus on one symptom to falsely reassure the public that other symptoms are not a sign of lung cancer, the impact on awareness of other lung cancer symptoms was also assessed. After the national campaign there was a small but significant decrease in the proportion spontaneously mentioning 'coughing up blood' as a symptom of lung cancer (from 19% to 16%; $p=0.031$), although there was no decrease in the proportion saying coughing up blood was definitely a warning sign (prompted awareness). Neither spontaneous nor prompted awareness for other lung cancer symptoms mentioned in the survey decreased after the national campaign (table 5). Following the regional campaign, in the pilot area there was a significant fall in spontaneous mentions of chest pain (from 13% to 9%; $p=0.026$), yet there was an increase in prompted awareness (from 12% to 17% $p=0.026$).

5.4 Attendances at GP practices - regional and first national campaigns

Healthcare IT specialists Mayden (2014) extracted data from a sample of 486 GP practices and used Read codes to demonstrate the numbers of patients presenting to GP practices with symptoms directly linked to the first national campaign (eg a cough) and selected control symptoms each week after the first national campaign between March 2010 and May 2013. The precise list of Read codes was determined with the support of primary care colleagues from DH Policy Research Unit and a wide range of other clinicians (see table 37). Numbers of visits in patients aged 50 years or more over the eight weeks around the campaign were compared with the same weeks in the previous year. More people with a cough went to see their GP following the campaign launch (table 6).

Table 6. First national campaign: presentations per GP practice per week for patients aged 50+, data from 486 practices. (Table 2 from Ironmonger et al, 2015)

Symptoms	Eight week period	Presentations per practice per week (adjusted[1])		Change (2012 vs 2011)	% change (2012 vs 2011)	p-value
		2011	2012			
Key campaign symptom (cough)	Control	6.2	6.5	0.3	+5%*	<0.001
	Campaign	4.8	7.8	3	+63%*	<0.001
	Post-campaign	4.1	5.9	1.9	+46%*	<0.001
Urinary Tract Infection	Control	1.1	1.1	0	2%	0.386
	Campaign	1.1	1.2	0.1	+5%*	0.016
Neck pain	Control	0.8	0.8	0	-4%	0.142
	Campaign	0.9	0.9	0	0%	0.963
Shoulder pain	Control	1.9	1.9	0	-1%	0.604
	Campaign	1.9	1.9	0	1%	0.681
Knee pain	Control	2.5	2.5	0	1%	0.436
	Campaign	2.8	2.8	0.1	3%	0.060

[1]Adjusted for a five day working week excluding bank holidays (eg includes Easter, Early May, Spring bank holidays and Queen's Diamond Jubilee bank holiday for 2012)

*Statistically significant difference between 2011 and 2012 (likelihood ratio test of significance p<0.05)

Presentations of patients aged 50+ with a cough increased by 63% for the eight weeks around the campaign compared with the same weeks in 2011 (adjusting for working days; p<0.001). This is equivalent to around three additional visits per practice per week (based on practices in the sample which had an average list size of around 7,800 patients), whilst the England average was around 6,800 visits for 2011/12 (HSCIC, 2012). For comparison: for those aged 50+ the largest increase in presentations for the control symptoms was 5% for urinary tract Infections (p=0.016); and just 5% more people presented with a cough during the eight pre-campaign control weeks in 2012 compared with those weeks in 2011 (p<0.001). This suggests the increase following the campaign launch was over and above a small year on year increase in presentations.

The increase in attendances was not confined to those over 50. Across all ages, there was a 67% increase in patients with a cough visiting their GP, equivalent to six additional visits per practice per week (data not included in report). The age group with the highest actual increase

in presentations during the campaign weeks was 60 to 69 year olds and the largest percentage increase was in 50 to 59 year olds (table 7).

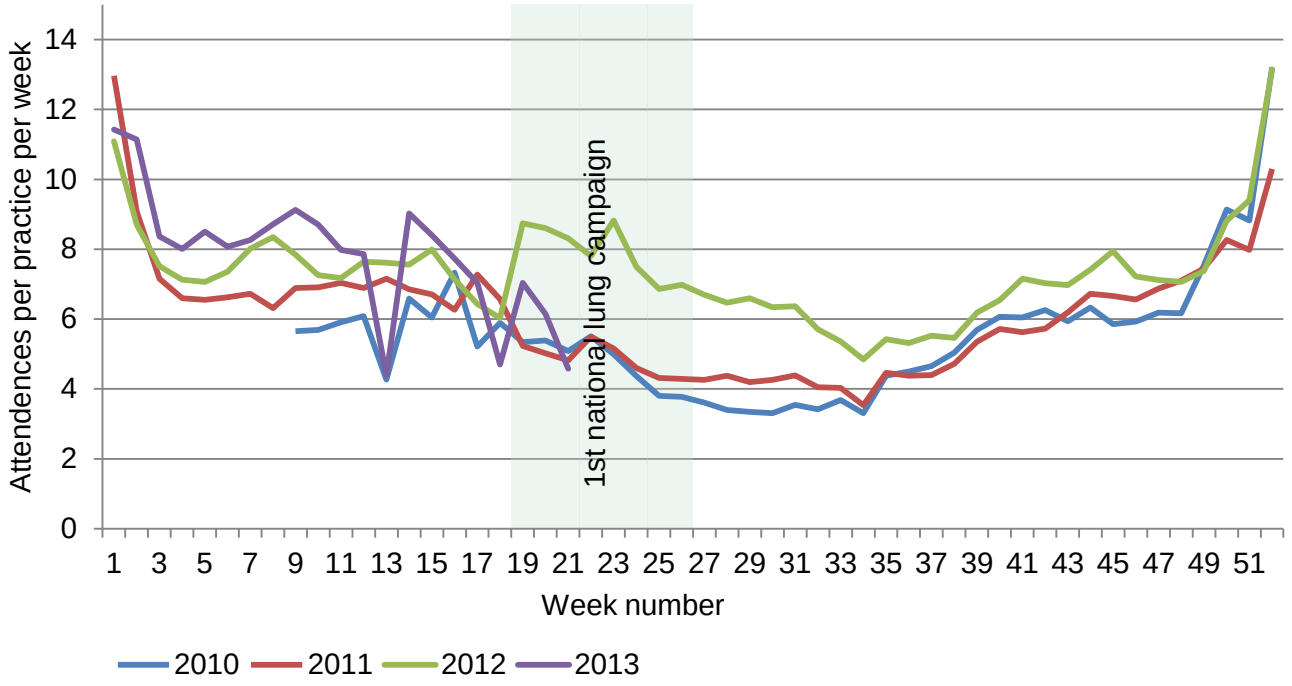
Table 7. First national campaign: number of GP presentations for cough (unadjusted) for the eight weeks of the campaign by age group, data from 486 practices (Table S4 from Ironmonger et al, 2015)

Age group	Number of GP presentations (% of all ages)		Change	% Change	p-value
	2011	2012			
0-9	6,389 (18.1%)	9,906 (17.3%)	3,517	+55.0%*	<0.001
10-19	2,366 (6.7%)	4,025 (7.0%)	1,659	+70.1%*	<0.001
20-29	1,883 (5.3%)	3,317 (5.8%)	1,434	+76.2%*	<0.001
30-39	2,447 (6.9%)	4,213 (7.4%)	1,766	+72.2%*	<0.001
40-49	3,648 (10.4%)	6,332 (11.1%)	2,684	+73.6%*	<0.001
50-59	4,091 (11.6%)	7,478 (13.1%)	3,387	+82.8%*	<0.001
60-69	5,632 (16.0%)	9,260 (16.2%)	3,628	+64.4%*	<0.001
70-79	5,025 (14.3%)	7,467 (13.1%)	2,442	+48.6%*	<0.001
80+	3,742 (10.6%)	5,155 (9.0%)	1,413	+37.8%*	<0.001
Total aged 50+	18,490 (52.5%)	29,360 (51.4%)	10,870	+58.8%*	<0.001
Total all ages	35,223 (100%)	57,153 (100%)	21,930	+62.3%*	<0.001

*Statistically significant difference between 2011 and 2012 (likelihood ratio test of significance p<0.05)

The increase in presentations appeared to continue for at least eight weeks after the campaign ended (figure 17). For the eight weeks post-campaign, there were 46% more presentations in those aged 50 and over compared with the same period in 2011 (p<0.001).

Figure 17. First national campaign: number of GP presentations for a cough per week adjusted for bank holidays, patients aged 50+, data from 486 practices January 2010 to May 2013. (Figure S1 from Ironmonger et al 2015)



During the regional campaign (results available in Supplementary table S5, in Ironmonger et al, 2015), there was a smaller, 22% increase in presentations for a cough amongst those aged 50 and over in the pilot area compared with the same time in the previous year ($p<0.001$). Data was not collected for the control area.

No data was available to assess attendances to GP practices for the second and third national campaigns.

5.5 Urgent GP referrals for suspected lung cancer – CWT data

5.5.1 The CWT dataset

The CWT Monitoring Dataset managed by NHS England provides the information on which an assessment of the impact of the campaigns on GP referral behaviour and outcomes can be measured. The analyses of the CWT data in this report considers five metrics:

Urgent GP referrals for suspected lung cancer

Urgent GP referrals for suspected lung cancer, presented by month first seen. Also known as two week wait (TWW) referrals.

Cancer diagnoses resulting from an urgent GP referral for suspected lung cancer
Those lung cancer diagnoses (ICD10 C33-C34, C37-C39, C45) resulting from an urgent GP referral for suspected lung cancer, presented by month first seen. Also known as two week wait (TWW) cancers, or 62 day cancers, based on the waiting times target from urgent GP referral to first treatment.

Conversion rate
Percentage of urgent GP referrals for suspected lung cancer resulting in a diagnosis of lung cancer, presented by month first seen.

Lung cancer diagnoses recorded in the CWT dataset
All lung cancer diagnoses recorded in the CWT dataset, presented by month of first treatment. Also known as CWT cancers, or 31 day cancers, based on the waiting times target from decision to treat to first treatment.

Detection Rate
Percentage of CWT dataset recorded lung cancer diagnoses which resulted from an urgent GP referral for suspected lung cancer, presented by month of first treatment.

5.5.2 Defining the campaign and comparison periods

We might expect campaigns to have an impact on referrals first seen during the campaign months and, allowing for reasonable intervals from campaign activity to referral, in the month following the end of the campaign. These intervals may occur for several reasons, for example some patients may only react after having seen the campaign materials multiple times, some are eventually prompted to act by family and friends, some patients may need to wait for a GP appointment, especially if they prefer a convenient time or a specific GP, and so may be seen by the GP after the campaign ended. Some patients may be partially investigated in primary care before being referred, so the real impact of the campaign cannot be timed precisely.

Dates are based on ‘date first seen’ as recorded in the CWT dataset, reflecting the date seen in secondary care rather than primary care, and referrals made towards the end of the campaign may not have been seen in secondary care until after the campaign ended.

Therefore the campaign period for referrals has, in this analysis, been considered to be the months of the campaign plus the following month. The same months are considered to be the campaign period for cancer diagnoses resulting from an urgent GP referral for suspected cancer and for the conversion rate, as these are defined using the date first seen recorded for the referral. This period was chosen by NCRAS analysts whilst different periods were used by Mayden in their assessment of GP attendance elsewhere in the report.

Similarly, there is a necessary period of time between the date first seen following an urgent GP referral for suspected cancer and the start of treatment. This is because of the time required to perform diagnostic tests, to establish the stage of disease and/or to plan and arrange treatment. This interval will vary for different patients and trusts. This means that, for cancer diagnoses recorded in the CWT dataset and the detection rate, it is not possible to identify a clear period relating directly and specifically to the campaign. Diagnoses in the early campaign months could include those resulting from referrals prior to the campaign or at the beginning of the campaign. Similarly, diagnoses in the months after the campaign could include those resulting from referrals during the campaign or after the end of the campaign. Taking into consideration the average interval from date first seen to treatment start date, and the waiting times target of 62 days from urgent GP referral to first treatment, the campaign effect on all CWT recorded cancers and detection rate has been thought to be best represented by the period one month later than campaign period for referrals. This period should include many of the diagnoses resulting from campaign period referrals without too many diagnoses from pre- or post-campaign referrals.

For the first and third national lung cancer campaigns, comparisons are made to the respective numbers or rates for the same campaign period months one year earlier. However, for the second national campaign, the results are compared to those for the same period two years previously, since the first national campaign took place at a similar time in the year and may have affected the number of referrals. This comparator is not ideal, considering the background trend for increasing referrals over this time period.

The specific campaign and comparison periods used, for each of the three campaigns and the five metrics, are detailed in the following sections.

5.5.3 Comparator referral types

The number of urgent GP referrals for suspected cancer has continued to increase year-on-year (NCRAS, 2016) (see table 8 below). This means that the evaluation's comparison of the change over a 1 (or 2) year period is likely to reflect a combination of a campaign's impact and the general increase in referrals. It is not possible to separate results for these two causes of the increase, but it is useful to consider the increases in urgent GP referrals for suspected lung cancer alongside increases in urgent GP referrals for other suspected cancers in order to provide an indication of increase that was not associated with the campaign.

For the first and second national lung cancer campaigns, comparison is therefore made to all urgent GP referrals for suspected cancer excluding referrals for suspected lung and lower gastro-intestinal (GI) cancers. For the third national campaign in 2014, the comparison is made to urgent GP referrals for suspected head and neck cancers only. The reason for this choice of comparator is that the majority of other referral types may have been affected by other Be Clear on Cancer awareness campaigns run, locally, nationally or regionally, between 2012 and 2014.

5.5.4 Statistical results and methods

The numbers of urgent GP referrals for suspected cancer are presented for the campaign period and the comparison period. Percentage change figures, between the comparison and campaign periods, are calculated based on these referral counts, as this reflects the absolute change in levels of activity.

A referral rate is also presented, in order to provide some context to explain how differences in the percentage change between areas (or ages) may relate to differing referral patterns. Differences in referral rates would suggest there may be underlying differences in referral practices or cancer incidence between groups. It was not possible to assess whether any apparent campaign impact may have resulted from these underlying differences. Urgent GP referral rates vary greatly with age, so to take account of differing age profiles of patients in different areas, the rates presented are directly age-standardised and presented as rates per 100,000 population using the 2013 European Standard Population weights. Age-specific crude referral rates are presented for the age breakdown.

Data for cancer diagnoses resulting from an urgent GP referral for suspected cancer (TWW cancers) and all cancers recorded in the CWT dataset (CWT cancers) are presented for the

campaign period and the comparison period, alongside figures for the percentage change figures between the comparison and campaign periods.

Data for the conversion rate and the detection rate are presented for the campaign period and the comparison period, alongside results for the percentage point change in the rate between the comparison and campaign period.

For referrals and cancer diagnoses within this section, data has not been adjusted for the number of working days. For these numbers, the reported p-values were obtained from a likelihood ratio test. The null hypothesis was that the number of urgent GP referrals or cancer diagnoses in the campaign period and the comparison period came from the same Poisson distribution.

For conversion and detection rates, the reported p-values are obtained from a two-sample proportion test. The null hypothesis was that the rate in the campaign period was equal to the equivalent rate in the comparison period.

P-values less than 0.05 indicate a statistically significant difference between the two periods, at the 95% level. These analyses produce results from a large number of statistical tests, so as with all multiple comparisons some caution needs to be adopted when considering these. Put simply, with a considered significance level of 95%, you could expect 5% of tests to provide a statistically significant result by chance alone.

Monthly diagnoses, conversion rate and detection rate data can be quite variable because they are based on only a small number of cancer diagnoses, particularly for some of the smaller breakdowns. Data on the number of urgent GP referrals or cancers diagnosed provided in this section have not been adjusted for the number of working days.

5.5.5 Urgent GP referrals for suspected cancer

For several years, there has been a large upward trend in the number of urgent GP referrals for suspected cancer, both for suspected lung cancer and for other suspected cancers (figures 18 and 19). For the first national campaign, there was a 32% increase in urgent GP referrals for suspected lung cancer, when comparing the period May to July 2011 with May to July 2012 (table 8). In comparison, there was an increase of 12% in urgent GP referrals for all other

suspected cancers (excluding lung and lower GI cancers), reflecting the general increasing trend.

For the second national campaign, there was a smaller increase in urgent GP referrals for suspected lung cancer relative to the general increasing trend. Over the 2 year period, comparing July to September 2011 with July to September 2013, there was a 30% increase in referrals for suspected lung cancer compared with a 26% increase in referrals for all suspected cancers excluding lung cancer and lower GI cancer.

When comparing the period March to May 2014 with the same months in the previous year, evaluating the third national campaign, there was a statistically significant 8% increase in the number of urgent GP referrals for suspected lung cancer for England. This appears lower than the general increasing trend in urgent GP referrals for suspected cancer, with a higher, 15% increase, seen for urgent GP referrals for suspected head and neck cancers. However, figure 18 suggests there may have been a small impact of the third campaign, with a slight peak in referrals, appearing above the general trend, in April 2014.

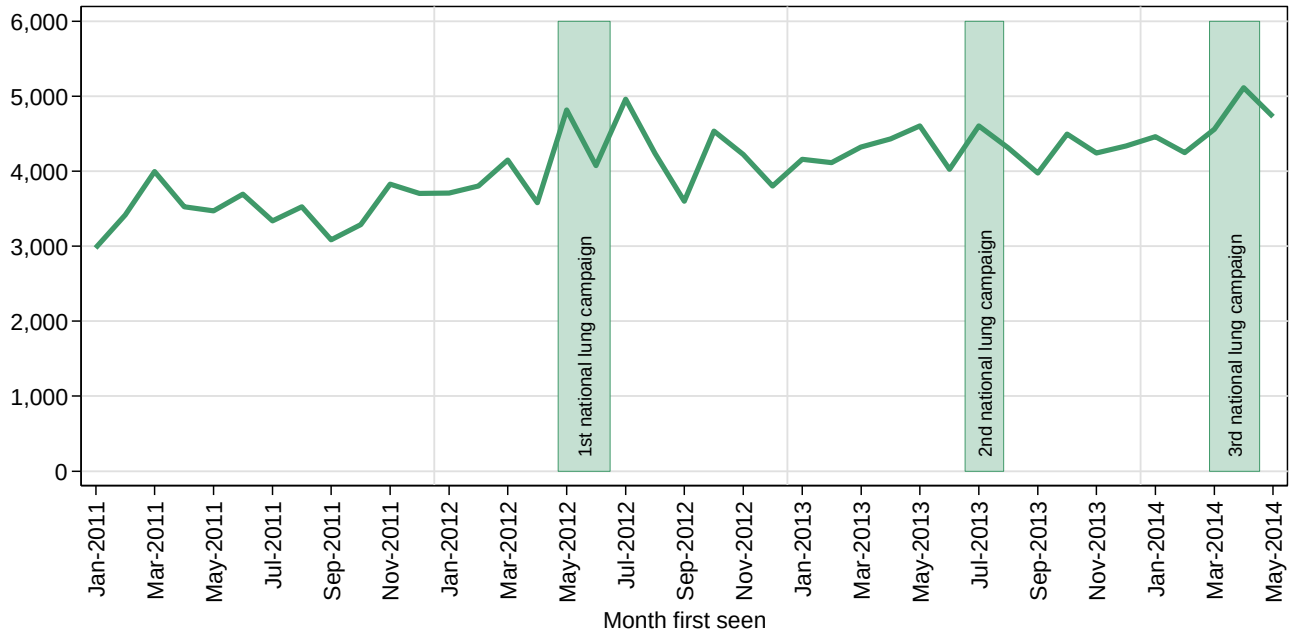
Table 8. For three national lung cancer campaigns, the number of urgent GP referrals for suspected lung cancer and for comparator referrals, with referral rate and percentage change in number of referrals, England

Campaign	Comparison and campaign periods	Ref. type	Comparison period				Campaign period				% Change in Number	p-value
			Number	Ref. Rate	LCL	UCL	Number	Ref. Rate	LCL	UCL		
First national	Comparison: May to July 2011 Campaign: May to July 2012	Lung	10,504	62.2	61.0	63.5	13,849	83.7	82.3	85.2	31.8	<0.001
		Other[1]	219,109	1449.9	1443.6	1456.2	244,464	1616.7	1610.1	1623.3	11.6	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	Lung	9,948	56.8	55.7	58.0	12,887	74.8	73.5	76.2	29.5	<0.001
		Other[1]	220,249	1405.0	1399.0	1411.1	276,639	1776.4	1769.6	1783.2	25.6	<0.001
Third national	Comparison: March to May 2013 Campaign: March to May 2014	Lung	13,350	120.6	118.5	122.7	14,398	132.2	130.0	134.4	7.9	<0.001
		Head & neck	30,336	257.2	254.3	260.2	34,776	300.4	297.2	303.6	14.6	<0.001

Referral rate (ref. rate) is age standardised, per 100,000

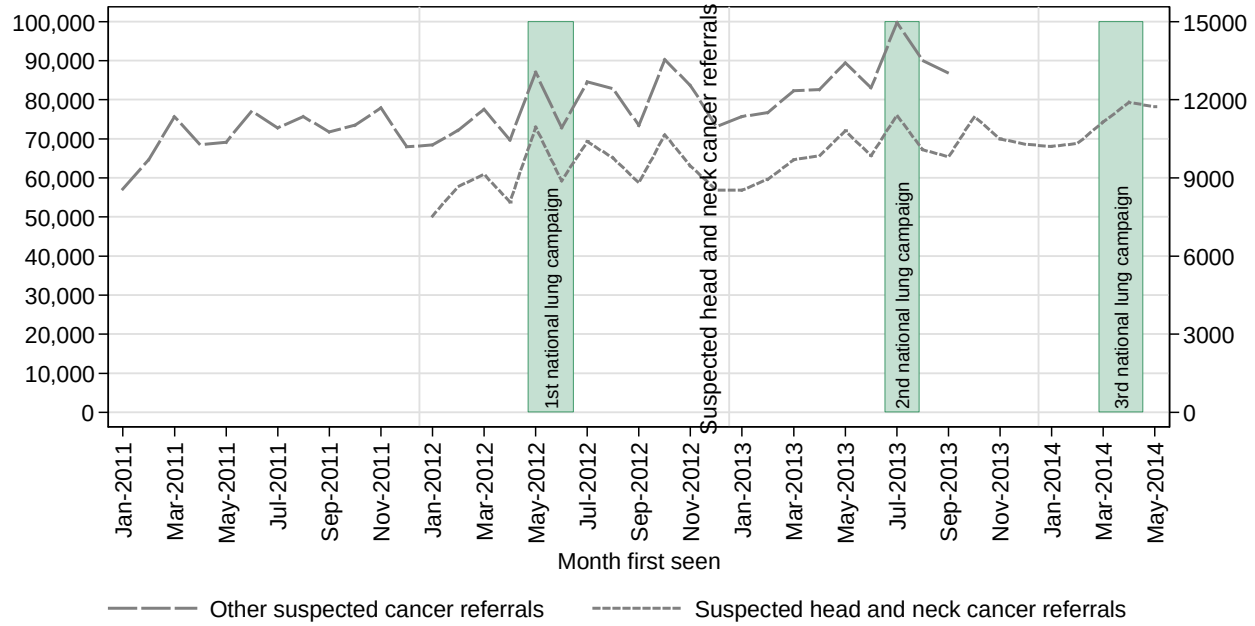
[1] Urgent GP referrals for all suspected cancer is excluding lung and lower GI cancers

Figure 18. Number of urgent GP referrals for suspected lung cancer, January 2011 to May 2014, England



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Figure 19. Number of urgent GP referrals for other suspected cancers (all suspected cancers excluding lung and lower GI cancers) and for suspected head and neck cancers, January 2011 to May 2014, England



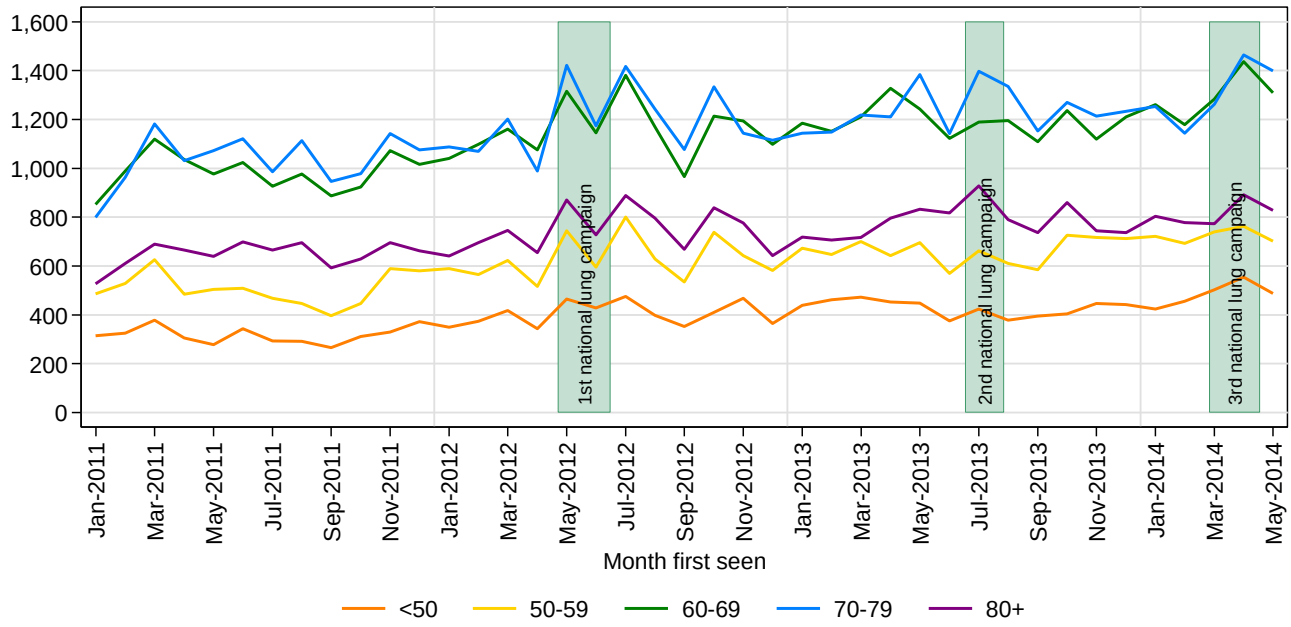
Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

At least partially reflecting the long-term increasing trend (figure 20), for all three lung cancer awareness campaigns there were statistically significant increases in the number of referrals for suspected lung cancer for all age-groups (table 9). There were increases in the number of

urgent GP referrals for suspected lung cancer following the first national campaign for all ages. The increase in referrals noted nationally during April 2014, following the third national lung cancer awareness campaign, was largest for those aged in their 60s and 70s.

For all three campaigns, the largest increases in the number of referrals were seen for those aged under 50 (50% increase over one year to the period May to July 2012, 41% increase over two years to the period July to September 2013 and 13% increase over one year to the period March to May 2014), and those aged 50 to 59 (45%, 42% and 8% respectively). Increases for the other age-groups were more similar to the all-age England increases, although slightly lower. However, despite the larger increases, the referral rate remains considerably lower for those aged under 50 and aged 50 to 59 than for the older age-groups.

Figure 20. Number of urgent GP referrals for suspected lung cancer, January 2011 to May 2014, by age



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 9. For three national lung cancer awareness campaigns, number of urgent GP referrals for suspected lung cancer, with referral rate and percentage change in number of referrals, by age

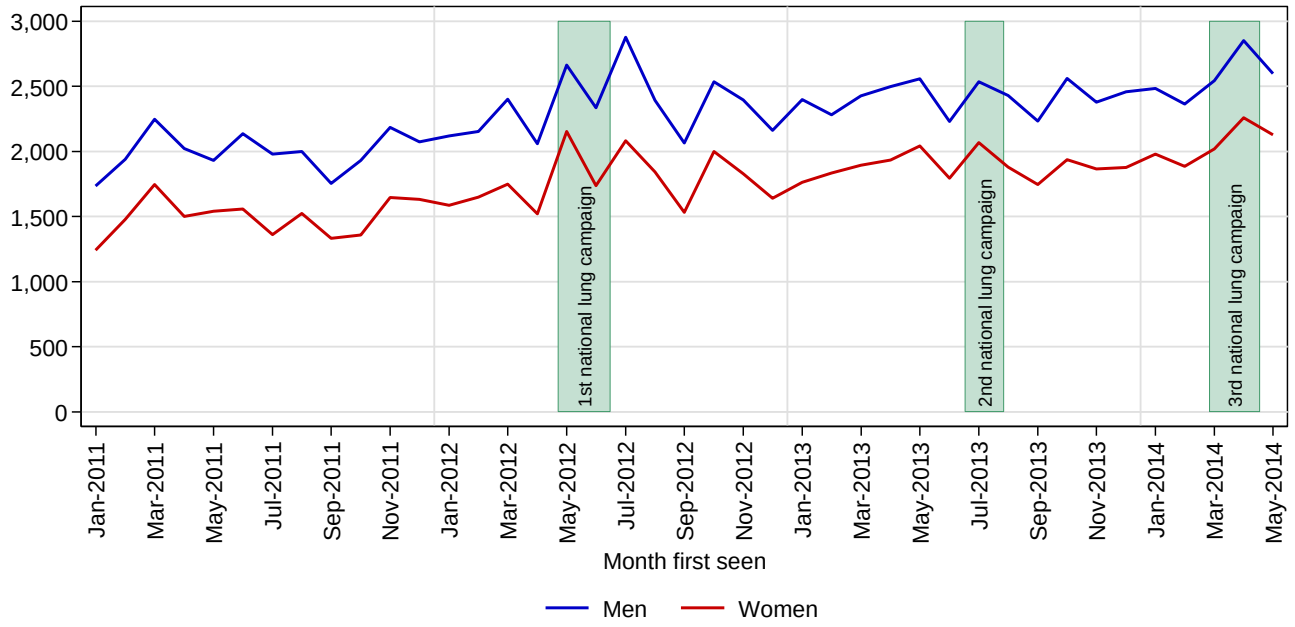
Campaign	Comparison and campaign periods	Age group	Comparison period				Campaign period				% Change in Number	p-value
			Number	Ref. Rate	LCL	UCL	Number	Ref. Rate	LCL	UCL		
First national	Comparison: May to July 2011 Campaign: May to July 2012	<50	914	10.6	10.0	11.4	1,368	16.0	15.2	16.9	49.5	<0.001
		50-59	1,481	94.0	89.3	98.9	2,140	136.3	130.6	142.2	44.6	<0.001
		60-69	2,926	209.1	201.6	216.8	3,842	275.7	267.0	284.5	31.3	<0.001
		70-79	3,180	340.5	328.8	352.6	4,013	431.4	418.2	445.0	26.2	<0.001
		80+	2,003	325.6	311.5	340.2	2,486	405.7	389.9	422.0	24.1	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	<50	850	9.6	9.0	10.3	1,197	13.6	12.9	14.4	40.8	<0.001
		50-59	1,309	80.5	76.2	85.0	1,858	115.2	110.0	120.5	41.9	<0.001
		60-69	2,790	193.3	186.2	200.6	3,492	243.8	235.8	252.0	25.2	<0.001
		70-79	3,046	316.1	305.0	327.6	3,886	406.5	393.8	419.5	27.6	<0.001
		80+	1,953	307.7	294.2	321.6	2,454	389.7	374.4	405.4	25.7	<0.001
Third national	Comparison: March to May 2013 Campaign: March to May 2014	<50	1,373	16.4	15.5	17.3	1,546	18.7	17.8	19.7	12.6	0.001
		50-59	2,038	132.5	126.8	138.3	2,204	145.6	139.6	151.8	8.1	0.011
		60-69	3,781	276.8	268.0	285.7	4,029	299.7	290.6	309.2	6.6	0.005
		70-79	3,813	418.2	405.0	431.7	4,126	459.9	446.0	474.2	8.2	<0.001
		80+	2,345	390.4	374.8	406.5	2,493	421.9	405.5	438.8	6.3	0.033

Referral rate is the age-specific rate, per 100,000

There are long-term increasing trends in the number of urgent GP referrals for suspected lung cancer for both men and women, but with consistently more referrals for men than for women (figure 21).

Following all three national lung cancer awareness campaigns, the increases in referrals for suspected lung cancer were slightly larger for women than for men (table 10). For the first national campaign, there was an increase of 34% for women, when comparing the period May to July 2011 with May to July 2012, compared to 30% for men. When comparing the period July to September 2011 with July to September 2013, for the second national campaign, there was a 35% increase for women compared to 26% for men. When comparing the period March to May 2013 with March to May 2014, for the third campaign, there was a 9% increase for women compared to 7% for men.

Figure 21. Number of urgent GP referrals for suspected lung cancer, January 2011 to May 2014, by sex



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 10. For three national lung cancer awareness campaigns, number of urgent GP referrals for suspected lung cancer, with referral rate and percentage change in number of referrals, by sex

Campaign	Comparison and campaign periods	Sex	Comparison period				Campaign period				% Change in Number	P-value
			Number	Ref. Rate	LCL	UCL	Number	Ref. Rate	LCL	UCL		
First national	Comparison: May to July 2011 Campaign: May to July 2012	Men	6,045	75.6	73.7	77.6	7,876	100.1	97.9	102.4	30.3	<0.001
		Women	4,459	48.8	47.3	50.3	5,973	67.4	65.6	69.2	34.0	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	Men	5,732	69.2	67.4	71.1	7,196	88.1	86.0	90.2	25.5	<0.001
		Women	4,216	44.5	43.1	45.9	5,691	61.6	60.0	63.4	35.0	<0.001
Third national	Comparison: Mar-May 2013 Campaign: Mar-May 2014	Men	7,482	144.4	141.1	147.7	7,993	156.9	153.5	160.5	6.8	<0.001
		Women	5,868	96.8	94.3	99.3	6,405	107.4	104.7	110.0	9.2	<0.001

Referral rate is age standardised, per 100,000

5.5.6 Lung cancer diagnoses resulting from an urgent GP referral for suspected cancer

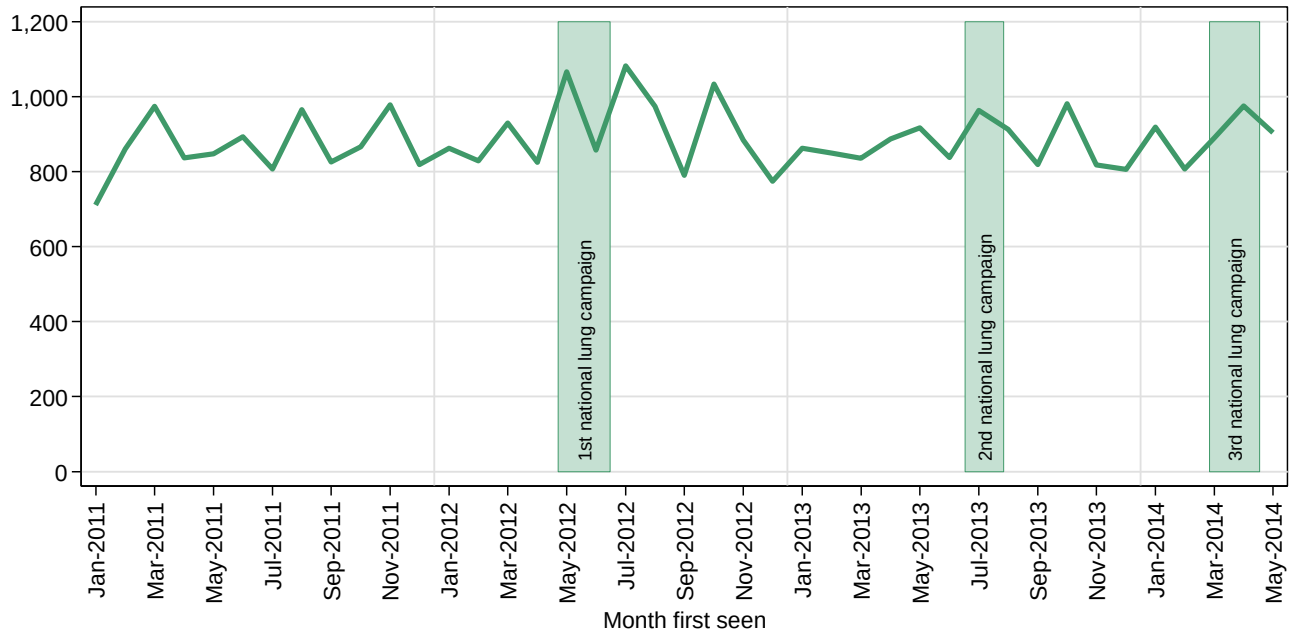
The number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer in England has been relatively steady over the past couple of years, with notable natural

monthly variation (figure 22). There is evidence of an increase around the time of first national lung campaign.

Following the first national lung cancer campaign, there was a statistically significant 18% increase in the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer, from May to July 2012 when compared with the same months in the previous year (table 11).

For the second and third national campaigns, there was no evidence of a change in the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer. There was no significant change in the numbers either when comparing the period July to September 2011 with July to September 2013, or from March to May 2013 with March to May 2014.

Figure 22. Number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer, January 2011 to May 2014, England



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

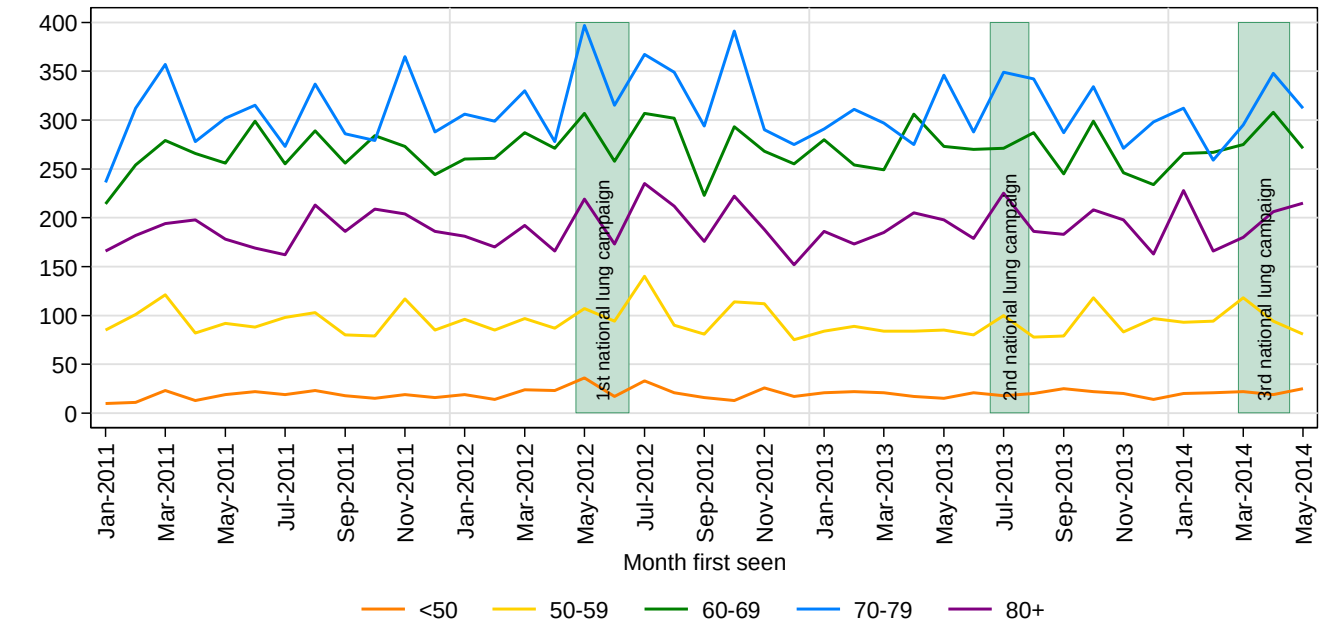
Table 11. For three national lung cancer awareness campaigns, number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer, with percentage change in number of cancers, England

Campaign	Comparison and campaign periods	Geography	Number of TWW cancers		% Change in Number	p-value
			Comparison period	Campaign period		
First national	Comparison: May to July 2011 Campaign: May to July 2012	England	2,547	3,005	18.0	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	England	2,598	2,695	3.7	0.182
Third national	Comparison: March to May 2013 Campaign: March to May 2014	England	2,640	2,769	4.9	0.079

Following the first national campaign, there were statistically significant increases in the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer for all ages except those aged 60-69. The largest percentage increase, when comparing the period May to July 2011 with May to July 2012, was seen for those aged under 50 (43%), but this was based on a small number of diagnoses. For those aged in their 50s, 70s and 80s, there were increases of just over 20% over the same period.

There were no significant differences by age in the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer following either the second or third national lung cancer awareness campaigns (table 11 and figure 23).

Figure 23. Number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer, January 2011 to May 2014, by age



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 12. For three national lung cancer awareness campaigns, number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer, with percentage change in number of cancers, by age

Campaign	Comparison and campaign periods	Age group	Number of TWW cancers		% Change in Number	p-value
			Comparison period	Campaign period		
First national	Comparison: May to July 2011 Campaign: May to July 2012	<50	60	86	43.3	0.031
		50-59	278	341	22.7	0.011
		60-69	810	872	7.7	0.131
		70-79	890	1079	21.2	<0.001
		80+	509	627	23.2	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	<50	60	63	5.0	0.787
		50-59	281	257	-8.5	0.301
		60-69	800	803	0.4	0.940
		70-79	896	978	9.2	0.058
		80+	561	594	5.9	0.332
Third national	Comparison: March to May 2013 Campaign: March to May 2014	<50	53	66	24.5	0.233
		50-59	253	293	15.8	0.087
		60-69	828	854	3.1	0.526
		70-79	918	955	4.0	0.393
		80+	588	601	2.2	0.706

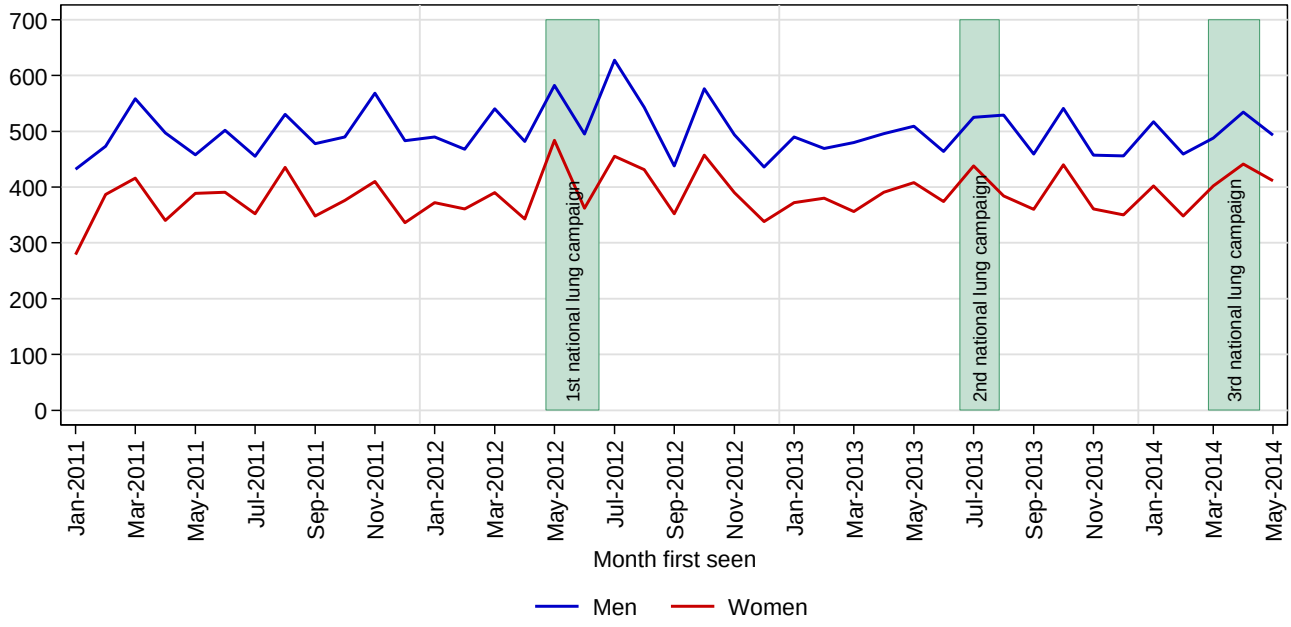
Following the first national campaign (May to July 2012) when compared with the same months in the previous year, there were statistically significant increases for both men and women in the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer. There was a slightly larger increase for men (20%) than for women (15%).

Following the second national campaign, there was no evidence of any change in the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer for either sex (table 13 and figure 24). However, following the third national campaign, there was a statistically significant 8.6% increase in the number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer for women, when comparing the campaign period of March to May 2014 with the same months in 2013. . For men, the smaller 2.0% change was not statistically significant.

Table 13. For three national lung cancer awareness campaigns, number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer, with percentage change in number of cancers, by sex

Campaign	Comparison and campaign periods	Sex	Number of TWW cancers		% Change in Number	p-value
			Comparison period	Campaign period		
First national	Comparison: May to July 2011 Campaign: May to July 2012	Men	1,415	1,704	20.4	<0.001
		Women	1,132	1,301	14.9	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	Men	1,463	1,513	3.4	0.359
		Women	1,135	1,182	4.1	0.329
Third national	Comparison: March to May 2013 Campaign: March to May 2014	Men	1,485	1,515	2.0	0.584
		Women	1,155	1,254	8.6	0.044

Figure 24. Number of lung cancer diagnoses resulting from an urgent GP referral for suspected lung cancer, January 2011 to May 2014, by sex



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

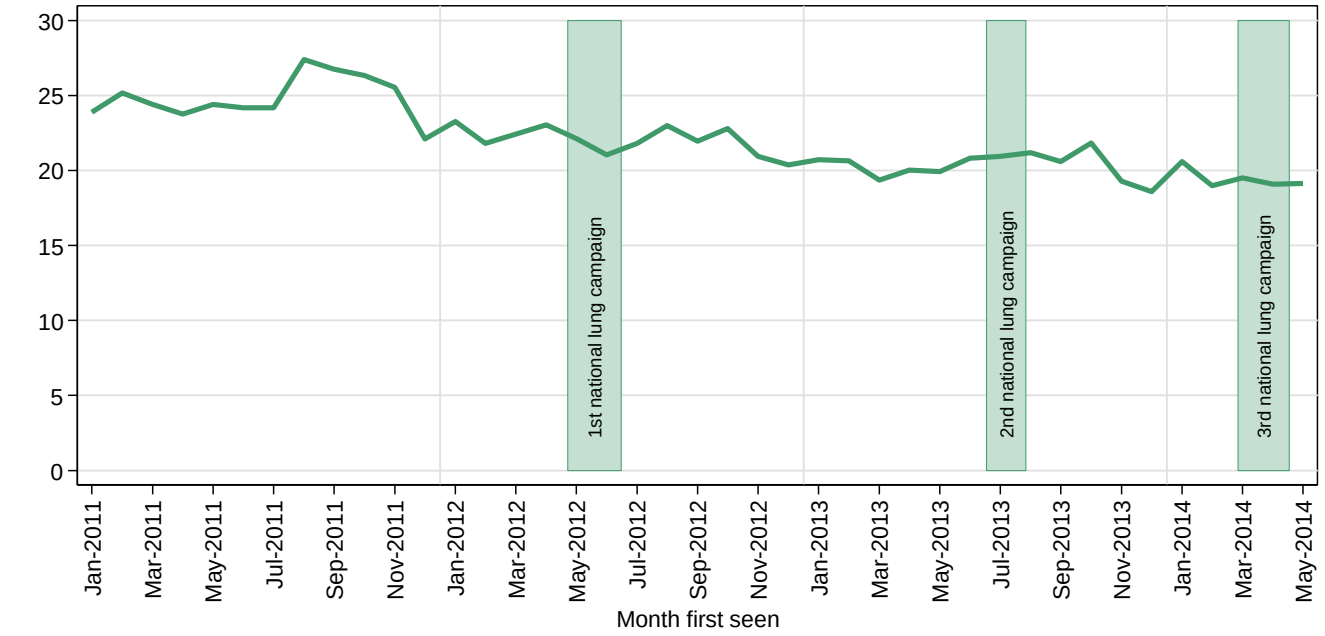
5.5.7 Conversion rate

There has been a general decreasing trend in the cancer conversion for urgent GP referrals for suspected lung cancer rate for several years (figure 25).

There were statistically significant decreases in the conversion rates following the first national campaign (2.5 percentage point decrease when comparing the period May to July 2011 with May to July 2012) and the second national campaign (5.2 percentage point decrease when

comparing the period July to September 2011 with July to September 2013) (table 14). In contrast, there was no statistically significant change in the conversion rate when comparing the period March to May 2013 with March to May 2014, following the third national campaign. However, the changes following the first and second national campaigns appeared consistent with the long-term trend rather than reflecting a particular change related to the campaign.

Figure 25. Conversion rates for urgent GP referrals for suspected lung cancer, January 2011 to May 2014, England



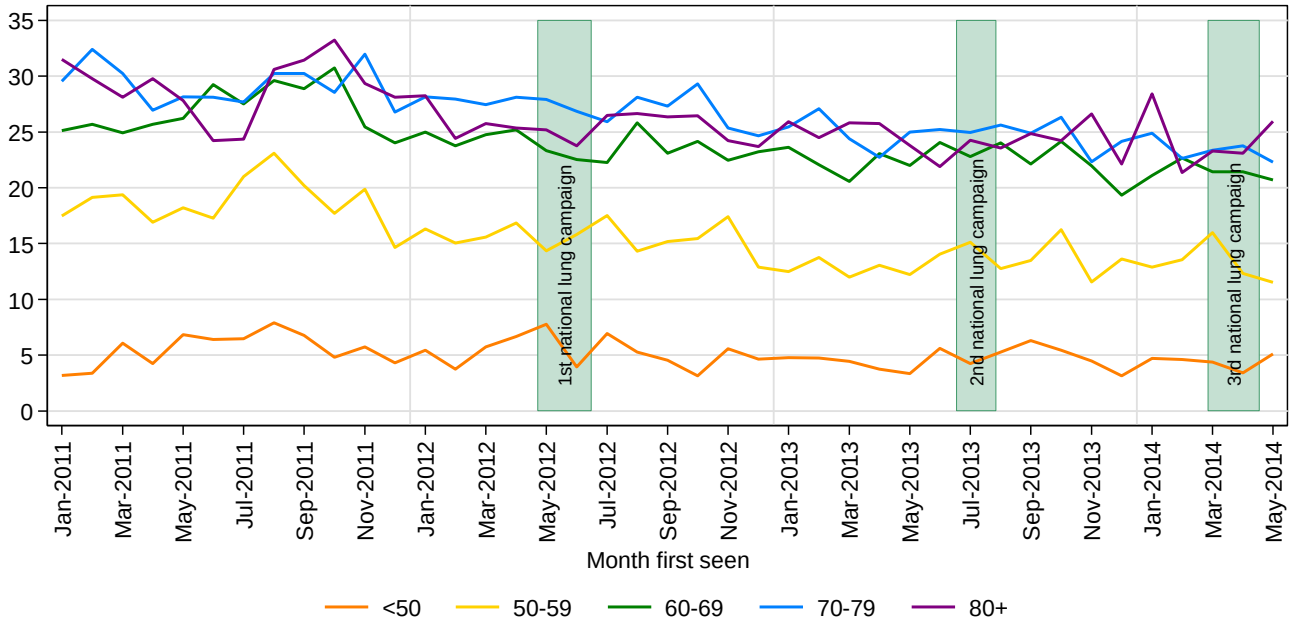
Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 14. For three national lung cancer awareness campaigns, conversion rates for urgent GP referrals for suspected lung cancer, with change, England

Campaign	Comparison and campaign periods	Geography	Comparison period			Campaign period			Change in Conv. rate	p-value
			Conv. Rate (%)	LCL	UCL	Conv. Rate (%)	LCL	UCL		
First national	Comparison: May to July 2011 Campaign: May to July 2012	England	24.2	23.4	25.1	21.7	21.0	22.4	-2.5	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	England	26.1	25.3	27.0	20.9	20.2	21.6	-5.2	<0.001
Third national	Comparison: March to May 2013 Campaign: March to May 2014	England	19.8	19.1	20.5	19.2	18.6	19.9	-0.5	0.254

The conversion rate has generally decreased for all ages (figure 26). For the first and second national campaigns, there were statistically significant decreases for some age groups, when comparing the period May to July 2011 with May to July 2012 (first campaign) and when comparing the period July to September 2011 with July to September 2013 (second campaign) (table 5.11), but these decreases generally appeared in line with the long-term trend and the variability in it. There were no statistically significant decreases for the period March to May 2013 compared with March to May 2014, following the third national campaign.

Figure 26. Conversion rates for urgent GP referrals for suspected lung cancer, January 2011 to May 2014, by age



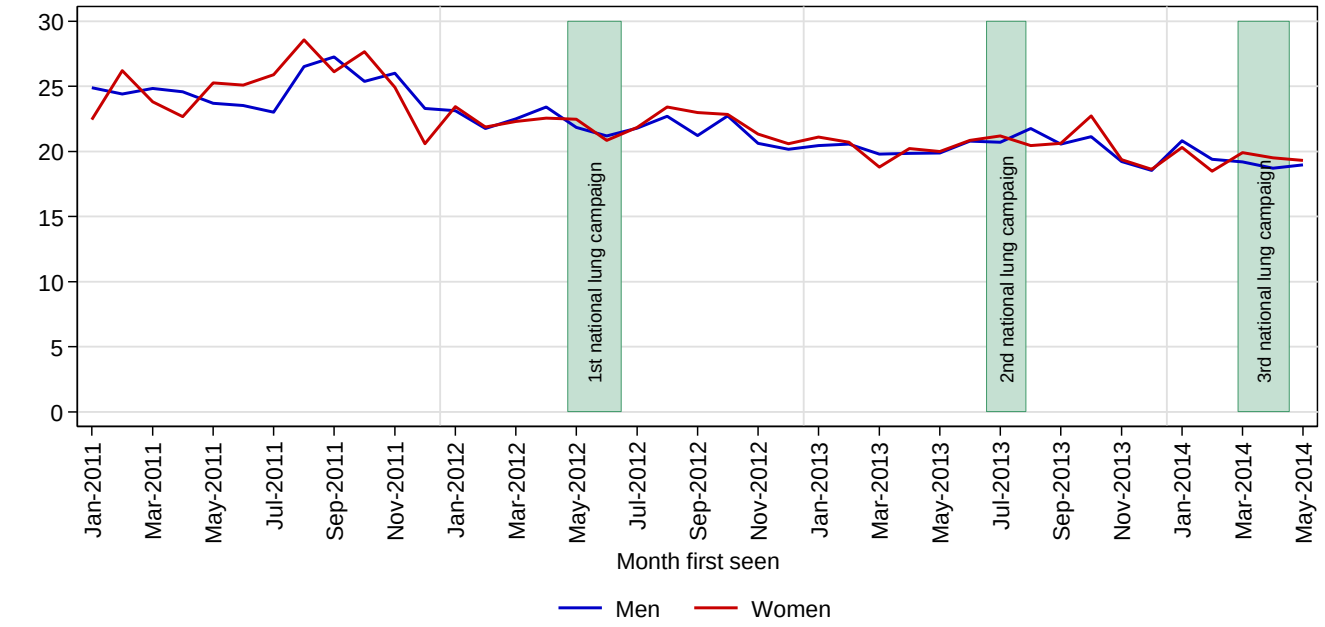
Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 15. For three national lung cancer awareness campaigns, conversion rates for urgent GP referrals for suspected lung cancer, with change, by age

Campaign	Comparison and campaign periods	Age group	Comparison period			Campaign period			Change in Conv. rate	p-value
			Conv. Rate (%)	LCL	UCL	Conv. Rate (%)	LCL	UCL		
First national	Comparison: May to July 2011 Campaign: May to July 2012	<50	6.6	5.1	8.4	6.3	5.1	7.7	-0.3	0.790
		50-59	18.8	16.9	20.8	15.9	14.4	17.5	-2.8	0.026
		60-69	27.7	26.1	29.3	22.7	21.4	24	-5.0	<0.001
		70-79	28.0	26.5	29.6	26.9	25.5	28.3	-1.1	0.299
		80+	25.4	23.6	27.4	25.2	23.6	27	-0.2	0.884
Second national	Comparison: July to September 2011 Campaign: July to September 2013	<50	7.1	5.5	9.0	5.3	4.1	6.7	-1.8	0.092
		50-59	21.5	19.3	23.8	13.8	12.3	15.5	-7.6	<0.001
		60-69	28.7	27.0	30.4	23.0	21.6	24.4	-5.7	<0.001
		70-79	29.4	27.8	31.1	25.2	23.8	26.6	-4.2	<0.001
		80+	28.7	26.8	30.8	24.2	22.6	25.9	-4.5	<0.001
Third national	Comparison: March to May 2013 Campaign: March to May 2014	<50	3.9	3.0	5.0	4.3	3.4	5.4	0.4	0.577
		50-59	12.4	11.1	13.9	13.3	11.9	14.8	0.9	0.393
		60-69	21.9	20.6	23.2	21.2	20.0	22.5	-0.7	0.450
		70-79	24.1	22.7	25.5	23.1	21.9	24.5	-0.9	0.330
		80+	25.1	23.4	26.9	24.1	22.5	25.8	-1.0	0.435

Following the first and second national campaigns, the statistically significant decreases in conversion rate appeared a little larger for women than for men (table 16). However, all changes following the campaigns appeared in line with the long-term decreasing trends for both men and women (figure 26); the slightly larger decreases for women reflected a slightly higher conversion rate for women in 2011 as conversion rates were very similar for men and women from 2012 onwards (table 14 and figure 27). There were no statistically significant changes for either sex following the third campaign.

Figure 27. Conversion rates for urgent GP referrals for suspected lung cancer, January 2011 to May 2014, by sex



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 16. For three national lung cancer awareness campaigns, conversion rates for urgent GP referrals for suspected lung cancer, with change, by sex

Campaign	Comparison and campaign periods	Sex	Comparison period			Campaign period			Change in Conv. rate	p-value
			Conv. Rate (%)	LCL	UCL	Conv. Rate (%)	LCL	UCL		
First national	Comparison: May to July 2011 Campaign: May to July 2012	Men	23.4	22.4	24.5	21.6	20.7	22.6	-1.8	0.013
		Women	25.4	24.1	26.7	21.8	20.8	22.8	-3.6	<0.001
Second national	Comparison: July to September 2011 Campaign: July to September 2013	Men	25.5	24.4	26.7	21.0	20.1	22.0	-4.5	<0.001
		Women	26.9	25.6	28.3	20.8	19.7	21.8	-6.2	<0.001
Third national	Comparison: March to May 2013 Campaign: March to May 2014	Men	19.8	19.0	20.8	19.0	18.1	19.8	-0.9	0.160
		Women	19.7	18.7	20.7	19.6	18.6	20.6	-0.1	0.884

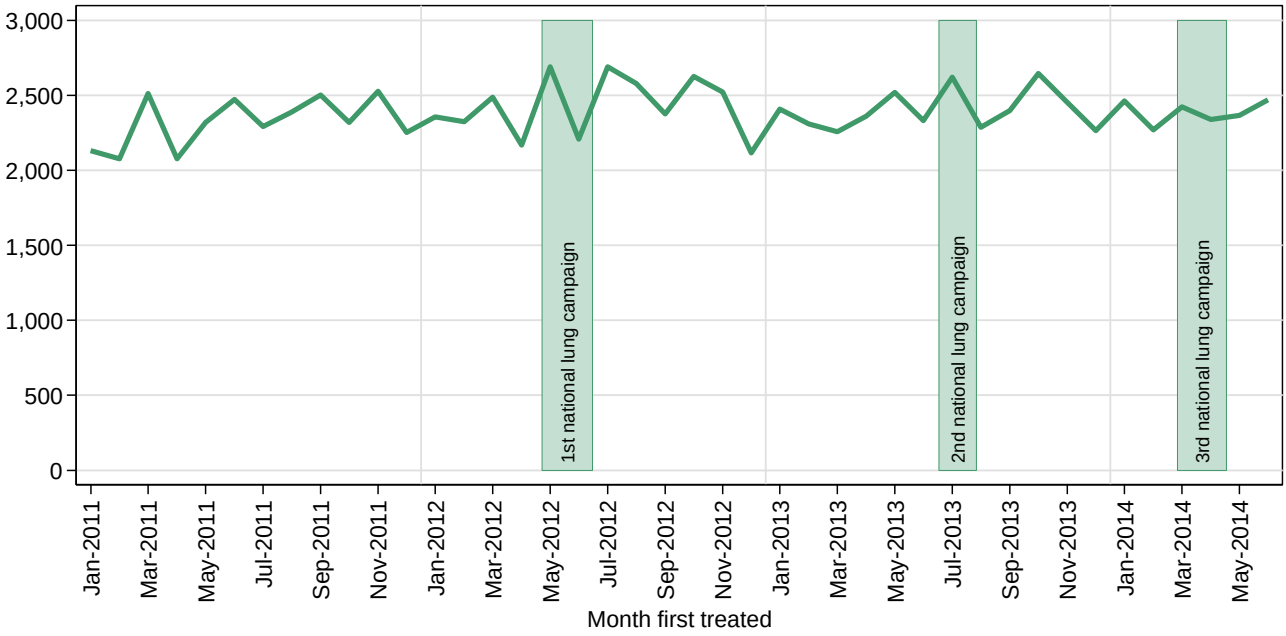
5.5.8 Cancer diagnoses recorded in the CWT dataset

For England, trends in the number of lung cancers recorded in the CWT dataset remained fairly consistent, with some natural monthly variation (figure 28). When comparing the period June to August 2011 with June to August 2012, there was a statistically significant 4.5% increase in the

number of lung cancers recorded in the CWT database (table 17), with numbers possibly slightly higher than the general trend.

There were no statistically significant changes in the number of lung cancer diagnoses recorded in the CWT dataset following either the second national campaign (comparing August to October 2011 with August to October 2013) or the third national campaign (comparing April to June 2013 with April to June 2014).

Figure 28. Number of lung cancer diagnoses recorded in the CWT dataset, January 2011 to June 2014, England



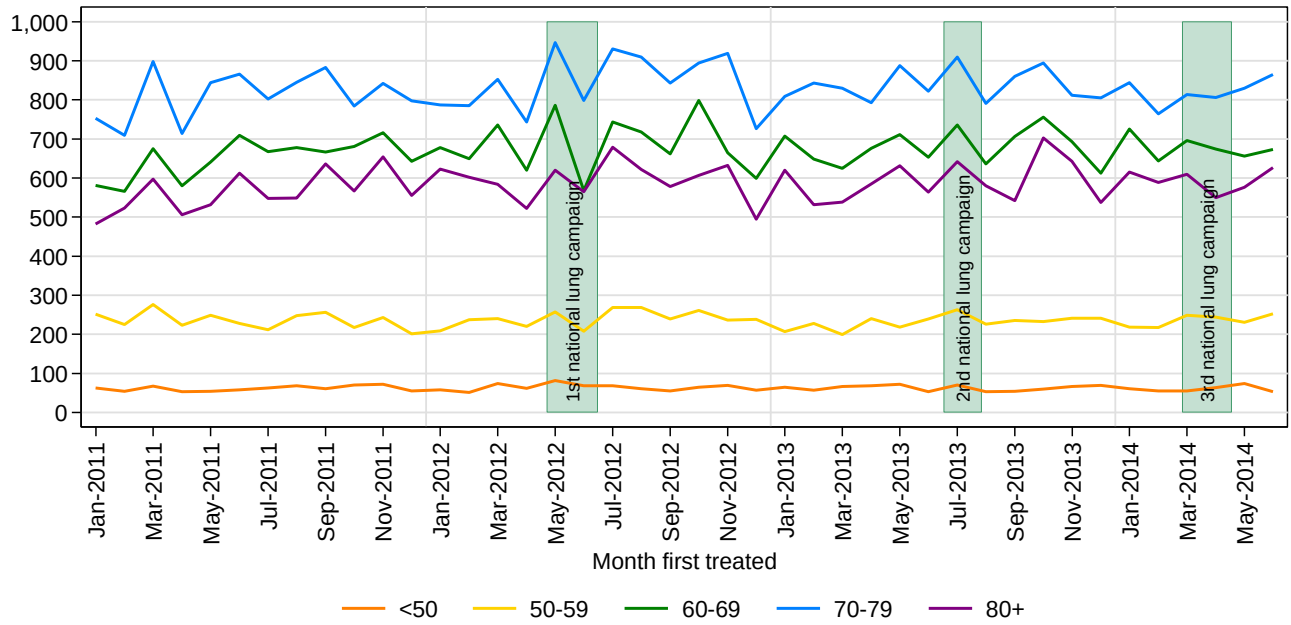
Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 17. For three national lung cancer awareness campaigns, number of lung cancer diagnoses recorded in the CWT dataset, with percentage change in number of cancers, England

Campaign	Comparison and campaign periods	Geography	Number of CWT dataset cancers		% Change in Number	p-value
			Comparison period	Campaign period		
First national	Comparison: June to August 2011 Campaign: June to August 2012	England	7,153	7,475	4.5	0.008
Second national	Comparison: August to October 2011 Campaign: August to October 2013	England	7,209	7,328	1.7	0.324
Third national	Comparison: April to June 2013 Campaign: April to June 2014	England	7,213	7,176	-0.5	0.758

The number of lung cancer diagnoses recorded in the CWT dataset did not change statistically significantly for any age group following either the second or third national lung cancer campaigns (table 18 and figure 29). Following the first national campaign, there was only one statistically significant change, for those aged 80 and over. However, the trend in the number of lung cancer diagnoses recorded in the CWT dataset was similar for this age-group and for the other ages.

Figure 29. Number of lung cancer diagnoses recorded in the CWT dataset, January 2011 to June 2014, by age



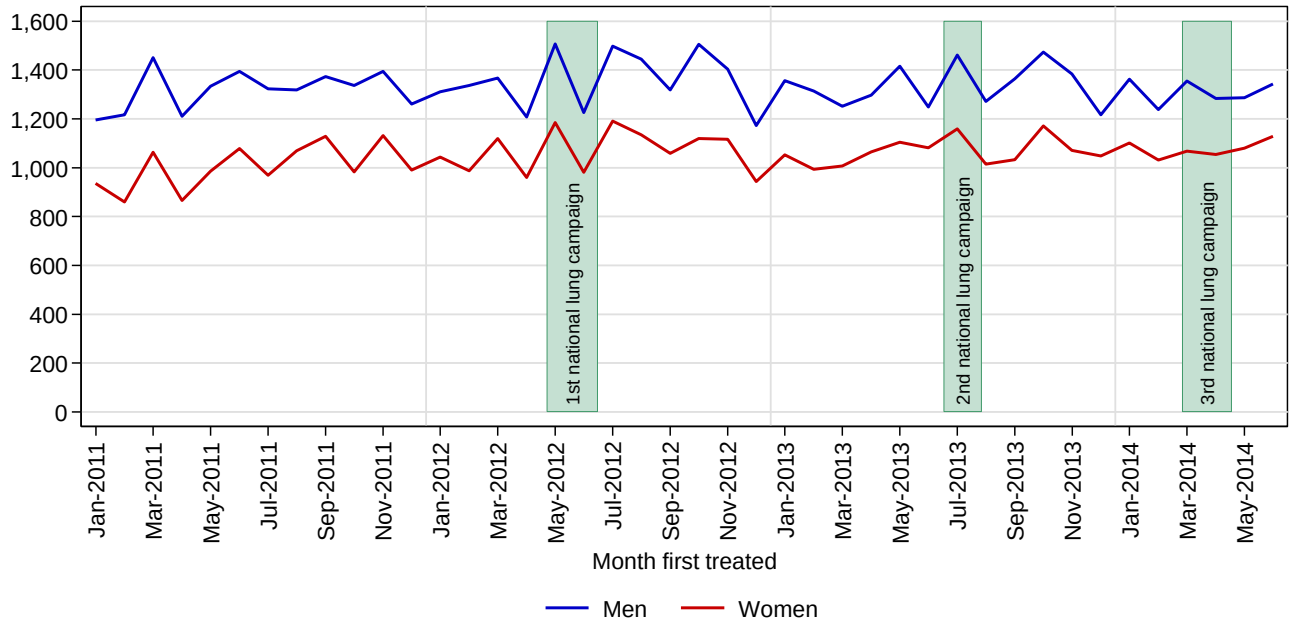
Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 18. For three national lung cancer campaigns, number of lung cancer diagnoses recorded in the CWT database, with percentage change in number of cancers, by age

Campaign	Comparison and campaign periods	Age group	Number of CWT dataset cancers		% Change in Number	p-value
			Comparison period	Campaign period		
First national	Comparison: June to August 2011 Campaign: June to August 2012	<50	189	197	4.2	0.684
		50-59	688	746	8.4	0.126
		60-69	2054	2029	-1.2	0.696
		70-79	2513	2637	4.9	0.084
		80+	1709	1866	9.2	0.009
Second national	Comparison: August to October 2011 Campaign: August to October 2013	<50	199	167	-16.1	0.094
		50-59	721	694	-3.7	0.473
		60-69	2,025	2,098	3.6	0.256
		70-79	2,512	2,545	1.3	0.643
		80+	1,752	1,824	4.1	0.229
Third national	Comparison: April to June 2013 Campaign: April to June 2014	<50	193	191	-1.0	0.919
		50-59	697	728	4.4	0.412
		60-69	2,040	2,003	-1.8	0.561
		70-79	2,503	2,501	-0.1	0.977
		80+	1,780	1,753	-1.5	0.650

By sex, trends in the number of lung cancer diagnoses recorded in the CWT dataset remained consistent over time, with no significant changes following either the second or third national campaigns (table 19 and figure 30). When comparing the period June to August 2011 with June to August 2012, there was a statistically significant increase, of 6%, in the number of lung cancer diagnoses recorded in the CWT dataset for women, but there was no clear difference in the trend for women, compared to men.

Figure 30. Number of lung cancer diagnoses recorded in the CWT dataset, January 2011 to June 2014, by sex



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 19. For three national lung cancer campaigns, number of lung cancer diagnoses recorded in the CWT dataset, with percentage change in number of cancers, by sex

Campaign	Comparison and campaign periods	Sex	Number of CWT dataset cancers		% Change in Number	p-value
			Comparison period	Campaign period		
First national	Comparison: June to August 2011 Campaign: June to August 2012	Men	4,035	4,169	3.3	0.139
		Women	3,118	3,306	6.0	0.019
Second national	Comparison: August to October 2011 Campaign: August to October 2013	Men	4,027	4,110	2.1	0.358
		Women	3,182	3,218	1.1	0.653
Third national	Comparison: April to June 2013 Campaign: April to June 2014	Men	3,962	3,913	-1.2	0.581
		Women	3,251	3,263	0.4	0.882

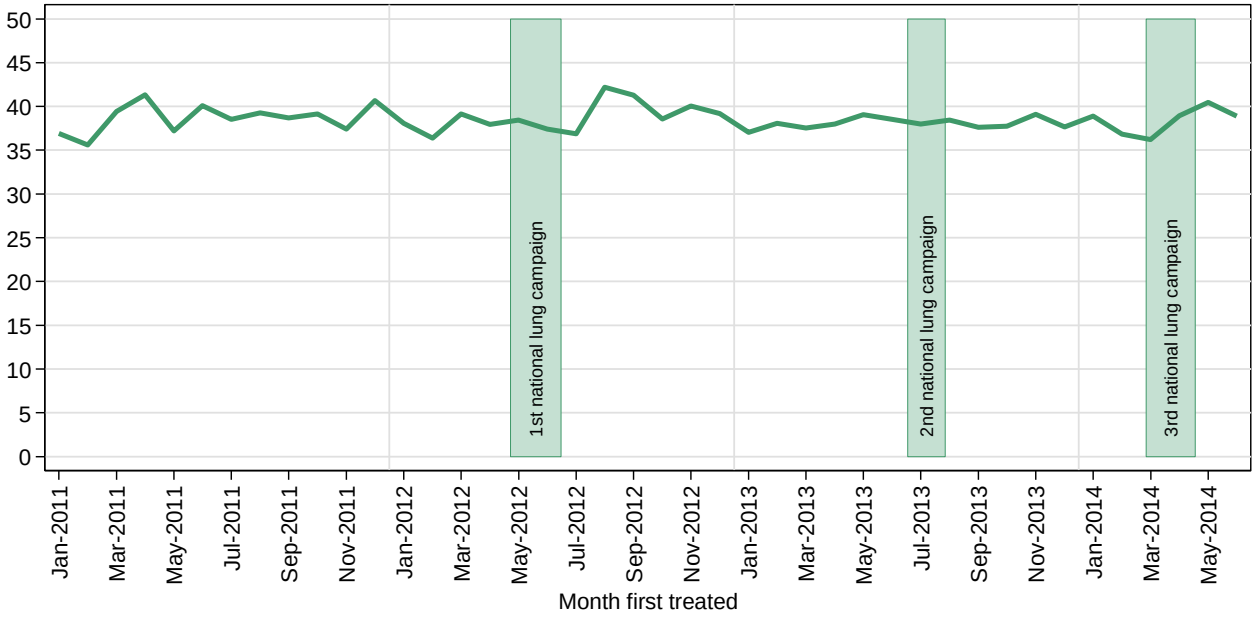
Please note Cancer Research UK analysed the data on the number of lung cancers diagnosed as recorded in the NLCA for the regional and first national campaigns (see section 3.9.1 and Ironmonger et al, 2015).

5.5.9 Detection rate

The lung cancer detection rate for England has remained stable from 2011 to 2014, at around 39% (figure 31). For the campaign and comparison periods considered, there were no statistically significant changes in the detection rate for lung cancer diagnoses for any of the

three national lung cancer campaigns (table 20). However, figure 31 appears to show a slight increase in the detection rate, to about 42%, for August and September 2012, a little after the first national campaign. This may suggest a slight impact of the campaign, delayed longer than initially considered, possibly due to waits for chest X-rays prior to referral. There does not appear to be a similar increase following the second national campaign.

Figure 31. Detection rates for lung cancer diagnoses, January 2011 to June 2014, England



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 20. For three national lung cancer campaigns, detection rates for lung cancer diagnoses, with change, England

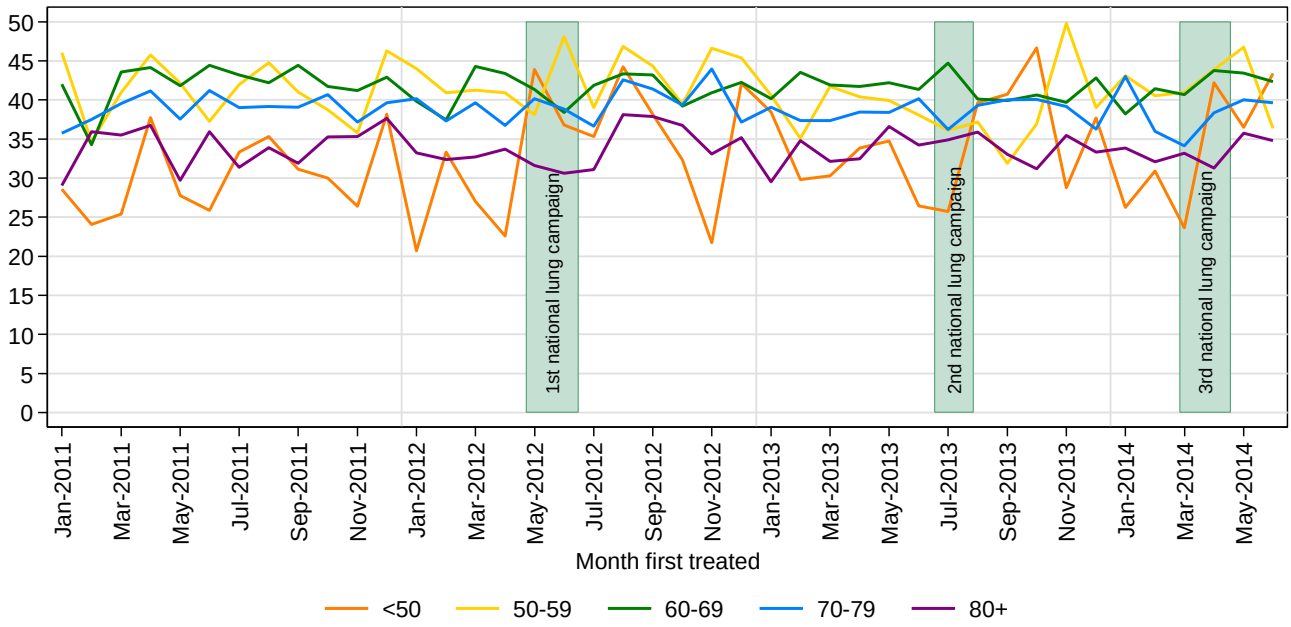
Campaign	Comparison and campaign periods	Geography	Comparison period			Campaign period			Change in Det. rate	p-value
			Det. Rate (%)	LCL	UCL	Det. Rate (%)	LCL	UCL		
First national	Comparison: June to August 2011 Campaign: June to August 2012	England	39.3	38.2	40.5	38.8	37.7	39.9	-0.4	0.553
Second national	Comparison: August to October 2011 Campaign: August to October 2013	England	39.0	37.9	40.2	37.9	36.8	39.0	-1.1	0.168
Third national	Comparison: April to June 2013 Campaign: April to June 2014	England	38.5	37.4	39.7	39.4	38.3	40.6	0.9	0.271

For most age groups, changes in detection rate following the three national campaigns were not statistically significant and did not exhibit a pattern with age (table 21 and figure 32). More specifically, there were no statistically significant changes following either the first national

campaign (comparing May to July 2011 with May to July 2012) or third national campaign (comparing April to June 2013 with April to June 2014).

Following the second national campaign, there were two statistically significant changes in the detection rate when comparing August to October 2011 with August to October 2013. For those aged less than 50, the detection rate increased by 10 percentage points, from 32% to 43%, but it is likely that this is related to the non-significant fall in lung cancers diagnosed in this age group (table 20), and it should be considered in light of the notable variability in detection rate for this age group. For those aged 50 to 59, there was a 7 percentage point decrease in the detection rate, from 42% to 35%, but again there is notable variability in the detection rate for this age group.

Figure 32. Detection rates for lung cancer diagnoses, January 2011 to June 2014, by age



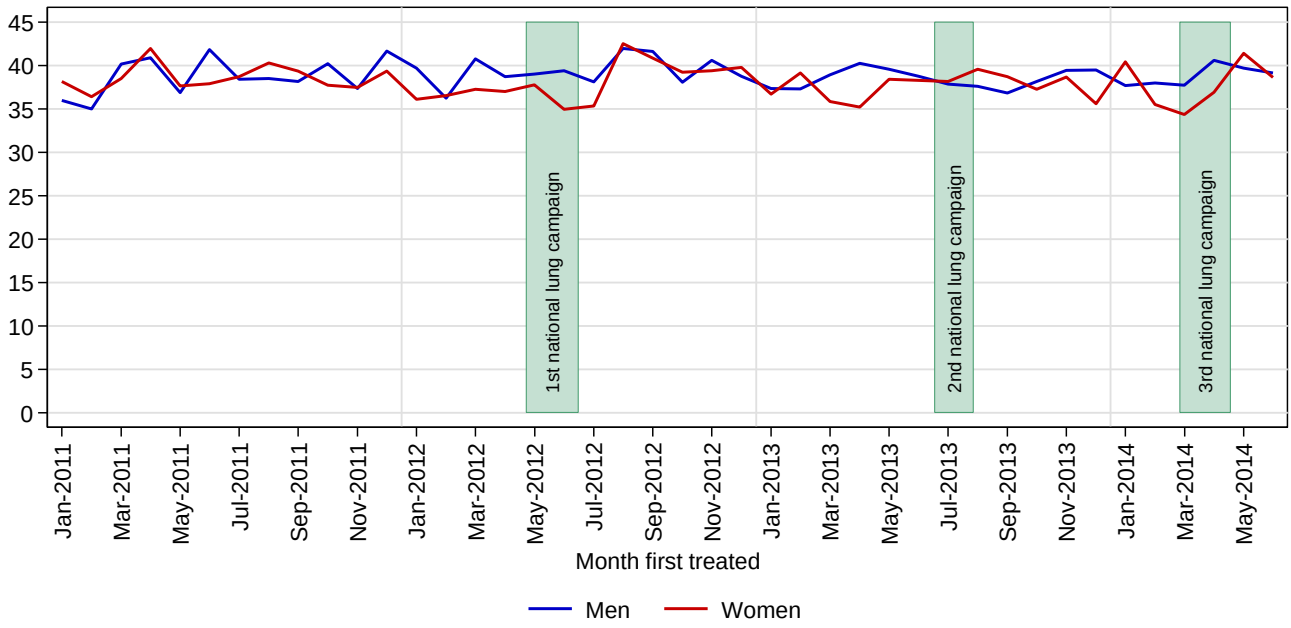
Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 21. For three national lung cancer campaigns, detection rates for lung cancer diagnoses, with change, by age

Campaign	Comparison and campaign periods	Age group	Comparison period			Campaign period			Change in Det. rate	p-value
			Det. Rate (%)	LCL	UCL	Det. Rate (%)	LCL	UCL		
First national	Comparison: June to August 2011 Campaign: June to August 2012	<50	31.7	25.5	38.7	38.6	32.1	45.5	6.8	0.160
		50-59	41.4	37.8	45.1	44.4	40.8	48	2.9	0.260
		60-69	43.3	41.2	45.4	41.4	39.3	43.6	-1.9	0.224
		70-79	39.8	37.9	41.8	39.4	37.5	41.2	-0.5	0.730
		80+	33.8	31.6	36.1	33.3	31.2	35.5	-0.5	0.732
Second national	Comparison: August to October 2011 Campaign: August to October 2013	<50	32.2	26.1	38.9	42.5	35.3	50.1	10.4	0.041
		50-59	41.6	38.1	45.2	35.3	31.8	38.9	-6.3	0.015
		60-69	42.8	40.6	44.9	40.2	38.2	42.3	-2.5	0.098
		70-79	39.6	37.7	41.5	39.8	37.9	41.7	0.2	0.888
		80+	33.6	31.4	35.9	33.2	31.1	35.4	-0.4	0.802
Third national	Comparison: April to June 2013 Campaign: April to June 2014	<50	32.1	25.9	39.0	40.3	33.6	47.4	8.2	0.095
		50-59	39.5	35.9	43.1	42.2	38.6	45.8	2.7	0.297
		60-69	41.8	39.6	43.9	43.2	41.0	45.4	1.4	0.361
		70-79	39.0	37.1	40.9	39.3	37.4	41.3	0.4	0.799
		80+	34.5	32.3	36.7	34.0	31.8	36.2	-0.5	0.756

By sex, there were no significant changes in the detection rate following any of the three national campaigns (table 22 and figure 33).

Figure 33. Detection rates for lung cancer diagnoses, January 2011 to June 2014, by sex



Data source: National Cancer Waiting Times Monitoring Dataset, NHS England. Analysed by: NCRAS

Table 22. For three national lung cancer campaigns, detection rates for lung cancer diagnoses, with change, by sex

Campaign	Comparison and campaign periods	Sex	Comparison period			Campaign period			Change in Det. rate	p-value
			Det. Rate (%)	LCL	UCL	Det. Rate (%)	LCL	UCL		
First national	Comparison: June to August 2011 Campaign: June to August 2012	Men	39.6	38.1	41.1	39.8	38.3	41.3	0.2	0.849
		Women	38.9	37.2	40.7	37.6	36.0	39.3	-1.3	0.273
Second national	Comparison: August to October 2011 Campaign: August to October 2013	Men	38.9	37.4	40.5	37.5	36.1	39.0	-1.4	0.188
		Women	39.2	37.5	40.9	38.4	36.8	40.1	-0.7	0.556
Third national	Comparison: April to June 2013 Campaign: April to June 2014	Men	39.5	38.0	41.1	39.8	38.3	41.3	0.3	0.810
		Women	37.3	35.7	39.0	39.0	37.3	40.7	1.7	0.165

5.6 Emergency presentation

Data on routes to diagnosis for the regional and first national campaign were analysed by Cancer Research UK using data from the NLCA. This data source depended on the route being recorded by the (multi-disciplinary team (MDT) and is different from the way in which NCRAS derive the route to diagnosis which is available in CAS and which was used for all the subsequent campaigns.

5.6.1 Regional and first national campaigns

For the period of the first national campaign, there was an increase in the proportion of patients diagnosed via GP referral (3.0 percentage point increase from 47.9% to 50.9%; $p<0.001$) and a decrease in the proportion diagnosed after an emergency admission or A&E attendance (1.9 percentage point decrease, from 21.5% to 19.6%; $p=0.004$), see table 23.

Table 23 . First national campaign: source of referral of lung cancer for the campaign and control periods (derived from NLCA data) (Table S11 from Ironmonger et al, 2015)

Source of referral	Control period				Campaign period			
	Cases (% of known)		Change in proportion	p-value	Cases (% of known)		Change in proportion	p-value
	February to April 2011	February to April 2012			May to July 2011	May to July 2012		
Following emergency admission	916 (12.8%)	959 (12.9%)	0.1	0.862	955 (12.9%)	983 (12.1%)	-0.8	0.119
Following an A&E attendance	575 (8.0%)	660 (8.8%)	0.8	0.068	633 (8.6%)	612 (7.5%)	-1.0*	0.018
SUBTOTAL of above (emergency admission and A&E attendance)	1,491 (20.8%)	1,619 (21.7%)	0.9	0.167	1,588 (21.5%)	1,595 (19.6%)	-1.9*	0.004
Referral from a GP	3,550 (49.4%)	3,655 (49.0%)	-0.5	0.583	3,540 (47.9%)	4,134 (50.9%)	+3.0*	<0.001
Referral from a consultant, other than in an A&E department	1,645 (22.9%)	1,774 (23.8%)	0.9	0.216	1,777 (24.1%)	1,991 (24.5%)	0.4	0.515
Other source of referral	496 (6.9%)	415 (5.6%)	-1.3*	0.001	481 (6.5%)	404 (5.0%)	-1.5*	<0.001
Total known	7,182 (100%)	7,463 (100%)	-	-	7,386 (100%)	8,124 (100%)	-	-
Not recorded (% of total)	222 (3.0%)	173 (2.3%)	-0.7*	0.005	253 (3.3%)	211 (2.5%)	-0.8*	0.003
TOTAL	7,404	7,636	-	-	7,639	8,335	-	-

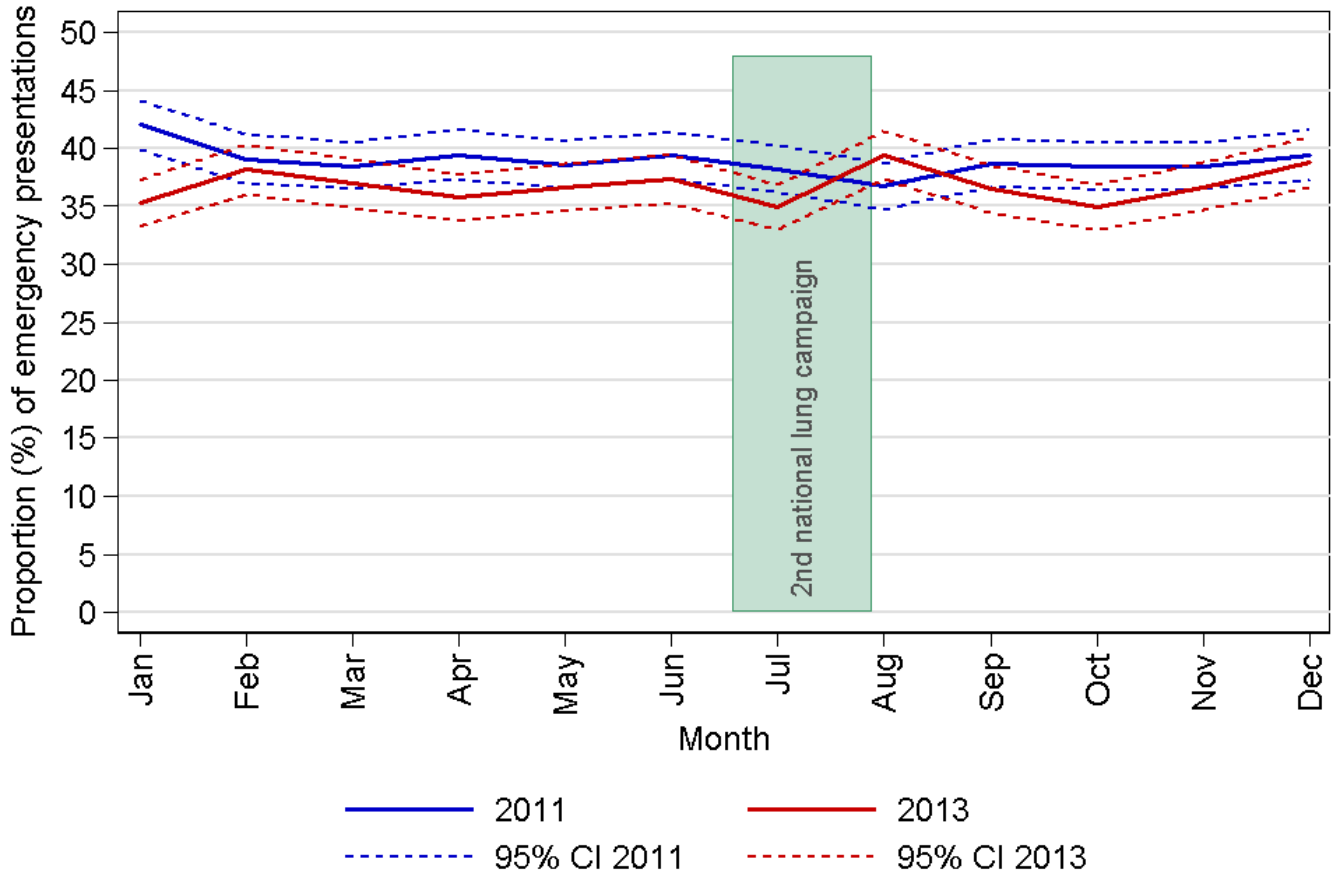
*Statistically significant difference between 2011 and 2012 (two-sample test of proportions; p<0.05)

Neither proportion significantly changed for the control period of February to April 2011 compared with February to April 2012 (p=0.583 and p=0.167). For the regional campaign, changes in the above proportions did not reach significance in either area.

5.6.2 Second and third national campaigns

Using the proxy emergency presentation methodology, there was a statistically significant difference in the proportion of emergency presentations between 2011 and 2013 for April (42% in 2011 compared to 35% in 2013) before the second national campaign (figure 34). Emergency presentations during the second national campaign were 35% in July and 39% in August compared with 38% and 37% for the same months in 2011.

Figure 34. Proportion of emergency presentations for lung cancer, second national campaign - England, 2011 versus 2013

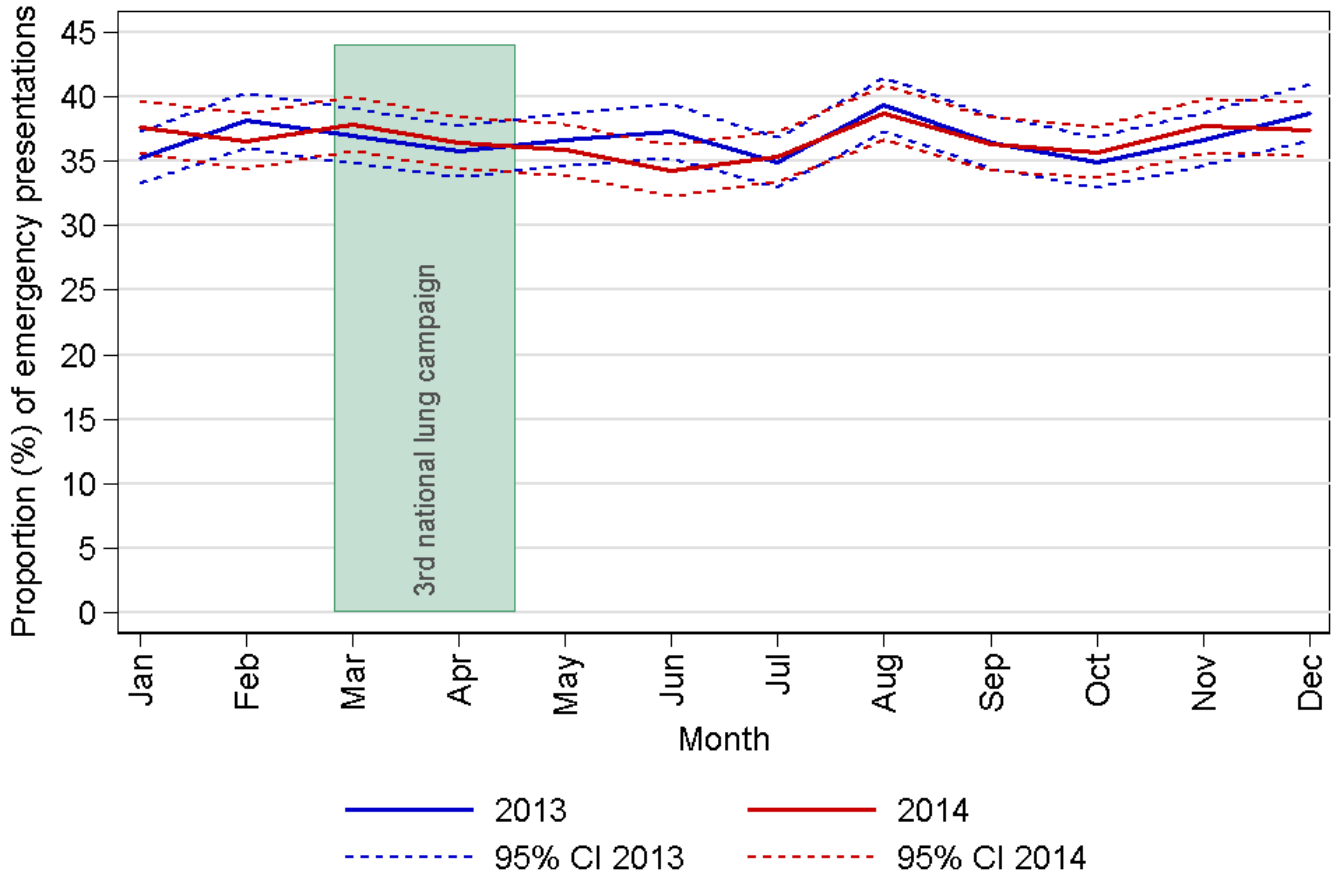


Second national lung campaign 2 July to 11 August 2013

Source: NCRAS Cancer Analysis System and the PHE Admitted Patient Care HES database

There were no significant differences between 2013 and 2014 in the proportion of lung cancers diagnosed via emergency presentation for England (figure 35). Emergency presentations during the third national campaign period were 38% in March 2014 and 36% in April 2014 compared to 37% and 36% for the same months in 2013.

Figure 35. Proportion of emergency presentations for lung cancer, third national campaign - England, 2013 versus 2014



Third national lung campaign 10 March to 30 April 2014

Source: NCRAS Cancer Analysis System and the PHE Admitted Patient Care HES database

The background level of patients being diagnosed as part of an emergency admission has however been falling steadily over the last few years making interpretation of the above data difficult.

5.6.3 Summary of impact on emergency presentation

For the period of the first national campaign, there was an increase in the proportion of patients recorded in the NLCA database diagnosed via GP referral (3.0 percentage point increase from 47.9% to 50.9%; p<0.001) and a decrease in the proportion diagnosed after an emergency admission or A&E attendance (1.9 percentage point decrease, from 21.5% to 19.6%; p=0.004). For the second and third campaigns, emergency presentation was defined in line with the proxy for emergency presentations methodology. There were no significant differences in the proportions of lung cancers diagnosed through emergency presentation for the year the campaign ran compared with the comparison periods. Over the time period of all the

campaigns, however, there was a slow but consistent fall in the proportion of patients diagnosed as part of an emergency admission in parallel with an increase in the proportion referred electively from GPs, making interpretation of the specific impact of the campaigns difficult. In particular, any impact on the numbers of patients diagnosed through an emergency route may take many weeks or months to become apparent. Details can be found on the NCRAS website.

5.7 Demographics of new cases diagnosed post campaign

There has been no evidence of a difference in the age or sex distribution of new cases of lung cancer following any of the campaigns. The following example of findings (table 24) is from the first national campaign:

Table 24. Lung cancers diagnosed during the first national campaign by age and sex

		Under 50 years			Age 50 and over			All ages		
		M	F	P	M	F	P	M	F	P
Lung cancers diagnosed	All of 2013	464	440	904	18,596	15,710	34,306	19,060	16,150	35,210
	2 July to 30 September 2013	113	99	212	4,769	3,887	8,656	4,882	3,986	8,868

Source: NCRAS

Carrying out chi-squared tests shows there is no strong evidence (all p-values >0.05) in support of a statistically significant difference in the age profile or the sex profile of lung tumours diagnosed in the campaign period (second national) and for the rest of 2013 (whether analysed as the whole year or excluding the campaign period).

5.8 Stage at diagnosis

For NSCLC, stage at diagnosis (stage 1, 2, 3A, 3B and 4) was defined by TNM seventh edition (Sobin et al, 2009). For SCLC (where analysed) the Veterans Association's grouping in to Limited and Extensive disease was used (Mountain,1986).

Analysis of stage for the regional and first national campaigns was carried out by the cancer statistics team at Cancer Research UK, though an additional analysis of the first national

campaign was carried out by NCRAS and is included here. The changes in proportions diagnosed at each stage were tested with and without exclusion of cases with unknown stage (uncertain or not recorded). For SCLC, proportions diagnosed with SCLC-limited stage and SCLC-extensive were also tested with and without exclusion of those with unknown stage.

5.8.1 Stage - regional campaign

Analysis of stage at diagnosis for the regional campaign was based on data from the NLCA database.

5.8.2 Stage of SCLC – regional campaign

Staging completeness of SCLCs increased in both pilot and control trusts when comparing the period October to December 2010 with October to December 2011, although the improvement was larger in the control trusts (88.3% to 91.1%, and 89.7% to 94.9% in the pilot and control trusts respectively).

Table 25 shows that of the SCLCs that did have a recorded stage, there was a statistically significant decrease in the percentage of SCLCs coded as having extensive disease when comparing the period October to December 2010 with October to December 2011 (74.1% to 63.4%). The corresponding increase in the percentage of SCLCs coded as having limited' disease therefore went up when comparing the period October to December 2010 with October to December 2011, from 25.9% to 36.6%. A similar, but much smaller, non-significant trend was found for the control trusts.

Table 25. Distribution of stage in SCLC patients between pilot and control trusts post the regional campaign 2012 compared with the same period 2011

Stage	Pilot Trusts		Control Trusts	
	October to December 2010	October to December 2011	October to December 2010	October to December 2011
SCLC - Limited	43 (25.9%)	60 (36.6%)	141 (27.1%)	174 (29%)
SCLC - Extensive	123 (74.1%)	104 (63.4%)	380 (72.9%)	426 (71%)
Total	166 (100%)	164 (100%)	521 (100%)	600 (100%)

There was thus a favourable (statistically significant) shift towards earlier stage at diagnosis in SCLC patients relating in time to the regional campaign.

5.8.3 Stage of NSCLC – regional campaign

The analysis of stage at diagnosis for NSCLC relating to the regional campaign was also carried out by Cancer Research UK, based on data from the NLCA.

Staging completeness of NSCLCs (including carcinoid tumours) increased similarly in both pilot and control trusts when comparing the period October to December 2010 with October to December 2011, although control trusts had a slightly higher percentage of cases with certain/known stage. Of these tumours, there was a higher proportion diagnosed as stage 1 and 2 in October to December 2011 compared with the same period in 2010 in pilot trusts (24.6% compared with 22.3%); and with stage 3A (12.6% compared to 10.3%; see table 26). There was a correspondingly lower proportion diagnosed at stage 3B and 4 (62.8% compared with 67.4%). However, this shift was not statistically significant, possibly a result of the small numbers. There was no evidence of a difference in stage at diagnosis in the control trusts between these two periods.

Table 26. Distribution of stage in NSCLC patients between pilot and control trusts post the regional campaign in 2011 compared with the same period 2010

Stage	Pilot trusts		Control trusts	
	October to December 2010	October to December 2011	October to December 2010	October to December 2011
1 & 2	231 (22.3%)	318 (24.6%)	922 (23.2%)	1,038 (23.4%)
3A	107 (10.3%)	163 (12.6%)	539 (13.5%)	599 (13.5%)
3B and 4	698 (67.4%)	813 (62.8%)	2,521 (63.3%)	2,801 (63.1%)
Total (1 - 4)	1,036 (100%)	1,294 (100%)	3,982 (100%)	4,438 (100%)

There was thus a trend towards a favourable stage shift in NSCLC patients relating in time to the regional campaign which did not reach statistical significance.

5.8.4 Stage - first national campaign

The analysis of stage at diagnosis for NSCLC and SCLC for the first national campaign was also carried out by Cancer Research UK and based on data from the NLCA database. The additional NCRAS analysis used CAS cancer registry data and is presented below, after the Cancer Research UK analysis.

The detailed changes as derived from the NLCA data are shown in table 27 and the key findings of this Cancer Research UK analysis are summarised in figure 9 (Ironmonger et al, 2015).

Table 27. First national campaign: number and proportion of NSCLC and SCLC diagnosed at each stage for the campaign and control periods (Table 6, Ironmonger et al, 2015)

Type of lung cancer	Stage		Control period				Campaign period			
			February to April 2011	February to April 2012	Change in proportion	p-value	May to July 2011	May to July 2012	Change in proportion	p-value
NSCLC	1	Number of cases	886	988	-	-	862	1,180	-	-
		% Total known	15.2%	15.8%	+0.6	0.404	14.1%	17.3%	+3.1*	<0.001
		% Grand total	13.6%	14.6%	+1.0	0.082	12.8%	16.0%	+3.2*	<0.001
	2	Number of cases	509	593	-	-	562	660	-	-
		% Total known	8.8%	9.5%	+0.7	0.169	9.2%	9.7%	+0.4	0.397
		% Grand total	7.8%	8.8%	+1.0*	0.041	8.3%	8.9%	+0.6	0.222
	3A	Number of cases	857	902	-	-	859	921	-	-
		% Total known	14.7%	14.4%	-0.3	0.614	14.1%	13.5%	-0.6	0.309
		% Grand total	13.1%	13.3%	+0.2	0.707	12.8%	12.5%	-0.3	0.587
	3B	Number of cases	603	656	-	-	608	720	-	-
		% Total known	10.4%	10.5%	+0.1	0.840	10.0%	10.5%	+0.6	0.295
		% Grand total	9.2%	9.7%	+0.5	0.354	9.0%	9.7%	+0.7	0.151
	4	Number of cases	2,958	3,117	-	-	3,201	3,350	-	-
		% Total known	50.9%	49.8%	-1.1	0.244	52.5%	49.0%	-3.5*	<0.001
		% Grand total	45.3%	46.1%	+0.8	0.344	47.5%	45.3%	-2.2*	0.008
	NK	Number of cases	59	46	-	-	43	50	-	-
		% Grand total	0.9%	0.7%	-0.2	0.147	0.6%	0.7%	0	0.783
	NR	Number of cases	656	455	-	-	597	513		
		% Grand total	10.0%	6.7%	-3.3*	<0.001	8.9%	6.9%	-1.9*	<0.001
	Total known (stages 1-4)	Number of cases	5,813	6,256	-	-	6,092	6,831	-	-
		% Grand total	89.0%	92.6%	+3.5*	<0.001	90.5%	92.4%	+1.9*	<0.001
	Total unknown	Number of cases	715	501	-	-	640	563	-	-
		% Grand	11.0%	7.4%	-3.5*	<0.001	9.5%	7.6%	-1.9*	<0.001

		total								
	Grand total		6,528	6,757	-	-	6,732	7,394	-	-
SCLC	SCLC - Limited	Number of cases	233	255	-	-	246	286	-	-
		% Total known	28.7%	30.4%	+1.7	0.440	28.8%	31.8%	+3.0	0.166
		% Grand total	26.6%	29.0%	+2.4	0.260	27.1%	30.4%	+3.3	0.121
	SCLC - Extensive	Number of cases	580	584	-	-	609	613	-	-
		% Total known	71.3%	69.6%	-1.7	0.440	71.2%	68.2%	-3.0	0.166
		% Grand total	66.2%	66.4%	+0.2	0.919	67.1%	65.1%	-2.0	0.364
	NK	Number of cases	10	5	-	-	3	8	-	-
		% Grand total	1.1%	0.6%	-0.6	0.193	0.3%	0.9%	+0.5	0.147
	NR	Number of cases	53	35	-	-	49	34	-	-
		% Grand total	6.1%	4.0%	-2.1*	0.047	5.4%	3.6%	-1.8*	0.063
	Total known	Number of cases	813	839	-	-	855	899	-	-
		% Grand total	92.8%	95.4%	+2.6*	0.019	94.3%	95.5%	+1.3	0.214
	Total unknown	Number of cases	63	40	-	-	52	42	-	-
		% Grand total	7.2%	4.6%	-2.6*	0.019	5.7%	4.5%	-1.3	0.214
	Grand total		876	879	-	-	907	941	-	-

In summary, during the period of the first national campaign and in the month following, there was an increase in the proportion of NSCLC diagnosed at stage 1 ($p<0.001$) and a fall in the proportion diagnosed at stage 4 ($p<0.001$), but no change for the control period ($p=0.404$ & $p=0.244$). In contrast to the finding in the regional campaign there was no statistically significant stage shift seen in SCLC case.

With regards to the NCRAS analysis of stage after the first national campaign it is noteworthy that the staging data available within the CAS dataset is very incomplete prior to 2012, but for the calendar year 2012 (the year of the first national campaign) the completeness is 84% for lung cancer.

In this analysis, different campaign periods were examined; firstly the 10 weeks post campaign (weeks 27 to37) and secondly incorporating the campaign period itself (weeks 19 to 37). Both were compared to the rest of 2012 pre and post the 19 to 37 week window. Table 28 shows the

proportion of lung cancers than are early stage (stage 1 or 2) and the percentage that are staged at all for various periods in 2012. In the period 27 to 37 weeks there is a small increase in the proportion of early stage cancers (from 19.3% to 20.5%) which is just statistically significant (p=0.02) (table 28). The numbers staged overall is also higher (increase from 83.8% to 85.5% with p=0.0002). For the longer period 19 to -37 weeks the difference in early stage is no longer significant (p=0.12) but the percentage staged remains so (p=0.006).

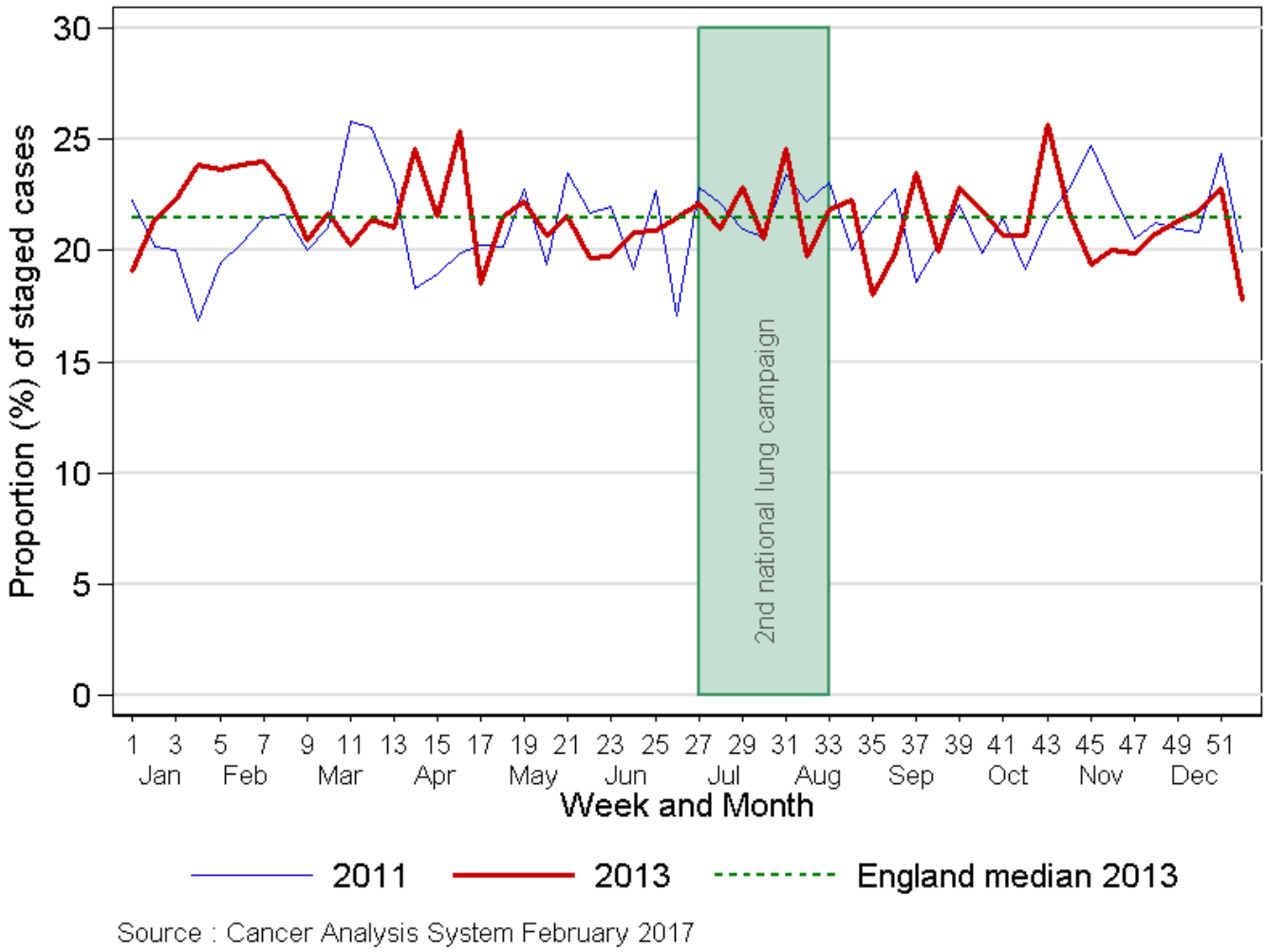
Table 28. proportion of patients with early stage disease and total proportion with stage recorded at all for lung cancer in various periods in 2012

Period	%early stage (1 and 2)	Confidence Intervals	% staged
2012	19.5%	19.1% to 20.0%	84.1%
2012, weeks 27 - 37	20.5%	19.6% to 21.4%	85.5%
2012, weeks 1 to 26 and 38 to 53	19.3%	18.8% to 19.7%	83.8%
2012, weeks 19 to 37	20.0%	19.4% to 20.6%	84.9%
2012, weeks 1 to18 and 38 to 53	19.5%	19.1% to 19.8%	84.0%

5.8.5 Stage, second national campaign

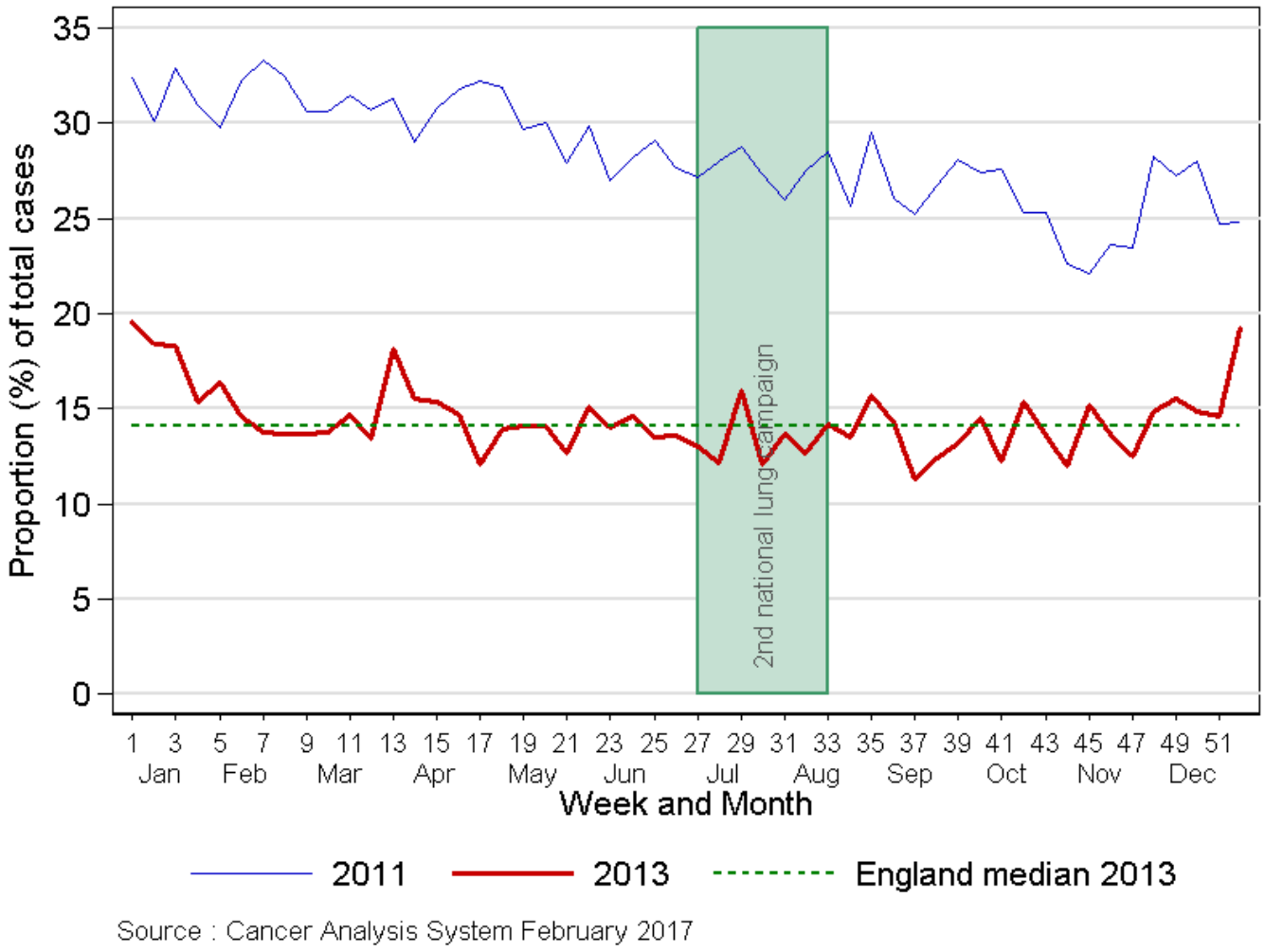
Data from the CAS database were used for the analysis of stage relating to the second national campaign. For 2013, over 86% of cases had a valid stage recorded. As outlined in section 3.10 the proportion of staged cases diagnosed at stages 1, 2, 3 and 4 and those with unknown stage were analysed by week and compared to the annual median for 2013. A significant result was defined as 5 or more consecutive weeks with higher or lower proportions of cases staged 1 to 2, 3, 4 or unknown compared to the median. There were 8 consecutive weeks (weeks 42 to 49) where the proportions of early staged 1 and 2 cases were above the median (figure 10). This corresponded with 5 consecutive weeks (weeks 45 to 49) where the proportions of stage 3 cancers were below the median (figure 36). For those cases where stage was unknown, there was a 5 week long period towards the end of 2013 (weeks 48 to 52) where the proportions of unknown cases were higher than the median (figure 37).

Figure 36. Proportion of staged cases diagnosed as stage 3 by week, 2013, England



Source : Cancer Analysis System February 2017

Figure 37. Proportion of total cases diagnosed as stage unknown by week, 2013, England



Source : Cancer Analysis System February 2017

5.8.6 Stage, third national campaign

Stage for the third national campaign was analysed in comparison to the second national campaign. In general there was an increase in the proportion of lung cancer diagnosed at stage 1 or 2 prior to, during and after this campaign, as illustrated in figure 38.

Figure 38. Percentage of staged cases diagnosed with stage 1 or 2 by week, 2013 and 2014, lung C33-C34 cases England, all ages

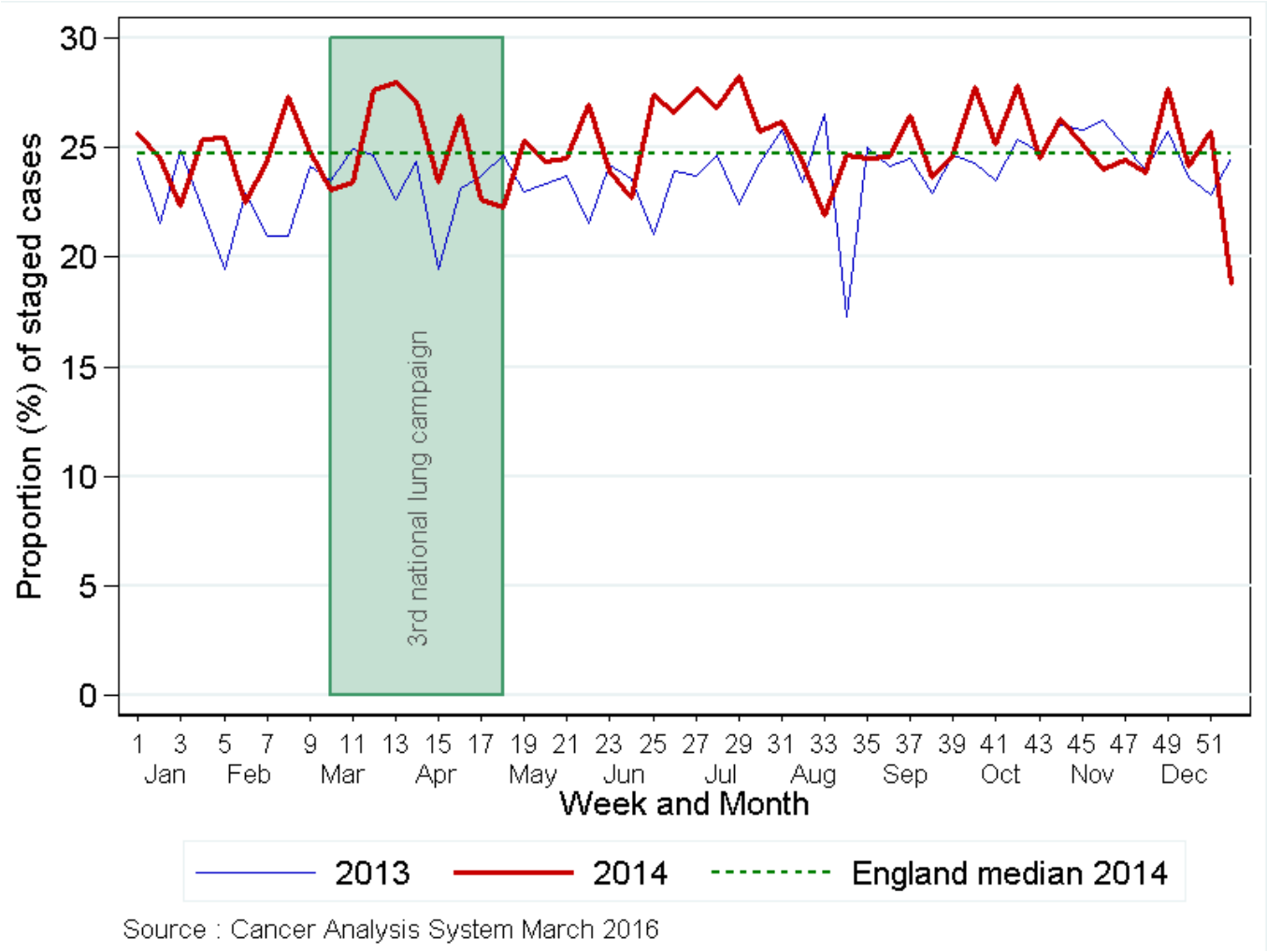


Figure 39. Percentage of staged cases diagnosed with stage 3 by week, 2013 and 2014, lung C33-C34 cases England, all ages

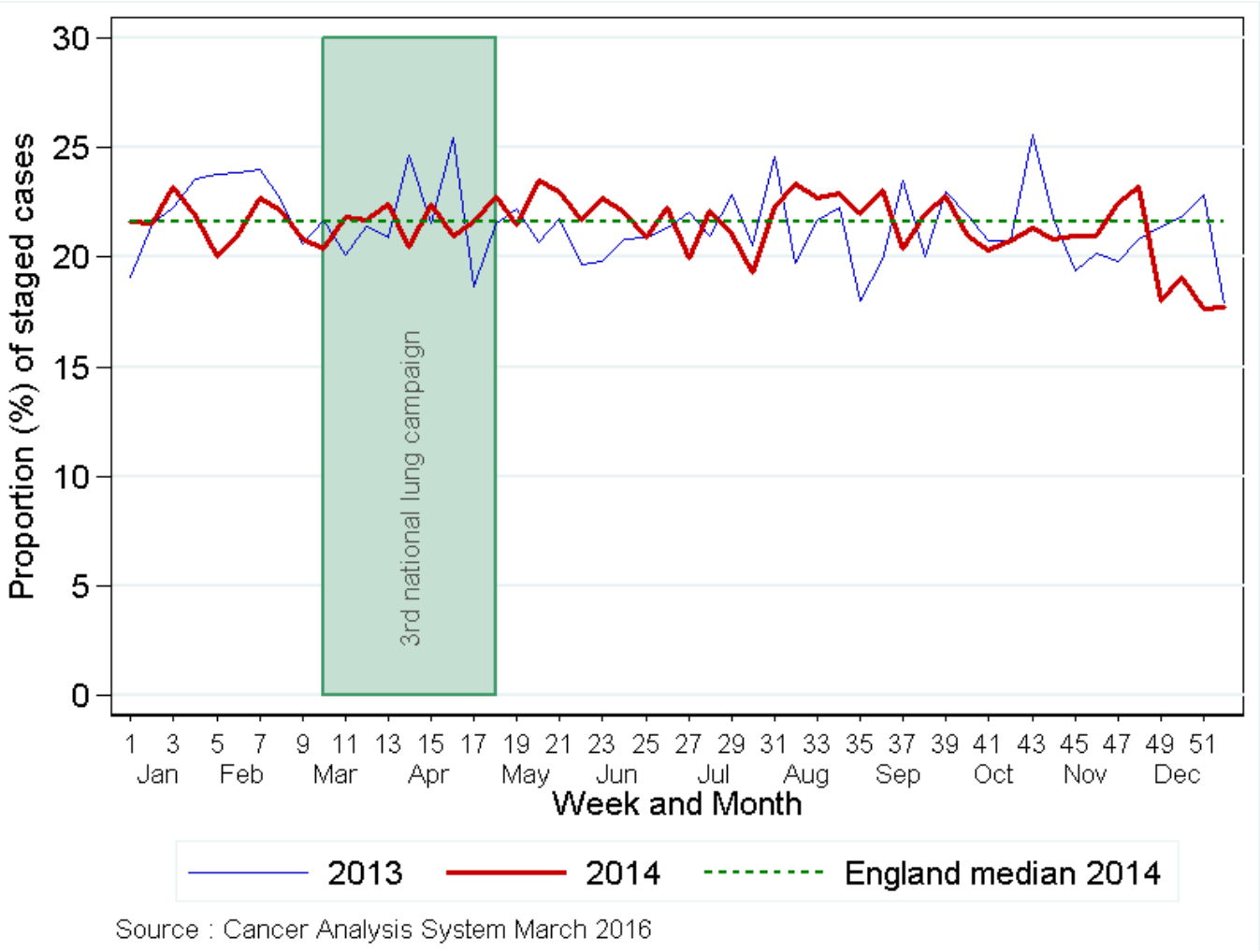
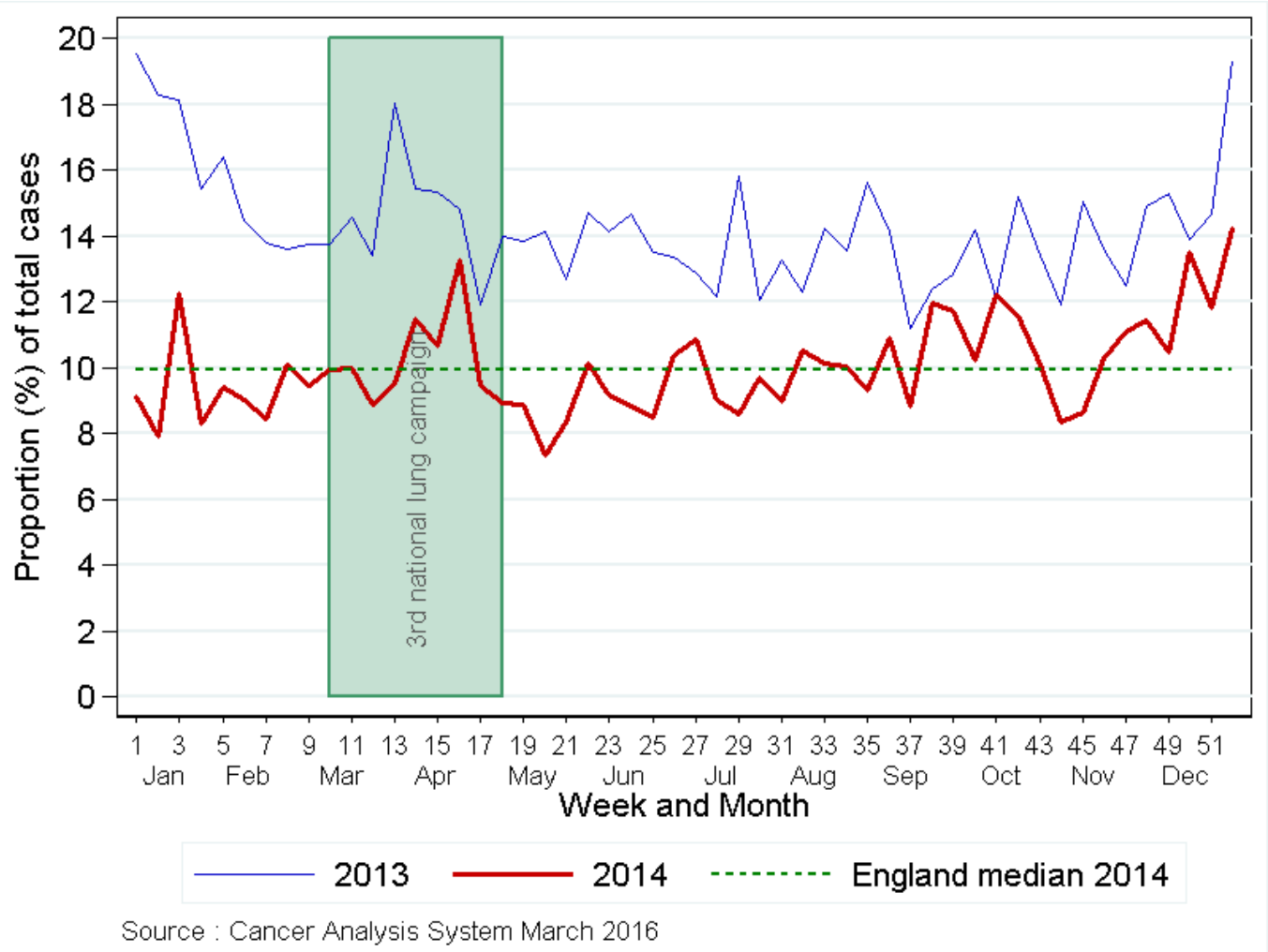


Figure 40. Percentage of staged cases diagnosed with stage unknown by week, 2013 and 2014, lung C33-C34 cases England, all ages



5.8.7 Stage, summary

There is evidence of a shift in stage at diagnosis in the weeks following all three of the national campaigns, despite the fact that different datasets were used for the first national campaign (NLCA) and second and third national campaigns (CAS), as well as different analytical methods including slight differences in how the stages were grouped and the fact that different time periods were used. There was also a trend towards this positive stage shift following the regional campaign, with statistical power likely to have been limited by the smaller numbers. These results are almost entirely related to NSCLC. Stage in SCLC patients was only specifically analysed for the regional and first national campaigns, for which the evidence was mixed; a significant shift towards limited disease was observed in the regional campaign but this was not significant for the first national campaign.

5.9. Performance status

Performance status is a clinical assessment of the impact of the cancer on the patient's ability to carry out the normal activities of daily living. Performance status is recorded by NCRAS and the NLCA using the World Health Organization (WHO) and Eastern Cooperative Oncology Group (ECOG) grading system (details given in appendix 38). In this classification performance status is split into three groups: 0 and 1; 2; 3 and 4, with 0 and 1 by convention being grouped together as being the best prognostic groups. Many treatments, especially chemotherapy and combination therapies, are limited to patients with a performance status of 0 or 1. Performance status can deteriorate over time, so delays in reaching secondary care may well result in patients becoming unfit for treatment, irrespective of the stage of disease. Performance status data was well recorded in the NLCA and used in the analysis by Cancer Research UK of the regional and first national campaigns. It was not analysed in the second and third national campaigns because of a fall in data completeness.

5.9.1 Performance status in the regional campaign

For the regional campaign there was a slight increase (57.6% from 53.2%) in the proportion of patients whose performance status was assessed as being 0 or 1 in pilot trusts during October to December 2011, compared with the same period in 2010; with a consequent decline in those assessed as 2, 3 or 4. However, this slight change in distribution of performance status was not statistically significant. There was no difference between the time periods for the control trusts.

5.9.2 Performance status in the first national campaign

Table 29 shows the impact of the first national campaign on performance status distribution. The proportion of patients diagnosed with lung cancer with performance status 0 or 1 did not change for the campaign period (an increase of 1.5 percentage points which did not reach statistical significance; p=0.075), whilst the proportion significantly decreased by 2.0 percentage points for the control period (p=0.019). The longer-term trends do not suggest a clear pattern associated with the campaign period. For the first national campaign therefore, there is no evidence of a major change in performance status at the time of presentation, but there is a trend towards a better performance status in patients diagnosed in the period following the campaign.

Table 29. National campaign: performance status of lung cancer patients first seen during the campaign months and control months in 2011 and 2012 (Table 8, Ironmonger et al, 2015)

PS Group	Control period				Campaign period			
	Cases (% of known)		Change in proportion	p-value	Cases (% of known)		Change in proportion	p-value
	February to April 2011	February to April 2012			May to July 2011	May to July 2012		
0 and 1	3,576 (54.9%)	3,686 (52.9%)	-2.0*	0.019	3,730 (54.8%)	4,283 (56.3%)	+1.5	0.075
2	1,342 (20.6%)	1,451 (20.8%)	+0.2	0.758	1,339 (19.7%)	1,451 (19.1%)	-0.6	0.358
3 and 4	1,594 (24.5%)	1,831 (26.3%)	+1.8*	0.017	1,739 (25.5%)	1,878 (24.7%)	-0.9	0.228
Total known	6,512 (100%)	6,968 (100%)	-	-	6,808 (100%)	7,612 (100%)	-	-
Unknown (% of total)	892 (12.0%)	667 (8.7%)	-3.3*	<0.001	831 (10.9%)	723 (8.7%)	-2.2*	<0.001
TOTAL	7,404	7,636	-	-	7,639	8,335	-	-

*Statistically significant difference between 2011 and 2012 (two-sample test of proportions; <0.05)

5.9.3 Summary of performance status findings

Performance status was only analysed with respect to the regional and first national campaigns. There was a non-statistically significant trend towards better performance status at diagnosis after the regional campaign and no evidence of a change over the period of the first national campaign. There was, however, a trend towards a better performance status in patients diagnosed in the period following the first national campaign.

5.10 Diagnostic imaging

5.10.1 Methods

Data from treating organisations was obtained from the DID, on the NHS Digital's iView system (formerly known as the Health and Social Care Information Centre (HSCIC)), for the pilot area and for the whole of England. The DID only includes data from April 2012 onwards, making comparisons with 2011 and assessing the impact of the regional campaign impossible.

5.10.2 Methods used in first national campaign

Assessment of the first national campaign was carried out by analysts from Cancer Research UK and NHS Digital. For that campaign the number of chest X-rays and CT scans including the

thorax from all referral pathways, and those following a GP referral specifically, in May to July 2012 were compared with April 2012, after adjustment for the number of organisations submitting data. No age cut-off was used. GP-referred investigations were further adjusted for working days under the assumption that GPs only work these days; data for all investigations were adjusted for all days in the month, as these include referrals from pathways used on both working and non-working days.

5.10.3 Methods used in the second and third national campaigns

This analysis was carried out by NCRAS analysts who extracted the DID data for patients for each calendar month to cover the period July 2012 to December 2014. The analysis was split into patients aged 50 years or more and below 50. As a control, comparisons were made between the campaign period plus one month, compared to the rest of the year in question. In the following analyses, the National Interim Clinical Imaging Procedure (NICIP) codes from the DID that were used are listed in appendix 6.1 and 6.2.

All imaging procedures were classed as referrals made by a GP or consultant for 'Early cancer diagnosis – Suspected Lung Cancer' in the DID. Only chest X-rays (plain), chest and abdominal CT scans and CT scans of chest were included for GPs referrals, all measures were included for consultant referrals.

5.10.4 Results of the first national campaign on the level of diagnostic imaging tests

The number of CXRs following GP-referral increased following the campaign launch (table 30). Specifically, the number of GP-referred chest X-rays increased by 18.6% in May to July 2012 compared with April 2012 with adjustment for working days ($p<0.001$). For comparison, the number of chest X-rays from all referrals increased by 7.3% comparing May to July with April 2012 when adjusting for total number of days ($p<0.001$). Also, as a control comparison, for the same period in 2013, GP-referred chest X-rays per working day decreased by 16.7% for May to July compared with April ($p<0.001$).

Table 30. First national campaign: number of chest X-rays and chest and/or abdomen CT scans, May/June/July compared with April, 2012 and 2013 (table 8, Ironmonger et al, 2015)

		Number of tests	Tests/ Organisation/Day	% change from April	p-value	Tests/ Organisation/ Working day	% change from April	p-value
GP-Referred Chest X-Rays								
2012	April	144,140	25.6	N/A	-	40.4	N/A	-
	May to July	566,045	32.8	28.3%	<0.001	47.9	+18.6%*	<0.001
2013	April	160,865	32.3	N/A	-	46.1	N/A	-
	May to July	404,115	26.7	-17.3%*	<0.001	38.4	-16.7%*	<0.001
All Chest X-Rays								
2012	April	606,840	107.6	N/A	-	169.9	N/A	-
2013	April	600,385	120.6	N/A	-	172.2	N/A	-
	May to July	1,624,980	107.5	-10.8%*	<0.001	154.5	-10.3%*	<0.001
GP-Referred Chest and/or Abdomen CT Scans								
2012	April	2,145	0.4	N/A	-	0.6	N/A	-
	May to July	8,215	0.5	+25.1%*	<0.001	0.7	+15.7%*	<0.001
2013	April	2,940	0.6	N/A	-	0.8	N/A	-
	May to July	8,360	0.6	-6.3%*	0.014	0.8	-5.8%*	0.025
All Chest and/or Abdomen CT Scans								
2012	April	28,650	5.1	N/A	-	8.0	N/A	-
	May to July	98,455	5.7	+12.3%*	<0.001	8.3	+3.8%*	<0.001
2013	April	31,515	6.3	N/A	-	9.0	N/A	-
	May to July	92,580	6.1	-3.2%*	<0.001	8.8	-2.6%*	<0.001

*Statistically significant difference to April (with adjustment for number of organisations submitting data and days/working days) (likelihood ratio test p<0.05)

The number of GP-referred CT scans per working day also increased, with an increase of 15.7% comparing May to July 2012 with April (from 0.6 to 0.7 per organisation per working day; p<0.001). For comparison to a control trend, in 2013 there was a 5.8% decrease for May to July compared with April (p=0.025).

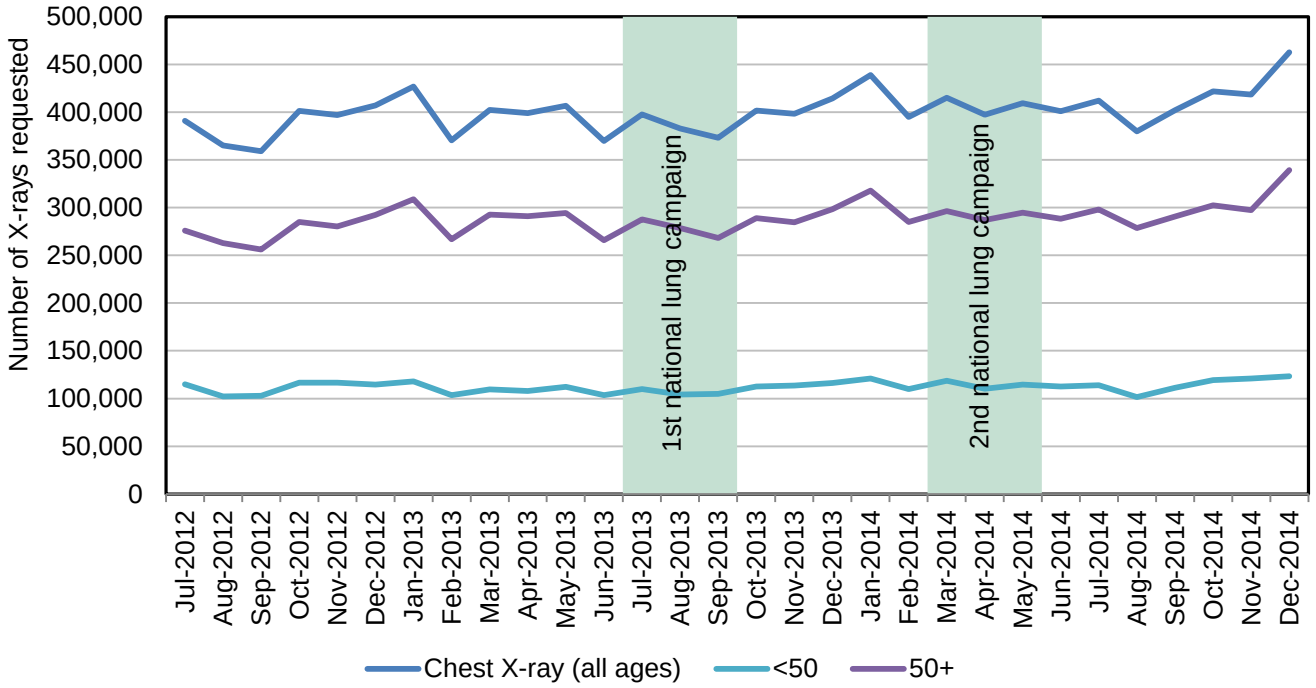
5.10.5 Results of the second and third national campaigns on the level of diagnostic imaging tests

As other campaigns show an extended period of primary care activity, the “campaign periods” are extended here to include a one month period post campaign. At a national level, imaging activity was compared between the campaign period (plus 1 month) and the remainder of 2013 and 2014 respectively. The period of the campaign in 2013 was also compared to the same period in 2012. Both the number of diagnostic tests requested and the number of tests actually carried out were used for each analysis.

5.10.6 Changes in the number of tests requested by consultants

The number of plain chest X-rays requested by consultants fell by 5% during the period of the second national campaign and 3% during that of the third campaign, though neither of these changes were statistically significant. There was no difference between these numbers when analysed by age group (<50 and 50+). (Figure 41 and table 31).

Figure 41. Number of plain chest X-rays requested by consultants each month, July 2012 to December 2014



With respect to the number of CT scans requested by consultants, there were variable, small and non-significant changes identified relating to the period of the campaigns, nor were there any differences between patients under and over the age of 50. (figure 42 and table 31)

Figure 42. Number of CT scans requested by consultants each month, July 2012 to December 2014

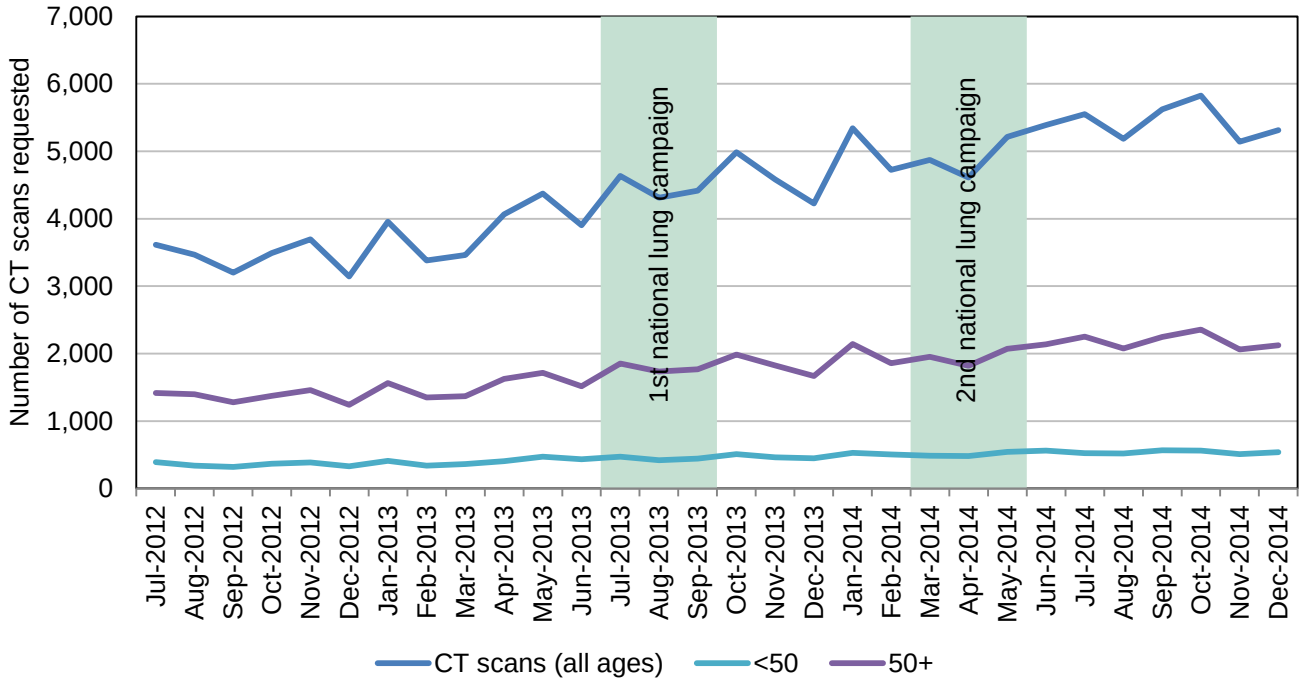
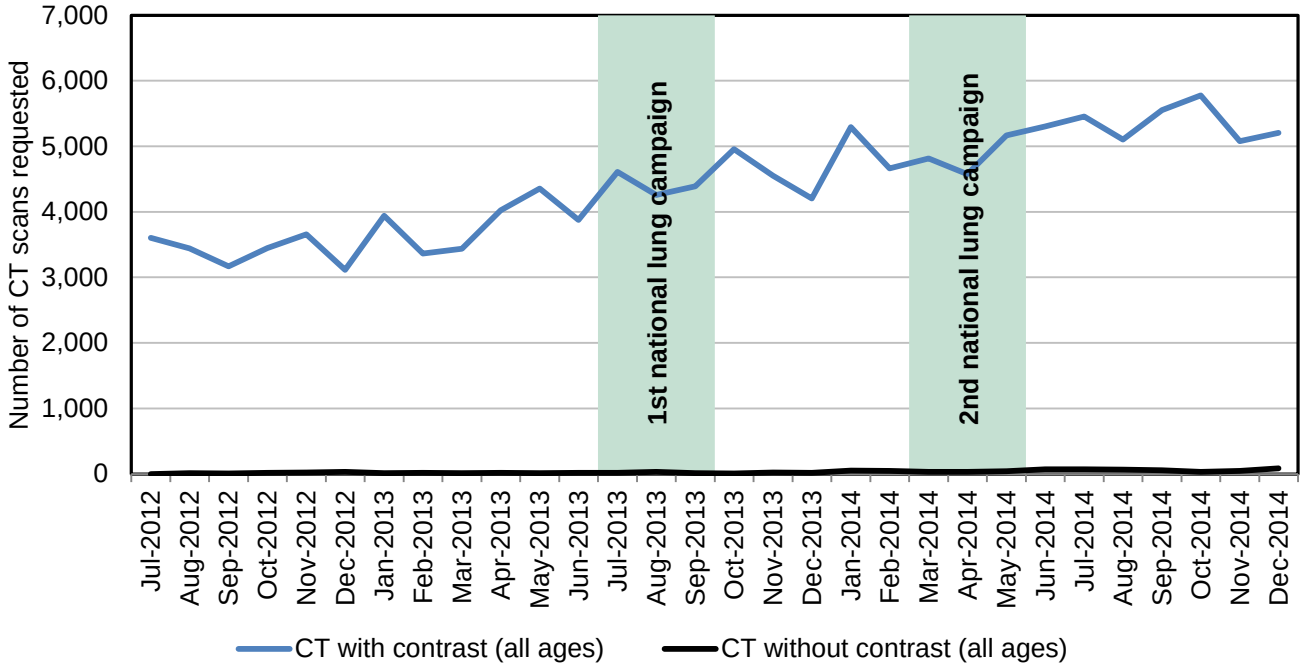


Table 31. Number of requests for chest X-rays and CT scans from consultants, for campaign periods and the remainder of the respective years

Test	Campaign period (July to September 2013)	Rest of 2013	% change 2013	Campaign period (March to April 2014)	Rest of 2014	% change 2014
Plain chest X-rays (<50)	3,468	3,654	-5%	3,736	3,788	-1%
Plain chest X-rays (50+)	9,072	9,493	-4%	9,541	9,881	-3%
Plain chest X-rays (all ages)	12,540	13,146	-5%	13,277	13,669	-3%
All CT scans (<50)	14	14	3%	16	18	-7%
All CT scans (50+)	58	54	9%	63	70	-10%
All CT scans (all ages)	145	135	7%	160	176	-9%

The number of CT scans requested by consultants was also analysed by whether they were contrast or non-contrast-enhanced. The reason for this is that contrast-enhanced scans are only done where there is a significant abnormality on the plain chest X-rays or non-contrast scan, so the numbers would be more closely related to the numbers of definite new cases of lung cancer than with non-contrast CTs. All but a very tiny minority of scans were contrast-enhanced, as shown in Figure 43.

Figure 43. Number of CT scans, with and without contrast enhancement requested by consultants each month, July 2012 to December 2014



5.10.7 Changes in the number of tests requested by GPs

For the second national campaign the number of chest X-rays carried out by GPs during the campaign was compared with those requested in the same period a year earlier. The number of plain chest X-rays fell by a monthly average of 11% between the campaign period in 2013 (n=7570) and its equivalent in 2012 (n=6730) but this is not a statistically significant decrease.

The monthly average of the number of chest X-rays requested by GPs over the period covering the second and third national campaigns is shown in figure 44 and table 32.

Figure 44. Number of plain chest X-rays per working day requested by GPs each month, July 2012 to December 2014

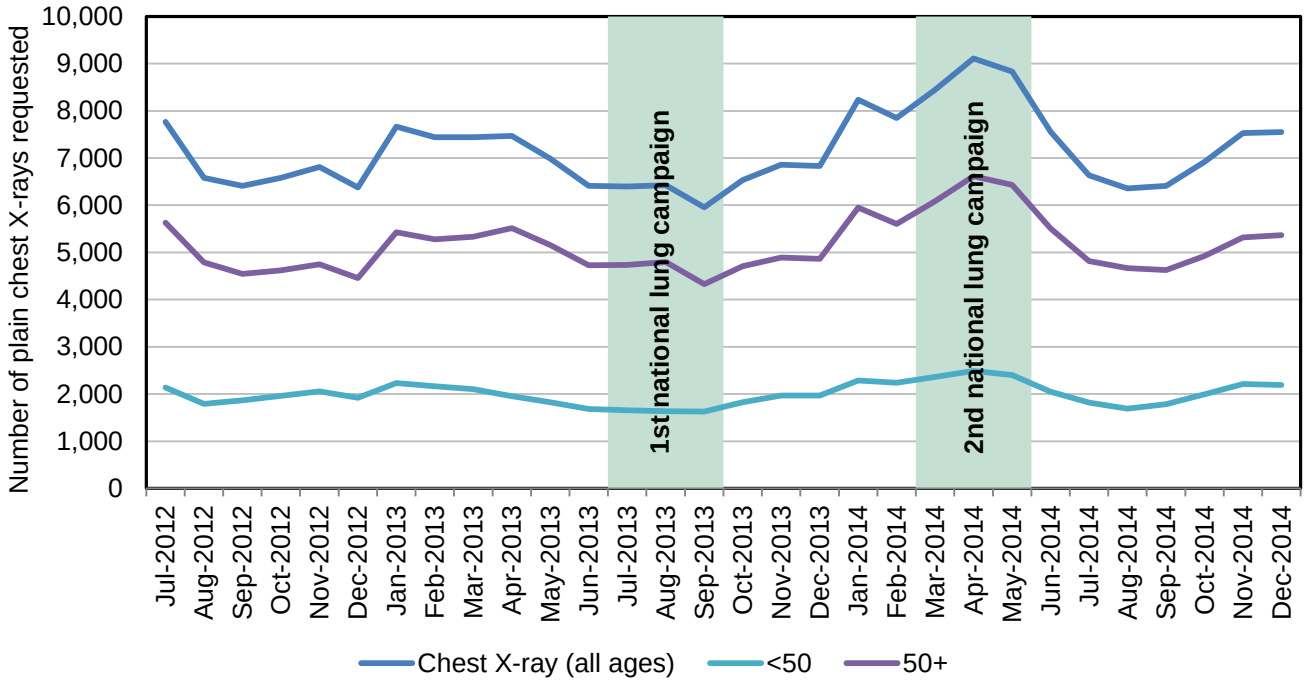
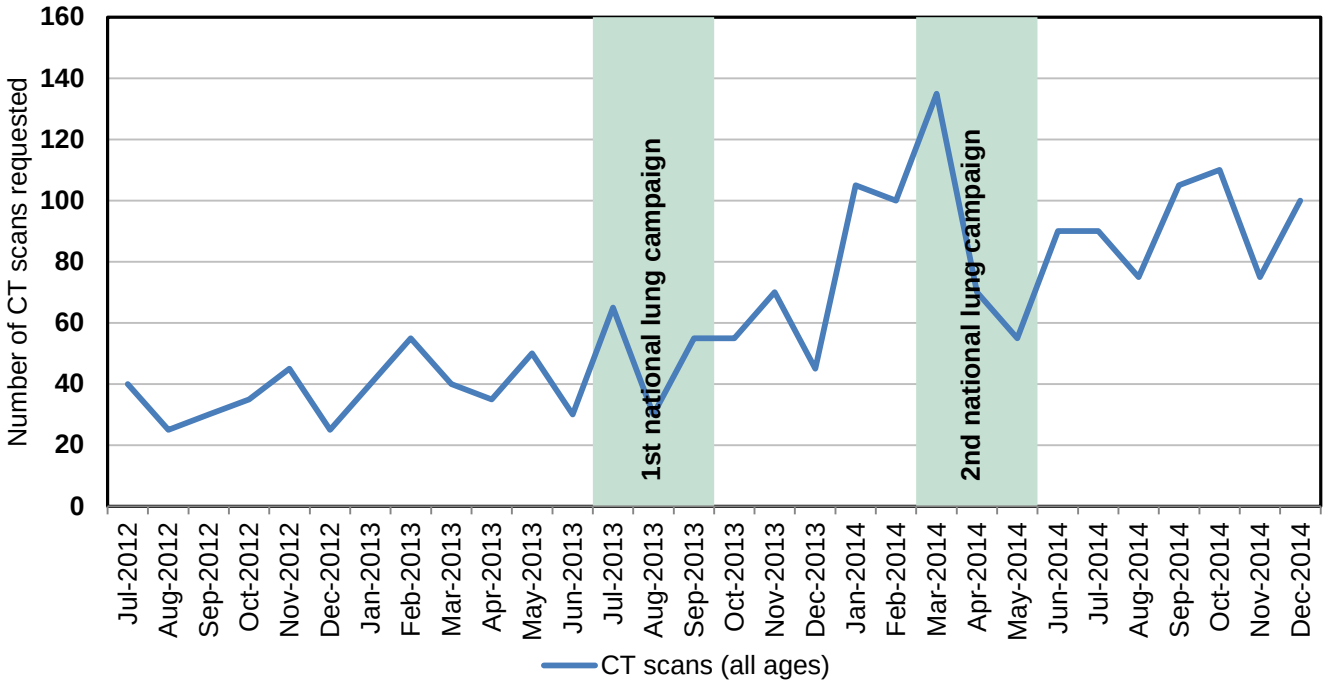


Table 32. Average number of requests for chest X-rays from GPs for the periods of the second and third national campaigns (+ 1 month) compared with the remainder of the respective years

Test	Campaign period (July to September 2013)	Rest of 2013	% change 2013	Campaign period (March to April 2014)	Rest of 2014	% change 2014
Plain chest X-rays (<50)	1,641	1,969	-17%	2,416	2,027	19%
Plain chest X-rays (50+)	4,622	5,098	-9%	6,374	5,191	23%
Plain chest X-rays (all ages)	6,264	7,067	-11%	8,790	7,219	22%

The number of CT scans requested by GPs is very much smaller than those requested by consultants (<2% of their rate) but there does appear to have been an increase in these numbers over the period between mid 2012 to the end of 2014, though no clear evidence of a positive relationship to the campaign periods. This is illustrated graphically in figure 45

Figure 45. Total (unadjusted for working days) number of CT scans, with and without contrast enhancement requested by GPs per month, July 2012 to December 2014.



5.10.8 Summary of diagnostic imaging findings

Since the collection of the DID only began in 2012, no data is available to evaluate the impact of the regional campaign on imaging and, the quality and completeness of the data is likely to have changed over the period of analysis. To complicate things further, the analysis of the first, second and third national campaigns were carried out by different groups and used slightly different groups of CT scan codes, which makes direct comparison difficult; however it is unlikely that a major change has gone undetected.

Following the first national campaign there were significant increases in requests for chest X-rays and CT scans both by GPs and consultants, the most notable was an increase in the number of GP requested chest X-rays of 18.6% ($p<0.001$) and an overall increase of 12.3% in CT scan requests. Since CTs were mostly only carried out where there was an abnormality on the chest X-rays, this implies a high detection rate of patients with clinically significant problems, whether cancer or not.

Following the second or third national campaign there were no statistically significant changes in any of the imaging test numbers that could be related directly to the campaign periods, either those requested by GPs or by consultants. There was no difference in the impact on patients

over or under the ages of 50. There was however a steady trend of an increasing number of CT scans as requested both by consultants and by GPs over the period between mid 2012 and the end of 2014. The absolute number of CT scans being requested by GPs was less than 2% of those requested by consultants.

5.11 Treatment

5.11.1 Regional and first national campaigns

Cancer Research UK analysed first treatment following the regional and first national campaigns and used data from the NLCA. This data set includes details of first treatment modality as recorded by the MDT. This preceded the availability of data on radiotherapy and systemic therapies as are now collected in the Radiotherapy dataset (RTDS) and Systemic anti-cancer therapy (SACT) dataset respectively.

A greater proportion of lung cancer patients received surgical resection as a first definitive treatment following the launch of both the regional and first national campaigns (tables 33 and 34). The proportion increased following the regional campaign by 3.6% and the first national campaign by 2.3 percentage points for the campaign period (from 13.7% to 16.0%, $p<0.001$; a proportional increase of 17.0%), with no evidence of a change for the control period ($p=0.425$). There were no statistically significant changes in any other treatment rates following the regional campaign. However after the first national campaign the proportion of patients receiving any active anti-cancer treatment (surgery, chemotherapy, or radiotherapy) increased by 1.9% and the proportion receiving only palliative care fell by the same proportion ($p<0.001$), there were no significant changes in the control periods (table 5.31).

Table 33. Regional campaign: first definitive treatment received for the campaign months of October to December 2011 and October to December 2010 for the pilot and control areas (Table S9, Ironmonger et al, 2015)

First Definitive Treatment[1]	Control Area (n=141 trusts)				Pilot Area (n=32 trusts)			
	Number of cases (% of all cases)		Change in proportion	p-value	Number of cases (% of all cases)		Change in proportion	p-value
	October to December 2010	October to December 2011			October to December 2010	October to December 2011		
Surgery	618 (11.8%)	696 (12.7%)	+0.9	0.160	180 (12.4%)	264 (16.0%)	+3.6*	0.005
Chemotherapy	1213 (23.2%)	1369 (25.0%)	+1.8*	0.029	334 (23.1%)	384 (23.3%)	+0.2	0.901
Radiotherapy	944 (18.1%)	956 (17.5%)	-0.6	0.420	291 (20.1%)	296 (18.0%)	-2.2	0.124
Palliative care/ active monitoring	1,857 (35.5%)	1,912 (34.9%)	-0.6	0.517	526 (36.4%)	577 (35.0%)	-1.4	0.422
Any Treatment[2]	4565 (87.4%)	4851 (88.6%)	+1.3*	0.041	1319 (91.2%)	1511 (91.6%)	+0.4	0.681
No Treatment[3]	661 (12.6%)	622 (11.4%)	-1. 3*	0.041	127 (8.8%)	138 (8.4%)	-0.4	0.681
Total	5226 (100%)	5473 (100%)	-	-	1446 (100%)	1649 (100%)	-	-

[1] Note that patients are counted more than once if they have multiple treatment types on the same earliest treatment date
[2] Number of patients receiving any treatment (surgery, chemotherapy, radiotherapy, palliative care or active monitoring)
[3] Patients with no treatment type recorded in the database. However, some patients may have had treatment that has not been recorded
*Statistically significant difference between 2010 and 2011 (two-sample test of proportions; $p<0.05$)

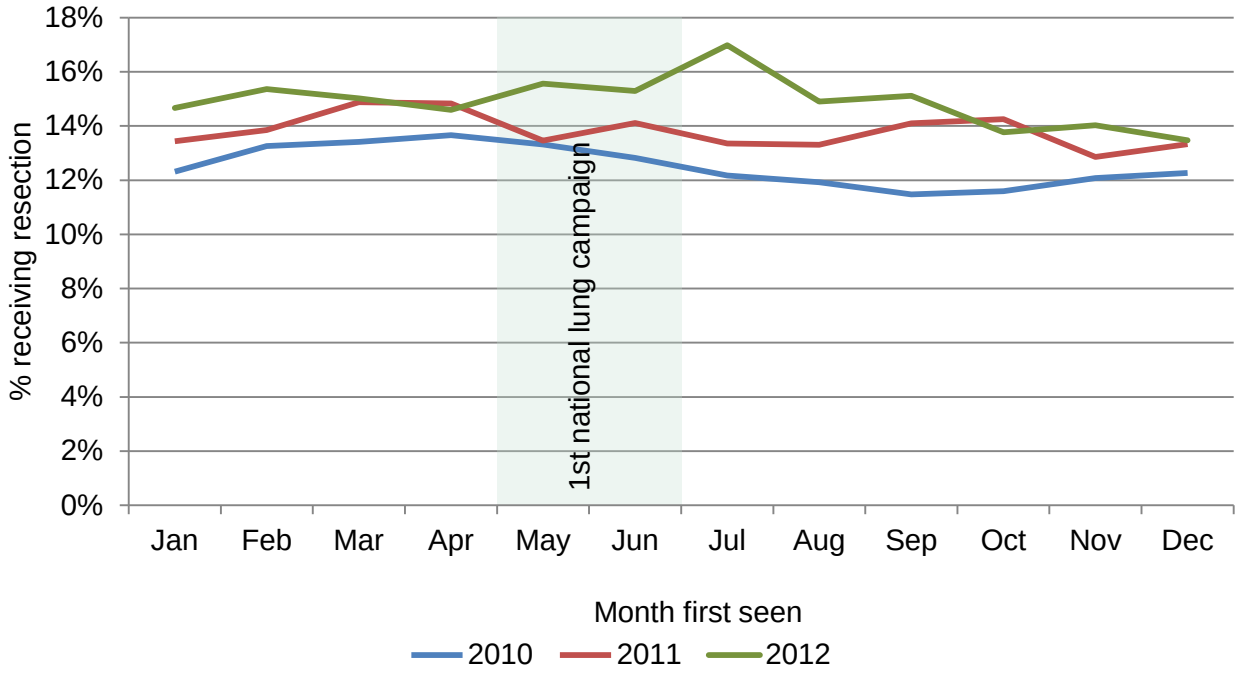
Table 34. National campaign: first definitive treatment received for lung cancer for the campaign and control period (Table 7, Ironmonger et al, 2015)

First Definitive Treatment[1]	Control period				Campaign period			
	Number of cases (% of all cases)		Change in proportion	p-value	Number of cases (% of all cases)		Change in proportion	p-value
	February to April 2011	February to April 2012			May to July 2011	May to July 2012		
Surgery	1,076 (14.5%)	1,145 (15.0%)	0.5	0.425	1,043 (13.7%)	1,331 (16.0%)	+2.3*	<0.001
Chemotherapy	1,909 (25.8%)	1,930 (25.3%)	-0.5	0.475	1,875 (24.5%)	2,150 (25.8%)	+1.2	0.069
Radiotherapy	1,366 (18.4%)	1,354 (17.7%)	-0.7	0.253	1,410 (18.5%)	1,462 (17.5%)	-0.9	0.132
Palliative care/ active monitoring	2,469 (33.3%)	2,709 (35.5%)	+2.2*	0.006	2,661 (34.8%)	2,817 (33.8%)	-1	0.168
Any 'Active Anti-Cancer Treatment[2]	6,752 (91.2%)	7,014 (91.9%)	0.7	0.146	6,890 (90.2%)	7,675 (92.1%)	+1.9*	<0.001
No Treatment[3]	652 (8.8%)	622 (8.1%)	-0.7	0.146	749 (9.8%)	660 (7.9%)	-1.9*	<0.001
Total	7,404 (100%)	7,636 (100%)	-	-	7,639 (100%)	8,335 (100%)	-	-

[1] Patients are counted more than once if they have multiple treatment types on the same earliest treatment date.
[2] Number of patients receiving any treatment (surgery, chemotherapy, radiotherapy, palliative care or active monitoring).
[3] Patients with no treatment type recorded in the database. However, some patients may have had treatment that has not been recorded.
*Statistically significant difference between 2011 and 2012 (two-sample test of proportions; p<0.05)

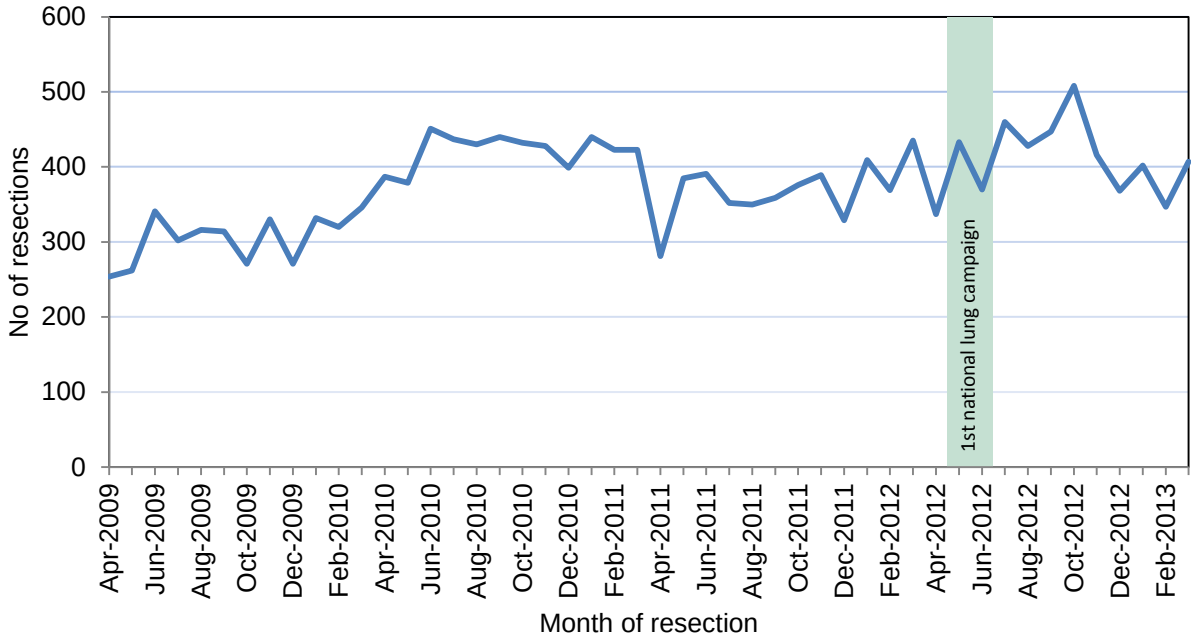
The proportion receiving surgical resection appeared to return to pre-campaign trends by around September 2012 (figure 46).

Figure 46. Monthly proportion of patients diagnosed with lung cancer receiving resection as a first definitive treatment, England Jan 2010 to Dec 2012 (by month first seen for lung cancer)



An independent analysis of HES records by DH came to similar conclusions (figure 47).

Figure 47. Number of surgical resections for lung cancer by month 2009 to 2013



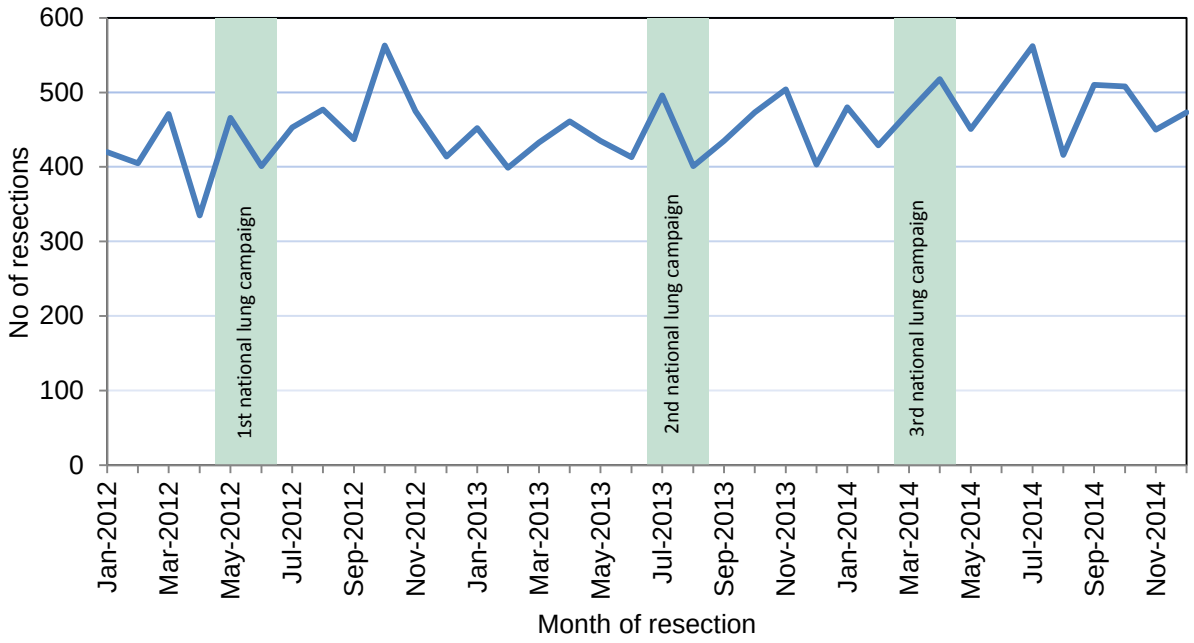
Source: HES – David Hansell, DH.

What is also interesting and important about this analysis is that the resection numbers did not fall in the months after the post-campaign peak showing that the overall number of surgical resections was higher that year.

5.11.2 Second and third national campaigns

NCRAS analysts examined the number of lung resections carried out by month in 2012 to 2014 from HES data using a list of OPCS 4 surgical codes relating to potentially curative procedures in patients diagnosed with lung cancer. Resections were only counted if they were within one month before or six months after diagnosis. Figure 48 shows the number of procedures by month and year in relation to the timings of the three national campaigns. From this, there appears to be an increase in resection in the periods following the first and third national campaigns, but no obvious change after the second national campaign.

Figure 48. Number of potentially curative surgical operations in lung cancer patient recorded in HES by month 2012 to 2014 in relation to campaign periods



5.11.3 Summary of impact on treatment

There is good evidence of a statistically and clinically significant increase in surgical resection rate associated with both the regional and first national campaigns. In absolute terms the increase after the first national campaign was 2.3%, a relative increase of 17%. These analyses

were largely based on the NLCA data, but confirmatory evidence was seen using OPCS4 codes from HES analysed independently by DH. Further analysis using HES linked to cancer registry data suggests that there was an increase in surgical resections after the first and third national campaigns, but not after the second national campaign.

Treatments other than surgery were only examined after the regional and first national campaigns and there is evidence that those campaigns were associated with statistically significant increase in overall active treatment rates and a fall in the proportion of people receiving only palliative treatments.

5.12 Survival

5.12.1 Regional campaign

Cancer Research UK examined 1-year survival rates relating to the regional campaign (Ironmonger et al, 2015) based on data from the NLCA. They found that there were increases in age-standardised 1-year crude survival rates over the period of the campaign. In the intervention area there was a 4.0 percentage point increase (from 35.2% to 39.2%; p=0.024) compared to a 2.0 percentage point increase (from 37.3% to 39.3%; p=0.034) in the control area, but that there was no statistically significant difference (p=0.425) in these improvements between the pilot and control areas (table 35).

Table 35. One year age-standardised survival rates by pilot vs 'control' trust for patients diagnosed during post the regional campaign (2011) compared with the previous year (2010)

	Pilot area hospitals (n=32)				'Control' area Trusts (n=141)			
	October to December 2010	October to December 2011	Difference	p-value	October to December 2010	October to December 2011	Difference	p-value
1-year survival	35.20%	39.20%	4%	0.02	37.30%	39.30%	2%	0.03

5.12.2 One year survival, first national campaign

Based on NCRAS data there was no difference in the 1-year survival rates of patients diagnosed during the first national campaign and the month following it compared with patients diagnosed in the rest of 2012 (Table 36).

Table 36. Difference in age-standardised 1-year net survival rates in patients diagnosed during and in the month after the first national campaign 2012 compared with that of patients diagnosed in the rest of that year

Sex	Standardisation	Comparison of 1-year survival estimates for May-July 2012 vs rest of year	Statistical significance
Male	Age-Standardised	+0.8%	NSS
Female	Age-Standardised	-0.6%	NSS
Persons	Age-Standardised	+0.24%	NSS

5.12.3 One year survival, second national campaign

The 1-year net survival of patients diagnosed in the campaign period was numerically higher (41.1%) than those diagnosed in the rest of the year (40.2%), but this did not reach statistical significance. Females had a significantly higher 1-year net survival than males.

5.12.4 One year survival, third national campaign

The 1-year net survival of patients diagnosed in the campaign period was approximately the same (41.0%) as those diagnosed in the rest of the year (41.2%). Females had a significantly higher 1-year survival than males. One-year net survival for those aged 50 plus during the campaign period was not significantly different to that outside of the campaign period.

As a control, the survival estimates were also compared to those diagnosed with lung cancer in the previous year. This showed that the 1-year survival for lung cancer (2014) were not significantly different than those diagnosed with lung cancer for the same time period in 2013.

5.12.5 Summary of impact on survival

No statistically significant increases in the proportions of patients surviving to 1 year post diagnosis have been shown after the regional or any of the national campaigns. Women have a significantly higher 1-year net survival compared to men, an observation that has been made in many previous studies with regards to lung cancer.

6. Appendices 2 – supplementary information

Table 37. List of lung campaign related symptom Read codes

Read V2	Description	Read V3	Description
1712	Dry cough	171A.	Chronic cough
1713	Productive cough -clear sputum	H3101	Smokers' cough
1714	Productive cough -green sputum	R062.	[D]Cough
1715	Productive cough-yellow sputum	X76I8	Dry cough
1716.11	Coughing up phlegm	Xa2kc	Persistent cough
1716	Productive cough NOS	XaFwR	Unexplained cough
1717	Night cough present	XE0qn	Cough
1719.11	Bronchial cough	XM0Ch	C/O - cough
1719	Chesty cough	X76Hy	Productive cough
171..12	Sputum - symptom	X76I3	Sputum - symptom
171..11	C/O - cough	X76IA	Producing sputum
171..00	Cough	1719	Chesty cough
171A.	Chronic cough	1719	Bronchial cough
171B.00	Persistent cough	171C.	Morning cough
171C.00	Morning cough	171D.	Evening cough
171D.00	Evening cough	Xa4fN	Barking cough
171E.00	Unexplained cough	Xa7u8	Observation of cough
171F.00	Cough with fever	Xa7u9	Brassy cough
171H.00	Difficulty in coughing up sputum	Xa7uA	Bovine cough
171J.00	Reflux cough	Xa7uB	Effective cough
171K.00	Barking cough	Xa7uC	Cough reflex
171Z.00	Cough symptom NOS	XaIO1	Cough with fever
173B.00	Nocturnal cough / wheeze	XaLCS	Reflux cough
H3101	Smokers' cough	XC07I	Coughing - function
R062.00	[D]Cough		
R0620	[D]Cough syncope		
R0630	[D]Cough with haemorrhage		
S120A00	Cough fracture		
S127100	Cough fracture of ribs		

Table 38. Definition of performance status categories

Performance status		N	%
Fully active, able to carry on all pre-disease performance without restriction	0	8976	14.79
Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, eg, light house work, office work	1	18026	29.70
Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours	2	12712	20.94
Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours	3	12974	21.37
Completely disabled. Cannot carry out any selfcare. Totally confined to bed or chair	4	4435	7.31
Dead	5	3580	5.90

6.1 DID (NICIP) Imaging code list used in the analysis of the impact on diagnostic imaging for the first national campaign

In the analyses of the impact on diagnostic imaging resulting from the first national campaign, the following National Interim Clinical Imaging Procedure (NICIP) codes on the DID that were used and grouped are as follows:

- Chest X-ray plain (CXR plain): abdomen X-ray (XABDO), chest X-ray (XCHES), chest and abdomen X-ray (XCHAB)
- Chest and abdominal CT scan: CT abdomen (CABDO), CT chest high resolution (CCHHR), CT chest high resolution (CHRC), CT chest with contrast (CCHEC)
- CT scan of chest: CT chest high resolution (CCHHR), CT Chest high resolution (CHRC), CT chest with contrast (CCHEC)
- Chest and Abdominal CT scan with contrast: CT Abdomen with contrast (CABDOC), CT chest/abdominal With Contrast (CCHEC)
- Thorax and abdomen CT scan with contrast: CT Thorax (CCHES), CT thorax and abdomen (CCABD), CT thorax and abdomen with contrast (CCABDC)
- CT thorax with contrast: CT thorax with contrast (CCHESC)

All figures were classed as referrals made by a GP or consultant for ‘Early cancer diagnosis – Suspected Lung Cancer’ in DID. Only CXR (plain), chest and abdominal CT scans and CT

scan of chest were included for GPs referrals, all measures were included for consultant referrals.

6.2 DID (NICIP) Imaging code list used in the analysis of the impact on diagnostic imaging for the second and third national campaigns

CT scans without contrast enhancement

CHTA CT Head thorax and abdomen

CHTH CT Head and thorax

CHTAP CT Head thorax abdomen and pelvis

CHNTA CT Head neck thorax and abdomen

CLDTH CT Low dose thorax

CT scans with contrast enhancement

CHTAPC CT Head thorax abdominal pelvis with contrast

CHTHC CT Head and thorax with contrast

CHTHAC CT Head thorax abdomen with contrast

CNCAPC CT Neck thorax abdomen pelvis with contrast

CHNTAC CT Head neck thorax abdomen contrast

Plain X-rays:

- XR Chest (XCHES)
- XR Ribs Lt (XRIBL)
- XR Ribs Rt (XRIBR)
- XR Chest and abdomen (XCHAB)

6.3 OPCS4 procedure code list (extracted from HES)

- E391 Open excision of lesion of trachea
- E398 Other specified partial excision of trachea
- E399 Unspecified partial excision of trachea
- E441 Excision of carina
- E461 Sleeve resection of bronchus and anastomosis HFQ
- E541 Total pneumonectomy, total removal of lung, Pneumonectomy NEC
- E542 Bilobectomy of lung
- E543 Lobectomy of lung
- E544 Excision of segment of lung

- E545 Partial lobectomy of lung NEC
- E548 Excision of lung, other specified
- E549 Excision of lung, Unspecified
- E552 Open excision of lesion of lung
- E559 Open removal of lesion of lung, unspecified
- T013 Excision of lesion of chest wall
- T023 Insertion of prothesis into chest wall NEC

Table 39. List of campaign evaluation metrics and their descriptions

Metric	Description	
Campaign and cancer awareness tracking	Public awareness of the campaign messages	
Cancer Waiting Times (CWT)	Two Week Wait referrals	Urgent GP referrals for suspected relevant cancers
	Two week wait cancers	Relevant cancer diagnoses resulting from a two week wait referral (also known as 62 day waits)
	Conversion rates	Percentage of two week wait referrals resulting in a diagnosis of cancer
	Detection rates	Percentage of CWT recorded cancer diagnoses which resulted from a two week wait referral
	CWT cancers	CWT recorded cancers (also known as 31 day waits)
Emergency presentations	Percentage of cancers diagnosed via an emergency presentation route during campaign period compared with control period	
Diagnostics in secondary care (DID) • Chest X-ray (CXR plain) • CT scan (chest) • CT scan (chest and abdomen)	Please see appendix 6.1 and 6.2	
Cancers diagnosed (NCRAS)	Number of relevant cancers diagnosed during campaign period compared with control period	
Stage at diagnosis	Stage distribution of relevant cancers diagnosed during campaign period compared with control period	
One year survival	One-year survival for patients with relevant cancers diagnosed during campaign year and previous years	
Surgical resections	Please see appendix 6.3	
Specific Metrics - NLCA	Please refer to Ironmonger et al, 2015	