Public Health England

Protecting and improving the nation's health

National Cancer Registration and Analysis Service

Be Clear on Cancer evaluation metrics: methodology

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Contents

1. Summary

The Be Clear on Cancer (BCoC) programme of activity aims to raise awareness of the importance of an early diagnosis of cancer and to encourage people to see their General Practitioner (GP) sooner. The programme is delivered by Public Health England (PHE) in partnership with NHS England, Department of Health and Social Care (DHSC), and Cancer Research UK (CRUK) with input from clinical and academic partners[a].

The campaigns use multiple media channels with simple messages to raise awareness of the potential signs and symptoms of cancer to encourage people to visit their GP promptly, for a greater chance of an earlier diagnosis. Some campaigns may also seek to raise awareness of national screening programmes.

Each BCoC campaign is typically active for around 6 weeks. They are usually tested in a local area followed by a regional area, both of which are carefully selected for the specific campaign, before being rolled out nationally if proven to be effective. Techniques such as public surveys are used to measure whether the campaign raises awareness of the campaign core messages. The National Cancer Registration and Analysis Service (NCRAS) evaluates the likely impact of the campaigns using several different evaluation measures (metrics) reflecting key points in the patient pathway. The findings are presented as individual metric summaries and subsequently as final evaluation reports.

Metrics include: public awareness of key campaign messages, GP attendances, urgent GP referrals, diagnostic tests, incidence, early stage at diagnosis and survival, as well as bespoke campaign specific metrics. Campaign materials can be seen at Public Health England's campaign resource centre[1].

PHE has been responsible for the development, marketing and evaluation of all campaigns run since April 2013. This document provides an overview of the methodologies used to evaluate these local, regional and national BCoC campaigns.

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[a] Additional campaigns may have been delivered by partner organisations, such as CRUK and DHSC.

2. Comparisons

2.1   Comparison periods

Analyses for all metrics include a comparison period; with activity for the period of interest, during or shortly after a campaign, compared to activity for this comparison period. This allows an assessment of whether the activity during the period of interest was different to what might have been otherwise expected.

For many metrics and campaigns, the comparison period is defined as the same time period as the campaign in the preceding year. Comparing to the same time period year-on-year enables a comparison without needing to adjust for seasonality. However, where a previous regional or national campaign took place at a similar time in the previous year, these may have affected the numbers for this usual comparison period. In such cases, data for the campaign period is compared to that for the same period 2 years previously. This comparator may not be ideal, especially if there is a more general trend, but the months affected by the previous campaigns would be too closely aligned for a 1-year comparison to be meaningful.

2.2   Comparison groups

In order to isolate campaign impact from other confounding factors (for example underlying trend, other awareness campaigns), comparison groups are considered in addition to the main measure of interest for each metric. Comparison groups are metric- and campaign-specific and could, for example, be a geographical area (comparison area) or a different symptom/cancer type (comparison symptom).

A comparison area is a defined geographical area where the residents were not exposed to the campaign's marketing media. Thus, any difference in trends between the campaign area and comparison area are likely due to the campaign. Comparison areas are restricted to local and regional campaigns. Comparison areas from previous regional campaigns are sometimes used to provide an additional breakdown of results for national campaigns, to consider whether there was a different impact for those previous exposed to a campaign compared to those seeing the campaign for the first time.

For some metrics, a comparison symptom/cancer type may be used to help identify campaign impact. The comparison symptom/cancer type will help assess the relative extents to which the evaluation's comparison of the change over a 1- (or 2-) year period reflects an impact of the campaign and/or a general increase in the long-term trend.

A comparison symptom/cancer type is one which is not expected to have been impacted by the campaign's marketing messaging. For example, with the oesophago-gastric cancer campaign where marketing messages centred around the symptoms of heartburn and food sticking when you swallow, a suitable comparison symptom might be back pain. Comparison symptoms are chosen after consultation with clinical experts.

Full definitions of the specific comparison groups will be provided in the individual campaign reports.

3. Metrics

3.1 Introduction

The methodology applied to each individual metric evaluated across BCoC campaigns is detailed below. Metrics have been set out to reflect the usual patient pathway timeline. Not every metric applies to each campaign and some metrics are specific to particular campaigns; please see the relevant metric summaries or final evaluation reports for further information.

For each NCRAS metric the analysis period is designed to capture possible campaign impact by allowing the patient time to access primary and secondary care services where appropriate.

Where a formal statistical test (for example likelihood ratio test) is performed during the analysis of a metric, a p-value of <0.05 is considered statistically significant unless stated otherwise. For metrics where a formal test is not performed, details of determining statistical significance are detailed in the relevant statistical analysis sections.

3.2 Update to methodology (January 2020 review)

A review of the methodology used to evaluate the BCoC campaigns was conducted in January 2020. We acknowledged that different analytical methods were used across the various metrics. As such, the main outcome of the review was to streamline as much as possible the analytical methods used to compile the metric summaries. For relevant metrics, these 'new' methods were used for all campaigns from the Respiratory 2nd National Respiratory Symptoms Campaign (May 2018) onwards. Please see relevant 'Statistical Methods' sections for specific details.

3.3 Campaign recognition and public awareness

Metric definition
Public awareness and recognition of the campaigns and public knowledge regarding cancer type.

Rationale
The research was designed to measure the impact of each individual BCoC campaign on public awareness and knowledge, beliefs and attitudes towards cancer and early diagnosis and intention to act.

Methodology[b]

The research methodology for all the pre- and post- tracking campaigns from 2011 up to October 2016 includes face-to-face surveys among a representative sample of adults aged 50 years and over in England. These surveys were carried out by independent market research agency Kantar (formerly known as TNS-BMRB)[2] specialising in social research, and the questionnaires were tailored to elicit information about each specific campaign. As far as possible the same questions were included across the different surveys for comparative purposes.

A range of topics were included in the marketing analysis of the BCoC campaigns such as; awareness of cancer advertising and cancer symptoms, beliefs and attitudes towards cancer and early diagnosis, and knowledge and recognition of the relevant campaign material. The aim of the evaluation was to look at changes in campaign recognition and knowledge between the pre- and post-campaign interviews. For regional pilot campaigns, where possible, a test and control approach was used to allow comparisons between areas with and without campaign activity.

Occasionally the target audience varied accordingly, such as the breast cancer campaigns where only women aged 70 years and over were interviewed.

The prostate cancer campaign in 6 London boroughs was evaluated qualitatively among black men aged 45 to 70 years and local GPs as the campaign spend was low and the cost of full-scale quantitative evaluation could not be justified.

From October 2016 Kantar recommended using online surveys for the 50 years and over adult surveys, but still maintaining face-to-face interviewing for the 70 years and over as they are under-represented in online panels. PHE have continued to use online surveys for all evaluations to date.

3.4   GP attendances

Metric definition

Number of visits made to GP practices for symptoms highlighted by the campaign.

Rationale

If the campaign encouraged people experiencing the campaign symptoms to seek healthcare professional assistance at their GP practice, there may be an impact on the number of recorded GP attendances during and around the campaign period.

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[b] Please see relevant final evaluation reports for further information on sample sizes.

Analysis period

Pre-campaign period: A period of between 8 and 15 weeks (determined by length of campaign, where pre-campaign period is 2 or 3 weeks longer than the campaign period) immediately before the start of the campaign period

Campaign period: A period of between 6 and 15 weeks, usually starting at the same time as the campaign (to capture activity where patients attend their GP practice immediately) and running for two weeks after the end of the campaign (to allow for those patients who may intend, but who may not be able to visit their GP practice within the campaign period, or who are monitoring their symptom duration before consulting their GP)

Post-campaign period: A period of between 8 and 15 weeks (determined by length of campaign, where post-campaign period is 2 or 3 weeks longer than the campaign period) immediately after the end of the campaign period.

Comparison period

All three periods are compared with the corresponding period in a previous year, as detailed in section 2.1 (comparison periods).

Campaign group

For GP attendances, symptoms are considered rather than cancer diagnoses, as most patients presenting with relevant symptoms will not have cancer. Analysis will consider the campaign highlighted symptom(s), using Read Codes[3] to identify attendances for these symptoms. Read Codes are a coded thesaurus of clinical terms, which provide a standard vocabulary for clinicians to record patient findings and procedures in health and social care IT systems across primary and secondary care. For campaigns highlighting more than one symptom, analysis will report changes for all symptoms combined, and also each symptom separately.

Comparison symptom

Analysis will also consider attendances for a clinically-agreed comparison symptom, which is unrelated to the campaign messages and the relevant cancer.

Data source

For the first national Blood in Pee, first national breast, regional oesophago-gastric and regional ovarian campaigns, the independent software company Mayden[4] was commissioned to collect a bespoke extract of primary care attendance data.

For the evaluation of all other campaigns since 2013 data from the Health Improvement Network (THIN) database[5], provided by IQVIA (formerly IMS Health), has been used. The THIN dataset is taken from the GP systems (at participating practices), as

populated in real-time by GPs. Data is recorded for patient care rather than analysis, so there may be different recording practices from different GP practices.

Statistical methods

The number of attendances is adjusted for bank holidays. Analysis considers the average number of attendances per practice per week, reporting the percentage change from the comparison period to the analysis period. A likelihood ratio test (previously Chi-squared test) is used to assess the statistical significance of a change between periods, with the null hypothesis that the number of attendances in the analysis period and in the comparison period (with adjustment for the number of practices) came from the same Poisson distribution.

3.5   CA125 test for ovarian cancer

Metric definition

The number of CA125 blood tests conducted. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale

CA125 is produced by some ovarian cancer cells and so a CA125 blood test is used as part of the diagnostic process for suspected ovarian cancer. If the campaign had an impact on the number of women reporting possible ovarian cancer symptoms to a GP, there may be an impact on the number of CA125 diagnostic tests performed.

Analysis period

Pre-campaign period: A period of several weeks immediately before the start of the campaign period (exact timeline determined by length of campaign)

Campaign period: A period of several weeks commencing at the same time as the campaign and running for 2 weeks after the end of the campaign

Post-campaign period: A period of several weeks immediately after the end of the campaign period (exact timeline determined by length of campaign)

Comparison period

All three periods were compared with the corresponding period 1 year earlier.

Campaign group

CA125 tests are identified using Read codes[3]. Read Codes are a coded thesaurus of clinical terms, which provide a standard vocabulary for clinicians to record patient findings and procedures in health and social care IT systems across primary and secondary care.

Data source

The Health Improvement Network (THIN) database[5], provided by IQVIA (formerly IMS Health). The THIN dataset is taken from the GP systems (at participating practices), as populated in real-time by GPs. Data is recorded for patient care rather than analysis, so there may be different recording practices from different GP practices.

Statistical methods

The number of tests is adjusted for bank holidays. Analysis considers the average number of tests per practice per week, reporting the percentage change from the comparison period to the analysis period. A likelihood ratio test is used to test for a change between periods, with the null hypothesis that the number of tests in the analysis period and in the comparison period (with adjustment for the number of practices) came from the same Poisson distribution.

3.6   Number of proton pump inhibitor (PPI) prescriptions

Metric definition

The number of PPI prescriptions. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale

This metric can be used to track whether a campaign had an impact on the number of PPI prescriptions issued. PPIs are a group (class) of medicines prescribed to relieve symptoms of acid reflux, which can be a symptom of benign conditions as well as oesophago-gastric cancer.

Analysis period

One month after campaign start date, to 2 months after campaign end date.

Comparison period

Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group

All PPIs prescribed during analysis period.

Data source

Data on prescriptions for people of all ages is extracted from OpenPrescribing.net[6].

Statistical methods

The number of PPI prescriptions per month is obtained. The difference in the number of PPI prescriptions per month between the analysis and comparison period is calculated. Likelihood-ratio tests are used to test for statistical significance between the two

periods. To understand any underlying trends, line graphs of the number of PPI prescriptions per month for the year surrounding the campaign and the preceding year are presented.

3.7   Cancer Waiting Times Data

National Cancer Waiting Times (CWT) data[7] is collected to monitor a number of waiting time requirements recommended by NHS or DHSC policies. At various stages of the diagnosis and treatment pathway, data on referrals, diagnosis and treatment are obtained from local care records and submitted to the national system.

The CWT data is used to evaluate the impact of BCoC campaigns using 5 metrics:

- urgent GP referrals for suspected cancer (sometimes referred to as 2-Week Wait referrals)
- cancer diagnoses resulting from an urgent GP referral for suspected cancer
- conversion rate (the percentage of urgent GP referrals for suspected cancer resulting in a diagnosis of cancer)
- cancer diagnoses recorded in the CWT database
- detection rate (the percentage of new CWT database recorded cancer diagnoses which resulted from an urgent GP referral for suspected cancer)

Data source
CWT data is obtained from the National Cancer Waiting Times Monitoring Dataset, provided by NHS England.

3.7.1 Urgent GP referrals for suspected cancer (2-week wait referrals)

Metric definition
Number of urgent GP referrals for suspected cancer. These are sometimes referred to as TWW referrals.

Rationale
If the campaign encouraged people with campaign symptoms to see their doctor and they met the criteria for referral[8], there may be an impact upon the number of urgent GP referrals for suspected cancer.

Analysis period
For urgent referrals for suspected cancer, periods are based on 'date first seen' as recorded in CWT, reflecting the date seen in secondary care rather than primary care. We might expect campaigns to have an impact on referrals first seen during the

campaign months[c] and, allowing for reasonable lags from campaign activity to referral, in the month following the end of the campaign. These lags may occur for several reasons; for example, some patients may need to see the campaign materials multiple times before reacting, some may need to wait for a GP appointment, some may prefer to wait for a convenient time or preferred GP, and referrals to secondary care made towards the end of the campaign may have been scheduled for a date outside of the campaign period.

Therefore, the analysis period for referrals is usually considered to be the months of the campaign[d] and the following month.

Comparison period

Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group

When patients are referred, cancer is only a suspicion, with the cancer or other diagnoses to be confirmed. As a result, specific cancer-type diagnoses are unknown and so urgent GP referrals for suspected cancer are recorded against a limited number of broad cancer types. For example, referrals for suspected urological cancers are related to bladder, kidney and prostate cancers. Therefore, analysis considers referrals for the most relevant broad referral type.

Comparison referrals

The comparison referral type is campaign-specific and is defined as a referral for other suspected cancers (excluding any referral type that may have been impacted by the campaign). If another campaign has run within the analysis and comparison periods, then referrals relating to this campaign are also excluded.

Statistical methods

Analysis considers the trend in urgent GP referrals for suspected cancer over the 18- to 24-month period up to the end of the analysis period. It looks at the percentage change in the number of referrals between the comparison and analysis periods. A likelihood ratio test considers the null hypothesis that the number of urgent GP referrals for suspected cancer in the analysis period and the comparison period came from the same Poisson distribution.

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[c] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.
[d] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

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

Metric definition
Number of cancer diagnoses resulting from an urgent GP referral for suspected cancer.

Rationale
If the campaign had an impact on the number of urgent GP referrals for suspected cancer, there may be an impact on the number of resulting cancer diagnoses.

Analysis period
The analysis period is the months of the campaign and the following month, which is the same period used for urgent GP referrals for suspected cancer, based on the 'date first seen' recorded for the referral.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
When patients are referred, cancer is only a suspicion, with the cancer or other diagnoses to be confirmed. As a result, specific cancer type diagnoses are unknown and so urgent GP referrals for suspected cancer are recorded against a limited number of broad cancer types. For example, referrals for suspected urological cancers are related to bladder, kidney and prostate cancers. Therefore, for campaigns relating to more specific cancer types, analyses are repeated for the relevant specific cancer types and for all diagnoses related to the relevant broad referral type.

Statistical methods
Analysis considers the trend in cancer diagnoses resulting from an urgent GP referral for suspected cancer over the 18- to 24-month period up to the end of the analysis period. It looks at the percentage change in the number of these diagnoses between the comparison and analysis periods. A likelihood ratio test considers the null hypothesis that the number of cancer diagnoses in the analysis period and the comparison period came from the same Poisson distribution.

3.7.3 Conversion rate

Metric definition
The conversion rate is the percentage of urgent GP referrals for suspected cancer resulting in a diagnosis of cancer.

Rationale

If the campaign had a different impact on the number of urgent GP referrals for suspected cancer than on the number of resulting cancer diagnoses, there may be an impact on the conversion rate. Conversion rate is most likely to decrease as an impact of the campaign, as those additionally referred for suspected cancer as a result of the campaign are less likely to have a cancer than those who would have been referred regardless of the campaign. If there is no specific change to the conversion rate or it's trend, around the time of the campaign, it suggests a similar likelihood of cancer for all those referred during the campaign as for those referred at other times.

Analysis period

The analysis period is the months of the campaign and the following month[e], which is the same period used for urgent GP referrals for suspected cancer, based on the 'date first seen' recorded for the referral.

Comparison period

Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group

When patients are referred, cancer is only a suspicion, with the cancer or other diagnoses to be confirmed. As a result, specific cancer type diagnoses are unknown and so urgent GP referrals for suspected cancer are recorded against a limited number of broad cancer types. For example, referrals for suspected urological cancers are related to bladder, kidney and prostate cancers. Therefore, for campaigns relating to more specific cancer types, analyses are repeated for the relevant specific cancer types and for all diagnoses related to the relevant broad referral type.

Statistical methods

Analysis considers the trend in conversion rate over the 18- to 24-month period up to the end of the analysis period. It looks at the percentage point change in the rate between the comparison and analysis period. A two-sample proportion test considers the null hypothesis that the rate in the analysis period was equal to the equivalent rate in the comparison period.

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[e] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

3.7.4 Cancer diagnoses recorded in the CWT database

Metric definition
Number of cancer diagnoses recorded in the CWT database.

Rationale
If the campaign message mobilised appropriate patients, there may be an impact on the number of cancers recorded as newly treated in the CWT database. This can be used as a proxy for all cancer diagnoses.

Analysis period
For cancer diagnoses recorded in the CWT data, periods are based on the 'treatment start date' recorded in CWT. There is a necessary period of time between a patient responding to a campaign and the start of treatment. For example, due to the time required to visit a GP, be referred, undergo diagnostic tests or to plan and arrange treatment. This will also vary for different patients and trusts, depending on the process for diagnosing their cancer, the complexity of diagnosis or treatment, the referral or treatment pathways etc. This means that, for cancer diagnoses recorded in the CWT database, 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, CWT recorded cancers first treated in the period 1 month later than the analysis period for referrals are those most likely to be related to the campaign. This period should include many of the diagnoses resulting from analysis period referrals without too many diagnoses from pre- or post-campaign referrals.

The analysis period is 1 month later than the analysis period used for urgent GP referrals for suspected cancer, based on the treatment start date.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
When patients are referred, cancer is only a suspicion, with the cancer or other diagnoses to be confirmed. As a result, specific cancer type diagnoses are unknown and so urgent GP referrals for suspected cancer are recorded against a limited number of broad cancer types. For example, referrals for suspected urological cancers are related to bladder, kidney and prostate cancers. Therefore, for campaigns relating to

more specific cancer types, analyses are repeated for the relevant specific cancer types and for all diagnoses related to the relevant broad referral type.

Statistical methods
Analysis considers the trend in cancer diagnoses recorded in the CWT database over the 18- to 24-month period up to the end of the analysis period. It looks at the percentage change in the number of these diagnoses between the comparison and analysis periods. A likelihood ratio test considers the null hypothesis that the number of cancer diagnoses in the analysis period and the comparison period came from the same Poisson distribution.

3.7.5 Detection rate

Metric definition
The detection rate is the percentage of new CWT database recorded cancer diagnoses which resulted from an urgent GP referral for suspected cancer.

Rationale
If the campaign had a different impact on the number of diagnosed cancers in the CWT database and the number of cancer diagnoses resulting from an urgent GP referral for suspected cancer, there may be an impact on the detection rate. The detection rate is most likely to increase as a result of a campaign, reflecting an increase in the proportion of cancer patients accessing care through the most relevant, managed route – following an urgent referral for suspected cancer.

Analysis period
The analysis period is 1 month later than the analysis period used for urgent GP referrals for suspected cancer, based on the treatment start date. This is the same period used for cancer diagnoses recorded in the CWT database.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
When patients are referred, cancer is only a suspicion, with the cancer or other diagnoses to be confirmed. As a result, specific cancer type diagnoses are unknown and so urgent GP referrals for suspected cancer are recorded against a limited number of broad cancer types. For example, referrals for suspected urological cancers are related to bladder, kidney and prostate cancers. Therefore, for campaigns relating to more specific cancer types, analyses are repeated for the relevant specific cancer types and for all diagnoses related to the relevant broad referral type.

Statistical methods

Analysis considers the trend in detection rate over the 18- to 24-month period up to the end of the analysis period. It looks at the percentage point change in the rate between the comparison and analysis periods. A two-sample proportion test considers the null hypothesis that the rate in the analysis period is equal to the equivalent rate in the comparison period.

3.8 Procedures used by secondary care in the diagnosis of cancer

3.8.1 Diagnostics in secondary care

Metric definition

Number of specified imaging tests for suspected cancer and other medical conditions (relevant to each campaign).

Rationale

A change in activity for diagnostic tests could be a result of the campaign message.

Analysis period

The analysis period is usually considered to be the months of the campaign[f] and the following 2 months.

Comparison period

Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group

Depending on the campaign, different National Interim Clinical Imaging Procedure (NICIP)[9] and SNOMED CT[10] codes are used based on advice from clinicians. These codes are used to define the imaging carried out associated with the relevant campaign symptoms.

Comparison of diagnostics in secondary care

Comparison is made with a change in the number of imaging tests for another type of suspected cancer to provide an indication of any increase that was not associated with the campaign. The comparison suspected cancer type is campaign-specific and is chosen to exclude any imaging test type that may have been impacted by the campaign.

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[f] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

Data source

Diagnostic Imaging Dataset (DID) data held on NHS Digital's system iView system. Data until end of March 2017 is available on the historic iView system[11]. Subsequent to this, data will be available on the iView Plus system[12].

Statistical methods

The number of imaging tests per month for each age group of interest is calculated. The percentage change in the total number of imaging tests between the analysis and comparison period is calculated.

Campaigns run pre-May 2018: Two-sided t-tests (adjusted for unequal variances if required) are used to test for statistical significance between the two periods. Campaigns run May 2018 onwards: Likelihood ratio tests are used to test for statistical significance between the two periods.

To understand any underlying trends, line graphs of the number of imaging tests per month surrounding the campaign and the preceding year are presented.

3.8.2 Cystoscopy

Metric definition

The number of cystoscopies performed by the NHS. Includes all referral routes (for example, whether the patient was referred by a GP or by a hospital-based clinician or any other route), and all settings in which they are carried out (outpatient clinic, inpatient ward, x-ray department, primary care one-stop centre). This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale

This metric can be used to track whether a campaign had an impact on the number of cystoscopies performed by the NHS. Some or most of the cystoscopy tests may be performed to diagnose bladder cancer.

Analysis period

The analysis period is usually considered to be the months of the campaign[g] and the following month.

Comparison period

Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

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[g] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

Campaign group
All cystoscopies carried out by the NHS during the analysis period.

Data source
Data is sourced from the NHS Monthly Diagnostic Waiting Times and Activity Dataset[13].

Statistical methods
The number of cystoscopies per month is obtained. The percentage change in the average number of cystoscopies per month between the analysis and comparison period is calculated.

Campaigns run pre-May 2018: A two-sided t-test (adjusted for unequal variances if required) is used to test for statistical significance between the two periods. Campaigns run May 2018 onwards: Likelihood ratio tests are used to test for statistical significance between the two periods.

To understand any underlying trends, line graphs of the number of cystoscopies per month for the year surrounding the campaign and the preceding year are presented.

3.8.3 Echocardiogram

Metric definition
The number of echocardiogram procedures carried out during the campaign period compared with a control period. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale
This metric can be used to track whether a campaign had an impact on the number of echocardiograms performed by the NHS for suspected cancer and other medical conditions.

Analysis period
The analysis period is usually considered to be the months of the campaign[h] and the following month.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

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[h] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

Campaign group
All echocardiograms carried out by the NHS during the analysis period.

Data source
Data is sourced from the NHS Monthly Diagnostic Waiting Times and Activity Dataset[13].

Statistical methods
The number of echocardiograms performed per month is obtained. The percentage change in the average number of echocardiograms performed per month between the analysis and comparison period is calculated.

Campaigns run pre-May 2018: A two-sided t-test (adjusted for unequal variances if required) is used to test for statistical significance between the 2 periods.
Campaigns run May 2018 onwards: Likelihood ratio tests are used to test for statistical significance between the two periods.

To understand any underlying trends, line graphs of the number of echocardiograms performed per month for the year surrounding the campaign and the preceding year are presented.

3.8.4 Gastroscopy

Metric definition
The number of gastroscopy tests performed by the NHS. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale
This metric can be used to track whether a campaign had an impact on the number of gastroscopies performed by the NHS. Gastroscopy tests may be performed to diagnose oesophago-gastric cancer.

Analysis period
The analysis period is usually considered to be the months of the campaign[i] and the following month.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

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[i] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

Campaign group

All gastroscopies carried out during analysis period.

Data source

DM01 return taken from the NHS Monthly Diagnostic Waiting Times and Activity Dataset[13].

Statistical methods

The number of gastroscopies per month is obtained. The percentage change in the average number of gastroscopies per month between the analysis and comparison period is calculated.

Campaigns run pre-May 2018: A two-sided t-test (adjusted for unequal variances if required) is used to test for statistical significance between the two periods. Campaigns run May 2018 onwards: Likelihood ratio tests are used to test for statistical significance between the two periods.

To understand any underlying trends, line graphs of the number of gastroscopies per month for the year surrounding the campaign and the preceding year are presented.

3.9 Procedures used in the management of cancer

3.9.1 Lumpectomy and mastectomy

Metric definition

The proportion of women diagnosed with breast cancer who had a lumpectomy or mastectomy within 6 months of their diagnosis. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale

This metric can be used to track whether a campaign had an impact on the number of lumpectomies or mastectomies performed by the NHS. Lumpectomy or mastectomy may be part of a treatment plan for breast cancer.

Analysis period

The analysis period is usually considered to be the months of the campaign[j] and the following 2-3 months.

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[j] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
All lumpectomies or mastectomies performed by the NHS during the analysis period.

Data source
Cancer registry data held by NCRAS within the Cancer Analysis System (CAS). CAS holds Encore cancer registration information and a range of other health datasets[14].

Statistical methods
The monthly proportion of women diagnosed with breast cancer who had a lumpectomy performed by the NHS within 6 months of their diagnosis is calculated. The crude percentage (proportion) is calculated as the number of women with breast cancer who had a lumpectomy within 6 months of their diagnosis divided by the number of women with breast cancer; multiplied by 100.

Campaigns run pre-May 2018: Binomial confidence intervals are calculated using the Wilson score method[15]. The difference in the proportion of women who had a lumpectomy or mastectomy in the analysis period compared to the comparison period is considered to be statistically significant if the confidence intervals do not overlap. Campaigns run May 2018 onwards: The percentage point change in the proportion of women who had a lumpectomy or mastectomy between the comparison and analysis periods is calculated. A two-sample proportion test considers the null hypothesis that the proportion in the analysis period is equal to the equivalent proportion in the comparison period.

To understand any underlying trends, line graphs of the proportion of women who had a lumpectomy per month for the year surrounding the campaign and the preceding year are presented.

3.9.2 Major resections

Metric definition
The proportion of men and women, diagnosed with lung cancer, who had a major resection within 6 months of their diagnosis. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale
This metric can be used to track whether a campaign had an impact on the number of lung resections performed by the NHS. Major resection is a potentially curative procedure which may be used for patients diagnosed with lung cancer.

Analysis period
The analysis period is usually considered to be the months of the campaign[k] and the following 2 months.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
Major resections for lung cancer carried out during analysis period.

Data source
Cancer registry data and Hospital Episode Statistics data held by NCRAS within the Cancer Analysis System (CAS). CAS holds Encore cancer registration information and a range of other health datasets[14].

Statistical methods
The monthly proportion of patients diagnosed with lung cancer who had a major resection within 6 months of their diagnosis is calculated. The crude percentage (proportion) is calculated as the number of patients diagnosed with lung cancer who had a major resection within 6 months of their diagnosis divided by the number of patients diagnosed with lung cancer; multiplied by 100.
Campaigns run pre-May 2018: Binomial confidence intervals are calculated using the Wilson score method[15]. The difference in the proportion of patients who had a major resection in the analysis period compared to the comparison period is considered to be statistically significant if the confidence intervals do not overlap.
Campaigns run May 2018 onwards: The percentage point change in the proportion of people who had a major resection between the comparison and analysis periods is calculated. A two-sample proportion test considers the null hypothesis that the proportion in the analysis period is equal to the equivalent proportion in the comparison period.

To understand any underlying trends, line graphs of the proportion of patients who had a major resection per month for the year surrounding the campaign and the preceding year are presented.

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[k] Unless the campaign started very near to the end of a month, in which case you would expect very little impact in that first campaign month. For such campaigns, the first campaign month is not included in the 'campaign period'.

3.9.3 Cancers diagnosed

Metric definition
Number of newly diagnosed cancers.

Rationale
If the campaign impacted upon the number of people reporting symptoms to their GP, there may be an impact upon the number of cancers diagnosed.

Analysis period
From 2 weeks after the campaign start date, to 2 months after the campaign period end date.

This estimates the earliest and latest points that a campaign may have resulted in a cancer being diagnosed. Two weeks from the start of the campaign was applied to cover the minimum timeframe for registering a tumour (based on two-week wait referral) from the campaign start date. Two months from the end of the campaign has been applied to cover the cover the maximum timeframe for registering a tumour from the campaign end date, whilst also considering campaign messaging that may have been acted upon following the campaign period.

Comparison period
Campaigns run pre-May 2018: A 12-month period including six months post campaign. Campaigns run May 2018 onwards: Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
Number of newly diagnosed cancers associated with the campaign symptoms during analysis period.

Data source
Cancer registry data held by NCRAS within the Cancer Analysis System (CAS). CAS holds Encore cancer registration information and a range of other health datasets[14].

Statistical methods
Campaigns run pre-May 2018: The number of newly diagnosed cancers (cases) per week for each age group in the analysis period is compared to the overall annual median. The annual median is calculated as the median number of cases per week for a 12 month period (including 6 months post campaign) The campaign is considered to have had an impact if a) the number of cases per week was the same or higher than the annual median for a period of 5 or more consecutive weeks (under the premise that there is a 50% change that a weekly count is higher or lower than the median, therefore

5 consecutive weeks equal to or above the median (one-tailed) equates a p=0.031) and b) this sustained period started during the analysis period.

Campaigns run May 2018 onwards: The number of newly diagnosed cancers (cases) per week for each age group in the analysis period is compared to the comparison period. The percentage change in the number of cases between the two periods is calculated. Likelihood ratio tests are used to test for statistical significance between the two periods.

Week is defined using the International Organisation for Standardisation week[16] (ISO) and ISO year (calendar system where each year has a whole number of weeks per year and each year starts on a Monday) to enable all cases in a partial week to be included.. In addition, the number of cases per week is adjusted for bank holidays (to account for non-working days in a week).

To understand any underlying trends, the data is displayed using a line graph of ISO week and month versus number of cases.

3.9.4 Early stage at diagnosis

Metric definition
Proportion of cancer cases diagnosed at early stage. For most campaigns this is defined as stage I and II, however this is open to change depending on the exact campaign (this will be stated in the individual report). The proportion of early staged cases is calculated using denominators which excluded cases with unknown stage.

Rationale
If the campaign led to an increase in the number of people recognising and reporting their symptoms - to their GP, then there may be increase in the proportion of cancers diagnosed at an early disease stage.

Analysis period
From 2 weeks after the campaign start date, to 2 months after the campaign period end date.

This estimates the earliest and latest points that a campaign may have resulted in a cancer being diagnosed. Two weeks from the start of the campaign has been applied to cover the minimum timeframe for registering a tumour (based on 2 week wait referral) from the campaign start date. Two months from the end of the campaign has been applied to cover the cover the maximum timeframe for registering a tumour from the campaign end date, whilst also considering campaign messaging that may have been acted upon following the campaign period

Comparison period

Campaigns run pre-May 2018: A 12-month period including six months post campaign. Campaigns run May 2018 onwards: Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group

Number of newly diagnosed cancer at early stage associated with the campaign symptoms during analysis period.

Data source

Cancer registry data held by NCRAS within the Cancer Analysis System (CAS). CAS holds Encore cancer registration information and a range of other health datasets[14].

Statistical methods

The proportion of early stage cases is defined as the number of early staged cases over the total number of staged cases (i.e. unknown stage are excluded from the denominator) multiplied by 100. The proportion of early stage cases per week for each age group of interest is calculated using incidence data as described in the previous section (cancers diagnosed) — using the International Organisation for Standardisation week[16] and adjusted for bank holidays.

Campaigns run pre-May 2018: The median proportion of early stage cases per week is calculated for the year surrounding the campaign period (annual median). The campaign is considered to have an impact if a) the proportion of early stage cases per week was the same or higher than the yearly median for a period of 5 or more consecutive weeks and b) this sustained period started during the analysis period. Campaigns run May 2018 onwards: The percentage point change in the proportion of early stage cancers between the comparison and analysis periods is calculated. A two-sample proportion test considers the null hypothesis that the proportion in the analysis period is equal to the equivalent proportion in the comparison period.

To understand any underlying trends, line graphs of the proportion of early stage cases per week surrounding the campaign and the preceding year are presented.

3.9.5 Emergency presentations

Metric definition

Proportion of cancer admissions diagnosed for the first time following an initial emergency presentation into secondary care.

Rationale

Cancer diagnosis can occur by many routes, for example via a GP referral or through an emergency presentation. This metric is designed to identify changes in the proportion of cancers diagnosed via an emergency route.

The anticipated impact of this metric is difficult to predict compared to other metrics. It is unclear whether the campaign would result in an increase or a decrease in the proportion of cancer admissions diagnosed following an emergency presentation. For example: 1) If a campaign is successful in helping people to recognise symptoms and to present to their GP earlier, then more cancers may be diagnosed at an earlier disease stage which would mean a decrease in the proportion of cancer admissions presenting via an emergency route, or 2) if people choose to go to A&E with associated symptoms, or if a GP refers a patient as an emergency, then we may expect to see an increase in the proportion of cancer admissions presenting via an emergency route.

For future campaigns (after May 2019) we will review the feasibility of further splitting this metric by emergency admissions presenting via the GP and via A&E.

Analysis period

The months that the campaign has run covering the campaign period. Please see individual evaluation reports for further information.

Comparison period

Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group

Cancers diagnosed associated with the relevant campaign symptoms who first presented as an emergency.

Data source

Hospital Episode Statistics (HES)[17] Admitted Patient Care data linked to cancer registration data. HES data are shared by NHS Digital under the memorandum of understanding between PHE and NHS Digital.

Statistical methods

The crude percentage (proportion) is calculated as the number of first inpatient admissions, having a cancer diagnostic code indicating a presentation with an emergency method of admission, divided by, the number of first inpatient admissions, having a cancer diagnostic code; multiplied by 100.

Note that the denominator is all tumours identified from Inpatient HES and therefore does not include all diagnosed tumours registered by the National Cancer Registration

Service. As a result, the results presented here may differ from publicly available results such as Routes to Diagnosis.

Only first admissions are included in the numerator or the denominator, as subsequent admissions may indicate a recurrence of the original cancer.

Campaigns run pre-May 2018: Binomial confidence intervals are calculated using the Wilson score method[15]. The difference in the proportion of cancers diagnosed via emergency presentation in the analysis period compared to the comparison period is considered to be statistically significant if the confidence intervals do not overlap. Campaigns run May 2018 onwards: The percentage point change in the proportion of emergency presentations between the comparison and analysis periods is calculated. A two-sample proportion test considers the null hypothesis that the proportion in the analysis period is equal to the equivalent proportion in the comparison period.

To understand any underlying trends, line graphs of the proportion of cancers diagnosed via emergency presentation per month for the year surrounding the campaign and the preceding year are presented.

3.9.6 Inpatient admissions

Metric definition
The number of inpatient admissions with relevant symptoms to the campaign. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale
If a campaign was successful in helping people to recognise symptoms and to present to their GP earlier, then there may be an increase in the number of people admitted with the relevant symptoms.

Analysis period
From the campaign start date, to 2 months after the campaign period end date.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
Number of inpatient admissions associated with relevant campaign symptoms.

Comparison symptom
No comparison symptom necessary.

Data source
Hospital Episode Statistics (HES)[17] Admitted Patient Care data. HES data are shared by NHS Digital under the memorandum of understanding between PHE and NHS Digital.

Statistical methods
The weekly number of inpatient attendances by age group is calculated. To ensure that all attendances within a partial week are captured, the International Organisation for Standardisation week[16] is used. In addition, the number of cases per week is adjusted for bank holidays.

The percentage change in the total number of inpatient attendances between the analysis and comparison period is calculated. Likelihood-ratio tests are used to test for statistical significance between the two periods. By comparing the analysis period to the same months in the preceding year, any bias due to seasonality of the particular symptom addressed by the campaign should be negligible. To understand any underlying trends, line graphs of the number of inpatient attendances per week for the year surrounding the campaign and the preceding year are presented.

3.9.7 Outpatient attendances

Metric definition
The number of outpatient attendances with relevant symptoms to the campaign. This metric is only relevant to certain campaigns, see the appropriate campaign evaluation report for further details.

Rationale
If a campaign had an impact, then there may be an increase in the number of outpatient attendances for the relevant campaign symptoms.

Analysis period
From the campaign start date, to 2 months after the campaign period end date.

Comparison period
Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
Number of outpatient attendances associated with relevant campaign symptoms.

Data source
Hospital Episode Statistics (HES)[17] Outpatient data. HES data are shared by NHS Digital under the memorandum of understanding between PHE and NHS Digital.

Statistical methods
The weekly number of outpatient attendances by age group is calculated. To ensure that all attendances within a partial week are captured, the International Organisation for Standardisation week[16] is used. In addition, the number of cases per week is adjusted for bank holidays

The percentage change in the total number of outpatient attendances between the analysis and comparison period is calculated. Likelihood-ratio tests are used to test for statistical significance between the two periods. By comparing the analysis period to the same months in the preceding year, any bias due to seasonality of the particular symptom addressed by the campaign should be negligible. To understand any underlying trends, line graphs of the number of outpatient attendances per week for the year surrounding the campaign and the preceding year are presented.

3.9.8 One-year survival

Metric definition
This metric considers whether the respective campaign had an impact on the one-year survival of patients diagnosed with cancer during and shortly following the campaign.

Rationale
This relates to net survival, which measures deaths that are in excess of what would be expected for the study population if it did not have cancer. In practice this is calculated as the observed survival in cancer patients compared to the expected survival based on the general population assuming that cancer patients can only die from the cancer itself.

Analysis period
From 2 weeks after the start of the campaign, to 2 months after the end of the campaign.

Comparison period
Campaigns run pre-May 2018: For campaigns where the analysis period occurs in 1 calendar year, then the comparison period is the remaining months in the calendar year preceding and following the analysis period. For campaigns where the analysis period spans across 2 calendar years then the comparison period is the remaining months in the calendar year preceding the analysis period only.

Campaigns run May 2018 onwards: Comparison is made to the corresponding period 1 year earlier, unless a 2-year comparison is required, as detailed at section 2.1 (comparison periods).

Campaign group
The survival of those diagnosed with cancer associated with relevant campaign symptoms during the analysis period.

Data source
Cancer registry data held by NCRAS within the Cancer Analysis System (CAS). CAS holds Encore cancer registration information and a range of other health datasets[14].

Statistical methods
One-year age specific net survival is calculated using the methodology[l] outlined in the version of the Office for National Statistics: Cancer Survival Statistical Bulletins[18] relevant to the year analysis is conducted. Net survival refers to the probability of surviving cancer assuming one can only die from cancer.
Campaigns run May 2018 onwards: in addition to the above, cox regression is used to test for differences in survival between the two periods.

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[l] Changes in the methodology may lead to changes in the results

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