Public Health England

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Indicator Specification

Title: Cancer Diagnosed at Early Stage: The proportion of invasive malignancies of breast, prostate, colorectal, lung, bladder, kidney, ovary, uterus, non-Hodgkin lymphomas, and melanomas of skin, diagnosed at stage 1 or 2

30th November 2015

Section 1. Introduction / Overview

1.1. Title	Cancer Diagnosed at Early Stage: The proportion of invasive malignancies of breast, prostate, colorectal, lung, bladder, kidney, ovary, uterus, non-Hodgkin lymphomas, and melanomas of skin, diagnosed at stage 1 or 2
1.2. Set or domain	
1.3. Topic area	Cancer, early diagnosis
1.4. Definition	New cases of cancer diagnosed at stage 1 and 2 as a proportion of all new cases of cancer diagnosed (specific cancer sites, morphologies and behaviour: invasive malignancies of breast, prostate, colorectal, lung, bladder, kidney, ovary, uterus, non-Hodgkin lymphomas, and invasive melanomas of skin)
1.5. Indicator owner & contact details	Sally Vernon Head of Quality and Analysis National Cancer Registration Service - Eastern Branch Office Public Health England Unit C - Magog Court, Shelford Bottom, Hinton Way, Cambridge, CB22 3AD sally.vernon@phe.gov.uk 020 781 17326
1.6. Publication status	Currently in publication

Section 2. Rationale

2.1. Purpose	The metric is designed to monitor the proportion of early staged cancers, which are associated with higher survival than late staged cancers. Cancer is a major cause of death, accounting for around a quarter of deaths in England. More than 1 in 3 people will develop cancer at some point in their life. In January 2011 the Government published Improving Outcomes – a Strategy for Cancer. This document sets out how the Government plans to improve cancer outcomes, including improving survival rates through tackling late diagnosis of cancer. Diagnosis at an early stage of the cancer's development leads to dramatically improved survival chances. Specific public health interventions, such as screening

	programmes and information/education campaigns aim to improve rates of early diagnosis. An indicator on the proportion of cancers diagnosed at an early stage is therefore a useful proxy for assessing improvements in cancer survival rates. This indicator will also encourage the collection of high quality staging data, which as it is a factor strongly influencing cancer outcomes is needed for a wide range of cancer analysis. A regularly updated version of this indicator focussed at CCG geographies is desired.
2.2. Sponsor	Secretary of State for Health, Department of Health
2.3. Endorsement	Expert input from the National Cancer Intelligence Network and National Cancer Registration Service, Public Health England
2.4. Evidence and Policy base Including related national incentives, critical business question, NICE quality standard and set or domain rationale, if appropriate	Diagnosis at an early stage of the cancers development leads to significantly improved survival outcomes, as shown in the BJC paper *Stage at diagnosis and early mortality from cancer in England*:http://www.nature.com/bjc/journal/v112/n1s/pdf/bjc201549a.pdf. Tackling late diagnosis of cancer is a Government priority, as set out in the review of the Independent Cancer Taskforce – 'Achieving World-Class Cancer Outcomes, A Strategy for England' : http://www.cancerresearchuk.org/sites/default/files/achieving_world-class_cancer_outcomes_-_a_strategy_for_england_2015-2020.pdf
Section 3. Data	
3.1. Data source	National Cancer Registry Cancer Analysis System
3.2. Justification of source and others considered	The National Cancer Registration Service is an already established provider of cancer incidence and staging data. Using this data source reduces duplication and minimises the burden of data collection on the NHS. There are no other national providers of high quality staging data for all cancer sites.
3.3. Data availability	Trusts submit data to the National Cancer Registration service, where it is processed and QAed on a central database (ENCORE). Data are made available from this database by the Cancer Analysis System. Fully processed stage data currently takes approximately a year after diagnosis, but this time period is reducing. Cancer registration is collected under Section 60 of the Health and Social Care Act 2001 and Section 251 of the NHS Act 2006. Cancer registration data has been collected in England for many years and will continue to be

	in the longer term.
3.4. Data quality	Data quality has improved in recent years for staging data, with completeness increasing each year. As of 2012 data were complete for over 70% of cases. The cancer sites in this indicator have been chosen to be ones where the staging data quality is best. Details on the quality of data are discussed in the published documentation: Short report - http://www.ncin.org.uk/view?rid=2752 Peer review paper - http://www.nature.com/bjc/journal/v112/n1s/pdf/bjc201549a.pdf
3.5. Quality assurance	Data are checked at each stage of processing. The initial code to derive and extract data has been established and tested, with any changes quality assured by an analyst familiar with the coding system. The output is checked for completeness by assessing missing fields and comparing numbers both to previous publications of the data. For areas where staging completeness is still low, this indicator may not reflect the true % of early stage cases.
3.6. Quality improvement plan If appropriate	Improvement in recording of stage continues to be part of the work programme for the National Cancer Registration Service. The % of cases staged continues to improve year on year.
3.7. Data linkage	No linkage outside of the core cancer registration dataset is used.
3.8. Quality of data linkage	N/A
3.9. Data fields	Year of diagnosis Site of the cancer (in ICD10 O2) Stage of the cancer Geographical area (derived from Postcode by NSPL)
3.10 Data filters	.

3.11 Justifications of inclusions and exclusions and how these adhere to standard definitions	
3.12 Data processing	Data are extracted as numerator and denominator fields.

Section 4. Construction

4.1. Numerator	Cases of cancer diagnosed at stage 1 or 2, for the specific cancer sites, morphologies and behaviour: invasive malignancies of breast, prostate, colorectal, lung, bladder, kidney, ovary, uterus, non-Hodgkin lymphomas, and invasive melanomas of skin
4.2. Denominator	All new cases of cancer diagnosed at any stage or unknown stage, for the specific cancer sites, morphologies and behaviour: invasive malignancies of breast, prostate, colorectal, lung, bladder, kidney, ovary, uterus, non-Hodgkin lymphomas, and invasive melanomas of skin
4.3. Computation	Crude percentage: the number of new cancer cases (for the specified site, morphology and behaviour) diagnosed at stage 1 and 2 is divided by the total number of new cancer cases (for the specified site, morphology and behaviour) in the same area and multiplied by 100. Cancers where the stage is not recorded are included in the denominator, so a low proportion of cases with staging data will lead to the indicator showing a low proportion of cases diagnosed at stage 1 or 2 Result is displayed as a proportion to zero decimal places, rounded up. The units used are %. All ages are included. All sexes are included (Persons). Data are provided at CCG level.
4.4. Risk adjustment or standardisation type and methodology	**None** *Variables and methodology:*
4.5. Justification of risk	The indicator is designed to accurately reflect the true distribution of stage without adjustment. Data are relatively new and a firm baseline of data

	adjustment type and variables or why risk adjustment is not used	needs to be established before a routine indicator is standardised. Adjusting for age and case mix was considered, but to align with the PHOF indicator and the CCG IOS no casemix adjustment is used in this publication.
4.6.	**Confidence interval / control limit use and methodology**	Confidence Intervals *Methodology:* Wilson Score method A confidence interval is a range of values that is used to quantify the imprecision in the estimate of a particular indicator. Specifically it quantifies the imprecision that results from random variation in the measurement of the indicator. A wider confidence interval shows that the indicator value presented is likely to be a less precise estimate of the true underlying value. The Wilson Score method[1] gives very accurate approximate confidence intervals for proportions and odds based on the assumption of a Binomial distribution. It can be used with any data values, even when the denominator is very small and, unlike some methods, it does not fail to give an interval when the numerator count, and therefore the proportion, is zero. The Wilson Score method is the preferred method for calculating confidence intervals for proportions and odds, but it can also be used for rates, as long as the event rate is low (relatively rare events within the population) as the Binomial distribution is a very good approximation to the Poisson distribution when the event rate is low. The method is described in detail in APHO Technical Briefing 3: Commonly used public health statistics and their confidence intervals.[2] [1] Wilson EB. Probable inference, the law of succession, and statistical inference. *J Am Stat Assoc*1927;22:209-12. [2] Eayres D. *Technical Briefing 3: Commonly used public health statistics and their confidence intervals.*York: APHO; 2008. Available at http://www.apho.org.uk/resource/item.aspx?RID=48457 Confidence limits at 95%
4.7.	**Justification of confidence intervals / control limits used**	These are the validated and standard confidence intervals used for health data and data of this type

Section 5. Presentation and Interpretation

Presentation

Cancer Diagnosed at Early Stage: The proportion of invasive malignancies of breast, prostate, colorectal, lung, bladder, kidney, ovary, uterus, non-Hodgkin lymphomas, and melanomas of skin, diagnosed at stage 1 or 2

5.1. Presentation of indicator	The indicator will be presented in an MS Excel workbook, with figures presented as proportions and an accompanying line graph to show variation over time. This will be hosted on the NCIN website (www.ncin.org.uk)and will be accessible to anyone who can access the website. A large proportion of the intended audience will have access to both the website and the software to utilise an MS Excel workbook, and this publication format lines up with many previous outputs.
5.2. Contextual information provided alongside indicator with justification	The output will include a spreadsheet with a brief description of the indicator and a summary of the methodology along with an outline of the cancer sites included and time periods covered. This will also include further contact details for more information, and a link to other relevant stage related resources. The % staged is important contextual information for understanding the % early stage, as a low % staged means the data quality of the indicator is low for this CCG. We will signpost where this data is available as part of the CCG IOS (relevant indicators are 2.17 and 2.18)
5.3. Calculation and data source of contextual information	The information has accompanied previous publications of this indicator, and will be updated to reflect the new time periods included.
5.4. Use of bandings, benchmarks or targets with justification	No targets or bandings are used. The average for England will be included as a benchmark. Other publications suggest a rise in earlier staged cancers helps improve cancer survival, but this may be in combination with many other factors such as improvements in surgical techniques and a shift in route to diagnosis. An increase in the proportion of earlier staged cancers is regarded as a goal to contribute to earlier diagnosis initiatives.
5.5. Banding, benchmark or target methodology if appropriate	N/A
Interpretation	
5.6. Interpretation guidelines	Improvements in this indicator are likely to be the result of improved staging coverage, so inferences about changes over time can only be made if it is clear that staging completeness did not change significantly. Note that not all cancers are included in the indicator. It is possible for an area to have 70% of the cancers included in the indicator staged, but not to have 70% of all cancers staged.

	The casemix of cancers diagnosed will impact on the proportion of early stage cancers. For example breast cancer is far more likely to be diagnosed at an early stage than lung cancer, so areas with a high proportion of breast cancer will have better outcomes on this indicator in comparison with areas with a high proportion of lung cancer. The definition of cancer stage is agreed internationally by professional bodies. No major changes to this are expected, but if there are major changes they could undermine meaningful comparisons over time.
5.7. Limitations and potential bias	Smaller numbers at CCG level may result in large variability in the confidence intervals.
5.8. Improvement actions	Increasing the number of early staged cancers is a long term goal and is closely aligned with work around early diagnosis. Research in to stage shifts is ongoing as data are relatively new to publication. Trusts and the NCRS will continue to improve staging data quality and the percentage of cases staged Work around awareness for the public, GPs and improvements in referral pathways are all some of the areas targeted to increase earlier staged cancers. For more information please see: http://www.cancerresearchuk.org/health-professional/early-diagnosis-activities/national-awareness-and-early-diagnosis-initiative-naedi
5.9. Evidence of variability	Variation is visible in this indicator. The data are available from http://www.ncin.org.uk/publications/survival_by_stage and from https://indicators.ic.nhs.uk/webview/ The range currently at CCG level is approximately from 20% - 60%
Section 6. Risks	
6.1. Similar existing indicators	PHOF indicator and the CCG OIS indicator
6.2. Coherence and comparability	The indicators use the same methodology and data source.
6.3. Undesired behaviours and/or gaming	Including prostate cancer in the indicator may incentivise PSA testing, as this would diagnose more early stage prostate cancers. Routinely screening all men to check PSA levels is a controversial subject, and it has not been proven that the benefits would outweigh the risks of false positives and extra treatments. More details can be found at

	http://www.nhs.uk/conditions/cancer-of-the-prostate/Pages/Prevention.aspx It is known that more intensive investigations can lead to diagnosing a later stage. For example, lymphatic spread that is missed on imaging may be found on a biopsy. An indicator around early stage cancer could be gamed by reducing the investigations performed. This would be clinically inappropriate and result in the patient not being treated on the correct pathway for their cancer.
6.4. Approach to indicator review	The indicator is reviewed in line with updated staging outputs outside of the indicator, for example publication of full stage breakdowns which occurs annually. An email address is provided on outputs for feedback which is incorporated by the project group where appropriate.
6.5. Disclosure control	Note that values based on less than 70% staging coverage are suppressed as they are considered unreliable. The proportion of local authorities achieving 70% staging coverage increased substantially after 2012, the first year of data collection for this indicator. This indicator is calculated at both CCG level and LA level, which means there is a risk of disclosure in small geographical slivers between CCGs and LAs. However, the indicator is already published at these geographies as part of the PHOF and the CCG IOS, and the potential for disclosure has been risk assessed and approved by the PHE Office for Data Release.
6.6. Copyright	Public Health England The data may be reused referencing Public Health England