**NHS Digital**

**Indicator Supporting Documentation**

**IAP00048 Referrals to cardiac rehabilitation following an admission for coronary heart disease**

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| IAP Code | IAP00428 |
| Title | Referrals to cardiac rehabilitation within 5 days of an admission for coronary heart disease |
| Published by | NHS Digital |
| Reporting period | Annual |
| Geographical Coverage | National |
| Reporting level(s) | CCG and National |
| Based on data from | Hospital Episode Statistics (HES) |
| Rating | Assured |
| Assurance date | 10/2/2016 |
| Review date | 10/02/2017 |
| Indicator set | CCGOIS |
| Brief Description |  |
| Purpose | Cardiac rehabilitation supports long-term quality of life and survival for people with coronary heart disease. Clinical Commissioning Groups (CCGs) can influence outcomes relating to this measure by ensuring that cardiac rehabilitation services are available locally to an appropriate capacity and by setting out the role of such services within the overall cardiac pathway which has been commissioned. Where the numbers of patients being referred for cardiac rehabilitation is low compared to the number of patients with relevant cardiac conditions, they could also take action to identify and address the causes of this.  This indicator will be presented alongside an indicator for completion of cardiac rehabilitation, which reports the number of referrals to cardiac rehabilitation that go on to complete cardiac rehabilitation.  The two indicators in conjunction aim to provide a view of the cardiac rehabilitation pathway. The referral indicator gives insight to the percentage of cases that could benefit from cardiac rehabilitation that are referred, whilst the completion indicator demonstrates the percentage of referrals that go on to complete cardiac rehabilitation. |
| Definition | The proportion of recorded referrals to a cardiac rehabilitation programme within 5 days of hospital admission with a primary diagnosis of at least one of:   * acute myocardial infarction (MI) * heart failure * a main operative procedure of Percutaneous Coronary Intervention (PCI) * Coronary Artery Bypass Graft (CABG) |
| Data Source | HES |
| Numerator | Of the denominator, the number of finished admission episodes (FAEs) that were referred to cardiac rehabilitation within 5 days of admission to hospital. |
| Denominator | The number of FAEs with a primary diagnosis of MI or heart failure, or a main operative procedure of Percutaneous Coronary Intervention (PCI) or Coronary Artery Bypass Grafting (CABG). |
| Calculation | The numerator is divided by the denominator and multiplied by 100 to provide a percentage indicator value. 95% confidence intervals are calculated using the Wilson Score method. |
| Interpretation Guidelines | he indicator will be presented alongside an indicator for completion of cardiac rehabilitation. This reports the number of referrals to cardiac rehabilitation that go on to complete core delivery of cardiac rehabilitation.  The two indicators in conjunction aim to provide a view of the cardiac rehabilitation pathway. The referral indicator gives insight to the percentage of cases that could benefit from cardiac rehabilitation that are referred, whilst the completion indicator demonstrates the percentage of referrals that go on to complete cardiac rehabilitation.  A Clinical Commissioning Group (CCG) may have a high referral rate, but due to the set-up of the programme, its location, or an inability to cater to a user’s needs the CCG may have a low completion rate.  A high percentage of finished admission episodes (FAEs) with a primary diagnosis of myocardial infarction (MI) or heart failure or a main operative procedure of percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG) that were referred to cardiac rehabilitation is desirable. However, this indicator makes no judgement as to what an acceptable level of referrals is. |
| Caveats | Neither the Hospital Episode Statistics (HES) Admitted Patient Care (APC) nor the National Audit of Coronary Rehabilitation (NACR) data sets have information on the time that an admission or activity occurred, only the date. As a result, some admissions may have a slightly longer timeframe in which this referral can take place.  The NACR is not a mandatory collection and as such has an inherent issue with missing data. Data is currently provided by 70% of all cardiac rehabilitation programmes with varying degrees of data completeness.  There is some inconsistency in the level of reporting., It is difficult to determine whether a case is not present in the referral count due to the patient not being referred or the programme failing to submit data about the referral. Clinical Commissioning Groups (CCGs) with low referral rates may actually be areas of poor coverage or data quality which will impact the interpretation of the indicator.  The distribution of cardiac rehabilitation programmes is not even. Some CCGs have multiple rehabilitation programmes, whilst others have few. As a result, when activity is disaggregated by CCG, the referral rate may be influenced by the proportion of cardiac rehabilitation programmes. This will be included in the indicator quality statement.  NACR records are linked to the closest HES episode within the time period. There is not enough information contained on the NACR record to ensure that it is linked with the correct source HES episode. The linkage performed allows for an approximation of activity.  The codes used to identify the diagnoses and procedures have been taken from the Payment by Results (PbR) cardiac rehabilitation post discharge tariff. These codes are slightly different from the ones supplied by the NHS Classification Service. The decision to use the PbR codes has been made to ensure that CCGs are being measured on what they are paid to deliver |

# Application Form

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| **Set or domain** | Clinical Commissioning Group Outcome Indicator Set (CCG OIS)  Domain 1: Preventing people from dying prematurely |
| **Topic area** | Cardiac Rehabilitation |
| **Definition** | This indicator measures the proportion of admissions to hospital with a primary diagnosis of acute myocardial infarction (MI) or heart failure, or a main operative procedure of percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) that were recorded as being referred to a cardiac rehabilitation programme within 5 days of the hospital admission.  Data from Hospital Episode Statistics (HES) Admitted Patient Care (APC) is linked to data from the National Audit of Cardiac Rehabilitation (NACR) to produce this indicator. Diagnosis and procedure codes for this indictor are taken from the Payment by Results (PbR)[[1]](#footnote-1) post discharge tariff as these are related to payment for cardiac rehabilitation.  The indicator is reported at CCG level by financial year, plus an additional 5 days in the numerator to allow for a referral to take place. This indicator is presented alongside another CCG OIS indicator that reports the proportion of referrals to cardiac rehabilitation who go on to complete core delivery of cardiac rehabilitation.  This indicator is sufficient to obtain an overview of those being referred to cardiac rehabilitation; however it can be used in conjunction with the corresponding completion of cardiac rehabilitation to gain a more complete overview of the referral pathway. |
| **Indicator owner & contact details** |  |
| **Publication status** | Currently in publication |
| **Purpose** | Cardiac rehabilitation supports long-term quality of life and survival for people with coronary heart disease. CCGs can influence outcomes on this measure by ensuring that cardiac rehabilitation services are available locally to an appropriate capacity and by setting out the role of such services within the overall cardiac pathway which has been commissioned. Where the numbers of patients being referred for cardiac rehabilitation is low compared to the number of patients with relevant cardiac conditions, they could also take action to identify and address the causes of this.  Patients should be referred to cardiac rehabilitation; therefore this indicator is a useful measure of whether CCGs are offering this service to patients. This indicator uses the codes included in the PbR Post Discharge Tariff payment in order to determine those who are eligible for cardiac rehabilitation.  CCGs may use this indicator to determine how they fit with the national figure. They may choose to take action to adjust their figure if they determine it to be necessary.  The indicator will be presented alongside an indicator for completion of cardiac rehabilitation, which reports the number of referrals to cardiac rehabilitation that go on to complete code delivery of cardiac rehabilitation.  The two indicators in conjunction aim to provide a view of the cardiac rehabilitation pathway. The referral indicator gives insight to the percentage of cases that could benefit from cardiac rehabilitation that are referred, whilst the completion indicator demonstrates the percentage of referrals that go on to complete cardiac rehabilitation. |
| **Sponsor** |  |
| **Endorsement** | NICE Indicator Advisory Committee.  The indicator was constructed following consultation with the following clinical and Cardiac Rehab data experts:   * Professor Patrick Doherty, Project Lead, NACR. * Corinna Petre, NACR Project Manager, NACR * Nerina Onion, Training and Information Officer, NACR |
| **Evidence and Policy base**  Including related national incentives, critical business question, NICE quality standard and set or domain rationale, if appropriate | This indicator aims to reflect the provision of high quality care as set out in the NICE Quality Standard for Chronic Heart Failure[[2]](#footnote-2), which includes a statement about the provision of cardiac rehabilitation. In April 2013 the Cardiovascular Disease Outcomes Strategy (CVD OS)[[3]](#footnote-3) introduced an ambition of 65% uptake of cardiac rehabilitation following a MI, PCI, or CABG, and an ambition of 33% uptake following heart failure.  These ambitions replaced the goal set in the National Service Framework for Coronary Heart Disease (NSF CHD)[[4]](#footnote-4) for 85% of people discharged with a MI or after coronary revascularisation are to be offered cardiac rehabilitation4.  Cardiac rehabilitation forms an intrinsic part of the cardiac pathway set out in the NSF CHD Evidence has demonstrated that cardiac rehabilitation improves the outcomes of people for people with heart disease. The CVD OS quotes a reduction in all-cause mortality of 18% over 6-12 months, 13% over 12 months, and a 31% reduction in readmissions over 6-12 months as a result of cardiac rehabilitation.  Research has suggested that cardiac rehabilitation is second only to aspirin and beta blockers in the cost effectiveness of treating the disease. The programmes are a cost effective method to help people live heathier, longer lives[[5]](#footnote-5).  However, despite these benefits the number of people accessing these services is low. Common issues include the services being insufficiently flexible and responsive to ensure that all people eligible take up the offer of cardiac rehabilitation. Services are said to be difficult to commission for by non-specialists due to the range of services, settings, people, and organisations involved. Increasing the awareness of these courses through these indicators may encourage more referrals and subsequent completion of cardiac rehabilitation[[6]](#footnote-6).  There is no timeframe dictated in which a referral must take place. This indicator uses the period of 5 days between admission and referral, which allows more time than the NACR reported median of 3 days between diagnosis and referral. This timeframe allows for time between the admission and diagnosis and has been agree as appropriate with the NACR.  The CCG OIS is an integral part of NHS England’s systematic approach to quality improvement. It is intended to provide clear, comparative information for CCGs, patients, and the public about the quality of health services commissioned by CCGs and the associated health outcomes. All of the CCG outcome indicators have been chosen on the basis that they contribute to the overarching aims of the five domains in the NHS Outcomes Framework (NOF) and it is intended as a tool for CCGs to drive local improvement and set priorities <http://www.england.nhs.uk/ccg-ois/>.  This indicator fits within Domain 1: Preventing people from dying prematurely. |
| **Data source** | Linked HES APC – NACR data  <http://content.digital.nhs.uk/hes>  <http://www.cardiacrehabilitation.org.uk/nacr/>  [http:/content.digital.nhs.uk/rehab](http://www.hscic.gov.uk/rehab) |
| **Justification of source and others considered** | HES contains details of all admissions to NHS hospitals in England, including private patients treated in NHS hospitals, patients who are resident outside of England, and care delivered by treatment centres (including those in the independent sector) funded by the NHS.  HES is the data source for a wide variety of healthcare analysis for the NHS, Government, and many other organisations and individuals. It is likely that most patients who have a MI or heart failure, or a PCI or CABG will be admitted to hospital and therefore recorded in HES.  The NACR is funded by the British Heart Foundation (BHF) and is the official audit for NHS cardiac rehabilitation programmes. The data set includes fields that are collected via a set of questionnaires completed by patients before, immediately after, and 12 months after a course. The data is entered into the national database by the rehabilitation programmes.  No other data sources were considered for the indicator. |
| **Data availability** | The underlying record level data from either source is not publically available. Aggregated reports of HES data are released on provisional monthly data approximately 4 months after the end of the reference month. The annual report based on final data is made available approximately 8 months after the end of the reference year and is accessible at the following link: <Check for updated link with Netta>  Extracts and tabulations of data from HES are available to order for a charge. This is managed by the NHS Digital Data Access Request Service (DARS) <http://content.digital.nhs.uk/dars>.  Aggregated reports of NACR data are released approximately 20 months after the end of the financial year at the following link: <http://www.cardiacrehabilitation.org.uk/reports.htm>. Organisations are able to view an extract of their own data held by the audit. |
| **Data quality** | **i) What data quality checks are relevant to this indicator?**  **Coverage**  **Completeness**  **Validity**  **Default**  **Integrity**  **Timeliness**  **Other** |
| **Data quality** | **If you included ‘Other’ as a data quality check, please describe the check, how it will be measured, and its reason for use below:** |
| **Data quality** | **ii) What are the current values for the data quality checks selected?** The period of data the current values are calculated from should be stated. Current values should be recorded as a percentage and calculated as described below.  **Period of data:**  **Coverage:**  **Calculation:**  **Completeness:**  **Calculation:**  **Validity:**  **Calculation:**  **Default:**  **Calculation:**  **Integrity:**  **Calculation:**  **Timeliness:**  **Calculation:**  **Other:**  **Calculation:** |
| **Data quality** | **iii) What are the thresholds for the data quality checks selected?**  **Coverage:**  **Completeness:**  **Validity:**  **Default:**  **Integrity:**  **Timeliness:**  **Other:** |
| **Data quality** | **iv) What is the rationale for the selection of the data quality checks and thresholds selected above?** |
| **Data quality** | **v) Describe how you would plan to improve data quality should it not meet, or subsequently fall below, the thresholds required for this indicator.** |
| **Data quality** | **vi) Who will own the data quality risks and issues for this indicator?**  **Name:**  **Job Title:**  **Role:**  **Email:**  **Telephone:** |
| **Data quality** | **vii) Describe how the data quality risks and issues will be managed for this indicator, including the escalation process.** |
| **Data quality** | **viii) Describe any assumptions you have made about data quality for this indicator.** |
| **Data quality** | **ix) Describe any data quality constraints you are aware of for this indicator.** |
| **Data quality** | **x) Additional data quality information:** |
| **Quality assurance** | There is no other national data set to compare HES against to obtain an overall quantitative assessment of accuracy. The data are completed from administrative records recorded by each Trust on their Patient Administration Systems (PAS) with the clinical information added by clinical coders based on doctors’ notes. The trusts are required to complete this information to inform how much they are paid under PbR and the Audit Commission run a rolling programme of audits of organisations’ coding to check for accuracy.  The HES Processing Cycle and Data Quality report includes and explains the data cleaning process, the provider organisation code mapping and the derivation rules which include examples of correction and validation rules and derivation is available at the following link: <http://content.digital.nhs.uk/article/1825/The-processing-cycle-and-HES-data-quality>.  NACR data is subject to a number of validation rules on entry, any data that is in the incorrect format can lead to a rejection of the record, or a blanking or truncation of the data item. Quality assurance is performed by the NACR when extreme values are found in the system, common issues that arise in the data are investigated and fed back to the teams involved and data validation rules are introduced to prevent issues reoccurring. |
| **Data linkage** | Records in the NACR have been linked to the HES APC data by the NHS Digital DARS team. This linkage has been performed through use of NHS Number, Postcode, Sex, and Date of Birth. Whilst the HES APC data set is recorded as a single table with a single differentiated record per episode identifier (EPIKEY), the NACR data meanwhile is a relational data set, where each contact with cardiac rehabilitation services is recorded alongside a person level identifier (StudyID). Data from a single financial year of HES data is linked to a single financial year of NACR data, plus 5 days. The NHS Digital DARS extract contains a list of StudyIDs linked to EPKIEYs. These keys are then linked back to their source data sets by the NHS Digital Clinical Indicators team.  This introduces a number of issues with the linkage of the datasets and subsequent analysis, for example, duplication of a StudyID means that each permutation of data will be linked to a single EPIKEY, artificially inflating figures. In order to avoid this situation, the NHS Digital Clinical Indicators team has attempted to remove any duplicate records when joining the NHS Digital DARS extract to both the HES and NACR data.  There are a small number of cases where the same EPIKEY has been linked to multiple StudyIDs; these have been removed from the analysis. In the 2011-12 data, 61 EPIKEYs were removed, leaving 329,977 remaining for analysis.  The linkage has been performed in order to obtain the number of eligible cases for cardiac rehabilitation, it also allows for the NACR data to benefit from the more complete data and robust data quality assurance that has been applied to HES whilst making use of specific fields in the NACR that allow these indicators to be constructed. Filters that are applied to the HES data set will allow for records to be excluded from the NACR data and aggregations can be performed through CCG of Responsibility from HES data rather than attempting to construct a similar field using geographical data contained in the NACR.  For the period 1st April 2011 to 31st March 2012, there are 148,157 eligible FAEs in the HES data set. For the equivalent period in the NACR data, 1st April 2011 to 5th April 2012, there are 77,393 distinct StudyIDs. Following linkage of the two data sets, 41,188 (53.2%) of NACR records are retained. This number is further reduced when the NACR records are limited to those that are relevant to the indicator, to 21,970 distinct StudyIDs.  NACR records are linked to the closest HES episode within the time period. There is not enough information contained on the NACR record to ensure that it is linked with the correct source HES episode, the linkage performed here allows for an approximation of activity.  Source of Referral is an available field in the NACR data set; however its completion is poor. This information is missing on over 85% of records. Of the records where this information is completed, NHS Trust is the most common response, with the other sources of referral making up only a small proportion of records. |
| **Quality of data linkage** | NHS Number is recorded on 99.3% of HES APC records in 2011-12 and on 100% of NACR records for the same period. It is expected that completion of NHS Number will be higher on HES APC records that are relevant to this indicator.  The table below reveals the match ranks for the data linkage performed by the NHS Digital DARS team for 2011-12: |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Step** | **Records** | **%** | **NHS** | **DoB** | **Sex** | **Postcode** |  |
| **1** | 279,222 | 84.6% | Exact | Exact | Exact | Exact |  |
| **2** | 39,068 | 11.8% | Exact | Exact | Exact |  |  |
| **3** | 2,587 | 0.8% | Exact | Partial | Exact | Exact |  |
| **4** | 398 | 0.1% | Exact | Partial | Exact |  |  |
| **5** | 3,238 | 1.0% | Exact |  |  | Exact |  |
| **6** | 137 | 0.0% |  | Exact | Exact | Exact | where NHSNO does not contradict the match and DOB is not 1 January and the POSTCODE is not in the 'ignore' list |
| **7** | 0 | 0.0% |  | Exact | Exact | Exact | where NHSNO does not contradict the match and DOB is not 1 January |
| **8** | 5,312 | 1.6% | Exact |  |  |  |  |
| **0** | 137 | 0.0% |  |  |  |  | Cases were HESID has changed over time |

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| **Data fields** | HES APC:  ADMIDATE – Date of admission  ADMISORC – Source of admission  CCG\_RESPONSIBILITY – CCG derived from the patient’s GP practice, or if this is not recorded, from their residence, or if this is not recorded, from the location of the hospital provider supplying care  CLASSPAT – Patient Classification  DIAG\_4\_01 – Primary Diagnosis, 4 character  DISMETH – Discharge method  EPIORDER – Episode number within a spell  EPISTAT – Status of Episode  EPITYPE – Type of Episode  OPERTN\_4\_01 – Main Operative Procedure, 4 character  SEX – Sex  STARTAGE\_CALC – Age at the start of the episode  NACR:  ReferredDate – The date a person was referred to core cardiac rehabilitation. (From April 2015, this has been moved from initiating event to rehabilitation records)  StudyID |
| **Data filters** | The OPERTN\_4\_01 and DIAG\_4\_01 codes used in this indicator have been taken from the PbR post discharge tariff; these differ from the NHS Classification Service codes which contain a greater number of codes. The decision to use PbR codes was made in order to have a consistent set of diagnosis and procedures that CCGs were paid to provide the treatment for. The NHS Classification Service includes codes for Heart Failure which have not been used in this analysis, whilst the PbR codes includes a number of coronary artery related procedures which are not included in the NHS Classification Service advice. In 2011,12, the PbR codes included approximately 10,000 more FAEs than the NHS Classification Service codes,  ADMISORC – Not in (51, 52, 53)  CCG\_RESPONSIBILITY – Code is valid  CLASSPAT – In (1, 2)  DIAG\_4\_01 – In (I210, I211, I212, I213, I214, I219, I220, I221, I228, I229, I500, I501, I509)  Or  OPERTN\_4\_01 – In (K401, K402, K403, K404, K405, K408, K409, K411, K412, K413, K414, K418, K419, K421, K422, K423, K424, K428, K429, K431, K432, K433, K434, K438, K439, K441, K442, K448, K449, K451, K452, K453, K454, K455, K456, K458, K459, K461, K462, K463, K464, K465, K468, K469, K491, K492, K493, K494, K498, K499, K501, K502, K503, K504, K508, K509, K751, K752, K753, K754, K758, K759)  DISMETH – Not 4 or 5  EPIORDER – = 1  EPISTAT – = 3  EPITYPE – = 1  SEX – In (1, 2)  STARTAGE\_CALC – Between 0 and 120  NACR:  ReferredDate – Is not null and is within 5 days of ADMIDATE  (ReferredDate between 1st April YYYY and 5th April YYYY+1, Datdif(ADMIDATE, ReferredDate) between 0 and 4)  Process:  Relevant HES records are selected  Duplicate EPIKEYs are removed from the NHS Digital DARS extract; remaining EPIKEYs are joined to the HES records to obtain the relevant StudyIDs.  The HES+StudyID data is linked to NACR data, records are joined if the ReferredDate is within 5 days of the ADMIDATE.  If an episode is referred twice to cardiac rehabilitation within the 5 day period, the earliest record is selected. |
| **Justifications of inclusions and exclusions**  and how these adhere to standard definitions | ADMISORC – Excludes transfers from NHS hospital providers. This is a standard HES definition in the indicator set.  CCG\_RESPONSIBILITY – Selects valid CCGs, this is a standard HES definition in the indicator set.  CLASSPAT – Selects both ordinary admissions and day cases. This is a standard definition in the indicator set when identifying non-emergencies.  DIAG\_4\_01 – These ICD-10 codes align with the PbR post discharge tariff:  I21 Acute myocardial infarction  I22 Subsequent myocardial infarction  I50 Heart failure  OPERTN\_4\_01 – These OPCS 4 codes align with the PbR post discharge tariff:  K40 Saphenous vein graft replacement of coronary artery  K41 Other autograft replacement of coronary artery  K42 Allograft replacement of coronary artery  K43 Prosthetic replacement of coronary artery  K44 Other replacement of coronary artery  K45 Connection of thoracic artery to coronary artery  K46 Other bypass of coronary artery  K49 Transluminal balloon angioplasty of coronary artery  K50 Other therapeutic transluminal operations on coronary artery  K75 Percutaneous transluminal balloon angioplasty and insertion of stent into coronary artery  DISMETH – Excludes those that were discharged as dead or as stillbirth from the indicator. Standard readmissions definition  EPIORDER – Standard HES definition, selects the first admission in a spell, known as the admission episode.  EPISTAT – Standard HES definition, selects only episodes that have finished.  EPITYPE – Standard HES definition, selects general episodes only.  SEX – Selects valid genders only  STARTAGE\_CALC – Selects valid ages only  NACR:  ReferredDate – Selects valid referrals, selecting referrals that are within 5 days of admission allows for a consistent timeframe in which referrals can take place. |
| **Data processing** | An extract of NACR data will be taken by the NHS Digital Clinical Audit team and linked to HES APC data by the NACR DARS team. The percentage referred calculation will be performed by the NHS Digital Clinical Indicators team. |
| **Numerator** | Of the denominator, the number of finished admission episodes (FAEs) that were referred to cardiac rehabilitation within 5 days of admission to hospital.  Neither the HES APC nor the NACR data sets have information on the time that an admission or activity occurred, only the date, as a result some admissions may have a slightly longer timeframe in which this referral can take place. |
| **Denominator** | The number of FAEs with a primary diagnosis of MI or heart failure, or a main operative procedure of PCI or CABG. |
| **Computation** | The percentage *p* is given by:  where:  *O* is the numerator; the number in the denominator that are referred to cardiac rehabilitation within 5 days of admission to hospital;  *n* is the denominator; the number of FAEs with a primary diagnosis of MI or heart failure, or a main operative procedure of PCI or CABG |
| **Risk adjustment or standardisation type and methodology** | **None**  *Variables and methodology:* |
| **Justification of risk adjustment type and variables**  or why risk adjustment is not used | Cardiac rehabilitation should be offered to all eligible cases. The codes used to identify relevant diagnoses and procedures have been taken from the PbR cardiac rehabilitation post discharge tariff, suggesting that all these cases should be referred to cardiac rehabilitation.  A person’s age or gender does not render them ineligible for cardiac rehabilitation, therefore to standardise for these variables may introduce a bias into the indicator. |
| **Confidence interval / control limit use and methodology** | Confidence Intervals  *Methodology:*  Using the Wilson Score method[[7]](#footnote-7),[[8]](#footnote-8), the 100(1– *α*)% confidence limits are given by:  where:  *q* is 1–*p*;  *z* is the 100(1– *α* /2)th percentile value from the Standard Normal distribution.  For example, for a 95% confidence interval, *α* = 0.05 and *z* = 1.96 (i.e. the 97.5th percentile value from the Standard Normal distribution)[[9]](#footnote-9). |
| **Justification of confidence intervals / control limits used** | Confidence intervals are used, recognising the existence of natural variation between the CCG populations.  The preferred PHE confidence interval method for proportions is the Wilson Score method[[10]](#footnote-10) which has been evaluated and recommended by Newcombe and Altman[[11]](#footnote-11);[[12]](#footnote-12). It can be used with any data values and, unlike some methods, it does not fail to give an interval when the numerator count, and therefore the proportion, is zero[[13]](#footnote-13). |
| **Presentation of indicator** | The indicator is to be presented on the NHS Digital Indicator Portal in a consistent format with other CCG OIS indicators. It is accompanied by a Specification and Quality Statement.  The data is presented with a detailed header including information on the statistic presented, the reporting period, level of coverage, publication date, data sources, and any further notes to be aware of. Drop-down filtering is also available. The data will be reported annually.  The specific fields to be presented in data are as follows: |

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| **Column Name** | **Output** |
| Reporting period | Period of coverage (years/rolling quarter) |
| Breakdown | National (all registered patients in England), CCG |
| ONS code | ONS geography code |
| Level | CCG code |
| Level description | CCG name |
| Percentage | Percentage of FAEs with a primary diagnosis of MI or heart failure or a main operative procedure of PCI or CABG who were referred to cardiac rehabilitation |
| CI lower (%) | Lower 95% confidence interval |
| CI upper (%) | Upper 95% confidence interval |
| Denominator | The number of FAEs with a primary diagnosis of MI or heart failure or a main operative procedure of PCI or CABG |
| Numerator | Of the denominator, the number of FAEs that were referred to cardiac rehabilitation. |

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| **Contextual information provided alongside indicator**  with justification | None |
| **Calculation and data source of contextual information** | n/a |
| **Use of bandings, benchmarks or targets**  with justification | None.  The indicator is to be presented without target or ranking. If a CCG believes their figure to be disproportionately low, for example when compared to the national figure, the factors contributing to this can be investigated and appropriate action can be taken.  It is noted that the CVD OS introduced ambitions of 65% uptake of cardiac rehabilitation following a MI, PCI, or CABG, and 33% uptake following heart failure. However, these indicators do not measure uptake and as such it would be misguided to compare a CCGs referral score to these figures. |
| **Banding, benchmark or target methodology**  if appropriate | n/a |
| **Interpretation guidelines** | The indicator will be presented alongside an indicator for completion of cardiac rehabilitation, which reports the number of referrals to cardiac rehabilitation that go on to complete core delivery of cardiac rehabilitation.  The two indicators in conjunction aim to provide a view of the cardiac rehabilitation pathway. The referral indicator gives insight to the percentage of cases that could benefit from cardiac rehabilitation that are referred, whilst the completion indicator demonstrates the percentage of referrals that go on to complete cardiac rehabilitation.  A CCG may have a high referral rate, but due to the set-up of the programme, its location, or an inability to cater to a user’s needs the CCG may have a low completion rate.  A link to the completion of cardiac rehabilitation indicator will be provided in the indicator metadata, these indicators can be looked at together (along with other sources of information) in order to judge a CCGs performance.  A high percentage of FAEs with a primary diagnosis of MI or heart failure or a main operative procedure of PCI or CABG that were referred to cardiac rehabilitation is desirable. However, this indicator makes no judgement as to what an acceptable level of referrals is.  The indicator requires careful interpretation and should not be viewed in isolation but instead be considered alongside information from other indicators, such as the corresponding cardiac rehabilitation completion indicator and various sources, such as the NACR reports: <http://www.cardiacrehabilitation.org.uk/>. However, a point to note is that these reports include estimated data and as such will not be directly comparable. The data reported in this indicator does not make use of estimated figures. |
| **Limitations and potential bias** | The NACR is not a mandatory collection and as such has an inherent issue with missing data. Data is currently provided by 70% of all cardiac rehabilitation programmes with varying degrees of data completeness. It is hypothesised that this data coverage issue will improve if the collection was mandated. There is some inconsistency in the level of reporting, it is difficult to determine whether a case is not present in the referral count due to the patient not being referred or the programme failing to submit data about the referral. This may manifest itself in the indicator as CCGs with low referral rates may actually be areas of poor coverage or data quality and will as such have consequences for the interpretation of the indicator. The NACR team, the BACPR, and the BHF regional teams are working to ensure that data entry is of the highest quality. The BACPR/NACR national accreditation scheme is helping to drive this initiative.  The distribution of cardiac rehabilitation programmes is not even, some CCGs have multiple rehabilitation programmes, whilst others have few. As a result, when activity is disaggregated by CCG, the referral rate may be influenced by the proportion of cardiac rehabilitation programmes. This will be included in the indicator quality statement.  For the period 1st April 2011 to 31st March 2012, there are 148,157 eligible FAEs in the HES data set. For the equivalent period in the NACR data, 1st April 2011 to 5th April 2012, there are 77,393 distinct StudyIDs. Following linkage of the two data sets, 41,188 (53.2%) of NACR records are retained. This number is further reduced when the NACR records are limited to those that are relevant to the indicator, to 21,970 distinct StudyIDs. This reduction also has an effect on the cardiac rehabilitation completion indicator. The NACR believe this data loss will be reduced with the new data system.  NACR records are linked to the closest HES episode within the time period. There is not enough information contained on the NACR record to ensure that it is linked with the correct source HES episode, the linkage performed here allows for an approximation of activity.  Heart failure and PCI are included as in-scope for this indicator, in 2011-12 however, patients with heart failure were deemed ineligible for 40 cardiac rehabilitation programmes, and patients who had a PCI were ineligible for 15 programmes. These exclusions may affect the referral rates for CCGs that have a larger proportion of these patients and programmes, the number of programmes that exclude these cases is reducing year on year.  The ambition of 65% uptake following a MI, PCI or CABG, and 33% uptake following heart failure set out in the CVD OS may cause issues for the interpretation of this indicator. Whilst these are not targets, the ambitions reflect an improvement on current performance, which is currently much lower. CCGs with a larger proportion of heart failure patients who are fulfilling the 33% uptake ambition will have a lower rate overall than CCGs who have a lower proportion of heart failure patients who are fulfilling the 65% uptake ambition. Due to the complexities of linkage and data quality issues, CCGs may never reach these ambitions when measured by this indicator.  The codes used to identify the diagnoses and procedures been taken from the PbR cardiac rehabilitation post discharge tariff. These codes are slightly different from the ones supplied by the NHS Classification Service. The decision to use the PbR codes has been made to ensure that CCGs are being measured on what they are paid to deliver.  Neither the HES APC nor the NACR data sets have information on the time that an admission or activity occurred, only the date, as a result some admissions may have a slightly longer timeframe in which this referral can take place. |
| **Improvement actions** | The indicator requires careful interpretation and should not be viewed in isolation, but instead be considered alongside information from other indicators and alternative sources, such as the corresponding cardiac rehabilitation completion indicator or the source NACR publication. CCGs can use this indicator in context to identify if any improvements are needed to their delivery of service, further information will be required in order to determine what, where, and how these services should improve.  If a CCG would like to increase the number of referrals to cardiac rehabilitation, it may consider commissioning additional services and reassessing its referral pathway.  Improvements could be made by enhancing aspects of the services CCGs commission for patients. This could come in the form of raising awareness of cardiac rehabilitation and its benefits for people who have had a cardiac event |
| **Evidence of variability** | At the national level in 2011-12, there were 148,157 FAEs with a primary diagnosis of MI or heart failure, or a main operative procedure of PCI or CABG. Of these, 22,393 were referred to cardiac rehabilitation within 5 days (15.3%).  Of the unsuppressed values, the number of FAEs ranges from 175 to 3,199, and the number of referrals ranges from 0 to 724. Zero CCGs have a supressed number of FAEs, 18 CCGs have a supressed number of referrals. The rate is suppressed for 18 CCGs. |

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| --- | --- | --- | --- | --- | --- |
| **CCG** | **FAEs** | **Referrals** | **%** | **Lower CI (%)** | **Upper CI (%)** |
| CCG1 | 272 | 0 | 0.0% | 0.0% | 1.4% |
| CCG2 | 287 | 0 | 0.0% | 0.0% | 1.3% |
| CCG3 | 326 | 0 | 0.0% | 0.0% | 1.2% |
| CCG4 | 570 | 0 | 0.0% | 0.0% | 0.7% |
| CCG5 | 714 | 0 | 0.0% | 0.0% | 0.5% |
| CCG6 | 175 | \* | \* | \* | \* |
| CCG7 | 232 | \* | \* | \* | \* |
| CCG8 | 251 | \* | \* | \* | \* |
| CCG9 | 279 | \* | \* | \* | \* |
| CCG10 | 389 | \* | \* | \* | \* |
|  |  |  |  |  |  |
| **CCG** | **FAEs** | **Referrals** | **%** | **Lower CI (%)** | **Upper CI (%)** |
| CCG202 | 2010 | 729 | 36.3% | 34.2% | 38.4% |
| CCG203 | 564 | 213 | 37.8% | 33.9% | 41.8% |
| CCG204 | 431 | 164 | 38.1% | 33.6% | 42.7% |
| CCG205 | 638 | 243 | 38.1% | 34.4% | 41.9% |
| CCG206 | 628 | 243 | 38.7% | 35.0% | 42.6% |
| CCG207 | 272 | 111 | 40.8% | 35.1% | 46.7% |
| CCG208 | 523 | 214 | 40.9% | 36.8% | 45.2% |
| CCG209 | 731 | 310 | 42.4% | 38.9% | 46.0% |
| CCG210 | 362 | 161 | 44.5% | 39.4% | 49.6% |
| CCG211 | 311 | 141 | 45.3% | 39.9% | 50.9% |

The following graphs will not be presented as part of the indicator.

It would be expected that 95% of data points would be within 2 standard deviations of the England figure. Of the 193 unsuppressed CCGs, 168 (87.0%) are outside of the 2 standard deviations limit.

It is possible that the variation comes down to issues with data quality, unmatched records, and the uneven distribution of cardiac rehabilitation programmes.

Analysis into longer timeframes has been conducted. Of the 148,156 FAEs in the denominator, 25,927 were referred within 7 days, 32,164 were referred within 14 days, and 35,841 were referred within 30 days. The use of longer referral time periods does not capture significant amounts of extra activity, so the referral period will remain 5 days from admission.

|  |  |
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| **Similar existing indicators** | There are currently no indicators in the CCG OIS, the wider NHS Digital Indicator Portal, or the Public Health Outcomes Framework that relate to cardiac rehabilitation. Data is available in the NACR annual reports, however these are not strictly comparable as these reports are at person level and include estimated figures. |
| **Coherence and comparability** | The ICD-10 and OPCS-4 codes that are used to identify the relevant diagnosis and procedure codes for this indicator have been taken from the PbR post discharge tariff for cardiac rehabilitation. As a result the indicators are measuring what the CCGs are being paid to offer.  This indicator is not comparable with the NACR annual reports as these contain estimated data. Estimated data is not included in this indicator as it cannot be verified; this indicator may highlight awareness of the data set and improve its data quality, thus reducing the need to rely on estimated data in the annual report. |
| **Undesired behaviours and/or gaming** | In order to remove patients from the indicator, hospitals could record patients as having a diagnosis or procedure in a secondary position, rather than a primary one. This may have the effect of increasing the proportion of referred cases, but may also affect the payment a hospital receives. The financial incentives associated with the PbR are likely to be greater than any potential bias due to being part of the CCG OIS. |
| **Approach to indicator review** | As this indicator was previously given the assurance rating ‘Use With Caution – Data Quality Issues’, the previous review period was set to one year. Following this indicator review, the review period will be set by the Indicator Governance Board (IGB). Prior to the review period lapsing the Indicator and Methodology Assurance Service (IMAS) will liase with the Clinical Indicators (CI) team to initiate the review process.  User feedback and comments on this indicator are welcomed via NHS Digital Enquiries [enquiries@nhsdigital.nhs.uk](mailto:enquiries@nhsdigital.nhs.uk) or the Clinical Indicators mailbox [clinical.indicators@nhs.net](mailto:clinical.indicators@nhs.net) |
| **Disclosure control** | When publishing the data, if the indicator is calculated from a value of 1 to 5, the value and percentage is suppressed to ensure an individual’s identity is not at risk of being disclosed. If there is only one value suppressed in this way, the rate based upon the next lowest numerator is also suppressed; this reduces the risk of the first suppressed number being identifiable in isolation.  Percentages are rounded to one decimal place before publication. |
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Indicator Assurance Report

**Final Assurance Rating from the Indicator Governance Board – 10/02/2016**

|  |  |
| --- | --- |
| **Reason for assessment** | Initial assurance |
| **Iteration** | 1st IGB meeting |

|  |  |  |
| --- | --- | --- |
| **Ratings Against Assessment Criteria** |  | **Overall Rating – use with caution – data quality issue** |
| Clarity | **Fit for use** |  |
| Rationale | **Fit for use** |  |
| Data | **Use with caution – data quality** |  |
| Construction | **Fit for use** |  |
| Presentation and Interpretation | **Fit for use** |  |
| Risks and Usefulness | **Fit for use** |  |

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| **Outcome** | **This indicator has been approved for inclusion in the National Library of Quality Assured Indicators** |

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| **Key findings from Assurance** |
| * IGB agrees with the conclusions reached by MRG as set out in the appraisal log with no further comments raised by Board members. The indicator is assured for inclusion in the Library and is put forward for review in 1 year to assess if data coverage has improved as expected. |

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| --- | --- |
| **Approval date** | 10/02/2016 |
| **Review date** | 10/02/2017 |

**Details of Methodology Appraisal - 06/01/2016, 04/02/2016**

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| --- | --- |
| **Methodology appraisal body** | HSCIC's Indicator & Methodology Assurance Service |
| **Reason for assessment** | Initial assurance |
| **Iteration** | Update from MRG Chair |

***Suggested Assurance Rating by Methodology Appraisal Body***

|  |  |  |
| --- | --- | --- |
| **Ratings Against Assessment Criteria** |  | **Overall Rating – use with caution – data quality issue** |
| Clarity | **Fit for use** |  |
| Rationale | **Fit for use** |  |
| Data | **Use with caution – data quality** |  |
| Construction | **Fit for use** |  |
| Presentation and Interpretation | **Fit for use** |  |
| Risks and Usefulness | **Fit for use** |  |

**Updated information supplied to MRG Chair:**

Following recommendations set out in the first MRG meeting, the applicant provided additional information and amended the form. In light of these changes made by the applicant, the MRG Chair and Vice Chair have revised the ratings for both the ‘Rationale’, ‘Construction’ and ‘Presentation and Interpretation’ as fit for use.

**Summary Recommendation to IGB:**

MRG members are prepared to endorse the indicator for inclusion in the Library of Quality Assured Indicators. Noting that data quality is still improving MRG recommend the indicator is reviewed within 1 year to review data coverage with the expectation that the level of assurance will be improved.

**Please find a detailed description of recommendations and actions in the appraisal log at the end of the document.**

**Details of Methodology Appraisal - 26/11/2015**

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| --- | --- |
| **Methodology appraisal body** | HSCIC's Indicator & Methodology Assurance Service |
| **Reason for assessment** | Initial assurance |
| **Iteration** | 1st MRG meeting |

***Suggested Assurance Rating by Methodology Appraisal Body***

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| --- | --- | --- |
| **Ratings Against Assessment Criteria** |  | **Overall Rating – use with caution – data quality issue** |
| Clarity | **Fit for use** |  |
| Rationale | **Fit for use with caveats** |  |
| Data | **Use with caution – data quality** |  |
| Construction | **Fit for use with caveats** |  |
| Presentation and Interpretation | **Fit for use with caveats** |  |
| Risks and Usefulness | **Fit for use** |  |

**Summary Recommendation to IGB:**

MRG members are prepared to endorse the indicator for inclusion in the Library of Quality Assured Indicators. A small number of suggestions have been put to the developer that may further strengthen the application, these being providing a note in the evidence base around the requirement to refer (regardless of dates), and the justification not to standardise in the construction. MRG have suggested that in the future developers may wish to provide further contextual information to identify the extent of admissions not meeting the 5 day requirement. Noting that data quality is still improving MRG recommend the indicator is reviewed within 1 year to review data coverage with the expectation that the level of assurance will be improved.

**Summary Recommendation to Applicant:**

MRG assessed the indicator as being fit for purpose against the ‘Clarity’ and ‘Risks and Usefulness’ criterion. The ‘Rationale’, ‘Construction’ and ‘Presentation and Interpretation’ were noted to be fit for purpose with caveats. MRG have recommended that further clarity be provided around the expectations for referring CHD admissions to receive a cardiac rehabilitation; adding to the justification to not make use of standardisation methods; and that consideration be given to providing further contextual information to identify the extent of CHD admissions which were referred to cardiac rehabilitation after 5 days of admission.   
  
In light of the improvements in data coverage for future reporting periods that have been identified during discussion at MRG, it is recommended that the indicator is reviewed in a years time to validate the improvement and with a view to uplift the level of assurance rating.

**Please find a detailed description of recommendations and actions in the appraisal log at the end of the document.**

**What do the Assurance Ratings mean?**

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| **Rating** | **Description** |
| **Fit for use** | This indicator can be used with confidence that it is constructed in a sound manner that is fit for purpose. |
| **Fit for use with caveats** | The indicator is fit for use, however users should be aware of caveats and/or recommendations for improvement that have been identified during the assurance process. |
| **Use with caution – data quality** | The indicator is based on a sound methodology for which the assurance process endorse the use, however issues have been identified with the national data source which have implications for its use as an indicator. |
| **Assessed as not meeting the assurance criteria** | Issues have been identified with the indicator which have resulted in the assurance process currently not endorsing its use as a quality indicator. |
| **Not enough information provided** | There has not been enough information supplied to the assurance process to be able to accurately give the indicator a level of assurance. |

**Appraisal Log**

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| --- | --- | --- | --- | --- | --- | --- |
|  | **Clarity** |  |  |  |  |  |
| ***Rec. no*** | ***Issue or recommendation*** | ***Raised by / Date*** | ***Response or Action taken by applicant*** | ***Response date*** | ***Resolved*** | ***Sign off by / Date*** |
|  | No issues or recommendations were highlighted during assurance for this criterion. |  |  |  |  |  |

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|  | **Rationale** |  |  |  |  |  |
| ***Rec. no*** | ***Issue or recommendation*** | ***Raised by / Date*** | ***Response or Action taken by applicant*** | ***Response date*** | ***Resolved*** | ***Sign off by / Date*** |
| 2a | It would be useful to provide a statement in the evidence base clarifying whether every CHD admission would be expected to be referred to cardiac rehabilitation within 5 days. | MRG – 26/11/2015 | This date was agreed with the NACR as an appropriate time frame. Documentation updated to reflect this. | 24/12/15 |  | Chair and Vice Chair - 06/01/2016 |

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|  | **Data** |  |  |  |  |  |
| ***Rec. no*** | ***Issue or recommendation*** | ***Raised by / Date*** | ***Response or Action taken by applicant*** | ***Response date*** | ***Resolved*** | ***Sign off by / Date*** |
| 3a | It was reported to MRG that the data coverage for the time period presented in the application is approx. 70%, although it is suggested that data coverage is achieving 90% in more recent data sets. On this basis MRG recommend this aspect is reviewed when the new data becomes available to validate the improvement. | MRG – 26/11/2015 | Noted that data quality is expected to improve. Documentation updated to reflect this. | 24/12/15 |  |  |

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|  | **Construction** |  |  |  |  |  |
| ***Rec. no*** | ***Issue or recommendation*** | ***Raised by / Date*** | ***Response or Action taken by applicant*** | ***Response date*** | ***Resolved*** | ***Sign off by / Date*** |
| 4a | Further justification is required for not using standardisation methods as per the comments made by the sponsor in the MRG meeting – i.e. that all cases should be referred , that age is not a factor within (most) of the care pathways, and that standardising would build in bias. | MRG – 26/11/2015 | Documentation updated. | 24/12/15 |  | Chair and Vice Chair - 06/01/2016 |

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|  | **Presentation and Interpretation** |  |  |  |  |  |
| ***Rec. no*** | ***Issue or recommendation*** | ***Raised by / Date*** | ***Response or Action taken by applicant*** | ***Response date*** | ***Resolved*** | ***Sign off by / Date*** |
| 5a | Consider publishing further information regarding patients who are not referred to cardiac rehabilitation within 5 days (e.g. those referred to cardiac rehab within 7 days/14 days/30 days). This would help to understand what the present average referral time from admission date is. | MRG – 26/11/2015 | These figures have been added to the evidence of variability, however it has been decided to not add them as contextual information to the indicator. The 5 day timeframe was agreed with the NACR, presenting additional timeframes will reduce the focus of the indicator. | 05/01/15 |  | MRG pre-meet 04/02/16 |

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|  | **Risks and Usefulness** |  |  |  |  |  |
| ***Rec. no*** | ***Issue or recommendation*** | ***Raised by / Date*** | ***Response or Action taken by applicant*** | ***Response date*** | ***Resolved*** | ***Sign off by / Date*** |
|  | No issues or recommendations were highlighted during assurance for this criterion. |  |  |  |  |  |

See our [accessibility statement](https://www.nice.org.uk/accessibility#what-to-do) if you’re having problems with this document.

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8. Newcombe RG, Altman DG. Proportions and their differences. In Altman DG et al. (eds). Statistics with confidence (2nd edn). London: BMJ Books; 2000: 46–8 [↑](#footnote-ref-8)
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