
Indicator Construction: Managing Outpatient Attendances

DOCUMENT MANAGEMENT**VERSIONS**

Version	Date	Summary	Editor
0.1	30/07/2010	Draft for internal review by Clinical Indicators team	
0.2	06/08/2010	2 nd draft after initial internal review and comments by clinical indicators team.	
0.3	12/08/2010	3 rd draft to bring all BCBV indicators into line	
0.4	23/08/2010	4 th draft to reflect changes suggested by the NHS Institute	
0.5	01/09/2010	Amendments following discussion with Neil Clark of SUS HES team	
0.6	15/09/2010	<ul style="list-style-type: none"> • Clarification on the calculation of reference rates. • Standardising of terms between indicator specifications. • Change to definition of AGE_GROUP. 	
0.7	31/10/2013	David Lukic made changes to reflect change in the organisation (eg SHA -> AT)	David Lukic
0.8	11/11/2015	Updated Deprivation Groups after ONS IMD release 2015.	Walt Treloar
0.9	12/09/2016	Minor changes to reflect suppression of output values to aid clarity.	Walt Treloar

APPROVALS

Name	Signature	Title	Date of Issue	Version
Chris Dew		Lead Information Manager, Clinical Indicators, NHS Digital		
Phil Wilcock		Senior Manager - Analytical Service , NHS England		

REVIEW DETAILS

Review Date:	17/10/2016
Reviewer:	Walt Treloar

Contents

1. OVERVIEW	4
Indicator Family Name	4
Indicator Family Code	4
Subject.....	4
Condition.....	4
Detailed Descriptor	4
Reporting Frequency.....	4
2. DATA.....	5
Data Source.....	5
Data Fields.....	5
3. DATA PREPARATION	6
Data Filter.....	6
Categorisation	7
Data Categorisation	7
Group Size	7
Data Linking.....	8
Output.....	8
4. INDICATOR CALCULATION	9
Calculation	9
Output.....	12
APPENDICES	13
Appendix 1 – Groupings of data	13

1. Overview

Indicator Family Name
Better Care Better Value

Indicator Family Code
BCBV

Subject
Managing outpatient attendances

Condition	Indicator Code
All	I00612

Detailed Descriptor
This indicator shows the financial opportunity of reducing the rate of outpatient appointments to those of the CCG at the N^{th} percentile. A large difference could highlight a potential referral practice outside of the level expected based on the profile of the local population.

Reporting Frequency
Data supplied on a quarterly basis. Reporting required on a quarterly basis.

2. Data

Data Source
Secondary Uses Service, Payment by Results (SUS PBR), SUS_PBR_OP_MASTER table.
Postcode Sector IMD Lkup table.
Office of National Statistics (ONS) Mid Year Population Estimates.
NHS Organisation table

Data Fields	
The source of data is the SUS PBR data set. The out-patient table is required for this indicator.	
The data fields required are as follows;	
<u>SUS PBR Outpatient table</u>	
1. FIRST_ATTENDANCE	Indicates whether this is a first attendance appointment
2. ATTENDANCE_STATUS	The attendance status (attended, did not attend etc)
3. ATTENDANCE_DATE	The date of appointment attendance
4. TREATMENT_FUNCTION_CODE	Code representing the clinical area of treatment
5. AGE_AT_CDS_ACTIVITY_DATE	The submitted patient age
6. AGE_AT_EVENT_DATE	Age of the patient at the event date
7. SEX	Gender of the patient
8. POSTCODE_SECTOR_USUAL_ADDR	The postcode sector representing the patients usual address
9. TARIFF_PRE_MFF_ADJUSTED_NATIONAL	The tariff relevant to the HRG before adjustment for market force factors
10. CCG_CODE_D	The code of the commissioning CCG
11. NHS_NUMBER	The patient's NHS number
12. IC_PBR_QUALIFIED	Describes whether the record has received a PBR tariff
<u>Organisation</u>	
1. Code	The code of the organisation
2. TypeID	The organisation type
This table is joined to the Spells table using the CCG_CODE_D and the CODE fields. The organisation table is populated from the ODS list of NHS organisations and is updated each quarter.	
<u>Postcode Sector IMD Lkup table</u>	
1. Sector	Postsector code
2. Rank_of_Index_of_Multiple_Depr	Rank of the Index of Multiple Deprivation relating to the Postsector
3. Deprivation Group	The group of the deprivation as derived using the table A.3 in the Appendix
The SUS PBR Outpatient and Postcode_Sector_IMD_Lkup tables are linked using the POSTCODE_SECTOR_USUAL_ADDR and Sector.	
<u>Processed Population Data</u>	
All fields from the data preparation explained in document 'ONS Population Data Preparation for Better Care, Better Value Indicators'.	

3. Data Preparation

Data Filter		
The following data filters should be applied to the data.		
1	Field Name:	ATTENDANCE_DATE
	Conditions:	Is within the quarter in question
	Rationale:	We are looking at patients who attended in the current quarter.
2	Field Name:	AGE_AT_CDS_ACTIVITY_DATE, AGE_AT_EVENT_DATE
	Conditions:	AGE_AT_CDS_ACTIVITY_DATE between 0 and 120 or AGE_AT_EVENT_DATE between 0 and 120
	Rationale:	This identifies the patients age at the date of appointment and identifies that it falls within the expected range.
3	Field Name:	SEX
	Conditions:	Is equal to 1 or 2
	Rationale:	Ensures that a valid gender has been entered for the patient.
4	Field Name:	POSTCODE_SECTOR_USUAL_ADDR
	Conditions:	Is contained in the valid postcode sector to Index of Multiple Deprivation (IMD) lookup file.
	Rationale:	Confirms that all patient addresses have a valid post sector and can be assigned a deprivation score.
5	Field Name:	IC_PBR_QUALIFIED
	Conditions:	Is equal to Y
	Rationale:	To find only PBR qualified records.
6	Field Name:	FIRST_ATTENDANCE
	Conditions:	= 1, 3
	Rationale:	Filters for the outpatient first attendances
7	Field Name:	ATTENDANCE_STATUS
	Conditions:	Is equal to 3, 5, 6 or 7
	Rationale:	Filters for patients who attended on time or, if late, before the relevant care professional was ready to see the patient (5) or patients who arrived late, after the relevant care professional was ready to see the patient, but was seen (6). Includes patients who did not attend without prior notification (3 and 7).
8	Field Name:	CCG_CODE_D
	Conditions:	Is not NULL and does not equal 59898 or 59999
	Rationale:	Only valid organisations should be used in the following calculations.
9	Field Name:	TypeID
	Condition:	In 4, 6
	Rationale:	To limit to records where a CCG or care trust is acting as a commissioner
10	Field Name:	CCG_CODE_D; CODE
	Conditions:	Records in the CCG_CODE_D field in the Spells table which are not present in the CODE field in the organisation table are excluded.
	Rationale:	Only valid organisations should be used in the following calculations.
11	Field Name:	TREATMENT_FUNCTION_CODE
	Conditions:	Is not NULL

	Rationale:	Data quality, comparison is not possible if treatment function is unknown.
11	Field Name:	NHS_NUMBER
	Conditions:	Is not NULL
	Rationale:	To limit to records with invalid NHS number.

Categorisation

Data Categorisation

The following variables need to be categorised into variable groups:

1. AGE_AT_CDS_ACTIVITY_DATE; AGE_AT_EVENT_DATE:
If AGE_AT_CDS_ACTIVITY_DATE is between 0 and 120, then this field should be used for categorisation. If AGE_AT_CDS_ACTIVITY_DATE is not between 0 and 120, then use AGE_AT_EVENT_DATE

For this indicator the ages are split into bands as follows: 0-18, 19-64, 65-120; see appendix 1 for the complete list. This is given the field name AGE_GROUP.

2. DEPRIVATION:
This is taken from the Rank_of_Index_of_Multiple_Depr from the Postcode_Sector_IMD_Lkup table. Each postcode sector has a dominant LSOA, and the IMD rank of this LSOA is used for all patients from the sector. These ranks are ordered and grouped into three groups, one representing the most deprived 20%, one for the least deprived 20% and one for the mid deprived 60%. This is then populated onto the spells table to give an estimate of the deprivation of the patient. These deprivation groups are given the field name DEPRIVATION_GROUP. See appendix 1 for the complete list.
3. ComponentID:
This relates to the treatment function for outpatient appointments.

Group Size

Given that the data is being grouped into combinations of age_group, deprivation_group, sex and treatment function there may be examples where the number of records and/or CCGs per group is small. Where the number or records per CCG within a combination is less than 1 the group will not be taken forward for further calculation.

Aggregate the data over CCG, age, sex, deprivation and procedure group. The number of records in each aggregation is to be recorded in new field 'COUNT_ROWS'. The sum of TARIFF_PRE_MFF_ADJUSTED_NATIONAL is to be recorded in new field 'Tariff'.

Field Name	Type	Length
ComponentID	Integer	
CCG	Character	3
AGE_GROUP	Integer	
SEX	Integer	
DEPRIVATION_GROUP	Integer	
COUNT_ROWS	Integer	
TARIFF	Integer	

Data Linking

The SUS PbR data needs to be linked to national population data. The preparation of this data is explained in the document 'ONS Population Data Preparation for Better Care, Better Value'.

- Take the ONS data and replicate for each ComponentID and create a column called ComponentID.
- For each replication populate the ComponentID column with each of the procedure codes as defined in the 'Categorisation' section.
- Link the table above to this data on ComponentID, CCG, AGE_GROUP, SEX and DEPRIVATION_GROUP populating new columns of VOLUME and TARIFF. Use an outer join on the Population data.

Please note that only CCG with their case-mixes that exist in the ONS Population table will be taken into account in the further calculations.

The ONS Population data remains static within a whole financial year.

Output

The case-mix variables in the data are as follows:

- | | |
|----------------------|--|
| 1. AGE_GROUP | Age group – groups as described above. |
| 2. DEPRIVATION_GROUP | Deprivation – as described above. |
| 3. SPELL_SEX | Sex – 1 or 2 (male or female). |

Each distinct combination of values of these variables in the data defines a distinct case-mix j .

Table 3.1 should be created following processing of the original data through the 'Data Preparation' section. This will be used in the 'Indicator Calculation' section.

Table 3.1

Field Name	Type	Length	Source
BATCH_ID	Integer		Input file identifier.
ComponentID	Character	3	Treatment function
CCG	Character	3	CCG_CODE_D
AGE_GROUP	Integer		As defined in 'Categorisation' section.
DEPRIVATION_GROUP	Integer		As defined in 'Categorisation' section.
SEX	Integer		SEX field from SUS PbR extract.
DENOMINATOR	Integer		POPULATION as defined in 'Data Linking'.
NUMERATOR	Integer		COUNT_ROWS.
TARIFF	Numeric	30.2	Sum of TARIFF_PRE_MFF_ADJUSTED_NATIONAL.

4. Indicator Calculation

Calculation
<p>1. Calculate the raw rate for each ComponentID s, each CCG p and each case mix j.</p> $rate_{spj} = \frac{FA_{spj}}{POP_{pj}}$ <p>where: <i>POP_{pj}</i> is the population of CCG p for each case mix j defined in the DENOMINATOR field in Table 3.1 above; <i>FA_{spj}</i> is the count of first attendance for each CCG p over each ComponentID s for each case mix j defined in the NUMERATOR field in Table 3.1; and <i>rate_{spj}</i> is the rate of first attendances for each CCG p over each ComponentID s for each case mix j.</p> <p>2. Calculate reference rates as follows:</p> <ul style="list-style-type: none"> - Calculate the <i>rate_{spj}</i> for each case mix, diagnosis and CCG, using data from quarter 1 of the current year. - For combination of case mix and diagnosis Rank the results in order with the lowest <i>rate_{spj}</i> at position 1. Where values are equal, order by alphabetising the organisation code. - For each combination of case mix and diagnosis select the rate for the CCG with the highest <i>rate_{spj}</i> less than or equal to the Nth percentile. N will take values of 10, 25 and 50. When there are no providers with a <i>rate_{spj}</i> less than or equal to the Nth percentile select the CCG with the lowest <i>rate_{spj}</i> - The selected <i>rate_{spj}</i> is the reference <i>rate_{spj}</i> for that case mix and diagnosis for the Nth percentile. - The reference <i>rate_{spj}</i>'s are used for calculating the savings in all four quarters of the year. If in later quarters a combination of case mix, diagnosis and CCG is observed that does not have a reference <i>rate_{spj}</i>, calculate the reference <i>rate_{spj}</i> with data from the first quarter the combination is seen. - <i>REF_rate_{sj}</i> is the reference rate. <p>3. Calculate the expected number of outpatient attendances for each CCG p and each case mix j over each ComponentID s using the relevant quarter's data and the reference CCGs attendance rate.</p> $FAE_{spj} = POP_{pj} \times REF_rate_{sj}$ <p>where: <i>FAE_{spj}</i> is the expected number of outpatient attendances for CCG p over each ComponentID s and for each case mix j.</p> <p>4. Calculate the Potential Reduction in attendances for each CCG over each ComponentID.</p> $PR_{spj} = MAX(FA_{spj} - FAE_{spj}, 0)$ <p>where: <i>PR_{spj}</i> is the potential reduction in attendances for each CCG p and each case mix j over each ComponentID s.</p> <p>5. Calculate the Average Tariff per ComponentID, CCG and case mix.</p> $AT_{spj} = \frac{TARIFF_{spj}}{FA_{spj}}$ <p>6. Convert the potential reduction in attendances for the quarter in question into a financial value.</p>

$$QFS_{spj} = PR_{spj} \times AT_{spj}$$

where:

QFS_{spj} is the estimated potential quarter financial saving for case mix j of CCG p in ComponentID s;

and

AT_{spj} is the average tariff, calculated per ComponentID and CCG for the quarter in question

7. Aggregate the estimated potential financial saving opportunities to produce output at CCG, NHS England geographical region (GR) and national levels.

$$FinancialOpportunity_{ps} = \sum_{j=1}^n QFS_{spj}$$

$FinancialOpportunity_{ps}$ is the quarter estimated potential saving for CCG p and ComponentID s; and

$$FinancialOpportunity_{hs} = \sum_{p=GR_1}^{GR_n} FinancialOpportunity_{ps}$$

$FinancialOpportunity_{hs}$ is the quarter estimated potential saving by NHS England geographical region (GR) h and ComponentID s; and

GR_1 to GR_n represent all of the CCGs in each GR; and

$$FinancialOpportunity_s = \sum_{p=1}^n FinancialOpportunity_{ps}$$

$FinancialOpportunity_s$ is the quarter estimated potential national saving by ComponentID; and

$$FinancialOpportunity_p = \sum_{s=1}^n FinancialOpportunity_{ps}$$

$FinancialOpportunity_p$ is the quarter estimated potential saving for each CCG p; and

$$FinancialOpportunity_h = \sum_{p=GR_1}^{GR_n} FinancialOpportunity_p$$

$$FinancialOpportunity = \sum_{p=1}^n FinancialOpportunity_p$$

$FinancialOpportunity_h$ is the quarter estimated potential saving for each GR h; and

8. *VOLUME* is the quarter potential attendance adjustment. Aggregate the potential attendance adjustment from the individual case mixes to produce output at CCG, NHS England geographical region (GR) and national levels.

$$VolumeOpportunity_{ps} = \sum_{j=1}^n PR_{spj}$$

$VolumeOpportunity_{ps}$ is the quarter potential attendance adjustment for CCG p and ComponentID s; and

$$VolumeOpportunity_{hs} = \sum_{p=GR_1}^{GR_n} VolumeOpportunity_{ps}$$

$VolumeOpportunity_{hs}$ is the quarter potential attendance adjustment by NHS England geographical region (GR) h and ComponentID s; and

GR_1 to GR_n represent all of the CCGs in each NHS England geographical region (GR); and

$$VolumeOpportunity_s = \sum_{p=1}^n VolumeOpportunity_{ps}$$

$VolumeOpportunity_s$ is the quarter potential attendance adjustment by ComponentID; and

$$VolumeOpportunity_p = \sum_{s=1}^n VolumeOpportunity_{ps}$$

$VolumeOpportunity_p$ is the quarter potential attendance adjustment for each CCG p; and

$$VolumeOpportunity_h = \sum_{p=GR_1}^{GR_n} VolumeOpportunity_p$$

$VolumeOpportunity_h$ is the quarter potential attendance adjustment for each GR h; and

$$VolumeOpportunity = \sum_{p=1}^n VolumeOpportunity_p$$

$VolumeOpportunity$ is the quarter potential national attendance adjustment.

9. **ATTENDANCES** are the number of attendances during the quarter in question. Aggregate the attendances to produce output at CCG, NHS England geographical region (GR) and national levels.

$$Attendances_{ps} = \sum_{j=1}^n FA_{spj}$$

$Attendances_{ps}$ is the number of attendances for the quarter in question for CCG p and ComponentID s; and

$$Attendances_{hs} = \sum_{p=GR_1}^{GR_n} Attendances_{ps}$$

$Attendances_{hs}$ is the number of attendances for the quarter in question by NHS England geographical region (GR) h and ComponentID s; and

GR_1 to GR_n represent all of the CCGs in each NHS England geographical region; and

$$Attendances_s = \sum_{p=1}^n Attendances_{ps}$$

$Attendances_s$ is the number of attendances for the quarter in question by ComponentID; and

$$Attendances_p = \sum_{s=1}^n Attendances_{ps}$$

$Attendances_p$ is the number of attendances for the quarter in question for each CCG p; and

$$Attendances_h = \sum_{p=GR_1}^{GR_n} Attendances_p$$

$Attendances_h$ is the number of attendances for the quarter in question for each GR h; and

$$Attendances = \sum_{p=1}^n Attendances_p$$

$Attendances$ is the national number of attendances for the quarter in question.

10. $Patients_{ps}$ is the count of unique values of NHS_NUMBER for the quarter in question for CCG p and ComponentID s; and
 $Patients_{hs}$ is the count of unique values of NHS_NUMBER for the quarter in question by NHS England geographical region (GR) h and ComponentID s; and
 $Patients_s$ is the count of unique values of NHS_NUMBER for the quarter in question by ComponentID s; and
 $Patients_p$ is the count of unique values of NHS_NUMBER for the quarter in question for each CCG p; and
 $Patients_h$ is the count of unique values of NHS_NUMBER for the quarter in question for each GR h; and
 $Patients$ is the count of unique values of NHS_NUMBER for the quarter in question.

Output			
The summaries produced should be in the common output format described below. One record should be present for the different geographical aggregation levels of CCG, NHS England geographical region (GR) and national with breakdowns at each geographical level for different ComponentIDs and overall total calculations.			
Field Name	Type	Length	Source
ID	integer		Primary key ID field
IndicatorID	Character	6	Indicator Code given in 'Condition' in section 1.
BatchID	integer		Input file identifier.
YearQuarterID	integer		ID of the quarter within the year
PercentileID	integer		ID of the percentile for this calculation
OrganisationCode	Character	15	Character code representing the organisation. ('National' where calculating over all organisations.)
ComponentID	integer		Treatment Function. ('999' where calculating over all Treatment Functions.)
Value	Numeric	30.2	Value used for ranking calculated in 'Indicator Construction: BCBV Ranking Element'.
FinancialOpportunity	Numeric	30.2	Financial opportunity calculated in equation 7
VolumeOpportunity	Numeric	30.2	Potential adjustment in attendance calculated in equation 8
Attendances ¹	integer		Number of attendances calculated in equation 9
Patients ¹	integer		Count of the distinct number of NHS_NUMBERS as described in equation 10
Rank	integer		Rank calculation from 'Indicator Construction: BCBV Ranking Element'.

¹ Value output is suppressed by (a) setting values between 1 and 5 to "*" and (b) rounding all other values to nearest 10.

Appendices

Appendix 1 – Groupings of data

Table A.1. Measure Types

Group Number	Description
1	10 th Percentile
2	25 th Percentile
3	50 th Percentile
4	Not Applicable

Table A.2. Age Groups for categorisation.

Group Number	Age Range (Years)
1	0-18
2	19-64
3	65-120

Table A.3. Deprivation Groups.

Group Number	Description	IMD Ranking
1	Most Deprived 20%	1 - 6,568
2	More Deprived 60%	6,569 – 26,275
3	Least Deprived 20%	26,276 – 32,844