

How NHS Choices generates personalised messages for users

NHS Choices provides a personalised information service by tailoring information relevant to individual users. Visitors to the website can now choose to enter personal details online (for example, their age, sex, postcode, health condition), and in return receive messages tailored to the details provided.

The messages displayed are based on an analysis of rates of hospital admission for different population groups throughout England. This document explains how NHS Choices has produced this set of messages.

Overview

NHS Choices analysed hospital admission rates throughout England for a specific set of health conditions over three years (see Appendix 1 for details). This analysis has been run by population group (see below) to determine which health conditions have higher than expected rates of hospital admission for each population group.

What is a 'population group'?

Every postcode in England is assigned a population group as defined by the Office of National Statistics. These population groups (for example, Afro-Caribbean communities, Prospering Younger Families) are known as Output Area Classification groups, or OAC groups. The OAC groups have been defined using a classification of areas in the UK based on information from the 2001 Census. There are 21 OAC groups, listed in Appendix 2.

This classification identifies areas with populations that have similar attributes, regardless of location. The OAC has three levels; super groups, groups and sub-groups. The analysis of hospital admissions has been carried out at group level. (More information about OAC groups is available at http://www.statistics.gov.uk/about/methodology_by_theme/area_classification/oa/default.asp).

How were hospital admission rates analysed?

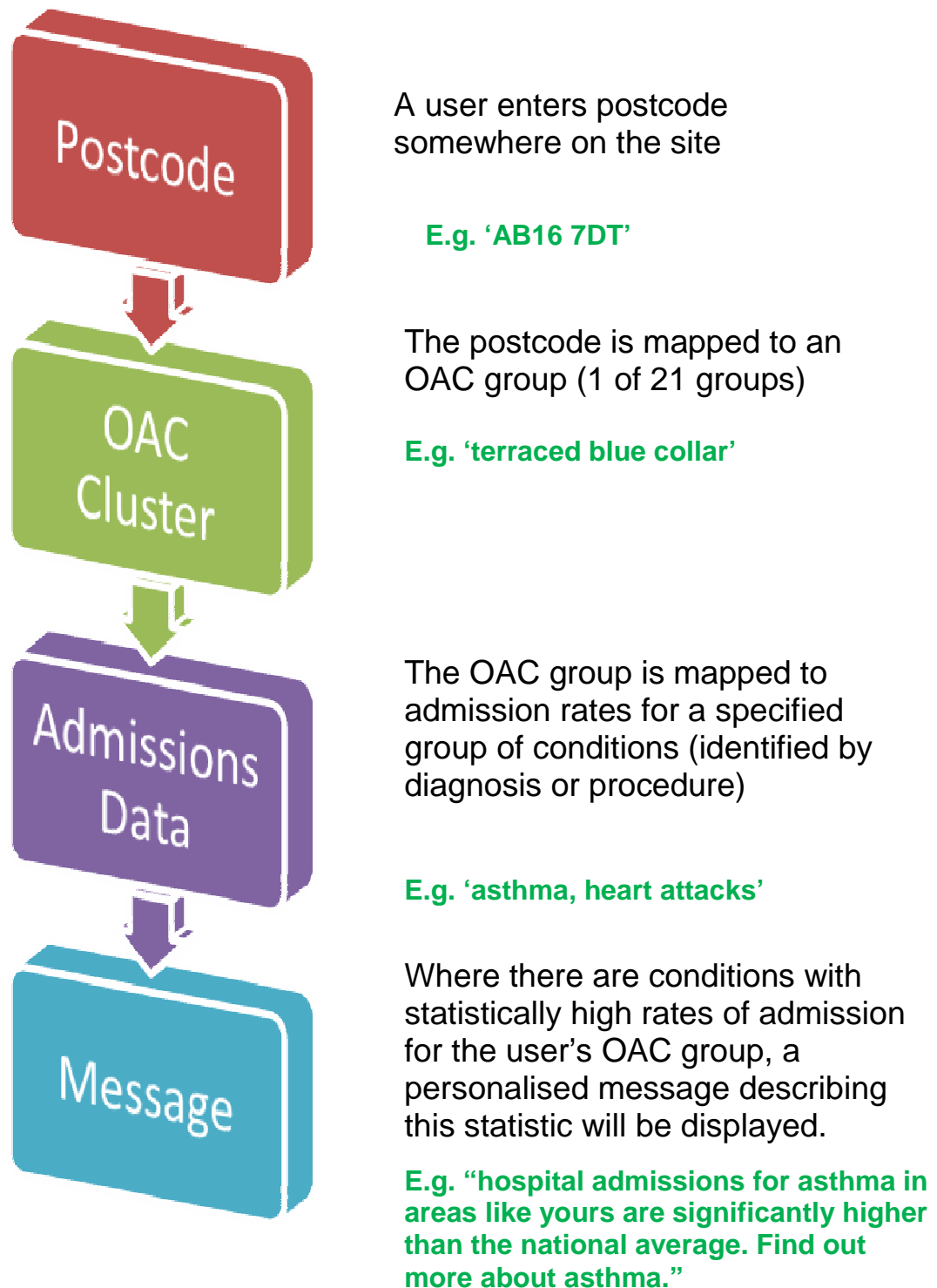
Admission rates to NHS hospitals in England for a specific set of health conditions have been analysed by age and sex for each OAC group. The period of analysis for hospital admissions was between November 2004 and October 2007. Health conditions were identified using ICD10 diagnosis codes and/or OPCS4 procedure codes. (More information about diagnosis and procedure coding is available at <http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=290>)

For each OAC group the analysis has identified the health conditions which have a higher than expected hospital admission rate. Appendix 1 provides full details of the method used to analyse admissions data.

How is a personalised message generated?

When a user enters their postcode on the site, if it is mapped to an OAC group with a significantly higher rate of hospital admission for a health condition, they will be presented with a message informing them of this and a link to find out more about the particular health condition.

Figure 1: Process for creating personalised messages



Appendix 1: Calculation of admission rates for OAC groups

The admission rates for each OAC group have been calculated for a defined set of health conditions (defined using diagnosis codes and procedure codes as set out in Table 1), as follows:

1. The England reference group admission rates were calculated as:
England admissions divided by England population, by age and sex, for each of the specified conditions.
2. The age and sex specific population were identified for each OAC group.
3. Expected admission rates for each OAC group were calculated as:
admission rate for England * population for each OAC group.
4. The total number of expected admissions were calculated as:
sum of the expected admissions for each OAC group.
5. The observed number of admissions for each OAC group were calculated as: count of admissions by age and sex and OAC group for each condition.
6. OAC group admission rates were calculated for each condition as:
observed number of admissions (5) / expected admissions (4) * 100
7. Confidence intervals were calculated using Byar's approximation:

Lower 95% limit

$$\left(\frac{\text{observed}}{\text{expected}} \right) * 100 * \left(\left(1 - \frac{1}{9 * \text{observed}} \right) - \frac{1.96}{3 * \sqrt{\text{observed}}} \right)^3$$

Upper 95% limit

$$\left(\frac{\text{observed} + 1}{\text{expected}} \right) * 100 * \left(\left(1 - \frac{1}{9 * (\text{observed} + 1)} \right) + \frac{1.96}{3 * \sqrt{\text{observed} + 1}} \right)^3$$

8. Identify, for each OAC group, the conditions that have a significantly high rate of admission, this is where the lower 95% confidence limit is greater than 100.

Table 1: Specified conditions

Condition	Codes	Type of codes used to identify condition
Chronic obstructive pulmonary disease (COPD)	J20, J41-J44, J47	Diagnosis (ICD10)
Acute myocardial infarction (heart attack)	I21, I22	Diagnosis (ICD10 codes)
Angina	I20, I240, I248, I249	Diagnosis (ICD10 codes)
Elective cataract surgery	C71-C77 (primary diagnosis H25-H26, H28, Q120)	Diagnosis (ICD10 codes) and Procedure (OPCS4 codes)
Elective knee replacement	W40-W42	Procedure (OPCS4 codes)
Chronic liver disease	K70	Diagnosis (ICD10 codes)
Breast cancer	C50, D05	Diagnosis (ICD10 codes)
Lung cancer	C34, D022	Diagnosis (ICD10 codes)
Prostate cancer	C61, D075	Diagnosis (ICD10 codes)
Bowel cancer	C19-C21, D011-D013	Diagnosis (ICD10 codes)
Cancer of the colon	C18, D010	Diagnosis (ICD10 codes)
Asthma	J45, J46	Diagnosis (ICD10 codes)
Pneumonia	A202, A212, A221, A310, A420, A430, A481, A78, B012, B052, B250, B583, B59, B671, J12-J16, J170-J173, J178, J18, J850, J851	Diagnosis (ICD10 codes)
Acute cerebrovascular disease (stroke)	G46, I60-I64, I66	Diagnosis (ICD10 codes)
Epilepsy	G40, G41, R56	Diagnosis (ICD10 codes)
Diabetes	E100-E149, R73, R81, R824	Diagnosis (ICD10 codes)
Cervical cancer	C53, D06	Diagnosis (ICD10)

		codes)
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Appendix 2: Output area classification groups

	OAC group	OAC Group Name
1: Blue collar communities	1a	Terraced Blue Collar
	1b	Younger Blue Collar
	1c	Older Blue Collar
2. City Living	2a	Transient Communities
	2b	Settled in the City
3. Countryside	3a	Village Life
	3b	Agricultural
	3c	Accessible Countryside
4. Prospering Suburbs	4a	Prospering Younger Families
	4b	Prospering Older Families
	4c	Prospering Semis
	4d	Thriving Suburbs
5. Constrained by circumstances	5a	Senior Communities
	5b	Older Workers
	5c	Public Housing
6. Typical traits	6a	Settled Households
	6b	Least Divergent
	6c	Young Families in Terraced Homes
	6d	Aspiring Households
7. Multicultural	7a	Asian Communities
	7b	Afro-Caribbean Communities

Further information about the classification is available at http://www.statistics.gov.uk/about/methodology_by_theme/area_classification/oa/default.asp