HOSPITAL RE-ADMISSION RATES: APPROACH TO DIAGNOSIS-BASED MEASURES – FULL REPORT

Michael Goldacre, David Yeates, Susan Flynn and Alastair Mason

National Centre for Health Outcomes Development
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Summary of progress

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REPORT OF PROGRESS TO DATE

Approach

NCHOD has been commissioned to develop screening measures for comparing the performance of the medical specialties. A previous report has addressed case fatality measures. This study relates to measures of admission and re-admission.

Traditional re-admission measures are not a clinically useful measure of the quality of care given in an index admission for chronic medical conditions and should not be used to compare performance between hospitals.

Indicators relating to the number of admissions per person and the time for which people were admitted over a period of time such as a year are relevant and could be used to assess the overall performance of a health economy. The responsibility for admission or for keeping a patient out of hospital lies with the commissioners of the whole patient pathway.

Initial results

Analyses have been done for six diagnoses for three of the measures being investigated:

- Spell-based admission rates per 100,000 resident population for each local authority
- Person-based admission rates per 100,000 resident population for each local authority over a four year period
- Ratio of number of spells over a four year period per person.

These initial results have not yet been discussed with the collaborating clinicians.
1. BACKGROUND AND APPROACH

Purpose of study

The Department of Health and the Healthcare Commission commissioned the National Centre for Health Outcomes Development (NCHOD) at Oxford to work with the Royal College of Physicians (RCP) to develop for emergency admissions in the medical specialties a set of outcome indicators that could help:

- Clinicians:
  - share information about prognosis with patients
  - assess outcomes in patients they have treated
  - compare outcomes of patients they have treated with colleagues’ experience.
- Healthcare Commission to screen trusts with acute hospitals as to whether their clinical performance needs further investigation.

The first phase of the work about case fatality rates has been completed and recommendations about suitable indicators, endorsed by the RCP advisers, have been submitted to the commissioners.

The next phase of this collaboration is intended to address the use of re-admission measures as outcome indicators. Following discussions with the project’s medical advisers we have decided to take a different approach from that used in previous clinical indicator work.

Traditional approach to re-admission measures

The acute trust star ratings and clinical indicators in England have included indicators for emergency re-admission within 30 days of an admission:

- in which a hysterectomy was performed
- in which a hip replacement operation was performed
- for fractured hip
- for stroke
- of an older person
- of a child.

The re-admission measures currently used for clinical indicators and star ratings relate to the occurrence of a first emergency re-admission for any cause following within a defined time after an initial (index) admission.

Thus in medical emergency work a re-admission indicator following admission with diagnosis X, based on the traditional thinking, would be defined as:
• Proportion of emergency continuous in-patient cells (CIPS) starting with a ‘medical’ FCE with the ‘main’ diagnosis X that resulted in a first emergency re-admission starting 0-n days after discharge from the index admission.

The index admissions would be those emergency CIPS starting with a medical specialty FCE and occurring in a calendar year for an individual with:
• X as the first diagnosis code in the last FCE
• ‘medical’ FCEs being defined as HES specialties 300-430 less 420 (paediatrics)
• admissions with disposals other than home excluded
• admissions ending in death or with death occurring within n days of discharge from the index admission without an earlier emergency re-admission being excluded.

The numerator would be emergency re-admissions starting 0-n days after discharge from an index admission with:
• only the first re-admission after discharge included
• re-admission for all causes included
• same day re-admissions included.

Previous studies on use of re-admission as a hospital outcome indicator

NCHOD carried out a literature review about the use of re-admission measures early in its programme of work and a report was submitted to the Department of Health in 2000.

Many studies have identified factors, other than the quality of care in the index admission, that might predict or be the cause of re-admission. With respect to the medical specialties the main ones that have been investigated are:
• Length of stay in index admission.
• Number of co-morbidities, in particular:
  - depression
  - renal failure
  - cancer
  - COPD
  - congestive heart failure.
• Number and frequency of previous hospital stays.
• Social factors such as:
  - inability to carry out activities of daily living
  - poor living conditions.
• Adverse drug reactions.

Overall, studies on patients with chronic medical conditions have shown that:
• Decreasing lengths of stay do not lead to increased re-admission rates.
• Only consistent factors related to increased re-admission rates were:
  - number of co-morbidities
  - number and frequency of previous admissions.
Some of the studies tried to identify whether re-admissions are actually avoidable or preventable. In two studies, 9% and 18% of medical re-admissions (a very small proportion) were considered to be preventable. In a number of small studies on older people from 15% to 60% were considered unavoidable with the principal reasons for re-admission being a new medical event and the deterioration of the existing condition.

The conclusion drawn from this literature search was that re-admission measures are a poor indicator of the quality of care given during a medical admission, in particular those for chronic medical conditions.

Furthermore, a fundamental flaw in the traditional measure is that it counts only one re-admission. It is possible that a more relevant performance indicator is the number of re-admissions per person and that the more important events in terms of clinical problems after discharge may sometimes be those in re-admissions after the first one.

**Proposed approach**

*Following a re-reading of the literature review and discussion with the RCP expert advisers it is proposed that:*

- **Traditional re-admission measures are not a clinically useful measure of the quality of care given in an index admission for chronic medical conditions and should not be used to compare performance between hospitals.**
- **Indicators relating to the number of admissions per person and the time for which people were admitted over a period of time such as a year are relevant and could be used to assess the overall performance of a health economy. The responsibility for admission or for keeping a patient out of hospital lies with the commissioners of the whole patient pathway.**

A re-admission measure based on a count of initial emergency re-admissions for a chronic condition such as heart failure or COPD is not clinically useful. However, in the current political climate a priority is being given to keeping people with chronic conditions out of hospital. Measures relating to the number of admissions that people have or the time spent in hospital will be essential for measuring the performance of those bodies responsible for commissioning services for people with these conditions.

Outcome indicators have been developed relating to the number of admissions and re-admissions which:

- relate to an individual person’s experience over at least a year
- are population based.

**Database used**

The database used was a linked file of English hospital episodes and ONS mortality data developed at Oxford. Index admissions were for the calendar years 1999-2002.
2. INITIAL SET OF MEASURES

Measures

The three admission/re-admission measures that have been addressed initially are:

- Spell-based admission rates per 100,000 resident population for each local authority. The spell is the hospital admission representing the continuous time spent in a hospital trust. Persons admitted several times are counted as many times as they have admissions.
- Person-based admission rates per 100,000 resident population for each local authority over a four-year period. A person admitted several times during the time period is only counted once. The measure is one of a ‘four-year period prevalence’ of people admitted.
- Ratio of the number of spells over a four year period per person.

Indicators

Continuous in-patient spells (CIPS) have been used as the unit for counting admissions. It was agreed with the medical advisers that the most clinically useful way of developing the requisite measures was to use diagnosis-specific indicators. The full set of diagnoses to be addressed is shown in Exhibit 1. In this initial study the following diagnosis-based analyses have been done:

- acute myocardial infarction, code I21
- asthma, codes J45-46
- COPD, codes J40-44
- diabetes, codes E10-15
- heart failure, code I50
- stroke, codes I61-64.

All CIPS in which the chosen diagnosis is recorded as the main diagnosis have been included in the initial analyses.

Depending on expert advice obtained from the collaborating clinicians, further investigations may restrict the admissions included in the analyses to those:

- with medical specialty finished consultant episodes only
- which are emergency admissions only.

Results of analyses

Information packs have been produced for each diagnosis containing:

- Maps of England showing the three measures initially analysed
- Tables showing individual results by local authority
• Lakhani-grams.

The first table shows the individual values for each local authority, ranked by their standard codes, for:

• Spell-based admission rates:
  - Observed (OBS) number of spells
  - Expected (EXP) number of spells obtained by applying national age-sex specific rates to the age-sex distribution of the local authority population
  - Age standardised rate calculated by indirect standardisation with the 95% lower and upper confidence limits for the rate.

• Person-based admission rates:
  - Observed (OBS) number of people
  - Expected (EXP) number of people obtained by applying national age-sex specific rates to the age-sex distribution of the local authority population
  - Age standardised rate calculated by indirect standardisation with the 95% lower and upper confidence limits for the rate.

• Ratio of spells in the four year period per person.

The second table shows the local authority areas ranked, from highest to lowest, according to the standardised spell-based admission rate.

*The tables have not been included in this progress report and are available as part of the diagnosis-specific information packs.*

The Lakhani-grams provide plots of the values of the spell-based and person-based rates for each local authority. Each vertical line represents one local authority area. It shows the point estimate for the standardised rate for the area with its 95% confidence intervals. At a glance it shows the spread of rates across England and the extent to which variation across the country is statistically significant.
Exhibit 1: Diagnoses chosen for analysis

A00-09 Intestinal infectious diseases
A15-19 and B90 Tuberculosis
B15-19 Viral hepatitis

C34 Malignant neoplasm of bronchus and lung
C81 Hodgkin’s disease
C82-85 Non-Hodgkin’s lymphoma
C91 Lymphoid leukaemia
C92 Myeloid leukaemia

E03 Hypothyroidism
E05 Thyrotoxicosis
E10-15 Diabetes mellitus

G12.2 Motor neurone disease
G20 Parkinson’s disease
G35 Multiple sclerosis

I05-09 Rheumatic heart disease
I10-15 Hypertension
I20 Angina pectoris
I21 Acute myocardial infarction
I25 Chronic ischaemic heart disease
I50 Heart failure
I61-64 Stroke

J12-22 Acute lower respiratory tract infection
J40-44 COPD
J45-46 Asthma

K25-26 Peptic ulcer
K50 Crohn’s disease
K51 Ulcerative colitis
K58 Irritable bowel syndrome
K74 Cirrhosis of liver

M05-06 Rheumatoid arthritis
N17-19 Renal failure
T39 and 43 Poisoning by analgesics/psychotropics
3. ACUTE MYOCARDIAL INFARCTION

This section about acute myocardial contains:

- Maps for England showing:
  - Spell-based admission rates per 100,000 resident population for each local authority
  - Person-based admission rates per 100,000 resident population for each local authority over a four year period
  - Ratio of number of spells over a four year period per person.
- Lakhani-gram showing spell-based admission rates per 100,000 resident population for each local authority
- Lakhani-gram showing person-based admission rates per 100,000 resident population for each local authority.
Acute myocardial infarction: people
Principal condition: males and females: 1998/99 to 2001/02
Rate per 100000 for each local authority in England
Acute myocardial infarction: ratios
Principal condition: males and females: 1998/99 to 2001/02
Number of CIPs per person for each local authority in England

Ratios
I21
- 1.05 to 1.15
- 1.04 to 1.05
- 1.03 to 1.04
- 1.02 to 1.03
- 1.00 to 1.02
4. ASTHMA

This section about asthma contains:

- Maps for England showing:
  - Spell-based admission rates per 100,000 resident population for each local authority
  - Person-based admission rates per 100,000 resident population for each local authority over a four year period
  - Ratio of number of spells over a four year period per person.
- Lakhani-gram showing spell-based admission rates per 100,000 resident population for each local authority
- Lakhani-gram showing person-based admission rates per 100,000 resident population for each local authority.
Asthma: people
Principal condition: males and females: 1998/99 to 2001/02
Rate per 100000 for each local authority in England
Continuous inpatient spells for each local authority

People for each local authority
5. COPD

This section about COPD contains:

- Maps for England showing:
  - Spell-based admission rates per 100,000 resident population for each local authority
  - Person-based admission rates per 100,000 resident population for each local authority over a four year period
  - Ratio of number of spells over a four year period per person.
- Lakhani-gram showing spell-based admission rates per 100,000 resident population for each local authority
- Lakhani-gram showing person-based admission rates per 100,000 resident population for each local authority.
COPD: people
Principal condition: males and females: 1998/99 to 2001/02
Rate per 100000 for each local authority in England

People
J40-J44

- 133 to 260
- 100 to 133
- 81 to 133
- 66 to 81
- 9 to 66
COPD: ratios
Principal condition: males and females: 1998/99 to 2001/02
Number of CIPs per person for each local authority in England
Continuous inpatient spells for each local authority
6. DIABETES

This section about diabetes contains:

- Maps for England showing:
  - Spell-based admission rates per 100,000 resident population for each local authority
  - Person-based admission rates per 100,000 resident population for each local authority over a four year period
  - Ratio of number of spells over a four year period per person.
- Lakhani-gram showing spell-based admission rates per 100,000 resident population for each local authority
- Lakhani-gram showing person-based admission rates per 100,000 resident population for each local authority.
Diabetes mellitus: people
Principal condition: males and females: 1998/99 to 2001/02
Rate per 100000 for each local authority in England
Diabetes mellitus: ratios
Principal condition: males and females: 1998/99 to 2001/02
Number of CIPs per person for each local authority in England
7. HEART FAILURE

This section about heart failure contains:

- Maps for England showing:
  - Spell-based admission rates per 100,000 resident population for each local authority
  - Person-based admission rates per 100,000 resident population for each local authority over a four year period
  - Ratio of number of spells over a four year period per person.
- Lakhani-gram showing spell-based admission rates per 100,000 resident population for each local authority
- Lakhani-gram showing person-based admission rates per 100,000 resident population for each local authority.
Heart failure: people
Principal condition: males and females: 1998/99 to 2001/02
Rate per 100000 for each local authority in England
Heart failure: ratios
Principal condition: males and females: 1998/99 to 2001/02
Number of CIPs per person for each local authority in England

<table>
<thead>
<tr>
<th>Ratios</th>
<th>1.31 to 1.49</th>
<th>1.28 to 1.31</th>
<th>1.24 to 1.28</th>
<th>1.21 to 1.24</th>
<th>1.08 to 1.21</th>
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Map showing the distribution of heart failure ratios across England, with different shades indicating different ratios.
Continuous inpatient spells for each local authority

People for each local authority

8. STROKE
This section about stroke contains:

- Maps for England showing:
  - Spell-based admission rates per 100,000 resident population for each local authority
  - Person-based admission rates per 100,000 resident population for each local authority over a four year period
  - Ratio of number of spells over a four year period per person.
- Lakhani-gram showing spell-based admission rates per 100,000 resident population for each local authority
- Lakhani-gram showing person-based admission rates per 100,000 resident population for each local authority.
Stroke: people
Principal condition: males and females: 1998/99 to 2001/02
Rate per 100000 for each local authority in England

People
101-164
152 to 286
136 to 152
123 to 136
111 to 123
52 to 111
Stroke: ratios

Principal condition: males and females: 1998/99 to 2001/02

Number of CIPs per person for each local authority in England
Continuous inpatient spells for each local authority

People for each local authority