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Influenza immunisation

Investigating the effect of provider incentives for influenza immunisation
a longitudinal study

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SAPC North, 26th November 2010

Outline

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   ■ Incentivisation
   ■ QOF performance
   ■ Research questions

2 QMAS analysis
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3 GPRD analysis
   ■ Method
   ■ Results

4 Conclusions
Influenza immunisation

The Quality and Outcomes Framework

Pay-for-performance

- QOF was introduced in 04/05, rewarding GPs for achieving a set of quality targets for patients with chronic conditions.
- 76 clinical indicator for 10 conditions in 04/05 (80 indicators for 19 conditions in 08/09).
- In 04/05, 5 indicators for the influenza immunisation of patients with Asthma, CHD, COPD, DM or Stroke.
- QOF reviewed every two years and in the 06/07 review Asthma7 removed & changes were made to the remaining indicators (CHD12, COPD8, DM18 and STROKE10).
- Patients aged 65+: item-of-service (IoS) fee since 00/01.
- All conditions bar Stroke: IoS fee since 04/05.

The Quality and Outcomes Framework

some details

- Practice achievement calculated as the % of patients for which the indicator was met over eligible patients.
- To protect patients against discrimination, practices are allowed to exception report patients from indicators.
- Practices achieving...
  - below lower threshold (LT) level receive no payment.
  - within lower-upper threshold range rewarded on a linear principle.
  - above upper threshold (UT) receive no excess payment.
- Number of points directly proportional to payment size.
- Influenza immunisation indicators in the 06/07 review:
  - LT increased for 4 remaining indicators from 25 to 40%.
  - UT increased only for CHD12 from 85 to 90%.
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Background

QOF performance

Measures of performance

- Reported achievement (RA) - used for the QOF payments:
  - the % of patients for which the indicator was met over eligible patients - after exception reported patients have been removed from both the numerator and denominator.

- Population achievement (PA):
  - the % of patients for which the indicator was met over eligible patients including exception reported patients.

- Exception reporting (ER):
  - the % of exception reported patients over eligible patients including exception reported patients.

Available datasets

- Quality and Measurement System (QMAS):
  - On which the QOF scheme is based.
  - Ready to use RA (since y1), PA and ER (since y2) rates.

- General Practice Research Database (GPRD):
  - Holds event data for more than 270 English practices, from 1999 (545 active practices in Apr10 and 11.2m patients).
  - Final sample of 653,500 patients from 148 nationally representative practices in terms of list size and deprivation (IMD).
  - Can be used to construct RA, PA, ER rates...
  - Data available prior to the introduction of QOF and can be used to extract data for non-incentivised processes and/or diseases.
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Background

QOF performance

Mean rates for RA, PA and ER
QOF years 1-5

Reported and Population Achievement
means from QMAS data

Exception Reporting
means from QMAS data

RA and ER distributions
CHD12 - worth 7 points

CHD 12

Number of practices

Percentage of patients

CHD12 RA
CHD12 PA
COPD8 RA
COPD8 PA
DM18 RA
DM18 PA
STROKE10 RA
STROKE10 PA

0 200 400 600 800 1000
0 20 40 60 80 100

Exception reporting 08/09
Reported achievement 08/09
Exception reporting 07/08
Reported achievement 07/08
Exception reporting 06/07
Reported achievement 06/07
Exception reporting 05/06
Reported achievement 05/06
Reported achievement 04/05
RA and ER distributions

COPD8 - worth 6 points

Diabetes 18 - worth 3 points
High levels of achievement but...

- are there performance differences between the indicators which can be attributed to differences in their characteristics?
- what happened to immunisation rates for patients with Asthma after the indicator was removed from the QOF following the first review?
- what were the effects of the introduced changes to the remaining four indicators?
- what were the effects of the various entangled incentivisation schemes over time? (especially QOF)
Investigating the effect of indicator characteristics

- Random effects multilevel multivariate linear regressions used on RA, PA and ER.
- Years, indicators, CHD12 upper threshold change, indicator denominator at the practice level included as independent variables.
- Lower threshold and points could not be including due to perfect collinearity.
- Practices classed into 3 groups, according to their RA in previous year:
  - 90% or above
  - 85% or above but below 90%
  - below 85%
- Included interactions to estimate the effect of the upper threshold increase on each of the practice groups.

## Results

Regressions’ table

<table>
<thead>
<tr>
<th>variables</th>
<th>RA model*</th>
<th></th>
<th>PA model**</th>
<th></th>
<th>ER model†</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff (95% CI)</td>
<td>p-value</td>
<td>Coeff (95% CI)</td>
<td>p-value</td>
<td>Coeff (95% CI)</td>
<td>p-value</td>
</tr>
<tr>
<td>2006/07</td>
<td>0.629 (0.543, 0.715)</td>
<td>&lt;0.001</td>
<td>-0.609 (-0.703, -0.516)</td>
<td>&lt;0.001</td>
<td>1.276 (1.189, 1.363)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>2007/08</td>
<td>0.409 (0.314, 0.504)</td>
<td>&lt;0.001</td>
<td>-1.321 (-1.420, -1.223)</td>
<td>&lt;0.001</td>
<td>1.847 (1.752, 1.941)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>2008/09</td>
<td>0.208 (0.161, 0.374)</td>
<td>&lt;0.001</td>
<td>-0.806 (-0.911, -0.701)</td>
<td>&lt;0.001</td>
<td>1.333 (1.029, 1.237)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CHD12</td>
<td>-0.292 (-0.434, -0.151)</td>
<td>&lt;0.001</td>
<td>-0.167 (-0.323, -0.011)</td>
<td>0.036</td>
<td>-0.479 (-0.622, -0.336)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>DM18</td>
<td>-0.968 (-1.065, -0.871)</td>
<td>&lt;0.001</td>
<td>-2.973 (-3.081, -2.865)</td>
<td>&lt;0.001</td>
<td>1.965 (1.866, 2.064)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>STROKE10</td>
<td>-2.475 (-2.550, -2.401)</td>
<td>&lt;0.001</td>
<td>-4.235 (-4.318, -4.152)</td>
<td>&lt;0.001</td>
<td>2.219 (2.143, 2.295)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Number of patients (per100)‡</td>
<td>0.515 (0.564, 0.466)</td>
<td>&lt;0.001</td>
<td>-0.371 (-0.318, -0.224)</td>
<td>&lt;0.001</td>
<td>0.107 (0.064, 0.149)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Upper threshold change for practices with RA≥90% in previous year</td>
<td>0.449 (0.304, 0.594)</td>
<td>&lt;0.001</td>
<td>0.252 (0.092, 0.413)</td>
<td>0.002</td>
<td>0.210 (0.063, 0.357)</td>
<td>0.005</td>
</tr>
<tr>
<td>Upper threshold change for practices with RA in (85%, 90%) range in previous year</td>
<td>1.096 (0.883, 1.309)</td>
<td>&lt;0.001</td>
<td>0.499 (0.264, 0.734)</td>
<td>&lt;0.001</td>
<td>0.479 (0.264, 0.695)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Upper threshold change for practices with RA&lt;85% in previous year</td>
<td>2.515 (2.275, 2.754)</td>
<td>&lt;0.001</td>
<td>1.161 (0.897, 1.426)</td>
<td>&lt;0.001</td>
<td>1.124 (0.882, 1.366)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* 8654 practices included. On average, data was available for 8351 practices across indicators and years.
** 8493 practices included. On average, data was available for 8282 practices across indicators and years.
† 8493 practices included. On average, data was available for 8282 practices across indicators and years.

Wald’s $\chi^2=11,510$ and $p<0.001$.

Wald’s $\chi^2=20,458$ and $p<0.001$.

Wald’s $\chi^2=9,017$ and $p<0.001$. 

Number of patients (per100)‡ for the RA model, $\bar{p}$ for the PA and ER models.
Compared to 2005/06, RA was higher in 2008/09.  
But PA since levels in 2008/09 were lower than in 2005/06 (ER increase to blame).  
Practice register size negatively associated with achievement.  
Increase in the CHD12 upper threshold in 2006/07 had a positive effect on achievement:  
High and low achieving practices alike improved, on average, more in CHD12 than they did in the other indicators in which the UT did not change.  
Although a large % of the RA increase is due to a large increase in ER, PA was positively affected.

Data on clinical events used to identify patient conditions and construct the QOF influenza immunisation indicators for seven QOF years (01Mar00- 31Apr07).  
Patient age, sex and relevant multi-morbidities available.  
To disentagle the incentivisation effects six mutually exclusive patient groups defined, for each of two age categories (45-65 and 65+):  
None of the five conditions present  
Asthma diagnosis and none of the other four conditions  
Stroke diagnosis and none of the other four conditions  
CHD diagnosis  
COPD diagnosis, but no CHD diagnosis  
Diabetes diagnosis, but no CHD and no COPD diagnosis  
Multilevel logistic regression used for each group with age, sex and their interactions included as covariates.
Comparison of condition groups vs no condition, 00/01

**Influenza Immunisation Odds Ratios, 2000/01**
compared to condition free group of same age range

<table>
<thead>
<tr>
<th>Condition</th>
<th>2000/01 Odds</th>
<th>2001/02 Odds</th>
<th>2002/03 Odds</th>
<th>2003/04 Odds</th>
<th>2004/05 Odds</th>
<th>2005/06 Odds</th>
<th>2006/07 Odds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>2.559</td>
<td>2.589</td>
<td>1.324</td>
<td>2.091</td>
<td>2.094</td>
<td>1.832</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>8.947</td>
<td>7.115</td>
<td>8.935</td>
<td>9.527</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Condition groups over time, 45-65

**Influenza Immunisation Odds Ratios across time for patients aged [45, 65]**
compared to the same patient group, in 00/01

**QOF years**
- no condition
- Asthma
- Stroke
- CHD
- COPD
- DM
### Influenza Immunisation

#### GPRD analysis

#### Results

**Condition groups over time, 65+**

#### Influenza Immunisation Odds Ratios across time for patients aged 65 or over compared to the same patient group, in 00/01

- **2001/02**
- **2002/03**
- **2003/04**
- **2004/05**
- **2005/06**
- **2006/07**

- **QOF years**
- **no condition**
- **Asthma**
- **Stroke**
- **CHD**
- **COPD**
- **DM**

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**Continuous increase in immunisation rates...**
- from 03/04 to 05/06 for condition groups aged [45-65].
- from 02/03 to 05/06 for condition groups aged 65+.

**Drop in immunisation rates in 06/07 for all groups bar COPD [45-65] and Stroke 65+:**
- for Asthma the odds ratios fell to 04/05 levels or below.
- for the other conditions odds ratios were above 04/05 levels.

**The QOF increased (often doubled) the immunisation rate in patients aged 45 to 65 with one of the incentivised conditions, compared to the non-incentivised group.**

**In contrast, for patients aged 65+, both the incentivised and the non-incentivised group rise.**
Discussion

- If the aim of the QOF is continuous improvement (and not only rewarding good practice):
  - increasing the upper threshold seems to be the simplest policy decision to that end.

- The QOF seems to have increased vaccination rates for those with the incentivised conditions aged 45 to 64.

- Rates for both incentivised and non-incentivised groups aged 65+ increased after the introduction of the QOF:
  - underlying positive trend for this age group, and therefore the QOF had no additional effect?
  - QOF did have a positive effect on the incentivised conditions, but also exerted a positive externality on non-incentivised patients?

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Thank you

Comments, suggestions: e.kontopantelis@manchester.ac.uk