The ability of DRG systems to explain variations in resource consumption

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Diagnosis Related Groups

- Classification system for hospital patients
- Used to reimburse hospitals
  - Transparent funding with price set in advance
  - Equal pay for equal work: same price paid for all patients in the same DRG
- Different DRG systems across Europe
- How well do these DRG systems perform?
Objectives

- Why do costs/LoS vary for patients who are receiving the same treatment?
- How much of the variation is captured by:
  - The DRG to which they are allocated
  - Socio-demographic characteristics
  - Diagnostic characteristics and co-morbidities
  - Quality and adverse events
  - The hospital in which they are treated
- Do some DRG systems have greater explanatory power than others?
10 countries
- Austria, England, Estonia, Finland, France, Germany, Ireland, Poland, Spain, Sweden

10 episodes of care
- AMI, appendectomy, breast cancer, CABG, childbirth, cholecystectomy, hernia, hip replacement, knee replacement, stroke
Appendectomy

- >18
  - w/o major cc: FZ20B
  - w. major cc: FZ20A

- <19: FZ20C
French DRGs

Appendectomy

- **Level 1**
  - Uncomplicated 06C091
  - Complicated 06C081

- **Level 2**
  - Uncomplicated 06C092
  - Complicated 06C082

- **Level 3**
  - Uncomplicated 06C093
  - Complicated 06C083

- **Level 4**
  - Complicated 06C084
European DRGs for appendectomy

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of DRGs</th>
<th>Form of primary diagnosis</th>
<th>CCs</th>
<th>Age</th>
<th>LoS</th>
<th>Death</th>
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Methods: data

- Analysis of routine patient-level data
  - Costs or length of stay for patients having the particular episode of care
  - Diagnostic and treatment details for all these patients
- Analysis of the hospitals in which patients were treated
<table>
<thead>
<tr>
<th>Country</th>
<th>Patients</th>
<th>Hospitals</th>
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<td>Finland</td>
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<td>5</td>
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<td>England</td>
<td>33,394</td>
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</table>
Patient costs: variation within and across hospitals


Source: Hospital Episode Statistics, 2007/8
Distribution of costs

Distribution of costs: A graph showing the distribution of costs among patients with a peak in the middle and a decline on either side.
Distribution of costs

- Patients vs. Cost

12
Why do some patients have different costs than others?

\[ \ln c_{ij} = \alpha + \beta^d d_{ij} + \beta^p x_{ij} + u_j + \varepsilon_{ij} \]

Log cost of patient \( i \) in hospital \( j \)

- DRGs
- Patient-level variables
- Hospital effect

Are DRGs better than our patient variables at explaining costs?
- Age and gender
- Type of admission (emergency)
- Whether transferred to/from hospital
- Counts of diagnoses and procedures
- Specific diagnoses and procedures
- Charlson and other co-morbidities
- OECD Patient safety indicators
- Urinary tract and wound infections
- Discharged dead or alive
Methods: LoS equation

- LoS are “count” data
- Estimate Poisson or Negbin models
- Include same patient-level variables as for cost equation
- Extract hospital effect by introducing dummy variable for each hospital
Methods: hospital effects

Why is the average cost/LoS of treating patients in one hospital higher than in another?

\[ \hat{\mu}_j = \alpha_o + \sum_{m=1}^{M} \gamma_m z_{jm} + \mu_j \]

- Estimated hospital effect for hospital j
- Hospital characteristics
  - Eg size, teaching status
Appendectomy patients have HIGHER costs/LoS if they:

- Are less than 11 or more than 35 years old
- Had a higher number of total diagnoses
- Underwent more procedures
- Were admitted as emergencies
- Had a laparoscopy
- Died (but shorter LoS)
- Had deep vein thrombosis pulmonary embolism
- Suffered wound infection
Finnish hospitals

Log of Patient Cost: Appendectomy (Finland)
Length of Stay: Appendectomy (Poland)
Evaluating DRGs

- Are DRGs better than patient characteristics at explaining costs?

[1] Cost = f(DRGs, Patient variables)

[2] Cost = f(DRGs)

[3] Cost = f(Patient variables)

Are DRGs better than patient characteristics at explaining costs?

- Yes: England, Sweden, Estonia
- No: Austria, Finland, Germany, Ireland, Poland, Spain
- About the same: France
<table>
<thead>
<tr>
<th>Medical Condition</th>
<th>Sweden</th>
<th>Estonia</th>
<th>Finland</th>
<th>England</th>
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Issues to bear in mind

- Complementary not substitute way to evaluate DRG systems
- No single national DRG system dominates
- Important differences in national coding and accounting practices
  - Eg recording of secondary diagnoses
  - No-one knows the true costs of treatment!
Conclusions

- Generally DRGs have good explanatory power
- Variation also driven by patient characteristics
- Large variation in resource use among hospitals
  - Scope for better utilisation of resources
Conclusions

- Some DRG systems have higher explanatory power than others
  - Scope for refinement, but not necessarily more groups
- Should there be a EuroDRG?
  - What is the variation in medical practice?
  - Great similarities in underlying architecture and data (ICD)
  - Local ownership
http://www.eurodrg.eu/

European Conference
Health Economics,
Zurich, 18-20 July 2012