EuroHOPE: Hospital performance

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What and how EuroHOPE does?

- Applies both the disease level and the sub-sector level approaches

- Develops methods to measure outcomes and costs of care of specific diseases for evaluation of care given during the whole cycle of care

- The methods can be used for
  - routine performance evaluation and monitoring
  - establishing recommendations for lists of indicators to be routinely collected and published by the EU (as a part of European Community Health Indicators)
Aims of EuroHOPE (I)

- **To develop** methods for international comparative health service research using register data

- **To contemplate** the relationship between outcomes/quality and use of resources (e.g. costs) and compare them between European countries, regions and providers

- **To explore and reveal** reasons behind differences in outcomes and costs
  - In particular: the interest will be on **policy driven factors**:
    - treatment practices, use of medicines and modern technology, waiting times, financing, organisation of delivery, reforms etc.
Aims of EuroHOPE (II)

- **To compare** quality and cost of acute hospital care in the Nordic countries

- **To give proposals** concerning the data content of national level registers and outcome measurements in order to improve the continuous monitoring of performance on both national and international level

- **To establish** requirements and standards for European-wide benchmarking on outcomes, quality and costs

- **To facilitate** decision-makers as well as health professionals at different levels to learn from the best practices
Patient group specific work (I)

- **Five** patient groups subject to
  - acute myocardial infarction (AMI)
  - stroke
  - hip fracture
  - breast cancer
  - very low birth weight infants

- **Clinical experts** from each of the participating countries

- **The protocols define**
  - inclusion/exclusion criteria
  - definition of cycle of care (when it starts, follow-up etc.)
  - comorbidities (used in risk adjustment)
  - specification of outcome measures
Patient group specific work(II)

- Development of national, regional and hospital level indicators for
  - access and utilisation of services
  - treatment practices
  - costs and outcomes

- A pilot study on HRQoL and patient satisfaction measurement in selected hospitals in participated countries for
  - stroke
  - breast cancer
Challenges – Searching for the smallest common denominator

- **Definition of an episode**
  - When it starts and when it finishes (follow up time)?

- **Balancing**
  - What can be done on routine basis with scientific/methodological aspects

- **Comparability**
  - Case-mix adjustment and/or eliminating selection bias
Solutions in EuroHOPE

- **Use of registers together with solid coding (ICD10, ICD9)**
  - Definitions of patient groups to maximize comparability

- **Follow-up and follow-down**
  - Extensive risk adjustment and baseline

- **Econometrics and statistics knowhow**
  - Standardisation by modeling and computing confidence intervals

- **Protocols**
  - Definitions of episodes
Definitions of the episodes

Total episode of care

First hospital episode

Admission to ward A  Admission to ward B
Discharge home or nursinghome  Outpatient visit

Procedure/treatment in ward A  Discharge to another hospital  Medication purchase
State variables for every day (365)

- Describes in which state a patient is in every day during the follow up: 0 Home; 1 Hospital/retirement or nursing home/outpatient visit 2; Dead
- For those classified to 1 additional information on type of institution (2 digit) and type of ward (4 digit)
Models for risk adjustment

Three different risk adjusted models were produced

1. adjusted for sex and age only (M1),
2. adjusted for sex, age, LOS previous year, disease specific comorbidities based on primary and secondary diagnoses the year prior to diagnosis (M2),
3. M3 identical to M2 except comorbidities were based on both primary and secondary diagnosis and medication purchase the year prior to diagnosis.
Method of risk adjustment for mortality

- Based on the experiences in the PERFECT project, the observed/expected approach described in Ash et al. (2003) was used, which roughly corresponds to indirect standardization.
- Use logistic regression
- Estimate regression coefficients from pooled data
- Calculate risk adjusted mortality for each hospital by multiplying the ratio of observed to expected no. of deaths and the mortality proportion from the reference database.
Importance of mortality definition and risk adjustment for hospital rankings. Ischaemic stroke patients in 140 hospitals (Moger et al. 2014)

- High correlation between the three risk adjustment models
- Less correlation between unadjusted and risk adjusted mortality estimates and has an effect on rankings
- The longer the follow up (30-day/90-day) more important is the risk adjustment
- The type of mortality (30-day/90-day) measure used had less impact than the risk adjustment
- The risk adjustment increased the variation in mortality between hospitals
- The choice of reference data does not effect hospitals ranking
Regional variation in mortality, AMI

Regional variation in mortality, stroke

- Age- and sex-adjusted one-year mortality by regions, ischaemic stroke in 2008
Regional variation in mortality, hip fracture

- Age- and sex-adjusted one-year mortality by regions, hip fracture in 2008 (Norway 2009)
Aims of hospital level analysis

- To compare quality and use of resources of hospital care using patient level data in treating of three important diseases (AMI, ischemic stroke and hip fracture) in five European countries
- Explore whether hospitals’ quality and cost variation can be explained by hospital- and health-system-level characteristics
- To examine whether cost-quality trade-off exists by comparing hospital level costs and survival rates
Measurement of quality

- Quality: 30-day survival after onset of the disease
  Individual patient level data from Finland, Hungary, Italy, Norway and Sweden from the years 2007-2008 (Norway 2009)

* Hospital-level random effects are used as measures of performance, recommended by “The Centers for Medicare and Medicaid Services“ (US)
## Description of data

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<tr>
<th></th>
<th>Finland</th>
<th>Hungary</th>
<th>Italy</th>
<th>Norway</th>
<th>Sweden</th>
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<tr>
<td>AMI Number of patients</td>
<td>16978</td>
<td>26075</td>
<td>19109</td>
<td>10558</td>
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<td>91.1</td>
<td>91.5</td>
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<td>8981</td>
<td>7344</td>
<td>7359</td>
<td>7770</td>
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<tr>
<td>Stroke Number of patients</td>
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<td>65</td>
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<tr>
<td>Mean 30 day-survival %</td>
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<td>87.8</td>
<td>93.0</td>
<td>88.7</td>
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<td>Hip Fracture Number of patients</td>
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<tr>
<td>Mean 30-day survival %</td>
<td>99.0</td>
<td>88.0</td>
<td>96.0</td>
<td>92.0</td>
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<td>20390</td>
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</table>
Variables used in estimations

Patient level variables used in performance analysis (risk adjustment):

- Age (classified)
- Gender
- Comorbidities based on medical history of the previous year
- Hospital transfer to higher level. The “first hospital” refers to the hospital where the patient initially arrived. “A hospital in charge” is the highest in the hierarchy in all hospitals the patient has been in during the first week of treatment. AMI analysis was made using both alternatives

Hospital and regional level variables:

- Teaching/university status
- Availability specific services and resources (catheterisation laboratory, stroke unit)
- Regional concentration of care (Herfindahl-Hirschman Index (HHI))
- GDP per capita
- Population density
Measurement of hospital quality performance (30-day survival)

- Empirical Bayes estimates of hospital effects for quality obtained from a model, where age, gender, comorbidities and transfers to a higher level hospital are taken into account
- The effects do not as such have exact practical interpretation but we can estimate that survival difference between the lowest and highest hospital was 30 percentage points (min 67.5, max 97.5) in the care of AMI patients
Hospitals quality performance in care of AMI patients on empirical Bayes estimates of random coefficients
Hospitals quality performance in care of ischemic stroke patients on empirical Bayes estimates of random coefficients
Hospitals quality performance in care of hip fracture patients based on empirical Bayes estimates of random coefficients
What explains good quality performance?

AMI
- Existence of a catheterisation laboratory in the hospital in all countries except Italy (+)
- Lower concentration care in Hungary and Norway (+)
- Higher GDP per capita in Hungary and Finland (+)

Ischemic stroke
- University/teaching status in Hungary and stroke unit in Italy (+)
- Higher GDP per capita in Finland (+)

Hip fracture
- Small volume in Italy (+)
Hospital level analysis: conclusions (1)

- Remarkable differences between hospitals and countries in both survival and cost
- The differences cannot be explained by the characteristics of the health care system; and inclusion of hospital or regional variables does not change the ranking of countries.
- Some evidence supporting an increasing horizontal integration in care for the three conditions: An increase in the concentration of the regional hospital system was associated with a decrease in costs in all countries except Italy.
Hospital level analysis: Conclusions (2)

- An analyse considering whether hospitals which perform well in terms of quality in treating one patient group are performing well also in treating another patient group => no correlation in hospitals quality between the three conditions
  - Using information quality on one specific health problem cannot be used as an only tracer to be generalized whole hospital level quality of care.
  - A comprehensive benchmarking requires performance information on many health conditions

- In the care of AMI a positive correlation between cost and quality. The effect was strongest in Hungary where the survival is lowest

- But positive cost–quality association was inconsistent and not present in all countries and not in stroke and hip fracture => potential exist for improving hospital performance by containing cost or improving quality
EuroHOPE now and future

- Maintains **national and regional indicators** at [http://www.eurohope.info](http://www.eurohope.info)

- Implements **framework for international performance and efficiency benchmarking**

- Provides audience with scientific and policy relevant results
  - Health Policy articles – 2 pieces on the air already!
  - Health Economics Supplement – end of 2014
  - Variety of clinical articles – 4 papers submitted
  - Stream of publications in EuroHOPE Discussion Papers Series at [www.eurohope.info](http://www.eurohope.info)

- Continues the performance evaluation and extends the activity to other countries and other patient groups
Health disparities in Europe: hope for the future?

The Lancet

More than 500 million people live in the European Union, but despite being connected on a political level, disparities in health outcomes are widespread. This disparity was exemplified in last week’s Lancet when Sheng-Chia Chung and colleagues reported that 30 day mortality after acute myocardial infarction (AMI) was more than a third higher in the UK than in Sweden, even though health spending was similar between the countries.

One project seeking to explain such findings is EuroHOPE (European Health-care Outcomes, Performance, and Efficiency), the results of which were presented on April 8 at the Karolinska Institutet in Sweden. Health systems in seven countries with linkable patient-level data (Finland, Hungary, Italy, the Netherlands, Norway, Scotland, and Sweden) were assessed in terms of outcomes, quality, use of resources, and cost for five groups: AMI, stroke, hip fracture, breast cancer, and very-low-birthweight and preterm infancy. Substantial variation in health outcomes was seen—both between and within countries. Hungary fared worst for most health outcomes, largely due to economic factors, and Norway and Sweden tended to have lowest mortality overall, but Scotland fared best for low birthweight mortality. Sweden (and Norway) had the lowest 1 year mortality for AMI, with Scotland’s best performing region still faring worse than Sweden’s worst.
EuroHOPE’s goal is commendable. However, standardised data collection needs to become routine to improve international comparisons. The true reasons for health-outcome differences need to be established before lessons from better-performing neighbours can be applied to improve health care across Europe.