Measuring and Reporting Hospital Mortality.

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Measuring and reporting Hospital mortality

The task

Measuring and reporting mortality aims to develop National indicator(s) of in-hospital mortality. The specified outcome for the project is:

- The development of indicators of in-hospital mortality taking into consideration different types of measurement and/or presentation (eg disaggregation) that may be required at the national level, at jurisdictional level and at facility or unit level.

What we did

- A detailed literature review, an analysis of Australian Hospital Mortality data, the production of various indicators and various formats for indicator presentation

The Literature Review

- Hospitals differ in the rate at which patients die whilst under care
- Variations in hospital mortality rates are always contentious.
- Hospital Standardised Mortality Ratios (HSMRs) are the favored indicator of in-hospital mortality
- HSMRs are observed death rates/expected death rates X 100 –eg an HSMR of 120 is 20% above the overall group average, an HSMR of 80 is 20% below.
- Many of the most common criticisms of HSMRs have been addressed or will be discussed (eg deaths in hospital or at thirty days, % of deaths to include)

The Literature Review

The first rule of indicator development- reliability before validity.

There are 3 potential sources of variation in HSMRs

- Patient level differences (demography, diagnosis, severity) present at the point of admission to hospital
- Systematic differences between hospitals that effect outcomes
- Random error or variation

Risk adjustment

- Methodological issues in risk adjustment have been extensively canvassed
- The consensus strategy is to use logistic regression to generate coefficients to apply probability of death back to individual cases, generating an expected mortality estimate for that hospital's casemix.
- Demographic variables, mode of admission, primary and secondary diagnoses are all usually tested in regression equations using administrative or morbidity data
- Concerns about such data sources are diminishing
- Secondary diagnoses are commonly grouped using the Charlson index
- SEIFA (or other measures of the socio-economic status of the postcode of patient origin) may or may not be included.

Random error or variation

- Early concerns about the size of random error were based on cross-sectional studies, with random error rates calculated using methods such as Monte Carlo simulation
- More recently, longitudinal studies of mortality rates in a variety of samples (eg South Australian unpublished data, Private Hospital unpublished data) including a large Dutch study, have confirmed that mortality rates within institutions are stable over time.
- We have also confirmed this in the national study
- Technically- HSMRs are consistent, i.e. reliable measures
- But are they valid measures of safety and quality

- The purpose of the National Indicators Project is to systematically identify and develop information which can be used to monitor Australia's performance in safety and quality in health care, for intra jurisdictional, inter-jurisdictional and international benchmarking and reporting purposes.

What is the gold standard?

- If, taking risk adjustment into account, you are at greater risk of dying in one hospital than another, there is a difference in the safety of the care provided in those two hospitals.
- Quality is more problematic
- If quality is defined using a restricted number of process measures, then mortality is an imperfect measure
- If variations in mortality are the gold standard, then process measures are imperfect!
- The issue is best resolved by thinking of mortality measures as screening tools to promote further investigation, not definitively diagnostic of quality issues

Public vs private reporting

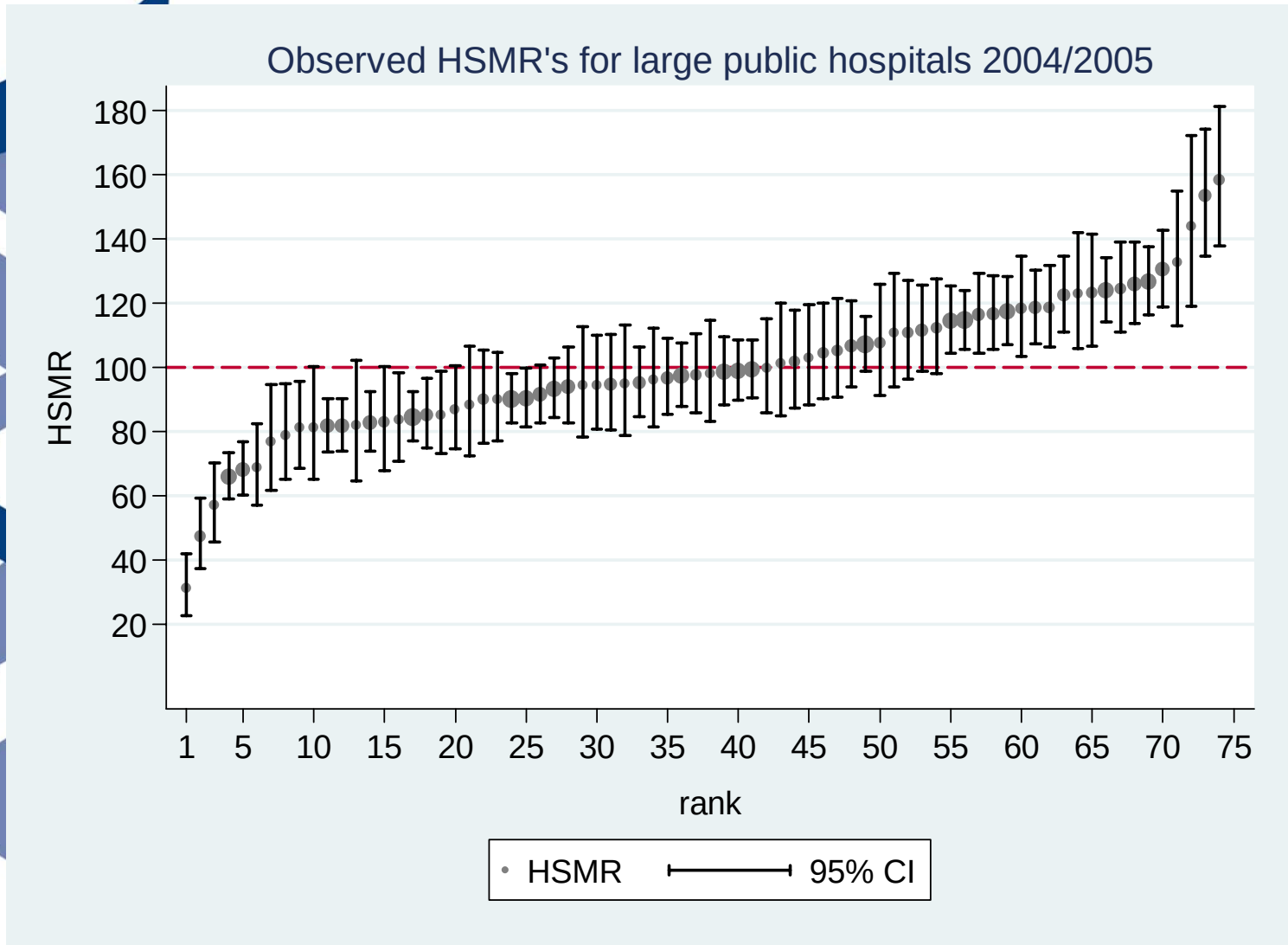
- HSMRs are group or average indicators. The ecological fallacy
- Informing hospitals of their relative performance can influence the subsequent behavior of those hospitals
- But maybe the most important issues in relation to public or private reporting lie elsewhere.

Mortality in Australian Hospitals

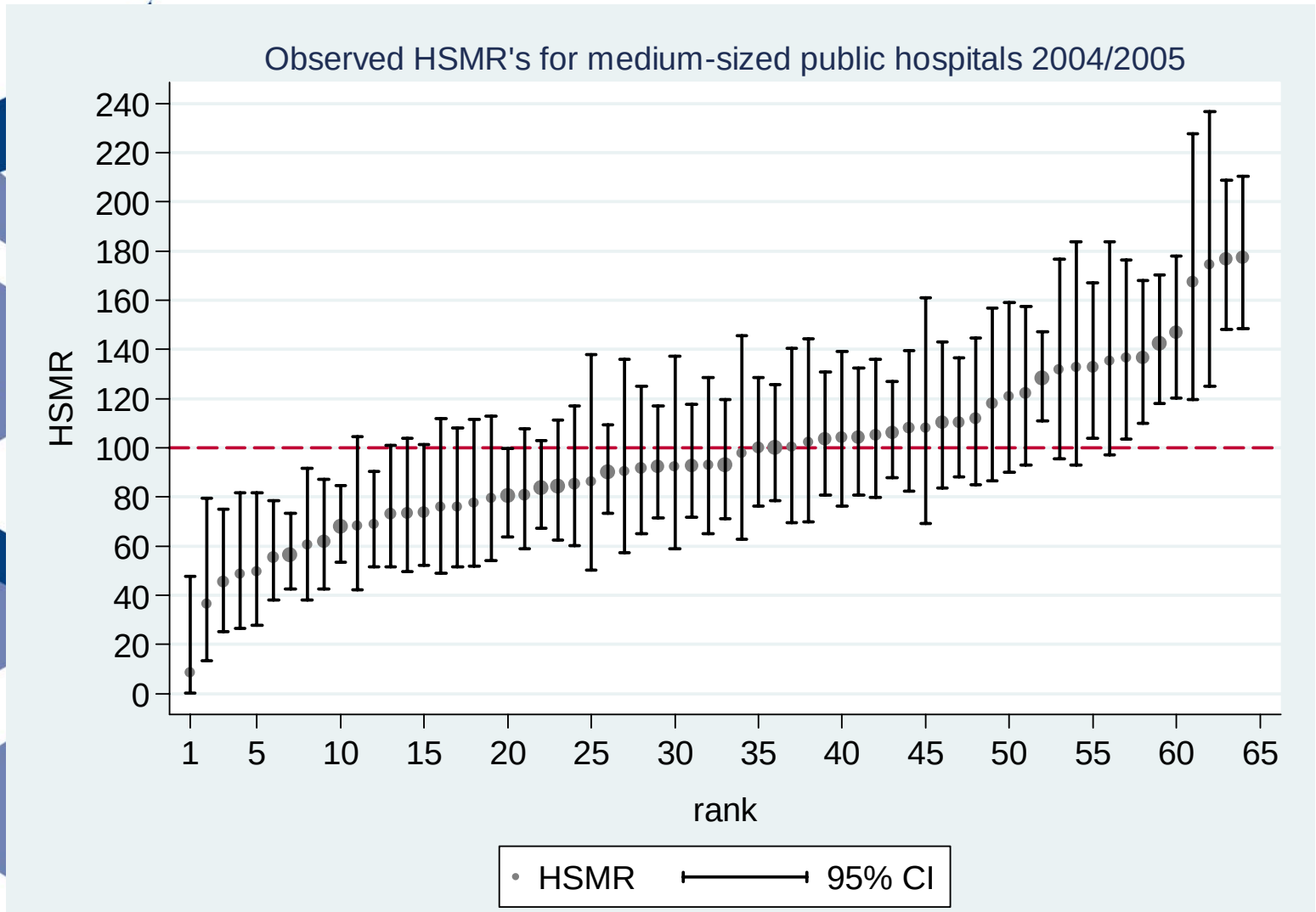
- Step 1
- We obtained a data set of all Australian hospital separations in financial year 2005/2006
- We tidied the data up in various ways
- We included the following variables in our logistic regression calculations-age, sex, mode of admission, length of stay (in 6 groups), Charlson category (in three groups), transfer status.
- We selected only acute care, but included all public and private hospitals,
- For most of the analyses, the modelling was consistent with the Canadian methodology (RACM)
- We did a separate test analysis with a more complex approach to variable adjustments and inter-actions between variables (ERM)

Mortality in Australian Hospitals

- We generated coefficients for diagnoses responsible for 80% of all hospital deaths, 20% and 100%, and generated HSMRs for each.
- The robustness of the model in the RACM was similar to that found in Canada and elsewhere- the model discriminates well in relation to patients truly at risk of dying, but is not an excellent technical ‘fit’-this is inherent in the use of logistic regression for binary outcomes
- .The models were acceptable for all mortality %’s
- We did a number of analyses within hospital peer groups- there is a real issue with very small hospitals that we could not resolve in this study.
- The ‘fit’ improved in the ERM model


Observed HSMR's for large public hospitals 2004/2005
HSMR
180
160
140
120
100
80
60
40
20
1
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
rank
HSMR
95% CI

80% of deaths


Observed HSMR's for medium-sized public hospitals 2004/2005
HSMR
240
220
200
180
160
140
120
100
80
60
40
20
0
1
5
10
15
20
25
30
35
40
45
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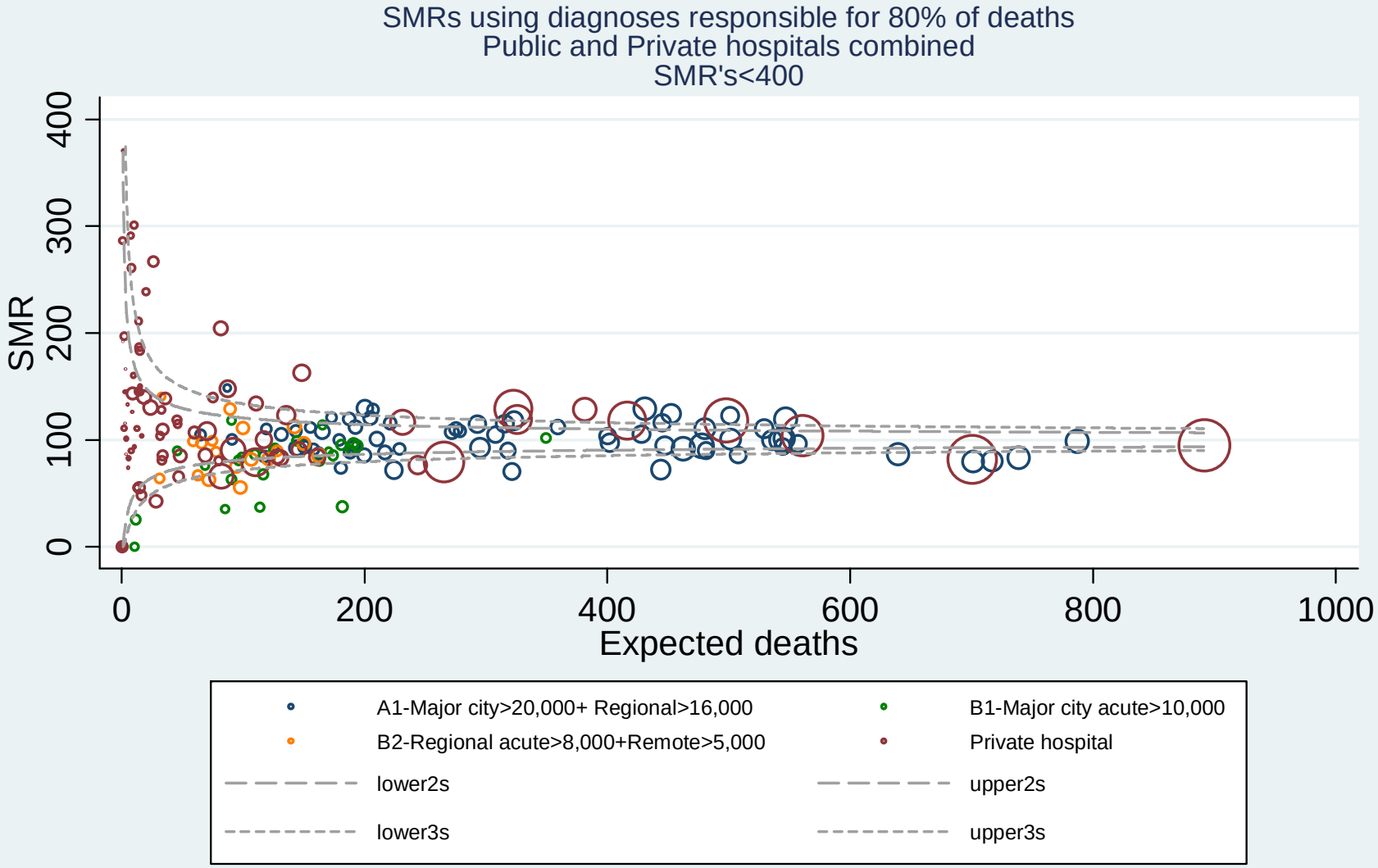
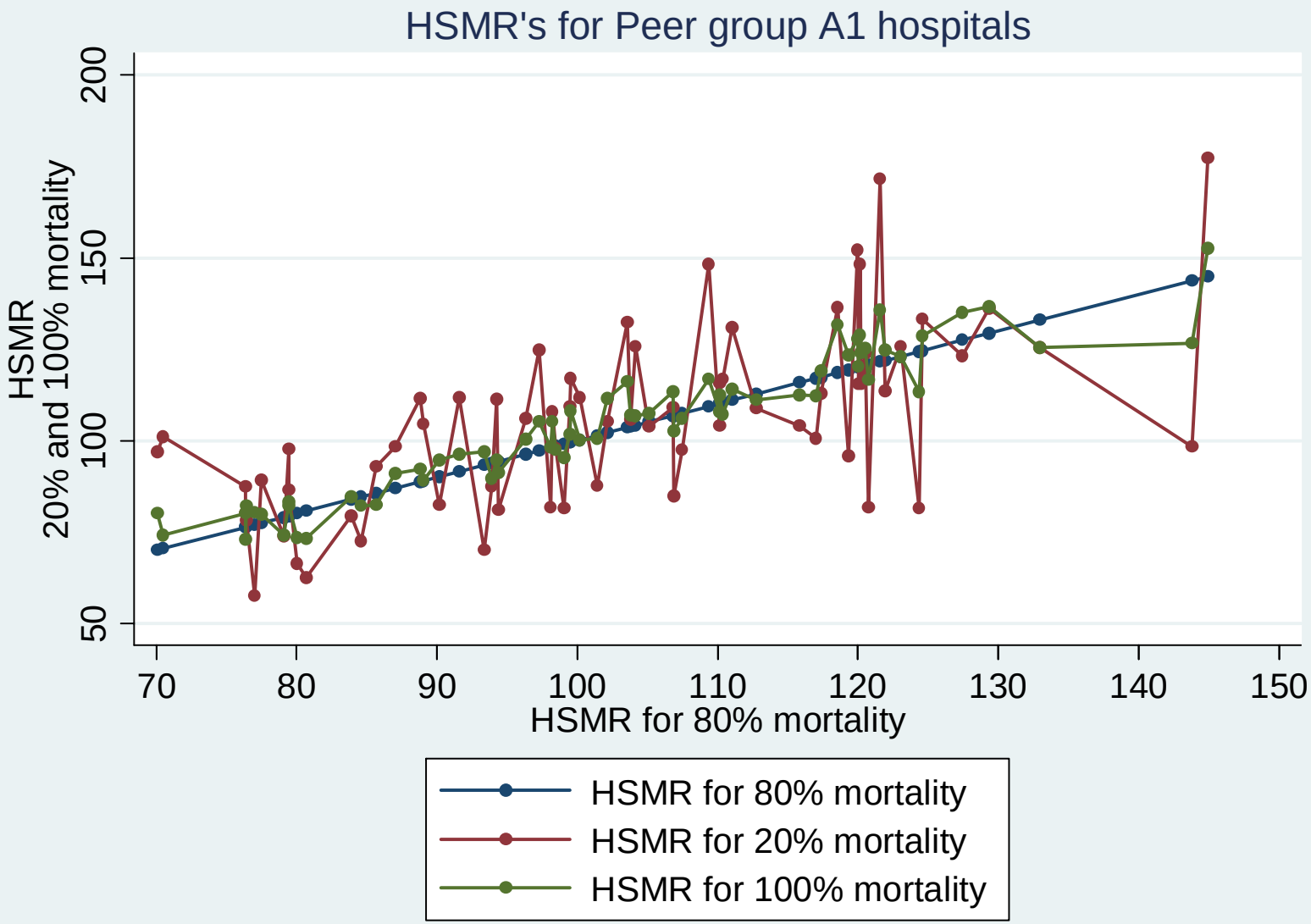
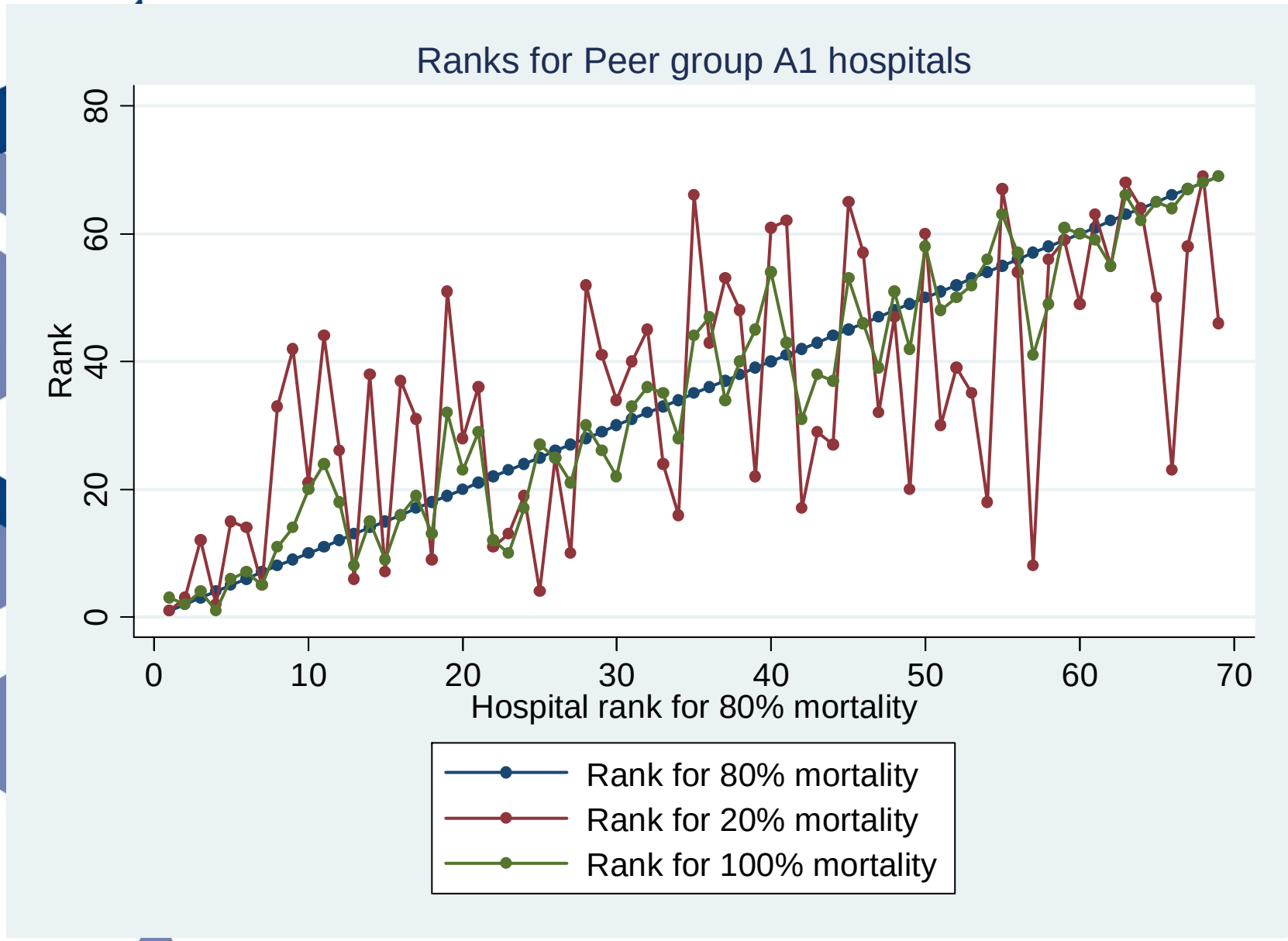
65
rank
HSMR
95% CI

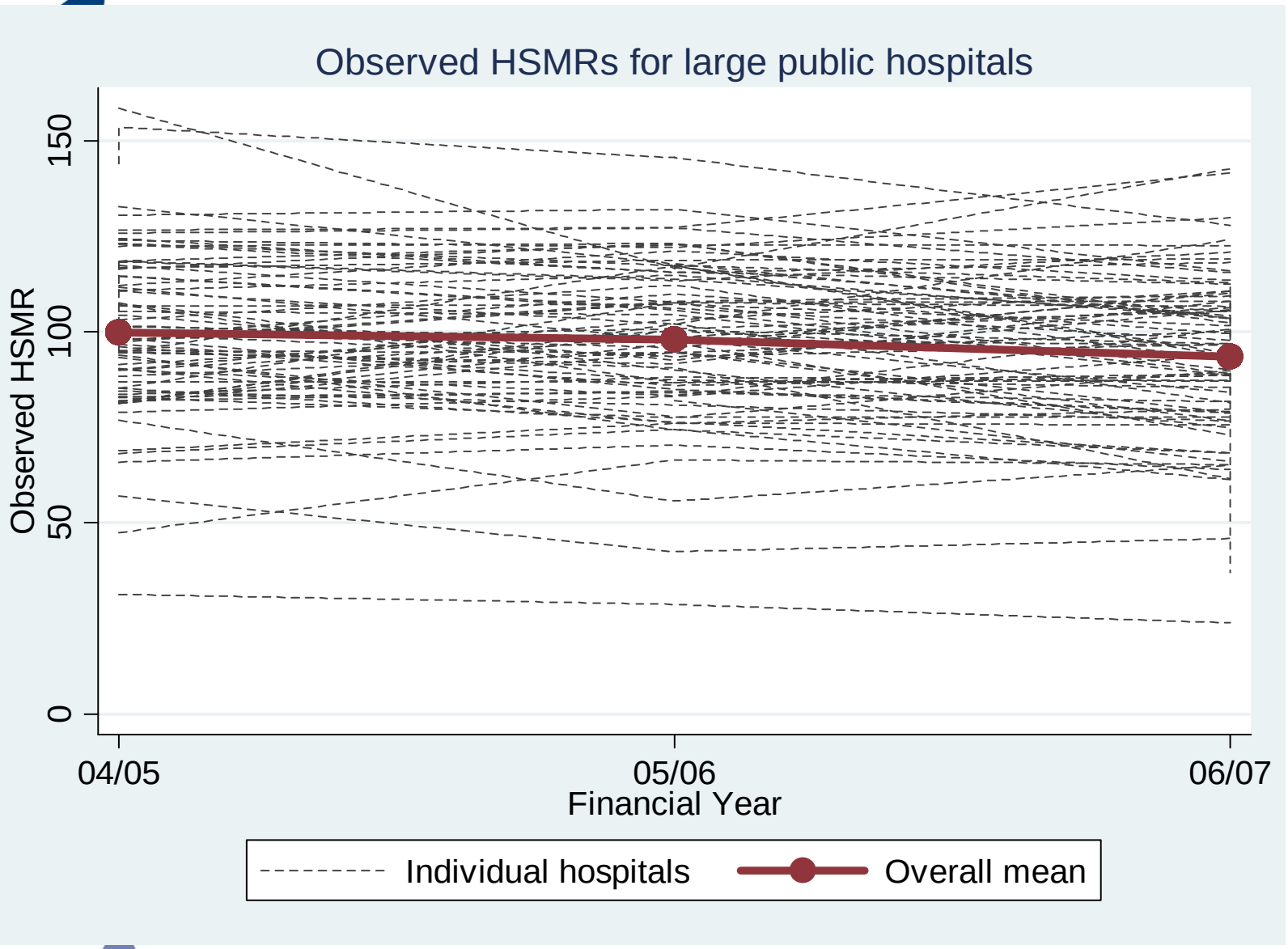
80% of deaths



Note1: Size of circles represents casemix-adjusted sperations using DRG cost-weightings
Note2: Numbers in legends refer to total casemix-adjusted separations per year


HSMR's for Peer group A1 hospitals
HSMR
20% and 100% mortality
50
100
150
200
70
80
90
100
110
120
130
140
150
HSMR for 80% mortality
HSMR for 80% mortality
HSMR for 20% mortality
HSMR for 100% mortality


Ranks for Peer group A1 hospitals
Rank
0
20
40
60
80
0
10
20
30
40
50
60
70
Hospital rank for 80% mortality
Rank for 80% mortality
Rank for 20% mortality
Rank for 100% mortality


Observed HSMRs for large public hospitals
Observed HSMR
0
50
100
150
04/05
05/06
06/07
Financial Year
Individual hospitals
Overall mean

Why this is worth doing.

780

1342