Comparing hospital performance in treatment and short-term outcome of patients with acute myocardial infarction in the city of Berlin

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Background: Judging hospitals according to their quality of care is one approach to improve hospital performance. The statistics behind these interhospital comparisons are frequently rather simple and misleading. Our study was aimed at showing that it is feasible to compare the quality of care between departments of cardiology in different hospitals adressing the problems of random variation and differences in patients' mix.

Methods: The BMIR is an ongoing prospective acute myocardial infarction registry. Our analysis was a cross-sectional interhospital comparison of 3571 patients with ST-segment elevation myocardial infarction (STEMI) from 18 Berlin hospitals (2010-12), and a longitudinal interhospital comparison for 6312 STEMI patients from 16 hospitals (2007/08, 2009/10, 2011/12). Hospital mortalities were compared by fitting a two-level random effects model with patient characteristics as covariates to the data. The resulting mortalities are Empirical Bayes (EB) estimates adjusted for differences in patient populations between hospitals and with missing data imputated.

Results: In the cross-sectional as well as in the longitudinal comparison there were large interhospital differences in crude hospital mortality rates. After Bayesian shrinkage and adjustment for the differences in patient mix, the range in hospital mortality was reduced in the cross-sectional as well as in the longitudinal comparison with no significant differences between hospitals. Adjusted mortality rates were 8.9% in 2007/08, 8.7% in 2009/10, and 8.5% in 2011/12 (p=0.609).

Conclusion: Our analysis demonstrates that the naïve comparison of hospitals by crude means may be unfair and misleading. A statistical analysis that takes population differences and random effects into account may result in different conclusions and may show stable results for average-size German city hospitals, if data are pooled over 3 years.