Using a cardiac arrest registry to measure the quality of emergency medical service care: a decade of findings from the Victorian Ambulance Cardiac Arrest Registry

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Background
While the value of clinical registries has been well recognised in developed countries, their use for measuring the quality of emergency medical service (EMS) care remains relatively unknown. We report the methodology and findings of a state-wide EMS surveillance initiative, which is used to measure the quality of systems of care for out-of-hospital cardiac arrest (OHCA) patients.

Methods
Between 1 July 2002 and 30 June 2012, data for adult OHCA cases of presumed cardiac aetiology occurring in the Australian south-eastern state of Victoria were extracted from the Victorian Ambulance Cardiac Arrest Registry (VACAR).

The Mantel-Haenszel χ² test was used to assess the significance of temporal trends in baseline characteristics across ordinal year categories. We used Join-point Regression to assess whether there were any statistically significant inflection points in trend for bystander CPR and survival outcomes. Regional and temporal trends in bystander cardiopulmonary resuscitation (CPR), event survival and survival to hospital discharge were analysed using logistic regression models.

In a sub-group analysis of cases transported from the scene, we constructed a multilevel logistic regression model to assess the impact of receiving hospital on survival to hospital discharge outcome.

Results
A total of 32,097 OHCA cases were identified, of whom 14,083 (43.9%) received treatment by EMS. The median EMS response time, the median time-to-defibrillation, and the proportion of asystolic events increased significantly over the 10 year study period.

The risk-adjusted odds of receiving bystander CPR (OR 2.96, 95% CI: 2.62-3.33), event survival (OR 1.55, 95% CI: 1.30-1.85), and survival to hospital discharge (OR 2.81, 95% CI: 2.07-3.82) improved significantly by 2011/12 compared to baseline.

Significant variation in rates of bystander CPR and survival were observed across regions, with arrests in rural regions less likely to survive to hospital discharge. The median odds ratio (MOR) for inter-hospital variability in survival to hospital discharge outcome was 70% (MOR 1.70).

Conclusion
Between 2002 and 2012, there have been significant improvements in bystander CPR and survival outcome for OHCA patients in Victoria, Australia. However, regional survival disparities and inter-hospital variability in outcomes pose significant challenges for future improvements in care.