

Quality of treatment and care is associated with mortality among patients with stroke: A nationwide population-based follow-up study

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Objective:

To examine the association between process and outcome among patients with stroke in terms of quality of treatment and care and mortality rate

Methods:

We conducted a nationwide population-based follow-up study among all patients registered with stroke in the Danish National Indicator Project (DNIP) during the period from January 13, 2003 to October 31, 2005 (n=29 573). DNIP is a nationwide initiative to monitor and improve the quality of health care in Denmark for a range of frequently occurring conditions through the use of indicators and standards for quality.

Setting: All Danish hospital departments which provide treatment and care for patients with stroke
Main outcome measures: 30 and 90 days mortality rate.

The quality of treatment and care among patients with stroke is monitored through the use of six process indicators, including early admission to a stroke unit, early use of antiplatelet treatment, use of anticoagulant treatment, early use of brain imaging, early assessment by a physiotherapist, early assessment by an occupational therapist and early assessment of nutritional risk. We examined the association between the process indicators and the 30 and 90 days mortality rates adjusted for possible confounding factors, including a wide range of demographic and clinical characteristics by use of multivariate Cox regression analyses.

Results:

The overall 30 and 90 days mortality rates were 11.2% and 15.0%, respectively. Fulfilment of six out of seven specific process indicators, including early admission to a stroke unit, early initiation of antiplatelet or oral anticoagulant therapy and early assessment by a physiotherapist, an occupational therapist and of nutritional risk, was associated with lower 30 and 90 days mortality rates with adjusted hazard ratios ranging from 0.42-0.85 when compared with patients where the indicators were not fulfilled. As shown in Table 1 we found indication of an inverse dose-response pattern between the number of fulfilled indicators and the mortality, i.e. the lowest mortality rate was found among patients in whom the treatment and care had fulfilled all process indicators (adjusted 30 days hazard rate 0.49, 95% confidence interval: 0.33 to 0.73) when compared with patients with no fulfilled process indicators. The dose response pattern was found in all subgroups when stratifying the analyses according to age and sex.

Table 1: 30 days mortality after admission for stroke according to number of fulfilled process indicators for treatment and care among patients where all indicators are found appropriate.

Number of Fulfilled process indicators	Mortality (%)	Adjusted hazard ratio (95% CI)
0	51 / 626 (8.1%)	1.00 (reference)
1	103 / 1323 (7.8%)	1.00 (0.71 to 1.40)
2	111 / 1950 (5.7%)	0.78 (0.56 to 1.09)
3	95 / 2305 (4.1%)	0.59 (0.42 to 0.83)
4	109 / 2450 (4.4%)	0.61 (0.43 to 0.85)
5	81 / 2581 (3.1%)	0.49 (0.34 to 0.70)
6	46 / 1519 (3.0%)	0.49 (0.33 to 0.73)

*Adjusted for age, atrial fibrillation, acute myocardial infarction, Scandinavian Stroke Scale, and high alcohol intake.

Conclusions:

This large nationwide study supports the hypothesis that compliance with specific evidence-based process indicators is associated with a lower 30 and 90 days mortality rate among patients with stroke, i.e. better quality of treatment and care offered to patients with stroke was associated with lower mortality rates. Further efforts should be made to ensure that evidence-based treatment and care of patients with stroke is implemented in clinical practice.