Overall societal cost of recurrent stroke: Population-based study

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Background & aims

Improved life expectancy after stroke has increased the patient-years lived at risk of recurrent stroke

Few data on recurrence rates on best medical treatment (BMT)

Few data too on long-term impact of recurrence on care costs, especially on:

- Care in the community (either paid or unpaid)
- Labour market costs, i.e. time of work and premature death before retirement

We quantify the 10-year cost burden of recurrent stroke after an initial stroke

Methodology

Oxford Vascular Study (OXVASC)

All first in study strokes (04/2002-03/2023) included

Patients were given guideline-based secondary prevention

Face-to-face follow-up for 20 years or death

Resource use & costs

Societal perspective adopted: 1. healthcare; 2. care home; 3. paid & unpaid care in the community; & 4. labour market costs

All-cause (i.e. stroke- & non-stroke related) were included

National record linkage for health and care home use

Face-to-face follow-up for:

- Unpaid & paid care in the community and labour market participation

Priced using English reference costs, reported in International US dollars ($)

Modelling approach

10-year follow-up was split into monthly 30-day periods

Two scenarios compared: 1. No recurrence; and 2. Recurrence

For each cost item, multivariable modelling with time-varying covariates:

- Adjusted for: age, comorbidity, risk & socioeconomic factors, vascular events

1. Survival – Cox model
2. Incurring cost – Patient fixed effects logistic regression
3. Cost levels (conditional on use) – Patient fixed effects GLM (gamma)
4. Total cost estimation for each month & scenario:
5. Sum across periods

Expected cost = survival x p_x cost incurred x $ cost level

- Uncertainty obtained through 1,000 bootstrap simulations

Results

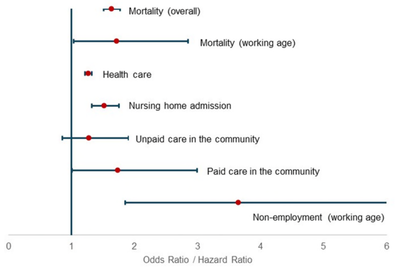
Among 3,790 patients, 670 (18%) experienced a total 851 recurrent strokes

Table. Baseline characteristics at time of first-in-study stroke

	All stroke (n=3,790)	Patients with recurrence* (n=670)
Age, years, mean (S.D)	74 (15)	74 (14)
Females	1,947 (51%)	360 (46%)
Previous history:		
Myocardial infarction	377 (10%)	81 (12%)
TIA	584 (15%)	125 (19%)
Stroke	303 (8%)	82 (12%)
Peripheral vascular disease	225 (6%)	40 (6%)
Diabetes	580 (15%)	125 (19%)
Atrial fibrillation	773 (20%)	135 (20%)
Hypertension	2,226 (59%)	425 (63%)
Disability (mRS≥3)	789 (22%)	117 (18%)
Current smoker	542 (15%)	101 (15%)
NIHSS > 3	1,823 (51%)	303 (47%)
Charlson score**, mean (S.D.)	0.83 (1.51)	0.76 (1.42)

*at time of first-in-study stroke. **excluding scores for vascular event history

Each recurrent stroke increased utilisation of resource & costs (Figure)



Costs	Additional costs for each recurrent stroke ($)
Healthcare	3,535 (1,534 to 5,394)
Care home	11,788 (2,746 to 21,040)
Community care	-8,250 (-18,587 to 5,506)
Labour market	27,326 (13,998 to 41,738)
TOTAL	34,399 (14,782 to 53,758)

10-year all-cause costs by recurrent stroke scenario:

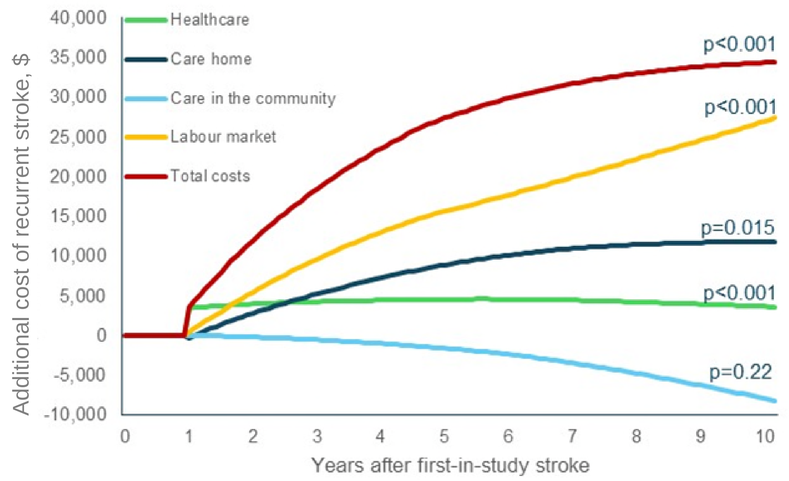
1. No recurrence: $232,068 (218,984 to 247,454)
2. Recurrence at: 1 year (~median time): $266,467 (250,438 to 285,906)

Sensitivity analysis

1 month (early recurrence): $274,913 (256,961 to 296,296)

5 years (late recurrence): $259,481 (245,754 to 275,467)

Figure. Additional costs of recurrent stroke over time



- Increased for:
  - Care home costs
  - Labour market costs (driven by early retirement/work absence)
- Decreased due to increased mortality after recurrence
  - After month 70 for health care costs
  - After month 12 for community care costs (driven by unpaid care)

Timing of recurrent stroke also has an impact on overall 10 year costs:

- Early (1 month after initial stroke): $42,845 (20,166 to 64,704)
- Late (61 months after initial stroke): $27,413 (15,328 to 39,633)

Conclusions

Societal cost of recurrent stroke remains substantial, both in:

- Health terms (increased 10-year mortality)
- Economic terms (increased 10-year costs)

This is despite patients being on current best medical treatment

The substantial societal costs associated with recurrent stroke highlight the need for more effective secondary prevention strategies

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