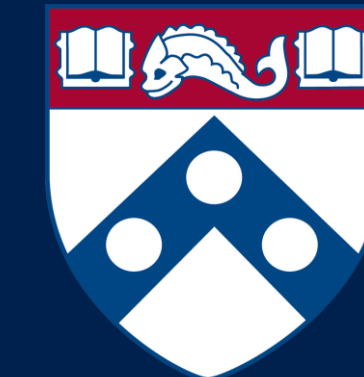




# The Impact of Stroke on Cost and Length of Stay of Patients Receiving Cardiac Surgery



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## Introduction

- Stroke after cardiac surgery is associated with poor outcome but there are limited data on the impact on cost and length of stay (LOS).

## Methods

- We performed a retrospective matched cohort study of patients who underwent cardiothoracic surgery at our tertiary referral center
- Strokes were identified in the local Get With The Guidelines Stroke database and the Stroke Team call log over a 26-month period ending 10/2019.
- Stroke severity was assessed by NIHSS, abstracted from the chart, or retrospectively calculated if not documented.
- Surgical patients without stroke were matched by procedure and age (within 5 years)
- Cost (direct and indirect) and length of stay (ICU, ward, and total) were compiled from the hospital administration database.

## Results

Procedure	Stroke	No stroke
CABG	2	41
Lone AVR or MVR	4	137
CABG + valve replacement	3	41
Ascending aortic repair	12	42
Ascending aortic repair + AVR	1	8
Transcatheter AVR	3	146
Heart transplant	3	23
ECMO	6	52
LVAD	3	38
Lung Transplant	2	14
Descending thoracic aortic stent	4	21
Descending thoracic aortic hybrid open surgery + stent	1	5
<b>TOTAL</b>	<b>44</b>	<b>568</b>

- Overall, 44 strokes and 568 matched non-stroke controls were identified
- 34% of the stroke patients were female, compared to 37% of controls without stroke, p=0.71.
- Patients with stroke were younger than patients without stroke, median 68 vs 74 years, p=0.008.
- Strokes were severe, median NIHSS was 18 (interquartile range [IQR] 9 – 29).
- Mortality was associated with higher stroke severity, with median NIHSS 30 for patients who died compared to 16 for survivors, p=0.005.

- Patients with stroke had higher in-hospital mortality, 25% vs 9.5%, OR 3.2, 95% CI 1.5 – 6.6, p=0.002 and were less likely to be discharged home 11% vs 63%, OR 0.06, 95% CI 0.02 – 0.16, p<0.0001.
- Excluding patients who died (which may shorten LOS), stroke severity was associated with both total and ICU LOS in univariable linear regression: Every 1-point increase in NIHSS was associated with 1.1 additional hospital days (95%CI 0.1 – 2.1 days), p=0.03, including 0.8 days (95%CI 0.2 – 1.5 days) in the ICU, p=0.01.

	Stroke N=44	No stroke N=568	Absolute difference	Relative difference	P-value
<b>Total direct costs</b>	\$147,617 (\$81,834 – \$229,843)	\$48,653 (\$39,006 – \$79,292)	<b>\$98,964</b>	<b>3.0</b>	<0.0001
<b>Total indirect costs</b>	\$67,300 (\$30,367 – \$102,200)	\$15,988 (\$10,296 – \$29,060)	<b>\$51,312</b>	<b>4.2</b>	<0.0001
<b>ICU length of stay, days</b>	17 (7 – 33)	2 (1 – 7)	<b>15</b>	<b>8.5</b>	<0.0001
<b>Ward length of stay, days</b>	12 (3 – 22)	5 (2 – 11)	<b>7</b>	<b>2.2</b>	0.03
<b>Total length of stay, days</b>	26 (14 – 54)	8 (5 – 17)	<b>18</b>	<b>3.3</b>	<0.0001

## Limitations

- This was retrospective analysis of data from a single tertiary referral center with a high volume of high risk cardiovascular procedures.

## Conclusions

- Stroke complicating cardiac surgery is associated with enormous increases in cost and length of stay**
- Length of stay was associated with stroke severity.**