

# Factors affecting post stroke survival

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## background

- \* Stroke remains the major contributor to inpatient rehabilitation as it leads to significant disabilities and long-term complications.
- \* The majority of stroke patients require long term follow up for co-morbidities and complications.

## background

- \* The strokes subgroups have been studied in the past comparing survival.
- \* Associated comorbidities apart from the stroke itself have been shown to affect the survival in this group of patients.
- \* Cardiovascular issues including atrial fibrillation, ischaemic heart disease have been shown to affect the survival.

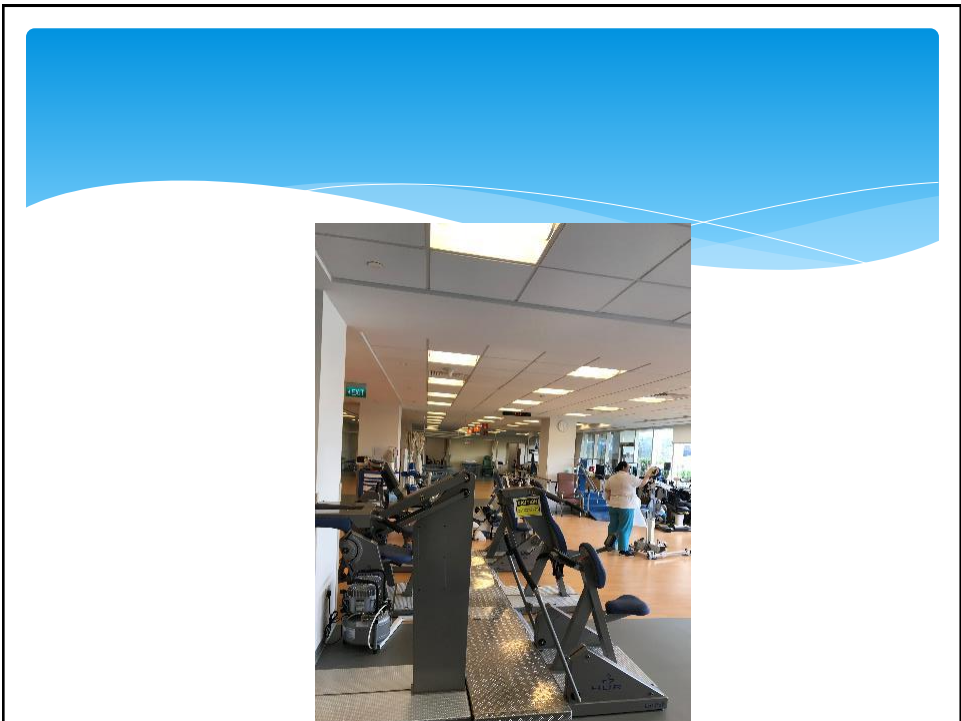
## aim

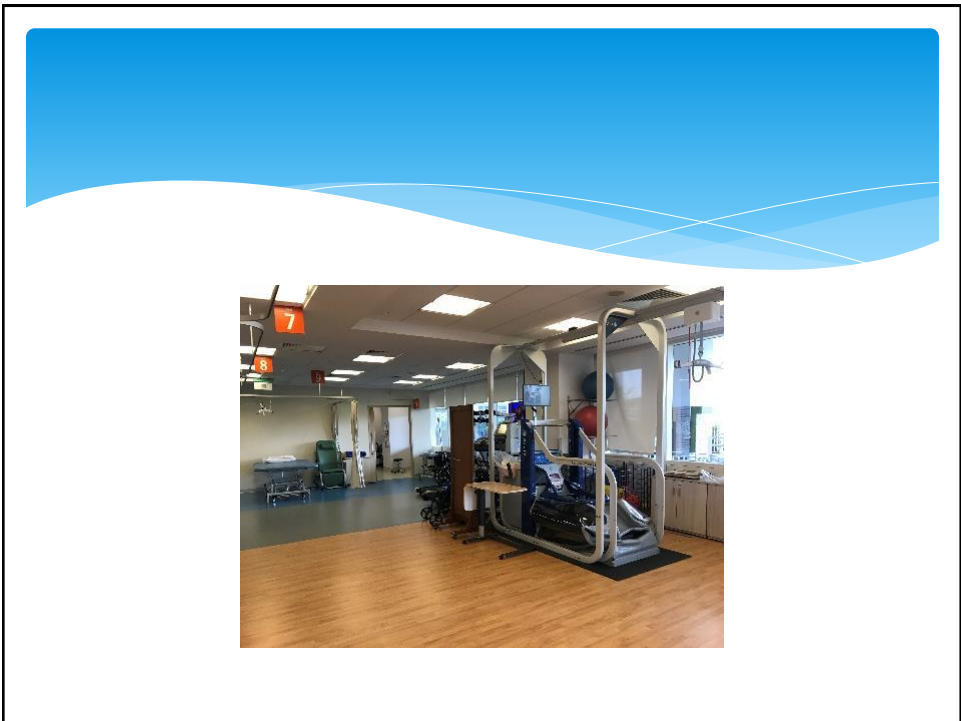
- \* Aim of our study was to identify the survival rates in various subgroups of strokes
- \* its association with underlying factors including age, cardiovascular and other comorbidities.

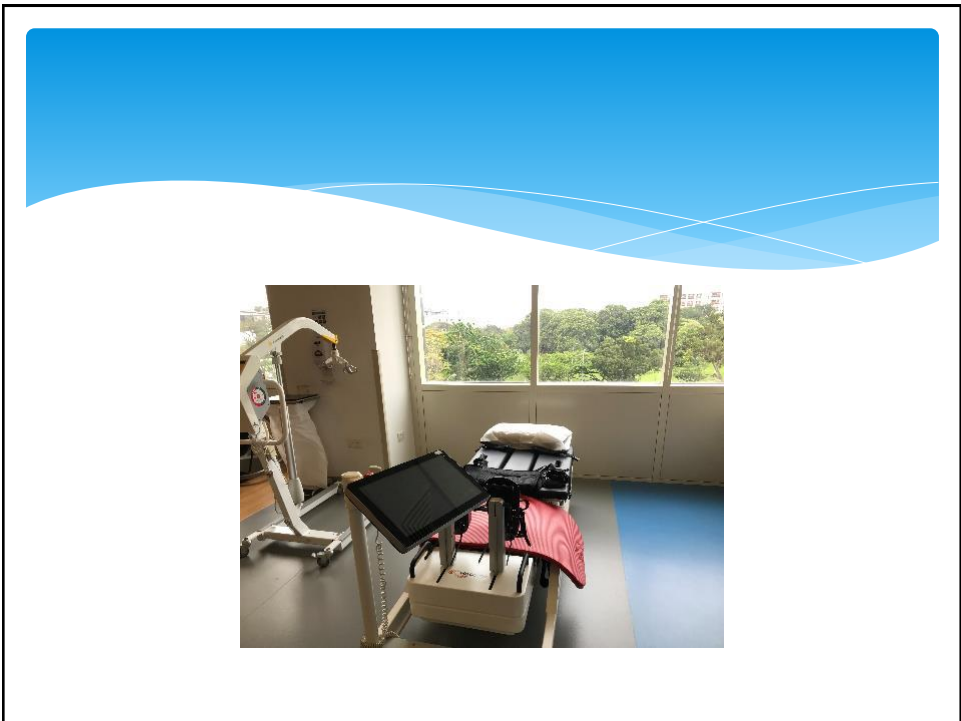
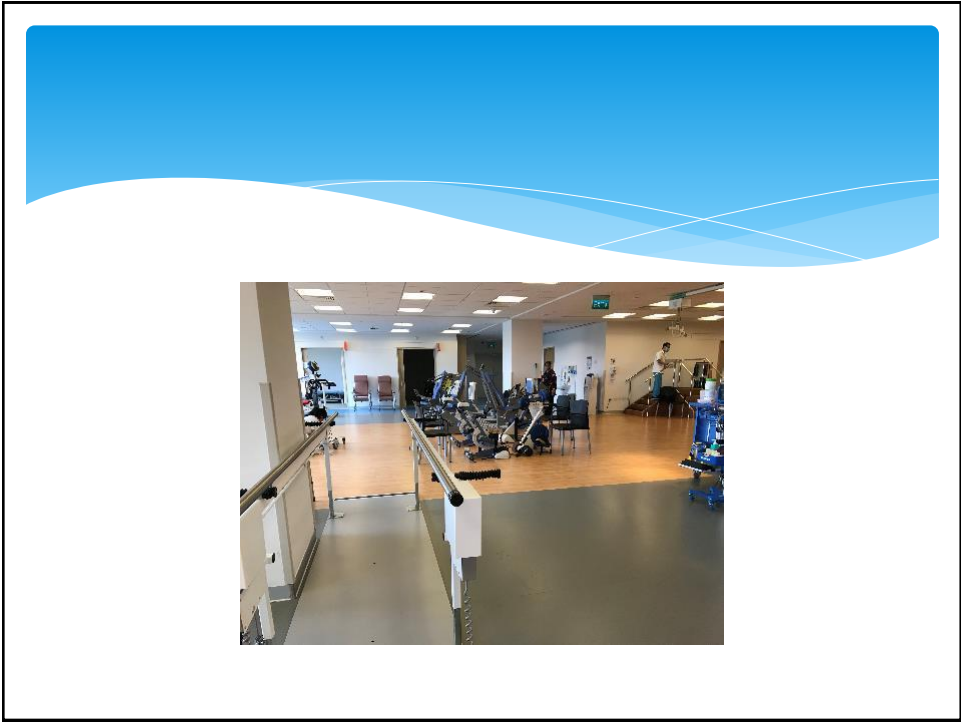
# Setting

- \* Changi general hospital: government restructured hospital in Singapore
- \* New Integrated building: with all modern facilities for in-patient and out patient rehabilitation.









## method

- \* Retrospective analytic study of patients with stroke who consecutively admitted to the neuro-rehabilitation facility
- \* June 2008 to May 2017 with outpatient follow ups
- \* Sing-Health Centralized Institutional Review Board approval.

## method

- \* Patient: Waiver of consent was obtained due to retrospective nature of the study.
- \* Inclusion criteria: consecutive patients age above 21 years, with stroke (both infarction or spontaneous intracerebral haemorrhage)
- \* admitted to inpatient rehabilitation unit with minimum post discharge follow up of 6 months during study period

## method

- \* Exclusion criteria: previous known strokes, incomplete follow records.

## diagnosis

- \* Stroke and subtypes were diagnosed by stroke physician or neuro-surgeon on admission by clinical examination, brain imaging (CT, MRI, MRA), ECG (12 leads, continuous monitor or Holter), carotid doppler and echocardiogram



## data

- \* Data collected: demographic details, diagnosis.
- \* Stroke subtypes (ischaemic, intracerebral bleed).
- \* CT/MRI scan finding for distribution of stroke territory.
- \* Admission electrolytes, clotting profiles and pre-morbid medications, and comorbidities.
- \* Treatments modalities: thrombolysis, medical treatments for raised intracranial pressure, neurosurgical interventions.
- \* Outpatient follow-up records and date of demise.

## Statistical analysis:

- \* Categorical data are presented as frequency (percentage) and continuous data are presented as mean ( $\pm$ standard deviation) for parametric distributions and median ( $\pm$ interquartile range) for non-parametric distributions. The differences in characteristics were examined using chi square tests for categorical variables and two sample t test or Mann Whitney U tests for continuous variable where appropriate.

## Results

- \* Total of 722 (Female: 38%) patients met the selection criteria, with average age of 64 years (21-97).
- \* Ischemic strokes were 531(74%) and 191 (26%) were haemorrhagic strokes with average follow up 50.4 months ( $\pm 27.6$  S.D), (range 6-108 months).

## Stroke territory

- \* Based on Oxfordshire Classification, the territories for ischemic stroke were:
- \* total anterior circulation syndrome (TACS) :12.5%
- \* partial anterior circulation syndrome (PACS) :46%
- \* posterior circulation syndrome (POCS) :26.5%
- \* lacunar syndrome (LACS) :15%

## Aetiology of the stroke using Trial of Org 10172 in Acute Stroke Treatment (TOAST) classification

- \* large artery atherosclerosis was 356 (67%)
- \* small artery was 175(33%)
- \* moderately probability for cardioembolic were 118(20%)
- \* high probability for cardioembolic were 104(18%).

## results

- \* One hundred (14%) patients displayed haemorrhagic conversion on their repeat brain scans after stroke.

### Significant associations with mortality

- \* Age
- \* ischaemic stroke
- \* large artery atherosclerosis
- \* Cardio embolic risk
- \* patients not receiving rtPA(thrombolysis)

### Significant associations with mortality

- \* Patients with DM, IHD, AF
- \* Abnormal kidney function
- \* Those with intracranial atherosclerosis
- \* ( $p < 0.05$ ).
- \* Hyperlipidaemia was of borderline significance ( $p = 0.06$ ).

## Significant associations with mortality

- \* These factors were assessed in a series of multivariable cox regression analyses to identify the optimal subset of independent predictors of mortality.

## Significant associations with mortality

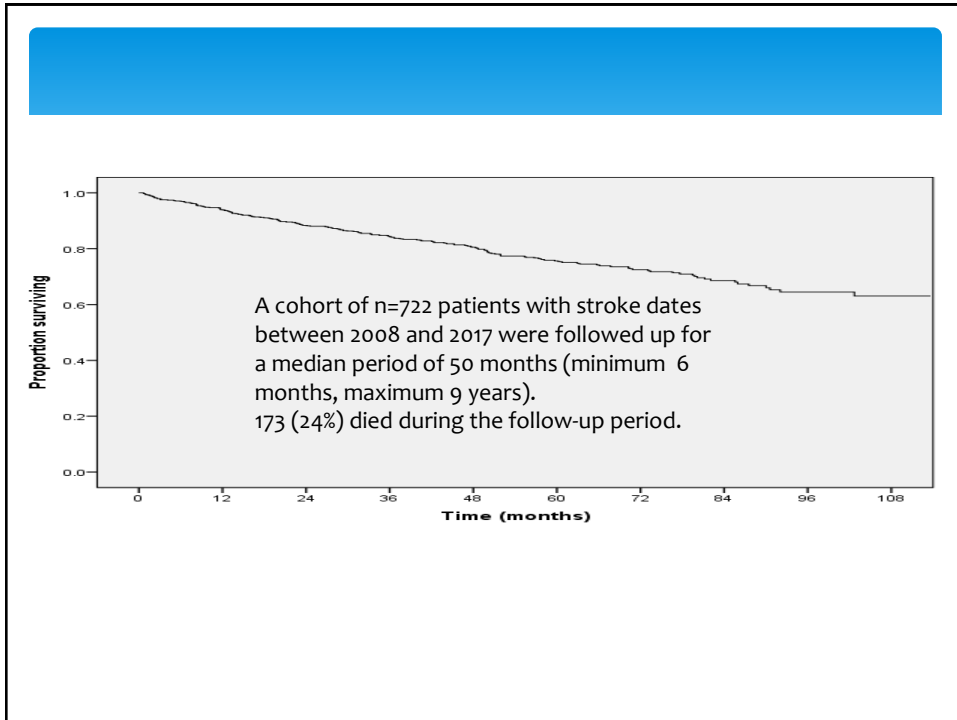
- \* The primary analysis looked at the predictive power of:
  - \* age, intracerebral bleed
  - \* cardio embolic risk
  - \* Treatment with rtPA
  - \* Underlying DM, IHD, AF, kidney function
  - \* Associated findings : intracranial atherosclerosis and hyperlipidaemia

## Significant associations with mortality

- \* Only : age, underlying IHD, AF and renal dysfunction function were found to be independent predictors of mortality.
- \* age [HR = 1.06 (1.05, 1.08);  $p < 0.001$  (per one year increase in age)]
- \* abnormal kidney function [HR = 1.83 (1.30, 2.57);  $p = 0.001$ ]
- \* IHD [HR = 1.70 (1.21, 2.40);  $p = 0.002$ ]
- \* AF [HR = 1.48 (1.03, 2.14);  $p = 0.033$ ].

## Significant associations with mortality

- \* Intracerebral bleed was not found to be a significant independent predictor
- \* When 'stroke territory' was included in the regression model as a potential predictive factor (including and excluding patients with bleed): type of stroke (including small vs large artery atherosclerosis) was not found to be a significant independent factor.



## Literature

- \* Stroke survival is improving as concluded from Minnesota study group.
- \* Ten-year survival for post stroke, has improved (from 29.5% to 46.5% for men and 32.6 to 50.5% for women) compared between 1980 to 2000.
- \* The significant improvement was seen in ischaemic strokes as compared to intracerebral bleeds.(1)

## Literature

- \* Results of Perth community study for post stroke patients concluded, 5 yr. risk of death was 59%.(7) .
- \* Major causes of death long term were stroke (27%) itself and cardiovascular diseases (26%).(8).

## Literature

- \* Compared to general population cumulative risk of death was 28%(28day) 42%(1yr) and 60% at 5 year. Major causes were CVS illness along with cancer.
- \* From Oxfordshire project,increased risk of death was in observed in all age group patients surviving more than 30 days post stroke.



## Conclusion and limitations

- \* We studied 722 patients with stroke, between 2008 and 2017, with a median follow up period of 50 months (minimum 6 months, maximum 9 years).
- \* We observed that 173 (24%) died during the follow-up period.
- \* Comparison with previous data is not possible as we only analysed those patients who underwent rehabilitation program.
- \* The early mortality in acute setting is not included in present study.

## conclusion

- \* **Age, underlying IHD and AF remains most significant factors for long term survival in post stroke patients.**
- \* **It is possible that better cardiovascular risk factors management can improve the stroke survival outcomes.**

## conclusion

- \* Our initial analysis also suggest that patients who did not receive thrombolysis and those with DM have poorer survival.
- \* More services need to be provided for better control of diabetic patients.
- \* Patients decline thrombolysis due to poor understanding and sometimes social reasons.
- \* These group of patients need more counselling to improve the thrombolysis rate in ischemic strokes.

## acknowledgements

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- \*

# Thank you

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