Exploring the Association Between Discharge Destination on Stroke Patient Outcomes

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INTRODUCTION

Rationale: The Canadian healthcare issue of *overcrowding* and *understaffing* in emergency departments (ED) is associated with negative clinical outcomes[1] as this environment places pressure on health care providers (HCPs). There is supporting evidence that HCPs find it challenging to determine the most suitable place care due to limited patient interactions[2] leading to a variable impact on stroke patient outcomes.

Objective: To identify how different discharge destinations ischaemic stroke patients are placed in, negatively or positively impact their stroke health outcomes.

METHODS

Study Cohort

We used the standardized open source data from the 2011 International Stroke Trial: Version 2 (IST2) randomized controlled trial[3] comparing the use of subcutaneous heparin and aspirin. This dataset was chosen due to its availability, variables measured, and study design. While the original study examines and compares antithrombotic therapy, this study is a re-analysis of published work that investigates how discharge destination impacts stroke health outcomes.

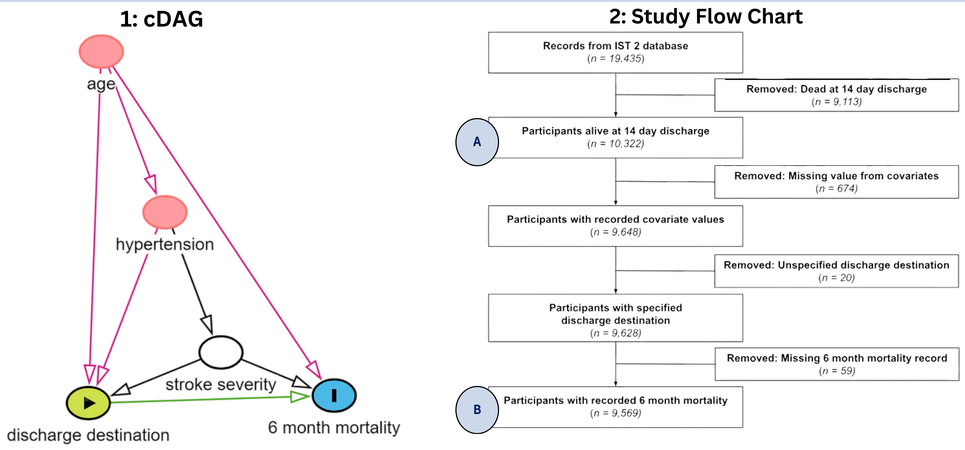


Figure 1.1: Causal Directed Acyclic Graphs (cDAG) of Research Project. Relationship between variables of interest are mapped. Exposure is discharge destination, primary outcome is 6 month morality. Confounders stroke severity, hypertension, and age were identified.

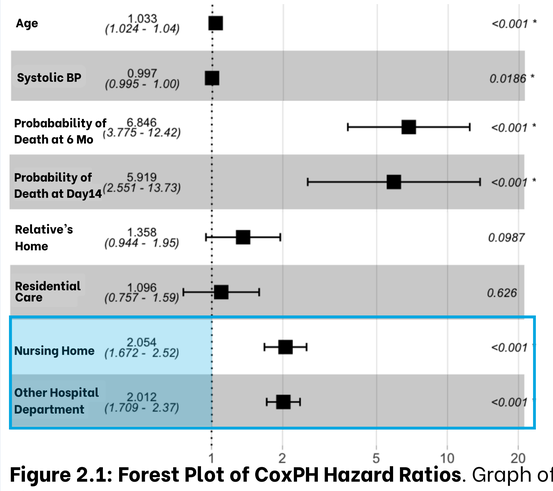
Figure 1.2: Data Cleaning Study Flow Chart. Removal of missing data during data cleaning process; (A) Eligible patients=10,322, (B) Patients included in our study=9,569

Statistical Analysis

A *Cox Proportional Hazards (CoxPH) Regression Analysis* was conducted to predict the 6 month mortality of patients in different discharge destinations while also adjusting for covariates. Home discharges were the reference level and all destinations can be evaluated based on their hazard ratios (HR).

RESULTS

1: Forest Plot of CoxPH HRs



2: Generated HRs of CoxPH Models

	Unadjusted for Collinearity HR		Adjust for Collinearity HR	
	HR (95% CI)	*P-value*	*HR (95% CI)*	*P-value*
Age	1.015 (1.003-1.027)	0.015	1.033 (1.024-1.041)	3.23E-13
Systolic Blood Pressure	0.997 (0.995-0.999)	0.018	0.997 (0.995-1.000)	0.019
Stroke Severity				
Probability of Death or Dependence At 6 Month	51.993 (50.215-53.771)	1.33E-05	—	—
Probability of Death At 6 Months	3.019 (2.314-3.724)	0.002	6.846 (6.250-7.441)	2.40E-10
Probability of Death At 14 Days	0.038 (-2.396-2.471)	0.008	5.919 (5.077-6.760)	3.45E-05
Discharge Destination				
Relative's Home	1.362 (0.998-1.725)	0.096	1.358 (0.995-1.721)	0.099
Residential Care	1.073 (0.703-1.444)	0.708	1.096 (0.726-1.467)	0.626
Nursing Home	2.026 (1.820-2.232)	1.86E-11	2.054 (1.848-2.259)	6.86E-12
Other Hospital Dep.	2.020 (1.857-2.183)	2.65E-17	2.012 (1.849-2.174)	3.95E-17

Figure 2.1: Forest Plot of CoxPH Hazard Ratios. Graph of HRs with variables of interest, HR>1 is associated higher risk of outcome

Figure 2.2: Table of HRs from CoxPH Model. Calculated HRs from model & removal of 1 stroke severity variable due to collinearity

Relevant Results

The average age of our cohort (n=9,569) was 69.9 years (±11.8). Results from our CoxPH regression indicate *nursing home* discharges increase risk of 6 month mortality by 105% (HR:2.054 [1.848-2.259]) and *other hospital departments* discharges increase risk of 6 month mortality by 101% (HR:2.012 [1.849-2.174]) in comparison to home discharges.

SIGNIFICANCE

In this study we were able to demonstrate the risks that certain discharge destinations pose on stroke patients' health outcomes. With this in mind, there should be emphasis on the importance of informed decision-making to have proper stroke care planning. Identifying the disparities between discharge destinations allows for critical assessment of public health services to improve resource allocation and promote proper prevention, care, and rehabilitation for stroke patients.

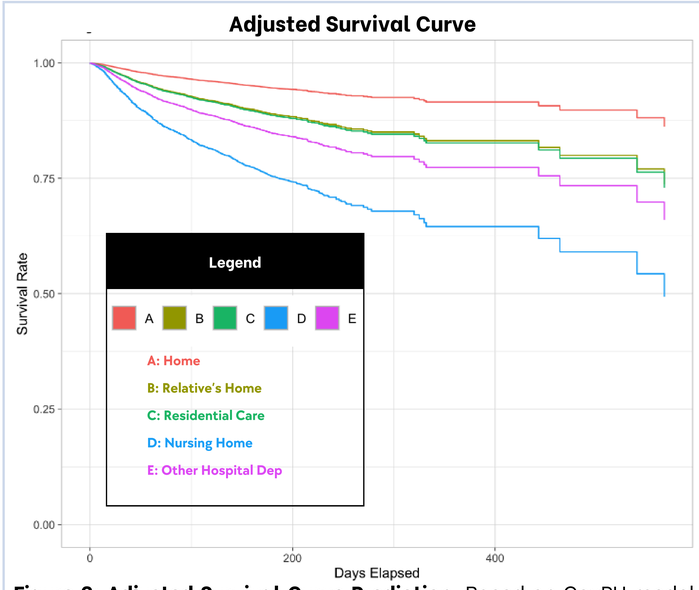


Figure 3: Adjusted Survival Curve Prediction. Based on CoxPH model of discharge destinations where survival rate is calculated on the population average covariates

REFERENCES

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3. Sandercock P, Niewada M, Czlonkowska A. International Stroke Trial Database (version 2). [dataset] 2 November 2011. DOI: 10.7488/DS/104.

Figure 1.1 generated on https://www.dagitty.net/dags.html#.
Other figures from R program using tidyverse package. Poster created on canva.com

GitHub Code

ACKNOWLEDGMENT This study uses the opensource IST2 dataset and is made possible thanks to the original investigators' for publishing their study data publicly. This is a re-analysis of the datta and is meant to replicate and build on the original investigators' work.