

Project Title

Survival Analysis of Home Ventilation Patients Enabled by Timeline Visualisation

Project Lead and Members

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Organisation(s) Involved

National Healthcare Group, Tan Tock Seng Hospital

Healthcare Family Group(s) Involved in this Project

Medical, Nursing, Allied Health

Applicable Specialty or Discipline

Respiratory Therapy, Internal Medicine, Palliative Medicine

Project Period

Start date: Not Applicable

Completed date: Not Applicable

Aims

To evaluate the differences in survival outcomes between deceased ventilator-assisted patients with and without HVRSS follow-up.

Background

See poster attached/below

Methods

See poster attached/below

Results

See poster attached/below

Lessons Learnt

See poster attached/below

Conclusion

See poster attached/below

Additional Information

Accorded the Singapore Health & Biomedical Congress 2023 (Singapore Young Investigator Award (Health Services Research) Merit Award

Project Category

Applied/ Translational Research

Quantitative Research

Care Continuum

End-of-Life Care, Home Hospice Care, Chronic Care, Primary Care

Keywords

Home Ventilation and Respiratory Support Service (HVRSS), Chronic Ventilatory Failure

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Survival analysis of home ventilation patients enabled by timeline visualisation



Adding years of healthy life

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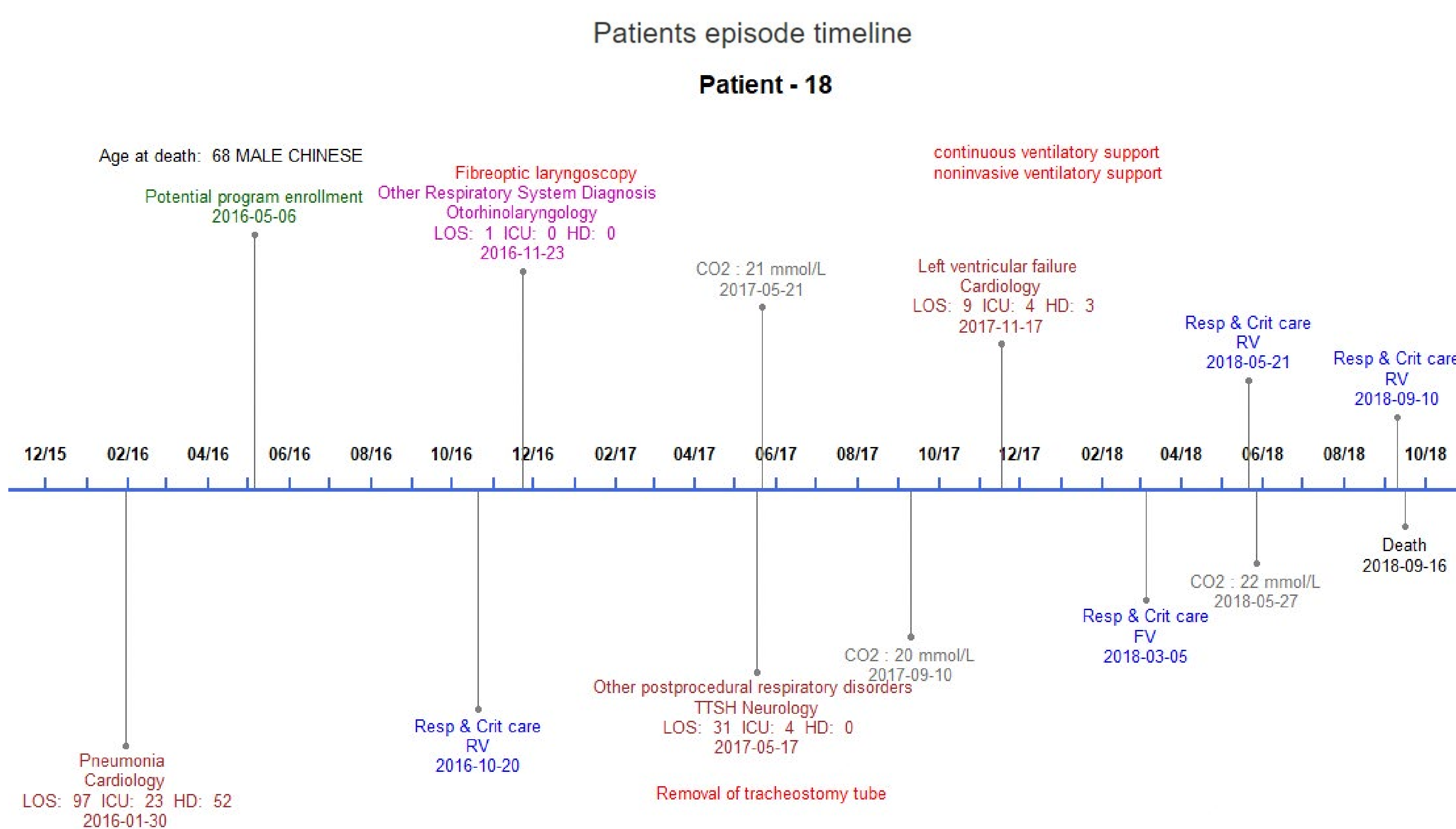
BACKGROUND

The multi-disciplinary Home Ventilation and Respiratory Support Service (HVRSS) provides home care services and end-of-life support to patients with chronic ventilatory failure. Through the selection of counterfactual controls and probable enrolment date facilitated by timeline visualisation, we aimed to evaluate the differences in survival outcomes between deceased ventilator-assisted patients with and without HVRSS follow-up.

METHODS

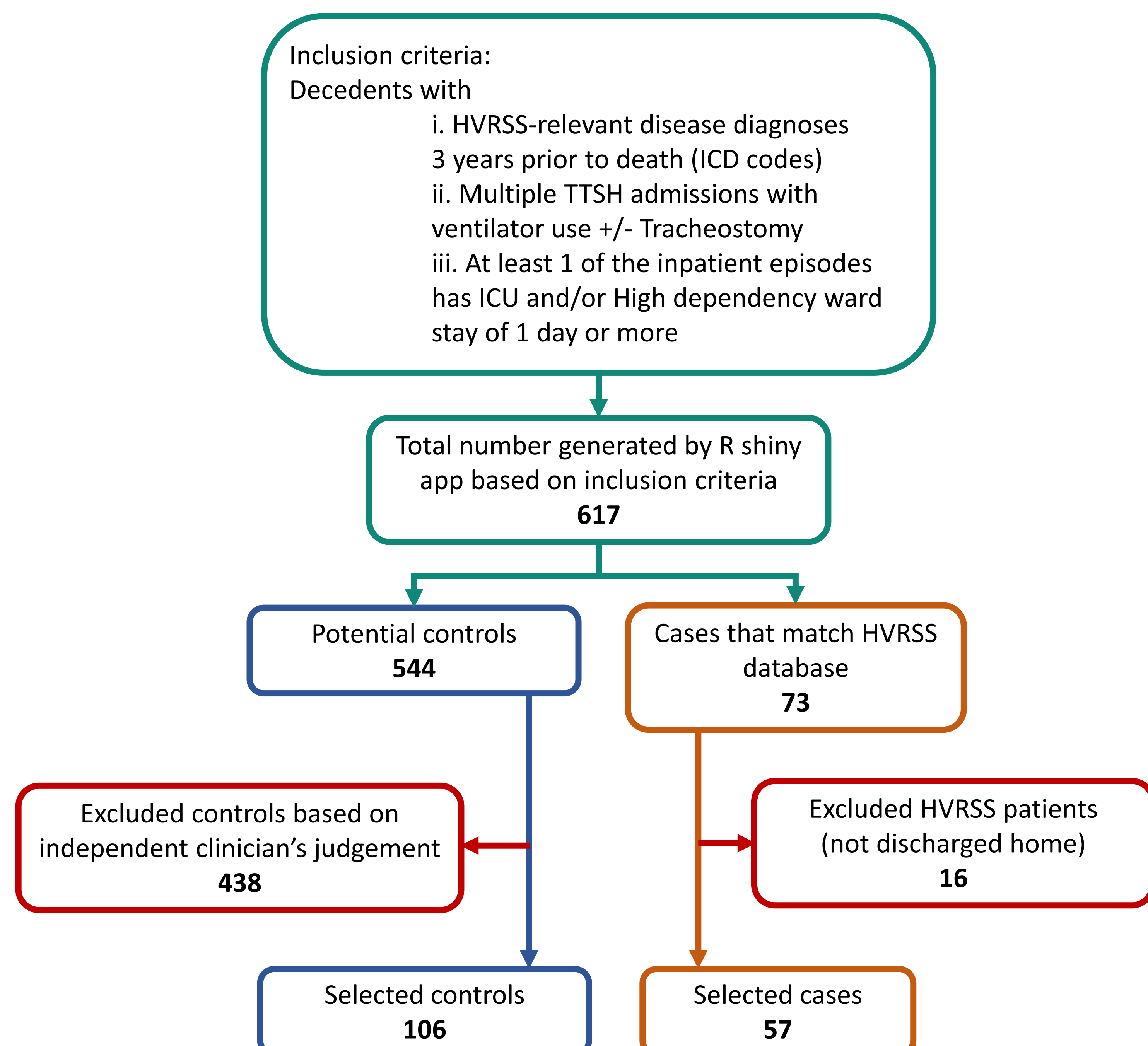
A retrospective case-control study was conducted using patient episodic data from administrative and HVRSS databases up to 3 years prior to death. Admission information and services rendered to patients with respiratory-related admissions and ventilation use, were presented chronologically using the web-based R Shiny application. Using the visualisation approach, controls were selected, and their probable treatment start date was indicated by a HVRSS physician.

Figure 1. Potential Control Patient's Timeline (Fictitious)



*Blue: Outpatient specialist visits (FV first visit, RV repeat visit); Brown: Inpatient episode; Magenta: Day surgery episode; Grey: Serum carbon dioxide lab test results; Red: Procedures rendered during episode; Green: Probable program enrolment date based on earliest discharge from episode with ICU or high dependency ward stay

Figure 2. Study Flow



STATISTICAL METHODS

Mortality

Survival analysis was performed using the Cox proportional hazards model, adjusted for demographics, comorbidities, primary diagnosis, and ventilation type.

Enrolment days outside of hospital

We derived the proportion of hospital-free survival over the enrolment period. Between-group differences were evaluated using multivariate linear regression, adjusted for the same covariates as above.

RESULTS

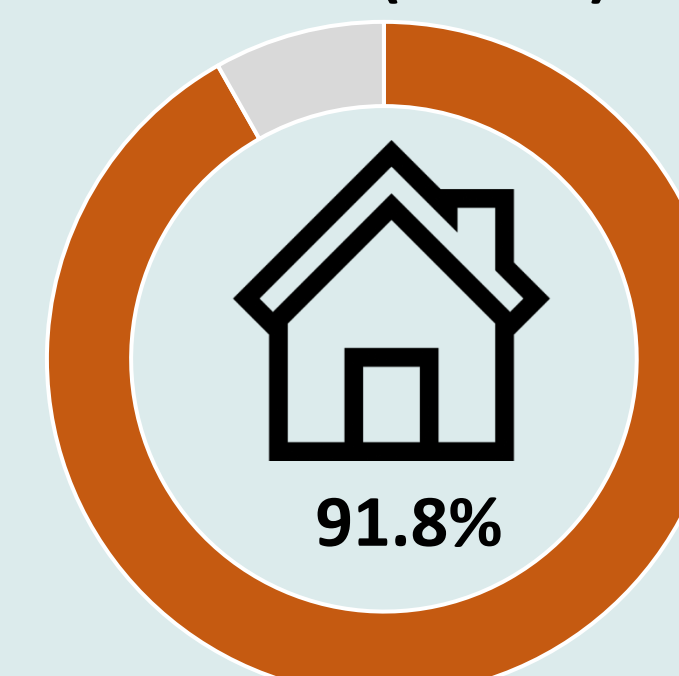
Mortality

No difference in mortality:
Hazard ratio 0.88 [95% CI 0.53-1.49], p-value = 0.606

Enrolment days outside of hospital

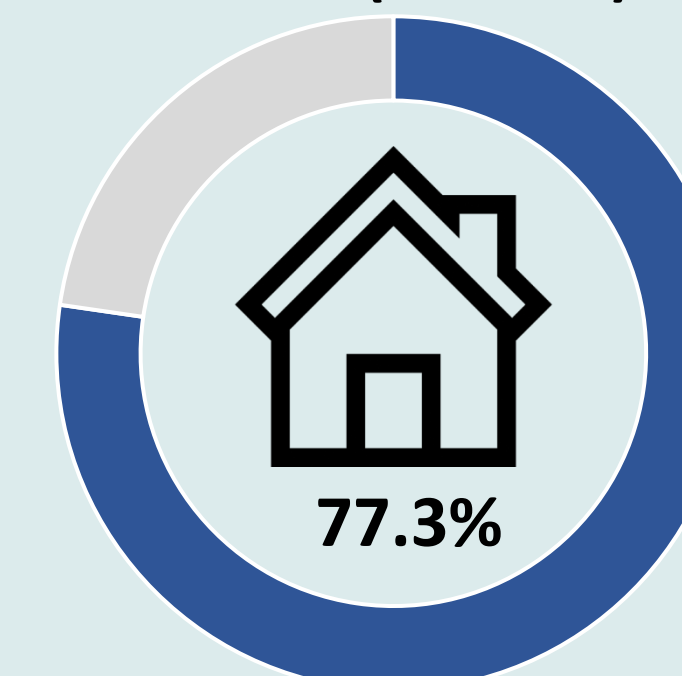
Higher hospital-free days proportion:
14.54 percentage point [95% CI 4.44-24.64], p-value = 0.005

HVRSS (n = 57)



91.8%

Control (n = 106)



77.3%

Figure 3. Adjusted proportion of enrolment days outside of hospital

Figure 4. Kaplan-Meier Survival Curves by groups

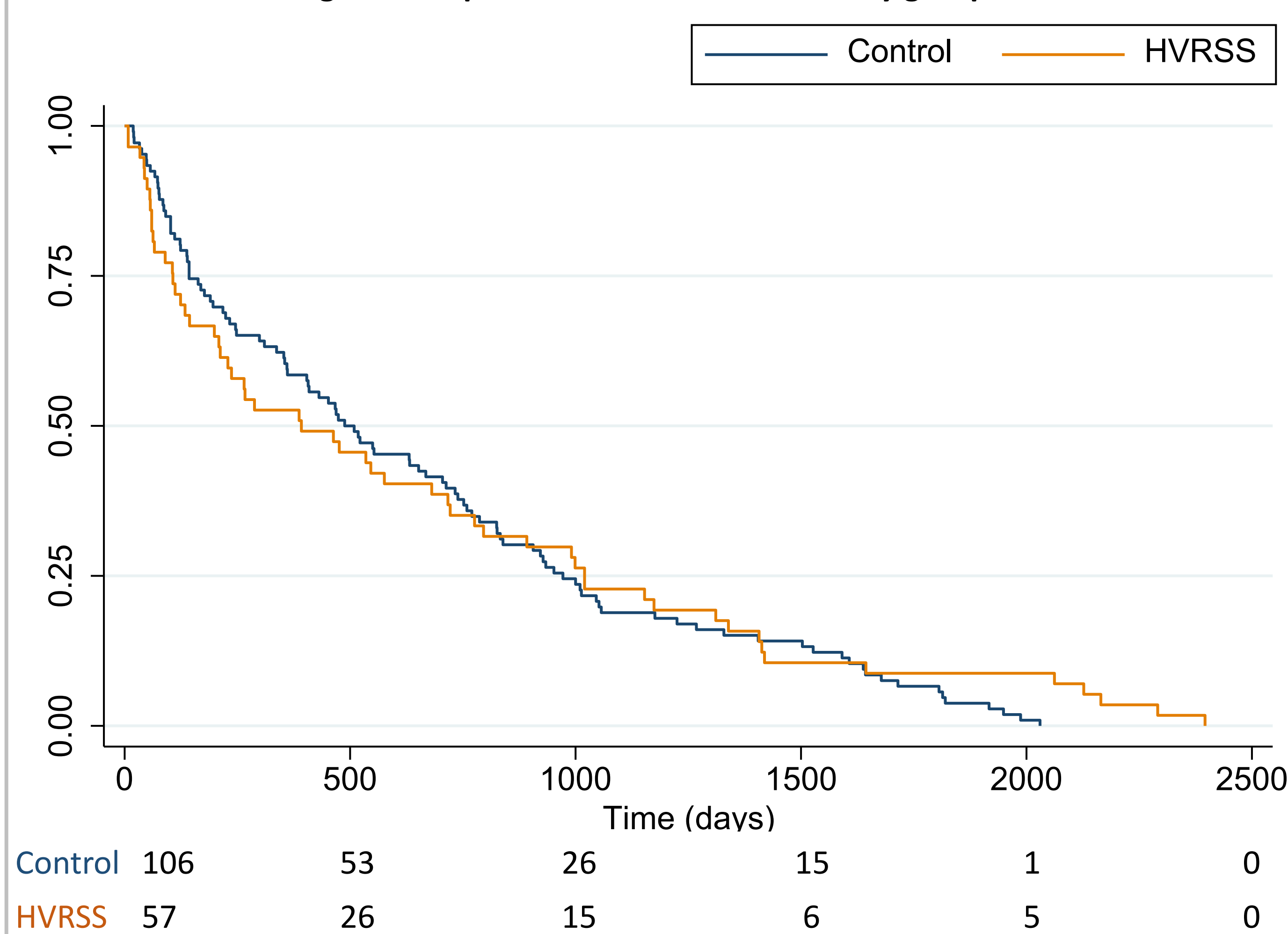


Table 1. Baseline demographics

Baseline demographics	HVRSS (n = 57)	Controls (n = 106)
Age at enrolment, years (SD)*	62.7 (19.1)	71.3 (12.4)
Age at death, years (SD)*	64.5 (18.9)	73.0 (12.3)
Male, n (%)	38 (66.7%)	52 (49.1%)
Invasive ventilation ¹ , n (%)*	30 (52.6%)	8 (7.5%)
Primary diagnosis, n (%)*		
Chronic Respiratory Disease	6 (10.5%)	61 (57.6%)
Motor Neuron Disease	15 (26.3%)	0 (0.0%)
Neuromuscular Disease	8 (14.0%)	9 (8.5%)
Obesity Hypoventilation Syndrome	2 (3.5%)	18 (17.0%)
Spinal Cord Injury	13 (22.8%)	0 (0.0%)
Others	13 (22.8%)	18 (17.0%)

* P-value <0.05; Other covariates had no statistical difference: ethnicity, housing type, CCI

¹ Invasive ventilation versus tracheostomy

DISCUSSION & CONCLUSIONS

Despite similar survival between-groups, the HVRSS has allowed patients to proportionally spend more survival days outside hospital. The adjusted comparisons in survival outcomes were enabled by the timeline visualiser which would prove useful for clinicians to understand the history of each patient.