WMRF Research Grant Report – July 2017

Application #265

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Hospital admissions for acute exacerbations of COPD; Contributing factors, risk prediction and prognosis

Following my successful application for a WMRF Research Grant in 2016 I have submitted my thesis for a Masters of Medical Science degree through the University of Otago, pending examination, on the 26th July 2017.

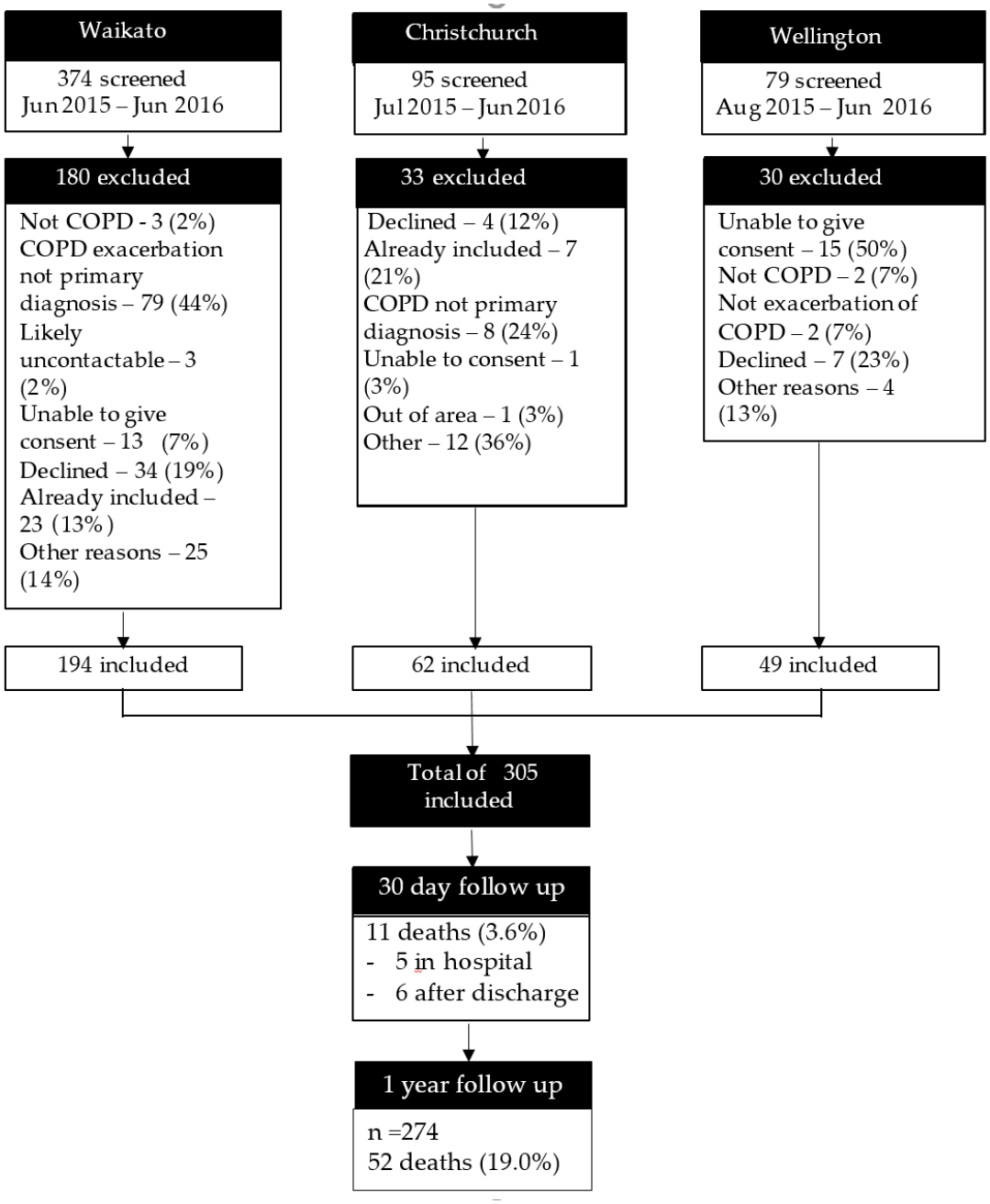
Below is a summary of the findings of the project;

Background: Hospitalisations for acute exacerbations of Chronic Obstructive Pulmonary Disease (COPD) are associated with high mortality. Clinical indicators and prognostic scores have been explored previously to identify patients at heightened risk, but may also be useful in detecting patients with a good prognosis that could avoid admission. However, there are often additional social and environmental factors at play that influence patients' reasons for admission. This thesis aims to explore these potential contributing factors in conjunction with the development of a new prognostic tool

Methods: Consecutive patients were recruited following hospitalisation with a primary diagnosis of acute exacerbation of COPD. Clinical data were collected and patient and admitting doctor questionnaires were completed to gather further information regarding the reasons for admission. The primary outcomes were all-cause mortality at 30-days and 1-year and cardio-respiratory related re-admissions over the same time period. This cohort was then used to externally validate a proposed prognostic tool, the CANT score, comprised of a composite score of CURB65 score ≥ 2, Acidaemia (pH <7.30), NT-proBNP >220pmol/L and Troponin >0.03µg/L.

CANT score criteria	Score allocated per criteria
CURB-65 score ≥ 2	1
Acidaemia – pH < 7.30	1
NT-proBNP > 220pmol/L	1
Troponin >0.03ug/L	1
	Maximum score = 4

Results:



305 patients were recruited across 3 New Zealand sites. The majority of patients had severe COPD as classified by the GOLD spirometry guidelines, and 13.5% of patients had long-term oxygen therapy at home prior to admission. Inpatient mortality was 1.6% (n=5). At 30-days post admission, mortality was 3.6% (n=11) and at 1-year 19.0% (n = 52). Readmissions for cardiac or respiratory related illnesses were 22.6% and 62.8% at 30-days and 1-year respectively. Raised NT-proBNP (>220pmol/L) and

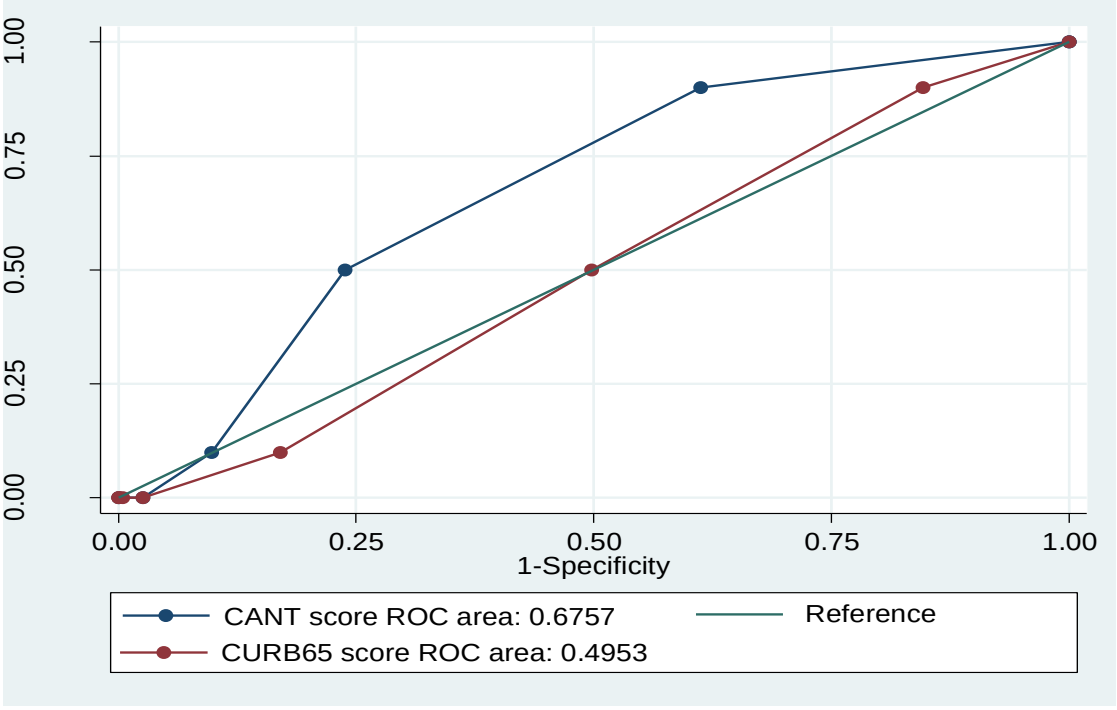
troponin (>0.03µg/L) on admission were associated with death at 1-year (p <0.05). Elevated NT-proBNP was also associated with death at 30-days (OR 3.6, CI 1.06-12.22, p = 0.04).

30-day and 1-year mortality for components of the CANT score independently in the COAST cohort.

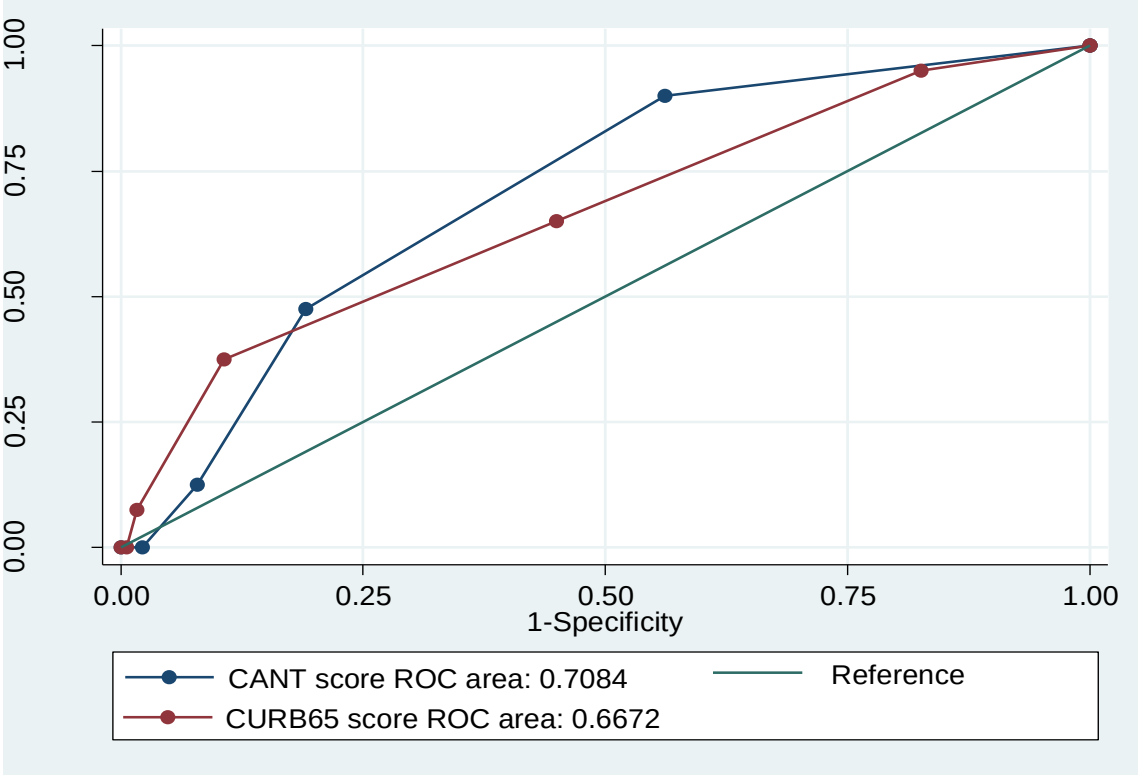
Predictors of death used in the CANT score	30-day mortality, n	%	1-year mortality, n	%
Low p H (<7.30)	2	6.7%	6	24.0%
NT-pro-BNP (>220pmol/L)	5	8.5%	16	30.2%
Troponin (>0.03µg/L)	4	6.5%	19	34.5%

The area under the receiver operating curve for mortality at 30-days post admission for the CANT score in this cohort was 0.68, which was lower than in the derivation (0.86) and internal validation cohorts (0.82).

Area under the curve ROC analysis of CANT score and CURB-65 score as predictors of 30-day mortality in the COAST cohort

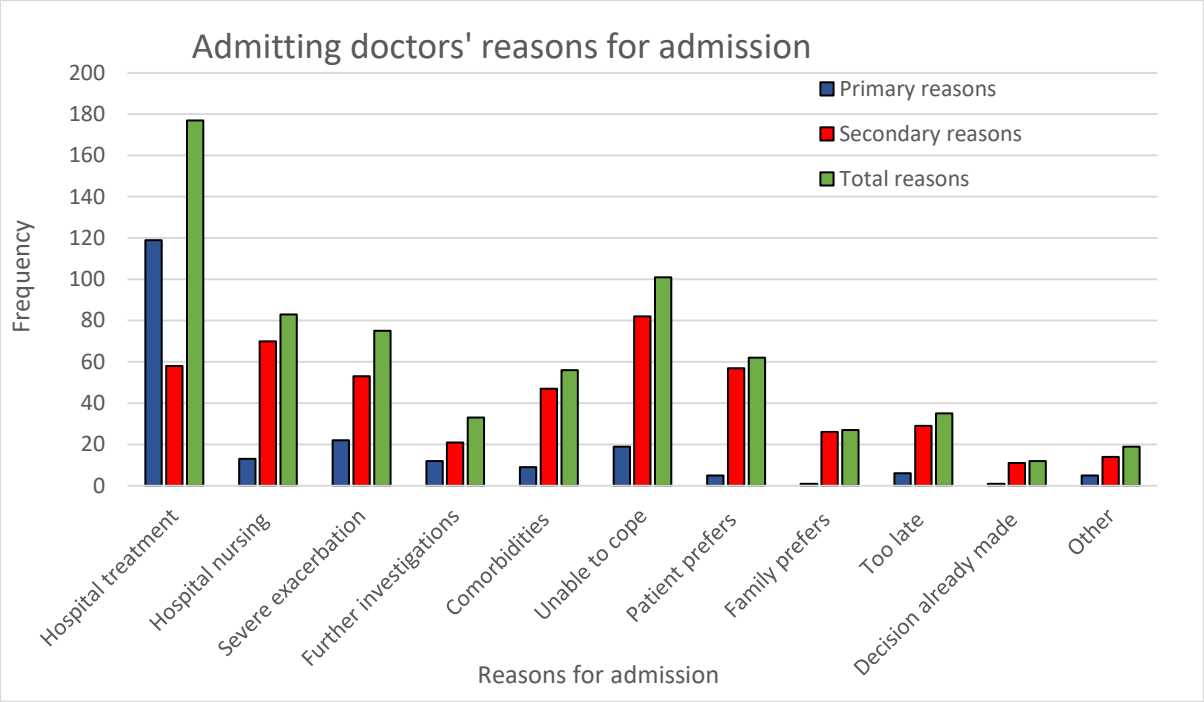


Area under the curve ROC score of the CANT score and CURB-65 score as predictors of 1-year mortality in the COAST cohort



The majority of patients were admitted due to the requirement for hospital level treatment, however the admitting doctors suggested that up to 30% of admissions could be avoided if additional support, such as acute personal cares or GP home visits, were available in the community. Over 40% of patients reported issues with GP availability, 25% reported avoiding seeing the GP due to cost and 17% due to lack of transport.

Graphical representation of admitting doctor's reason for admission



Conclusion:

We have been unable to externally validate the use of the CANT score as an effective short-term prognostic tool following acute COPD exacerbation, due to a lower than expected mortality rate at 30-days in this cohort.

Elevated NT-proBNP and troponin on admission were associated with an increased mortality at 1-year and NT-proBNP with an increased mortality at 30-days, inferring that these cardiac biomarkers are predictors of short and long-term prognosis following COPD exacerbation.

Cost, lack of transport and availability of GP services may contribute to patient admissions in addition to the clinical need for hospital level treatment. The majority of admissions are likely to be unavoidable, unless considerable increased resources can be provided in the community.