

The New Zealand Oxygen in Acute Coronary Syndromes Trial

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*on behalf of the National Cardiac and Emergency Medicine Clinical Networks
and St John and Wellington Free Ambulance Services*

Declaration of interest

- I have nothing to declare

Background

ESC recommendations for acute coronary syndromes: hypoxia	Class	Level
Oxygen is indicated in patients with hypoxaemia ($\text{SaO}_2 < 90\%$ or $\text{PaO}_2 < 60 \text{ mmHg}$)	I	C
Routine oxygen is not recommended in patients with $\text{SaO}_2 \geq 90\%$	III	B

Aim

To compare 30 day mortality for two oxygen protocols used as part of routine care in patients with a suspected acute coronary syndrome

High oxygen protocol

Oxygen by face mask at 6-8l/min for ischaemic chest pain or ECG changes irrespective of SpO₂

Stop oxygen when clinical evidence of myocardial ischemia has resolved

Low oxygen protocol

Only give oxygen if SpO₂<90%.

Target SpO₂ 90 to 94%

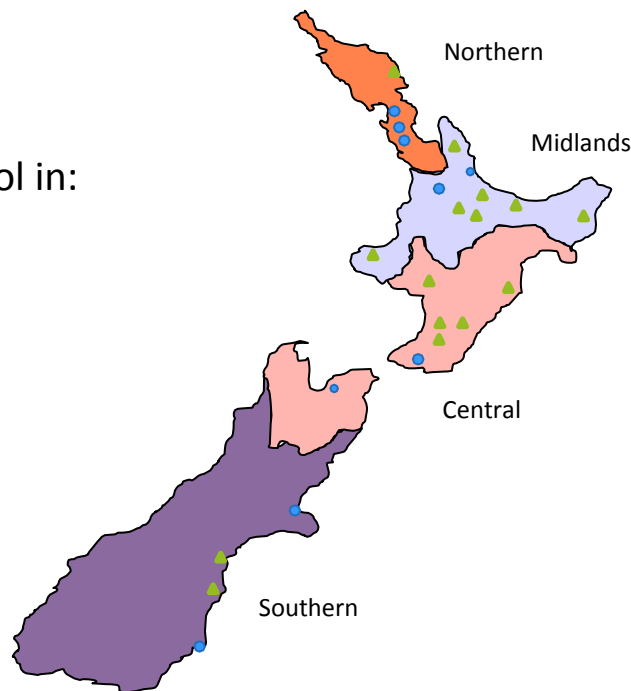
Stop O₂ when not needed to maintain SpO₂>90%

Oxygen protocols were used as part of routine care

New Zealand population ~4.8 million

Each region used the same oxygen protocol in:

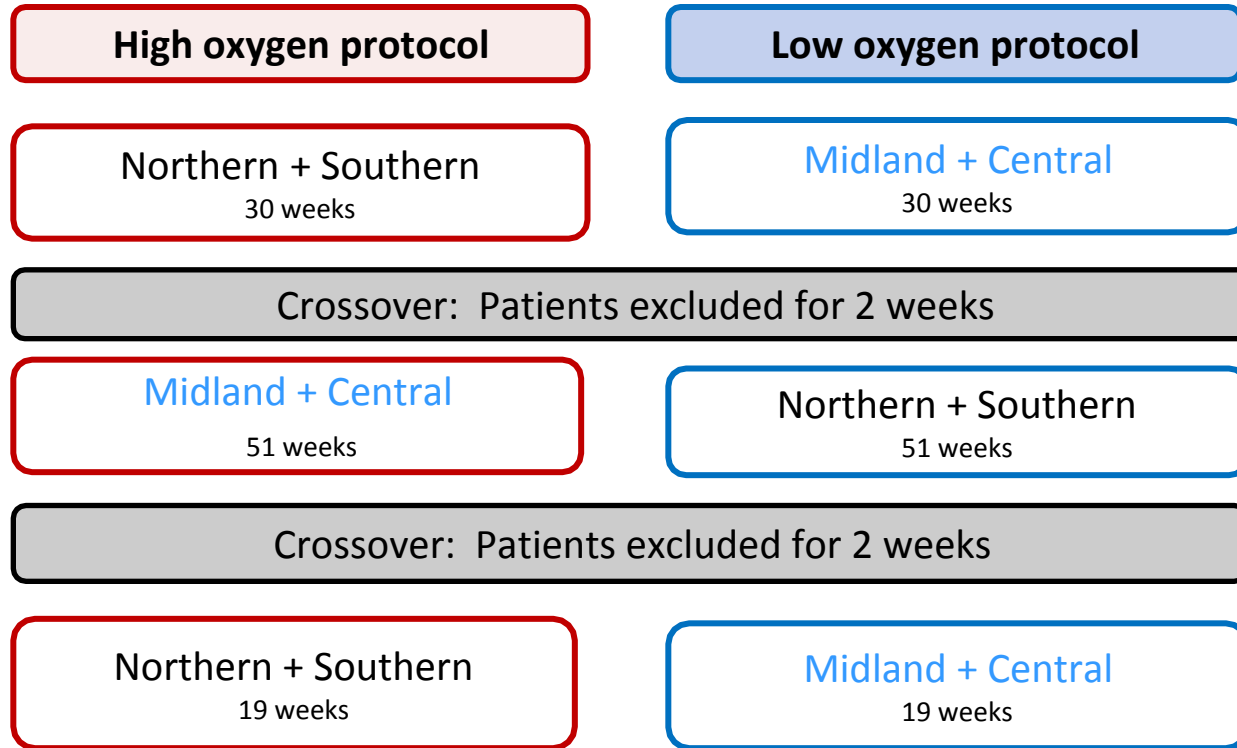
- ambulances
- emergency departments (ED)
- cardiac catheterization labs
- acute cardiac care units (CCU)



Participating hospitals

- Interventional (9)
- Non interventional (15)

Oxygen protocol use - cluster randomized cross-over



Study population

All patients presenting with suspected ACS during the study periods who were in one or both of two registries – for each patient only first assessment included.

1. All NZ Acute Coronary Syndromes – Quality Improvement Registry (n=19,566)

- Hospital based registry includes 98% of ACS patients who have coronary angiography $\pm$ PCI

2. Ambulance Acute Coronary Syndromes Care Pathway (n=29,401)

- Electronic ambulance record
- Used by St John Ambulance that services ~90% of NZ population

Assessment of outcomes

For all study patients the encrypted National Health Identifier linked to national administrative databases

- Sociodemographic characteristics
- Final diagnosis – ICD-10 codes
- 30 day all cause mortality

Study population

	High oxygen n = 20,304	Low oxygen n = 20,568
Age, mean (SD)	66.5 (14.4) years	66.4 (14.6) years
Female	8,527 (42.0%)	8,625 (41.9%)
Ethnic group		
Māori	2,298 (11.3%)	2,370 (11.5%)
Pacific	919 (4.5%)	958 (4.7%)
Asian	1,404 (6.9%)	1,495 (7.3%)
NZ European (Pākehā)	15,683 (77.2%)	15,745 (76.6%)
Socioeconomic status		
Most affluent 20% of NZ population	3,234 (15.9%)	3,203 (15.6%)
Most deprived 20% of NZ population	4,753 (23.4%)	4,856 (23.6%)

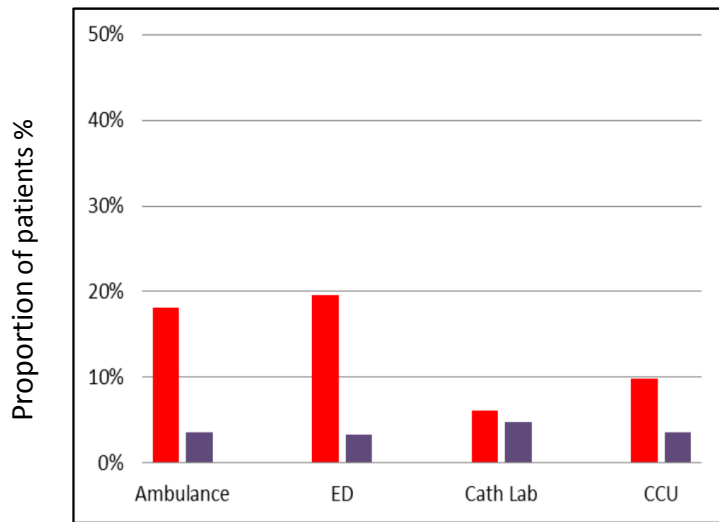
Final diagnosis

	High oxygen	Low oxygen
ACS		
ST elevation myocardial infarction	2,031 (10.0%)	2,128 (10.4%)
Non-ST elevation myocardial infarction	5,152 (25.4%)	5,066 (24.6%)
Unstable angina	1,606 (7.9%)	1,678 (8.2%)
Not ACS		
Not ACS	9,681 (47.7%)	9,838 (47.8%)
Not classified	1,834 (9.0%)	1,858 (9.0%)

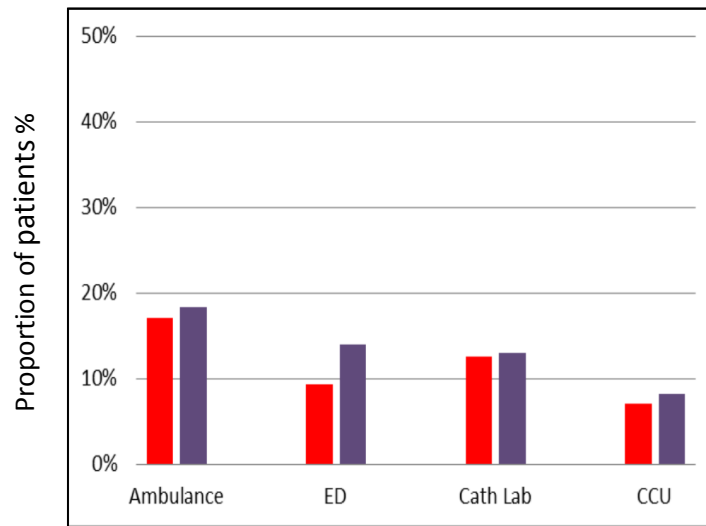
Audit of adherence to oxygen protocol

On random days (~1/month) for all patients in ANZACS-QI registry, n=812

Did not adhere to protocol



Unknown adherence to protocol

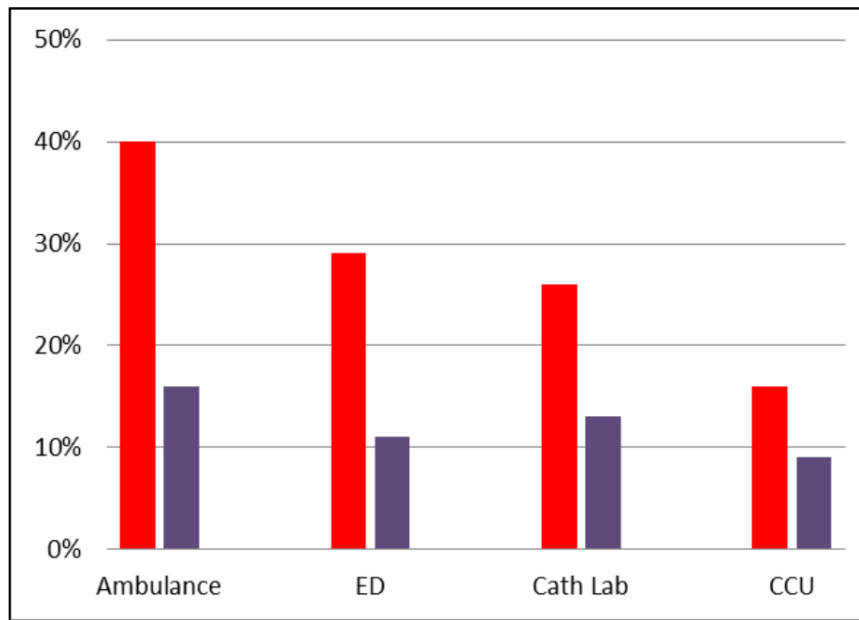


■ High oxygen protocol

■ Low oxygen protocol

Oxygen use from audit

Proportion of patients who received oxygen
and documented in medical record %

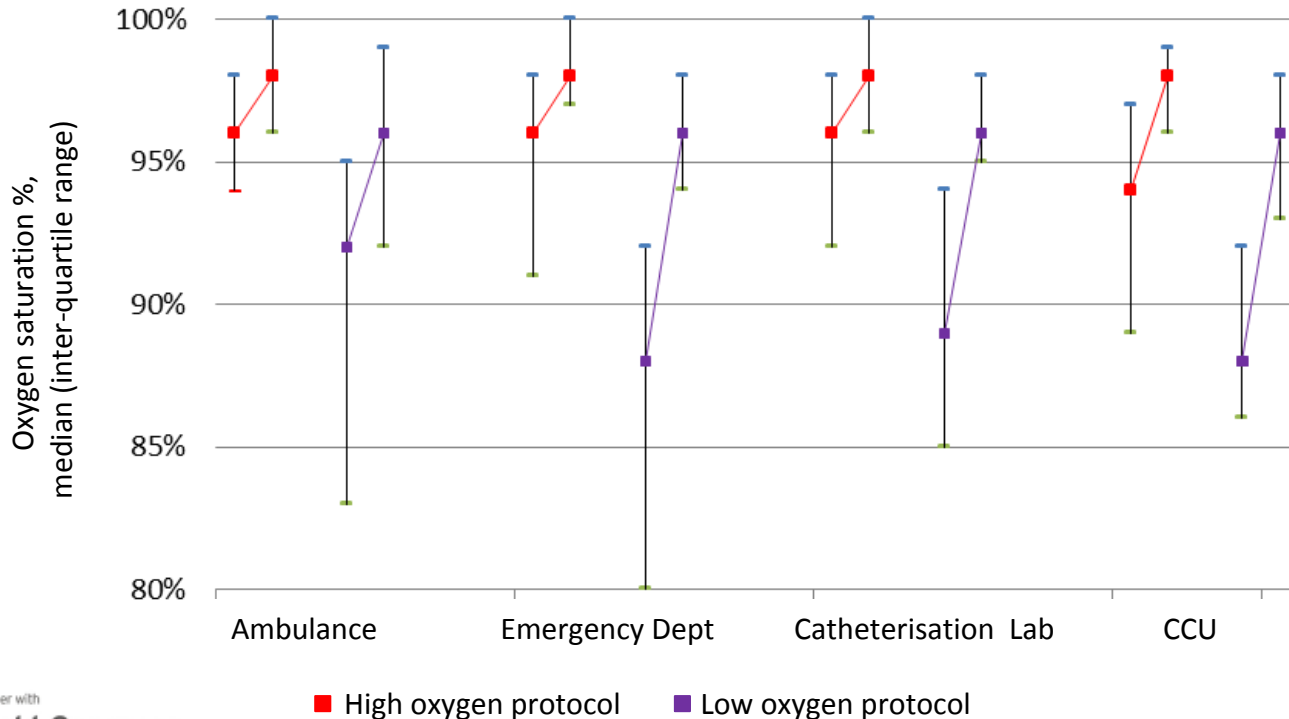


■ High oxygen protocol

■ Low oxygen protocol

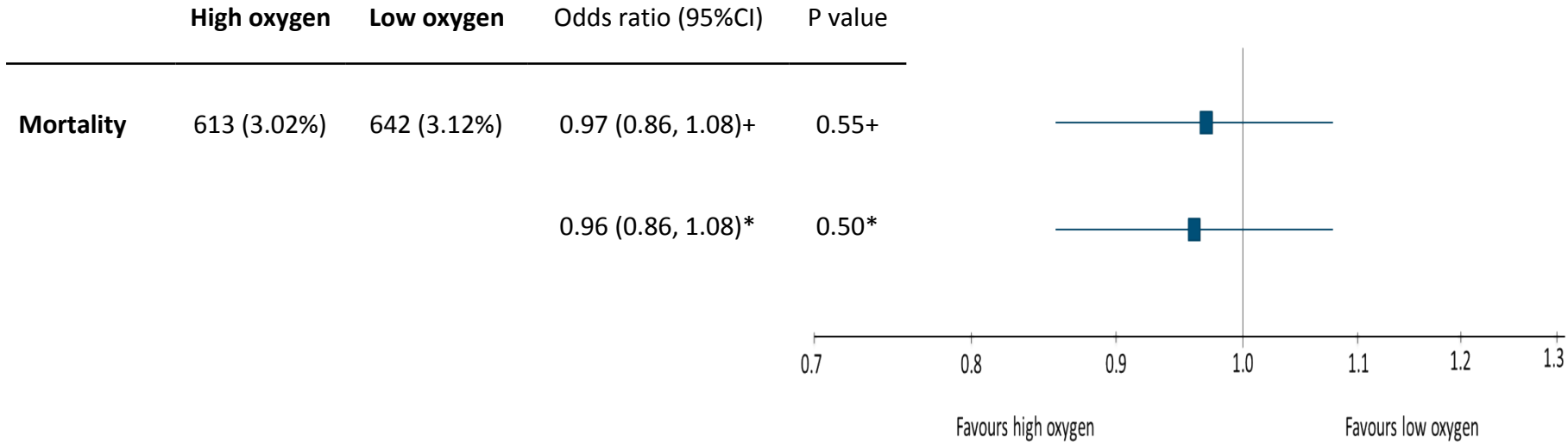
Oxygen saturation before and on oxygen

Data from random audit of medical records (n=821)



Primary outcome

30 day mortality for all patients with suspected ACS

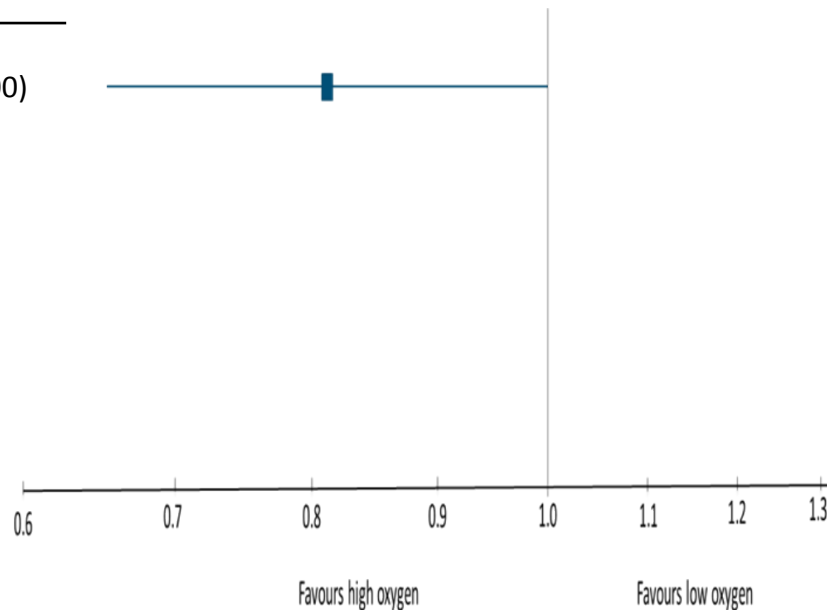


+ unadjusted

*adjusted for region, age, sex, ethnicity, socioeconomic level, season, ACS type

30 day mortality by final diagnosis

	No. patients	High oxygen Deaths (%)	Low oxygen Deaths (%)	Odds ratio (95%CI)
STEMI #	4,159	178 (8.8%)	225 (10.6%)	0.81 (0.66, 1.00)



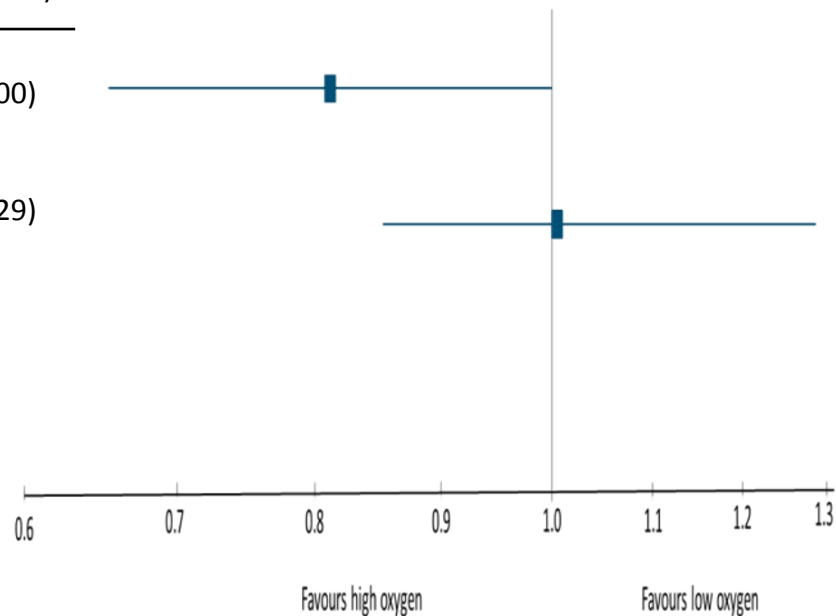
pre-specified subgroup analysis

STEMI versus all other patients, test for interaction for $p=0.016$

STEMI high versus low group unadjusted $p=0.049$, adjusted $p=0.027$

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Non-STEMI #	10,218	187 (3.6%)	176 (3.5%)	1.05 (0.85, 1.29)



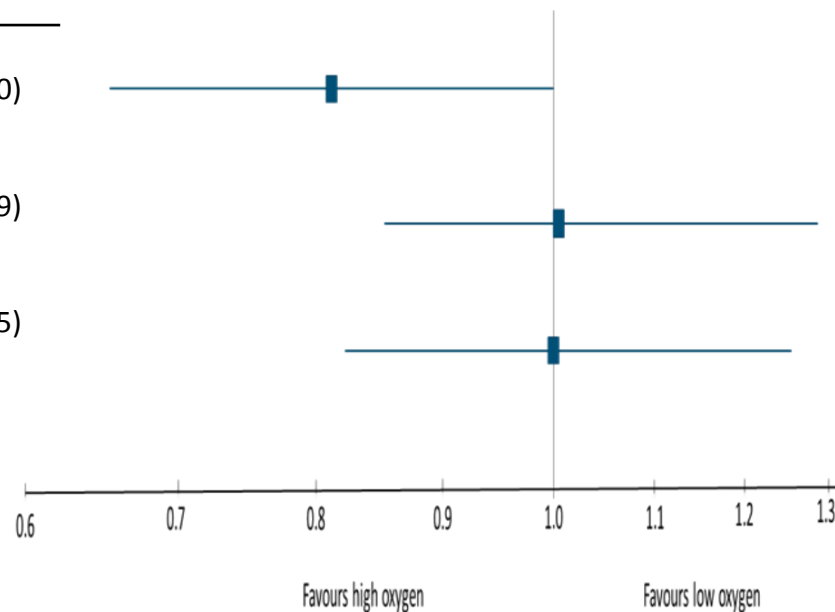
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Non-STEMI #	10,218	187 (3.6%)	176 (3.5%)	1.05 (0.85, 1.29)
Not ACS	19,519	174 (1.8%)	175 (1.8%)	1.01 (0.82, 1.25)



pre-specified subgroup analysis

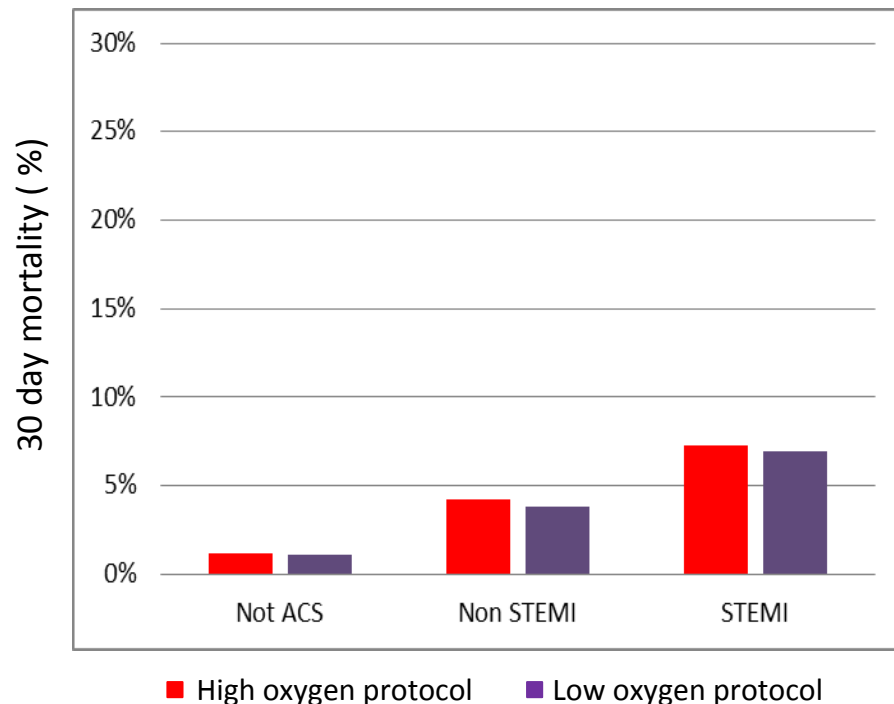
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Oxygen saturation $\geq 95\%$ on ambulance arrival

n=24,468 (89% of patients with first SpO₂ recorded on ambulance electronic record)

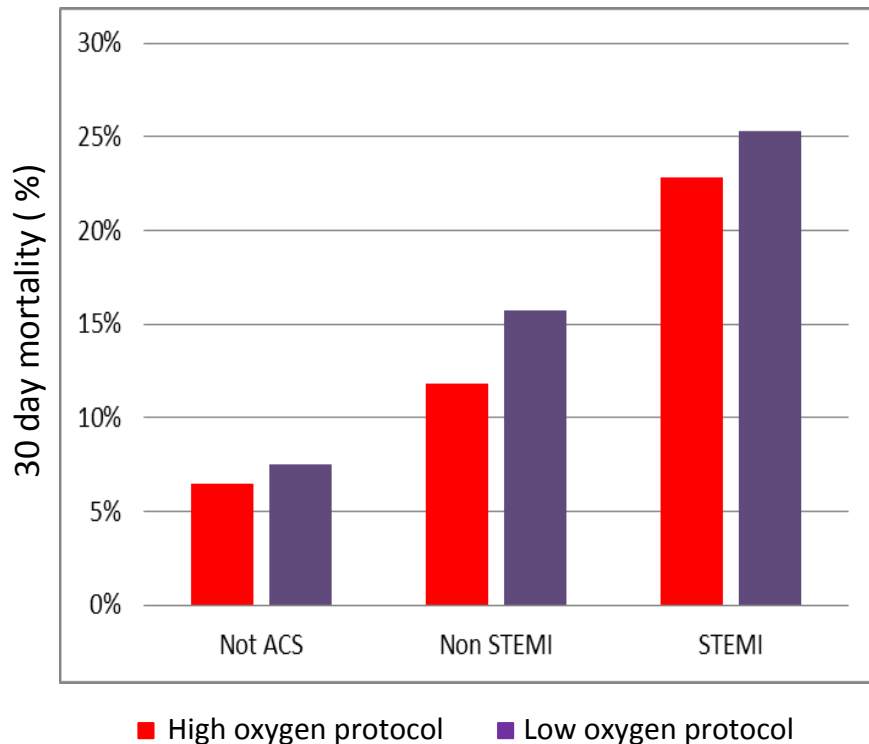
	High oxygen	Low oxygen	Odds ratio (95%CI)
Mortality	258 (2.1%)	236 (1.9%)	1.09 (0.91, 1.31)



Oxygen saturation <95% on ambulance arrival

n=3,273 (12% of patients with first SpO₂ recorded on ambulance electronic record)

	High oxygen	Low oxygen	Odds ratio (95%CI)
Mortality	168 (10.1%)	179 (11.1%)	0.88 (0.70, 1.11)



Conclusions

- In patients with suspected ACS there was no difference in 30 day mortality between high and low oxygen protocols
- Patients with suspected ACS who have a normal oxygen saturation level are unlikely to benefit from high flow oxygen
- It is possible high flow oxygen improves outcomes for patients with $\text{SpO}_2 < 95\%$, and with ST elevation myocardial infarction, but not confirmed

Acknowledgements

