TITLE (SHORT, 200 CHARACTERS MAX.):

CHEST TRAUMA AND WEANING POST-CARDIAC ARREST

MAIN HYPOTHESES TESTED (2 MAX)

What is the prevalence of chest trauma following successful resuscitation post-cardiac arrest?

Does the TTSS chest trauma score predict difficulty in weaning from mechanical ventilation post-cardiac arrest?

Rib and sternal fractures are known to be the most common CPR-related chest injuries. Previous studies based on post-resuscitation CT have reported the incidence of rib fractures to range from 26.8% to 70% and that of sternal fractures from 4.2% to 30% (1). Thoracic injury is a well-recognised cause of delayed weaning from mechanical ventilation in trauma patients but this remains poorly studied in the cardiac arrest patient cohort.

In 2000, Pape et al described the Thorax Trauma Severity Score (TTSS), a scale that included both anatomical and functional parameters (2). The purpose of the scale was to help emergency medical evaluation in identifying trauma patients at risk of pulmonary complications, using parameters available during the initial evaluation which could be applied in primary and secondary-level hospitals.

The TTSS has subsequently been validated as a predictive score in trauma patients for both complications and mortality (3). Additionally, the TTSS has been validated as a predictor for the development of ARDS following thoracic trauma (4).

The Thorax Trauma Severity Score uses 5 parameters: patient's age; the number of rib fractures; pleural involvement (haemo/pneumothorax); presence and degree of pulmonary contusion and PaO2/FiO2 to grade the severity of the thoracic trauma. Each variable is scored on a scale of 0 to 5 points, with 0 representing normal function; absence of injury or age <30 years and 5 representing severity or age > 70 years (see below).

Thorax Trauma Severity Score (Pape *et al.*)

Grade	PaO2/FiO2	Rib Fractures	Lung Contusion	Pleura	Age (years)	POINTS
0	> 400	0	No	No	< 30	0
I	300-400	1-3	Unilobar unilateral	Pneumothorax	30-41	1
II	200-300	3-6	unilobar bilateral or bilobar unilateral	Haemothorax or haemo/pneumothorax unilateral	42-54	2
III	150-200	> 3 bilateral	bilateral < 2 lobules	Haemothorax or haemo/pneumothorax bilateral	55-70	3

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IV	<150	Flail chest	Bilateral ≥ 2 lobules	Tension pneumothorax	> 70	5

A cut-off level of 8 points in the TTSS can be used to classify patients for enhanced observation in the context of thoracic trauma. It is unclear what cut-off is applicable, if at all, with the TTSS in OOHCA patients.

SINGLE CENTER [ ], MULTICENTER [X]

Multicenter observational

PICO

Patients - all patients in STEPCARE with an admission CT where the number of individual fractures can be obtained

Information -

Calculation of TTSS:- P/F ratio, number of rib fractures on CT, presence of lung contusions on CT, presence of haemo/pneumothorax.

Outcome data:- duration of mechanical ventilation, need for tracheostomy, the occurrence of ventilator-associated pneumonia, need for reintubation

Consent - observational only

Outcome -

1) A better understanding of the prevalence of chest trauma post-cardiac arrest

2) Validation of the TTSS score in predicting duration of mechanical ventilation, need for tracheostomy, need for reintubation and occurrence of ventilator-associated pneumonia in OOHCA patients.

DATA NEEDED FOR THE ANALYSIS
(SPECIFY VARIABLES AND MOTIVATE ANY PROPOSED ADDITIONS TO THE ECRF)

As above

LOGISTICS — HOW WILL ADDITIONAL DATA BE GATHERED?

Most data will be collected as part of the STEPCARE CRF. Additional information will be needed from participating sites on the number of individual fractures, presence of contusions and haemo/pneumothoraces seen on admission CT thorax.

BRIEF STATISTICAL ANALYSIS PLAN AND SAMPLE SIZE ESTIMATE

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We plan to perform a logistical regression analysis based on the above data.

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References:-

1) S J Jand et. al. "Computed tomographic findings of chest injuries following cardiopulmonary resuscitation" Medicine (Baltimore). 2020 Aug 14; PMCID: PMC743782 PMID: 32872040

2) H C Pape et. al. "Appraisal of early evaluation of blunt chest trauma: development of a standardized scoring system for initial clinical decision making." *J Trauma.* 2000;49(3):496–504.

3) I M Casas et. al. "Thorax Trauma Severity Score: Is it Reliable for Patient's Evaluation in a Secondary Level Hospital?" Bull Emerg Trauma. 2016 Jul; 4(3): 150–155. PMCID: PMC4989041 PMID: 27540549

4) T S Aukema et. al. "Validation of the Thorax Trauma Severity Score for mortality and its value for the development of acute respiratory distress syndrome" Open Access Emerg Med. 2011; 3: 49–53. Published online 2011 Aug 23. doi: 10.2147/OAEM.S22802 PMCID: PMC4753967 PMID: 27147852

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