Chelsea Critical Care Physical Assessment (CPAx) scores and tracheostomy weaning in cardiothoracic critically ill patients: a retrospective observational study

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Introduction:
Chelsea Critical Care Physical Assessment tool (CPAx) is a bedside objective tool designed to measure function in critical illness. CPAx has demonstrated validity, reliability and responsiveness, and is widely used, in the critical care population [1]. Martin et al [2] looked at responsiveness and Construct Validity of the Chelsea Critical Care Physical Assessment Tool in a Cardiothoracic ICU. They found that CPAx is able to detect clinically important changes inpatients' physical function throughout their hospital stay suggesting good responsiveness. There have been no studies to date that investigate whether there is a relationship between tracheostomy weaning and CPAx score increasing with rehabilitation.

Aims:
1. Investigates if a relationship exists between an increasing CPAx score and tracheostomy weaning.
2. Whether an increasing CPAx score indicates when a patient may be ready for decannulation.
3. If there is a relationship between CPAx score and tracheostomy weaning, does this relationship change depending on present condition causing critically illness, i.e. medical or surgical admission?

Method:
Retrospective data collection was completed from June 2020 to December 2020, with data collected from the physiotherapist's electronic notes on Metavision. Patients with tracheostomies were identified from tracheostomy round data.

Inclusion criteria: patients admitted to ICU in the 6 month period, and had a tracheostomy, over 18 years old, COVID 19 negative status and must have stayed on ICU for at least 72 hours with a tracheostomy.

A negative COVID 19 status was stipulated as the CPAx score has not yet been validated in COVID 19 positive patient group [3]. As there is no formalised outcome for tracheostomy weaning a 1-5 scale was created to gain a numerical value of weaning as seen in Figure 2. Spearman Rank Correlation coefficients were then applied to the data sets to analyse the significance of the results using Statistical Package for the Social Sciences (SPSS) and scatter graphs to demonstrate if a visual correlation was present.

Example of CPAx Web

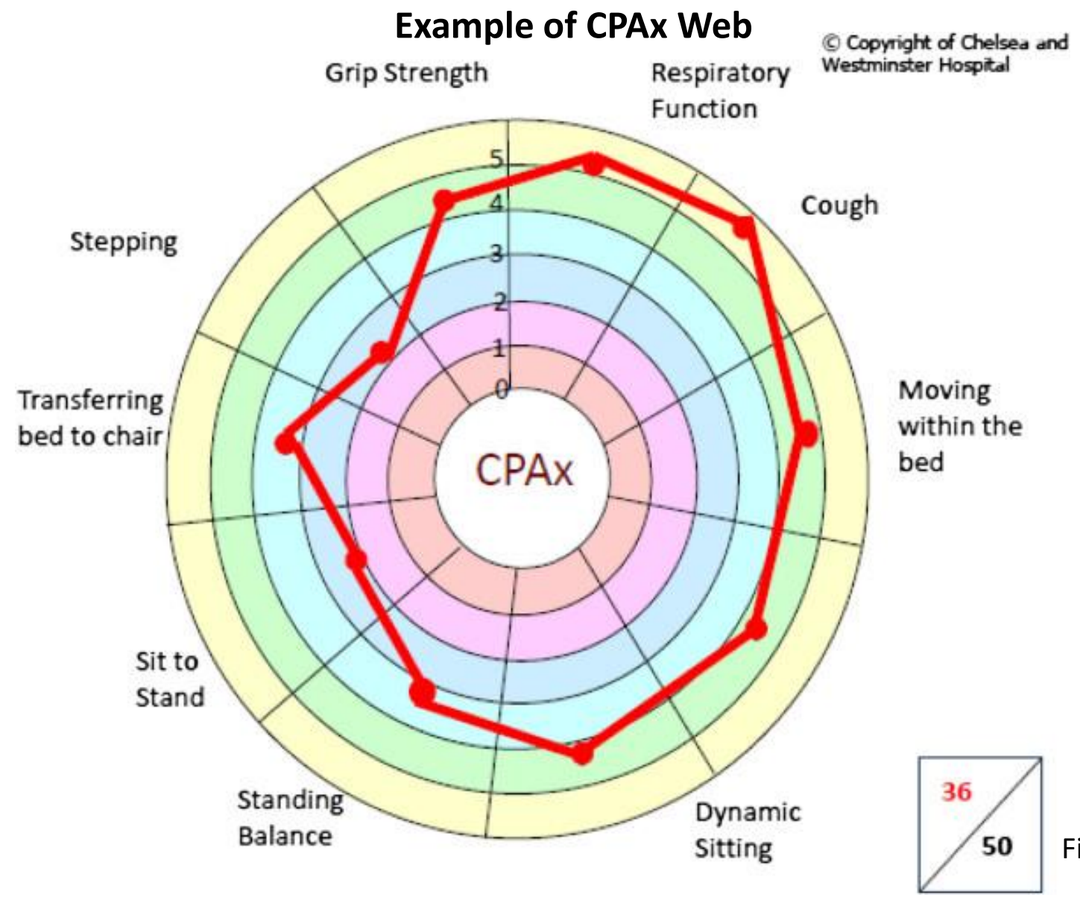

Fig. 1 [1]

Tracheostomy Outcome Measure	
Vent - no spontaneous breaths	0
Vent - spontaneous breaths	1
Tracheostomy Mask	2
Speaking Valve	3
Capped Off	4
Decanulated	5

Fig. 2

Results:
Cardiac surgery (43%), out of hospital cardiac arrests (18%), and pneumonia (7%) made up a significant percentage of the patients admitted to ICU requiring a tracheostomy; further breakdown can be seen in Figure 3. Of the 28 patients included, 23 patients survived RPH ICU stay, and 5 patients died. 14 of the 28 patients were decannulated during their ICU admission, and 9 patients were repatriated to their local hospital prior to decannulation. One patient that was successfully decanulated, unfortunately then died subsequently from sepsis. Spearman's Rank Correlation Coefficient showed a positive correlation between CPAx score and tracheostomy weaning (CI = 95%, r=0.79), see scatter graph in Figure 4. Medical cardiothoracic patients (n=12) e.g. pneumonia and cardiology patients, appear to have a stronger positive correlation (r=0.84) with CPAx and tracheostomy, than surgical cardiothoracic patients (n=16, r=0.73).

Type of admission to ICU

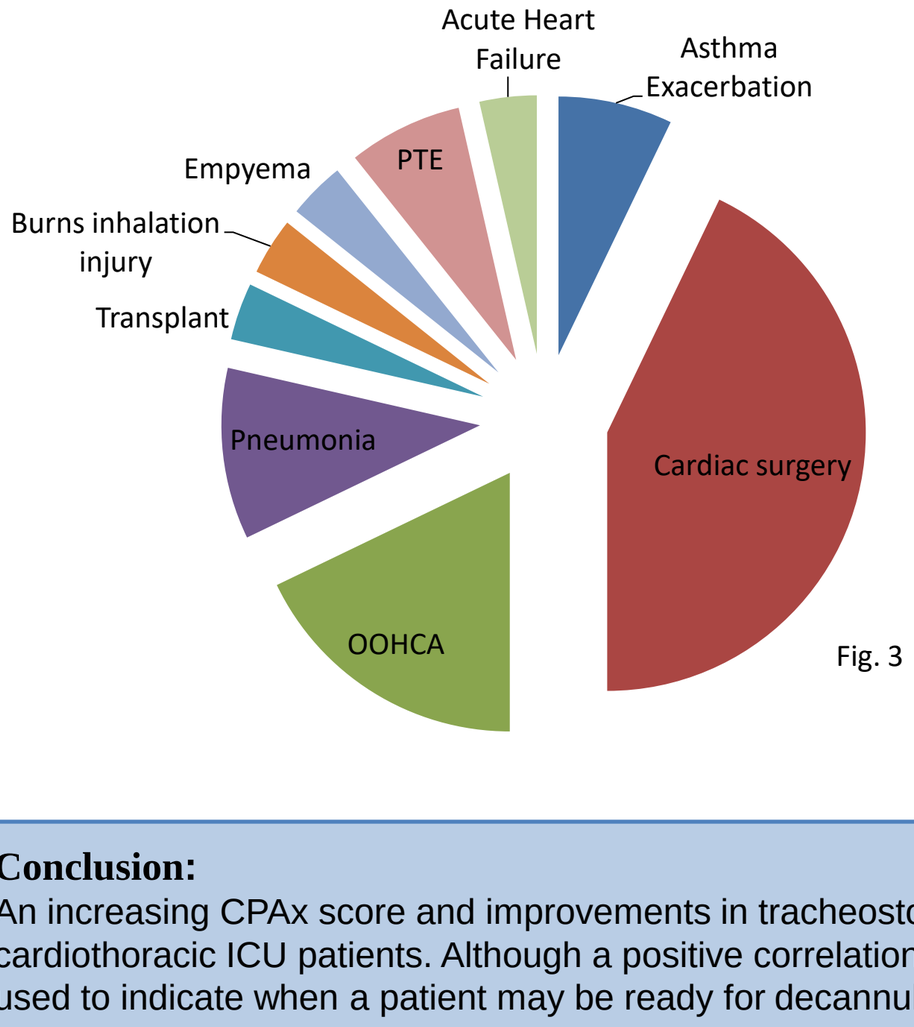

Fig. 3

CPAx Score and Tracheostomy Score Relationship

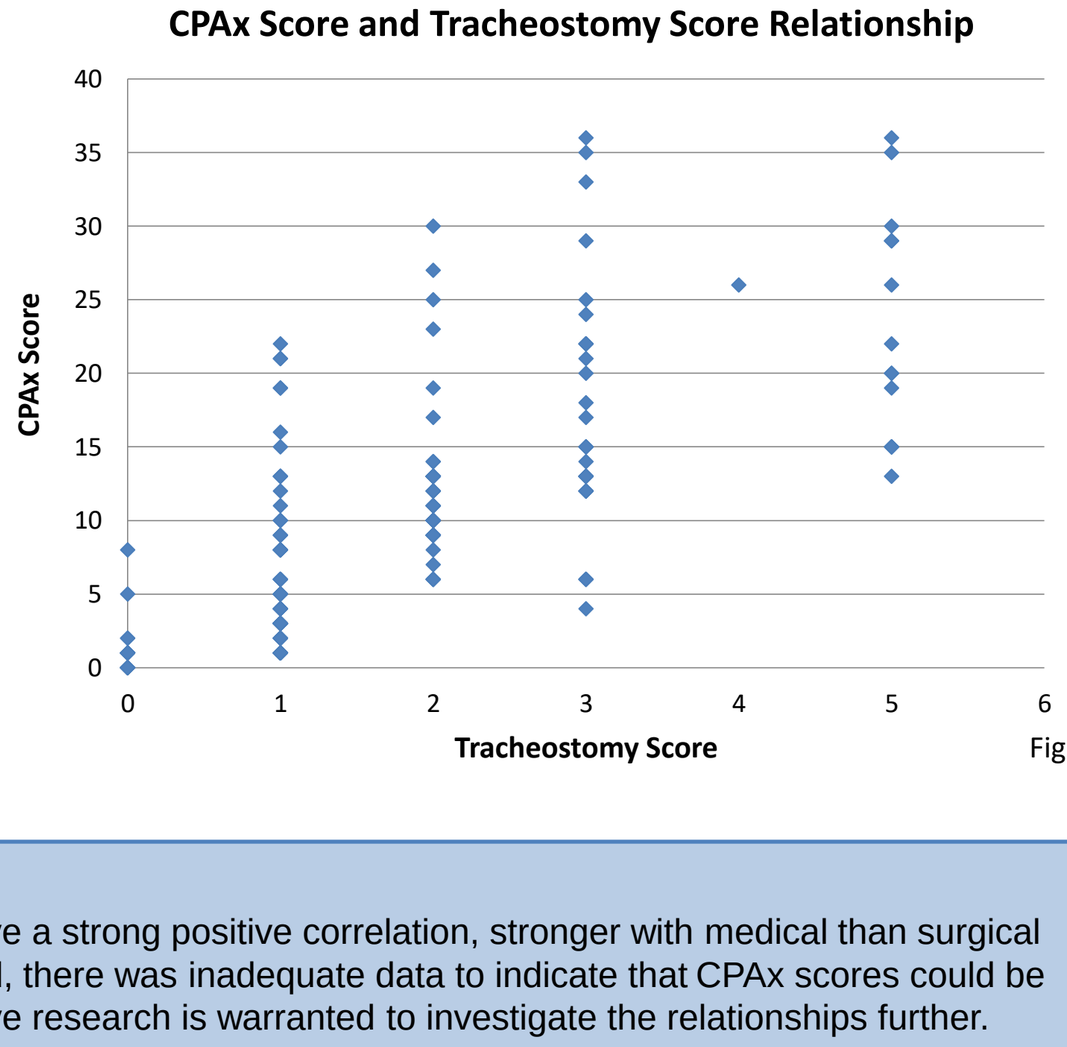

Fig. 4

Conclusion:
An increasing CPAx score and improvements in tracheostomy weaning have a strong positive correlation, stronger with medical than surgical cardiothoracic ICU patients. Although a positive correlation is demonstrated, there was inadequate data to indicate that CPAx scores could be used to indicate when a patient may be ready for decannulation. Prospective research is warranted to investigate the relationships further.

References

[1] Corner, E,, et al. (2014) *J. Crit. Care*; 18:1-10. [2] Martin N, Meehan C, Curran R, Dowling K, Purkiss C, Corner EJ1. Responsiveness and Construct Validity of the Chelsea Critical Care Physical Assessment Tool in a Cardiothoracic ICU. In: Intensive Care Society State of the Art 2019. [3] Sire, A., et al. *J. Med. Virol.* 2021;1–3.

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