



Yong Loo Lin  
School of Medicine

# Impact of Time- to-Compression on Out-of-Hospital Cardiac Arrest Survival Outcomes: a National Registry Study

Goh Jia Ling<sup>a</sup>, Pin Pin Pek<sup>b</sup>, Stephanie Man Chung Fook-Chong<sup>c</sup>, Andrew FW Ho<sup>b</sup>, Fahad Javaid Siddiqui<sup>c</sup>, Benjamin Sieu-Hon Leong<sup>d</sup>, Desmond Ren Hao Mao<sup>e</sup>, Weiming Ng<sup>f</sup>, Ling Tiah<sup>g</sup>, Michael Yih-Chong Chia<sup>h</sup>, Lai Peng Tham<sup>i</sup>, Nur Shahidah<sup>j</sup>, Shalini Arulanandam<sup>k</sup>, Marcus Eng Hock Ong<sup>b</sup>

<sup>a</sup>Yong Loo Lin School of Medicine, National University of Singapore

<sup>b</sup>Health Services and Systems Research, Duke-National University of Singapore Medical School, Singapore; Department of Emergency Medicine, Singapore General Hospital, Singapore

<sup>c</sup>Health Services and Systems Research, Duke-National University of Singapore Medical School, Singapore

<sup>d</sup>Emergency Medicine Department, National University Hospital, Singapore

<sup>e</sup>Department of Acute and Emergency Care, Khoo Teck Puat Hospital, Singapore

<sup>f</sup>Emergency Medicine Department, Ng Teng Fong General Hospital, Singapore

<sup>g</sup>Accident & Emergency, Changi General Hospital, Singapore

<sup>h</sup>Emergency Department, Tan Tock Seng Hospital, Singapore

<sup>i</sup>Children's Emergency, KK Women's and Children's Hospital, Singapore

<sup>j</sup>Department of Emergency Medicine, Singapore General Hospital, Singapore

<sup>k</sup>Medical Department, Singapore Civil Defence Force, Singapore

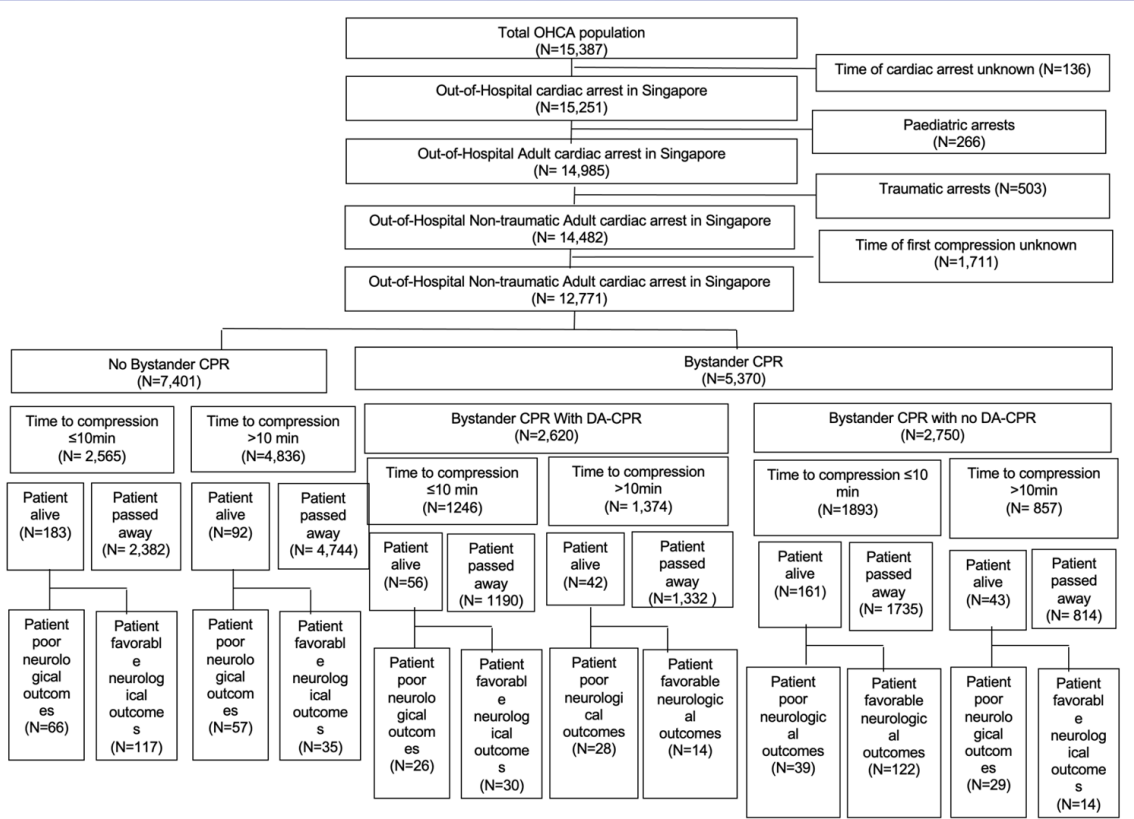
## Aims

- Time To first Compression (TTC) in out-of-hospital cardiac arrests (OHCA) is thought to be an important predictor of survival outcomes.
- Guidelines recommend that extracorporeal membrane oxygenation (ECMO) should not be used on OHCA patients with TTC > 10 minutes.
- However, no literature has validated this exclusion criterion on OHCA survival and neurological outcomes.
- This study aimed to
  - evaluate the difference in neurological and survival outcomes of patients with cardio-pulmonary resuscitation (CPR) administered after 10 minutes, compared to within 10 minutes.
  - Determine a suitable cut-off time of TTC for ECMO inclusion criteria

## Methodology

- Data of OHCA from 2012-2017 in Singapore were extracted from our national OHCA registry.
- Patients who received CPR within 10 minutes versus those who received CPR after 10 minutes were compared
- Primary outcomes were favorable cerebral performance (Glasgow-Pittsburgh Cerebral Performance Categories 1 and 2), and secondary were survival to hospital discharge or 30-day-survival.
- Chi-square test was used for categorical data while t-test was used for continuous data
- The association between TTC and outcomes were analysed using univariate and multivariate logistic regressions

Figure 1: Study Population Flowchart



## Results

- 12,771 OHCA were analyzed [Figure 1]
  - 5,704 patients with TTC ≤10 minutes
  - 7,067 with TTC >10 minutes
- Fewer patients survived to hospital discharge/30th day with TTC > 10 minutes (aOR 0.43, 95%CI: 0.32-0.58)
- Survival with good neurological outcomes was lower (aOR 0.51; 95%CI: 0.41-0.62).
- Other significant predictors of good neurological outcomes:
  - age (aOR 0.98, 95%CI: 0.98 - 0.99)
  - witnessed arrest (aOR 2.39, 95%CI: 1.69-3.40)
  - bystander AED (aOR 1.55, 95%CI: 1.12-2.26)
  - presence of shockable rhythm (aOR 8.76, 95%CI: 7.12-10.78)
- A cut-off of 17.5 minutes (aOR 0.43, 95%CI:0.28-0.65) resulted in <1% chance of survival with good neurological function [Figure 2] based on the medical definition of Futility (specificity 0.84 sensitivity 0.84 ROC 0.91) [Figure 3].

## Conclusion

- There is a significant difference in survival and favourable neurological outcomes when TTC was >10 minutes.
- More data-driven cut-off timings/criteria should be considered instead of the arbitrary 10 minutes for eligibility of ECMO therapy.

Figure 2: Frequency of favorable neurological outcomes against TTC

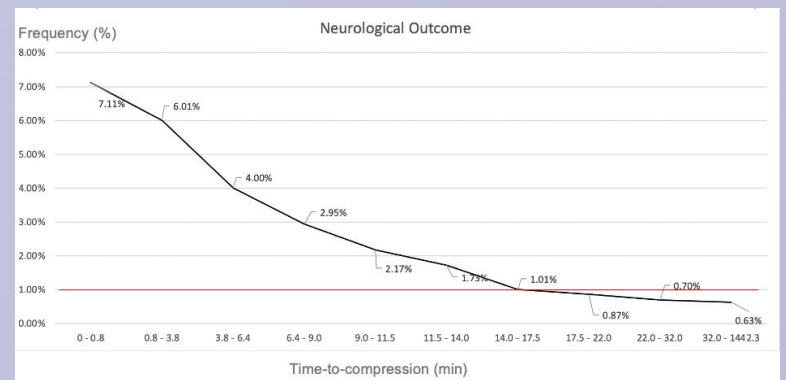


Figure 3: ROC and sensitivity/specificity curve using cut-off 17.5min

