Outcomes of OHCA patients stratified by mode of transport to the ED in Singapore

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Outline of Study

- Introduction
- Aims/Hypotheses
- Methods
- Significance
- Results & Conclusion (for published study)

Introduction

- In developed countries, most patients with OHCA will arrive in the hospital via ambulances.
- This is largely due to the presence of a developed EMS system as well as greater awareness of the “Chain of survival” which consists of immediate recognition and activation of emergency medical services (EMS), early chest compression, rapid defibrillation, effective advanced life support and integrated post cardiac arrest care

Objectives

- To examine the effect of mode of transportation to the ED on the outcomes of OHCA patients in different PAROS countries – whether there is a difference in terms of witnessed arrest, bystander CPR & AED rates across the different modes of transport to the ED on the survival outcome of OHCA patients
- We hypothesise that OHCA patients brought in by Emergency Medical Services (EMS) will have a higher rate of ROSC, survival to discharge and better neurological outcome compared to other modes of transport e.g. own or public transport.

Methodology

- Setting: all PAROS countries with different mode of transportation to the ED
- Inclusion: All OHCA patients
- Exclusion: Missing survival data
- Basic descriptive baseline characteristics: age, gender, race past medical history, location, country, witnessed status, bystander CPR & AED rates, prehospital defibrillation, first arrest rhythm
- Outcomes: Primary: Survival to discharge or 30 days
- Secondary: ROSC, good neurological status (Cerebral performance category 1 or 2)
- Statistics: Multivariable logistic regression.

Significance

- The EMS is an important and early link in the chain of survival, as trained paramedics and emergency medical technicians perform cardiopulmonary resuscitation and defibrillation as well as provide standby alerts to receiving hospitals, and these various measures have been shown to improve survival outcomes in OHCA patients.
- Countries with developed EMS systems are expected to have a higher rate of EMS utilization for OHCA cases as compared to developing EMS systems. The difference in survival rates and outcome may serve as an impetus for individual EMS systems to improve their system and enhance public education on the utilization of EMS for OHCA to enhance the chance of survival.

Impact of COVID-19 on adult OHCA in Asia

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Background

- COVID-19 pandemic may have direct and indirect effects on the incidence of OHCA
- Management of OHCA may be adversely affected by COVID-19 concerns
- Little is known about the impact of COVID-19 on OHCA incidence, management and outcomes in Asia

Aims and Hypotheses

- To compare the incidence, pre-hospital management and outcomes of OHCA between COVID and non-COVID periods, amongst Asian countries.
- We hypothesised that the pandemic would affect the incidence, characteristics and management of OHCA, leading to changes in outcomes

Methods

Data sources: ePAROS or direct contribution

Study period: 1st Jan 2020 to 31st Dec 2020, compared with similar time period in 2018

Study population: All adult (≥18yo), EMS-attended, OHCA patients

Study outcome: Pre-hospital ROSC

Methods

Variables of interest: incidence of OHCA, demographics, event characteristics, bystander interventions, EMS timings, pre-hospital ROSC

Statistical analysis: multi-level regression modelling is used to compare pre-COVID and COVID periods, with separate models for each country/region

Significance

- Varying measures were imposed in each country to tackle the pandemic
- These measures may have ramifications on other aspects of healthcare.
- Knowledge of the impact on OHCA is vital for countries to adapt medical services and public health education in order to limit the collateral consequences of the pandemic

Thank you

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Pediatric OHCA in Covid-19 Pandemic

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Outline of Study

- Introduction
- Aims/Hypothesis
- Methods
- Significance

Introduction

- There is a dismal data on pediatric out-of-hospital cardiac arrest
- There is a wide variation on pediatric survival outcomes
- Improvement in survival outcomes for pediatric OHCA still remains indistinct over time
- The entire health care system has been reorganized during COVID19 Pandemic

Introduction

Research Question:

Among pediatric non-traumatic out-of-hospital cardiac arrest (OHCA) patients during the COVID-19 pandemic in Pan-Asian countries, what are the clinical, pre-hospital, and epidemiological characteristics related to survival outcomes?

Aims and Hypothesis

GENERAL AIM

To describe the clinical, pre-hospital, and epidemiological characteristics and survival of Pediatric Non-Traumatic Out-Of-Hospital Cardiac Arrest (OHCA) patients in Pan-Asian countries during the time of the COVID- 19 Pandemic.

Aims and Hypothesis

Specifically,

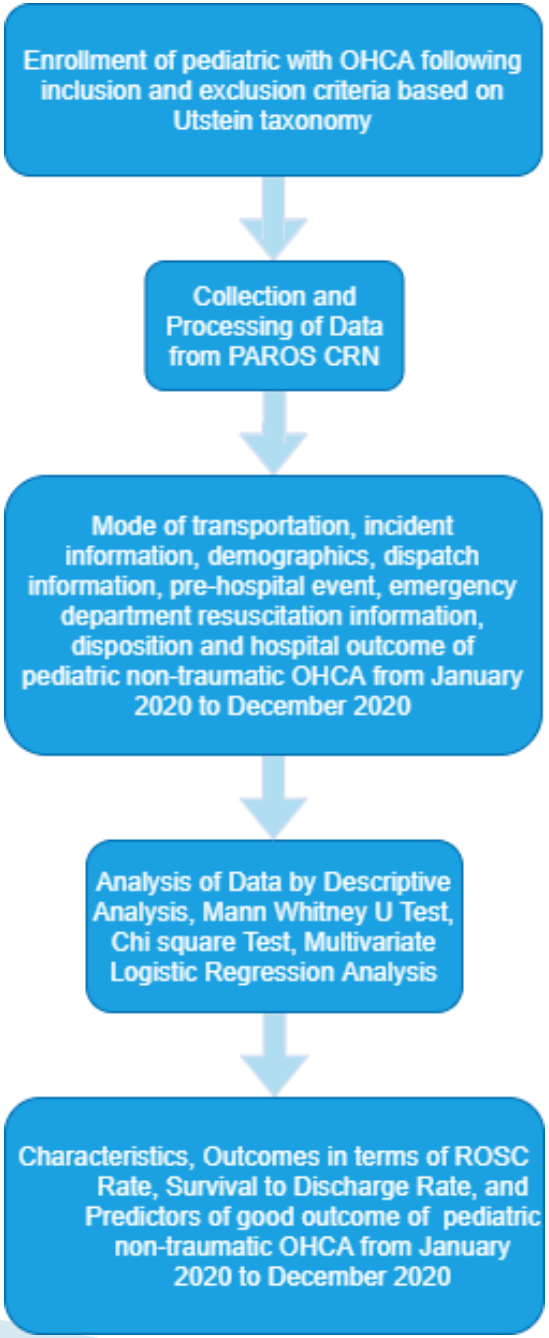
- survival outcome of OHCA patients
- modifiable pre-hospital factors: bystander CPR, dispatch-assisted CPR, dispatch time, call-to-arrival at scene, call-to-arrival at hospital by pre-hospital care providers
- clinical and demographic characteristics of out-of-hospital cardiac arrest patients: age, sex, incident information, co-morbid condition, ED resuscitation information
- clinical outcomes: return of spontaneous circulation (ROSC), survival-to-discharge and CPC score) before and during COVID-19 pandemic
- challenges of pre-hospital care and ED personnel during the COVID-19

Hypothesis

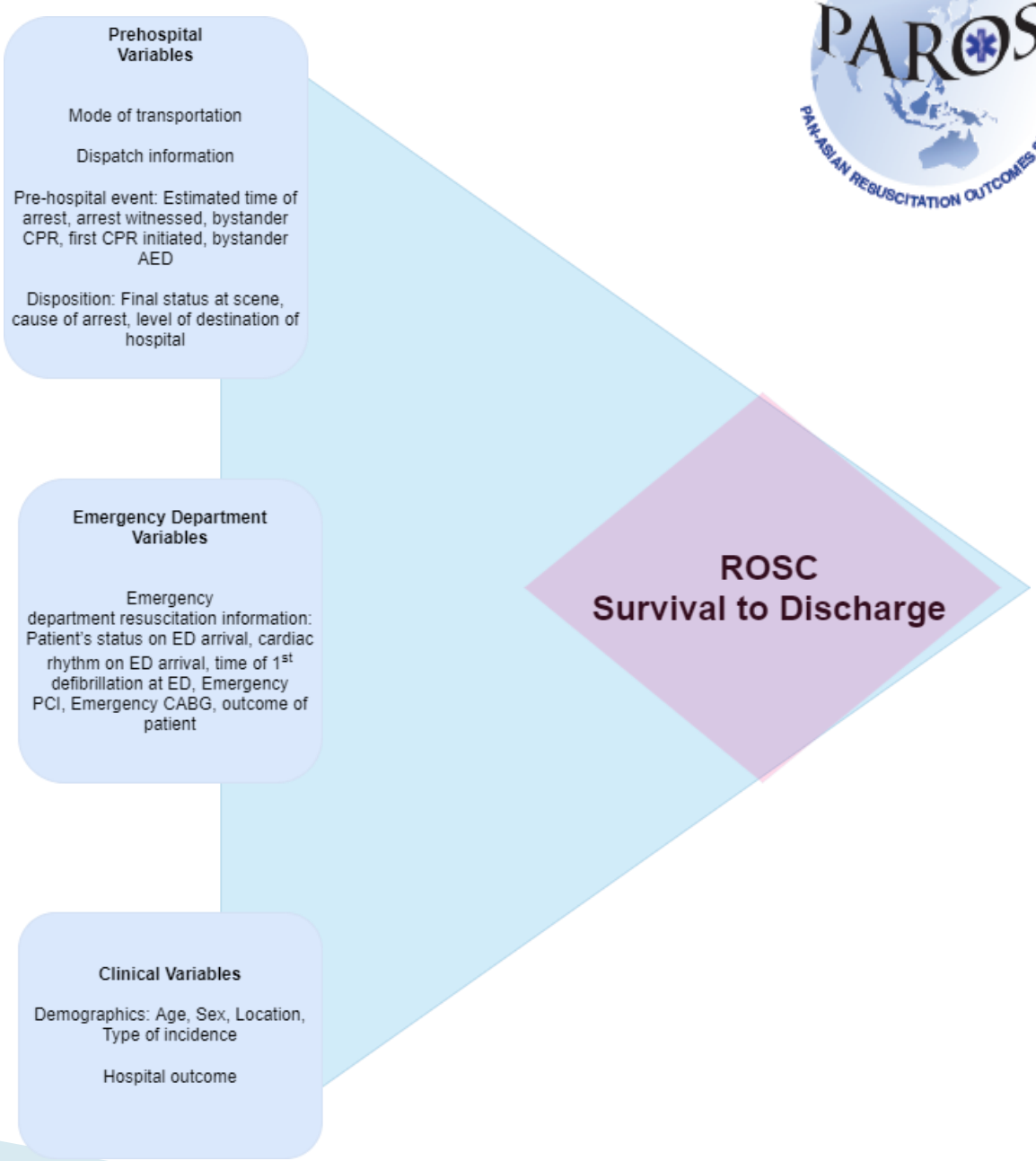
There is no significant difference in the relationship of clinical, pre-hospital, and epidemiological characteristics to the survival outcomes of pediatric non-traumatic out-of-hospital cardiac arrest (OHCA) in Pan-Asian countries during COVID- 19 pandemic.

Methods

Research Method Algorithm of the Study



Methods



Conceptual Framework of the Study

Significance

Continuous restructure of the EMS struggles in answering the direct and indirect effects of COVID-19 Pandemic in different countries. There is virtually non-existent assessment as of this writing on how the EMS system handles emergencies during pandemic, more so, on OHCA response. This study aims to provide characteristics and outcomes of pediatric non-traumatic OHCA during COVID-19 pandemic. This study will provide baseline data highlighting the importance and identifiable gaps in OHCA response to better meet public needs in times of a pandemic like COVID-19.

Thank you for your time.

Be well.

Early vs late Endotracheal Intubation among Out-of-Hospital Cardiac Arrest Patients in Pan-Asian Countries in the time of COVID-19 Pandemic

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Country: Philippines

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Out of Hospital Cardiac Arrest (OHCA)

$$$

The loss of mechanical cardiac activity and the absence of blood circulation throughout the systemic circuit

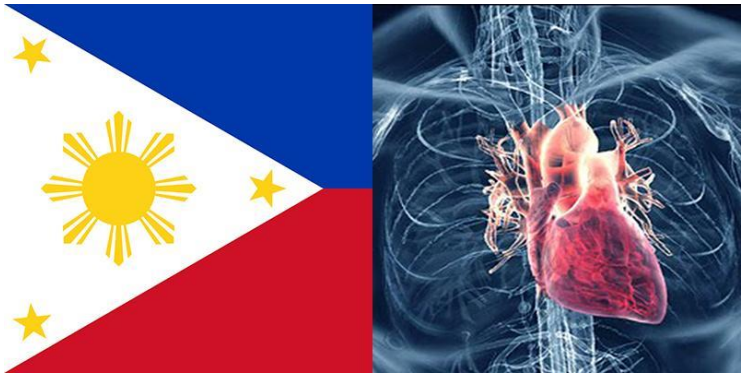
Philippines

43 OHCA per 100,000 per year

Return of Spontanoues Circulation – 17.27% (SAVE STUDY, Gaerlan, Faith Joan et.al)

In SPMC, the average monthly non trauma OHCA census is 45-60 (Hega, et. al.)

Less than 10 is EMS-assessed



How to improve survival in OHCA?

- Initial presenting rhythm of VF
- Bystander CPR
- Short response time to defibrillation

ABC (2005)

↓

CAB (2010,2015)

COVID-19 Pandemic

- The coronavirus pandemic has led to calls to limit aerosol-generating procedures to prevent transmission of Covid-19 in frontline providers.

COVID in the Philippines

New Cases in the last 14 Days by Date of Onset of Illness
(or by date of specimen collection when by Date of Onset of Illness is not available)

DAVAO CITY	1,138
QUEZON CITY	1,010
RIZAL	881
CAVITE	873
CITY OF MANILA	772

Cases overview

Davao Region

Total cases	Recovered	Deaths
6,471	4,180	163

Philippines

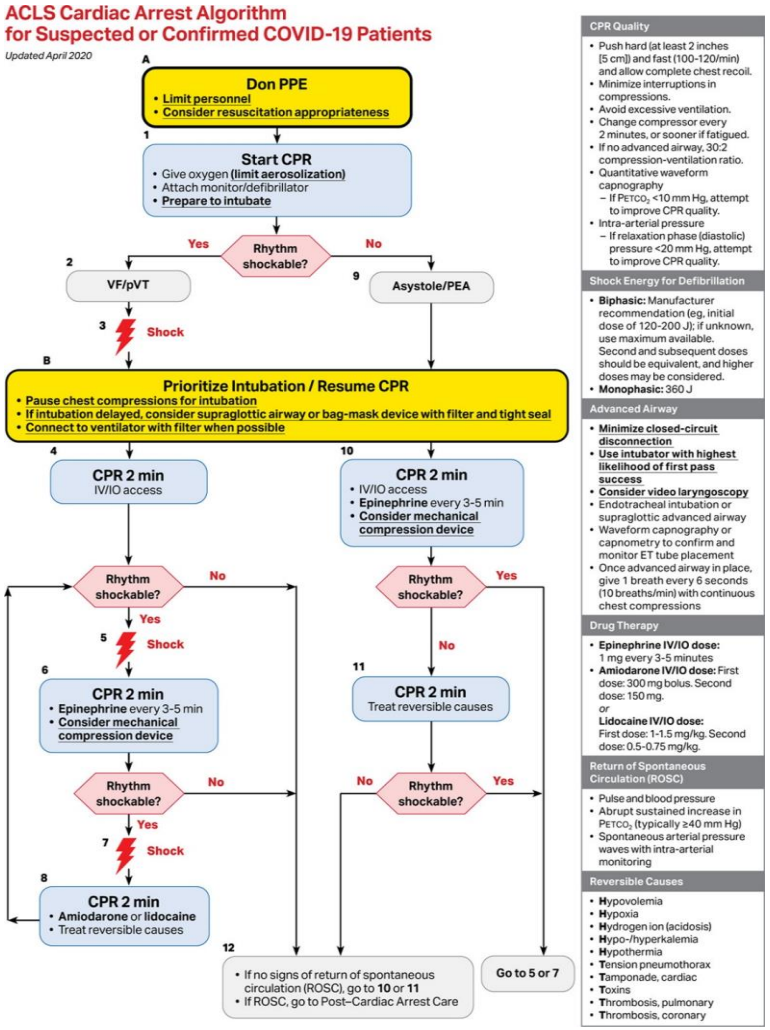
Total cases	Recovered	Deaths
396K	362K	7,539
+2,434		+54

Worldwide

Total cases	Recovered	Deaths
50.1M	32.9M	1.25M

Cases

Location	Total cases	New cases (1 day*)	New cases (last 60 days)	Cases per 1 million people	Deaths
Indonesia	433,836	4,262		1,625	14,540
Bangladesh	418,764	1,289		2,487	6,049
Czechia	411,220	7,723		38,454	4,681
Netherlands	404,401	6,671		23,173	7,960
Philippines	393,961	2,152		3,631	7,485
Turkey	391,739	2,483		4,711	10,803
Saudi Arabia	350,229	407		10,235	5,525
Pakistan	343,189	1,436		1,566	6,968

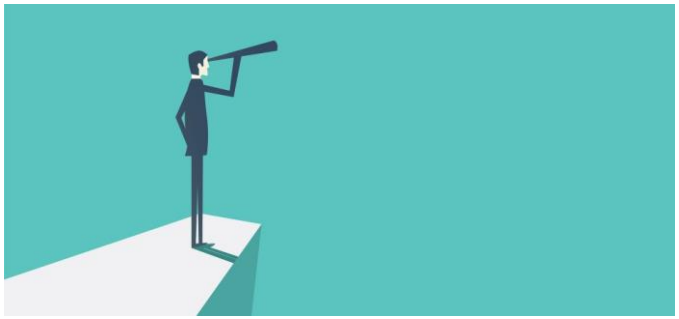

ACLS Cardiac Arrest Algorithm
for Suspected or Confirmed COVID-19 Patients
Updated April 2020
A
Don PPE
• Limit personnel
• Consider resuscitation appropriateness
1
Start CPR
• Give oxygen (limit aerosolization)
• Attach monitor/defibrillator
• Prepare to intubate
Rhythm shockable?
Yes
No
2
VF/pVT
3
Shock
9
Asystole/PEA
B
Prioritize Intubation / Resume CPR
• Pause chest compressions for intubation
• If intubation delayed, consider supraglottic airway or bag-mask device with filter and tight seal
• Connect to ventilator with filter when possible
4
CPR 2 min
IV/IO access
10
CPR 2 min
• IV/IO access
• Epinephrine every 3-5 min
• Consider mechanical compression device
Rhythm shockable?
No
Yes
5
Shock
6
CPR 2 min
• Epinephrine every 3-5 min
• Consider mechanical compression device
Rhythm shockable?
No
Yes
7
Shock
8
CPR 2 min
• Amiodarone or lidocaine
• Treat reversible causes
Rhythm shockable?
Yes
No
11
CPR 2 min
Treat reversible causes
Rhythm shockable?
No
Yes
12
• If no signs of return of spontaneous circulation (ROSC), go to 10 or 11
• If ROSC, go to Post–Cardiac Arrest Care
Go to 5 or 7
CPR Quality
• Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
• Minimize interruptions in compressions.
• Avoid excessive ventilation.
• Change compressor every 2 minutes, or sooner if fatigued.
• If no advanced airway, 30:2 compression-ventilation ratio.
• Quantitative waveform capnography
– If PETCO2 <10 mm Hg, attempt to improve CPR quality.
• Intra-arterial pressure
– If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve CPR quality.
Shock Energy for Defibrillation
• Biphasic: Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
• Monophasic: 360 J
Advanced Airway
• Minimize closed-circuit disconnection
• Use intubator with highest likelihood of first pass success
• Consider video laryngoscopy
• Endotracheal intubation or supraglottic advanced airway
• Waveform capnography or capnometry to confirm and monitor ET tube placement
• Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions
Drug Therapy
• Epinephrine IV/IO dose: 1 mg every 3-5 minutes
• Amiodarone IV/IO dose: First dose: 300 mg bolus. Second dose: 150 mg.
or
Lidocaine IV/IO dose: First dose: 1-1.5 mg/kg. Second dose: 0.5-0.75 mg/kg.
Return of Spontaneous Circulation (ROSC)
• Pulse and blood pressure
• Abrupt sustained increase in PETCO2 (typically ≥40 mm Hg)
• Spontaneous arterial pressure waves with intra-arterial monitoring
Reversible Causes
• Hypovolemia
• Hypoxia
• Hydrogen ion (acidosis)
• Hypo-/hyperkalemia
• Hypothermia
• Tension pneumothorax
• Tamponade, cardiac
• Toxins
• Thrombosis, pulmonary
• Thrombosis, coronary

Research Question

- Among OHCA patients in PAN Asian countries treated initially with BVM ventilation and late ETI versus early ETI in the time of COVID-19 pandemic, is there a difference in the 30-day survival-to-hospital discharge outcome and return of spontaneous circulation (ROSC)?

General Objectives

To compare the return-of-spontaneous circulation and 30-day survival-to-hospital discharge outcome among OHCA patients, in Pan-Asian countries in 2019 and 2020, treated initially with bag-valve mask ventilation with late ETI and early endotracheal intubation.



Specific Objectives

- To describe the following:
  - **demographic profile** – age, sex, location of arrest
  - **pre-arrest state** – chief complaint, time of arrest, co-morbids
  - **pre-hospital arrest state** – arrest witnessed by; by stander CPR; 1st CPR initiated by; Time CPR started; bystander AED; pre-hospital arrest rhythm
  - **ED state** – date of arrival; Time CPR initiated; cardiac rhythm; ED defibrillation; ROSC; reasons for discontinuing CPR; outcome of patient

  of OHCA patients in PAN Asian countries using the Utstein data elements.

Specific Objectives

- To determine the airway status (Intubated/assisted or not) of OHCA patients upon reaching definitive care in Pan Asian countries in COVID-19 pandemic.

- To compare the clinical outcome of OHCA patients, in Pan Asian countries in COVID-19 pandemic, treated initially with Bag Valve Mask with Late ETI or early endotracheal intubation in terms of:
  - 30-day survival-to-hospital discharge and favorable functional outcome (using the cerebral performance category score)
  - Return-of-spontaneous circulation (ROSC)

Specific Objectives

To compare the airway management of OHCA patients among PAROS countries in the period of 2019 and 2020.

Outcome Measures

A. **Primary**: 30 day survival-to-hospital discharge rate and favorable functional outcome
B. **Secondary**: ROSC rate

SURVIVAL

Medical

ROSC

Methodology

- This will be a **retrospective study design.**
- The study will include patients subjected to the BVM with late ETI and early ETI.

- **Early ETI – as intubation done ≤ 5 minutes**
- **Late ETI – defined as intubations done after 5 minutes.**

- **5 minutes cut off time** – from time of arrest to time of ETI

Significance of the Study

- First in Mindanao and SPMC
- This study may guide physicians, EMTs, first responders in the optimal airway approach in OHCA during this pandemic
- May benefit hospitals with their existing OHCA and IHCA resuscitation protocols in airway management
- Source of data for future research about OHCA and resuscitation

Setting

Data will be gathered from the PAROS registry, covering participating Pan Asian countries in 2019 to 2020.

Inclusion Criteria

1. 18 years or older with OHCA
2. witnessed or unwitnessed OHCA;
3. OHCA transported by EMS or Non-EMS;
4. With or without pre-hospital resuscitation attempted by a bystander and/or emergency responders.[5]

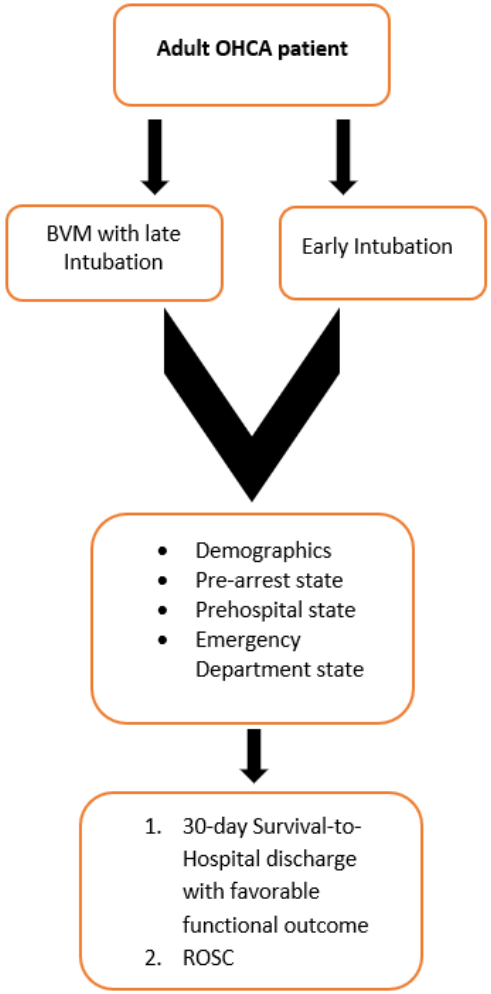
Exclusion Criteria

1. Patients with signs of irreversible death (decomposition, rigor mortis, decapitation, etc.)
2. witnessed or unwitnessed IHCA [5]
3. pre-existing DNR order;
4. Patients with advanced airway in place prior to resuscitation;
5. Known pregnancy

Sampling

- The study will make use of **Total Enumeration** of all out-of-hospital cardiac arrest brought to ED of SPMC and across PAROS countries.
- Where, only those who will satisfy the inclusion criteria and exclusion criteria will form part of the research process.

Conceptual Framework



Data Analysis

Objectives	Data substrates	Variables	Analysis
To describe demographic profile, pre arrest state, pre hospital arrest state, ED state of OHCA patients in Pan Asian countries using the Utstein data elements	PAROS CRN Form	Description of: Demographic profile Pre arrest state Prehospital arrest state ED state	**Univariate Descriptive analysis** to determine the characteristics, clinical parameters and outcomes of OHCA patients with early ETI and BVM with late ETI.
To determine the airway status (Intubated/assisted or not) of OHCA patients upon reaching definitive care in Pan Asian countries in COVID-19 pandemic.	PAROS CRN Form	Description of airway status: Intubated/assisted or Not intubated of OHCA patients upon reaching definitive care in Pan Asian countries	**Univariate Descriptive analysis** – to determine the airway status OHCA patients in PAROS countries upon reaching definitive care.

Data Analysis

Objectives	Data substrates	Variables	Analysis
To compare the clinical outcome of OHCA patients, in Pan Asian countries in COVID-19 pandemic, treated initially with Bag Valve Mask with Late ETI or early endotracheal intubation in terms of: • 30-day survival-to-hospital discharge and favorable functional outcome (using the cerebral performance category score) • Return-of-spontaneous circulation (ROSC)	PAROS CRN Form	Those treated with BVM and late ETI and those treated with early ETI in terms of 30-day survival-to-hospital discharge and ROSC.	**Multivariate analysis in regression** – to identify relationship of timing of ETI in OHCA patients in terms of 30-day survival-to-hospital discharge and ROSC.

Data Analysis

Objectives	Data substrates	Variables	Analysis
To compare the airway management of OHCA patients among PAROS countries in the period of 2019 and 2020.	PAROS CRN Form	Those treated with BVM and late ETI and those treated with early ETI in terms of 30-day survival-to-hospital discharge and ROSC of OHCA patient among PAROS countries in 2019 and 2020.	**Multivariate analysis in regression** – to identify relationship of timing of ETI in OHCA patients in terms of 30-day survival-to-hospital discharge and ROSC among PAROS countries in 2019 and 2020.

References:

1. Nichol G. et at. Resuscitation Outcomes Consurtium Investigators. Regional variation in out-of-hospital cardiac arrest incidence and outcome. JAMA. 2008;300:1423-31
2. Gaerlan, Faith Joan et.al Survival from Out-of-Hospital Cardiac Arrests: Report of Resuscitation Outcomes and Modifiable Factors from a Philippine Emergency Medical System (EMS) Out-of-Hospital Cardiac Arrest (OHCA) Registry (SAVE STUDY), 2014. Unpublished paper
3. Mawani, M. et. Al., "Epidemiology and Outcomes of Out-of-Hospital Cardiac Arrest in a Developing Country- A Multicenter Cohort Study," http://bmcemergmed.biomedcentral.com/articles/10.1186/s12873-016-0093-2 Downloaded March 13, 2017.
4. Boyd, TS, et. al., Out-of-Hospital Cardiac Arrest. 2012 Elsevier Inc. Downloaded from ClinicalKey.com on July 12, 2019
5. Hega, John Micheal and Gaerlan, Faith Joan et. al. Characteristics, Clinical Parameters and Outcomes of Out-of-Hospital Cardiac Arrest in Southern Philippines Medical Center from July 2016 to December 2016: A Retrospective Cohort Study, Philippine Journal of Emergency Medicine April 2019, Vol 4 No. 1
6. Montermayor, M.T., CPR, a Life-Saving Know-How, Downloaded from pna.gov.ph/articles/1067826, published on April 27, 2019
7. Jabra P, Penaloza A, Pinero D, et al. EFFECT OF BAG-MASK VENTILATION VS ENDOTRACHEAL INTUBATION DURING CARDIOPULMONARY RESUSCITATION ON NEUROLOGICAL OUTCOME AFTER OUT-OF-HOSPITAL CARDIORESPIRATORY ARREST. Jama 2018;319(8):779-787
8. Out-of-hospital cardiac arrest: a unique medical emergency, Vol. 391 March 10, 2018. http://cpr.heart.org/ AHAECC/CPRAndECC/AboutCPRFirstAid/HistoryofCPR/UCM_475751_History-of-CPR. Jsp
9. Lurie, K., et. al. The Economic Impact of Out-of-Hospital Cardiac Arrest Care, EMS Insider. December 2017.
10. 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2015.
11. Banner, J.P., A Phased Approach to Cardiac Arrest Resuscitation Involving Ventricular Fibrillation and Pulseless Ventricular Tachycardia. Circulation 2011.
12. Wang HE, et al. Interruptions in cardiopulmonary resuscitation from paramedic endotracheal intubation. Ann Emerg Med 2009;54:645-52
13. Emergency Department Annual Audit 2018, Southern Philippines Medical Center
14. Aufderheide TP, Sigurdsson G, Pirrallo RG, et al. Hyperventilation-induced hypotension during cardiopulmonary resuscitation. Circulation 2004;109:1960-5.
15. Martin LD, Mhyre JM, Shanks AM, Tremper KK, Kheterpal S. 3,423 emergency tracheal intubations at a university hospital: airway outcomes and complications. Anesthesiology. 2011;114(1):42-8. https://doi.org/10.1097/ ALN.0b013e318201c415.
16. Chan PS, Krumholz HM, Nichol G, Nallamothu BK. American Heart Association National Registry of Cardiopulmonary Resuscitation Investigators. Delayed time to defibrillation after in-hospital cardiac arrest. N Engl J Med. 2008;358(1):9-17. https://doi.org/10.1056/NEJMoa0706467.
17. Donnino MW, Salciccioli JD, Howell MD, et al. Time to administration of epinephrine and outcome after in-hospital cardiac arrest with non-shockable rhythms: retrospective analysis of large in-hospital data registry. BMJ. 2014;348:g3028.
18. Link MS, Berkow LC, Kudenchuk PJ, et al. Part 7: Adult Advanced Cardiovascular Life Support: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2015;132:S444-64.
19. Hasegawa K, Hiraide A, Chang Y, Brown DF. Association of prehospital advanced airway management with neurologic outcome and survival in patients with out-of-hospital cardiac arrest. *JAMA*. 2013;309(3):257-266.
20. Andersen LW, et al. Association Between Tracheal Intubation During Adult In-Hospital Cardiac Arrest and Survival. JAMA 2017;317:494-506.
21. Idris, Ahamed H., et. al., The BVM Effect: An Overview of Studies Assessing Airway Management in Out-of-Hospital Cardiac Arrest, Issue 10 and Volume 40. JEMS. 9.28.15
22. Hanif MA, Kaji AH, Niemann JT. Advanced airway management does not improve outcome of out-of-hospital cardiac arrest. Acad Emerg Med 2010;17(9):926-31
23. Tahara, Yoshio et al, Efficacy of Bag-Valve-Mask Ventilation for Ventricular Fibrillation Sudden Cardiac Arrest. American Heart Association. Circulation 2013;128:A12885


thank
you