

Prehospital Advanced Airway Management and Outcomes in Out-of-Hospital Cardiac Arrest : a Cluster Randomized Controlled Trial

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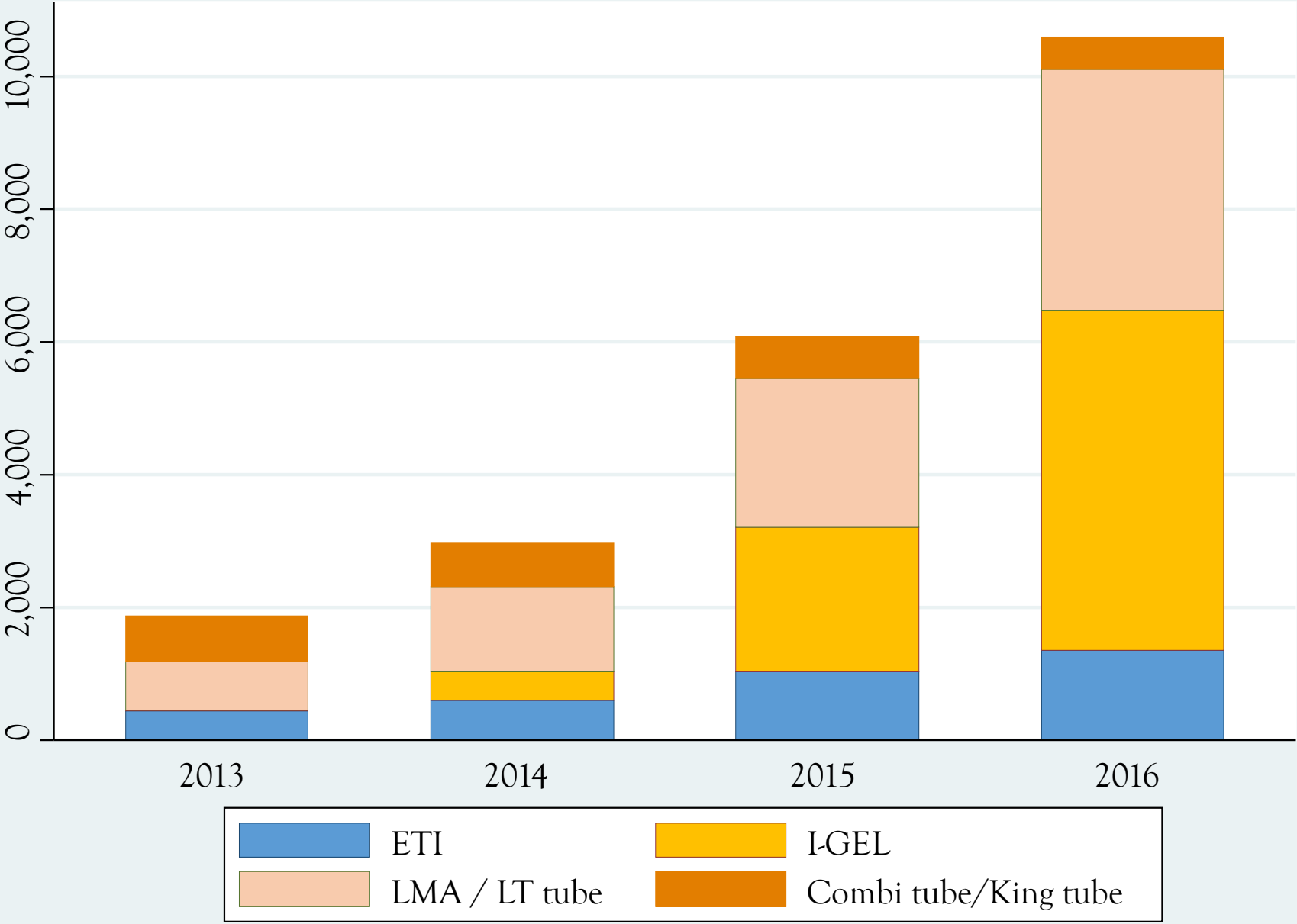
Background

- To improve oxygenation and ventilation
 - Advanced airway placement required during ACLS
- Type of advanced airway in EMS
 - Conventional choice
 - Endotracheal intubation (ETI) / Supraglottic airway (SGA)
 - New choice
 - Videolaryngoscope assisted

Result from previous PAROS dataset

	Total		Osaka (2009 ~ 2010)		Seoul (2011 ~ 2012)		Singapore (2010 ~ 2012)		Taipei (2010 ~ 2011)	
	N	%	N	%	N	%	N	%	N	%
Total	18596		8787		5249		2205		2355	
ETI	2799	15.1	2323	26.4	122	2.3	15	0.7	339	14.4
SGA	2759	14.8	31	0.4	480	9.1	1825	82.8	423	18.0
Others	3429	18.4	3159	36.0	270	5.1	0	0.0	0	0.0
BVM	9609	51.7	3274	37.3	4377	83.4	365	16.6	1593	67.6

EMS advanced airway during recent years in Korea

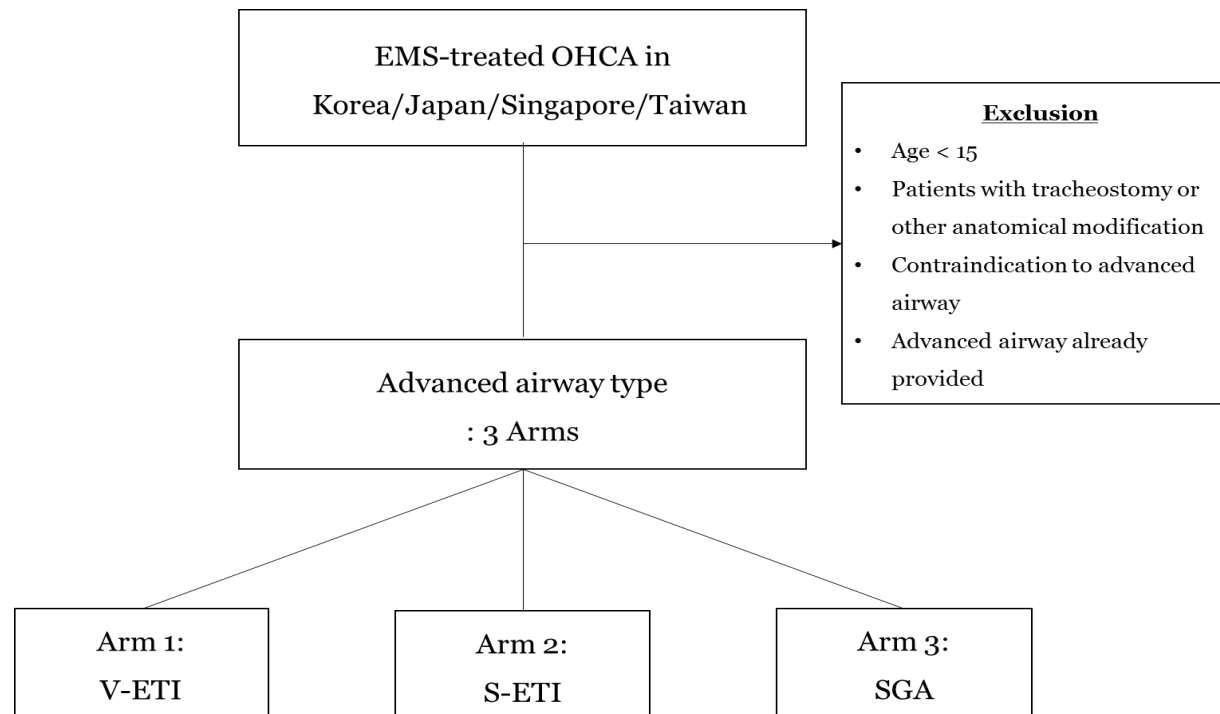


Goal of study

- Superiority among advanced airway technique in EMS field
 - Not been revealed in clearly randomized controlled trial
 - Recent RCTs performed outside Asia
- Test effect of 3 advanced airway techniques (V-ETI / S-ETI / SGA) in prehospital EMS field in OHCA
 - On neurologic outcome of patients

Study design

- Pragmatic cluster randomized controlled trial
 - Ambulance vehicle as unit of randomization

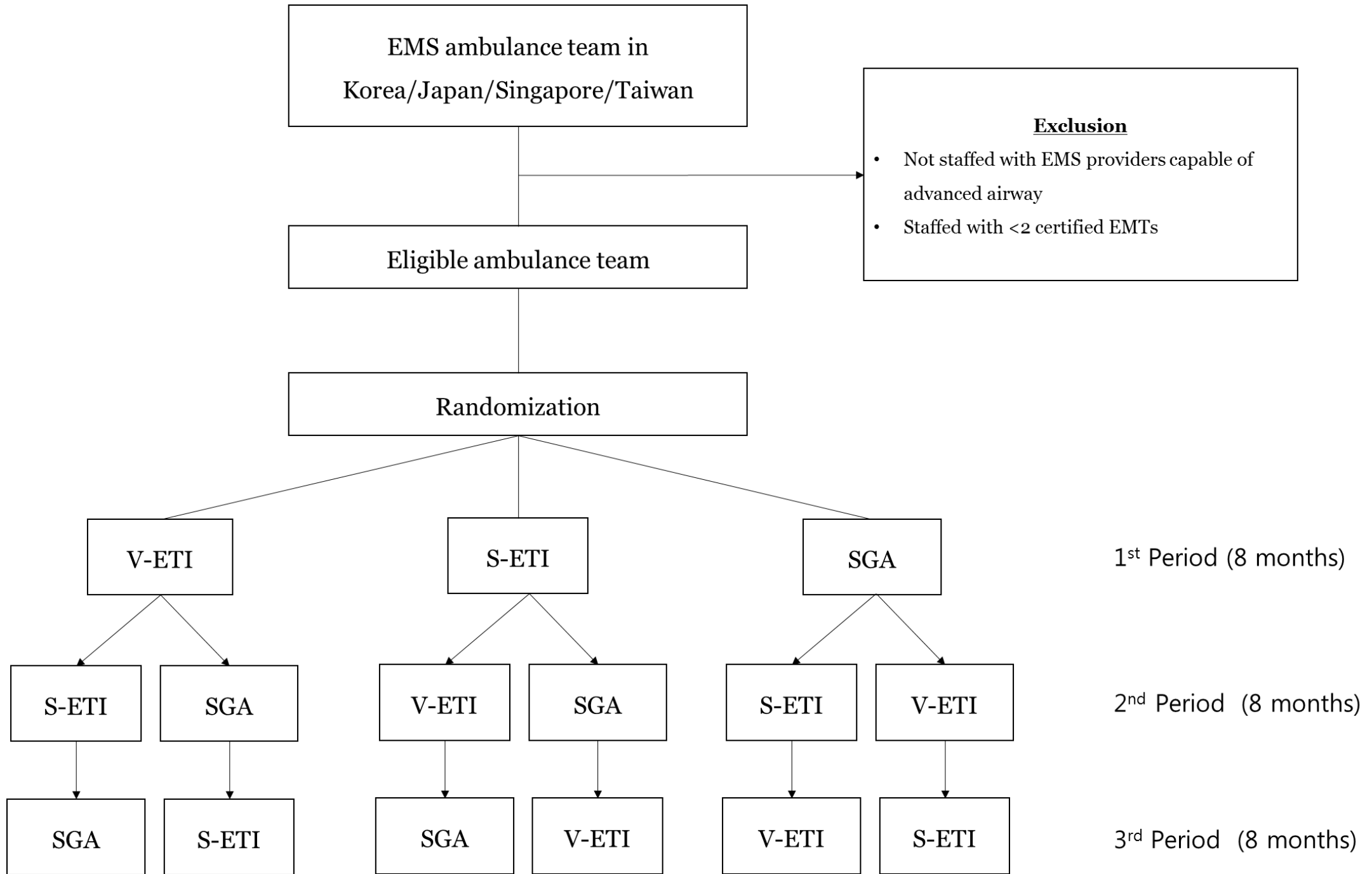


Study intervention

- 3 types of advanced airway placement
 - Endotracheal intubation with videolaryngoscope (V-ETI)
 - Standard endotracheal intubation with direct laryngoscope (S-ETI)
 - Sugraglottic airway insertion (SGA)

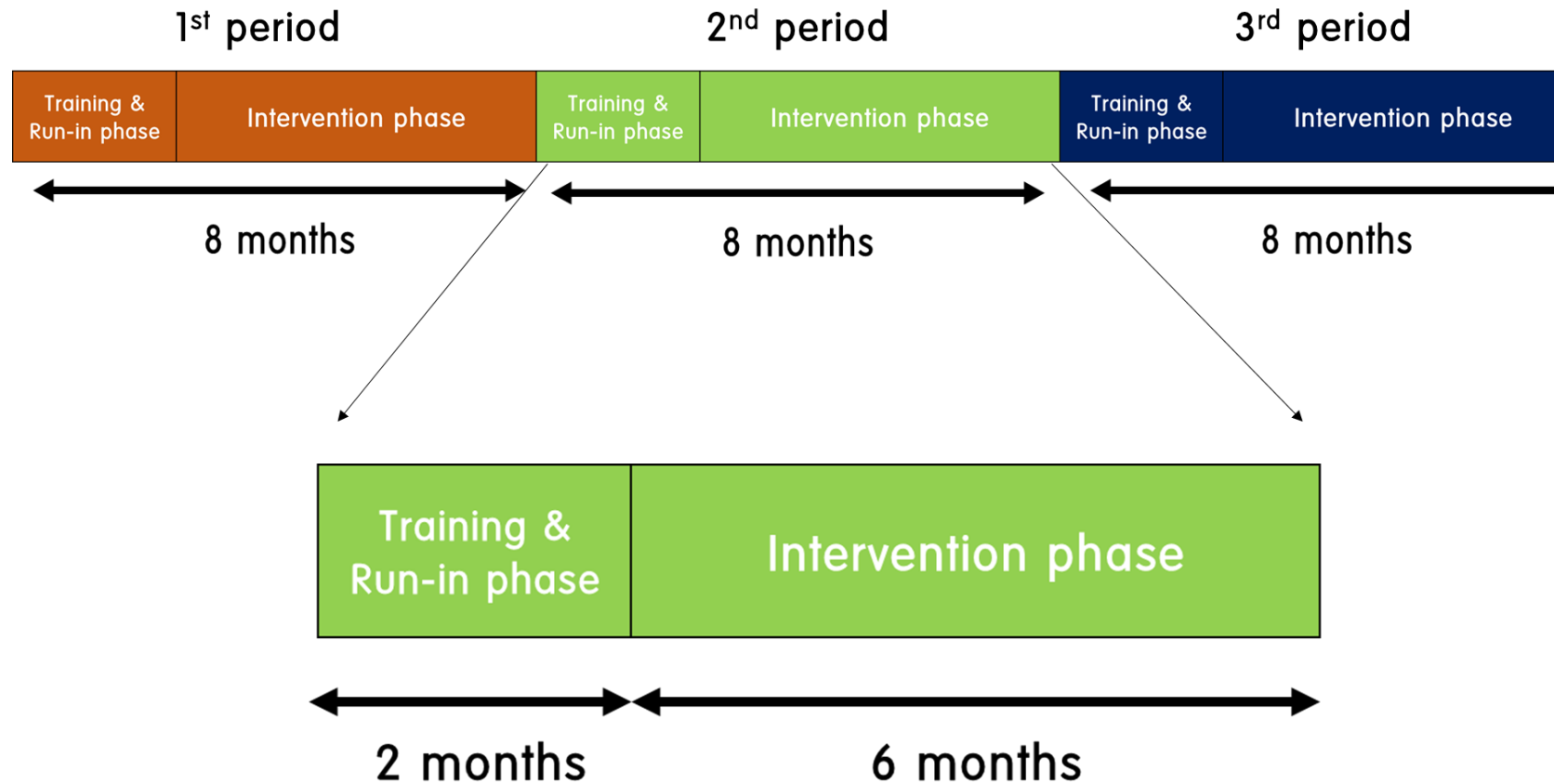
Randomization and allocation

- Randomized crossover design and allocation
 - Inclusion criteria for enrolled ambulance unit
 - Team with certified EMS providers capable of advanced airway placement (ex> level-1 EMT in Korea)
 - Team with at least 2 certified EMS providers or ACLS unit
 - Available advanced airway technique in field



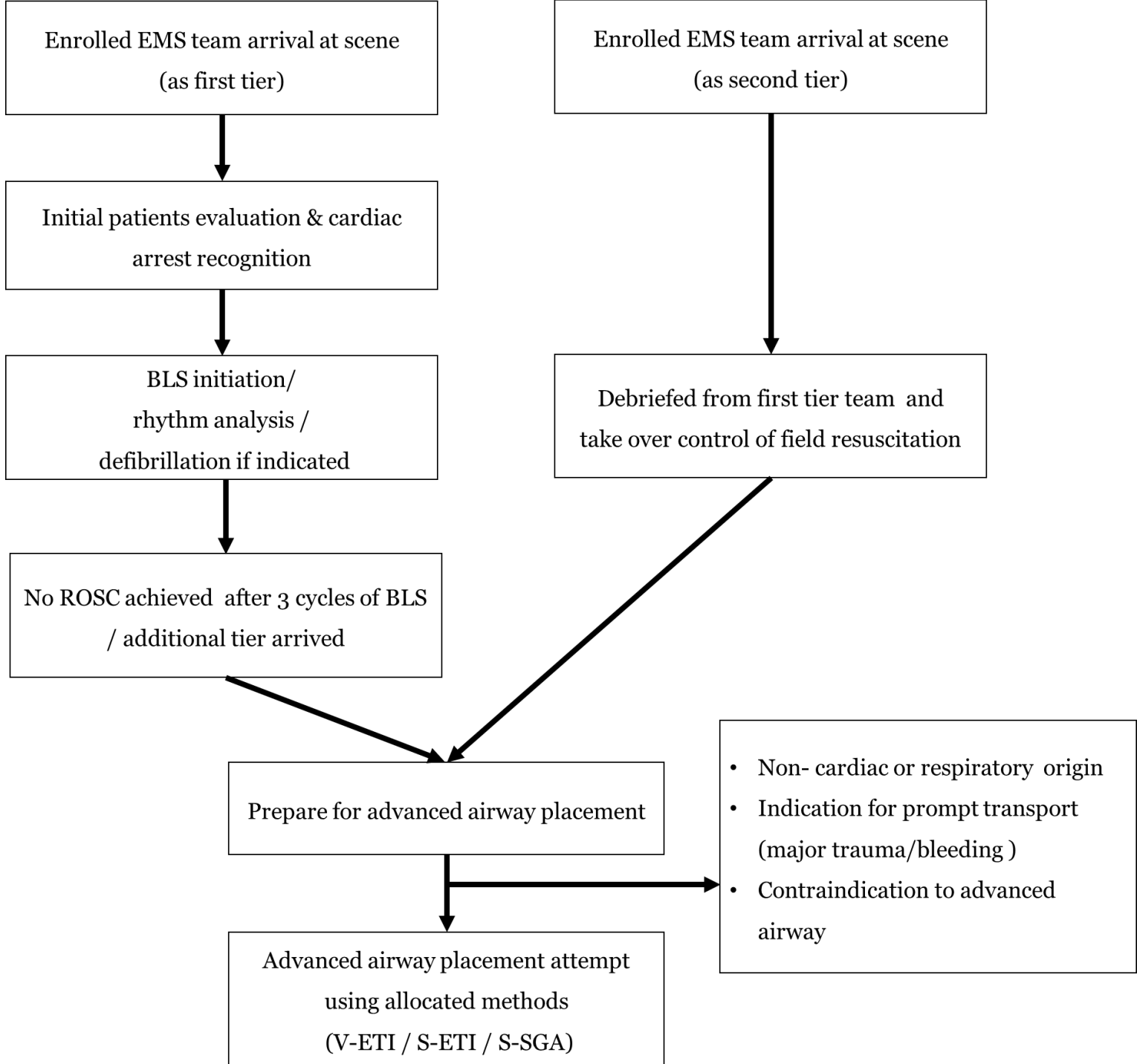
Study period

- 3 periods
 - 1 airway for 1 period
 - Training & Run-in
 - 2 months
 - Intervention
 - 6 months



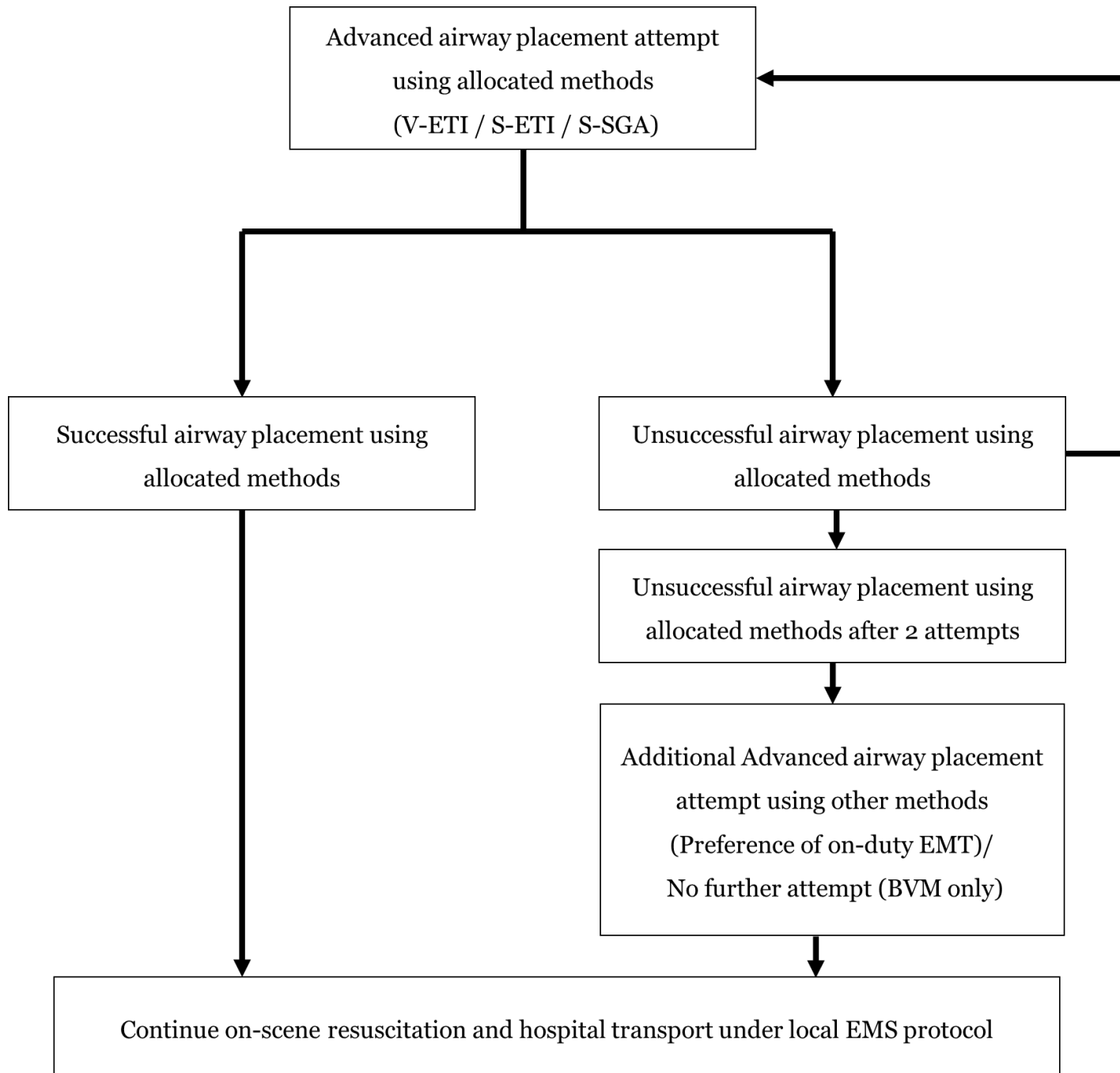
Protocol (1)

- Depend on enrolled EMS team arrival timing at scene
 - If advanced unit arrived as first tier
 - Advanced airway placement initiation
 - After 3 cycles of BLS or
 - As soon as 2nd tier arrives
 - If advanced unit arrived as second tier after basic unit
 - As soon as advanced team is debriefed and finished taking over control of scene resuscitation



Protocol (2)

- Advanced airway placement after 3 cycles
 - Up to 2nd attempt
 - Allocated airway device
 - Failure after 2nd attempt
 - Airway of EMT preference or no advanced airway



Study population

- Inclusion criteria
 - Adult EMS-assessed OHCA
 - Presumed cardiac etiology

Study population

- Exclusion
 - DNR or obvious sign of death
 - Arrest during hospital transport in ambulance
 - ROSC before EMS arrival to scene
 - ROSC during early resuscitation by EMS resuscitation
 - Prior to 3 cycles of BLS
 - Prior to arrival of enrolled EMS team or 2nd-tier
 - Tracheostomy or anatomical modification
 - Airway deformity

Study outcome

- Primary outcome
 - Cerebral performance category (CPC) scale 1 or 2 upon hospital discharge
- Secondary outcome
 - Survival upon hospital discharge
 - Rate of successful airway placement at scene

Other measurement

- Existing PAROS variable
- Advanced airway variables (additional variables)
 - Type of allocated device
 - Number of attempts
 - Successful airway placement
 - Reason for failure , etc..

Statistical analysis

- Comparison between 3 groups
 - Per protocol & intention-to-treat technique
- Association of advanced airway to outcome
 - Multivariable logistic regression model

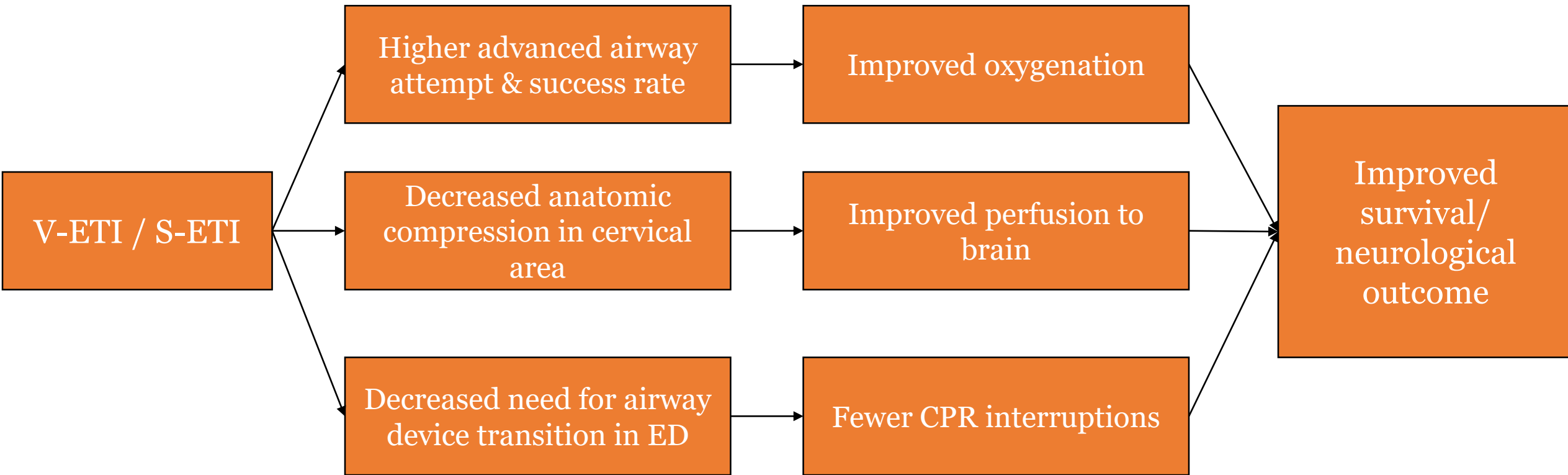
Sample size calculation

- No survival outcome comparison including V-ETI
 - ETI -> SGA : approx. 1% increase
- Hypothesizing 1% increase in neurological outcome
 - Sample size per 1 group
 - 3,000 ~ 4,000 patients

Previous reports regarding ETI vs. SGA

Study	Airway	N	ROSC (%)	Admit (%)	Survival (%)	Neurological outcome (%)
Cady 2009	ETI	4335	1558 (35.9)	1112 (25.7)	279 (6.4)	
	SGA	1487	508 (34.2)	377 (25.4)	97 (6.5)	
Hanif 2010	ETI	1027	244 (24)	152 (15)	38 (4)	
	SGA	131		5 (4)	0 (0)	
Kajino 2011	ETI	1679	802 (47.8)	688 (41)	180 (10.7)	61(3.6)
	SGA	3698	1643 (44.4)	1412 (38.2)	361 (9.8)	133(3.6)
McMullan 2014	ETI	5591	1890 (33.8)	1487 (26.6)	464 (8.3)	302(5.4)
	SGA	3110	793 (25.5)	666 (21.4)	208 (6.7)	162(5.2)
Nagao 2012	ETI	10	1 (10)			
	SGA	189	36 (19)			
Noda 2007	ETI	4	2 (40)	2 (40)	1 (20)	0(0)
	SGA	24	5 (20.8)	4 (16.7)	3 (12.5)	0(0)
Shin 2012	ETI	250		55 (22)	20 (8)	
	SGA	391		80 (20.5)	22 (5.6)	
Tanabe 2013	ETI	12992	853 (6.6)		474 (3.7)	162(1.3)
	SGA	29640	1386 (4.7)		1060 (3.6)	310(1.1)
Wang 2012	ETI	8487				399(4.7)
	SGA	1968				77(3.9)
Yanagawa 2010	ETI	158	18 (11.4)			2(1.3)
	SGA	478	37 (7.7)			6(1.3)

Expected outcome of study



Update in Korea

- Launching ALS ambulance-”Special EMS team”n Korea
 - 2nd tier ALS providing EMS team
 - Available to provide IV medication and dispatched for all OHCA
 - Equipped with videolaryngoscope and USG
 - Advanced airway training sessions for all ALS teams in Seoul

Lecture (09:00 ~ 10:20, 20mins for each session)

- A. Advanced airway, preparation and general consideration
- B. Videolaryngoscope – endotracheal intubation
- C. Confirmation using ultrasound
- D. Supraglottic airway and EtCO2

Hands on training (10:30~12:30, 30 mins for session)

Team 1	Team 2	Team 3	Team 4	
A	B	C	D	30 min
B	C	D	A	30 min
C	D	A	B	30 min
D	A	B	C	30 min

Field Protocol (12:30~12:40)

Team Approach Protocol(12:40~13:00)

Debriefing (13:00~)

- 6 Training classes with approximately 180 ALS team crews(level-1 EMT)
- From Feb 2019 ~ June 2019



Future plan

- Accomplish training all ALS ambulance crews within June
- Detailed discussion for research protocols and launching plans
 - With Seoul Metropolitan Fire headquarters and other Fire headquarters in Korea

Thank you for attention