



1

## Peer reviewed resources

- Prehospital Emergency Care (PEC)
- Annals of Emergency Medicine
- Academic Emergency Medicine
- Journal of Trauma
- Journal of Critical Care Medicine
- Resuscitation

2

# A few...

3

# Airway / Ventilation

4

AIRWAY/BRIEF RESEARCH REPORT

### Comparison of Ventilation With One-Handed Mask Seal With an Intraoral Mask Versus Conventional Cuffed Face Mask in a Cadaver Model: A Randomized Crossover Trial

Andrew J. Amack, MD; Gary A. Barber, MD; Patrick C. Ng, MD; Thomas B. Smith, MD; Michael D. April, MD, DPHIL\*

- A one handed seal technique was used to simulate single operator ventilation.
- ventilator delivered 10 breaths each with a standardized tidal volume of 750 ml.
- After a 5-minute washout period, they performed ventilation using the alternative device.
- Primary outcome measure was air leak ( $V_t$  received –  $V_t$  delivered) as measured by the ventilator

Amack A, Barber GA, Ng PC, Smith TB, April MD. Comparison of Ventilation With One-Handed Mask Seal With an Intraoral Mask Versus Conventional Cuffed Face Mask in a Cadaver Model: A Randomized Crossover Trial. *Annals of Emergency Medicine* 2015;163:681-690

5

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Mean received VM

- 6.4 L (SD 0.9 L) for the intraoral mask versus
- 5.0 L (SD 1.5 L) for the conventional cuffed face mask.


Amack A, Barber GA, Ng PC, Smith TB, April MD. Comparison of Ventilation With One-Handed Mask Seal With an Intraoral Mask Versus Conventional Cuffed Face Mask in a Cadaver Model: A Randomized Crossover Trial. *Annals of Emergency Medicine* 2015;163:681-690

6

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7

### AI – Artificial Intelligence Intubation

- 70 total recorded laryngoscopic video attempts
  - 2,465 time intervals.
- Computer algorithms using artificial intelligence were able to identify the glottic opening with over 80% accuracy
- Potential for providing real-time, direction feedback to the provider to help guide successful ETI.



Justin N. Carlson, Samarjit Das, Fernando De la Torre, et al. A Novel Artificial Intelligence System for Endotracheal Intubation *Prehospital Emergency Care* 2016; 20:5,667-671

8

### New airway device

- The Vie Scope
- Great rescue device
- Cheap
- Easy to use



9



10

# New Tech

11

TRAUMA

Review Article

## Ultrasound in pre-hospital trauma care

Trauma  
2016, Vol. 18(2) 101-110  
© The Author(s) 2015  
Reprints and permissions:  
sagepub.co.uk/journalsPermissions.nav  
DOI: 10.1177/1445008615606753  
tra.sagepub.com  
SAGE

Frances Corcoran<sup>1,2</sup>, Adam Bystrzycki<sup>3</sup>, Syed Masud<sup>4,5</sup>, Stefan M Mazur<sup>1,2</sup>, David Wise<sup>6</sup> and Tim Harris<sup>7</sup>

Table 1. Diagnostic value of ultrasound.	
Major haemorrhage identification	FAST (intra-abdominal fluid) Chest (pneumothorax) Aortic aneurysm identification
Pulmonary injury	Pneumothorax Haemothorax Pulmonary contusion Pleural effusion
Cardiac injury	Cardiac muscle injury Cardiac tamponade
Fluid status	Cardiac ventricular contracture and size IVC status IVC compression index FAST (intra-abdominal bleed)
Traumatic cardiac arrest	hypotension Chest – pneumothorax Cardiac tamponade Fluid status
Bone ultrasound	Fracture identification


Table 2. Use of ultrasound as a procedural aid.	
Vascular access	Femoral vein access Central venous access
Nerve blocks	Femoral nerve block
Checking placement of tracheal tube	Tracheal imaging Pleural sliding Diaphragm movement
Insertion of surgical airway	Identification of thyro-cricoid membrane

Corcoran F, Bystrzycki, A, Masud S, et al. (2016). Ultrasound in pre-hospital trauma care. *Trauma*. Apr 2016, 18(2):101-110

12

## Ultrasound

- Phillips Lumify
  - Smart phone or tablet based ultrasound technology
  - 1. Download the App
  - 2. Attach the mini USB
  - 3. Scan




- Monthly plans at \$200 per month

13

## LOCATING AED ENABLED MEDICAL DRONES TO ENHANCE CARDIAC ARREST RESPONSE TIMES

Aaron Pulver, Ran Wei, PhD, Clay Mann, PhD, MS



Pulver, Aaron (05/2016). Locating AED Enabled Medical Drones to Enhance Cardiac Arrest Response Times. *Prehospital emergency care*, 20 (3), p. 378 - 389

14

## LOCATING AED ENABLED MEDICAL DRONES TO ENHANCE CARDIAC ARREST RESPONSE TIMES

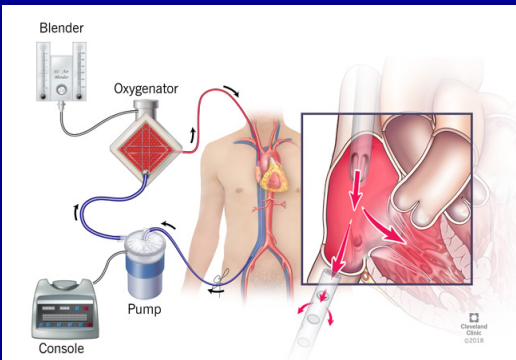
Aaron Pulver, Ran Wei, PhD, Clay Mann, PhD, MS

- Drones equipped with an AED and can fly at speeds up to 100km/h.
  1. Drones are dispatched immediately and fly directly to the patient's vicinity using cell phone GPS as a target.
  2. Upon reaching the target, the dispatcher, through real-time video, can direct bystanders to use the AED on the patient
- Objective 1: Get an AED on location within 1 minute of a call
  - Traditional EMS arrivals 4.3% of the time
  - Launching from existing EMS bases resulted in drone arrival 80.1% of the time
  - Additional locations moved the arrival time to 90.3% of the time
- Objective 2: Get an AED on location within 5 minutes of a call
  - Traditional EMS arrivals 96.4% of the time

Pulver, Aaron (05/2016). Locating AED Enabled Medical Drones to Enhance Cardiac Arrest Response Times. *Prehospital emergency care*, 20 (3), p. 378 - 389

15

## ECMO



16

Mosier et al. *Critical Care* (2015) 19:431  
DOI 10.1186/s13054-015-1155-7

**CRITICAL CARE**

**REVIEW** Open Access

### Extracorporeal membrane oxygenation (ECMO) for critically ill adults in the emergency department: history, current applications, and future directions

Jarrod M. Mosier<sup>1,2,3\*</sup>, Melissa Kelsey<sup>1</sup>, Yuval Raz<sup>3</sup>, Kyle J. Gunnerson<sup>5</sup>, Robyn Meyer<sup>4</sup>, Cameron D. Hypes<sup>1,2,3</sup>, Josh Malo<sup>3</sup>, Sage P. Whitmore<sup>4</sup> and Daniel W. Spalte<sup>2</sup>

- This study demonstrated survival with a favorable CPC score in 11.2 those with ECPR versus 2.6 % with conventional CPR at 6 months.
- Optimistic estimate of survival from OHCA with the use of ECPR may be in the 15–20 % range, the critical factor that determines success appears to be the duration from the onset of arrest to achieving ECMO flow

Mosier JM, Kelsey M, Raz Y, et al. (2015). Extracorporeal membrane oxygenation (ECMO) for critically ill adults in the emergency department: history, current applications, and future directions *Critical Care*, 19:431, 1-8

17

Clinical paper

### Practice characteristics of Emergency Department extracorporeal cardiopulmonary resuscitation (eCPR) programs in the United States: The current state of the art of Emergency Department extracorporeal membrane oxygenation (ED ECMO)<sup>\*</sup>

Joseph E. Tonna<sup>1,2,3,4\*</sup>, Nicholas J. Johnson<sup>5</sup>, John Greenwood<sup>6</sup>, David F. Gaieski<sup>6</sup>, Zachary Shinar<sup>7</sup>, Joseph M. Bellezzo<sup>8</sup>, Lance Becker<sup>9</sup>, Atman P. Shah<sup>1</sup>, Scott T. Youngquist<sup>10,11</sup>, Michael P. Mallin<sup>12</sup>, James Franklin Fair III<sup>13</sup>, Kyle J. Gunnerson<sup>5</sup>, Cindy Weng<sup>1</sup>, Stephen McKellar<sup>1</sup>, for the Extracorporeal Resuscitation Consortium (ERECT) Research Group

- 99 resuscitation centers in the US with protocols to institute ECMO CPR in the Emergency Department.
- ED Physicians are placing the catheters and the ECMO is managed by RN's supervised by Perfusionists
- Data is favorable but sample size is small.
- Critical Care Paramedics (and some RN's) are transporting ECMO with perfusionist support.
- Surgeons are beginning to travel to referring centers to initiate ECMO prior to transport

Tonna JE, Johnson NJ, Greenwood J, et al. (2016). Practice characteristics of Emergency Department extracorporeal cardiopulmonary resuscitation (eCPR) programs in the United States: The current state of the art of Emergency Department extracorporeal membrane oxygenation (ED ECMO) *Resuscitation* 2016;107:38-46

18

Review article  
 Comparing extracorporeal cardiopulmonary resuscitation with conventional cardiopulmonary resuscitation: A meta-analysis<sup>22</sup>  
 Su Jin Kim<sup>a</sup>, Hyun Jung Kim<sup>b</sup>, Hee Young Lee<sup>c</sup>, Hyeong Sik Ahn<sup>b</sup>, Sung Woo Lee<sup>a,\*</sup>

- ECMO CPR (ECPR) may give a chance for better survival and neurologic outcome than Conventional CPR (CCPR), especially at 3–6 months and
  - location of arrest was a key variable
- Beneficial effect of ECPR on survival to hospital discharge in the studies with OHCA were not clearly shown.

Kim SJ, Kim HJ, Lee HY, et al. (2016). Comparing extracorporeal cardiopulmonary resuscitation with conventional cardiopulmonary resuscitation: A meta-analysis. *Resuscitation* 2016;103:106-166

19

## ECMO today

20

# Stroke Care

26

## Mobile Stroke Unit

Mercy Health – Toledo, OH  
 UT Health – Houston, TX  
 UT Health – Memphis, TN  
 Cleveland Clinic – Cleveland, OH  
 NY Presbyterian – Brooklyn, NY

27

## Benefit to Patient & Community

On scene	At Hospital
EMS	Load & Go
	E.D. Physician
	CT Scan & Lab tests
	Page Neuro specialist
	Treatment Decision made
0.....30.....90 Minutes	
MSU	Immediate specialist
	CT scan & lab tests
	Treatment

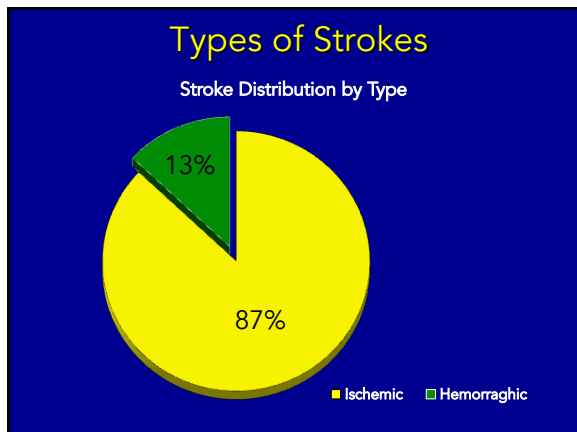
28

## Benefits of Stroke Treatment Delivered Using a Mobile Stroke Unit

50% reduction of the alarm-to therapy decision and stroke management subintervals by MSU based stroke care

S. Walter, et al. Diagnosis and treatment of patients with stroke in a mobile stroke unit versus in hospital: a randomized controlled trial. *Lancet Neurology* 2012;11:397-404

29



30

### Stroke Care 2016

- Cath Lab no longer means just the Heart
  - Neurovascular stent retrievers.
    - first alternative to clot-busting drugs to treat emergency stroke patients
    - wire-caged device can now be threaded through a patient's blood vessels to catch and remove clots from the bloodstream.

31

### Trauma Resuscitation

- A 25-year-old male is brought in by EMS with a gunshot wound. Vital signs are as follows: HR 130 BPM, BP 60/palp, RR 24, and SpO2 99% RA. He appears pale, is unable to follow commands, and has a gunshot wound on the anterior aspect of his pelvis. You know the patient needs emergent surgical intervention, but is he even going to make it out of the emergency department (ED)?

Hemorrhage, especially non-compressible hemorrhage, is the number 1 cause of death in trauma

32

### Trauma Resuscitation

**Non-compressible vascular injuries**

- Thoracic
- Abdominal
- Pelvic

Thomas MS & D. Malik. (10/2016). REBOA: A Precious (Life)line. EM Resident Magazine October 2016;80(2):324-332

33

### Trauma Resuscitation

Traditional management was a thoracotomy with cross-clamping of the aorta

34

### Trauma Resuscitation

- REBOA (resuscitative endovascular occlusion of the aorta)

Morrison JJ, et al. (2016). A systematic review of the use of resuscitative endovascular balloon occlusion of the aorta in the management of hemorrhagic shock. Journal of Trauma Acute Care Surgery 2016;80(2):324-332

35

### Trauma Resuscitation

- A 25-year-old male is brought in by EMS with a gunshot wound to his thigh. Vital signs are as follows: HR 130 BPM, BP 60/palp, RR 24, and SpO2 99% RA. He appears pale, is unable to follow commands, and has a gunshot wound on the anterior aspect of his left thigh. What do you do?

Hemorrhage, especially non-compressible hemorrhage, is the number 1 cause of death in trauma

36

### Trauma Resuscitation



37




38

### Education/Training

39

### iSimulate



40

# THANK YOU!!

For handouts or further information  
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41