CRNAs as First Responders

BY MARY SCOTT-HERRING, DNP, MS, CRNA

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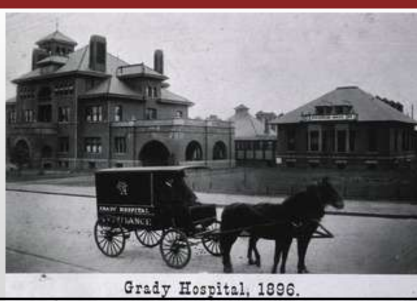
OBJECTIVES

- Explain the EMS system
- Compare skills sets/medication/equipment used
- Analyze the types of patients treated

2

History



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History

- Ambulance service was largely unregulated before 1970
- Common for the local undertaker to operate the local ambulance service
- After the release of the National Highway Traffic Safety Administration's study, "Accidental Death and Disability: The Neglected Disease of Modern Society", an effort was made to improve emergency medical care in the pre-hospital setting.

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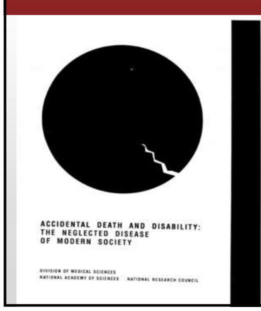
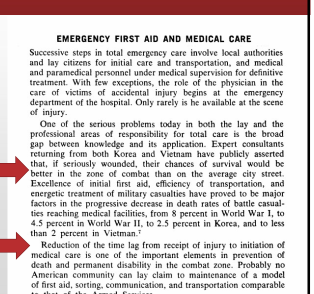
History





EMERGENCY FIRST AID AND MEDICAL CARE

Successive steps in total emergency care involve local authorities and lay citizens for initial care and transportation, and medical and paramedical personnel under medical supervision for definitive treatment. With few exceptions, the role of the physician in the care of victims of accidental injury begins at the emergency department of the hospital. Only rarely is he available at the scene of injury.

One of the serious problems today in both the lay and the professional areas of responsibility for total care is the broad gap between knowledge and its application. Expert consultants returning from both Korea and Vietnam have publicly asserted that, if seriously wounded, their chances of survival would be better in the zone of combat than on the average city street. Excellence of initial first aid, efficiency of transportation, and energetic treatment of military casualties have proved to be major factors in the progressive decrease in death rates of battle casualties reaching medical facilities, from 8 percent in World War I, to 4.5 percent in World War II, to 2.5 percent in Korea, and to less than 2 percent in Vietman.[7]

Reduction of the time lag from receipt of injury to initiation of medical care is one of the important elements in prevention of death and permanent disability in the combat zone. Probably no American community can lay claim to maintenance of a model of first aid, sorting, communication, and transportation comparable to that of the Armed Services.

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History

- First statewide EMS in US
- First civilian helicopter transport
- Communication system
- Golden hour

Hospital's Special Trauma Unit Has Saved Lives of 400 Accident Victims in 2 Years

6

EMS System

- Provide out-of-hospital acute medical care and/or transport to definitive care for those in need
- Broadly regulated by the National Highway Traffic Safety Administration
- Individual state governments more oversight
- Large variation in services
- Public or private
- Bring the patient to the hospital

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EMS System

- Emergency Medical Responder
  - 23 States and DC require National EMS Certification
  - 22 don't license EMRs
- Emergency Medical Technician
  - 42 States and DC require National EMS Certification
- Advanced Emergency Medical Technician
  - 36 States and DC require National EMS Certification
  - 10 don't license AEMTs
- Paramedic
  - 45 States and DC require National EMS Certification

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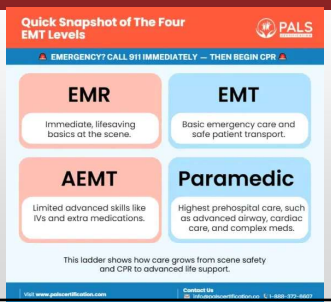
EMS System



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I. Skill – Airway/Ventilation/Oxygenation

I. Skill – Airway / Ventilation / Oxygenation	EMR	EMT	AEMT	Paramedic
Airway – nasal		X	X	X
Airway – oral	X	X	X	X
Airway – supraglottic			X	X
Bag-valve-mask (BVM)	X	X	X	X
CPAP		X	X	X
Chest decompression - needle				X
Chest tube placement – assist only				X
Chest tube – monitoring and management				X

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Cricothyrotomy				X
End tidal CO_2 monitoring and interpretation of waveform capnography			X	X
Gastric decompression – NG Tube				X
Gastric decompression – OG Tube				X
Head tilt - chin lift	X	X	X	X
Endotracheal intubation				X
Jaw-thrust	X	X	X	X
Mouth-to-barrier	X	X	X	X

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Medications Used

- BLS: Acetaminophen, activated charcoal, albuterol, ASA, epi, naloxone, NTG, oral glucose
- ALS: Adenosine, amiodarone, atropine, Atrovent, calcium, dexamethasone, dextrose, diazepam, diltiazem, Benadryl, dopamine, fentanyl, glucagon, Haldol, lidocaine, magnesium, midazolam, morphine, Zofran, sodium bicarb
- RSI: Etomidate, ketamine, midazolam, succinylcholine, vecuronium

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Equipment Used

- BSI (Body Substance Isolation)
- CPR (CardioPulmonary Resuscitation)
- CPR Valve-mask, RespAide, or CPR mouth barrier
- Wound management
- Airway management
- Vital signs
- Breathing aids and oxygen therapy
- Extrication tools and devices
- Miscellaneous, special, and optional items
  - Oral glucose
  - Activated charcoal
  - Suction device: Res-Q-Vac
  - OB kit (for emergency deliveries)
  - Sawyer Extractor bite and sting kit
  - Blanket(s): small emergency, or larger
  - Notebook and/or patient information pad and pencil (and/or clipboard)
- Departmental equipment

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MD/OK EMS Systems

Feature	Maryland EMS	Oklahoma EMS
Central Coordinating Agency	Maryland Institute for Emergency Medical Services Systems (MIEMSS) — independent state agency with governor-appointed EMS Board	Oklahoma State Department of Health, Emergency Systems Division — handles licensing and regulatory oversight
System Oversight	Coordinates EMS education, statewide protocols, quality assurance, data systems (eMEDS®), trauma & specialty care integration, and medical direction	Provides regulatory oversight; does not centrally coordinate all EMS operations statewide
Medical Direction	Structured network of base stations provides statewide medical direction	Local/regional medical directors oversee medical direction; varies by region
Operational Programs	Jurisdictional EMS Operational Programs (JEMSOPs) provide 9-1-1 EMS response in all counties	Regional response structures exist for large-scale incidents; EMS delivery via municipal services, fire departments, and large urban authorities like EMSA
Data & Reporting System	eMEDS® — integrated statewide prehospital data reporting	OKEMSIS — state EMS reporting system; transitioning to NEMSIS standards
Scope & Uniformity	High statewide standardization in protocols, education, and quality assurance	Less centralized; policies and protocols can vary regionally

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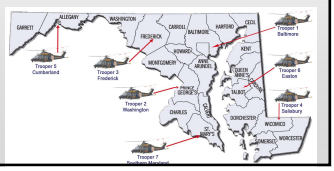
Maryland EMS System

- The EMS communication system integrates the entire EMS system in Maryland.
- The Emergency Medical Resources Center (EMRC) coordinates medical consultation between medic units and hospital physicians.
- SYSCOM—the System Communication Center



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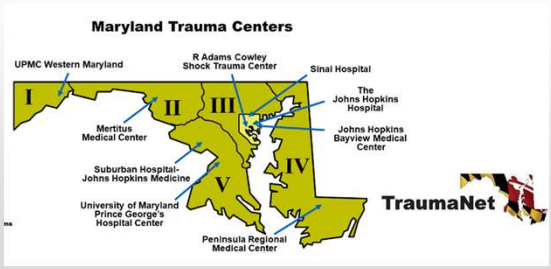
Maryland EMS System



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CRNA First Responders

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Types of Patients Treated

- Anticipated prolonged extrication (entrapment >1 hr.)
- Unstable or potentially unstable patient
- Mass casualty incidents

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Transportation

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Deployment

- Syscom
- Maryland Express Care
- Go-team activated

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Skills

- Advanced airway maneuvers, including surgical cricothyrotomy and mechanical ventilations
- Chest tube decompression of hemopneumothorax
- Surgical procedures to achieve hemostasis
- Administer advanced fluid resuscitation, including blood transfusion
- Administer sedative, analgesic and paralytic medications
- Initiate invasive and non-invasive vital sign monitoring including: arterial oxygen saturation, quantitative measurement of expired ETCO2, measurement of core body temperature, arterial pressure and central venous pressure
- Insert gastric and urinary bladder drainage catheters
- Administered vasoactive medications to support blood pressure and maintain organ blood flow
- Administer medications and institute measures to reduce brain swelling and lower intracranial pressure
- Administer treatments and medications to patients with crush injury in order to reduce the risk of myoglobin-induced acute renal failure
- Perform life-saving extremity amputation
- Provide advanced medical and triage expertise for mass-causality incidents, including incidents potentially involving weapons of mass destruction.

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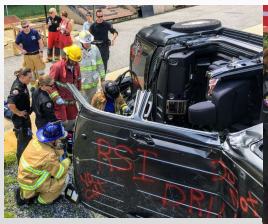
Training



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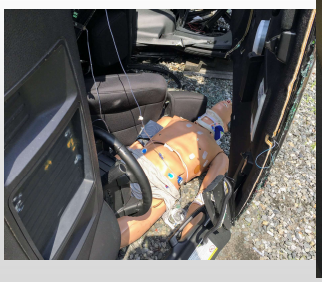
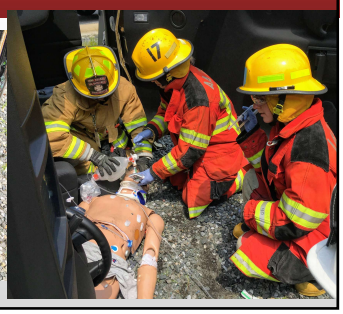
Training





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Training

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CRNA Training-Online

- Policy
- EMS Provider Protocols
- Agusta Westland Video
- HAZMAT
- Glidescope Go
- Cricothyrotomy
- EZ IO
- CAT
- SAM
- Needle Decompression

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CRNA Training- Drills

- Scavenger Hunt
  - Keys
  - Go-Team Medication Kit
  - Blood/FFP/cooler/blood tubing
  - Surgical bag
  - Airway supplies and backpack
  - Glide scope
  - Anesthesia short form flow sheet
  - Turnout gear (boots/helmet/goggles/jacket/pants/gloves)

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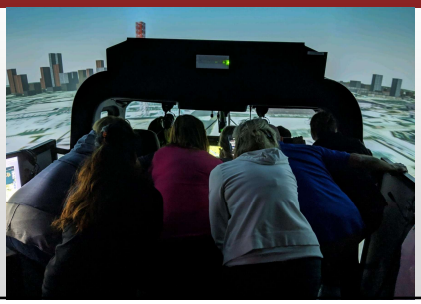
CRNA Training- Simulation



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CRNA Training-Simulation

- Needle decompression
- Pelvic binder
- CAT
- EZIO
- Glidescope-Go
- Belmont Buddy Lite

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Interstate 95 Incident

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Interstate 95 Incident

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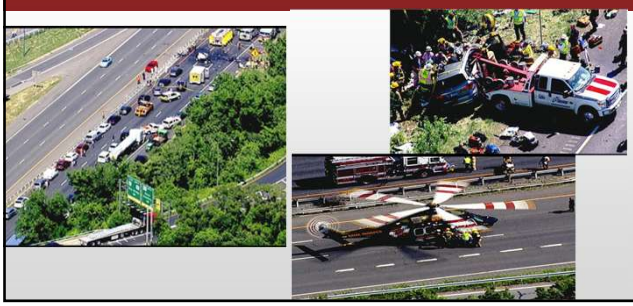
Deployed



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Deployed

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Equipment Checklist

- ✓ ***Pharmacy Kit*** – Located in TRU Pyxis. Remove under DOE number.
- ✓ ***Blood Cooler*** – Located in TRU cabinet. 2 PRBC & 2 FFP.
- ✓ ***2 Surgical Bags*** – Located in TRU cabinet.
- ✓ ***Airway Bag*** – Located in bunker room on helipad in locked cabinet.
- ✓ ***Glidescope Go*** – Located in bunker room on helipad in locked cabinet.
- ✓ ***Belmont Buddy***- Located in bunker room on helipad in locked cabinet.
- ✓ ***Turnout Gear*** – Located in bunker room on helipad.

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Medication Bag

	Medication	Quantity
1	Amiodarone 150 mg/3 mL vial	1
2	CeFAZolin 1 gm vial	2
3	Clindamycin Phosphate 900 mg/6 mL vial	1
4	EPHEDrine 50 mg/1 mL vial	1
5	Esmolol 100 mg/10 mL vial	1
6	Etomidate 40 mg/20 mL vial	2
7	FentaNYL 250 mcg/5 mL vial	3
8	Glycopyrrolate 0.2 mg/1 mL vial	2
9	Hydrocortisone Sodium Succinate 100 mg/2 mL vial	1
10	HYDROmorphone 2 mg/1 mL syringe	2
11	Ketamine 200 mg/20 mL vial	1
12	Mannitol 20% 500 mL bag	1
13	Midazolam 10 mg/10 mL vial	1
14	Midazolam 2 mg/2 mL vial	2
15	Phenylephrine 10 mg/1 mL vial	1
16	Propofol 200 mg/20 mL vial	2
17	Rocuronium 100 mg/10 mL syringe	2
18	Sodium Chloride 0.9% 90 mg/10 mL vial	2
19	Succinylcholine 200 mg/10 mL syringe	2
20	Vasopressin 20 units/1 mL vial	2
21	Vecuronium 10 mg/10 mL vial	2
22	Tranexamic acid	1

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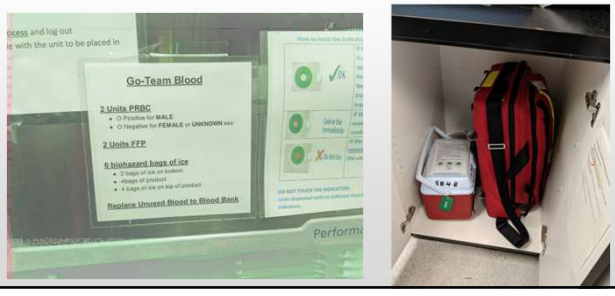
Cooler



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Brown JB, Sperry JL, Fombona A, Billiar TR, Peitzman AB, Guyette FX, Pre-Trauma Center Red Blood Cell Transfusion Is Associated with Improved Early Outcomes in Air Medical Trauma Patients, *Journal of the American College of Surgeons.* (2015), doi: 10.1016/ j.jamcollsurg.2015.01.006.

- 5 fold increase in 24hr survival
- 72% reduction in odds of shock on admission
- 3 units RBCs less over 24hr vs control

Table 1. Protocol for Helicopter Emergency Medical Services Red Blood Cell Transfusion

RBC transfusion should be administered after 1-2L of crystalloid total has been received by an injured patient and any one of the following are present:
1. Hypotension with systolic blood pressure <90 mmHg 2. Changes in mental status 3. Changes in skin color (pallor, mottling or cyanosis) 4. Tachycardia with heart rate >120 beats per min 5. Capillary refill >2 seconds 6. Urine output <30 mL/h for ≥4 h (inter-facility transports) 7. Lactate level ≥4 mmol/L 8. Shock index (HR/SBP) >0.9 9. RBC transfusion initiated at a referring facility (inter-facility transports)
In cases of penetrating wounds or clinical evidence of active bleeding, RBC may be initiated earlier through consultation with a medical command physician.

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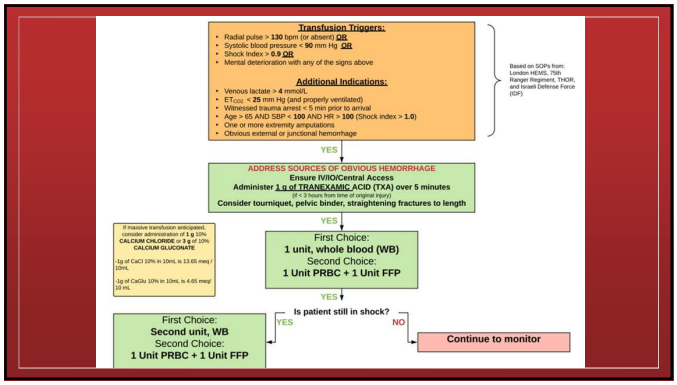

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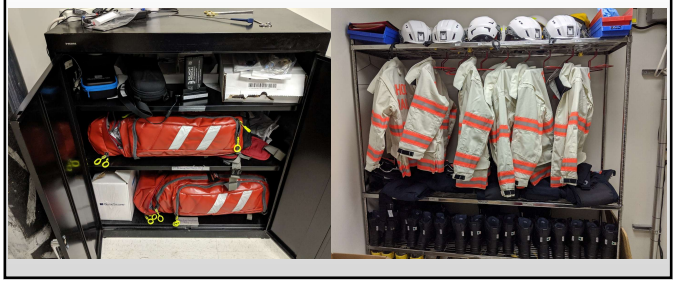
Equipment



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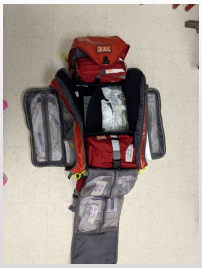
Equipment Bag



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Equipment Bag

Left Pocket
Pressure bag
Bougies
6.0, 6.5, 7.0, 7.5 & 8.0 ETTs, Stylets, Glidescope stylet
Right Pocket
Gloves, tape, 3, 4, 5 LMAs
Top Compartment
Safety goggles, bags, shears, trach ties, tape
Disposable stethoscope, ear plugs
Inner Liner Main
Space for medication Kit, Glidescope Go
Peds ETTs; 3, 3.5, 4, 4.5, 5
Shiley 6 cuffed trach, ETCOs
Main Compartment
Anesthesia short forms, biohazard bags
1 perc Cricothyrotomy Cath Set
Airway Kit
4, 10ml syringes
1 short metal handle, 1 regular metal handle
1 MAC 3 & 4 blade, 1 Miller 2 & 3 blade
1 #10 Scalpel, Tongue depressors, OPAs, NPAs, lube
IV Kit-Under Flap
20, 18, 16, 14g Angiocaths, tape, tourniquets, ETOH
2 Sets blood tubing, IV tubing/extensions, bagaderm, flushes, guaze
Syringe Kit
Syringes and needles

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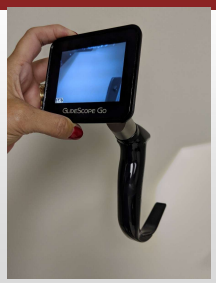
GlideScope Go



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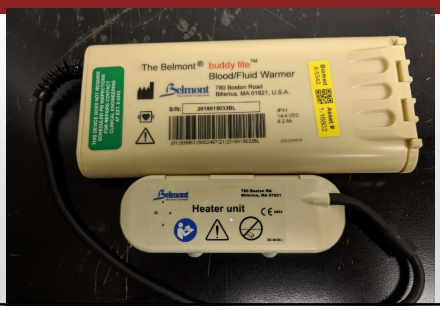
Fluid Warmer



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Air Med J. 2020 Jan - Feb;39(1):51-55. doi: 10.1016/j.amj.2019.09.004. Epub 2019 Oct 23.

Advanced Prehospital Trauma Resuscitation With a Physician and Certified Registered Nurse Anesthetist: The Shock Trauma "Go-Team".

Howie W[1], Scott-Herring M[2], Pollak AN[3], Galvagno SM Jr[4].

Author information

Abstract

OBJECTIVE: The R Adams Cowley Shock Trauma Center (STC) is Maryland's primary adult resource center for trauma care. The Shock Trauma "Go-Team" is a specialized component of Maryland's emergency medical system and is composed of a physician and certified registered nurse anesthetist. They are dispatched when advanced prehospital resuscitation is required. The purpose of this study is to describe the capabilities and historic epidemiology outcomes of the Go-Team.

METHODS: A retrospective case series review of recoverable Go-Team records was performed from 2011 to 2018. Go-Team call logs/records were identified from multiple sources. Medical records were reviewed for patient demographics, mechanisms of injury, and treatments in the field. There was a total of 61 activations, with 22 deployments to the scene of injury.

RESULTS: The majority of deployments were via helicopter (73%) and lasted 2 hours. The most common indications for deployment were motor vehicle entrapment (41%), trench collapse (14%), and building collapse (9%). Of the 22 patients treated by the Go-Team, 50% received at least 1 blood transfusion in the field, and 23% required an advanced airway. No field amputations were required.

CONCLUSION: The STC Go-Team is a unique multidisciplinary specialized component of a statewide emergency medical system.

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Historical Review

- Demographics
  - 86% male
  - Mean age 35 years (range 19-67)
  - 59% PS 2
  - Mean BMI 27 (range 17-44)
  - 72% negative toxicology
  - 46% work related

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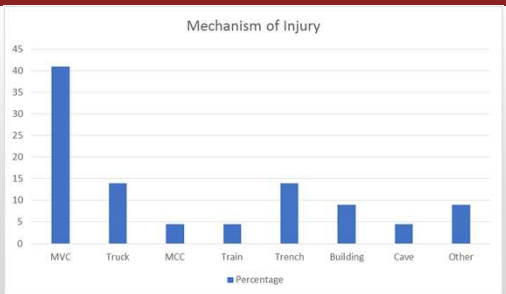
Historical Review



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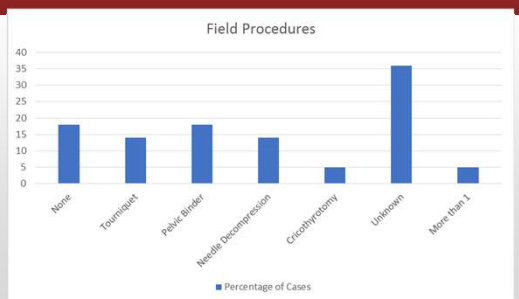
Historical Review



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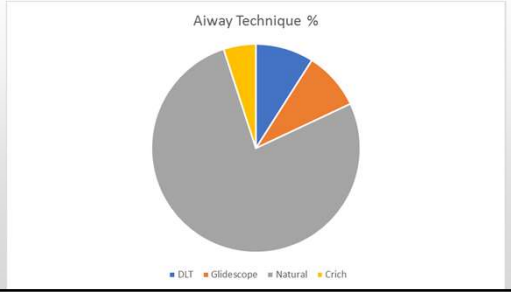
Historical Review



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Historical Review

Status	N (%)
Cardiac Arrest	
No	19 (86)
Yes	3 (14)
REBOA Placed	
Yes	4 (18)
No	18 (82)
Massive Transfusion Initiated	
Yes	6 (27)
No	16 (73)
Chest X-Ray	
Clear	16 (73)
Pneumothorax	3 (14)
Other (Mainstem, pulmonary contusions, atelectasis)	3 (14)
Temperature (Celsius)	Mean 36.4 (SD +/- 1.8, range 33.1-37.2)
Systolic Blood Pressure (mmHg)	Mean 115 (SD +/- 41, range 0-170)
Hemoglobin (g/dl)	Mean 12.7 (SD +/- 2.3, range 7.9-16.2)
Lactate (mmol/L)	Mean 6.5 (SD +/- 5.9, range 1.2-17)

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Historic Review

Call Characteristics	N (%)
Season	
Fall (SEP, OCT, NOV)	7 (32)
Winter (DEC, JAN, FEB)	7 (32)
Spring (MAR, APR, MAY)	6 (27)
Summer (JUN, JUL, AUG)	2 (9)
Time of day	
0400-1200	6 (27)
1200-1800	12 (54)
1800-2100	3 (14)
2100-0400	1 (5)
Mode of Deployment	
Air	16 (73)
Ground	6 (27)
Length of call (min)	126 (+/- 54)

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Historical Review

- Patient Outcomes

	Mean (SD)	Range
Time to OR (min)	23.8 (348)	16-1343
Ventilator (days)	1.5 (3)	0-11
Surgeries (number)	2.5 (2.6)	0-11
Hospital days (days)	14.5 (23)	1-99

- 55% home, 27% rehab, 18% expired

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Bush Hog

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Cement Mixer

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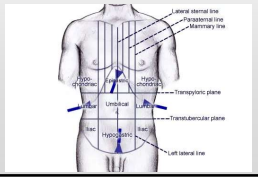
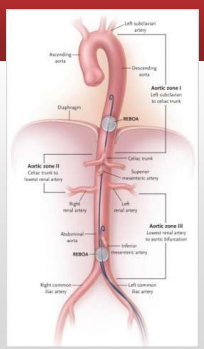
Future

- REBOA
- Ultrasound
- SOPs





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Questions?

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References

- Brown, Sperry, Fombona, Billiar, Peitzman, Guyette (2015). Pre-trauma center red blood cell transfusion is associated with improved early outcome in air medical trauma patients. Journal of the American College of Surgeons, 220(5):797-808.
- Dilmen, Eryılmaz, Balkan, Serdar, Durusu,Yıldırım, Dilmen (2017). Comparison of warm fluid and cold fluid resuscitation during uncontrolled hemorrhagic shock model in rats. Ulus Travma Acil Cerrahi Derg, 23(4): 287-293.
- Howie, Scott-Herring, Pollak, Galvagno (2019). Advanced prehospital trauma resuscitation with a physician and certified registered nurse anesthetist: The Shock Trauma Go-team. Air Medical Journal, 00: 1-5.
- Howie (2007). Anesthesia "Go Team" for trauma patients: Field based anesthesia. AANA Journal, 75 (2): 107-110.
- Neeki, Dong, Toy, Vaezazizi, Powell, Jabourian, Jabourian, Wong, Vara, Seiler, Pennington, Powell, Yoshida-McMath, Kissel, Schulz-Costello, Mistry, Surrusco, O'Bosky, Van Stralen, Ludi, Sporer, Benson, Kwong, Pitts, Culhane, Borger (2017). Efficacy and Safety of Tranexamic Acid in Prehospital Traumatic Hemorrhagic Shock: Outcomes of the Cal-PAT Study. Western Journal of Emergency Medicine, 18(4):673-683 .
- Russo, Nickel, Leissner, Schwerdtfeger, Bauer, Roessler (2016). Use of the GlideScope®-Ranger for pre-hospital intubations by anaesthesia trained emergency physicians – an observational study. BMC Emergency Medicine, 16(8).
- Wright (2014). Battlefield administration of tranexamic acid by combat troops: a feasibility analysis. JR Army Med Corps, 160(4):271-2.
- https://www.miemss.org/home/who-we-are

55

References

- https://en.wikipedia.org/wiki/Emergency_medical_services_in_the_United_States
- https://www.ems.gov/pdf/National_EMS_Scope_of_Practice_Model_2019.pdf
- https://www.google.com/search?q=grady+memorial+horse+drawn+ambulance&rlz=1C1GGRV_enUS794US795&tbm=isch&source=lnms&sa=X&ved=2ahUKEwi76pvi7dPmAhVECFQIHdKmAeAQ0pQEwAHoECAoQBg#imgrc=I5sOE9OXD_Tw6M
- https://www.ems.gov/pdf/1997-Reproduction-AccidentalDeathDisability.pdf
- https://www.prb.org/usyoungadultinjury/
- https://www.baltimoresun.com/news/bs-xpm-1991-10-28-1991301035-story.html
- https://www.rd.com/culture/why-call-911-emergencies/
- https://nasemso.org/wp-content/uploads/Prepublication-Display-Copy-2018-National-EMS-Scope-of-Practice-Model-20180929.pdf
- https://www.nremt.org/rwd/public/document/paramedic
- Heiss, Foemges, Minzola (2020). Damage control resuscitation of a patient with traumatic aortic rupture: A case report. AANA Journal, 88(1), p 49-58.
- https://www.jems.com/2018/02/01/whole-blood-in-ems-may-save-lives/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5292303/

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