EMS Subspecialty Certification Review Course

Delivery Systems with Special Considerations

2025

1

ABEM EMS Core Content

2.2.3	**Delivery Systems with Special Considerations**
2.2.3.1	Urban EMS
2.2.3.2	Rural EMS
2.2.3.3	Wilderness EMS
2.2.3.4	Volunteer EMS
2.2.3.5	Inter-facility transport
2.2.3.6	Military EMS
2.2.3.7	Air medical
2.2.3.8	International EMS

2

Learning Objectives

Upon the completion of this program participants will be able to:

1. Describe the various aspects and challenges of medical direction of varied types of EMS systems
2. Describe features of each system that make it unique but part of a larger global EMS system

3

Delivery Settings

One way of classifying is based on the geographic setting of an EMS system

- Urban/Suburban
- Rural
- Wilderness (Day 3)

4

Urban EMS

- High to moderate population densities
- Largely self-contained destination hospital resources
  - Generally -> shorter hospital transport times
- Higher patient volume -> more $$ opportunities
  - Can have multiple agencies with overlapping areas of response (gov agencies, private companies, hospital-based)
  - Coordination & efficiency is critical
- Combination of emergency & non-emergency ambulance services

5

Urban EMS: System-Level Oversight

- County/Regional level medical oversight
  - Regional medical director v council
- When multiple agencies are involved, need compatible:
  - Radios
  - Data exchange/aggregation
  - Mutual aid policies
  - Clinical protocols

6

Urban EMS: Single v Multiple Ambulance Service Providers

- Single Ambulance Service Providers
  - Pro: one infrastructure = less $
  - Con: monopoly
- Multiple Ambulance Service Providers
  - Pro: competition
  - Con: duplication of infrastructure = more $

7

Urban EMS: Single v Multiple Ambulance Service Providers

- The happy medium? Allow competition *for* the market rather than *within* the market
  - Competitive procurement process
  - Consequences for failing to meet requirements
  - Revisit the procurement process from time to time
- May also see a separation based on call type
  - Emergency ambulance: gov agency
  - Non-Emergency ambulance: private company

8

Urban EMS: ALS and/or BLS Levels of Care

- All ALS ambulances
  - Even if the call is under-triaged, ALS is there
  - $$$: education, equipment, salary
- ALS + BLS ambulances
  - Calls may be under-triaged
  - Smaller cadre of medics -> less skill dilution… but how long does it take for ALS to get on scene?
  - Does the data support improved outcomes in ALS v BLS?
    - Especially with EMTs obtaining 12-lead EKGs, etc

9

Urban EMS: Tiered Response

- Stay tuned…

10

Urban EMS: Hospital Destination Policies

- Policies need to be in place to guide decision-making process for hospital destination
  - Right patient to the right hospital at the right time
  - Allowance for patient preference when reasonable
  - Specialty-care capabilities (STEMI, CVA/LVO, trauma, burn)
- Diversion policies
  - EMS – Hospital administration collaboration is key

11

Rural EMS

- Lower overall population density; some pockets of higher density in small towns/villages
  - Generally lower call volume
  - Longer transport time -> implications on protocols, staffing, etc
- Variable funding sources
  - Taxes
  - Subscription-service (ambulance insurance)
  - Volunteer system

12

Rural EMS

- Smaller budgets ->
  - Less $ to buy expensive technology
  - Ex. may not have e911 (cell tower reception; equipment $)
- Response intervals are impacted by:
  - Staffing models: are they responding from home?
  - Geographical distances
  - Handling multiple calls at once, especially if the hospital is a ways away
    - What if the patient decompensates?

13

Rural EMS

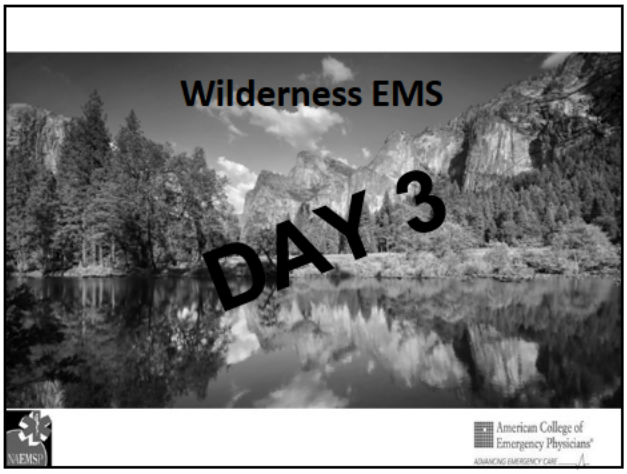
- Educational considerations
  - Where are classes being held?
  - What's the call volume? How are high-risk low-frequency skills maintained?
- Rural paramedic paradox
  - Low call volume, lower levels of funding -> really hard to pay for and properly support ALS
  - Longer transport times = more opportunity for a patient to get sicker… and really need ALS care

14

Rural EMS: Medical Oversight

- Major challenge
  - Many medical directors are not EM trained (let alone EMS trained)
  - May not have the $ to pay a medical director
  - Importance of considering distance education
  - Limiting factors:
    - Liability insurance
    - Time commitment
    - Demands for service

15



16

Additional Delivery Settings

- Volunteer EMS
- Air Medical Transport
- Inter-Facility Transport
- Military Medicine
- International

American College of Emergency Physicians
ADVANCING EMERGENCY CARE

17

Volunteer EMS

- Similar challenges as Rural EMS Systems, although volunteer EMS providers do not work exclusively in rural EMS systems (30% EMS volunteers are in urban environments)
- Training (time, $) can be a significant problem
- Volunteers typically work <40 hours/week
  - Limited call exposure
  - Skill degradation

American College of Emergency Physicians
ADVANCING EMERGENCY CARE

18

Air Medical EMS

- EMS at the Crossroads (IOM, 2007) identified challenges in air medicine:
  - Growth primarily driven by reimbursement changes
  - Clinical efficacy, appropriateness w the challenges of of triage and use decisions
  - Safety
  - System integration and the interface of state/federal regulation

19

Air Medical EMS: Early Stages in the US

- 1966 Accidental Death & Disability mentioned the potential use of HEMS in the developing trauma system
- 1970: Dr. R Adams Cowley (University of MD Shock-Trauma) partnered w Maryland State Police -> 911 police-based HEMS
- 1972: First hospital-based HEMS at St. Anthony's in Denver, CO (interfacility + scene 911)

20

Air Medical EMS

- CDC: 90% of the US population has access to level I or II trauma centers; 27% require HEMS transport to achieve timely access
- ~43 million Americans live in rural areas without timely access to specialist care… which will only get worse w rural hospital closures
- The population, especially in rural areas, is aging

21

Air Medical EMS

- 1997: Balanced Budget Act -> significantly increased CMS reimbursement for HEMS transport
- Coupled w regionalization of care, closure of rural ERs…
- Unsurprising tremendous growth in HEMS
  - Does this translate to improved outcomes?
  - Must consider patient, crew, and bystander safety

22

Air Medical EMS: Outcomes

- AMS is controversial
  - It's expensive, but could decrease overall healthcare costs by decreasing length of stay or use of critical care resources
  - The challenge: assess risk/reward and identify cases where AMS is clear benefit
  - Inter-facility Transport: availability of more specialized services elsewhere (stroke, ACS, sepsis, OB, trauma)
  - Extended scope of practice/resources compared to local ground EMS
  - Distribution of patients in MCI/overcrowding

23

Air Medical EMS: Regulations

- States license air ambulances & provide oversight to medical care
- Due to the federal preemption under the Airline Deregulation Act, states have no jurisdiction over:
  - Aviation aspects of the program
  - Economics of providing services (decisions on certificates / determination of need, insurance regulation)

24

Air Medical EMS: Regulations

- Federal Aviation Administration is responsible for all aviation-specific issues under Title 14 of the Federal Code:
  - Safety inspections
  - Helicopter licensure
  - Air traffic control

25

Air Medical EMS: Regulations

- FAR = Federal Aviation Regulations
  - FAR Part 91: General Operating and Flight Rules
  - FAR Part 135: Air Carrier Certificates, Commuter and On-Demand Operations and Rules Governing Persons on Board Such Aircraft
    - Pilot rest
    - Training
    - VFR/IFR rules
    - Maintenance

26

Air Medical EMS: Regulations

- Medical director needs to understand that the FAA requires the certificate holder maintain operational control of the aircraft at all times (go/no go, diversion, on board equipment, etc.)
  - Part 135 certificate holder may be different from the owner of the aircraft

27

Air Medical EMS: Regulations

- CAMTS: voluntary industry gold-standard for AMS accreditation

28

Air Medical EMS: Operations

- Bases: Hospital v Remote
- Staffing: Most have 2 providers (RN-RN, RN-EMTP)
  - Specialty transport (perfusionist, RT, Neonatal RN)
- HEMS mission profile depends on the program (scene response, IFT)
- Fixed wing (airplane) v rotor wing (helicopter; HEMS)

29

Air Medical EMS: Operations

- HEMS: short, time dependent missions, weather dependent, 5-10 min launch time
  - 50-175 miles
- Fixed: longer to mobilize, airport dependent, less weather dependent, greater distances, need ground transport on either end
  - >150-175 miles

30

Air Medical EMS: Operations

- Aircraft Considerations
  - Space: airway management and patient access difficult
  - Weight: lift capacity is aircraft/weather dependent
  - Hearing: history and lung sounds BEFORE flight
  - Lighting: night vision issues for the pilot
  - Electronics: interference with nav equipment

31

Air Medical EMS: Operations

- Physiologic Considerations
  - Air Emboli/Decompression Illness: flown at LOWEST altitude possible (1000-2000 feet)
  - Motion sickness: weather, aircraft movement
    - Pretreat patient with antiemetic
  - "Flicker" seizures from sunlight shining through rotor blades -> strobe light-like stimulation

32

Air Medical EMS: Operations

- Visibility: 1 mile visibility, 500 foot ceiling (VFR min)
  - IFR is possible, but generally requires landing at an airport
- Freezing Precipitation: grounds the aircraft
- Ambient Temperature
  - Higher temp, less dense the air = limits lift/capacity
- Landing Zone (LZ)
  - 100' x 100' without adjacent obstructions/debris
  - Weather/conditions can impact this

33

Air Medical EMS: Special Capabilities

- Difficult Area Access: remote wilderness, inaccessible areas secondary to flooding/snow/fire
- Aerial Rescue
- Aerial Reconnaissance
- Search
- Mass gatherings: crowds and inaccessible areas
- Go Team: bringing the hospital resources to the patient's side

34

Inter-facility Transport

- "Closest, most appropriate" facility = challenge
- Patients self-present
- Regionalization of care, especially of specialty centers
- Diversion issues -> pts need to be secondarily brought to more appropriate definitive care

35

Inter-facility Transport

- Choosing an appropriate transport vehicle, appropriate level of personnel, and equipment for the transport requires evaluation of the patient's condition and potential needs for care during the transport.
- Sending physician and facility are legally responsible for appropriate transportation arrangements

36

Inter-facility Transport: Oversight

- Requires in-depth understanding of the most appropriate resources, personnel, and equipment to address a particular situation, and a clear understanding of the risk/benefit of transfer
- Transfers should be routinely reviewed to assure protocols were followed and there were no complications/unforeseen dangers, and design education/remediation

37

Inter-facility Transport

- Considerations
  - Vehicle type/equipment (availability?)
  - Staffing
- Hazards of Transfer
  - Vehicle Crash
  - Lights and Siren
  - Helicopter Crash

38

Inter-facility Transport: Indications

- Trauma
  - Undertriage, local protocols
- Cardiac
  - Rapid transfer for PCI, VAD, IABP, ECMO
- Stroke
  - Reperfusion therapy, mechanical thrombectomy
- Burns
  - Airway management concerns, Shock, CO/CN
  - Burn centers promote healing and prevent infection

39

Inter-facility Transport: Indications

- Spinal Trauma
  - Prevention of movement/extending the injury
- OB
  - Premature labor or Pre-eclampsia
  - By definition, any woman in labor is unstable
    - Can only be transferred if expected benefit > risk; premi infants born at neonatal centers are more likely to survive than non-neonatal centers
  - Most reliable indication for imminent delivery is > 4cm dil
- Peds/Neonatal
  - AAP has published transport guidelines based on experts
  - Often require specialized care providers and equipment

American College of Emergency Physicians
ADVANCING EMERGENCY CARE

40

Inter-facility Transport: Legal Issues

- Specific concerns:
  - Interstate transport: licensing, scope of practice, pronouncing should the patient expire during transport

American College of Emergency Physicians
ADVANCING EMERGENCY CARE

41

Inter-facility Transport: Legal Issues

- EMTALA
  - Sending hospital must perform MSE and decide if patient is "stable" v "unstable"
  - Active labor = unstable
  - If the patient is unstable, then the hospital must provide care (regardless of ability to pay), until stability achieved
  - If sending hospital is unable to provide necessary care, it must find an appropriate facility and arrange the transfer
  - MUST bring transfer paperwork, records, imaging, etc

American College of Emergency Physicians
ADVANCING EMERGENCY CARE

42

Inter-facility Transport: Legal Issues

- EMTALA
  - May legally transfer an unstable patient if:
    - Patient requests the transfer
    - Sending hospital not able to provide urgently needed service
    - Sending hospital has found an appropriate accepting hospital
    - Patient consents to the transfer after being formed of risks/benefits of the transfer

43

Military EMS

- Modern EMS was born out of military medical ops, particularly from the Vietnam War forward
- Military EMS relies on three keys:
  - training non-medical soldiers in basic preventative medicine and lifesaving skills (ie: tourniquets)
  - a small group of well-trained medics
  - a system of graduated care
- Military lessons often translate into the civilian world

44

Military EMS: Personnel & Facilities

- 1st echelon: scene to the aid station
- 2nd echelon: aid station to division level facility (ex forward surgical teams)
- 3rd echelon: transport to higher level of care: **initial delivery of hospital care**
- 4th echelon: communications zone-level health service support (general hospital, stabilize for trip back to the U.S.)
- 5th echelon: definitive care and rehab; in the U.S.

45

Military EMS: Lessons Learned

- Hemorrhage Control: probably THE single best lesson learned
  - The role of tourniquets
  - Hemostatic agents

46

International EMS Systems

- EMS is well developed in some parts of the world, and in its infancy in others
- Most of the more matured systems have tiered levels of response

47

International EMS: Anglo-American Model

- Non-physicians primarily staff ambulances
- As much care as possible is deferred until arrival at the hospital
- Physician involvement generally limited to direct and indirect medical oversight
- Model largely driven by cost of physician salary

48

International EMS: Franco-German Model

- Heavily relies on physician-staffed field response
- Strong emphasis on on-scene stabilization prior to transport
- Greater opportunity for treat-and-release
- Often in areas of less aggressive med-mal climate

American College of Emergency Physicians®
ADVANCING EMERGENCY CARE

49

Take-Home Points

- EMS is broad sweeping and touches all aspects of society
- The medical director faces a multitude of unique challenges depending on the system and environment that his/her EMS providers are operating in
- Active, engaged, and knowledgeable medical directors are the key to any successful EMS system

American College of Emergency Physicians®
ADVANCING EMERGENCY CARE

50