Learning Objectives

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

1. Describe the various aspects and challenges of medical direction as it applies to urban, rural, wilderness, volunteer, inter-facility transport, military, air medical, and international EMS systems.

2. Describe features of each system that make it unique but part of a larger global EMS system.
Urban EMS

- Medical Oversight
  - Require medical directors that are actively engaged and provide input into in a wide variety of areas
  - Should possess excellent interpersonal skills and ideally have some knowledge of business practices

Urban System Design: Dispatch

- Dispatch
  - 1/3 of all 911 calls are from cell phones*
  - Primary vs Secondary PSAP

- Response
  - Traditional response goals came from cardiac arrest goals
  - Performance Metrics: First Responder = 4 minutes (start CPR), ALS = 8 minutes (defibrillation)
  - Tracking response times varies, particularly when considering what starts the clock

*This number has increased since first printing, now >70%
(https://www.fcc.gov/consumers/guides/911-wireless-services) Has test question been updated?

Often in urban environments, the initial 911 call goes to law enforcement (primary PSAP) who then routes the call to EMS/Fire (secondary PSAP) Cardiac arrest standards have never been validated (except with “death curve” showing 10%/min increased death until defib)
Starting the clock: first ring at first PSAP, unit assigned, or unit en route

The issue of cell phone percentage has increased since the first test in 2013, it is hoped that such questions if present would be updated or the question would be deleted.
Urban System Design: **Response**

- Medical director plays a key role in defining standards
  - Tiered response: ALS for more critical patients
  - Dispatcher qualifications/training
  - Innovative Strategies
    - QRVs, Bike medics, non-transporting first responders with AEDs

Medical director assigns response criteria, especially with regards to tiered response
Dispatchers must have high compliance to protocols, undergo regular QI feedback, and track performance and have outcome data to assess performance

Urban System Design: **Quality**

- Medical Director should play a **visible** and **active** role in the quality system:
  - Chair the “quality council”
  - Establish quality indicators
  - Communicate CQI achievements
  - Advocate for a CQI environment
  - Verify that key clinical decisions are driven by data
  - Facilitate the “team” approach
Quality council: QI leaders from dispatch, fire, private providers, air medical, unions, city leadership, hospitals
Quality indicators might include ROSC, successful intubation, dispatch accuracy, use of capnometry, customer satisfaction, etc.

Urban System Design: CME and Satisfaction

- Continuing Education
  - Content expert
  - Oversee instructor preparation and delivery of training
  - Use cost effective, efficient strategies for CME

- Employee Satisfaction
  - Leading factors in job illness/stress
  - Solutions:
    * Strong EAPs and health programs
    * Crew rotation

Medical director is the content expert and should review and approve all CME materials
Medical director should be actively involved in instructor preparation and ensure that the instructors are delivering quality presentations
Job stress: Call volume, urban environment, sleep disruption, infectious disease exposure
EAP: Employee Assistance Programs
Crew rotation: High to low volume: ambulance to engine, busy to slower area, etc.
Urban System Design: Safety

• Occupational Health
  – Protocols for exposures should be clear and coherent
  – Coordinate with local hospital infection control
  – Training updates

• On the Job Injuries
  – Common are sprains, strains, lacerations, and fractures
  – Protocols for the agitated patient
  – Vehicle crashes are STILL a major problem

Urban System Design: Public Health

• EMS Agenda for the Future, IOM 2006
  – “...EMS of the future will be community based health management that is fully integrated with the overall health system.”
  – Healthy People 2010
    • Defined health objectives for our nation
    • Examples applicable to EMS included
      – Increased access to emergency care
      – Public education of early warning signs of heart attack and stroke
      – Partnerships for substance abuse prevention and treatment
Rural EMS is faced with a multitude of challenges
- Personnel recruiting/retention
- Primary and continuing education
- Skills retention
- Geography (distance, adequate coverage)
- Qualified medical oversight
- Inadequate local community healthcare resources

Education and skills require $$$ which most rural communities do not have

Geography: not just the distance to travel to a call, but the geography that requires adequate coverage and the impact of one unit’s response on the rest of the geography as those areas are potentially left uncovered

Qualified medical oversight: often the local doc, a family practice doc, or a surgeon who has little or no understanding of the local EMS climate or challenges

Inadequate local resources: fewer hospitals with less staff and fewer. In addition, rural providers might be the only healthcare resource in their area
Components of Rural EMS Systems

- Adapted from the *Rural/ Frontier EMS Agenda for the Future* (2004)
- The “Vision” of the Agenda
- Served as a template for planners, EMS professionals, the community, and medical directors to grow and mature a rural EMS system
- Several important components of a Rural EMS System (as defined in the Agenda)

Closely mirrored the *EMS Agenda of the Future* published in 1996
Several “giants” in the EMS community served on the steering committee to develop this project (Tom Judge, Mic Gunderson, Kevin McGinness)
The Vision: Assure rapid response with basic and advanced levels of care as appropriate to each emergency, and will serve as a community resource prevention, evaluation, care, triage, referral and advice. Its foundation will be a MIX of volunteer and paid professionals at all levels, DETERMINED BY THE COMMUNITY
There is often a disconnect from what rural communities expect and what can be/is delivered
ALS Paradox: Rural communities often EXPECT ALS service, but the volunteer responders are BLS
14 components in all: we will discuss a few

Integration of Health Services

- Health care initiatives MUST incorporate EMS (greater potential for success)
- Growing interest in EMS providers expanding their scope of service and scope of practice
  - Requires enhanced oversight and quality assurance
  - “Community paramedics”
Incorporating EMS: injury prevention, etc. Rural EMS systems have greater potential for success (lower call volumes, lack of other agencies to provide the same resource, community integration).

Expanded scope: deficits identified in local primary and urgent care, no competition with other local services. Community paramedics: partner with regional healthcare to fill the gap of healthcare needs in rural areas, expand the paramedic’s scope, provide financial backing to sustain the rural EMS frontier, and keeps skills up.

Information Systems

• Challenges with call volumes and collecting sufficient data to make meaningful conclusions
• NEMSIS is a standardized national dataset, which will make pulling from several rural areas easier

Legislation/Regulation

• Statewide and regional legislation can pigeon-hole a rural provider into a tough position that they can neither meet nor fund.
• “Optional” protocols: continue operating at a higher level but not carry all required equipment or training.
• Available staffing vs. required staffing.
System Finance

- Operational costs
- Local Solutions:
  - Fundraisers (minimally effective typically)
  - Hire paid personnel during the day so volunteers can work day jobs and be available at night
  - Subscription programs
- Medicare “super rural” reimbursement

Operational Costs: tend to be higher in order to maintain current operational levels
Higher costs: Transport times are considerably longer. Utilization rates are much lower. Fixed costs do not substantially change for the service.
Healthcare payers reimburse only when the patient is transported
Subscription programs: small investment into local rural EMS service who will then provide service for no additional charge to the subscriber.
Medicare reimburses 22.6% for calls initiated in low population density areas

Human Resources

- Volunteers are the backbone of rural EMS systems
  - Motivation: typically altruism
  - Incentives to increase recruitment
- Volunteer Demographics:
  - Self employed, Retired, Employed
- Retention
  - Successful retention can depend on strong medical oversight, community need, high visibility, sound business operation, formal organizational structure and cohesive community environment
Motivation: give back to the community, take part in healthcare of family and friends, ability to belong

Incentives: CME, financial assistance, tax credits, health benefits

Employed: employers generally are willing to allow a volunteer to respond from work in a moments notice

Medical Oversight

• Major challenge
  – Many are not EMS trained (let alone EM trained)
  – Multitude of online and free programs exist
  – Limiting factors:
    • Liability insurance
    • Time commitment
    • Demands for service

Education Systems

• NREMT requires all applicants to have graduated from nationally accredited training programs

• Continuing Education
  – Not widely available in rural environments, most have to be after hours for volunteers
  – Distance learning is an option
  – Rural specific programs are available (FARM-Medic)
Public Education
Public Access/Communication
• Rural EMS providers are uniquely positioned to “give back” to their communities via public education campaigns
• Communication infrastructure and sophisticated 911 services are generally less well developed in rural communities
  – Centralized dispatch centers are less familiar with local geography and resources
  – Prearrival instructions

Clinical Care and Transportation Decisions
• Rural EMS systems must identify what services are of most benefit, and how to provide that service
  – Advanced technicians are rare
  – Treatment without transport
  – Transport to alternative destinations
  – Community paramedicine

Wilderness EMS
Wilderness EMS Systems
• Wilderness EMS is better defined by the **situation** and **circumstance**, rather than geography and transport distances
  – Needs for specialized training, equipment, and expertise to deliver patient care in the particular environment
• Wilderness EMS brings challenges to the scope of practice, medical oversight, operations, and protocols

Scope of Practice/Operations
• EMT-B may perform interventions typically considered reserved for a higher scope of practice
• Rescues can involve multiple agencies with variable expertise and training, and complex logistics
• Primary consideration is the safety of the rescuers weighed against the rescue of the individual(s)

Medical Oversight
• Direct medical oversight: challenging, requires wilderness knowledge and expertise
• Indirect medical oversight: educational sessions for special field assignments and protocols.
  – Protocols must allow for flexibility
  – Case review is especially helpful
Protocols

• Wound Care: definitive care may not be available
  – Irrigation, ongoing assessment, removal of FB, antibiotics

• CPR Termination
  – Risk to rescuer vs chance of survival of victim
  – Special cases: hypothermia, cold water drowning

• Dislocation reduction:
  – Shoulders, digits, patella
  – Allows victim to assist in self extrication

Protocols

• Selective Spinal Immobilization

• Anaphylaxis/Severe Asthma
  – BLS level of care
  – Risks vs benefit of age related epinephrine administration need to be weighed

• “Standing Orders”
Volunteer EMS Systems

• Similar challenges as Rural EMS Systems, although volunteer EMS providers do not work exclusively in rural EMS systems
• Training is a significant problem
• Volunteers typically work <40 hours/week
  – Limited call exposure
  – Skill degradation

30% EMS volunteers are in urban environments
Training: paramedic requires 1000+ hours. Volunteers typically are unable to commit that much time and energy
Skill degradation: might require more frequent hand-on skills reviews.
Keeping run logs can help track which skills might need more training and education and which ones are encountered more frequently by the provider

Volunteer EMS Systems

• On line Education
  – Difficult to replace hands on training and experience
• Volunteer Motivation
• Driving positive change in the volunteer
  – requires understanding motivation for wanting to serve in EMS
Volunteer EMS: Quality Management

- 911 Services
  - Enhanced 911 typically not available
- Lower patient call volume = skill degradation
- Most volunteer systems can not afford EMR
- Recruitment/Retention:
  - Insufficient personnel to staff for a single call (unique)

Enhanced 911 is often too expensive.
Call location becomes an issue, especially in rural areas
EMR: making QI/QA difficult, however
NEMSIS is required in several states creating a challenge
Recruitment solutions: academic reimbursement/scholarships, paid
workers when volunteers are unavailable during daylight hours
Insufficient staff requires mutual aide response agreements with neighboring communities/EMS systems

Volunteer EMS: Medical Oversight

- Often lack of sufficient funds to pay for a full time medical director
- Requirements/Attributes
- Know the Volunteer
Inter-facility transport

• “Closest, most appropriate” facility = challenge
• Specialty centers
  – Trauma
  – Burns
  – Pediatrics/Neonates
  – Stroke
  – High risk OB
• Diversion issues

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
Inter-facility Transport

• Considerations
  – Vehicle type/equipment (availability?)
  – Staffing
• Hazards of transfer
  – Vehicle crash
  – Lights and Siren
  – Helicopter Crash

Vehicle type: private vehicle, wheelchair van, stretcher van, EMS vehicle (BLS/ALS), or specialty vehicle (CCT, helicopter). Often highly specialized vehicles/staff are not available (ie: weather for helicopters, specialty staff not available). In this case, local EMS is potentially the fastest.

Staffing: depends on the needs/potential needs of the patient, can be untrained up to physician, with other specialists involved like respiratory therapy, perfusionist, etc.

Vehicle crash: underappreciated, accounts for significant injuries to all parties involved, requires appropriate restraint devices for all people including the patient.

Lights and siren of no benefit on long distance transports, but substantial increased risk.

Helicopters require significant risk/benefit measurement: dramatic costs with dramatic risk, high lethality.

Inter-Facility Transport: Specific

• Trauma
  – Undertriage, local protocols
• Cardiac
  – Rapid transfer for PCI, alternatives
• Stroke
  – Similar to PCI, but benefit is not as clear
• Burns
  – Airway management concerns, Shock, CO/CN
  – Burn centers promote healing and prevent infection
Undertriage: went to lower level of care inappropriately
Local Protocols: Level III stabilization, then transfer to Level II or I
Alternatives: system must plan for non-PCI or delays (thrombolytics at hospital or in route to PCI)
Airway management in burns: should NOT be done during transfer, but prior to transfer
Hypovolemic shock is another major complication of burns
Carbon monoxide, cyanide: often seen in burn victims

Inter-Facility Transport: Specific

• Spinal Trauma
  – Prevention of movement/extending the injury
  – Most of these are NON-URGENT, BLS transfers
• OB
  – Premature labor or Pre-eclampsia
  – “unstable”, helicopter is preferred
• Peds/Neonatal
  – AAP has published transport guidelines based on experts
  – Often these patients require specialized care providers and equipment

Inter-facility Transport: Oversight

• EM physicians are often the most appropriate
• 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
• Medical director should ideally review every transfer to assure protocols were followed and there were no complications/unforeseen dangers, and design education/remediation
Inter-facility Transport: Legal Issues

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

• EMTALA
  – MSE provision, determination of “stable” v “unstable”
  – May transfer if unstable:
    • Patient request
    • Does not offer the service required (higher level of care)
    • Transfer document must indicate reason for transfer

Military EMS: Introduction

• 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
Military EMS: Personnel and Facilities

- “Buddy” or “Self” aid > Combat medic > Independent Duty Medic > Flight Nurse
- Organization:
  - Level I: Aid Station, first medical contact
  - Level II: Forward surgical team, blood, stabilization
  - Level III: Combat Support Hospital, comprehensive resuscitative surgery and medical care
  - Level IV: Comprehensive intermediate hospital
  - Level V: Fixed hospitals in the US

Military EMS: Transportation/Equipment

- MEDEVAC = combat casualty evac on dedicated platforms, this is the GOAL!
  - CCATT (MD, RN, and RT)
- CASEVAC = combat evac
- Equipment limited by weight: what the soldier can carry (splinting, tourniquet, airway, circ, breathing)
- Definitive care reserved further back in the evacuation chain

Military EMS: Communications/Oversight

- Advancing technology is enabling improved communications from forward providers to physicians further to the rear (ie: remote outposts)
- No direct medical oversight on the battlefield
  - Company commander is often non-medical
- Medical mission: subordinate to the tactical mission
Military EMS: Lessons Learned

- Hemorrhage Control: probably THE single best lesson learned (MARCH, XABC)
  - The role of tourniquets (<2 hour application)
  - Hemostatic agents

MARCH = massive hemorrhage, airway, respiration, circulation, head injury/hypothermia
XABC: exsanguination, airway, breathing, circulation

Military EMS: Civilian Partnership

- Specialty Care Centers:
  - Brooke Army Burn Unit
- Disaster Response/Aid
  - DSCA: Defense Support to Civilian Agencies
    - Commanders using military assets to assist civilian operations to preserve life or mitigate/prevent property loss
  - NDMS: National Disaster Medical System
    - Part of HHS and has admin and operational control
    - DOD, VA, DHS are partner agencies
    - Military will provide transportation assets for NDMS
    - Eg: Katrina response
Air Medical EMS

- EMS at the Crossroads (IOM, 2006)
- How to Integrate AMS into EMS?
  - Patient selection/Dispatch criteria (trauma, ACS, stroke)
  - Communication
  - EMS Provider Training
  - Appropriate AMS transport
  - Trauma scene v Intra-facility transport

EMS at Crossroads: called for integration of AMS into regionalized EMS systems
Communication: integrate 911, ground and AMS; air medical crew members must be able to maintain communication with dispatch center, scene personnel, and LZ personnel
Provider training: when/how to use AMS, LZ training, when/how to approach the aircraft
Appropriate transport: extended transport, extended extrication, ALS when none is available, traffic conditions, MCI, nearest ground farther than air, advanced medical equipment/resources needed
Scene v Intrafacility: weather factors won’t allow flight, too unstable to wait for helicopter,
Air Medical Services: Outcomes

• AMS is controversial!
  – It’s expensive, but could decrease 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)

Air Medical EMS: Regulations

• FAA maintains responsibility of aviation aspects
• IOM recommends states maintain regulatory oversight of communications/dispatch/protocols
• FAR = Federal Aviation Regulations
  – FAR Part 91: General operations, Flight rules
  – FAR Part 135: Pilot rest, training, VFR/IFR rules, maintenance
    • Part 135 holder may be different from the owner of the aircraft

Regulations were updated as of April 2015 and require helicopters with medical flight crews to operate under part 135, formerly the flight to pick up the patient and the return to base unloaded of patient was operated under part 91. Also, all time with the flight crew on board count against the pilot’s flight time limitations


Quick synopsis of part 91 v 135
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.)
• Federal Preemption
• CAMTS: voluntary industry standards for AMS

Fed Preemption: states have no jurisdiction over the AVIATION aspects, including safety, of HEMS, this is FEDERAL

Air Medical Services: Operations

• Basing: Home v Remote
• Staffing: Most have 2 providers (RN-RN, RN-EMTP)
  – Specialty transport (perfusionist, RT, Neonatal RN)
• Physiologic Issues
  – Air Emboli/Decompression Illness: flown at LOWEST altitude possible (1000-2000 feet)
  – Motion sickness: weather, aircraft movement
    • Pretreat patient with antiemetic
Air Medical Services: Operations

- Aircraft Issues
  - HEMS v Fixed Wing
    - HEMS = short, time dependent missions, weather dependent
    - Fixed = longer to mobilize, airport dependent, less weather issues, greater distances, need ground transport on either end
  - Space: airway mngmt 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

Air Medical Services: Operational Challenges

- Visibility: 1 mile visibility, 500 foot ceiling
  - IFR is possible, but generally requires landing at a 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

Air Medical Services: 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
International EMS Systems

- EMS is well developed in some parts of the world, and in its infancy in others
- Some systems use physicians on the response team and in dispatch
  - Germany, France, UK, Austria, Denmark
- Most of the more matured systems have tiered levels of response
- Many systems allow for treat and release or no-transport

Take-Home Points

- Please answer these questions on this slide:
  - How does your presentation help the audience pass the Subspecialty Exam?
    - Medical Oversight of EMS (30% of exam)
  - What are the specific take home points for this lecture?
    - 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