Prehospital Critical Care

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Why Prehospital?

- History
- Current State of Prehospital Critical Care
- Future Direction

Development of ALS

- Before 1970's low survival rate for out of hospital cardiac arrest
  - Development of mobile coronary care
  - Belfast NI, Columbus OH and others
  - Validation of paramedic skills
  - Many legal/political hurdles

Development of ALS

- 1966 Dr Frank Pantridge developed 1st MCCU
  - Lancet 1967 10 cardiac arrests
    - All V-Fib 6 in transit, 4 prior
    - All resuscitated, 5 survivied
- 1967 William Grace began program in NYC

Development of ALS

- Late 60's evolution to paramedics in US
- Eugene Nagel in Miami
  - Developed concept of medical control
  - Trained fire fighters to in ALS
  - Gradually went to standard protocols
  - 1 st defib save in June 69

Development of ALS

- Leonard Cobb in Seattle March 1970
  - Tiered response fire unit/MUCC
  - Gathered data from the beginning
  - CPR in less than 3 minutes
  - Started bystander CPR training (1st save 3/73)

Development of ALS

- Richard Lewis in Columbus, OH
  - October 1969 ALS unit with MD
  - July 1971 paramedic only units
- Michael Criley LA county 1969
  - Basis of "Emergency" TV show

Cardiac Care - Chain of Survival

- Access Link - 911
- Early CPR Link - bystander CPR
- Early Defibrillation Link - First responders
- ACLS Link - Paramedic and hospital care - Designated Destinations

Critical Care Development

- 1970: SCCM founded by Dr. Peter Safar (anesthesia)
- Saw the field of critical care as a seamless continuum from prehospital to ER to ICU
  - Liaison with EM should be an initial step
- 1972: ACEP and SCCM formed Federation for Emergency and Critical Care Medicine (FECCM)
  - Later dissolved as both specialties underwent separate paths for specialty certification

Late 1980s and Early 1990s

- Nursing experienced shortage
  - Number of ICU units, beds dropped
  - ICU units could not allow RNs on transfers
  - Nurses developed flight nursing curriculum
    - Included specialty certification
    - Later broadened to include surface transport

Late 1980s and Early 1990s

- Helicopters could transport critical patients without impeding care
  - Helicopter could not be used in all cases
    - Craft sometimes grounded due to weather
    - Some patients failed to meet flight criteria
    - Ground critical care transports systems were developed
      - Staffed by RNs
  - As demand for ground transport increased, need for alternative crew configuration developed
    - Role of critical care paramedic created

Late 1980s and Early 1990s

- Increased demand for critical care paramedics forced the development and standardization of a curriculum
  - Educators at the University of Maryland, Baltimore County, and in Iowa and Texas established the initial critical care paramedic curriculum
    - No single accrediting body set to oversee process
    - Many different courses of differing complexity now exist

EMS Today

- Ground and air
- Primary(911) and Intra facility
- Technology
- Treatment protocols
- Destination

EMS monitoring

- Cardiac Monitoring
- Pulse Ox
- NIBP
- Continuous ET CO_2
- Simple point of care testing
- 12 Lead

Role of the Critical Care Paramedic

- Team configuration
  - Two variations
  - RN/paramedic
  - Paramedic/paramedic
  - Often driven by patient care or system needs
  - Some specialize in the transport of patients classified as
    - Pediatric
    - Neonatal

Role of the Critical Care Paramedic

- Skills
  - 3 to 5 years of experience usually required
  - Mastery of "normal" paramedic ALS skills
  - Acquisition of skills and procedures not common in paramedic care

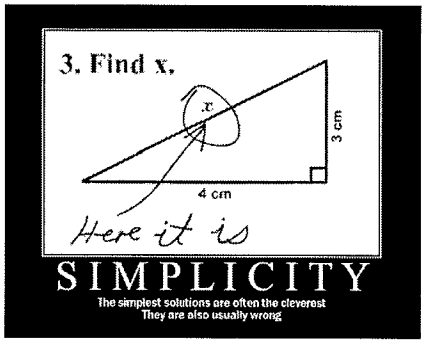
Role of the Critical Care Paramedic

- Certification
  - Currently in state of flux
  - Certified Flight Paramedic (FP-C) certification
    - Offered by Board of Critical Care Transport Paramedic Certification (BCCTPC)
    - Affiliate of the International Flight Paramedics Association (IFPA)
  - Certified Critical Care Paramedic
    - Certification not certified or standardized

Role of the Critical Care Paramedic

- Critical care paramedics are directed by licensed physicians
  - Care guided by protocols, standing orders
- Hospital based ground/air
- Comprehensive formulary
  - Allows for greater continuation of care
  - Increased responsibility

Transfer of ICU Patients



EMTALA

If an emergency medical condition exists, the hospital must:

- Provide treatment until the patient is stabilized.
- Then transfer the patient to a medical facility that is better able to provide the necessary treatment.

Requirements of Transferring Hospital

- Provide medical treatment, if possible, to minimize the risk of transfer,
- Obtain patient's consent for transfer,
- Provide signed certificate of transfer,
- Assure that the transfer takes place with qualified personnel and equipment,
- Send copies of medical records related to the emergency condition.

Ethics Resource Center
American Medical Association

Obligations of Receiving Hospital

- Have available space and qualified personnel for treating the patient,
- Agree to accept transfer of the patient and to provide appropriate medical treatment.
- Regional referral centers and hospitals with specialized capabilities cannot refuse to accept an appropriate transfer if they have the capacity.

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Transfer of Non-stabilized Patients

Non-stabilized patients may be transferred ONLY IF:

- The patient (or someone acting on the patient's behalf) requests a transfer in writing after being informed of the risks involved and the hospital's duty to treat under EMTALA, or
- A physician certifies that the medical benefits expected from transfer outweigh the risks involved in the transfer.

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Liabilities Under EMTALA

There are 2 courses of action for violations of EMTALA:

- Private civil suits against the hospital (but not the physician).
- HHS penalty fines against hospital, physician, or both.

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Responsibility

- Transferring Physician
- What about "transfer teams"
- Medical Control Protocols

Ambulance Care

- Many transferred directly from peripheral hospital to ICU
- Prehospital transport period is a field of expertise of the ED MD
- Participation of a consulting ED MD could be valuable in ensuring adequate preparation and safe transport during this dangerous period

HEMS

Ground Vs Air

- Distance to the closest appropriate facility is too great for safe and timely transport by ground ambulance
- The potential for transport delay (e.g., traffic and distance)
- More expert personnel

Ground Vs Air

- Beyond 100 miles, a ground may become inefficient, costly to operate, and time consuming
- Helicopter is used for up to 150 mile radius
- Fixed wing greater than 150

Performance Comparison Ground vs. Air

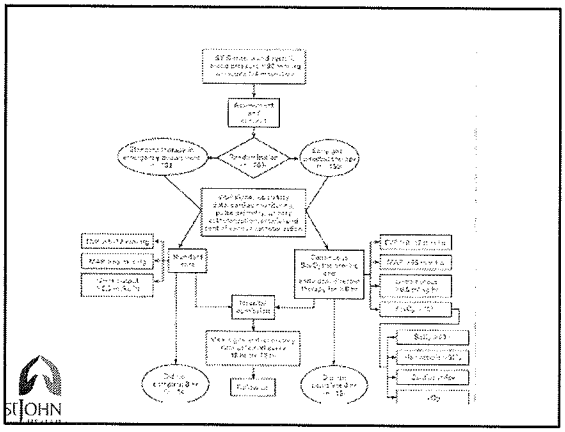
- **Ground Ambulance**
  - 70 MPH
  - 100 minutes
  - 2 hours for specialty care
  - = 3.7 hours trip time
- **Helicopter**
  - 155 MPH
  - 23 minutes
  - 30 Minutes for specialty care
  - = 53 min trip time

Which way to the future

The Future

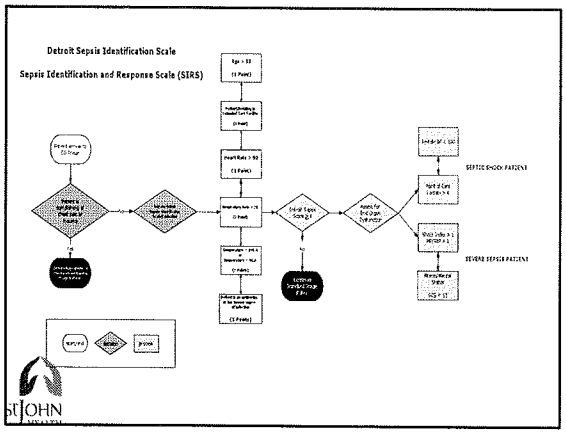
- Destination Protocols
- Remote Presence
- Critical Care Protocols
- Dispatch of critical care resources

- SAEM 1999: ED should be given designation similar to trauma centers depending on levels of critical care treatment that can be provided



Destination Protocols

- Trauma, MI, Stroke, Hypothermia, Burn, Peds....
- Why not Critical care, based on early recognition?
- Should temperature be routine prehospital?
- Shock Index?



Detroit Sepsis Identification Scale

- Age > 55 = 1 point
- ECF = 1 point
- HR>90 = 1 point
- RR > 20 = 1 point
- T>100.4 or < 96.6 = 2 points
- On Abx or known infection = 2 points
- 4 or greater to Critical Care Hospital

Satheesh Gunaga MD

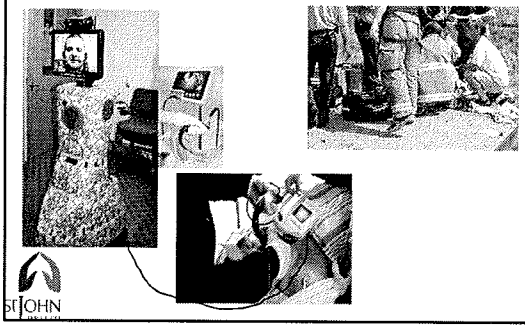
Lactate

QuickTime™ and a decompressor are needed to see this picture

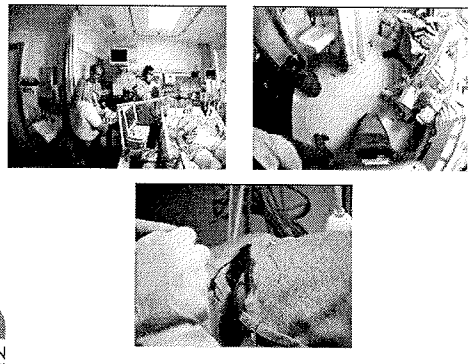
- Point of Care
- Quick, accurate
- 4 or greater to COE

Comparison of Lactate Values Between Point-of-Care and Central Laboratory Analyzers Brad S. Karon, MD, PhD; Renee Scott, Mary F. Burritt, PhD, Paula J. Santrach, MD

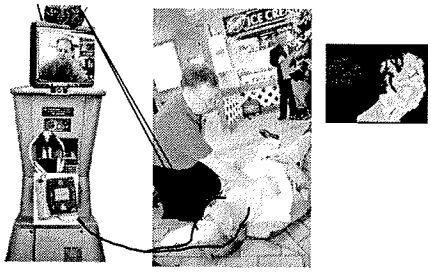
Advanced Care in the Field



Being there to assist ICP monitor insertion



Rapid Response in the Field Thermal Imaging



This is not just science fiction

- Telepresence Integration into Neurologic monitoring - UCLA
- Military Use of RP7
  - BAMC, Landstuhl, Water Reed
- Pre-hospital smart phone technology
- Mobile Head-only unit of RP7

Summary

- Resus/Critical Care drives EMS development
- Many opportunities for the future
- Needs to be EM driven

QUESTIONS

BALTIMORE CITY HOSPITAL
DEPARTMENT OF ANESTHESIOLOGY
RESUSCITATION EXPERIMENT, JULY 13, 1953
VOLUNTEER: FELIX STEICHEN, M.D.
RESIDENT IN SURGERY