



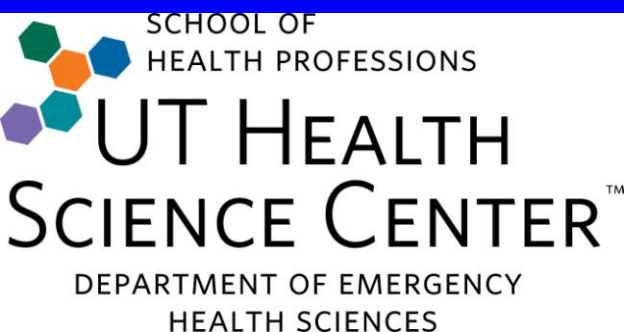
# Pre Hospital Ultrasound: Direction for the future?

Craig Manifold, DO

Medical Director

San Antonio Fire Department

San Antonio AirLIFE

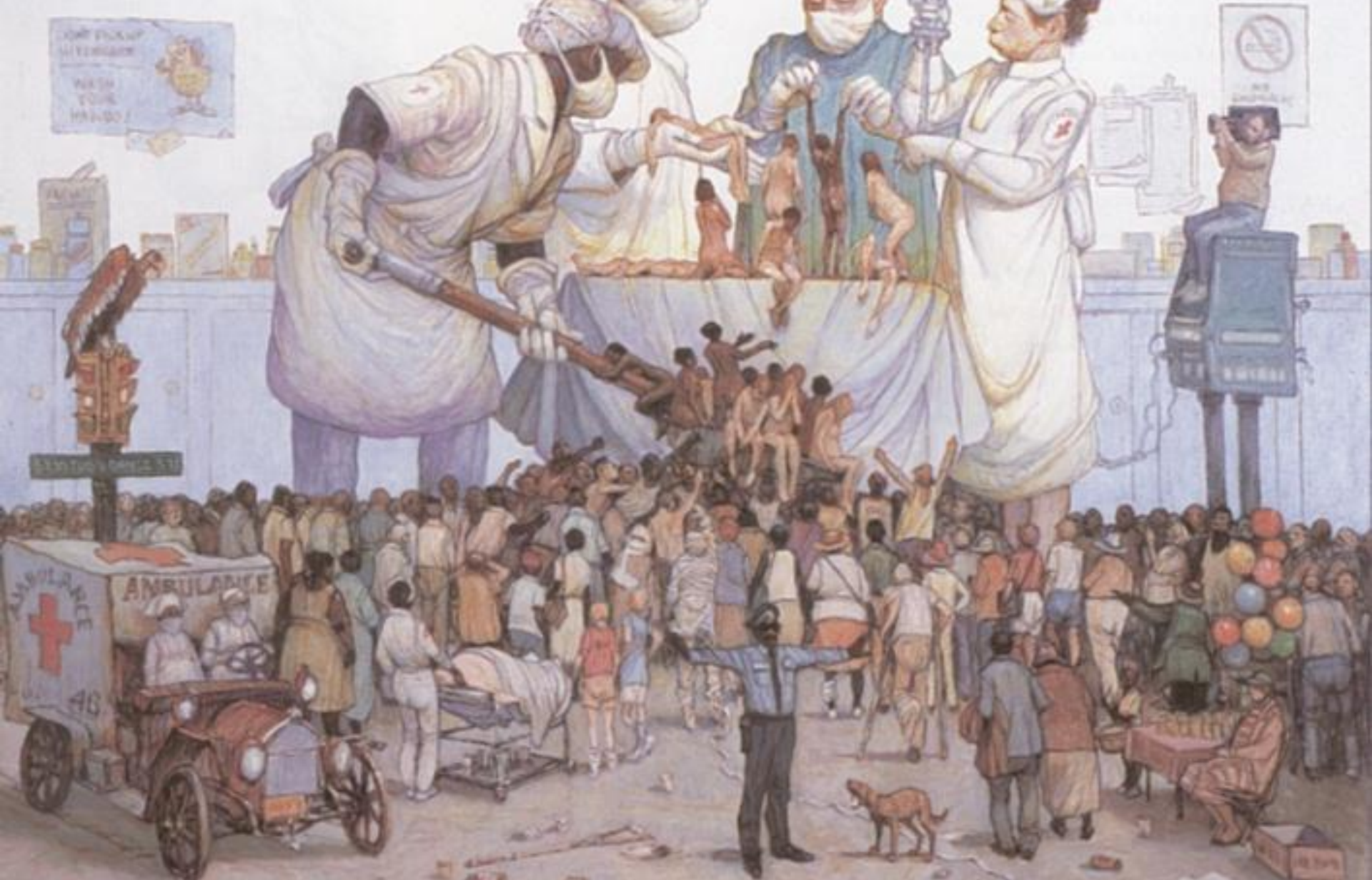








# EMERGENCY ROOM



# Historical Perspective

“Like most new technology, there is a risk unskilled practitioners will make mistakes based on their erroneous interpretations. This technology must therefore be restricted....”

Attributed to a physician in an 1800 editorial regarding the:

# Stethoscope

# Not just for radiologist any longer

- Obstetrician/ Gynecology
- Cardiologist
- Urologist
- Surgeons
- Emergency Physicians
- Family Medicine
- Non-physician
  - (Paramedics, Nurses)







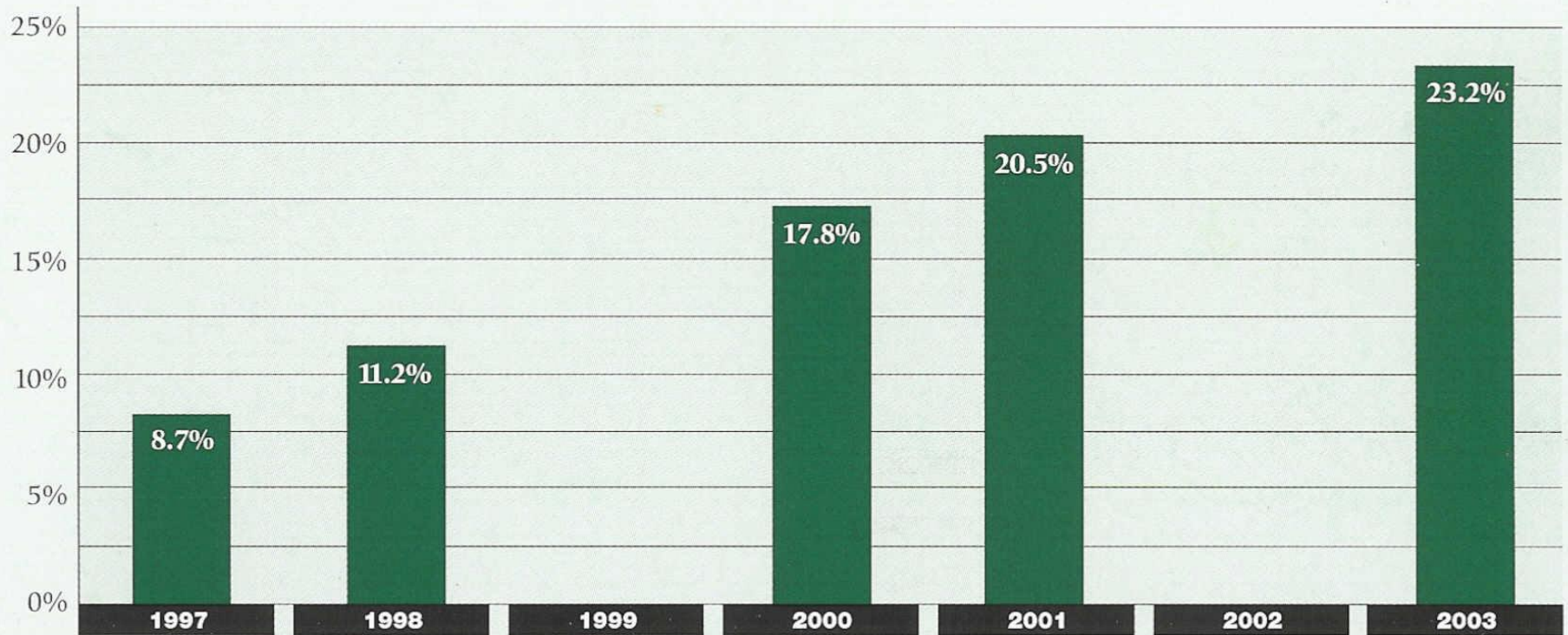
# Capabilities and Benefits

- How my practice benefits from ultrasound
  - Lifesaving diagnostic tool
  - Timesaving diagnostic tool
  - Teaching tool





# ABEM Longitudinal Study of Emergency Physicians Percent of Emergency Physicians Indicating They Perform Bedside Ultrasound



# What are the right questions?

- Can prehospital personnel reliably perform the exam?
- What are the exams we should be doing in the field?
- What are the training requirements?
- Does the use of prehospital ultrasound improve efficiency for EMS systems?
- Does it improve patient care and outcomes?
- Can we justify the cost?


# Ideal Machine



- Image Quality
- Durable
- Multiple Transducers
- Reliable
- Exposure Proof
- Weight
- Quick power up
- Simple Interface
- Battery Power
- Ambient Lighting
- Cost ?
- Diagnostic Algorithm ?
- Image transmission ?

**MONEY!**





SonoSite

The World Leader in  
Hand-Carried Ultrasound

**Hand-Carried Ultrasound**  
*designed for veterinary life*



# Environment

- Urban
- Suburban
- Rural
- Disaster response





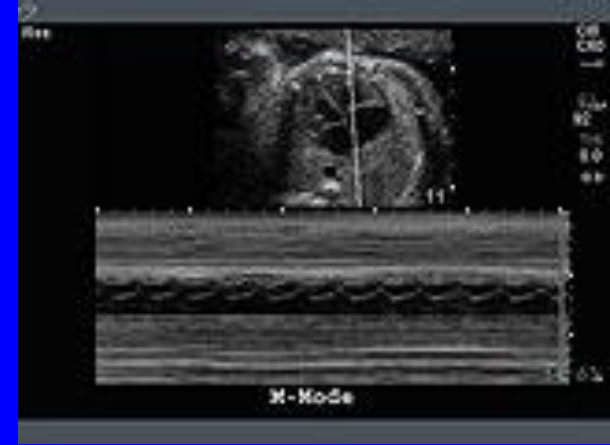


- Air
- Ground
- Critical Care Transfer
- Military



# Exams

- Unexplained Hypotension
- FAST or eFAST
- AAA
- Procedural
  - Line placement
  - Tube placement
- Obstetrics
- Confirmation of Death



# Review Article

- Use of ultrasound by emergency medical services: a review
  - Bret P Nelson and Kevin Chason
  - International Journal of Emergency Medicine
  - (2008) 1:253-259
  - Published on line 11 Nov 2008



# Disaster Response

- Earthquake Armenia 1988
  - 400 patients received ultrasound exam
    - 96 patients with “clinically significant pathologic condition”
    - 16 patients to OR based on ultrasound findings
    - 4 false negative exams
      - Kidney rupture, splenic hematoma, retroperitoneal hematoma, hemothorax

# Disaster Response

- Earthquake 1999 Turkey
  - “ultrasound impacted care of patients with regards to fluid resuscitation and other management options”
- Mudslide Guatemala
  - 99 patients with ultrasound exam
  - In 12% ultrasound confirmed the “presence of an emergent disorder”
  - 42% of patients, ultrasound was able to rule out disease

# Disaster Response

- “Second” Lebanon War
  - 102 patients with suspected abdominal injury
  - “useful screening tool in determining which patients should be dispositioned to laparotomy, CT scan, or clinical observation
- How many ultrasound units and “ultrasonographers” would you need for disaster response?

# Prehospital Personnel

- Studies reported
  - Physician
  - Physician extenders
  - Nurses
  - Paramedics
  - EMT ?





# US Paramedic Study

- The Prehospital Ultrasound Study: Results of the First Six Months
  - Heegaard, Ho, Hildebrant, Hennepin County Medical Center
  - Abstract presented at National Association of EMS Physicians Mtg Jan 09
  - 64 patients, Urban and Suburban setting, Paramedics performing exam
  - FAST Exam- 100% sensitivity and 100% specificity using physician over read
  - Six hour training program, written exam, objective structured clinical exam

# The Ability of EMS Personnel to Confirm Endotracheal Tube Placement Using Ultrasound

- Miller, McArthur, Bauer D.R. Darnell Army Medical Center
- Abstract presented at National Association of EMS Physicians Mtg Jan 09
- Sensitivity 89% and Specificity 72% Accuracy 83%
- 5 minute lecture, real time demonstration of endotracheal tube placement and esophageal tube placement and allowed scan for 1 minute

# Prehospital ultrasound imaging improves management of abdominal trauma

- British Journal of Surgery Vol 93 Issue 2, Pages 238-242 2 Dec 2005
- Walcher et al
- German Air Rescue (Physician and Paramedic)
- 202 patients comparing prehospital FAST and physical exam
- Prehospital Fast Sensitivity 93% Specificity 99% Accuracy 99%
- Physical Exam Sensitivity 93% Specificity 52% Accuracy 57%
  
- Prehospital FAST occurred 35 minutes earlier than ED ultrasound eval
- Prehospital FAST led to change in therapy or management in 30% of patients

# Portable ultrasound in pre-hospital emergencies: a feasibility study

- Busch, M Norwegian Air Ambulance
- Acta Anaesthesiologica Scandinavica Vol 50 Issue 6 Pages 754-758 26 Jun 2006
- Physician performed exam, 38 patients enrolled
- Median examination time 2.5 minutes
- “Diagnostic usefulness was high in undetermined cardiac arrest and hypotension and massive hematoperitoneum”





# Outcome in Cardiac Arrest Patients Found to Have Cardiac Standstill on the Bedside Emergency Department Echocardiogram

- Blaivas and Fox, Academic Emergency Medicine, Vol 8 Issue 6, Pages 616-621 28 Jun 2008
- 169 patients with cardiac standstill on initial echocardiogram, 71 of these had an identifiable rhythm on monitor. No patient with cardiac standstill survived to leave the ED regardless of initial electrical rhythm.
- Positive Predictive Value 100% for death in ED

# Venous Access

- Central line placement
  - 1.5 minutes vs 7 minutes

Acad Emerg Med 2002 Aug;9(8):800-5

- Central venous line insertion

–Increased success with first attempt  
and less inadvertent arterial sticks

J Crit Care 2002 Jun;17(2):126-37



**OUR FAMILY  
PROTECTING  
YOUR FAMILY**



