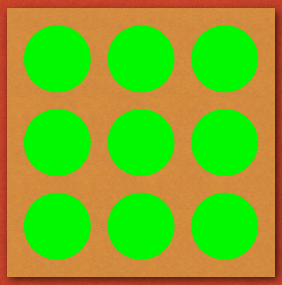
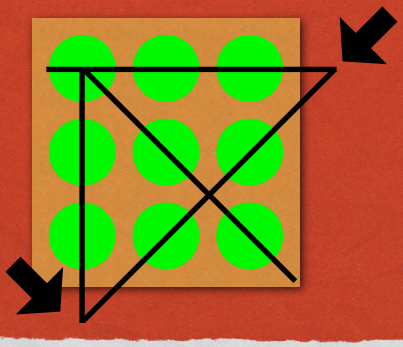
EARLY IMPACT ALS

Jamie Syrett, MD
Director of Prehospital Care
Rochester General Health System

PUZZLE



PUZZLE



THINKING OUTSIDE THE BOX!

EARLY IMPACT?

- What things do we do that make a difference?

IV ACCESS?

IV ACCESS?

- Probably not needed in all circumstances
  - San Francisco 2009 - 34,585 patients
    - IV placed in 60% - but used in only 17% of patients

PARADIGM SHIFT

- Evidence is coming thick and fast that there are few ALS interventions that are not now at the BLS level that make a clinical difference

TOPICS TO DISCUSS

- Sepsis
- Trauma management with IV fluids
- Myocardial Infarction
- ACLS medications and management

SEPSIS - NEW PROGRAM

- Severe sepsis is common and accounts for 27% of ICU admissions in the UK
- Accounts for 44% of ICU days
- Mortalilty is 44%
- Treatment costs in the US is $16B

SEPSIS

- Increasing incidence - 1.5%/year
- Leading cause of non-coronary ICU death
- 87% of cases can be attributed to another pathology

SEPSIS

- 1,400 deaths worldwide every day
- 50% underestimation due to misdiagnosis
- 1 month mortality is 28-50%

SEPSIS

- Complex response that is hard to define, diagnose and treat
- Body response to infection

DEVELOPING CONCEPTS 1990

- Infection
- SIRS - Systemic Inflammatory Response to Stress
- MODS - Multiple organ dysfunction syndrome
  - "1- 5% ; 2 - 15% ; 3 - 40% ; 4 - 98%"

MANNY RIVERS

- 2001 - Developed "Early Goal Directed Sepsis"
- 263 patients with severe sepsis
- 2 groups
- Aggressive managment - 30% mortality
- Traditional Management - 46% mortality

WHAT WAS THE EPIPHANY?

WHAT WOULD EMS DO?

WHAT DID HE DO?

- Managed oxygenation and preload
  - Aggressive fluid resuscitation
  - Early intubation
  - Early use of pressors
- Early antibiotics

SEPSIS ALERT

- Some regions have now introduced the concept of a "Sepsis Alert"
- Important that EMS recognizes sepsis
- Important that EMS aggressively manages in the field

SEPSIS

- Surviving sepsis is centered around recognition and proactive management
- BLS need to call ALS or inform the hospital PTA

VITALS

- If they have 2 of the following
  - HR>90
  - Temp >38.3C (100.9F) or <36C (96.8F)
  - RR>20
  - Altered mental status
  - Glucose > 120 (if non-diabetic)

SSI - SIGNS AND SYMPTOMS OF INFECTION

HISTORY

- Is the history suggestive of new infection?
  - Pneumonia
  - UTI
  - Abdominal pain / diarrhea
  - Meningitis
  - Cellulitis / septic arthritis / wound infection
  - Indwelling line

SEPSIS

THEN

- Are any of the following present or new to the patient?
  - SBP<90 or MAP<65
  - Sats<90%
  - No urine in >8 hours
  - Prolonged bleeding

IF YES - THEN GOAL DIRECTED SEPSIS

SEPSIS ALERT

SEPSIS

- ALS management
  - Oxygen - High Flow (NRB)
  - Start IV fluids and open up
  - IV D50 to bring BG to 100-150
  - Early pressors
  - Early intubation
  - Inform ED of arrival

IN THE RGHS EMERGENCY DEPARTMENTS

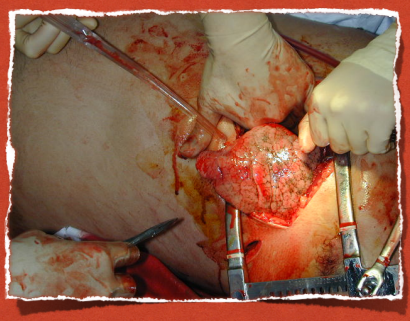
- Continue fluid resuscitation
- Intubate and place central line/arterial lines
- Antibiotics
- Admit to the ICU or transfer as needed

ONE COOL THING

- We will look at the avDO2
  - Take arterial oxygen level
  - Take mixed venous oxygen level
  - Calculate oxygen extraction to determine tissue hypoxia level
  - Intubate based on this level (!)

CHAMPIONS?

- Need champions at the agency level
- Build a community EMS response mentality
- Agency level involvement - If we want to do it we do it at the ground level



VOLUME RESUSCITATION IN TRAUMA

VOLUME RESUSCITATION

- The value of fluid resuscitation is not being questioned - only the volume used
- 2005 AHA stated "aggressive fluid resuscitation is no longer indicated in trauma and resuscitation should focus on maintaining a SBP at 90mmHG"

TRADITIONAL VIEW

- "2 Lines and 2 Lts"
- Theory was dilute down the blood but restore the preload to allow the heart to pump - more is better

1994 - BICKELL

- Houston 1994
  - Every other day randomization
  - Penetrating trauma to torso + hypotension
    - Group 1 - 2 lines and IV fluid bolus
    - Group 2 - 2 lines and low volume fluids

1994 - BICKELL

- In the low volume resuscitation group
  - 8% lower mortality (p=0.04)
  - 7% lower complication rate (p=0.08)
  - Average volume infused was EMS (92 vs 870cc) and ER (283 vs 1608cc)

WHY?

- POP OFF pressure
- Dilution of blood - thinner - easier to bleed through and around the clot
- Dilution of clotting factors
- "Secondary bleeding"

DISCUSSION

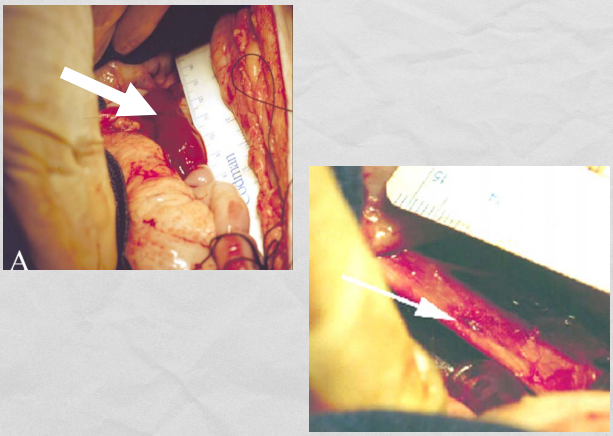
- Below 40mmHg - fluid is needed to prevent cardiac arrest
- Prognosis would be poor anyway
- Similar management seen in leaking AAA - Keep the pressure low until it needs to be high!

DISCUSSION

- The conclusions you should draw
  - Don't fluid resuscitate until the hemmorhage is controlled
  - Protocol driven resuscitation does not work - need to use clinical evaluation and skill
  - Low BP is not bad and may be good - "Permissive hypotension"

POP OFF PRESSURE

- US Army study in pigs
  - 2mm hole in the aorta, infusion rates of 100-300cc/min after 5, 10 or 15 minute delay
  - Pop off pressure was 94/45 regardless of method used (MAP 64)



PIG STORY CONTINUED

- Continued resuscitation led to 4 times more bleeding but no survival benefit from stopping fluids
- Best survival was in the do nothing group - suggesting any amount of rebleeding is bad

THE BLOODY CYCLE OF TRAUMA

- Coagulopathy
- Acidosis
- Hypothermia

US ARMY WISH LIST

- IV solution that enhances coagulation
- Followed by fluid resuscitation

EVEN MORE PIGS

- Used recombinant factor VII and gave IV
- Gave factor VII, waited 10 mins then fluid resuscitated
- Result was POP OFF went to 85 mmHg !
- No decrease in volume of initial bleeding

SHEAR FORCE CONCEPT

- Platelets can't stick to the wall of the hole with high flow due to shear force
- YOU ACTUALLY NEED HYPOTENSION TO STOP BLEEDING!

NORTH AND SOUTH IRAQ

- Different challenges - Different fluids
- Better in the North than South
- Presumed to be sodium related but actually was volume related

CONCLUSIONS

- US Army resuscitation is now based at up to 24 hours at SBP of 80 mmHg

NOW (2010)

- There is a move towards fluid resuscitation using plasma, blood (PRBC) and platelets in a 1:1:1 ratio

AIMS

- The ultimate aim in resuscitation is to provide enought oxygen to the tissues to meet the metabolic needs

MYOCARDIAL INFARCTION

- Already discussed the benefits of aspirin/oxygen
- Other options
  - Morphine
  - Beta-blockers
  - Nitroglycerine
  - Benzodiazepine
  - Lytics pre-hospital

NTG AND MORPHINE

- ISIS-4 looked at NTG (58,058 STEMIs)
  - No benefit from NTG, only showed hypotension
- CRUSADE looked at morphine (57,039 non-STEMIs)
  - Increased mortality (OR 1.5)

BETA-BLOCKERS

- CCS-2 study (45,852 STEMIs)
  - Randomized to up to 15mg lopressor vs placebo
  - Decreases the risk of VF and reinfarction, increases the risk of cardiogenic shock
  - What does this mean? - Directed betablocker use

BENZODIAZEPINES

- Effective in cocaine associated AMIs
- Due to hyperactivity of the sympathetic system with spasm of the coronary arteries
- Benefit confined to cocaine associated chest pain

PRE-HOSPITAL LYTICS

- Done around the world but not in the US
  - Time is muscle
  - Different populations
  - There may be an additional benefit in giving under 2 hours from onset of pain

KEY IS RECOGNITION

AND THEN TRANSPORT TO THE APPROPRIATE FACILITY

RECOGNITION OF MI

- Recognition of MI and appropriate transport leads to an improvement in all outcomes
- Team approach where EMS is the key player
- Even patients that receive lytics also benefit from being move to the cath centers
- Time is muscle but early PCI is better

ACLS

HIGH DOSE EPI

- Remember the 5mg IV or IC days
  - European study - 3327 patients radomized
  - 40.4% (5mg) vs 26.4% (1mg) survived to hospital
  - 2.3% (5mg) vs 2.8% (1mg) got out of hospital
  - High dose epi improved ROS in asystole not VF

EPI

- Yes.....in dogs!
- After a down time, epi does improved chances for reperfusion, however this is not aggressively studied in humans due to the "standard of care" argument

ACLS

- BCLS began in 1960, ACLS in 1962
- Even today we are still trying to optimize ACLS

ACLS

- 2005 Guidelines
  - Chapter 7.2 - Management of Cardiac Arrest
    - "There is no evidence that any antiarrhythmic drug given routinely during human cardiac arrest increases survival to hospital discharge."

AMIODARONE

- Wonderone is now in the dog-house..... and making a comeback is.....

PROCAINAMIDE

- 20mg/min up to 17mg/kg

ACLS

- The intervention that has made a difference is defibrillation

OPPORTUNITY

- The opportunity for benefit in EMS now lies in directed management and cooling

COOLING

- In Wake County, NC
  - In cardiac arrest they
    - Give cold IV fluids
    - Place ice packs in armpits and groin
    - Paralyze patients that shiver

EFFECT

- Odds ratio for complete restoration of neurological function using hypothermics in EMS is 6.21

EFFECT

- Bystander CPR - 2.65
- New CPR - 3.19
- Hypothermics - 6.21

ANOTHER WAY - NNT

- Hypothermics - 6
- ASA in MI - 25
- Cath lab in MI - 15
- Betablocker in MI - 42

COST

- Set up for Wake County EMS - $5000
- Cost per patient - $4

WHAT DOES THIS MEAN

- Paramedics now need to redefine before someone does it for you - Sharpen up or ship out!
- In 10 years time - paramedicine will look completely different
- Medics will be thinking machines and not protocol driven

WHAT DOES IT MEAN

- New programs - "Sepsis Alert", "Hypothermics"
- Concept of pre-hospital ownership and building into the hospital management plans
- Use of evidence based medicine

SUMMARY

- Recognition of Sepsis - Looking for champions
- Volume and Trauma - Pop off
- Hypothermics - Looking for champions

CONTACT INFORMATION

- jsyrett@rochester.rr.com
- Newark Wayne Community Hospital