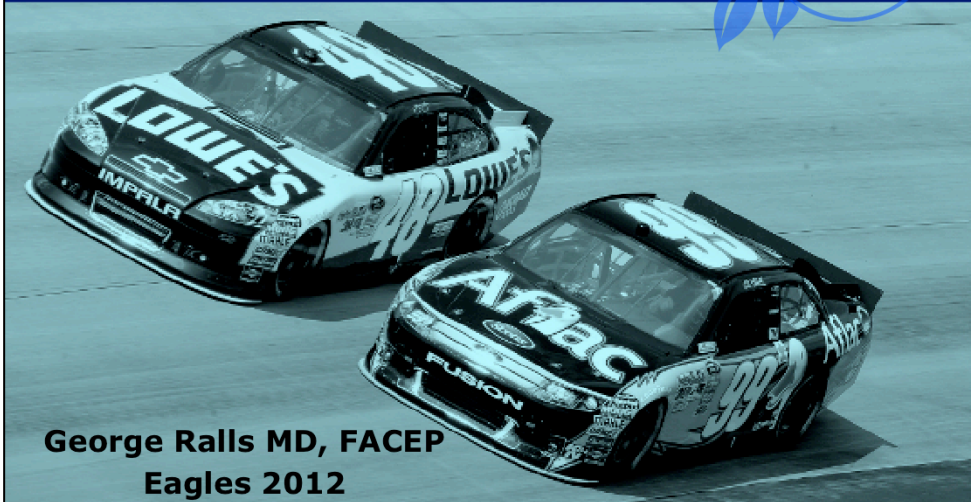


TIME IS MUSCLE!

Pit Crew Approach to Chest Pain

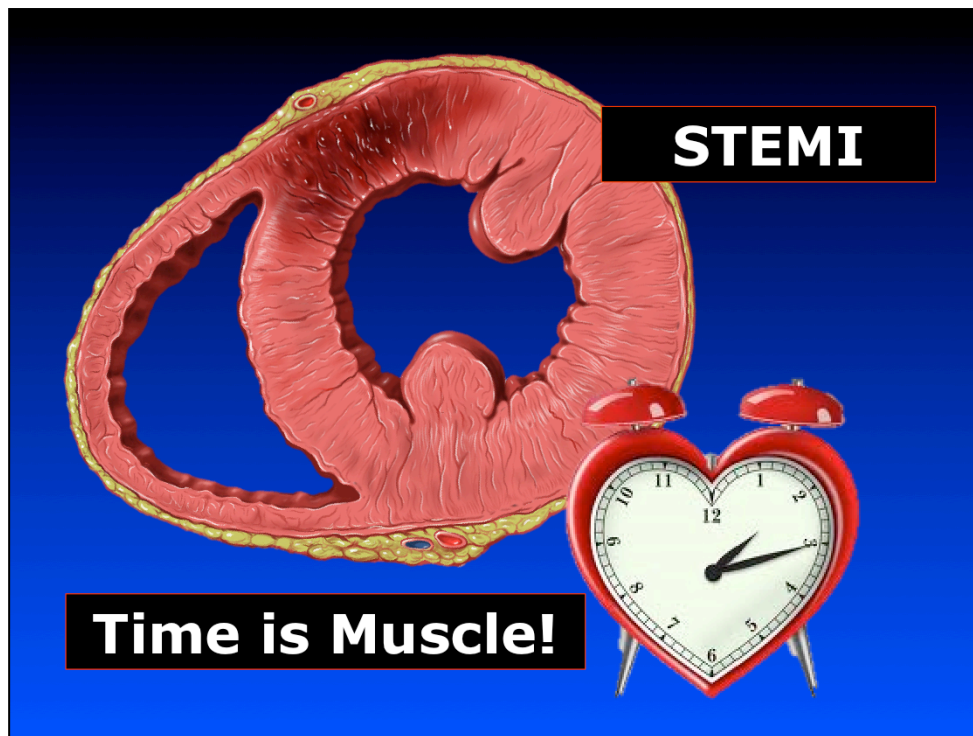


**George Ralls MD, FACEP
Eagles 2012**



No Disclosures

Eagles 2012



The complex task we're talking about is the prehospital management of chest pain, a condition we all recognize as time dependent and a common performance metric for most of our systems.

FACTS

Patients with potential ACS must be recognized quickly in order to initiate proper evaluation and triage



Lets discuss things we would all agree with:

ACS patients must be approached aggressively if we are in fact going to recognize those that have time dependant conditions such as STEMI. These patients require specific evaluation (ie ECG) and disposition to the right receiving center.

FACTS

- **Things all potential ACS patients should receive:**
 - Aspirin
 - Nitrates (if appropriate)
 - Morphine, Oxygen if needed
 - Pre-hospital 12 lead ECG
+/- transmission

STEMI

Earliest possible activation of the cardiac cath lab, based on the prehospital ECG

AHA ~ 8 studies

Early prehospital EKG demonstrated a reduction in reperfusion delay ranging from 15 to 65 minutes in patients treated with PCI 2 studies

Comparison of all cause in hospital mortality of patients with STEMI and prehospital EKG vs NO prehospital EKG

Reduction of in hospital mortality from 11-15% to 5-8% with prehospital EKG

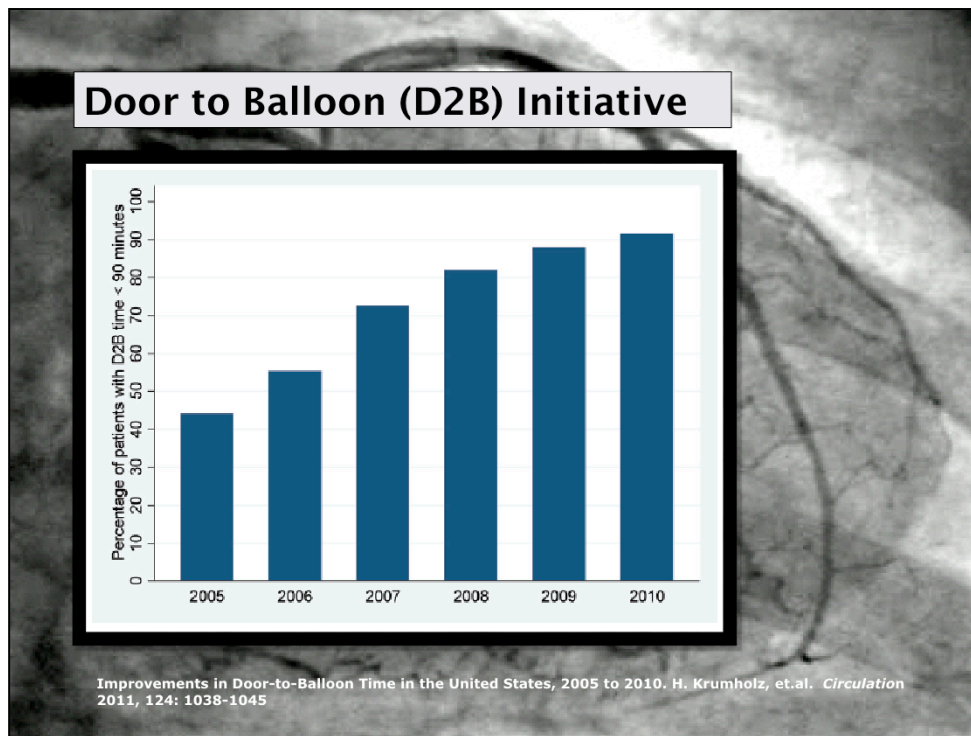
Not statistically significant but overall trend to reduction

Evidence for improved outcome in patients with recognized STEMI diverted to primary PCI centers



FACTS

- **Delays in treatment of ACS are not uncommon:**
 - **Patient Factors**
 - **Older age**
 - **Racial/Ethnic minorities**
 - **Females**
 - **Lower socioeconomic status**
 - **Solitary living arrangements**
 - **EMS may contribute to delays**



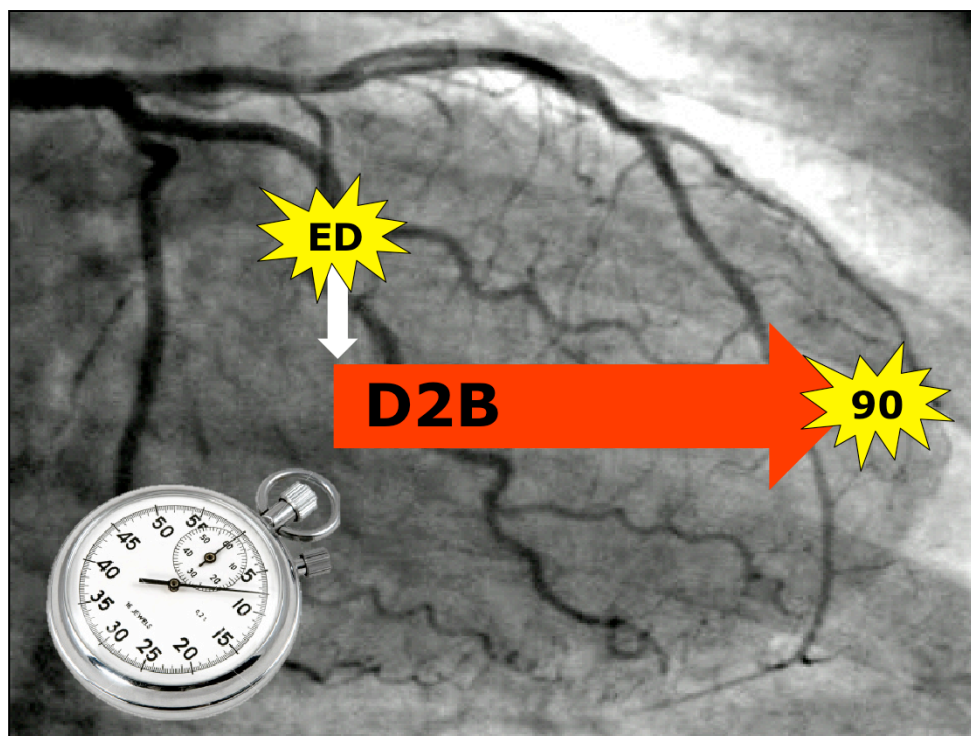
EMS-to-balloon (E2B)

In some locations, a prehospital 12 lead ECG may be transmitted to the emergency department with the use of a [Bluetooth](#) capable cardiac monitor and cell phone.

Although incorporating a prehospital 12 lead ECG into critical pathways for STEMI patients is listed as an optional strategy by the D2B Alliance, the fastest median door-to-balloon times have been achieved by hospitals with paramedics who perform 12 lead ECGs in the field.^[18] [EMS](#) can play a key role in reducing the first-medical-contact-to-balloon time, sometimes referred to as EMS-to-balloon (E2B) time,^[19] by performing a 12 lead [ECG](#) in the field and using this information to triage the patient to the most appropriate medical facility.

[\[20\]\[21\]\[22\]\[23\]](#)

Depending on how the prehospital 12 lead ECG program is structured, the 12 lead ECG can be transmitted to the receiving hospital for physician interpretation, interpreted on-site by appropriately trained paramedics, or interpreted on-site by paramedics with the help of computerized interpretive algorithms.^[24] Some EMS systems utilize a combination of all three methods.^[19] Prior notification of an in-bound STEMI patient enables time saving decisions to be made prior to the patient's arrival. This may include a "cardiac alert" or "STEMI alert" that calls in off duty personnel in areas where the [cardiac cath lab](#) is not staffed 24 hours a day.^[19] The 30-30-30 rule takes the goal of achieving a 90 minute door-to-balloon time and divides it into three equal time segments. Each STEMI care provider (EMS, the emergency department, and the cardiac cath lab) has 30 minutes to complete its assigned tasks and seamlessly "hand off" the STEMI patient to the next provider.^[19] In some locations, the emergency department may be bypassed altogether.^[25]



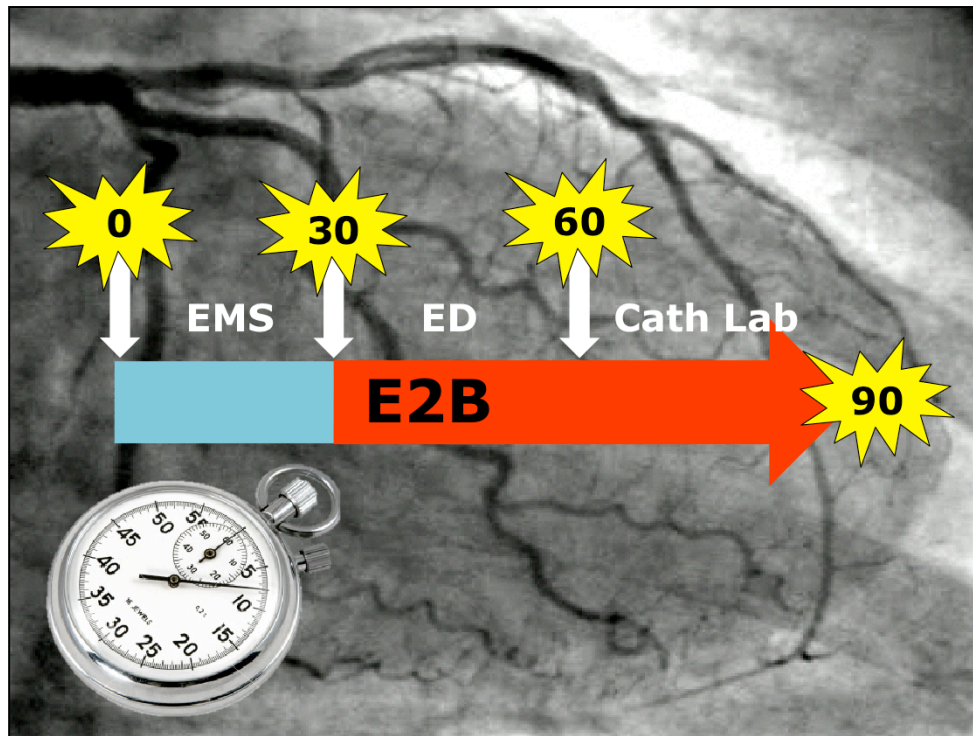
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Auto-racing "pit crews" accomplish task "precisely" and rapidly by pre-assigning roles to team members.

- **Cardiac Arrest**
- **Trauma**
- **Extrication**
- **Tactical Teams**



Image of an empty basket or plate: here is the stack of literature showing the health care consequences of being a healthcare worker

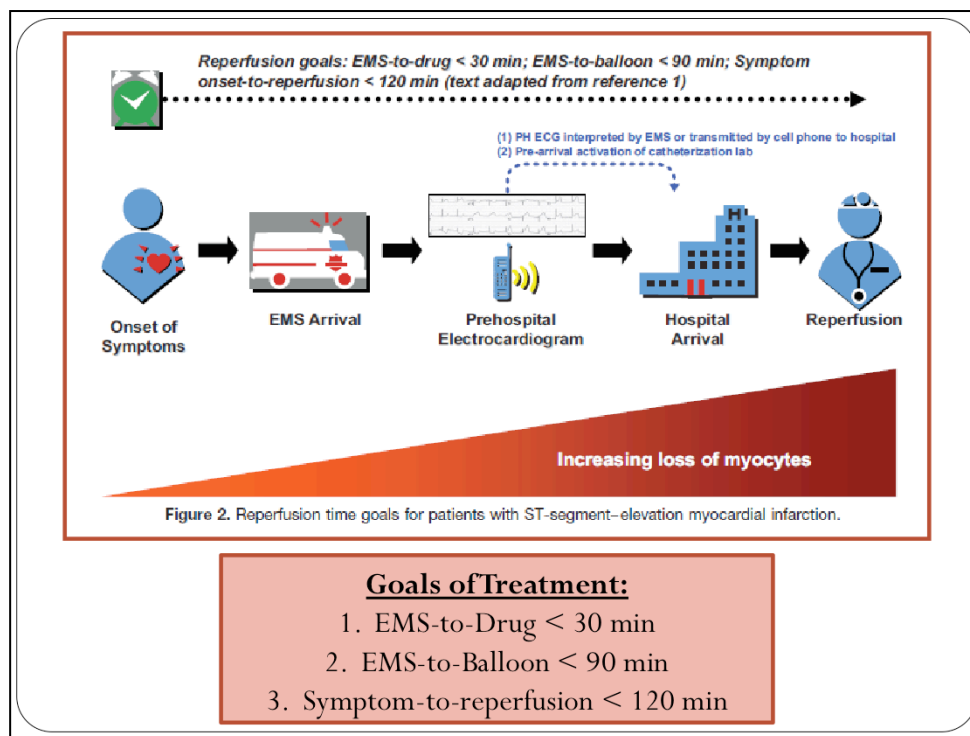
Comment on influenza, biological agents (anthrax, etc.)

Utilization of Team Assignment Training in Simulated Pre-hospital Chest Pain Patients

- **Randomized Control Trial**
- **3 person teams**
- **Simulation Center**
- **Chest Pain Scenarios**
 - **30 Control Group**
 - **24 Intervention Group**

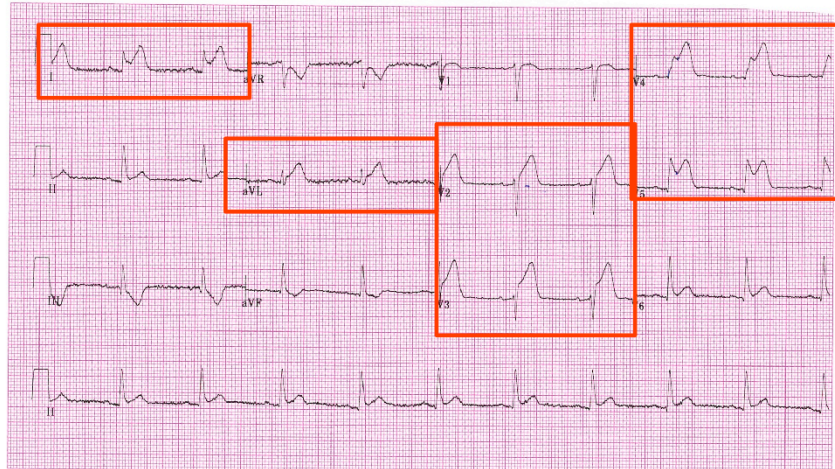


Study Design - This study is a randomized control trial comparing time to task of certain critical endpoints in the pre-hospital setting by EMS personnel using the currently accepted EMS approach featuring the Orange County EMS chest pain algorithm vs. a pre-assigned team-oriented algorithm in simulation patients with chest pain. This study will feature EMT, Paramedic, and EMT/Paramedic student volunteers.



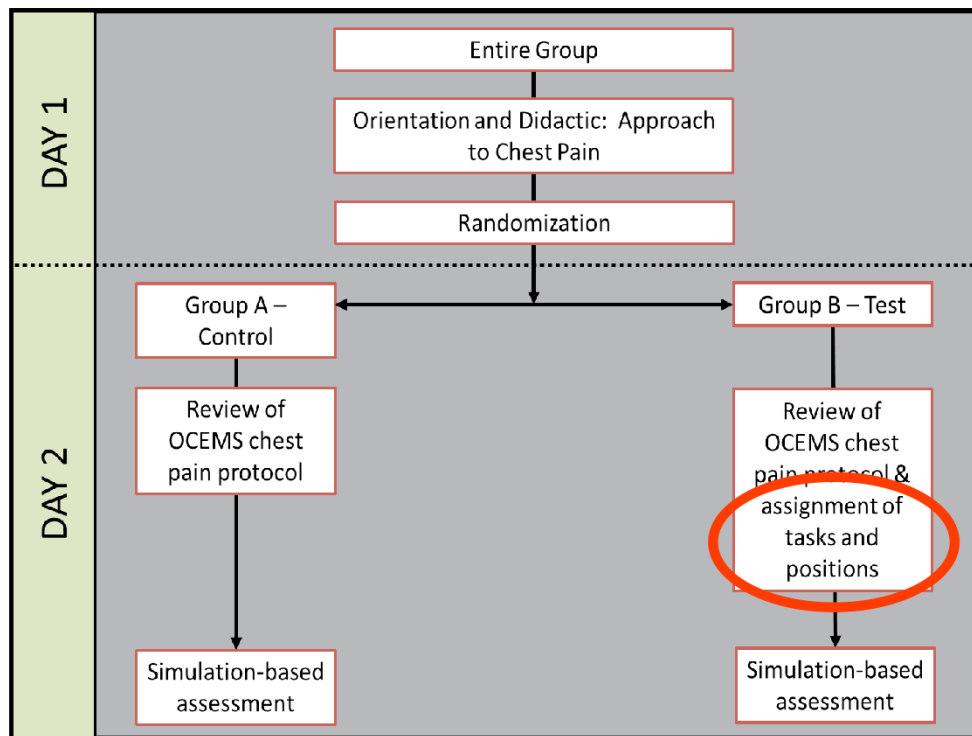
Slide represents the general concept of EMS responsibilities in patients with CP. The saying “Time is Tissue” is a core concept, therefore time-to-tasks of various events are pivotal.

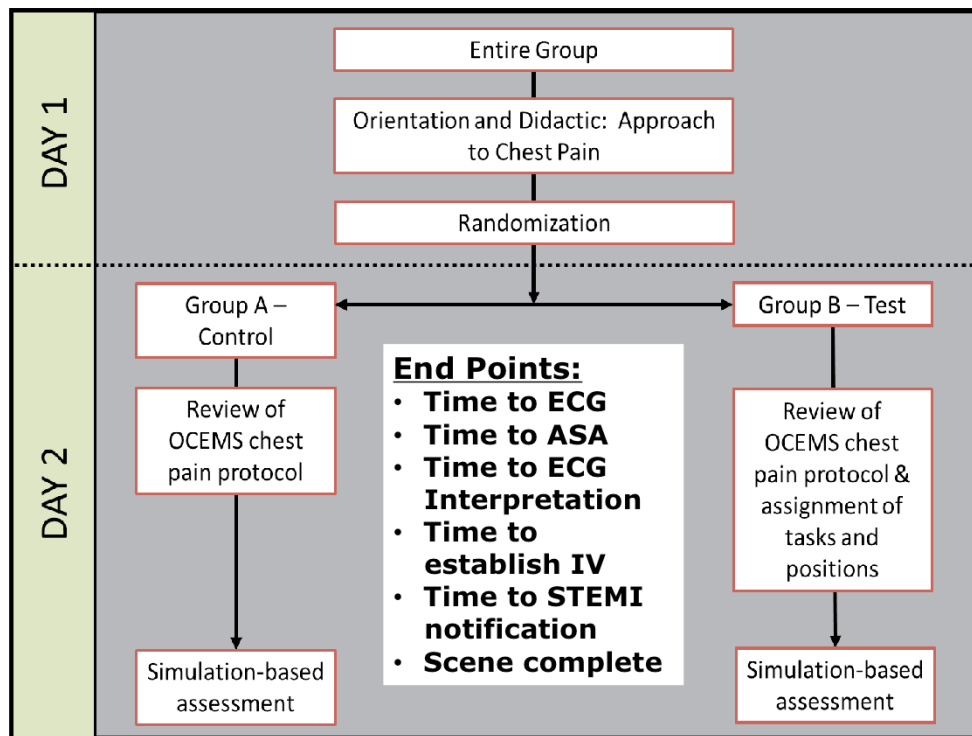
What is this?



Anterolateral AMI

AMI – Anterolateral.





1. Turn on EKG Machine
2. Approach patient's left
3. Undress patient's chest → ≤ 1 min
4. Attach lead stickers → ≤ 2 min
5. Attach leads → ≤ 3 min
6. Acquire EKG → ≤ 4 min
7. Analyze EKG
8. Call **STEMI Alert** if needed → ≤ 8 min
9. Prepare transport to nearest PCI facility or nearest receiving facility

Goals

STEMI Criteria:

- ST segment elevation ≥ 1 mm in 2 or more contiguous leads OR
- New or presumably new Left Bundle Branch Block (LBBB)

Total Scene Time
Goal ≤ 10 min

Position ONE

1. Identify patient
2. Obtain history of chest pain
3. Perform vectored physical exam
4. Ask if ASA has been taken:
 - a. Yes – go to #5
 - b. No – administer ASA if no evidence of active bleeding
5. Assess current chest pain scale
 - a. No pain – go to #6
 - b. Any pain – administer nitroglycerin **if not contraindicated**
6. Re-evaluate chest pain scale in 5 min
7. Repeat #5 - #6 as needed

Goals

≤ 3 min

≤ 4 min

≤ 5 min

Nitroglycerin Contraindications (any of the following):

- Systolic BP < 90 mm Hg
- Viagra (Sildenafil) or Levitra (Vardenafil) use within past 24 hrs
- Cialis (Tadalafil) use within past 48 hrs

Total Scene Time
Goal ≤ 10 min

Position TWO

1. Approach patient's right

2. Obtain patient's vitals

3. Establish IV access

4. Provide IV fluids if not **contraindicated**
If systolic BP < 90 mm Hg → administer 250 mL bolus of 0.9% NaCl until systolic BP > 90 mm Hg

5. Attach supplemental oxygen

6. Monitor patient's vitals

Goals

≤ 2 min

≤ 4 min

≤ 6 min

≤ 8 min

IV Fluid Contraindication:

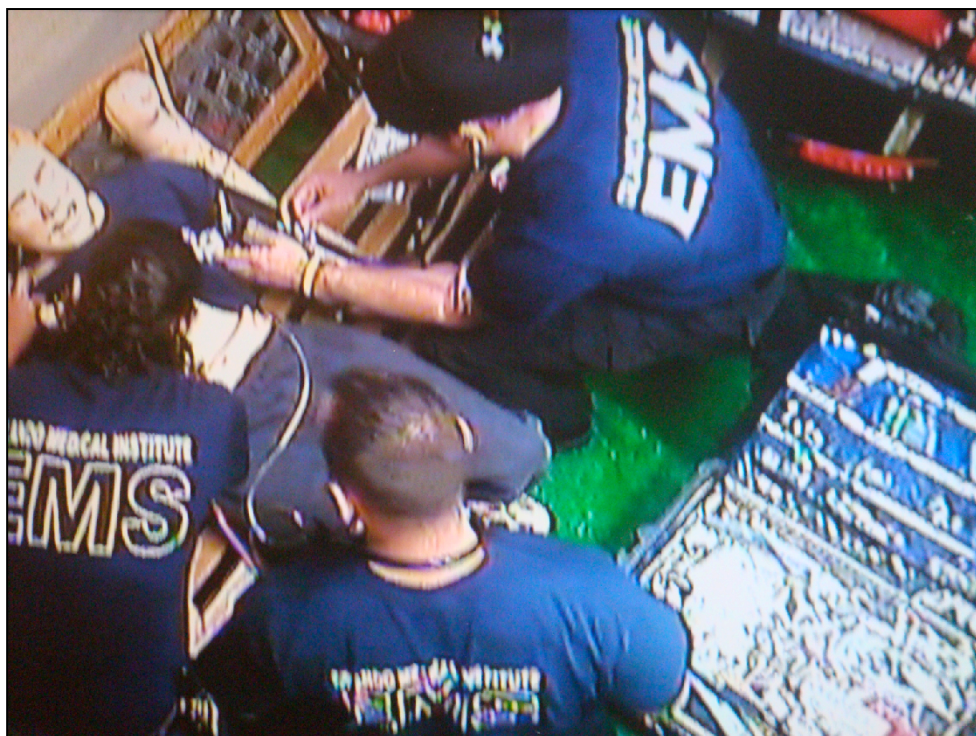
- Evidence of Congestive Heart Failure (CHF), ex: *Rales*

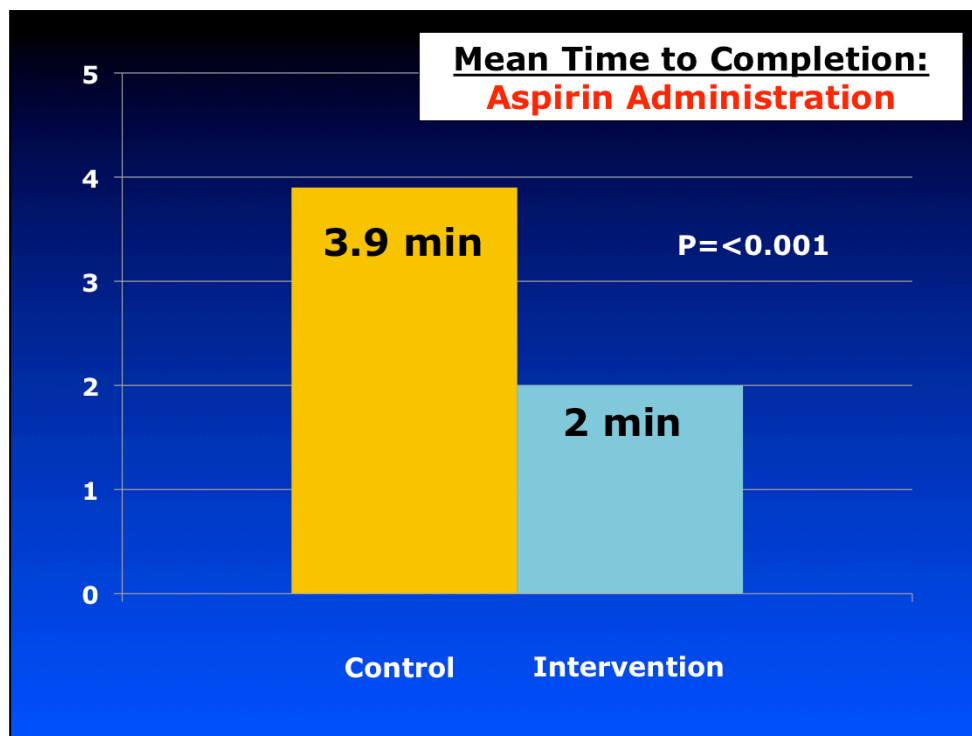
Total Scene Time

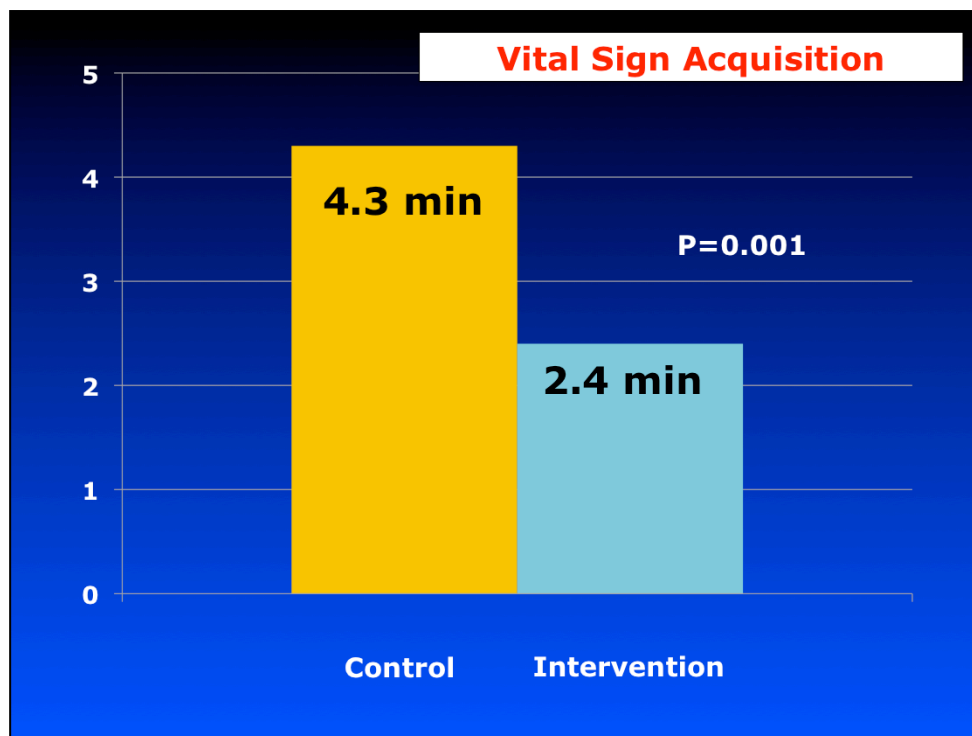
Goal ≤ 10 min

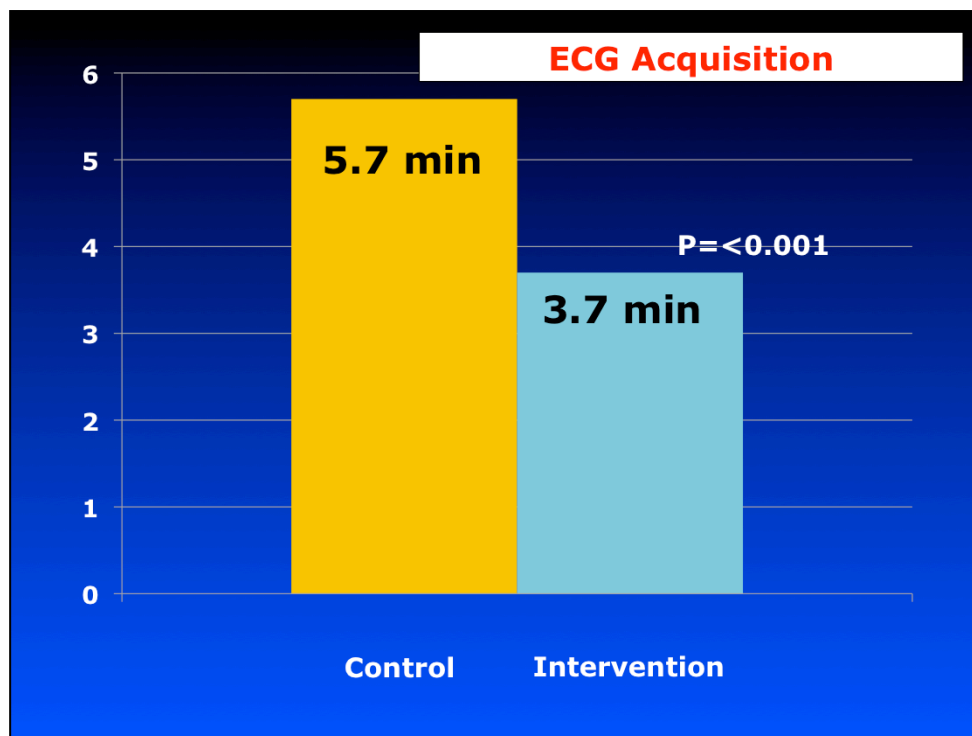
Position THREE

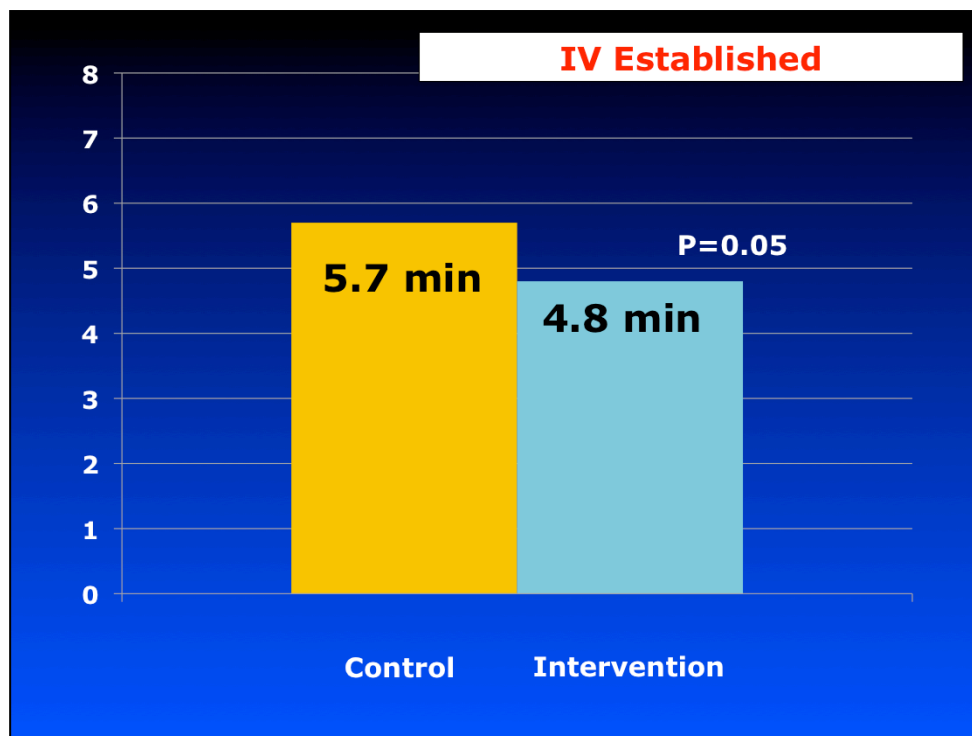


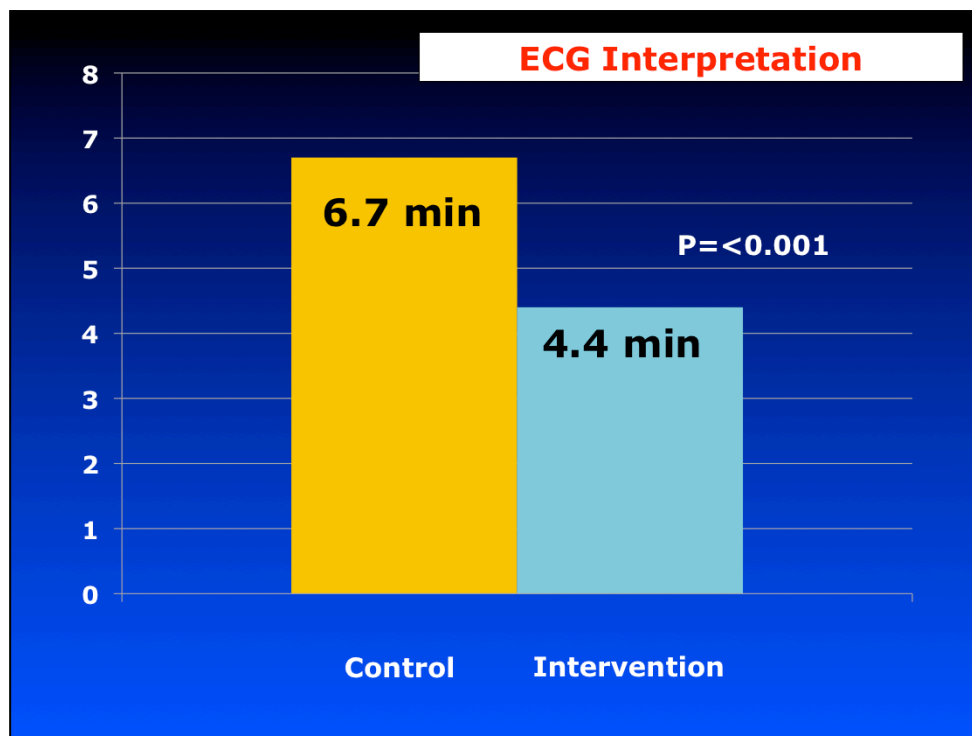


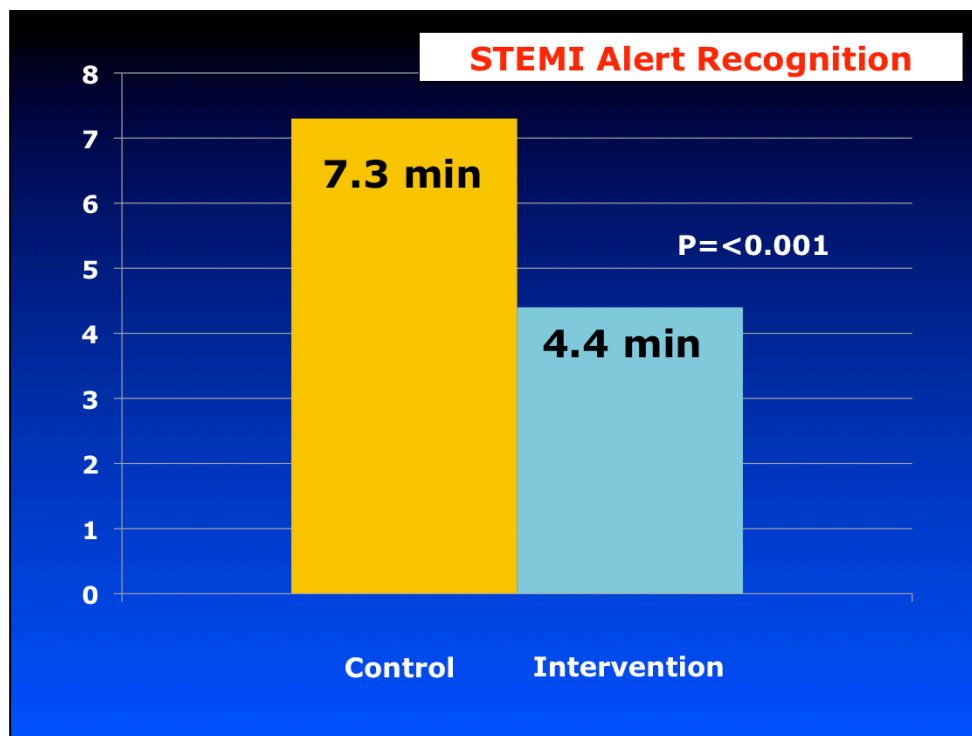


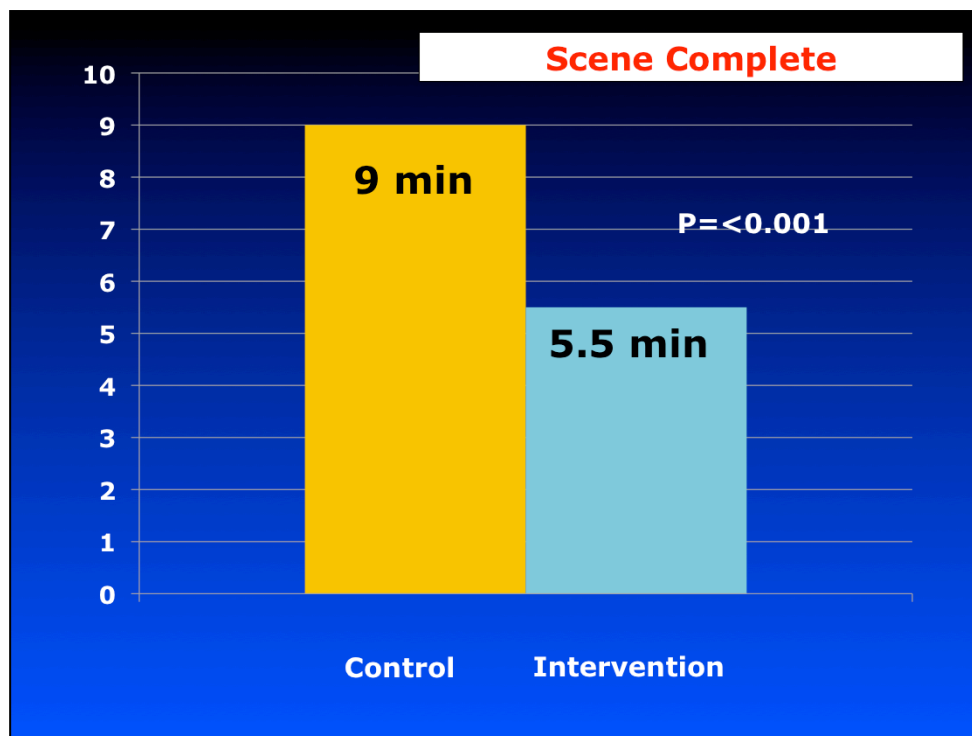










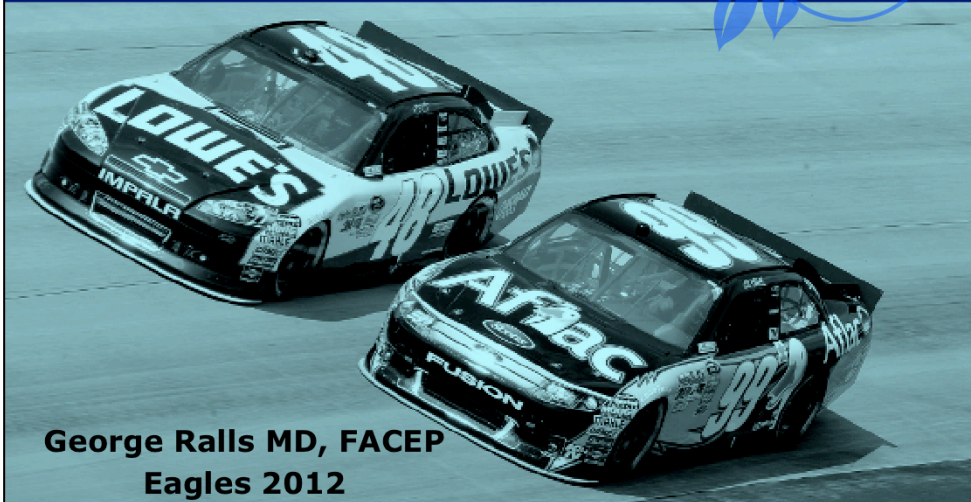


Utilization of Team Assignment Training in Simulated Pre-hospital Chest Pain Patients

- **Paramedic teams with pre-assigned roles ("pit crew" model):**
 - **Faster to obtain vital signs**
 - **Administer ASA**
 - **Acquire and interpret the 12 lead EKG**
 - **Recognize STEMI criteria:**
 - **ED notification, transmission, etc.**
 - **Rapid transport**
- **Further study necessary to confirm the relevance of these findings.**

TIME IS MUSCLE!

Pit Crew Approach to Chest Pain



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