

Who Should Transport your STEMI?



Richard Childress

Richard Childress

- ▣ Who is this guy?

WHAT...?!?
UNLOADED TO SHERVNET

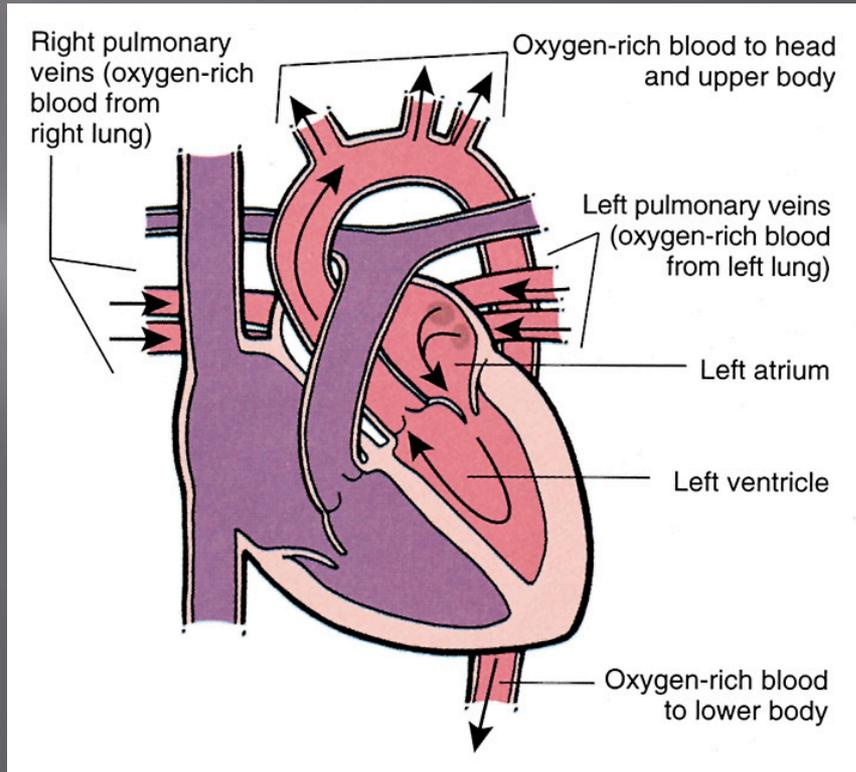
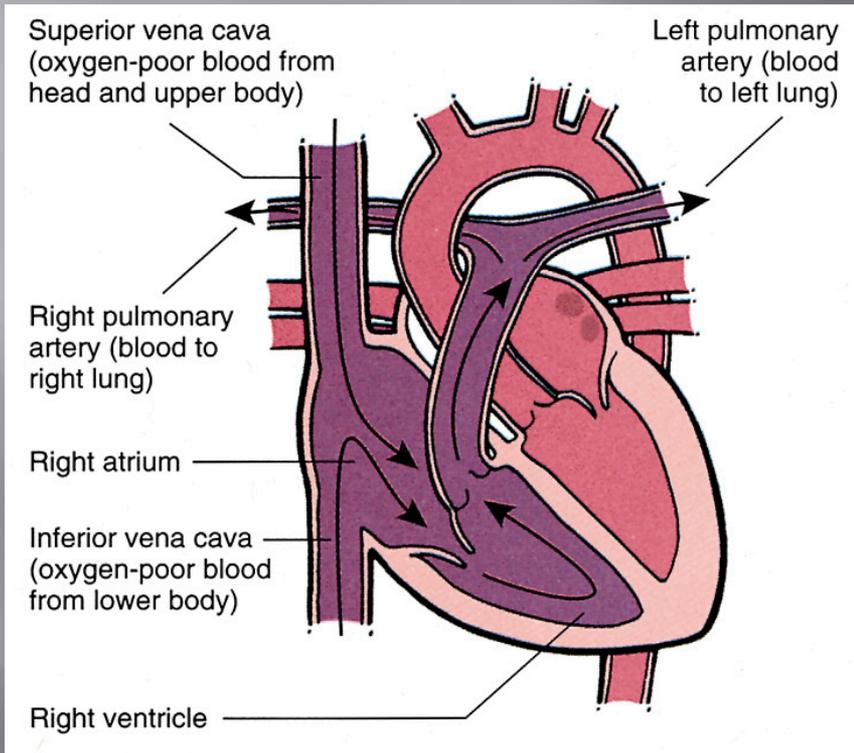
- ▣ What makes him think he knows anything?



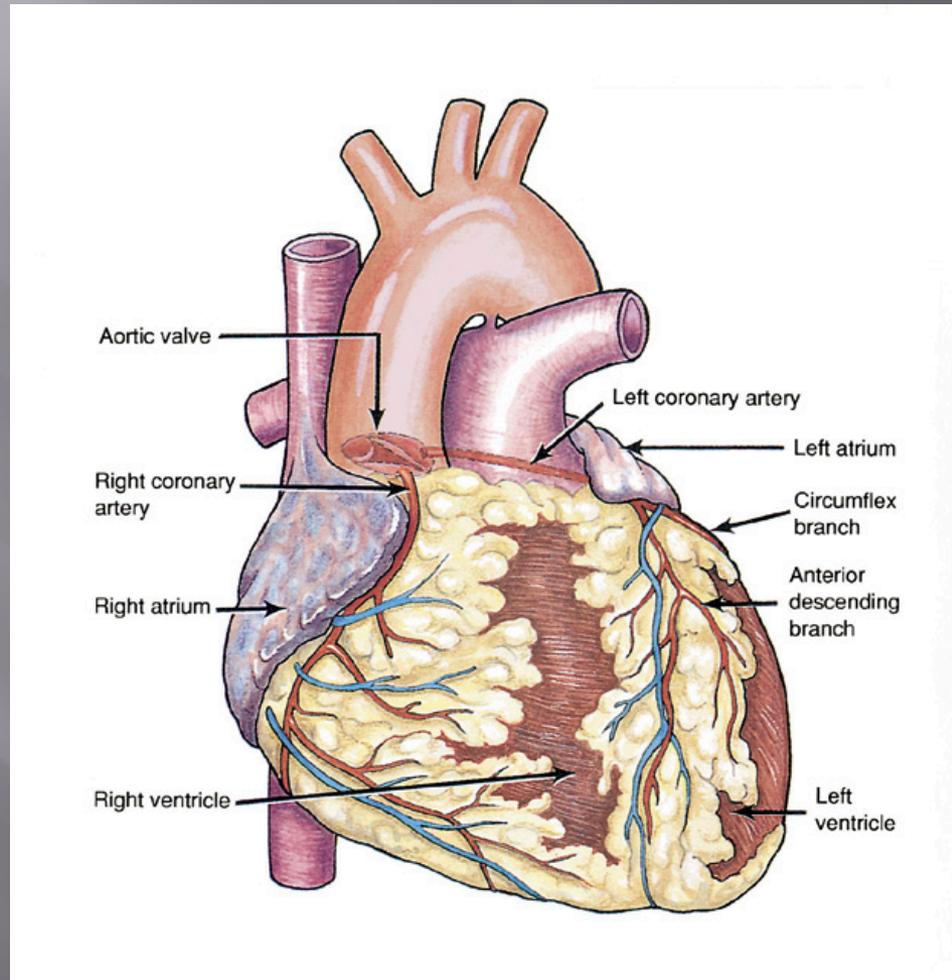
Who Should Transport Your STEMI?

- ▣ What we're going to look at:
 - Heart
 - STEMI Treatments and Goals
 - Protocols from My Area
 - Key Factors
 - Case Studies
 - Cool Video

Anatomy of the Heart

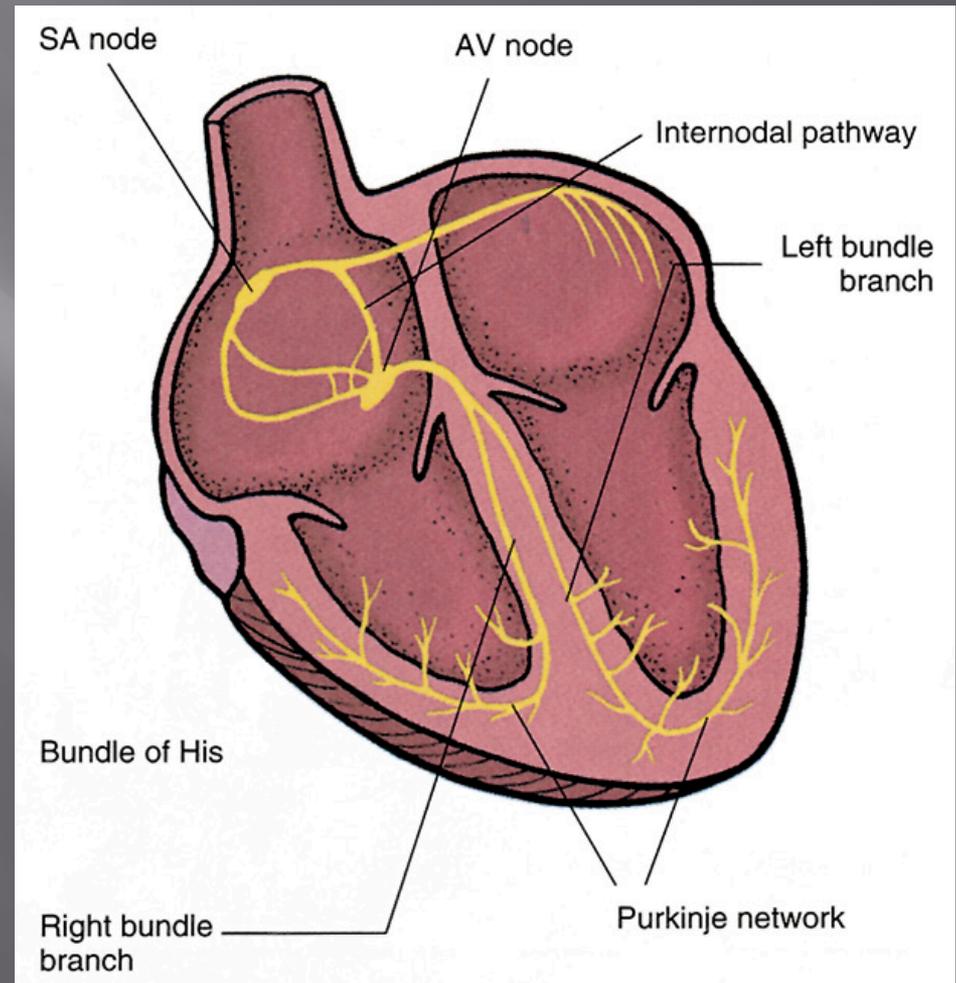


Coronary Arteries



Electric Conduction

SA NODE IS PRIMARY
PACEMAKER OF THE HEART.



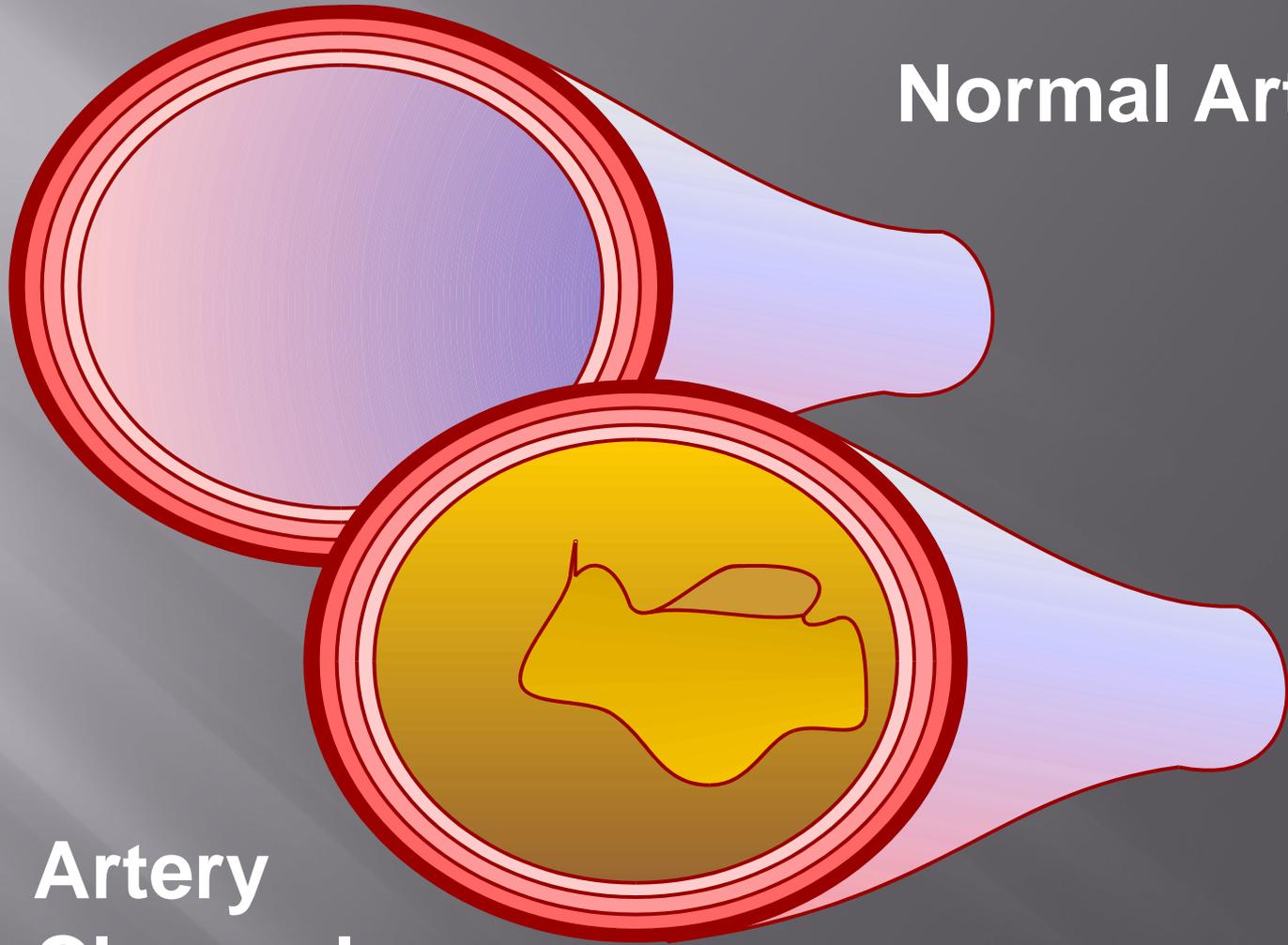
Cardiac Compromise

Cardiac compromise is the result of ischemia, or insufficient blood flow to the heart.

Typically caused by a blockage or narrowing of the coronary arteries.

Will result in tissue infarct, or tissue death, if not corrected.

Normal Artery



**Artery
Clogged
with plaque**

Pathophysiology of Arterial Blockage

- Atherosclerotic changes in the coronary arteries decrease the lumen size and limit the body's ability to change the vessel sizes (dilation or constriction) when needed.
- With plaque rupture, the body sends platelets to the location to try and heal the damage
- The platelet aggregation can occlude the artery, hampering blood flow

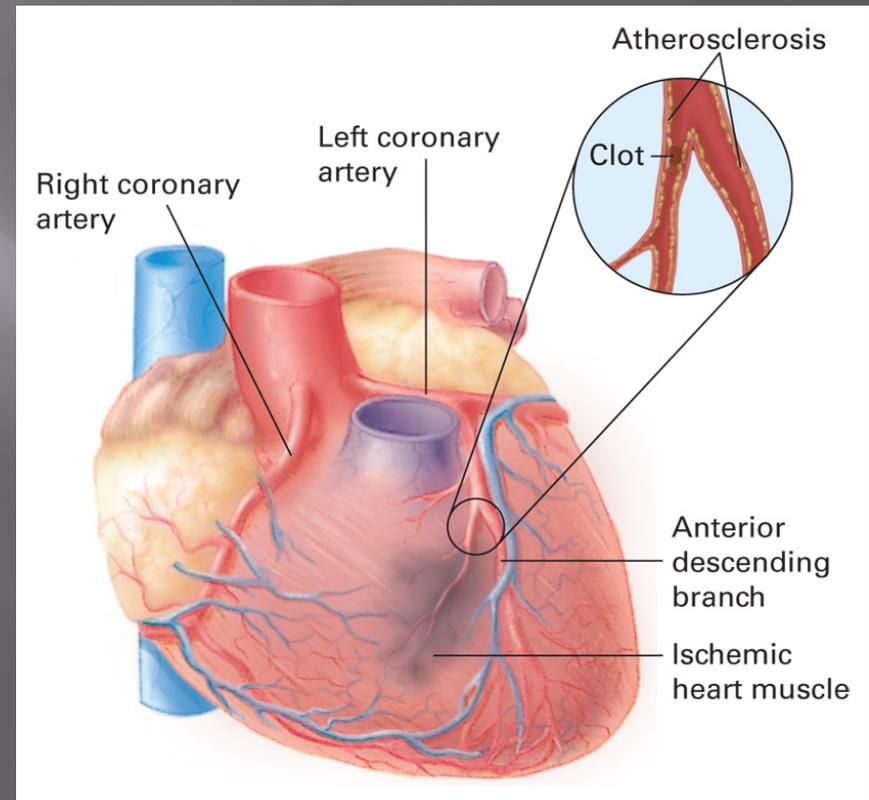
Acute Coronary Syndrome

- ▣ Acute Coronary Syndrome, or ACS, is a set of signs and symptoms related to the heart caused by a decrease in blood flow to the heart.

- ▣ Often due to Atherosclerosis

Acute Coronary Syndrome

- ▣ Conditions causing cardiac emergencies
 - Angina pectoris
 - ▣ Stable
 - ▣ Unstable
 - Myocardial infarction
 - ▣ STEMI (ST Elevated Myocardial Infarction)
 - ▣ NSTEMI (Non-ST Elevated Myocardial Infarction)



2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

Developed in Collaboration with American College of Emergency Physicians
and Society for Cardiovascular Angiography and Interventions

© American College of Cardiology Foundation and American Heart Association, Inc.

Classification of Recommendations and Levels of Evidence

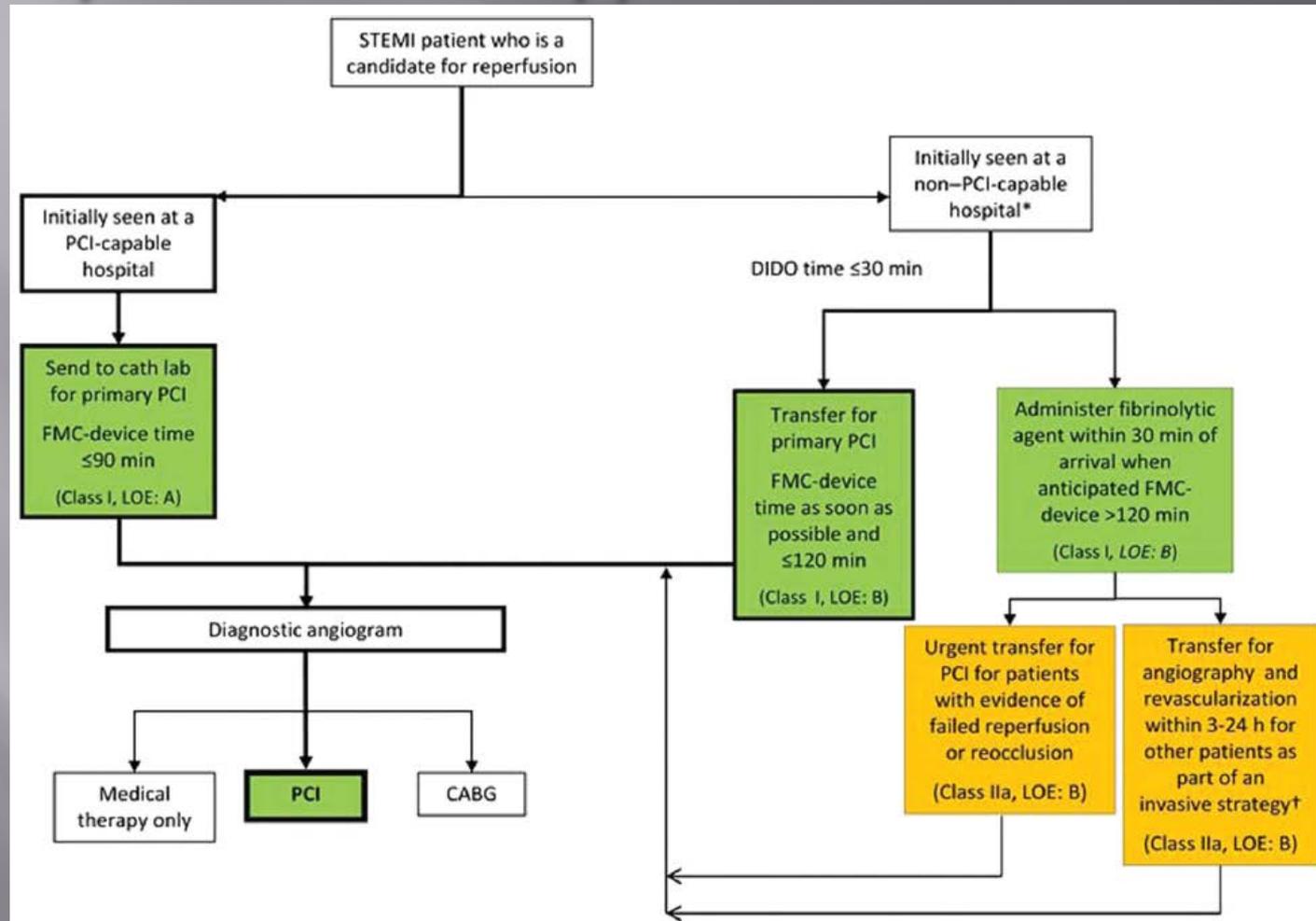
		SIZE OF TREATMENT EFFECT												
		CLASS I <i>Benefit >>> Risk</i> Procedure/Treatment SHOULD be performed/administered	CLASS IIa <i>Benefit >> Risk</i> Additional studies with <i>focused objectives needed</i> IT IS REASONABLE to perform procedure/administer treatment	CLASS IIb <i>Benefit ≥ Risk</i> Additional studies with <i>broad objectives needed; additional registry data would be helpful</i> Procedure/Treatment MAY BE CONSIDERED	CLASS III <i>No Benefit</i> or CLASS III <i>Harm</i> <table border="1"> <thead> <tr> <th></th> <th>Procedure/Test</th> <th>Treatment</th> </tr> </thead> <tbody> <tr> <td>COR III: No benefit</td> <td>Not Helpful</td> <td>No Proven Benefit</td> </tr> <tr> <td>COR III: Harm</td> <td>Excess Cost w/o Benefit or Harmful</td> <td>Harmful to Patients</td> </tr> </tbody> </table>		Procedure/Test	Treatment	COR III: No benefit	Not Helpful	No Proven Benefit	COR III: Harm	Excess Cost w/o Benefit or Harmful	Harmful to Patients
	Procedure/Test	Treatment												
COR III: No benefit	Not Helpful	No Proven Benefit												
COR III: Harm	Excess Cost w/o Benefit or Harmful	Harmful to Patients												
ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT	LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	<ul style="list-style-type: none"> Recommendation that procedure or treatment is useful/effective Sufficient evidence from multiple randomized trials or meta-analyses 	<ul style="list-style-type: none"> Recommendation in favor of treatment or procedure being useful/effective Some conflicting evidence from multiple randomized trials or meta-analyses 	<ul style="list-style-type: none"> Recommendation's usefulness/efficacy less well established Greater conflicting evidence from multiple randomized trials or meta-analyses 	<ul style="list-style-type: none"> Recommendation that procedure or treatment is not useful/effective and may be harmful Sufficient evidence from multiple randomized trials or meta-analyses 									
	LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	<ul style="list-style-type: none"> Recommendation that procedure or treatment is useful/effective Evidence from single randomized trial or nonrandomized studies 	<ul style="list-style-type: none"> Recommendation in favor of treatment or procedure being useful/effective Some conflicting evidence from single randomized trial or nonrandomized studies 	<ul style="list-style-type: none"> Recommendation's usefulness/efficacy less well established Greater conflicting evidence from single randomized trial or nonrandomized studies 	<ul style="list-style-type: none"> Recommendation that procedure or treatment is not useful/effective and may be harmful Evidence from single randomized trial or nonrandomized studies 									
	LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	<ul style="list-style-type: none"> Recommendation that procedure or treatment is useful/effective Only expert opinion, case studies, or standard of care 	<ul style="list-style-type: none"> Recommendation in favor of treatment or procedure being useful/effective Only diverging expert opinion, case studies, or standard of care 	<ul style="list-style-type: none"> Recommendation's usefulness/efficacy less well established Only diverging expert opinion, case studies, or standard of care 	<ul style="list-style-type: none"> Recommendation that procedure or treatment is not useful/effective and may be harmful Only expert opinion, case studies, or standard of care 									
Suggested phrases for writing recommendations		should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	COR III: No Benefit is not recommended is not indicated	COR III: Harm potentially harmful causes harm								
Comparative effectiveness phrases*		treatment/strategy A is recommended/indicated in preference to treatment B treatment A should be chosen over treatment B	treatment/strategy A is probably recommended/indicated in preference to treatment B it is reasonable to choose treatment A over treatment B		should not be performed/administered/other is not useful/beneficial/effective	associated with excess morbidity/mortality should not be performed/administered/other								

A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Although randomized trials are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

*Data available from clinical trials or registries about the usefulness/efficacy in different subpopulations, such as sex, age, history of diabetes, history of prior myocardial infarction, history of heart failure, and prior aspirin use.

†For comparative effectiveness recommendations (Class I and IIa; Level of Evidence A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

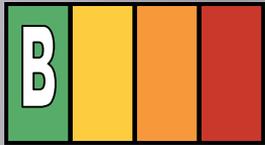
Reperfusion Therapy for Patients with STEMI



*Patients with cardiogenic shock or severe heart failure initially seen at a non-PCI-capable hospital should be transferred for cardiac catheterization and revascularization as soon as possible, irrespective of time delay from MI onset (Class I, LOE: B). †Angiography and revascularization should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy.

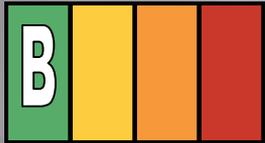
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals

I IIa IIb III



All communities should create and maintain a regional system of STEMI care that includes assessment and continuous quality improvement of EMS and hospital-based activities. Performance can be facilitated by participating in programs such as Mission: Lifeline and the D2B Alliance.

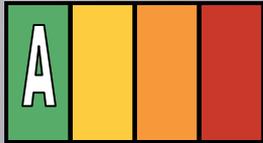
I IIa IIb III



Performance of a 12-lead ECG by EMS personnel at the site of FMC is recommended in patients with symptoms consistent with STEMI.

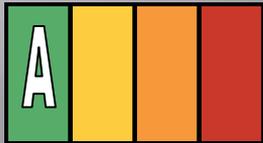
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals

I IIa IIb III



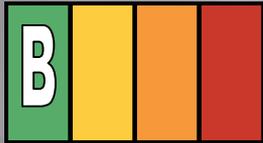
Reperfusion therapy should be administered to all eligible patients with STEMI with symptom onset within the prior 12 hours.

I IIa IIb III



Primary PCI is the recommended method of reperfusion when it can be performed in a timely fashion by experienced operators.

I IIa IIb III

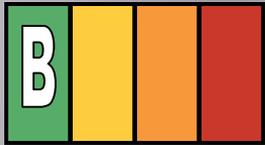


EMS transport directly to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI with an ideal FMC-to-device time system goal of 90 minutes or less.*

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.

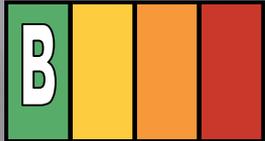
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals

I IIa IIb III



Immediate transfer to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI who initially arrive at or are transported to a non-PCI-capable hospital, with an FMC-to-device time system goal of 120 minutes or less.*

I IIa IIb III

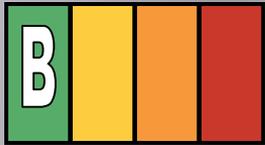


In the absence of contraindications, fibrinolytic therapy should be administered to patients with STEMI at non-PCI-capable hospitals when the anticipated FMC-to-device time at a PCI-capable hospital exceeds 120 minutes because of unavoidable delays.

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.

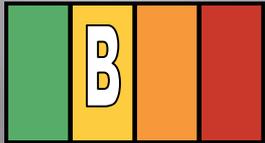
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals

I IIa IIb III



When fibrinolytic therapy is indicated or chosen as the primary reperfusion strategy, it should be administered within 30 minutes of hospital arrival.*

I IIa IIb III

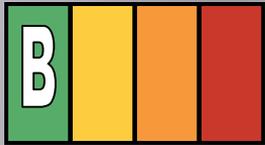


Reperfusion therapy is reasonable for patients with STEMI and symptom onset within the prior 12 to 24 hours who have clinical and/or ECG evidence of ongoing ischemia. Primary PCI is the preferred strategy in this population.

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.

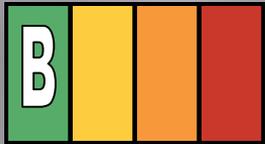
Evaluation and Management of Patients With STEMI and Out-of-Hospital Cardiac Arrest

I IIa IIb III



Therapeutic hypothermia should be started as soon as possible in comatose patients with STEMI and out-of-hospital cardiac arrest caused by VF or pulseless VT, including patients who undergo primary PCI.

I IIa IIb III



Immediate angiography and PCI when indicated should be performed in resuscitated out-of-hospital cardiac arrest patients whose initial ECG shows STEMI.

Can a Patient in Arrest be Cathed?

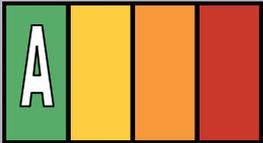
YES

Primary PCI in STEMI

	COR	LOE
Ischemic symptoms <12 h	I	A
Ischemic symptoms <12 h and contraindications to fibrinolytic therapy irrespective of time delay from FMC	I	B
Cardiogenic shock or acute severe HF irrespective of time delay from MI onset	I	B
Evidence of ongoing ischemia 12 to 24 h after symptom onset	IIa	B
PCI of a noninfarct artery at the time of primary PCI in patients without hemodynamic compromise	III: Harm	B

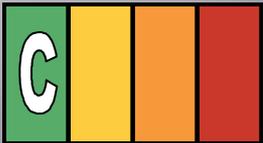
Use of Stents in Patients With STEMI

I IIa IIb III



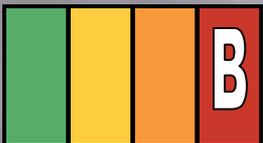
Placement of a stent (BMS or DES) is useful in primary PCI for patients with STEMI.

I IIa IIb III



BMS* (Bare Metal Stents) should be used in patients with high bleeding risk, inability to comply with 1 year of DAPT (Dual Anti-Platelet Therapy), or anticipated invasive or surgical procedures in the next year.

I IIa IIb III



Harm

DES (Drug Eluting/Emitting Stent) **should not be used** in primary PCI for patients with STEMI who are unable to tolerate or comply with a prolonged course of DAPT because of the increased risk of stent thrombosis with premature discontinuation of one or both agents

• Balloon angioplasty without stent placement may be used in selected patients.

Antiplatelet Therapy to Support Primary PCI for STEMI



Aspirin 162 to 325 mg should be given before primary PCI.



After PCI, aspirin should be continued indefinitely.

Antiplatelet Therapy to Support Primary PCI for STEMI



A loading dose of a P2Y₁₂ receptor inhibitor should be given as early as possible or at time of primary PCI to patients with STEMI. Options include:

- Clopidogrel (Plavix) 600 mg; or
- Prasugrel (Effient) 60 mg; or
- Ticagrelor (Brilinta) 180 mg

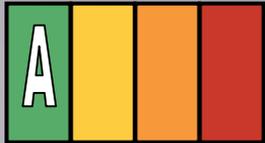
Antiplatelet Therapy to Support Primary PCI for STEMI



It may be reasonable to administer intravenous GP IIb/IIIa receptor antagonist (Abciximab/Integrilin) in the precatheterization laboratory setting (e.g., ambulance, ED) to patients with STEMI for whom primary PCI is intended.

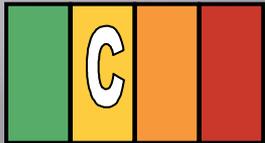
Fibrinolytic Therapy When There Is an Anticipated Delay to Performing Primary PCI Within 120 Minutes of FMC

I IIa IIb III



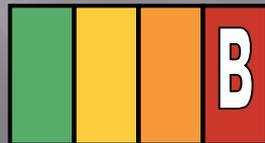
In the absence of contraindications, fibrinolytic therapy should be given to patients with STEMI and onset of ischemic symptoms within the previous 12 hours when it is anticipated that primary PCI cannot be performed within 120 minutes of FMC.

I IIa IIb III



In the absence of contraindications and when PCI is not available, fibrinolytic therapy is reasonable for patients with STEMI if there is clinical and/or ECG evidence of ongoing ischemia within 12 to 24 hours of symptom onset and a large area of myocardium at risk or hemodynamic instability.

I IIa IIb III

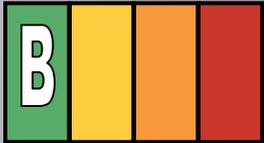


Harm

Fibrinolytic therapy **should not be administered** to patients with ST depression except when a true posterior (inferobasal) MI is suspected or when associated with ST elevation in lead aVR.

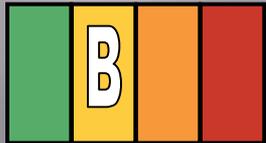
Transfer of Patients With STEMI to a PCI-Capable Hospital for Coronary Angiography After Fibrinolytic Therapy

I IIa IIb III



Immediate transfer to a PCI-capable hospital for coronary angiography is recommended for suitable patients with STEMI who develop cardiogenic shock or acute severe HF, irrespective of the time delay from MI onset.

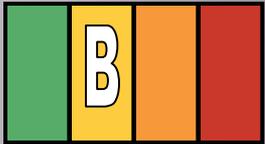
I IIa IIb III



Urgent transfer to a PCI-capable hospital for coronary angiography is reasonable for patients with STEMI who demonstrate evidence of failed reperfusion or reocclusion after fibrinolytic therapy.

Transfer of Patients With STEMI to a PCI-Capable Hospital for Coronary Angiography After Fibrinolytic Therapy

I IIa IIb III



Transfer to a PCI-capable hospital for coronary angiography is reasonable for patients with STEMI who have received fibrinolytic therapy even when hemodynamically stable* and with clinical evidence of successful reperfusion. Angiography can be performed as soon as logistically feasible at the receiving hospital, and ideally within 24 hours, but should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy.

*Although individual circumstances will vary, clinical stability is defined by the absence of low output, hypotension, persistent tachycardia, apparent shock, high-grade ventricular or symptomatic supraventricular tachyarrhythmias, and spontaneous recurrent ischemia.

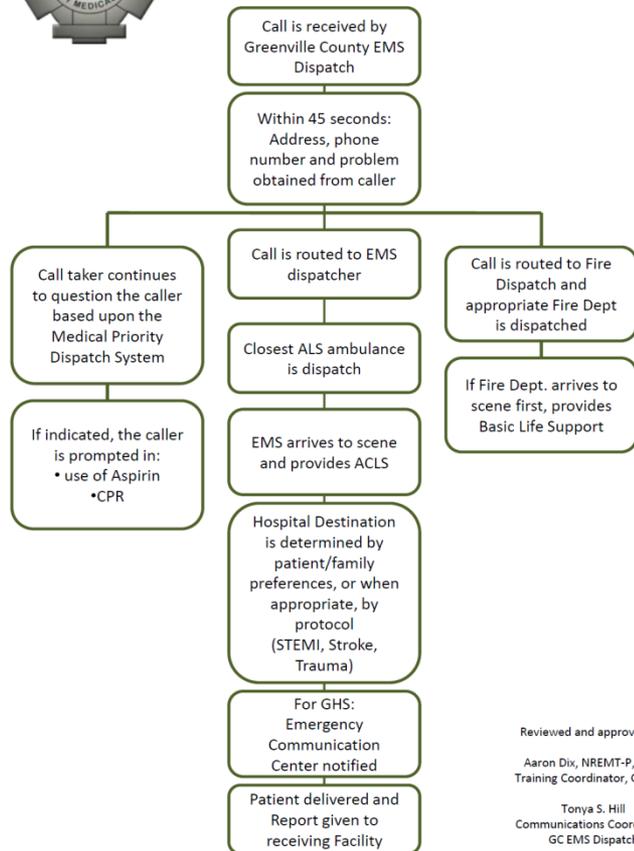
STEMI Treatment

- ▣ MONA (not so much anymore)
- ▣ Current For Our Area:
 - Administer **Nitroglycerin** 0.4 mg SL
 - ▣ Systolic blood pressure must be greater than 90 torr.
 - ▣ May be repeated at 5-minute intervals until pain is relieved (no maximum administration as long as blood pressure stays above 90 torr).
 - ▣ If patient has a suspected Right Ventricular Infarct, Nitroglycerin may be administered in **stable patients (B/P >120)** and after an IV of NS is established – INT is not acceptable (understanding that a significant BP drop may occur with nitrate administered).
 - ▣ Withhold Nitroglycerin in any patient who has used an erectile dysfunction medication in the past 24 hours.
 - Administer chewable **Aspirin** 324 mg PO (*ONLY ADMINISTER OUTSIDE OF ANY OTHER ETIOLOGY, SUCH AS CVA*).
 - If ST elevation MI patient (**STEMI**), administer 5000 units of **Heparin** IV and 600 mg **Plavix** PO (*ONLY ADMINISTER IF A SUSPECTED STEMI PATIENT OUTSIDE OF ANY OTHER ETIOLOGY, SUCH AS CVA*).
 - If pain is not relieved administer **Morphine** in 2 mg increments for pain relief. In hemodynamically unstable patients Fentanyl 1 mcg/kg (max 150 mcg) may be substituted, repeat as needed.

Dispatch and Activation



Greenville County EMS Dispatch Flow Chart



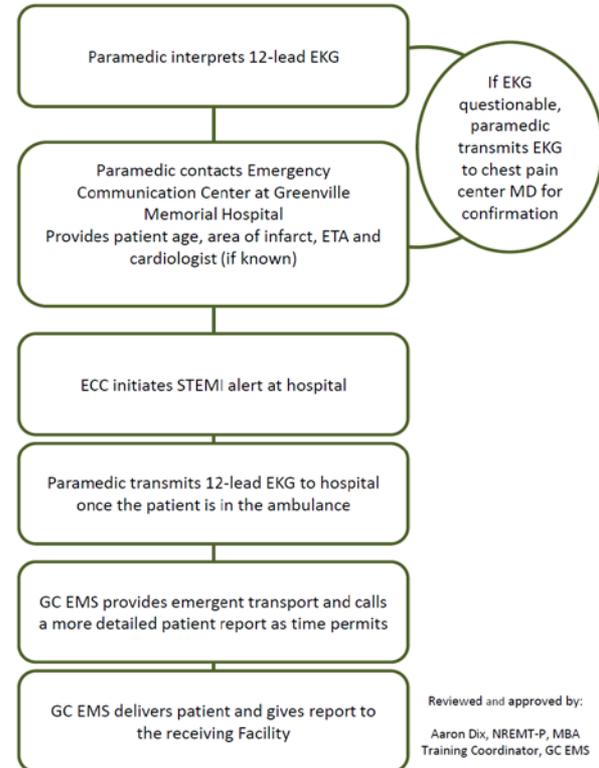
Reviewed and approved by:

Aaron Dix, NREMT-P, MBA
Training Coordinator, GC EMS

Tonya S. Hill
Communications Coordinator
GC EMS Dispatch



Greenville County EMS STEMI Activation Process to GHS



Reviewed and approved by:

Aaron Dix, NREMT-P, MBA
Training Coordinator, GC EMS

Ground Ready to Go

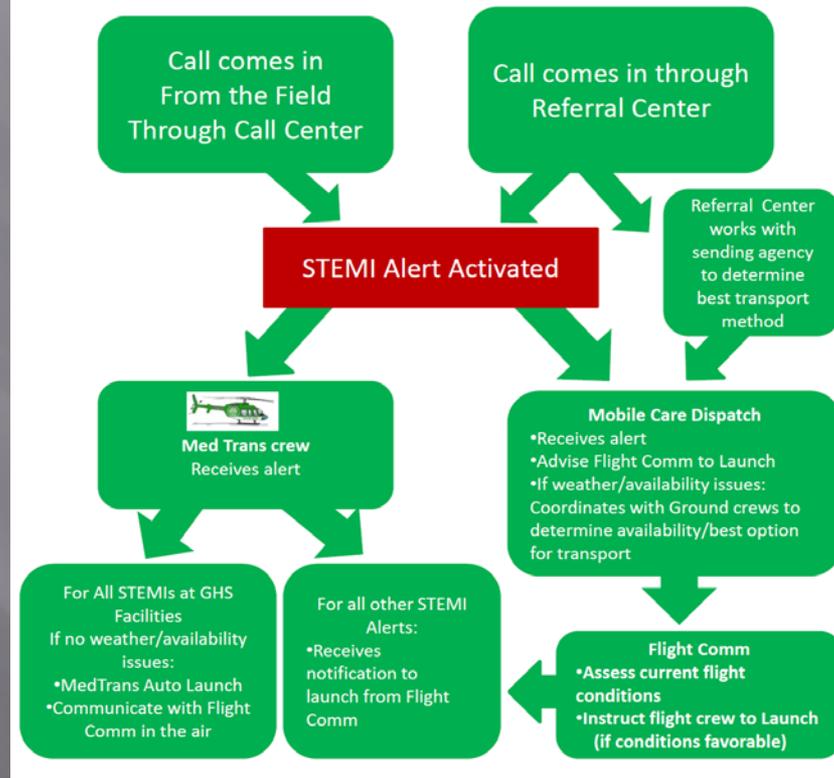


Transport Decision



GREENVILLE
HEALTH SYSTEM

Helicopter Launch Protocols



Transport Protocol

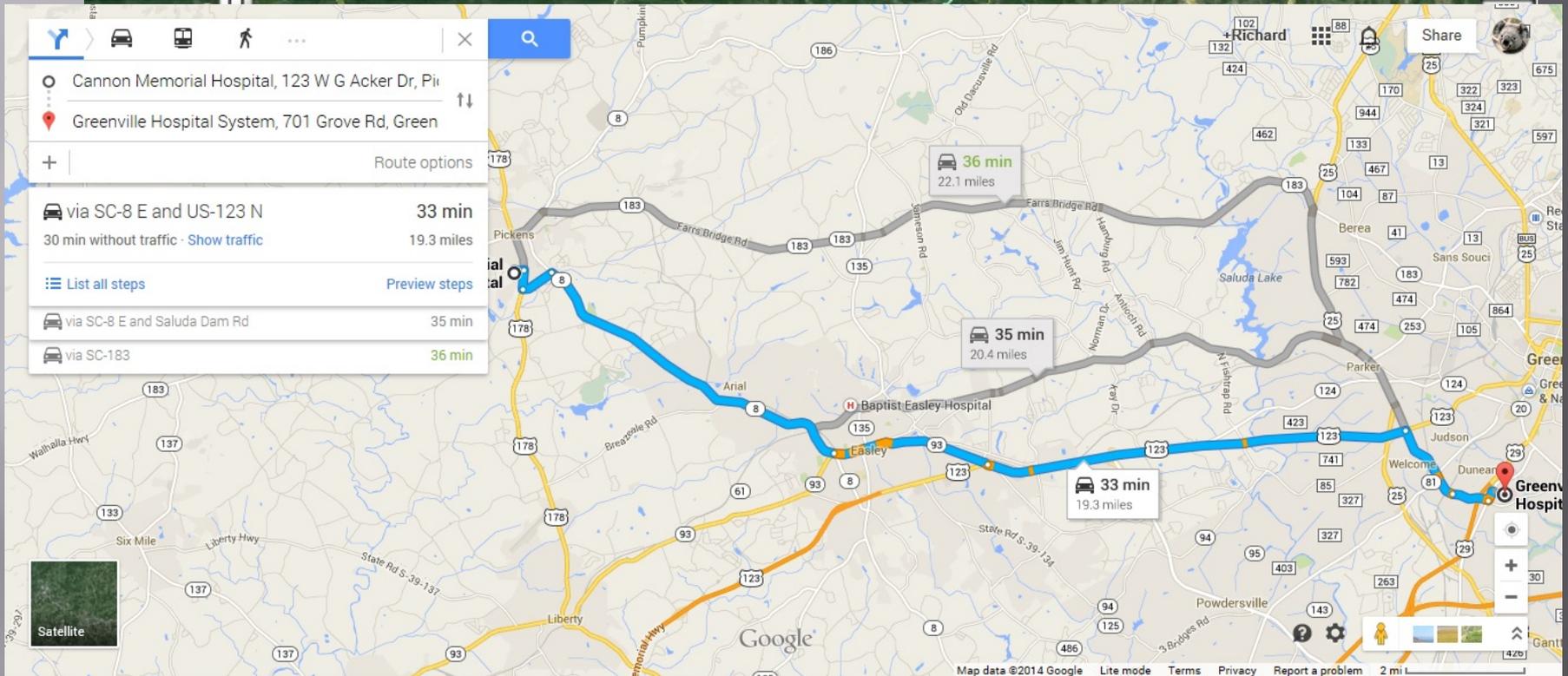
Origination	Default	Back-Up (Weather/Availability)
<p>GrMH ED (15 miles/22 minutes drive time)</p> <p>HMH ED (14 miles/20 minutes drive time)</p> <p>NGH (14 miles/18 minutes drive time)</p>	<ul style="list-style-type: none"> GMH Med Trans (4/5 minutes flight time) 	<ol style="list-style-type: none"> MCAS dispatches crew Then checks w/GC EMS to determine who is closer 
<p>Laurens County Healthcare System</p> <p>(47 miles/57 minutes drive time)</p>	<ul style="list-style-type: none"> GHS Med Trans (14 minutes flight time) 	<ol style="list-style-type: none"> EagleMed 28  <ol style="list-style-type: none"> Regional Ambulance Service Laurens County EMS
<p>Baptist Easley Hospital</p> <p>(13 miles/20 minutes drive time)</p>	<ul style="list-style-type: none"> Pickens County EMS 	<ol style="list-style-type: none"> Meeting scheduled with BEH to discuss default being GHS Med Trans (4 minutes flight time) <p>(Pilot being planned for using GHS Med Trans for all STEMIs and Strokes.)</p>
<p>Cannon Memorial Hospital</p>	<ul style="list-style-type: none"> Pickens County EMS 	

What are the Key Factors?

- ▣ First and foremost, what is best for the patient?
 - Not what's best for a facility's DIDO time
 - Not what's best for an agency's bottom line
- ▣ How long will it take to get to the patient?
- ▣ How long will the patient be outside of a tertiary care facility?
- ▣ Crew and Resources
- ▣ Safety
- ▣ Cost

Case Studies

Case Studies



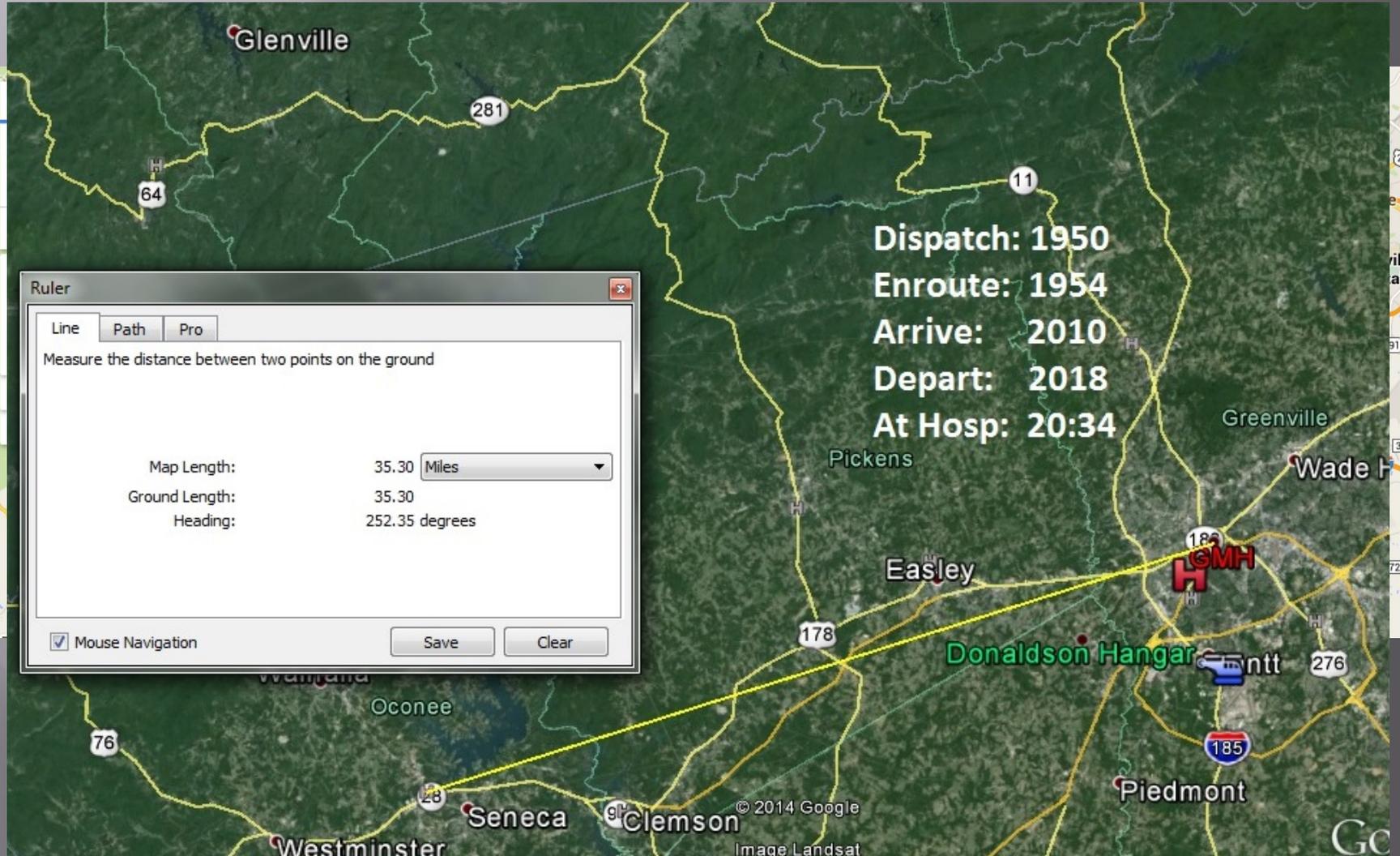
Map Length: 17.06 Miles
Ground Length: 17.07
Heading: 101.26 degrees

Mouse Navigation

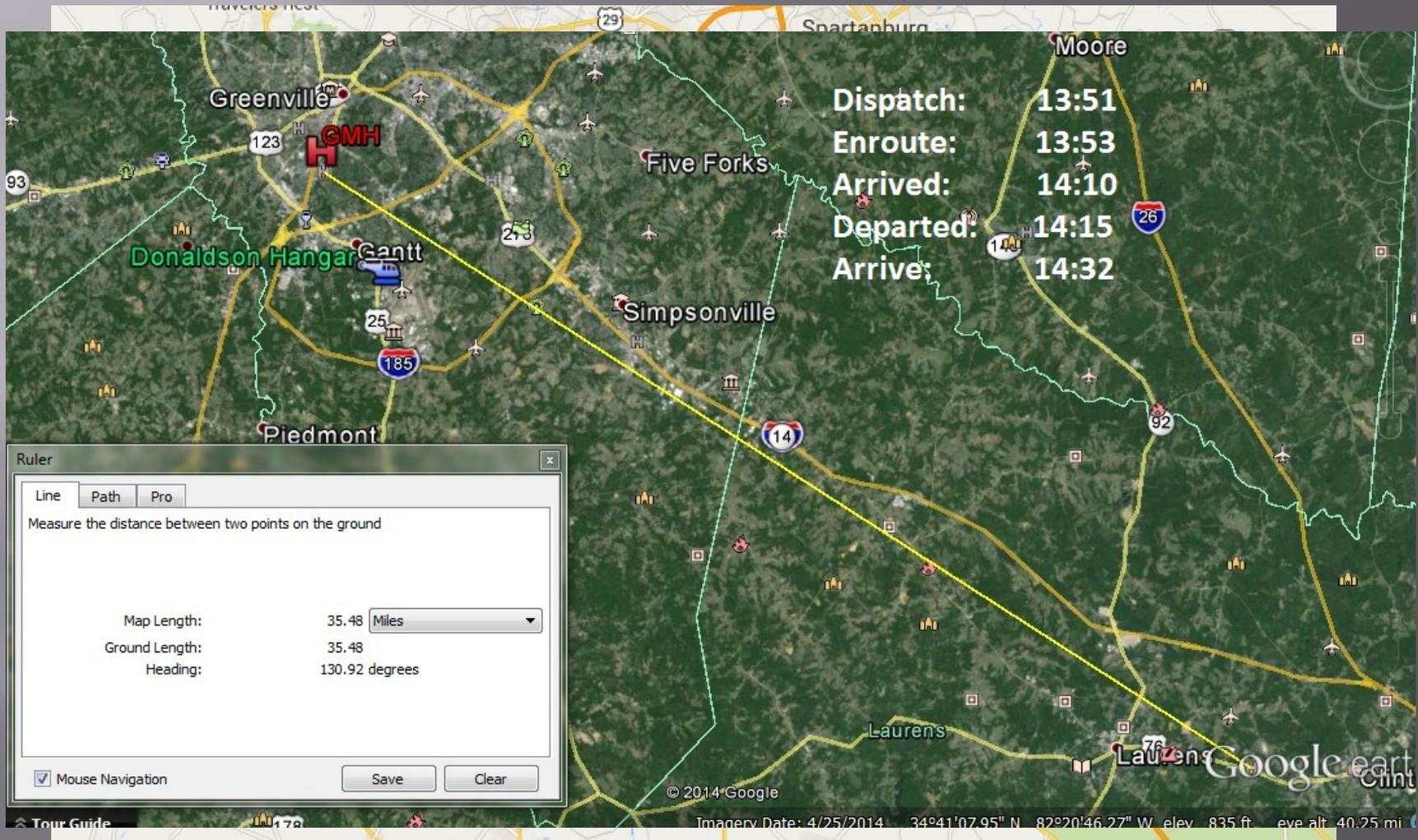
Save Clear



Case Studies



Case Studies



Case Studies



Ruler

Line Path Pro

Measure the distance between two points on the ground

Map Length: 11.44 Miles

Ground Length: 11.44

Heading: 126.71 degrees

Mouse Navigation

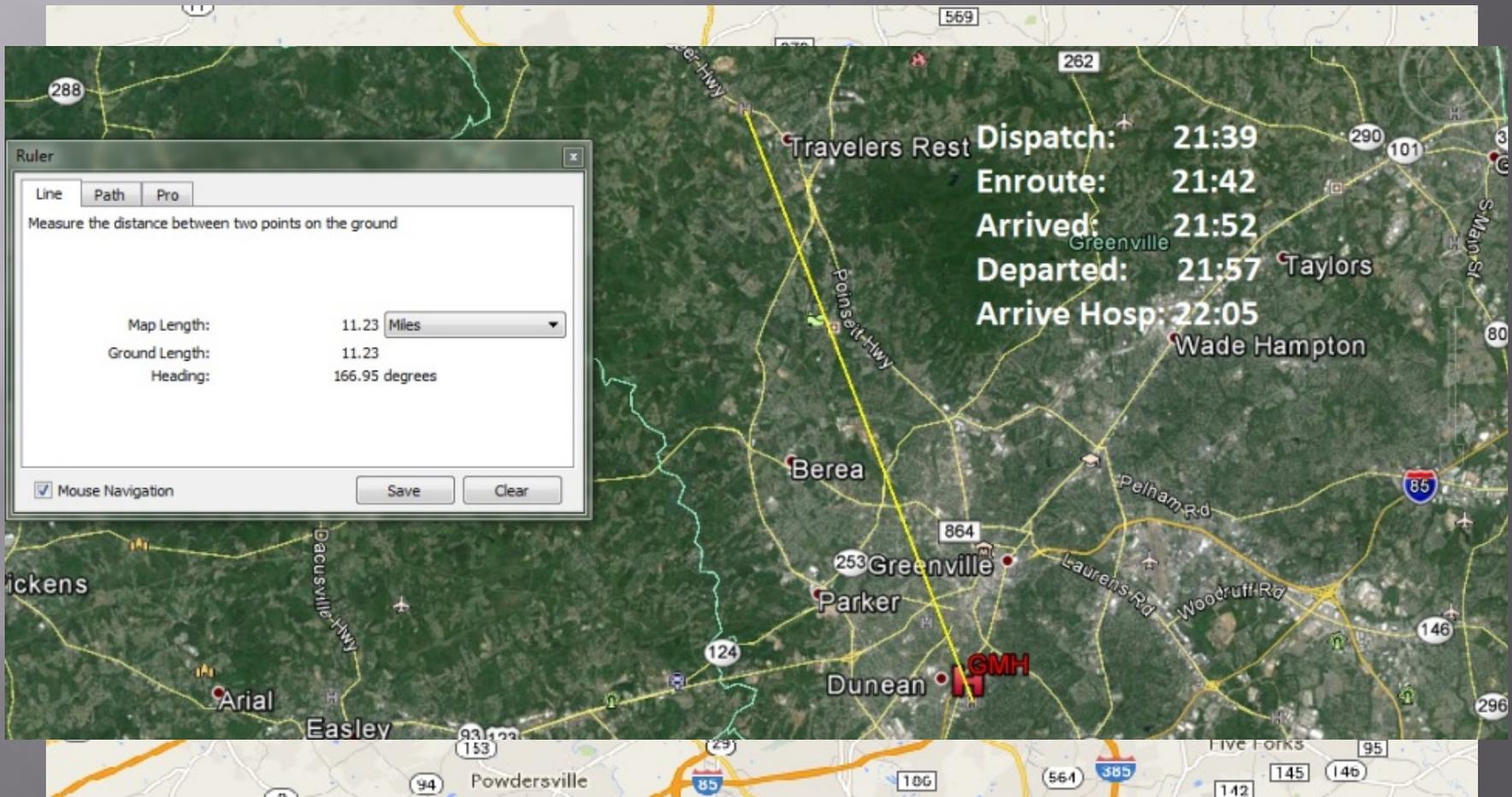
Save Clear

Dispatch: 03:45
Enroute: 03:52
Arrived: 03:59
Departed: 04:04
Arrive Hosp: 04:12

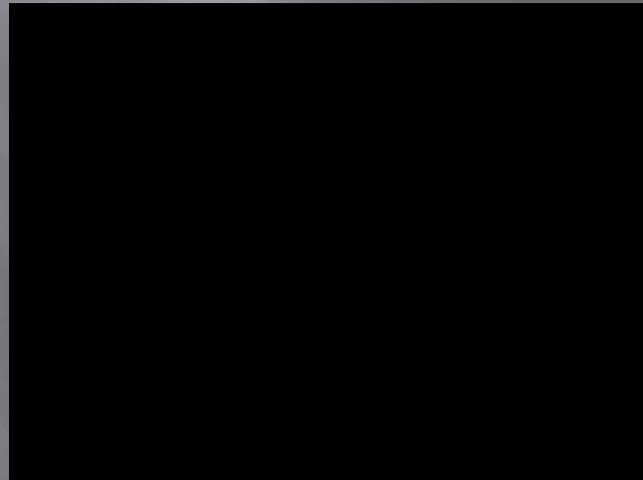
Greenville Downtown Airport
Greenville
Five Forks
Mauldin
Simpsonville
Golden Grove
Piedmont
Fountain I



Case Studies



When its Done Right



Questions?