



# OHSU STEMI CHECK LIST

## From ED to Cath Lab

Patient Stamp

### STEMI ACTIVATION

**GOAL: ECG TO CATH LAB TIME: 10 MINUTES**

PHYSICIAN Activate: ED COMMUNICATIONS CENTER  
RRT responds to all STEMI Activations

ED ARRIVAL  
DATE \_\_\_\_\_ TIME \_\_\_\_\_

Time Line	Check off	EST Wt. (Kg) _____	Start Times
<b>0-4 minutes</b>	<input type="checkbox"/>	<b>ECG with physician interpretation</b>	
	<input type="checkbox"/>	<b>Oxygen</b>	
	<input type="checkbox"/>	IV x 2 expected but <b>DO NOT DELAY TRANSFER TO CATH LAB</b>	
	<input type="checkbox"/>	Obtain Labs (Troponin, CBC, INR, PTT, CMS & Mg)	
	<input type="checkbox"/>	<b>B/P Both arms and record _____ Right _____ Left</b>	
	<input type="checkbox"/>	CXR (Consider) <b>DO NOT DELAY TRANSFER TO CATH LAB</b>	
<b>4-8 minutes</b>	<b>Physician ordered Medication</b>		
		<b>Dosage</b> NOTE: Meds in Pyxis under "STEMI KITS"	
	<input type="checkbox"/>	<b>Aspirin</b> 325 mg chewed	
	<input type="checkbox"/>	<b>Nitroglycerin</b> 0.4 mg SL for pain	
	<input type="checkbox"/>	<b>Morphine</b> 2mg IV every 5 min for pain above 3/10. <i>Hold for SBP below 100 or RR below 8.</i>	
	<input type="checkbox"/>	<b>Heparin</b> Loading dose 60 units/kg IV x 1 <b>with maximum dose of 4000 units</b>	
	<input type="checkbox"/>	<b>Clopidogrel (Plavix®)</b> <input type="checkbox"/> 600 mg po if below age of 75 <input type="checkbox"/> 300mg po if 75 years or above	
	<b>Individual patient consideration- physician determination</b>		
	<input type="checkbox"/>	<b>Metoprolol</b> 50 mg po x 1- <i>Hold for SBP &lt; 90, pulmonary edema, shock</i>	
	<input type="checkbox"/>	<b>Eptifibatide (Integrilin®)</b> <i>*Kept in refrigerator</i> Bolus dose 180 micrograms per kg per IV over 1-2 minutes. <i>Contraindicated for dialysis or known renal disease</i> <b>Maximum bolus dose:</b> 11.3ml (=22.6 mg) - see dosing on reverse side	
<b>8-10 minutes</b>	<b>RAPID TRANSPORT TO CATH LAB</b>		
	<input type="checkbox"/>	Portable monitor placed by RRT	
	<input type="checkbox"/>	Remove patient clothing and have gown on- begin clipping – <b>DO NOT DELAY TRANSFER</b>	
	<input type="checkbox"/>	Obtain elevator- Rapid Response Team has access badge.	
	<input type="checkbox"/>	RRT take check-list and patient to cath lab room 2 unless otherwise specified	
	<input type="checkbox"/>	Patient ready for transfer to Cath Lab- consider this a "Trauma transfer" (Cardiac Fellow, ED RN, RRT x2)	
	<input type="checkbox"/>	TOTAL TIME IN ED _____ (minutes)	

RN Signature \_\_\_\_\_ Time \_\_\_\_\_

Confidential document for the improvement of patient care protected pursuant to ORS 41.677

**Send check list with patient to cath lab – not a permanent part of the medical record – for quality tracking only**

**Development Date: May 28, 2009** Developed as a collaborative effort of ED, Cath Lab & Rapid Response Team- Contact :Mary Spiering 8-3772

## Supporting Information

### Helpful Hints for Rapid Response Team when transporting STEMI patient to Cath Lab from ED on OFF HOURS

<b>Arrival in ED</b>	<ul style="list-style-type: none"> <li>Follow STEMI Check-list</li> <li>Apply transport monitor</li> <li>Assist with rapid transfer to cath lab</li> </ul>
<b>Secure transport team</b>	Assure at least 4 people available to transport patient to cath lab to assist with process outlined below
<b>Elevator</b>	<ul style="list-style-type: none"> <li><b>Use ID badge to access</b></li> </ul>
<b>Cath Lab Room 2</b>	Take patient to cath lab room 2 located on the left side of the unit
<b>Disposition</b>	Transport patient into cath lab room head-first
<b>Cart Locations</b>	<ul style="list-style-type: none"> <li><b>STEMI cart</b> labeled "STEMI CART" located on the right hand side of the room 2 as you first enter</li> <li><b>Code Cart</b> located at far end of the room</li> </ul>
<b>Move To table</b>	Slider board located near large pyxis machine on the left hand side of room 2
<b>Prep</b>	<ul style="list-style-type: none"> <li>Apply O2</li> <li>Remove gown</li> <li>Apply radio-opaque ECG leads/monitor leads</li> <li>Place B/P cuff</li> <li>Clip and prep groin</li> </ul>
Cath Lab personnel will arrive within 25-30 min of STEMI call.	

### **Cath Lab Phone Numbers**

0730-1600 Mon-Fri ----- 4-7481  
 After Hours/Weekends ---- 4-8724  
 Fax ----- 4-0822  
 Cath Lab Location: **11C (Main Hospital)**

### **STEMI TIMI Risk Score**

<b>History</b>			
Age $\geq$ 65 to 74 yrs	2		
$\geq$ 75 yrs	3		
DM or HTN or Angina	1		
<b>Exam</b>			
SBP < 100 mmHg	3		
Killip Class II-IV	2		
Weight < 67 kg (147.7 lbs)	1		
<b>Presentation</b>			
Anterior ST Elev or LBBB	1	<b>STEMI RISK</b>	
Time to Treatment > 4 hours	1		0-5
<b>STEMI TIMI Risk Score</b>		6-7	Mod
		> 7	High

### **ED Physician responsible for STEMI ACTIVATION and report to Cardiology:**

- Pain duration,
- Coumadin use,
- History dye or contrast allergy,
- History of prior MI/Sent, CABG, renal failure
- Age and code status
- CPR, intubation or multiple defibrillations in route
- Document rhythm on 12 lead ECG and sign.
- STEMI TIMI risk score
- Update family

### **EPTIFIBATIDE (Integrilin®) Dosing**

- For Cr Cl > 50 mL/min. Follow bolus with continuous infusion at 2 mcg/kg/min.
- For Cr Cl < 50 mL/min (or SCr > 2 if Cr Cl not available). Follow bolus with continuous infusion at 1 mcg/kg/minute

<b>PATIENT ACTUAL BODY WEIGHT (kg)</b>	<b>180 mcg/kg BOLUS VOLUME (2 mg/mL)</b>	<b>2 mcg/kg /min INFUSION RATE (0.75 mg/mL)</b>
37 to 41	3.4 mL	6 mL/hour
42 to 46	4 mL	7 mL/hour
47 to 53	4.5 mL	8 mL/hour
54 to 59	5 mL	9 mL/hour
60 to 65	5.6 mL	10 mL/hour
66 to 71	6.2 mL	11 mL/hour
72 to 78	6.8 mL	12 mL/hour
79 to 84	7.3 mL	13 mL/hour
85 to 90	7.9 mL	14 mL/hour
91 to 96	8.5 mL	15 mL/hour
97 to 103	9 mL	16 mL/hour
104 to 109	9.5 mL	17 mL/hour
110 to 115	10.2 mL	18 mL/hour
116 to 121	10.7 mL	19 mL/hour
over 121	11.3 mL	20 mL/hour

### **Contraindications**

- Abnormal bleeding within the previous 30 days or a history of bleeding diathesis
- Major surgery (within the previous 6 weeks)
- Dependence on renal dialysis
- Stroke (within previous 30 days), any history of hemorrhagic stroke
- Hypertension - severe, uncontrolled (systolic pressure over 200 mmHg or diastolic pressure above 110 mmHg)
- Concomitant or planned administration of other parenteral glycoprotein IIb/IIIa inhibitors

Reference: Micromedex

# Chest Pain

## REGISTRATION STAFF

**Alert** Triage Nurse if patient presents with

- Chest pain, pressure, tightness, or heaviness; pain that radiates to neck, jaw, shoulders, back, or 1 or both arms
- Indigestion or “heartburn”; nausea and/or vomiting associated with chest discomfort
- Persistent shortness of breath
- Weakness, dizziness, lightheadedness, loss of consciousness

## TRIAGE NURSE

### Immediate Assessment

- Chest pain or severe epigastric pain, nontraumatic in origin, with components typical of myocardial ischemia or MI:
- Central/substernal compression or crushing chest pain
- Pressure, tightness, heaviness, cramping, burning, aching sensation
- Unexplained indigestion, belching, epigastric pain
- Radiating pain in neck, jaw, shoulders, back, or 1 or both arms
  - Associated dyspnea
  - Associated nausea and/or vomiting
  - Associated diaphoresis



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### Obtain Brief History

- CABG, PCI, CAD, angina on effort or MI
- NTG use to relieve chest discomfort
- Risk factors such as smoking, hyperlipidemia, HTN, DM, family history, and cocaine or meth use
- Regular and recent medication use

If these symptoms are present, obtain immediate ECG

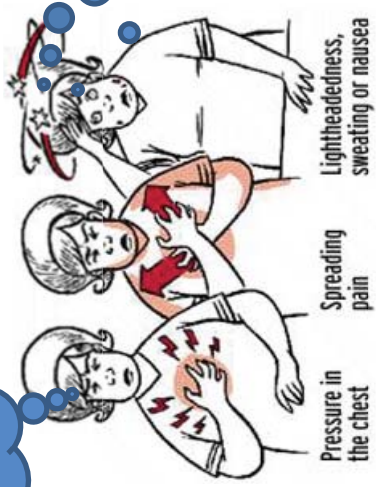
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I can't catch my breath



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  - Associated dyspnea
  - Associated nausea and/or vomiting
  - Associated diaphoresis

Obtain immediate ECG and show to physician within 5 minutes of arrival



### Obtain Brief

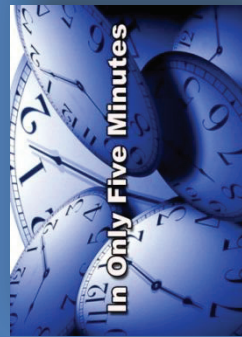
### History

- CABG, PCI, CAD, angina on effort or MI
- NTG use to relieve chest discomfort
- Risk factors such as smoking, hyperlipidemia, HTN, DM, family history, and cocaine or meth use
- Regular and recent medication use

If these symptoms are present, obtain immediate ECG



# Who requires a screening ECG?



References: Project Upstart and ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina/Non-ST-Elevation Myocardial Infarction

## Patients **OVER 30** experiencing any of the following:

- Chest pain or discomfort
- Chest pressure, tightness
- “Heartburn” or epigastric pain
- Complaints of “Heart racing” (HR > 150 or irregular and >120)
- Complaint of “Heart too slow” (HR < 50 and symptomatic)
- A syncopal episode or severe weakness in patients over 45 years old
- New onset stroke symptoms (Less than 24 hours)
- Difficult breathing (with no obvious non-cardiac cause)

## Patients regardless of age with symptoms **AND HISTORY OF:**

- Prior cardiac disease such as heart attack
- Family history of early heart disease
- Diabetes
- Severe obesity
- Recent cocaine use

## Obtain immediate ECG and show to physician within 5 minutes of arrival

### Reminder

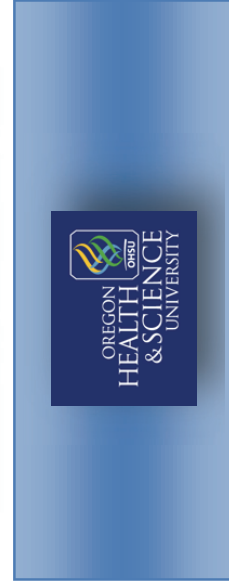
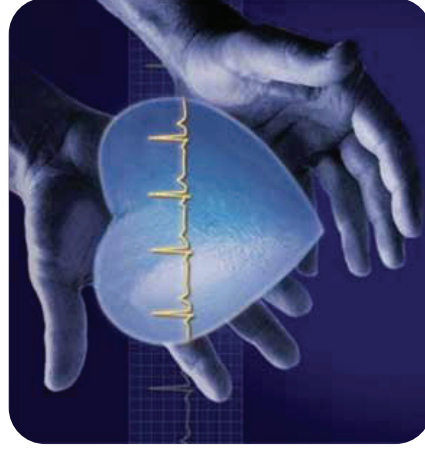
- Transport patients by wheelchair
- Women and diabetic* patients are more likely to present with atypical symptoms.
- Elderly patients* may have symptoms such as generalized weakness, altered mental status or syncope as their only sign of acute heart attack
- Transplant patients* have a denervated heart so may present with nausea, SOB and diaphoresis

Guidelines for Diagnosis and Management of  
**Acute Coronary Syndrome**  
Oregon Health & Science University (OHSU)

**2009**

These guidelines were developed by Oregon Health & Science University Cardiovascular Service Line. They are intended to guide diagnosis and treatment of patients presenting to the Emergency Department with signs and symptoms suggestive of acute coronary syndrome (ACS). Recommendations are based on stratification into ACS-probability categories.

*This is a guideline only and should not be substituted for individual clinical judgment*



# Guidelines for diagnosis and management of ACS– 2009

## Assign patient to ACS-probability category based on signs and symptoms

CAD Likelihood	High	Intermediate	Low
<b>Presentation/History</b>	<ul style="list-style-type: none"> <li>Recurrent angina/ Worsening HF</li> <li>Hemodynamic instability</li> <li>Sustained VT</li> <li>PCI within 6 mo</li> <li>LVEF below 40%</li> <li>Prior CABG</li> </ul>	<ul style="list-style-type: none"> <li>Primary symptom of chest pain/left arm pain</li> <li>Extracardiac vascular disease</li> <li>Age &gt; 70/Male</li> <li>Diabetes</li> </ul>	<ul style="list-style-type: none"> <li>Probable ischemic symptoms with no intermediate characteristics</li> <li>Chest pain reproduced by palpitation</li> <li>Recent cocaine use</li> </ul>
<b>ECG/Cardiac Markers</b>	<ul style="list-style-type: none"> <li>New ST Seg depression &gt; 1 mm or inverted T waves in multiple precordial leads</li> <li>Elevated Troponin</li> <li>High-risk finding on noninvasive testing</li> </ul>	<ul style="list-style-type: none"> <li>Q waves</li> <li>ST depression 0.5 mm to 1mm or T wave inversion &gt; 1mm</li> <li>Normal Troponin</li> </ul>	<ul style="list-style-type: none"> <li>T wave flattening or inversion &lt; 1 mm in leads with dominate R waves</li> <li>Normal ECG</li> <li>Normal Troponins</li> </ul>

	HIGH Probability		Intermediate Probability	Low Probability
	STEMI	NSTEMI Unstable Angina		
<b>Examination</b>	Typical of ischemia/infarction	Strongly suggestive of ischemia/infarction	Strongly suggestive of ischemia	Suggestive but atypical for ischemia
<b>ECG</b> Within 5 min with Dr. Interpretation	<ul style="list-style-type: none"> <li>ST elevation in 2 or more contiguous leads</li> <li>New LBBB</li> </ul>	<ul style="list-style-type: none"> <li>ST Depression greater than 1mm</li> <li>Deep T-wave inversion</li> <li>Normal ECG does not exclude</li> </ul>	Normal or non-specific with or without pain.	Normal or non-specific, with or without pain.
<b>Troponin</b>	May or may not be elevated , typically elevate at 6 hours	If elevated (with or without ECG changes): NSTEMI If Normal: Unstable Angina	Must be normal at 0 & 6, (12) from ED arrival.	Must be normal at 0 & 6, (12) from ED arrival.

TIMI Risk Score	STEMI		NSTEMI		Intermediate	Low
	STEMI TIMI Risk	Score	UA/ NSTEMI TIMI Risk	Score		
	Age 65-74	2	Age > 65	1	Use UA/NSTEMI TIMI Risk Score  <b>Inpatient Telemetry / ED Obs</b> <ul style="list-style-type: none"> <li>ECG and Troponin every 6 hours X 2 from ED arrival</li> <li>If normal troponin, negative ECG, no recurrent chest pain then obtain imaging stress test prior to discharge.</li> <li>Consider Cardiology Consult</li> <li>Able to exercise               <ul style="list-style-type: none"> <li>Exercise stress ECHO</li> <li>Exercise nuclear stress test</li> </ul> </li> <li>Unable to exercise               <ul style="list-style-type: none"> <li>Dobutamine Stress ECHO</li> <li>Dipyridamole Nuclear stress test</li> </ul> </li> </ul>	Use UA/NSTEMI TIMI Risk Score  <b>ED Obs</b> <ul style="list-style-type: none"> <li>ECG and Troponin every 6 x 2 from ED arrival</li> <li>If stable vital signs, consider discharge and imaging stress test or cardiac CT within 72 hours</li> </ul>
	Age > 75	3	>3 CAD Risk Factors	1		
	DM/HTN or angina	1	Known CAD (Stenosis >50%)	1		
	SPB < 100	3	ASA use in past 7 days	1		
	HR > 100	2	Recurrent (<24 hr) severe angina	1		
	Killip Class II-IV	2	Cardiac Markers	1		
	Weight < 67 kg	1	ST deviation >0.5mm	1		
	Anterior STE or LBBB	1	<b>TOTAL</b>	<b>(0-7)**</b>		
	Time to treat > 4 hours	1	See Page 4 for scoring risk calculations			
	<b>TOTAL</b>	<b>(0-14)*</b>				
<b>Admit</b>	<b>Cath Lab/ ICU</b>		<b>ICU/Inpatient Telemetry</b>		<b>Inpatient Telemetry / ED Obs</b> <ul style="list-style-type: none"> <li>ECG and Troponin every 6 hours X 2 from ED arrival</li> <li>If normal troponin, negative ECG, no recurrent chest pain then obtain imaging stress test prior to discharge.</li> <li>Consider Cardiology Consult</li> <li>Able to exercise               <ul style="list-style-type: none"> <li>Exercise stress ECHO</li> <li>Exercise nuclear stress test</li> </ul> </li> <li>Unable to exercise               <ul style="list-style-type: none"> <li>Dobutamine Stress ECHO</li> <li>Dipyridamole Nuclear stress test</li> </ul> </li> </ul>	<b>ED Obs</b> <ul style="list-style-type: none"> <li>ECG and Troponin every 6 x 2 from ED arrival</li> <li>If stable vital signs, consider discharge and imaging stress test or cardiac CT within 72 hours</li> </ul>
<b>Diagnostic and Therapeutic</b>	<b>If estimated D2B Less than 90 min</b>	<b>If estimated D2B Greater than 90 min</b>	<b>Immediate Invasive</b>	<b>Early Invasive</b>		
	*document rationale if no reperfusion attempted					
	<b>URGENT REPERFUSION</b> Primary PCI in less than 90 minutes door-to-balloon time	<b>URGENT REPERFUSION</b> Fibrinolytic in less than 30 minutes	<b>ECG and Troponin</b> every 6 hours from ED arrival Cath with intervention as indicated ASAP (ongoing chest pain or hemodynamic instability)	<b>ECG and Troponin</b> every 6 hours from ED arrival Cath or transfer to interventional center within 24 hours or immediately if ongoing pain		
<b>Initial Medication</b> NOTE: Do not give beta blockers if pulse below 60, SBP below 100, or signs of heart failure, cardiogenic shock or AV Block	<ul style="list-style-type: none"> <li>Oxygen</li> <li>Aspirin</li> <li>Beta Blocker</li> <li>Heparin</li> <li>Clopidogrel</li> <li>Eptifibatide</li> <li>NTG/Morphine</li> <li>Statin</li> <li>ACEI or ARB</li> </ul>	<ul style="list-style-type: none"> <li>Oxygen</li> <li>Aspirin</li> <li>Clopidogrel</li> <li>Beta Blocker</li> <li>Heparin</li> <li>NTG</li> <li>Morphine</li> </ul>	<ul style="list-style-type: none"> <li>Oxygen</li> <li>Aspirin</li> <li>Beta Blocker</li> <li>Heparin</li> <li>Eptifibatide</li> <li>NTG</li> <li>Morphine</li> </ul>	<ul style="list-style-type: none"> <li>Oxygen</li> <li>Aspirin</li> <li>Beta Blocker</li> <li>Heparin</li> <li>Eptifibatide</li> <li>NTG</li> <li>Morphine</li> </ul>		<ul style="list-style-type: none"> <li>As indicated</li> </ul>
<b>Adjunct care unless contraindicated</b>	<ul style="list-style-type: none"> <li>ACEI or ARB</li> <li>Clopidogrel 300-600 mg by mouth after PCI if not administered prior to PCI, then 75 mg by mouth for &gt; 3-12 months (for DES)</li> </ul>	<ul style="list-style-type: none"> <li>ACEI or ARB</li> <li>Clopidogrel 300-600 mg by mouth after PCI then 75 mg by mouth for &gt; 3-12 months (&gt; 12 months for DES)</li> </ul>	<ul style="list-style-type: none"> <li>Statin</li> <li>ACEI or ARB</li> <li>Clopidogrel 300-600mg by mouth after PCI, then 75 mg by mouth for &gt; 3-12 months (&gt; 12 months for DES)</li> </ul>	<ul style="list-style-type: none"> <li>Statin</li> <li>ACEI or ARB</li> </ul>		<ul style="list-style-type: none"> <li>As indicated</li> <li>If evaluation is negative for ischemia consider pulmonary embolism, pericarditis, aortic dissection, and GI</li> </ul>



### OHSU STEMI Process Through the ED

### EPTIFIBATIDE (Integrilin®) Dosing

Bolus of 180 micrograms/kilogram (mcg/kg) at the time of diagnosis

- (maximum 22.6 mg)
- Followed by an infusion of 2 mcg/kg /min (maximum 15 mg/hr)
- **Renal dosing (CRCL < 50 ml/min)**
- **DO NOT USE IF Cr ≥ 4**
  - Bolus 180 micrograms/kilogram (Maximum 22.6 mg)
  - Infusion 1 mcg/kg/min (Maximum 7.5 mg/hr)

PATIENT ACTUAL BODY WEIGHT (Kg)	BOLUS VOLUME (2 mg/mL)	180 mcg/kg 2 mcg/kg /min INFUSION RATE (0.75 mg/mL)
37 to 41	3.4 mL	6 mL/hour
42 to 46	4 mL	7 mL/hour
47 to 53	4.5 mL	8 mL/hour
54 to 59	5 mL	9 mL/hour
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**Contraindications**

- Abnormal bleeding within the previous 30 days or a history of bleeding diathesis
- Major surgery (within the previous 6 weeks)
- Dependence on renal dialysis
- Stroke (within previous 30 days), any history of hemorrhagic stroke
- Hypertension - severe, uncontrolled (systolic pressure over 200 mmHg or diastolic pressure above 110 mmHg)
- Concomitant or planned administration of other parenteral glycoprotein IIb/IIIa inhibitors

Reference: Micromedex

## Intermediate

Discharge Criteria

- Normal Troponin
- Assessment of LV Function (TTE )
- Normal ECG or no change from previous ECG prior to admission
- No recurrent chest pain
- Stable vital signs
- Negative or low risk imaging stress test
- Consider Phase I cardiac rehab

## Low

Discharge Follow-up

- Follow up appointment with PCP
- Medication reconciliation
- Stress testing arranged within 72 hours
- Discharge instructions- when to call 911 , return to ED, contact PCP

## Discharge Follow-up

Discharge Criteria

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- Assessment of LV Function (TTE )
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- Negative or low risk imaging stress test
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*STEMI TIMI RISK		**UA/NSTEMI TIMI RISK	
Score	30 day mortality risk	Risk Score	Death, MI or Urgent Revasc
0	0.1	0/1	3
1	0.3	2	3
2	0.4	3	5
3	0.7	4	7
4	1.2	5	12
5	2.2	6	19
6	3.0	7	26
7	4.8	8	41
8	5.8		
>8	8.8		

# STEMI Transfers

Ground miles versus nautical miles and mean  
Life flight transport time to OHSU

