The Role of EMS in Emergency Cardiac & Stroke Care

Pierce County
May 2011

Objectives

- Introduce Washington's new Emergency Cardiac and Stroke System
- Review cardiac & stroke protocol guidelines
- Review cardiac & stroke triage tools
- Administer stroke F.A.S.T. assessment
- Apply triage tools
- Discuss cardiac & stroke quality improvement opportunities

Emergency Cardiac & Stroke System

- Why do we need a system?
  What are the components?
  How will it work in Washington?

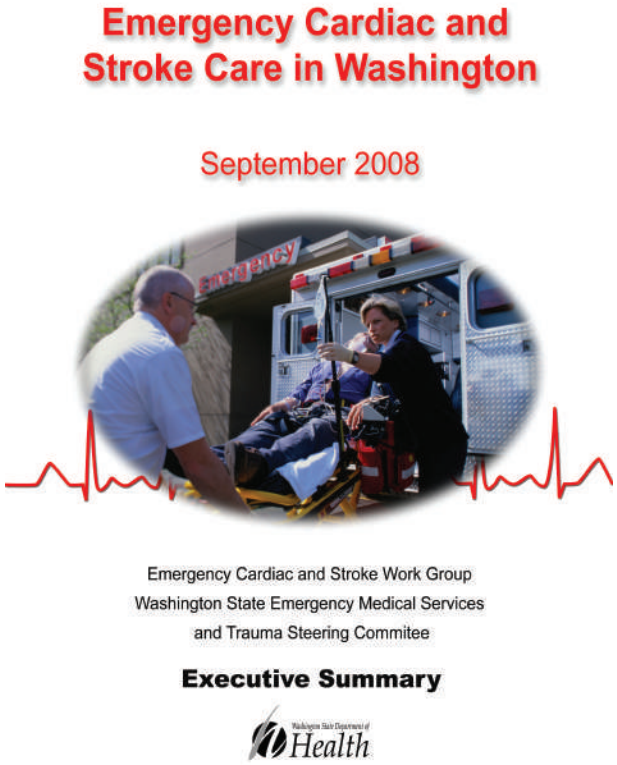
Why do we need a system?

Systems minimize delays in the chain of survival

Deliver the **right** patient,
to the **right** place,
in the **right** amount of time.

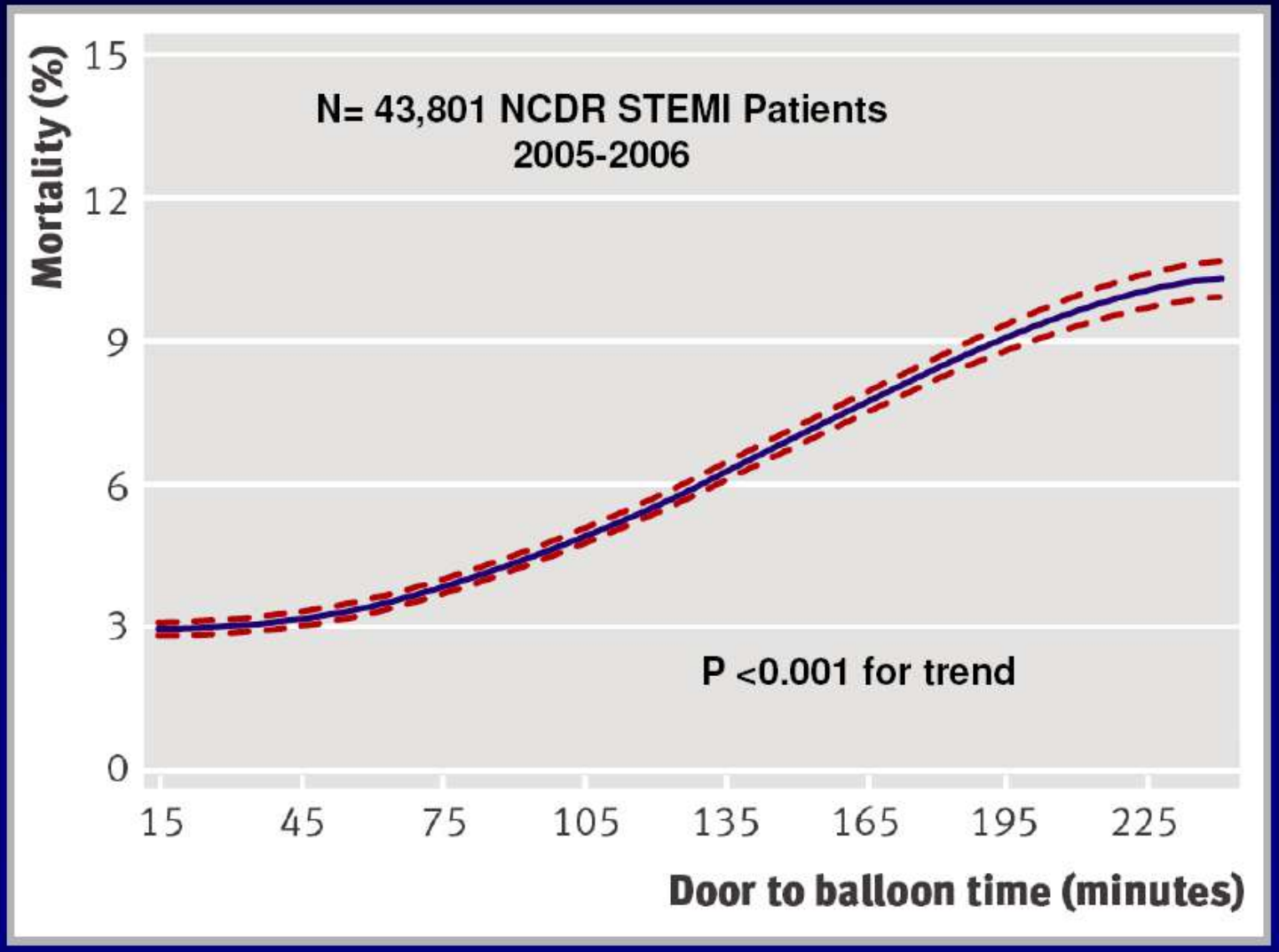
Why do we need a system?

- People aren't getting proven treatments
  - <50% of heart attacks get PCI
  - <3% of ischemic strokes get tPA
- Variation in care and outcomes across the state
- Time to treatment makes big difference in outcomes
- Because we can do better



D2B and Mortality

In hosp Mort Adjusted for Clinical + Procedural Features



Rathore BMJ 338: b 1807, 2009

D2N and Stroke Mortality

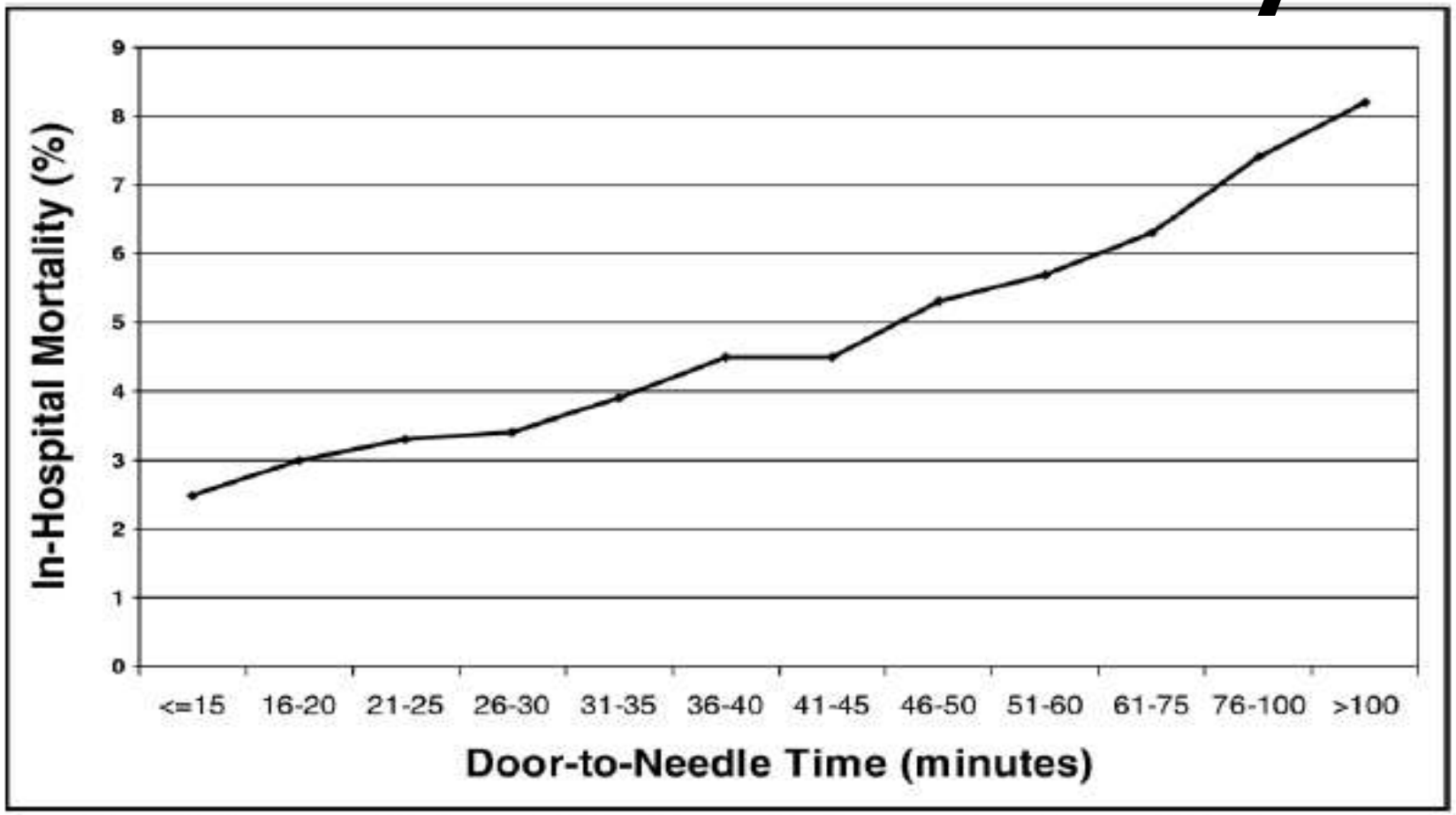


Figure 2. Door-to-needle time and in-hospital mortality for the entire cohort, p <0.001 for trend.

McNamara, et al.; American Journal of Cardiology 2007.05.043

Stroke
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Stroke Association
A Division of American Heart Association

Recommendations for the Establishment of Stroke Systems of Care: Recommendations From the American Stroke Association's Task Force on the Development of Stroke Systems

Task Force Members, Lee H. Schwamm, Arthur Pancioli, Joe E. Acker, III, Larry B. Goldstein, Richard D. Zorowitz, Timothy J. Shephard, Peter Moyer, Mark Gorman, S. Claiborne Johnston, Pamela W. Duncan, Phil Gorelick, Jeffery Frank, Steven K. Stranne, Renee Smith, William Federspiel, Katie B. Horton, Ellen Magnis and Robert J. Adams

Stroke 2005;36;690-703; originally published online Feb 2, 2005;
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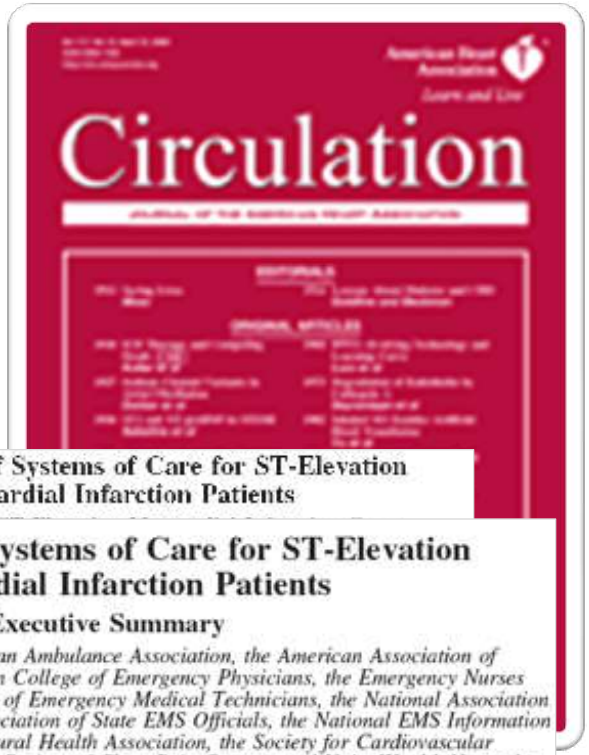


Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

Regional Systems of Care for Out-of-Hospital Cardiac Arrest. A Policy Statement From the American Heart Association

Graham Nichol, Tom P. Aufderheide, Brian Eigel, Robert W. Neumar, Keith G. Lurie, Vincent J. Bufalino, Clifton W. Callaway, Venugopal Menon, Robert R. Bass, Benjamin S. Abella, Michael Sayre, Cynthia M. Dougherty, Edward M. Racht, Monica E. Kleinman, Robert E. O'Connor, John P. Reilly, Eric W. Ossmann, Eric Peterson and on behalf of the American Heart Association Emergency Cardiovascular Care Committee; Council on Arteriosclerosis, Thrombosis, and Vascular Biology; Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation; Council on Cardiovascular Nursi

Circulation published online Jan 14, 2010;

Development of Systems of Care for ST-Elevation Myocardial Infarction Patients

Development of Systems of Care for ST-Elevation Myocardial Infarction Patients

Executive Summary

Endorsed by Aetna, the American Ambulance Association, the American Association of Critical-Care Nurses, the American College of Emergency Physicians, the Emergency Nurses Association, the National Association of Emergency Medical Technicians, the National Association of EMS Physicians, the National Association of State EMS Officials, the National EMS Information System Project, the National Rural Health Association, the Society for Cardiovascular Angiography and Interventions, the Society of Chest Pain Centers, and UnitedHealth Networks

Alice K. Jacobs, MD, FAHA, Chair; Elliott M. Antman, MD, FAHA; David P. Faxon, MD, FAHA; Tammy Gregory; Penelope Solis, JD

Penelope Solis, JD; Ezra A. Amsterdam, MD; Vincent Bufalino, MD, FAHA; Barbara J. Drew, RN, PhD, FAHA; Alice K. Jacobs, MD, FAHA

Systems Work!

- National momentum
  - American Heart /American Stroke Association
  - American College of Cardiology
  - Centers for Disease Control – CARES
  - Society for Chest Pain Centers
  - CMS
- Examples
  - North Carolina RACE
  - Los Angeles
  - Minnesota Cardiac Level 1
  - Spokane and North Puget Sound Cardiac Level 1
  - Cascade Heart-Rescue

SSHB 2396 Passed in 2010

WA Legislation setting up Emergency Cardiac & Stroke Systems

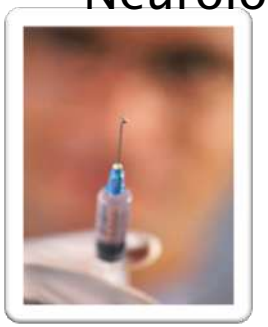
SSHB 2396 2010-03-15L_4999

System Components

911

Dispatch

Neurology / Cardiology



Every Second Counts!

Washington's Approach

Emergency Cardiac & Stroke Technical Advisory Committee made recommendations on:

- Dispatch guidelines
- Standardized EMS protocol guidelines
- Standardized EMS triage tools
- Voluntary hospital categorization
- Quality improvement & data collection
- Public education

Goal: *Get right patient to right hospital in time for treatment*

Partially blocked artery

Completely blocked artery

Emergency Cardiac Care

- **Prehospital protocol guidelines**
  Triage tool
  Hospital levels

ACS ALS Protocol

I. Scene Size-Up/Primary Patient Assessment

A) Monitor/support ABCs

B) Be prepared to provide CPR/Defibrillation

II."Pit crew" approach to pt. care

A) Team leader interviews pt. & obtains hx

B) Crew assigned to various tasks at patient side:

- Vital signs & place patient
- Obtain and transmit a 12 Lead ECG on suspected ACS/STEMI pts. < 10 min. of pt. contact (EPFR goal)
- Establish an IV or saline lock if time permits
- Prepare to extricate patient to unit

ACS ALS Protocol

III. Secondary Physical Exam & History

A) Assess patient for signs and symptoms of Acute Coronary Syndrome
   - *Be mindful of atypical presentations:*
     - *Weakness, dyspnea, AMS in elderly*
     - *Nausea, vomiting, weakness in diabetics*
     - *Epigastric discomfort when accompanied by dyspnea, weakness or diaphoresis is ACS until proven otherwise*

B) Ensure 12-lead ECG is obtained in the atypical presentations, described above

C) Repeat 12-lead if symptoms, worsen, change o reoccur.

IV. **Objective: limit scene time to <15 min.**

ACS ALS Protocol (cont.)

V. Clinical Management:

A) Notify receiving hospital with transmission and/or interpretation of ECG

B) Administer oxygen, as appropriate

C) Administer 160-325 mg non-enteric-coated ASA, crushed or chewed (unless allergy history)

D) Administer NTG 0.4 mg spray q 3-5 minutes up to 3 doses

Contraindications:

- SBP <100 mm Hg.
- Severe bradycardia (heart rate < 50/min)
- Erectile dysfunction drugs taken within 48 hours.

Cautions:

- Use with caution or seek expert consultation if HR > 100 systolic
- Extreme caution in patients who may have RV infarction

E) Obtain IV access

F) Administer opiates as needed for pain control – Fentanyl ideal in ACS pts

ACS ALS Protocol (cont.)

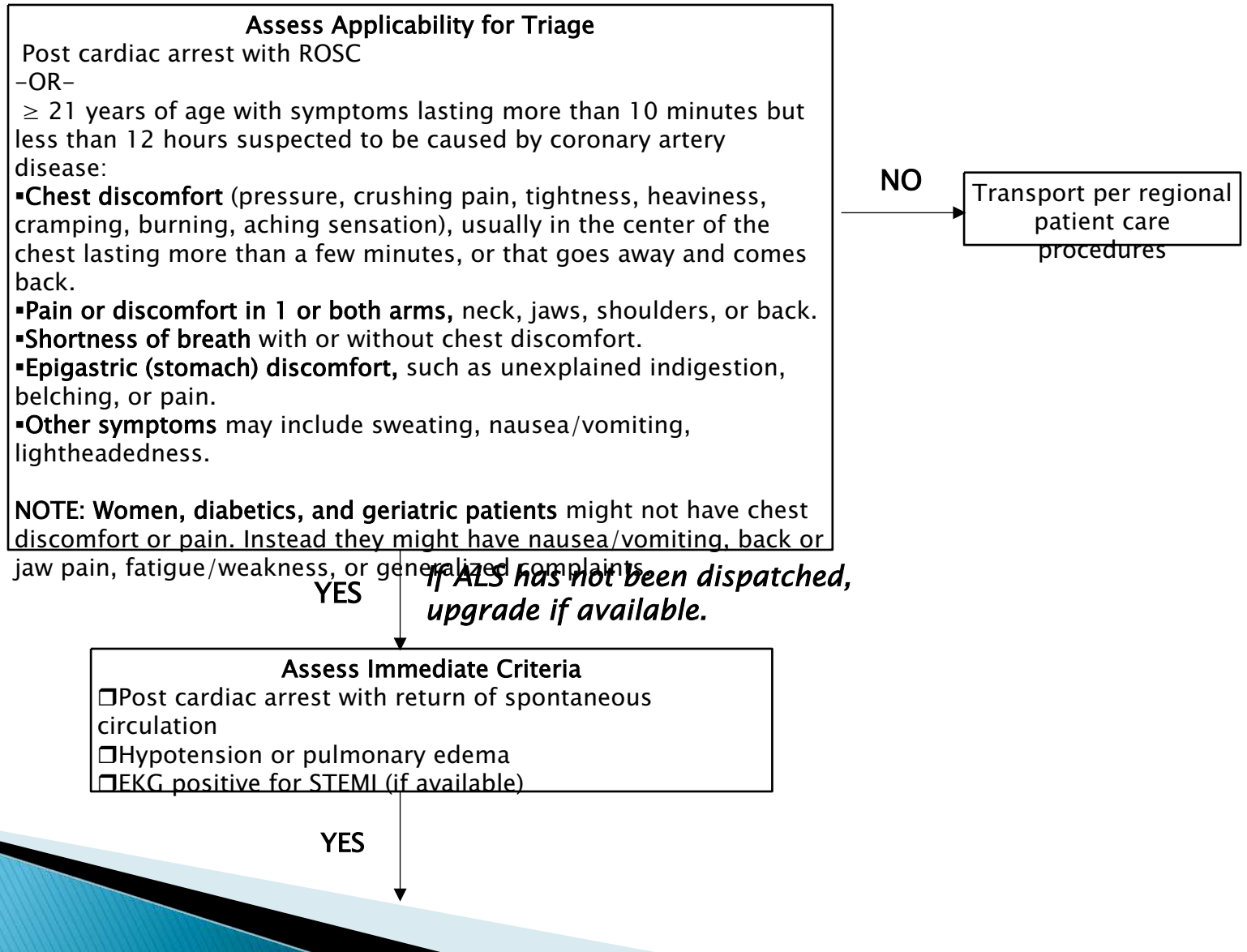
IV. Ongoing Assessment, treatment & transport

A)Repeat 12-lead ECG as needed

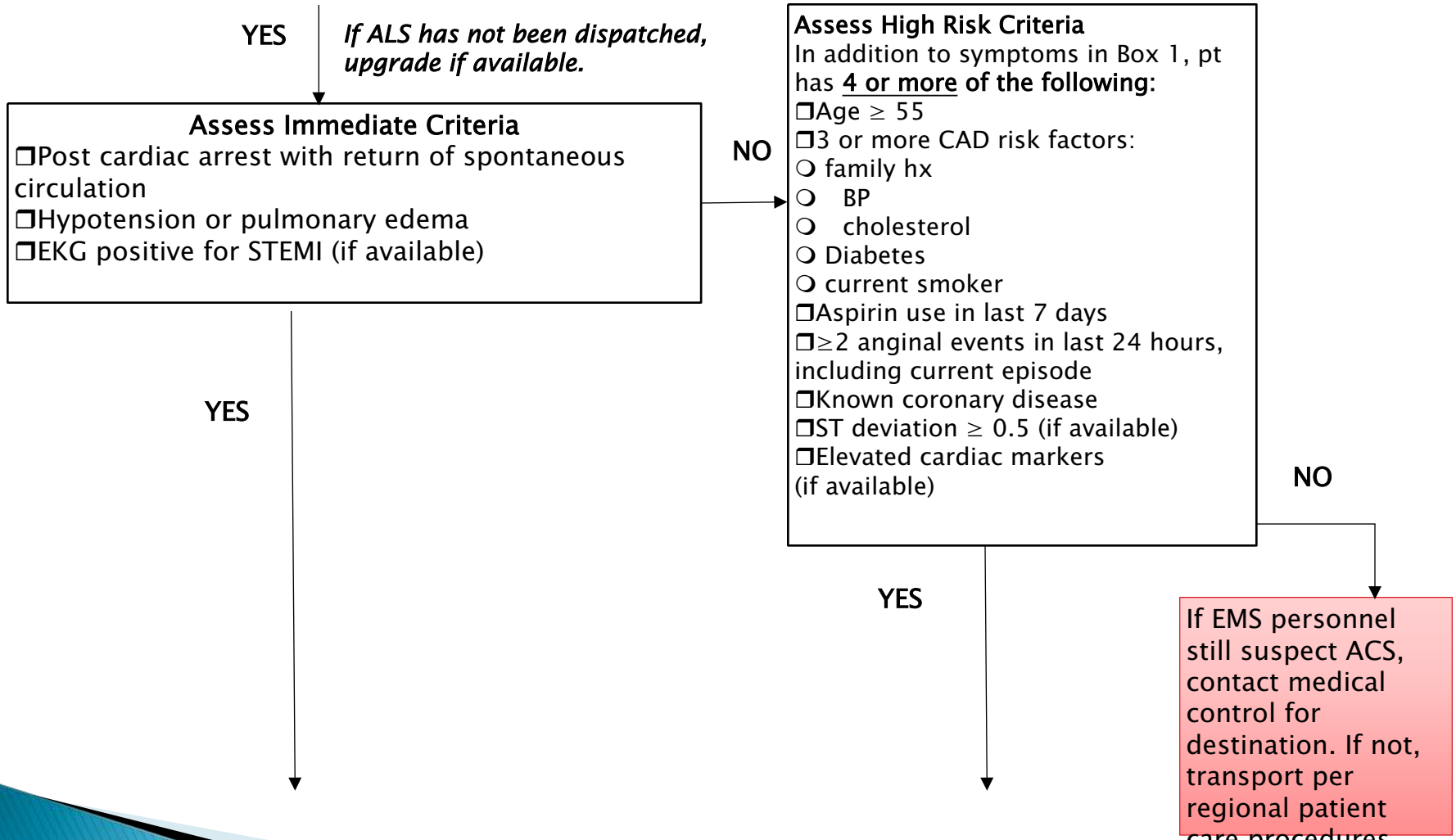
B) Fluids, pain control

C) Follow State Prehospital Cardiac Triage Destination Procedure

Cardiac Triage Tool



Cardiac Triage Tool (cont.)



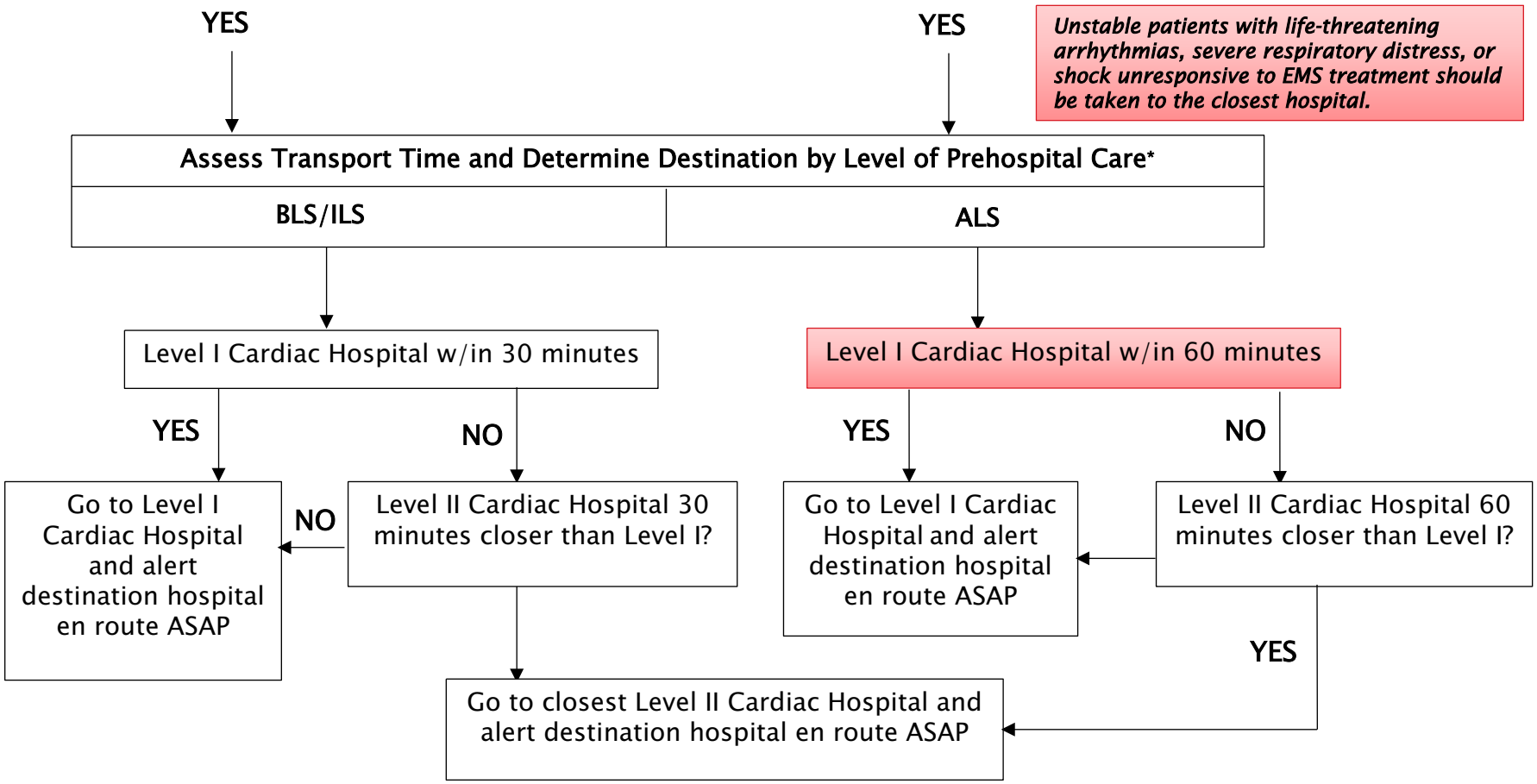
Assess High Risk Criteria *(4 or more)*

- 3 or more CAD (coronary artery disease) risk factors:
  - Age ≥ 55 (epidemiological data in WA State show that incidence of heart attack increases at this age)
  - Family history: father or brother with heart disease before 55, or mother or sister before 65
  - High blood pressure: ≥140/90, or patient/family report, or on blood pressure medication
  - High cholesterol: patient/family report or on cholesterol medication
  - Diabetes: patient family report
  - Current smoker: patient family report
- Aspirin use in last 7 days: any aspirin use in last 7 days ??
- ≥2 anginal events in last 24 hours: 2 episodes of symptoms described in first box of the triage tool, including the current event
- Known coronary disease: history of angina, heart attack, cardiac arrest, congestive heart failure, balloon angioplasty, stent, or bypass surgery
- ST deviation ≥ 0.5 mm (if available): ST depression ≥ 0.5 mm is significant; transient ST elevation ≥ 0.5 mm for < 20 minutes is treated as ST-segment depression and is high risk; ST elevation >1 mm for more than 20 minutes places these patients in the STEMI treatment category
- Elevated cardiac markers (if available) CK-MB or Troponin I in the "high probability" range of the device used. Only definitely positive results should be used in triage decisions. (Future use? Pros, Cons)

No High Risk Criteria—but EMS still suspects ACS Patient

- Even if patient does not meet High Risk Criteria (i.e. only 3 boxes positive), EMS crew may still have high index of suspicion that patient is a high risk ACS patient (i.e. patient has had 4 stents and states “this feels just like last heart attack”)
- This allows for medic judgment. Err on the side of a higher level of care.
- Contact medical control and consult with physician or RN for appropriate patient destination.

Cardiac Triage Tool (cont.)



Asses Transport Time & Determine Destination by Level of Prehospital Care

- If there are two or more Level I facilities to choose from within the transport timeframe, patient preference, insurance coverage, physician practice patterns, and local rotation agreements may be considered in determining destination.
- This also applies if there are two or more Level II facilities to choose from.
- Patients benefit from continuity of care.

Determine Destination

- The general guideline is to take a patient meeting the triage criteria ***directly to a Level I cardiac hospital (24/7 Cardiac Cath Lab)*** within reasonable transport times, generally 60 minutes for ALS units, or 30 min. for BLS units.

- **Inform the receiving hospital ASAP so E.D. staff can activate the cath lab and call in personnel if necessary.**

Cardiac Destination Issues

- In other parts of state, a lack of 24/7 Cath Lab-equipped hospitals requires that EMS units in those systems carefully determine appropriate destination for STEMI / High-Risk cardiac pts.

- Pierce County is fortunate to have multiple Level 1 Cardiac Hospitals—transport times will rarely exceed standards of 60 min. transport via ALS unit or 30 min. via BLS unit.

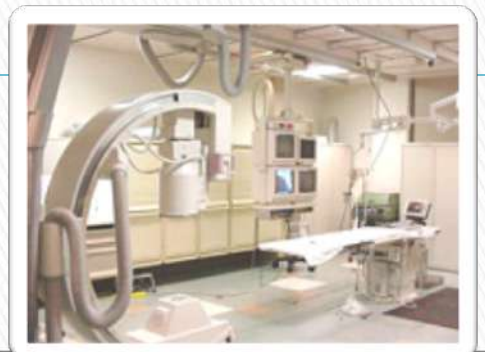
Emergency Cardiac Hospitals

- Cardiac team activation policy and criteria based on EMS pre-arrival notification
- Cardiac protocols include use of induced hypothermia for post-cardiac arrest patients.
- Participate in regional QI program that includes EMS
- Provide training for EMS if requested, particularly in reading ECG for STEMI
- No divert policy for emergency cardiac cases (STEMI, cardiac arrest, post cardiac arrest with ROSC)

Hospital Levels–Emergency Cardiac

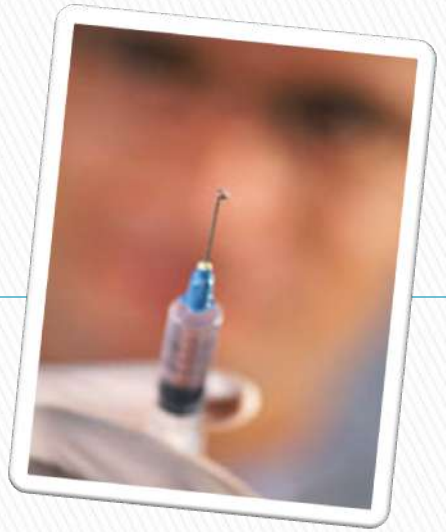
Level One

- Perform PCI 24/7 within 90 minutes
- Interventional cardiologists and cath lab team available within 30 minutes 24/7
- Cardiac surgery onsite or transfer agreements



Level Two

- Administer fibrinolytics 24/7 within 30 minutes
- ACLS trained providers



Our Local Cardiac Hospitals

Level Ones

- Tacoma General
- St. Joseph
- Good Samaritan
- Auburn Regional
- St. Francis

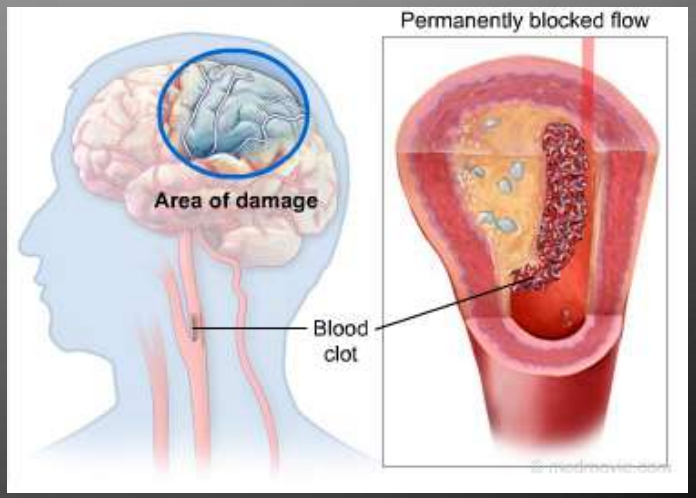
Level Twos

- St. Elizabeth
- Allenmore
- St. Clare
- St. Anthony (?)

- NOTE: Madigan is not participating at this time

Acute Stroke

- Prehospital protocol guidelines
  Triage tool
  Hospital levels



Signs of a Stroke

Stroke Protocol

I. Scene Size-Up/Primary Patient Assessment

- Support ABCs
- Check glucose, temperature, SpO2 (if possible)
- Treat hypoglycemia (if possible)
- NPO

Stroke Protocol

II. Secondary Survey

- Perform FAST Assessment (**Face/Arms/Speech/Time last normal)**
  - **One abnormal finding is extremely sensitive for stroke**
  - **TIME LAST NORMAL, after establishing an adequate glucose level, is PARAMOUNT**
  - **Question all possible bystanders and attempt to nail down an exact time the patient seen NORMAL. If this cannot be determined, then do not make up times or guess.**

B) Limit scene time with goal of ≤ 15 minutes.

Stroke Protocol (cont.)

III. Transport

A) Early hospital notification – specify FAST findings (issue stroke alert & share abnormal physical findings and TIME LAST NORMAL).

B) Transport according to Washington State Stroke Triage Tool and regional patient care procedures.

C) If closest appropriate facility is greater than 30 minutes, consider air transport when appropriate.

Stroke Protocol (cont.)

IV. Management/Ongoing Assessment en route

- Lay patient flat unless signs of airway compromise, in which case elevate no higher than 20 degrees.
- IV access (as able)
  - Ideally, 16 or 18 ga IV in unaffected arm (affected arm is acceptable)
  - Normal saline (avoid glucose-containing and hypotonic solutions)
  - Optional: Blood draw with IV start
- 2nd exam/neurologic reassessment
- Optional: initiate tPA checklist

Stroke Triage Tool

Assess Applicability for Triage

Report from patient or bystander of one or more **sudden**:

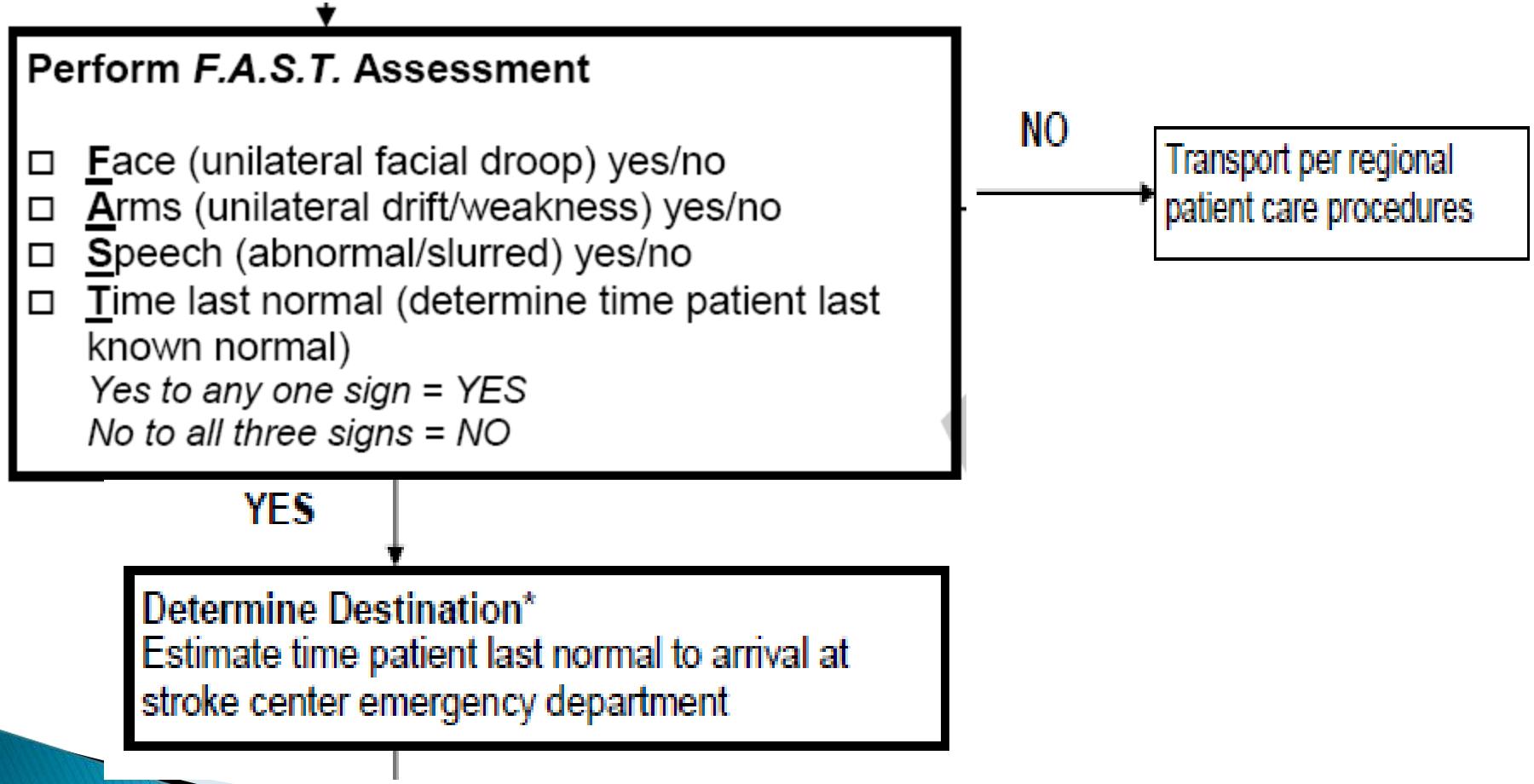
- ☐ Numbness or weakness of the face, arm or leg, especially on one side of the body
- ☐ Confusion, trouble speaking or understanding
- ☐ Trouble seeing in one or both eyes
- ☐ Trouble walking, dizziness, loss of balance or coordination
- ☐ Severe headache with no known cause

NO →

Transport per regional patient care procedures

Yes?

Stroke Triage Tool



FAST Assessment

Test	Normal	Abnormal
Facial droop: Ask the patient to show his or her teeth. Watch closely to observe that both sides of the face move equally.	Both sides of the face move equally	One side of the face does not move as well as the other

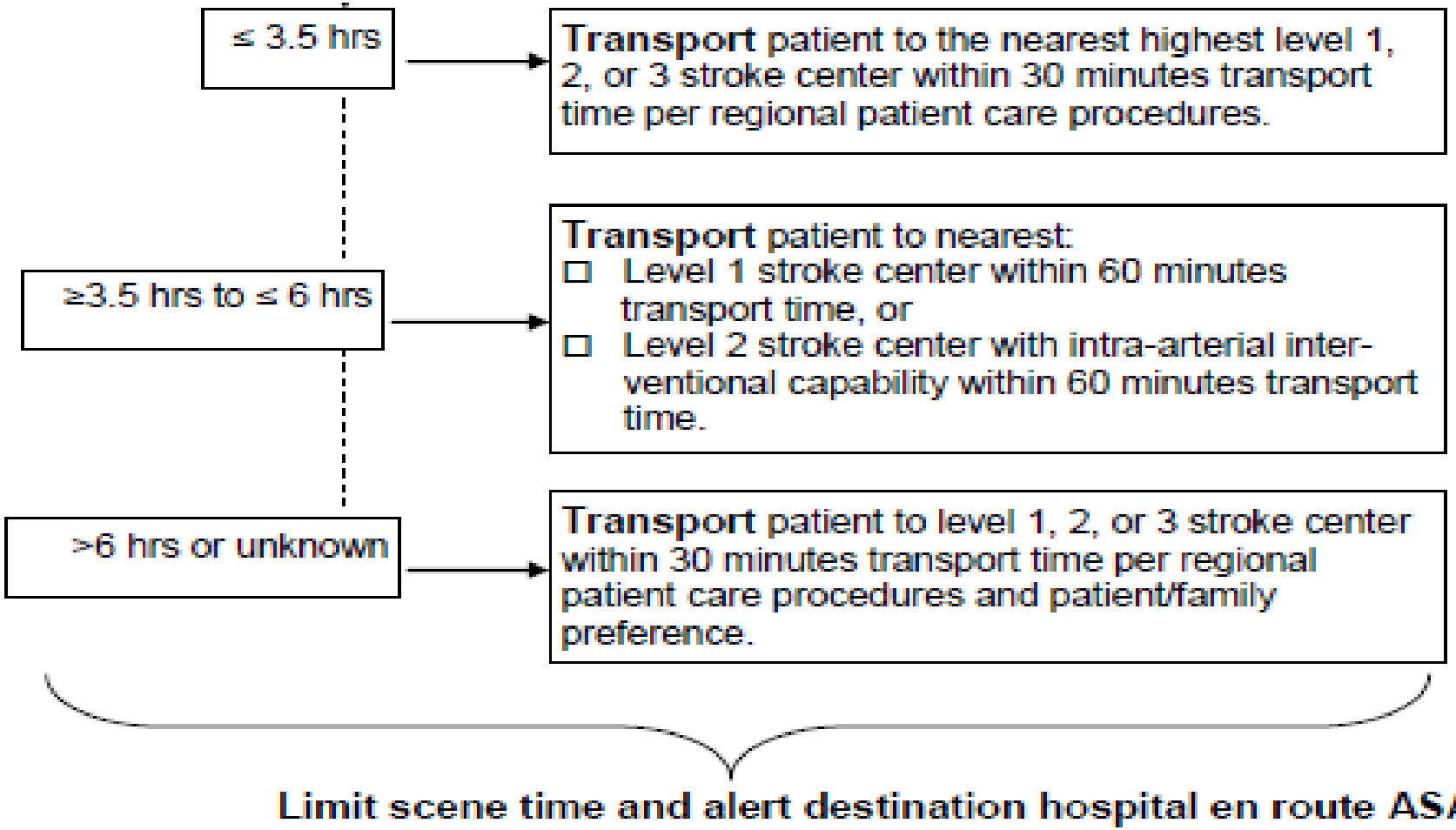
FAST Assessment (cont.)

Test	Normal	Abnormal
Arm drift: Ask the patient to close his or her eyes and extends both arms straight out for 10 seconds. The palms should be up, thumbs pointing out.	Both arms move the same or both arms do not move at all	One arm drifts down compared to the other or one arm does not move

FAST Assessment (cont.)

Test	Normal	Abnormal
Speech: Ask the patient to repeat a simple phrase such as "Firefighters are my friends."	The patient says correct words with no slurring of words	The patient slurs words, says the wrong words, or is unable to speak
Time: Ask the patient, family or bystanders the last time the patient was seen normal.		

Destination if YES on F, A, or S



TIME: from "Last Normal " to est. time at hosp. E.D.

"Possible stroke w/ x symptoms"

TIME LAST NORMAL

- < 3.5 hours
  - Patient is in eligibility time frame for IV or IA tPA if there are no exclusion criteria
  - Time to transfer patients for IA tPA if necessary
- 3.5 – 6 hours
  - IA tPA is preferred and cutoff of 4.5 hours of IV tPA in select circumstances
- Over 6 hours
  - tPA generally excluded from possible interventions

Exclusion criteria for tPA

- Use of coumadin
- BP > 185/110
- Witnessed seizure at onset
- *Any* history of intracranial hemorrhage
- GI/GU bleeding within 3 weeks
- Stroke within 3 months of prior stroke
- Stroke within 3 months of serious head injury
- Stroke within 21 days of AMI
- Stroke within 21 days of LP
- Stroke within 14 days of major surgery or serious trauma
- Pregnancy
- ADDITIONAL EXCLUSION CRITERIA ARE BASED ON CLINICAL EXAM AND CT FINDINGS

Exclusion criteria for tPA

- MINIMIZE scene time to stay within windows of treatment
- Clearly identify TIME LAST NORMAL
- Communicate information to base, stating:
  - "Possible CODE NEURO"
  - "Abnormal FAST…"—*specifying exam findings*
  - "TIME LAST NORMAL is…" *or unknown*
  - Any EXCLUSION CRITERIA for tPA. CRITERIA

- *Should we have exclusion checklists and complete them en route?*

tPA in stroke

- A very dangerous intervention
- Even in those patients that meet all criteria, there is a 3-6% chance of fatal intracranial hemorrhage.
- The earlier administered, the lower likelihood of bleed.
- TIME LAST NORMAL is CRUCIAL.
- MAKE EVERY EFFORT TO TRANSPORT FAMILY/CAREGIVER OR HAVE ACCURATE CONTACT INFORMATION

Hospital Levels-Stroke

- Level 1-Comprehensive Stroke Center
  - Certified Primary Stroke Center that also has:
    - Neurologist w/in 20 minutes 24/7
    - Neurosurgeon w/in 30 minutes 24/7
    - Vascular neurologist and vascular surgeon
    - Other highly specialized stroke care capabilities
- Level 2- Primary Stroke Center
  - Has the necessary staffing, infrastructure, and programs to stabilize and treat most acute stroke patients.
  - Some may also have capability to do more advance intra-arterial therapies
- Level 3-Acute Stroke Center
  - Have the infrastructure and capability to care for acute stroke, including administration of IV t-PA
  - Most stroke patients would be transferred to a Level 1 or 2 post-treatment

Our Local Stroke Hospitals

- Level 1 Stroke Centers
  - Tacoma General Hospital
  - St. Joseph Medical Center
- Level 3 Stroke Centers
  - Good Samaritan Hospital
  - Allenmore Hospital
  - St. Clare Hospital
  - St. Francis Hospital
  - St. Elizabeth Hospital

Working Systems

- Data collection
- Quality improvement
- Resources & tools

Data and Quality Improvement

ECS TAC Report:

Develop a comprehensive data system to demonstrate the effectiveness of the ECS system and improve performance. Include dispatch, EMS and hospitals, and use existing data systems (WEMSIS!) to avoid duplicate data entry and analysis.

EMS/T Strategic Plan:

Goal 19, Objective 5: Local Quality Improvement
By June 2012 regional cardiac and stroke systems evaluate system performance through a quality improvement process.

Key System Measures

- Time from onset to 911 call
- Time from first medical contact (EMS or first ED) to treatment (e.g., balloon or t-PA)
  - For STEMI—moving from D2B to ***EDB < 90 min.***
- On-scene time – MINIMIZE!
- Time from onset to treatment (e.g., balloon or t-PA)

Key System Measures

- % of cardiac/stroke patients that arrive by EMS
- % of patients EMS notified hospital pre-arrival
- Cardiac arrest measures (future)
  - East Pierce already participating in state WA CARES (Cardiac Arrest Registry for Enhanced Survival) program

Some of the Data Elements

- Time of symptom onset
- PSAP call receipt
- Time of dispatch
- Time of EMS arrival at patient's side
- Time left scene
- Time arrived at hospital
- FAST, ECG or other clinical findings
- (Resuscitation efforts and outcomes)
- Medications administered

Essential from EMS for QI

- Crucial that EMS Patient reports are left at hospital for system evaluation and QI.
- Accurate, complete documentation on ESO reports essential for EMS system review.
- GSH staff committed to obtaining patient outcomes for all STEMI and possible CVA patients.

Quality Improvement

- Dispatch, pre-hospital and hospital partners must work together to set goals and ensure they are being met

- Washington's law allows cardiac and stroke cases to be discussed in the regional EMS/Trauma QI forums

Resources & Tools

- Emergency Cardiac and Stroke System http://www.doh.wa.gov/hsqa/hdsp/default.htm
- Emergency Cardiac & Stroke Care in Washington Report http://www.doh.wa.gov/cfh/heart_stroke/For_Healthcare/Carstrokeresp.htm
- Development of Systems of Care for STEMI Patients: The EMS and ED Perspective http://circ.ahajournals.org/cgi/reprint/116/2/e43
- Implementation Strategies for EMS Within Stroke Systems of Care http://stroke.ahajournals.org/cgi/reprint/38/11/3097?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=Implementation+strategies&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT&eaf
- AHA E-learning: Learn Rapid STEMI ID, Prehospital Stroke http://www.onlineaha.org/index.cfm?fuseaction=main.courseCatalog
- Stroke Rapid Response™ Prehospital Education Training http://www.stroke.org/site/PageServer?pagename=SRR_testimonials
- Washington Stroke Forum http://strokeforum.doh.wa.gov/