Supporting Regional System of Care for STEMI

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- Describe the development of regional STEMI systems of care including:

  – Regional models of STEMI and stroke care

  – The evidence base for these models

  – Rural issues

  – The role of EMS

  – The role of CAHs

  – The ways in which State Flex programs can support the development of these systems of care

Flex Program Expectations

- Flex Program guidance encourages development of cooperative systems of care

- State work plans must include at least one of the following:
  - Support CAHs, communities, rural and urban hospitals, EMS, other community providers in developing local/regional systems of care
  - Support inclusion of EMS into local/regional systems of care and/or regional/state trauma systems

- States have struggled with how to support EMS and in the development of regional systems of care

Scope of Problem - STEMI

- STEMI stands for ST-elevation myocardial infarction
- Estimated 400,000-500,000 STEMI events annually in the US
- Accounts for 30% of patients with acute coronary syndrome
- Characterized by:
  - ECG tracings for ST segment that are elevated above baseline
  - A completely blocked artery -no blood flow to a portion of the heart
  - Substantial risk of death or disability
  - Need for rapid restoration of blood flow by reopening the artery – also known as reperfusion

Reperfusion Options

- Mechanical - primary percutaneous coronary intervention (PCI)
  - Includes balloon angioplasty and placement of intracoronary stents
  - Preferred option - more effective and carries lower risk of bleeding
  - Limitations – only 25% of acute care hospitals have PCI capacity and not all hospitals with PCI capacity cannot provider 24/7 service

- Pharmacological – using "clot-busting" drugs (Fibrinolytics or thrombolytics)
  - Fibrinolysis is more widely at US hospitals
  - An option when the recommended timeframes for PCI cannot be met
  - Limitations – less effective and carries a greater risk of bleeding

Guidelines for Reperfusion

- American College of Cardiology/American Heart Association Guidelines for management of STEMI patients

- ACC/AHA system goals for STEMI patients:

  - Patients presenting at a PCI-capable hospital should be treated with primary PCI within 90 minutes of first medical contact (defined as EMS arrival on scene)

  - Patients presenting at non-PCI capable hospital and who cannot be transported to a PCI center and undergo PCI within 90 minutes of first medical contact should be treated with fibrinolytic therapy within 30 minutes of hospital presentation unless contraindicated

System Failure

- Treatment of STEMI is "primarily a systems problem of local communities"

- **Time is muscle!**

- 30% of patients do not receive primary PCI or fibrinolytic therapy in the absence of contraindications to their use

- Less than half of patients receiving fibrinolytic therapy are treated within the recommended guidelines

- For those ineligible for fibrinolysis, 70% do not receive PCI

- 40% of those receiving PCI are treated within the recommended guidelines

Driving Forces Behind Regionalization

- In 2006, IOM called for the development of a "regionalized, coordinated, and accountable system of emergency care"

- In September 2009, DHHS workshop examined models of regionalized care for stroke, out-of-hospital cardiac arrest, STEMI, and care for critically ill/injured children

- In 2007, AHA introduced Mission: Lifeline to assist communities in improving quality of STEMI care through by defining key components of an ideal systems of STEMI care and how these components should work together

2009 ACC/AHA Recommendation

- Each county should develop a STEMI system of care that follows standards at least as rigorous as those developed for Mission: Lifeline and include:

    - Ongoing multi-disciplinary team meetings that include EMS, non- PCI capable hospitals (STEMI referral centers), and PCI (STEMI receiving centers) to evaluate outcomes and QI data;

    - A process for prehospital identification and activation;

    - Destination protocols for STEMI receiving center; and

    - Transfer protocols for patients who arrive at STEMI referral centers who are primary PCI candidates, are ineligible for fibrinolytic drugs, and/or are in cardiogenic shock.

AHA's Mission: Lifeline

- Developed through consensus of key emergency and cardiac care stakeholders through an ongoing advisory group and a three day workshop in March 2006

- Findings and recommendations published in AHA journal, Circulation in May 2007 - program released in July 2008

- National initiative to improve local health care system readiness and response to STEMI

- Key components: the public; patients; EMS; non-STEMI capable hospitals; and STEMI-capable hospitals - defines ideal role for each component

Mission: Lifeline - Process

- Define the ideal practice
- Recommend strategies to achieve ideal practice
- Provide resources/tools to achieve ideal practice
- Recommend metrics for structure, process, outcomes
- Recommend criteria for recognition and certification in a comprehensive system design

Mission: Lifeline - Approach

- Assess and improve EMS system

- Establish local initiatives

- Evaluate existing models

- Explore the possibility of developing national STEMI certification program

- Launch Mission: Lifeline campaigns

- Create system resources

- Engage strategic alliances

Primary Barriers to Timely Reperfusion

- **Patients:** Failure to recognize symptoms and/or reluctance to seek medical attention
  - 50% of STEMI patients call 9-1-1 for transport/50% drive themselves or have others drive them to ED

- **Time to transport:** Local policies may require EMS to transport patient to nearest possible hospital, regardless of PCI capabilities. Travel times for patients in remote areas my preclude access to PCI within recommended guidelines

Primary Barriers to Timely Reperfusion (continued)

- **Decision on reperfusion strategy:**
  - *Patients present at STEMI receiving hospital:* Delays are not related to decision. Related to timeliness during off hours or when multiple, simultaneous cases overwhelm existing PCI resources
  - *Patients present at STEMI referral hospital:* determine if it is possible to transfer patient to primary PCI within recommended window or be given Fibrinolytics. Transfers from PCI referral to PCI receiving are other sources of delay

- **Time to implement treatment strategy:**
  - Delays caused by PCI receiving hospitals without 24/7 cardiac catheterization capacity – lab teams and resources must be mobilized
  - Cath labs are not activated prior to patient's arrival

Point of Entry Protocols

- Key to a functional STEMI system of care – development of standardized protocols for each point of entry (POE) into system

- Should be developed by regional/state-based work groups of EMS personnel, emergency physicians and nurses, and cardiologists with support and involvement of third party payers

- Key Points of entry
  - EMS system - activated by 9-1-1 call
  - Presentation at non-PCI capable/STEMI referral hospital
  - Presentation at PCI-capable/STEMI receiving hospital

Economic Realities of STEMI Systems of Care

- Unlike trauma systems of care, cardiovascular systems of care are a profitable revenue center for many med-surg hospitals
- Goal for PCI referral hospitals is to avoid diverting patients to PCI receiving hospitals when not medically necessary
  - For this reason, Mission: Lifeline specifically acknowledges role of non-PCI capable hospitals
- For PCI receiving hospitals, it is necessary to be aware of overlapping service areas where hospitals can be expected to aggressively compete for patients
- Protocols must be sensitive to these economic issues

Ideal EMS System

- Ambulances are equipped with 12 lead ECGs
- EMS providers are trained to:
  - Use and transmit 12 lead ECGs, care for STEMI patients, provide feedback on performance and compliance with guidelines
- Standardized point of entry protocols
- In the event of STEMI, cath lab is activated promptly
- Patients transported to STEMI referral hospitals remain on stretcher with EMS present pending transport decision
- Activation of EMS occurs when a walk-in STEMI patient presents at a STEMI referral hospital
- Communication gaps with hospitals are closed

Ideal STEMI Referral Hospital

- Standardized POE protocols dictate transport of patients to STEMI receiving hospital based on specific criteria for risk, fibrinolysis is contraindicated, proximity to nearest PCI facility

- Patients are treated according to standardized triage and transfer protocols

- Incentives are provided to:
  - Treat patients in accordance with ACC/AHA guidelines
  - Transfer to PCI receiving hospital using: reperfusion checklists, standardized pharmacological regimens/order sets, clinical pathways

- Rapid and efficient transfer of data, data collection, feedback

- Plans for return of patient to community for care are set

Ideal STEMI Receiving Hospital

- Prehospital ECG diagnosis, ED notification and cath lab activation occurs according to standard algorithms

- Algorithms facilitate: short ID stay for patient, transport directly from field to cath lab

- Single call from referral hospital activates cath lab

- 24/7 Primary PCI availability

- Written collaboration protocols with referral hospitals

- Multidisciplinary team meets regularly

- Continuing education

- Monitor performance, process measures, and patient outcomes

Rural STEMI Challenges

- Distance
  - Optimal travel time for some rural communities must be considered
  - May not be able to meet ACC/AHA 90 minute window from PCI
- EMS transport protocols may automatically divert patients to local hospitals regardless of appropriateness
- EMS service may not have 12 lead ECG capacity
- Patients presenting to PCI transfer hospitals may experience unnecessary delays
- Resource and capacity limitations

Can Treatment Guidelines Be Met in Rural Areas?

- Yes – with work and depending on optimal travel times
- Stat Heart Program – Illinois (Aquirre, et al, 2008)
  - 6 rural STEMI referring hospitals, 2 STEMI receiving hospitals, and a large CV specialty group
  - Process of care - 32-65 minute time in STEMI referral hospital EDs, Door 1 – Door 2 travel time ranged between 61-95 minutes, Door 2 to balloon 31-39 minutes
  - Median door 1 to balloon was 117 minutes
  - Greatest source of delay – STEMI referral hospitals waiting for transport
  - Demonstrates feasibility of initiating various reperfusion strategies on basis of standardized POE algorithm

Other STEMI Systems Involving Rural Hospitals

- Geisinger STEMI Network – Pennsylvania (Blankenship, et al, 2011)

- Dartmouth-Hitchcock Medical Center – New Hampshire (Niles, et al, 2010; Rezaee, et al, 2010)

- Regional STEMI Program – Yakima Valley, WA

- Minneapolis Heart Institute – includes 210 urban and rural hospitals up to 210 miles from STEMI receiving hospital

- North Carolina RACE (Reperfusion in AMI in carolina Emergency Departments) – involves 5 geographic regions of NC, 21 PCI centers, and open to all 122 acute care hospitals

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