“Acute STEMI: Optimizing Door-to-Balloon Time from Pre-Hospital to Cath Lab”

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- **PROBLEM**: blood supply to the heart has been compromised and heart muscle is dying ... “TIME IS MUSCLE”

- **TARGET**: patient comes to the hospital ETD via EMS or Walk-In

- **GOAL**: quick patient assessment, enrollment in a reperfusion strategy (balloon vs drug), open the blocked artery, restore myocardial blood flow as soon as possible with the best durability
Getting to Goal and Staying at Goal (a formidable task)

**Strategy:**
- The team players
- Plans of action
- Mid-game rule changes

**Action:**
- Issues and results (making it all happen)
- Patients (If you can’t help me don’t confuse me!)
- Life (things happen – future predictions)
STRATEGY : STEMI PATIENTS and the Door to Balloon (D2B) time

- Formation of a multidisciplinary team: ETD, Cath Lab, CCU and Intermediate Care Units, Performance Improvement, Cardiac Rehabilitation, IT and EMS

- Regularly scheduled meetings to evaluate processes, outcomes and measures of performance.

- Emergency meetings with key personnel when real time events or issues arise requiring a “Rapid Cycle Change”
TREATMENT STRATEGIES:
OPEN THAT ARTERY
Drugs vs. Balloon

Balloon wins, end of story
Balloon Power (Yes with Stents)

- Thrombolytic therapy is effective in 40–60%, high reocclusion
- Primary PCI is effective in ~90%, durable and low reocclusion
- You would be comparing a semi-effective therapy vs. a fully effective therapy

Only 25% of US hospitals have PCI capability but transport to a PCI Center is available in most cases

*After deciding this step things get much harder*

Looking at multiple studies in various scenarios: Pre-Hospital and Pre-Cath arenas, FACILITATED PCI (IV Lytic drugs or IV Anti-Platelet inhibitors) DID RESULT in a higher percentage of complete ST segment ECG resolutions, some before cath lab arrival.

However, this enhanced early reperfusion DID NOT significantly improve the outcome ... keep it simple whenever you can, provisional strategies are always an option.

Staying at goal and focus on new areas for improvement

**Pre-Hospital**
- Identification of the STEMI patient in the field via Paramedic teams with subsequent pre-hospital activation of the “Thrombo-Page”

**Hospital**
- EMS arrival of the patient with acute chest pain, Dx, “Thrombo-Page”
- Walk-In ETD patients, perhaps the biggest and most formidable issue moving forward, requiring efficacious clinical pathways to allow ETD staff to identify the atypical MI patient and “Thrombo-Page”

**Transfer Protocols** for STEMI patients arriving at a NON-PCI facility who are candidates for primary PCI. D2B times are counted for a 2nd campus as if arriving at the main campus / otherwise ASAP upon arrival
D2B – Door to Balloon

What does time have to do with it all?

Complete restoration of blood flow results in improved survival and clinical outcome at 90 minutes

TIMI coronary flow score: 0 = no flow to 3 = best

“BLUSH” scores are nice to know but have limited specificity in predicting myocardial viability

GUSTO I - NEJM 1993 / Califf et. al. AJC 1996
Angiology. 2007 Oct-Nov;58(5):556-60
Time Matters

Longer door-to-balloon time is associated with increased in-hospital mortality

29,222 STEMI patients PCI < 6 h of presentation (NRMI-3 /-4 from 1999 to 2002)

Mortality rates:
- 3.0% @< 90 min
- 4.2% @> 91-120 min
- 5.7% @ 121-150 min
- 7.4% @ > 150 min

J Am Coll Cardiol. 2006;47(11):2180
MI complications decline

- Decrease in left ventricular thrombus
- Decrease in myocardial rupture
- Decreased mitral valve dysfunction
- Decrease in cardiogenic shock
- Improved residual left ventricular function
- Enhanced positive remolding (less aneurysm formation)
- Beneficial effects on arrhythmia reduction

Am J Cardiol. 2003;92(7):785
D2B times are better (but the devil is in the details)

Patients with PCI < 90 minutes nationally is about 92%

“.........A new study published this week in Circulation shows that median door-to-balloon (D2B) times for patients undergoing percutaneous coronary intervention following an acute myocardial infarction have declined from 94 minutes in 2005 to 64 minutes in 2010. The improvements represent a more than 30 percent decline in D2B times based on Centers for Medicare and Medicaid Services data from Jan. 1, 2005, to Sept. 30, 2010...”

Circulation. 2011;124:1038-1045
Trends in Data

Case exclusions, accuracy of data reported, reporting rule interpretation all have substantial impact on data submission and an institutions reported D2B time reported success.
Evaluation from wherever (field – door) to balloon

The bar is constantly being raised

No time to rest on past success
In the United States, the major limitations to a pPCI strategy are universal access and the lack of an organized system of care for STEMI patients...

............... BUT ONCE ORGANIZED .................

rapid transfer of STEMI patients from community hospitals up to 210 miles to a PCI center is safe and effective using a standardized protocol with an integrated transfer system... For us, we need less than 25 miles to cover a pPCI

Dartmouth, NH  Circulation.
2007;116:721-728
But really ...

In some respects, the occurrence of symptoms may be regarded more properly as a medical failure than as the initial indication for treatment.”

—William B. Kannel, MD
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Boston University Medical Center
1923-2011