REFERRAL HOSPITAL

The Importance of Door In Door Out Time

DIDO
For patients with ST-segment elevation myocardial infarction (STEMI), **percutaneous coronary intervention** (PCI) is the preferred method of reperfusion¹

Both the American College of Cardiology / American Heart Association (ACC/AHA) and the European Society of Cardiology (ESC) recommend a door-to-balloon time of less than 90 minutes²

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Improving door-to-balloon time for primary PCI has been shown to decrease mortality.
• 1/3 pts with STEMI will die within 24 hours
• Majority of deaths within the first 2 hours
• Average patient does not seek care for 2 hours
• Each minute a patient remains in VF, survival odds decrease 7-10%
• Patients with STEMI should use ambulance
AHA 2010 Guidelines recommend a System of Care approach to effectively handle STEMI patient care:

- **Goal:** get a STEMI patient to appropriate treatment as quickly as possible.

Same Goal, Differing Needs

- Patient
  - Rapid access to appropriate treatment
- EMS Care Team
  - Provide critical data to hospital teams quickly
  - Transport patient to most appropriate facility
  - Early identification of a STEMI patient
  - Advanced warning and activation of Cath Lab and teams
- Hospital Care Team
  - Early diagnosis of a STEMI patient
  - Remotely review and diagnose difficult rhythms
- Cardiology
  - Improve (reduce) door-to-balloon metrics
- Hospital Administration
  - Meet Core Measure / CMS benchmarks
  - Meet chest pain accreditation key elements
The prehospital 12-lead ECG is a critical tool in identifying and diagnosing a STEMI patient and shortening the time to treatment

AHA/ACC recommends that EMS acquire a 12-lead ECG as soon as possible for all patients exhibiting symptoms of ACS

Along with early Cath Lab activation, it can be the single most important factor in reducing door-to-balloon time

2 Brown JP et al; Effect of Prehospital 12-Lead Electrocardiogram on Activation of the Cardiac Catheterization Laboratory and Door-to-Balloon Time in ST-Segment Elevation Acute Myocardial Infarction. Am J Cardiol 2008;101:158-161
SOUTH DAKOTA HAS MADE A COMMITMENT TO IT’S EMS SYSTEMS TO FACILITATE THE PLACEMENT OF 12 LEAD EKGS IN EVERY AMBULANCE SERVICE IN THE STATE.
Patient routing and Cath Lab activation decisions are able to be made before patient arrival, helping reduce time to treatment.
Referral Hospitals are measured on Door-In to Door-Out (DIDO) times

PCI Hospitals are measured on Door-to-Balloon (D2B) times
**REFERRAL HOSPITALS**

- **DIDO**
  - Performance measure used to measure efficiency of referral hospital’s care and transfer for STEMI patients\(^1\)
  - Measures the time it takes to receive a patient, make a STEMI diagnosis, and transfer them to a PCI facility
  - **ACC/AHA recommendation: 30 minutes\(^1\)**
  - Performance measure recorded by CMS\(^2\)

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1. Wang TY et al. Association of Door-In to Door-Out Time With Reperfusion Delays and Outcomes Among Patients Transferred for Primary PCI. JAMA 2011;305(24):2540-2547

30 minute DIDO is difficult to achieve - Examples

Example 1 - ACTION registry assessment:¹

- 14,821 STEMI patients transferred for primary PCI (2007-2010)
- Only 11% of patients had a DIDO of less than 30 minutes

¹ Wang TY et al. Association of Door-In to Door-Out Time With Reperfusion Delays and Outcomes Among Patients Transferred for Primary PCI. JAMA 2011;305(24):2540-2547
**Example II - Miedema Study:**

- 2,028 STEMI patients analyzed from 2003-2008
- 64% of patients had a DIDO time > 45 minutes

<table>
<thead>
<tr>
<th>Cause of Delay</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>No delay</td>
<td>36%</td>
</tr>
<tr>
<td>Awaiting Transport</td>
<td>26%</td>
</tr>
<tr>
<td>ED Delay</td>
<td>14%</td>
</tr>
<tr>
<td>Nondiagnostic ECG</td>
<td>9%</td>
</tr>
<tr>
<td>Diagnostic Dilemma</td>
<td>9%</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>6%</td>
</tr>
</tbody>
</table>

1 Miedema MD et al. Causes of Delay and Associated Mortality in Patients Transferred with ST-Segment Elevation Myocardial Infarction. Circ. 2011;124
STEMI-referral hospital treatment and triage algorithm.

STEMI-REFERRAL HOSPITAL PROCESS MEASURES

1. Symptom onset to door 1 (ie, symptom onset to STEMI-referral hospital ED presentation)
2. Door 1 to medical contact (ie, STEMI-referral hospital ED presentation to initial physician or nurse contact)
3. Door 1 to ECG (ie, STEMI-referral hospital ED presentation to acquisition of 12-lead ECG)
4. Door 1 to decision (ie, STEMI-referral hospital ED presentation to ED physician’s call to initiate transfer)
5. Door 1 to needle (ie, STEMI-referral hospital ED presentation to initiation of intravenous fibrinolytic; acquired only from fibrinolytic-treated patients)
6. Door 1 to departure (ie, STEMI-referral hospital ED presentation to ED departure).

Helicopter transfer is preferred if the interhospital transport time is >30 minutes
SYMPTOM ONSET TO DOOR 1

- Community Education
- EMS providers, nurses and Primary Care providers are the experts in their own communities.
- Get in front of your small groups and educate about Signs and Symptoms of Heart Attack and the importance of calling 911
- Put literature around waiting rooms and educate your patients and neighbors
DOOR 1 TO MEDICAL CONTACT

- Is your Physician, PA or NP in house
- How and when do you contact them when a chest pain patient comes in to your ED
- How long does it take them to get to the ED
- Can they receive an EKG by e-mail or Smart Phone
What symptoms trigger you to get an ECG
Can you obtain one prior to the Doctor seeing the patient
Who does ECGs in your facility
Goal of obtaining ECG within 5 minutes of patient arrival
Goal needs to be less than 10 minutes Door to ECG reviewed by physician/PA/NP
What do you do if the physician is not in-house and you have a STEMI sitting in front of you?

Do you have the numbers right by the phone in the ED so it can be made quickly?

Most PCI centers have one-call systems so you only have one number to dial and they will contact Cardiology and help you arrange transport if needed.

Early activation of air transport is very important when ground transport will be more than 30 minutes.
If transport time will be prolonged (more than 30 minutes) you may need to infuse Thrombolitics.

Goal is 10 minutes from door to start of infusion.

Notify Receiving hospital ASAP of Non-Reperfused Lytic Patient

In rural facilities weather and time of day may effect decision on how to manage the patient.
Weather, staff, co-morbidities, time of day may all affect best management strategies.

- Time to ECG  \textit{Goal} < 5 minutes
- Time to Ambulance Commitment  \textit{Goal} < 10 \textit{minutes}
- Time to Ambulance Arrival  \textit{Goal} < 10 \textit{minutes}
- Time to Ambulance Departure  \textit{Goal} < 5 minutes
- Total Time in ED  \textit{Goal} < 30 \textit{minutes}
“The development of a regional STEMI system that includes transfer of patients from non-PCI centers is an important strategy to improve timely access to primary PCI.”⁠¹

Receiving data from Referral Hospitals helps the team prepare resources

Sharing data between ED and Cath Lab helps enable Cath Lab activation decision

¹ Miedema MD et al. Causes of Delay and Associated Mortality in Patients Transferred with ST-Segment Elevation Myocardial Infarction. Circ. 2011;124
CONCLUSIONS

- Patients requiring transfer for PCI have the longest treatment times, and most do not reach 90 minute first door to device goal.
- STEMI reperfusion can be markedly accelerated by establishing a single plan with standardized processes.
Primary Percutaneous Coronary Intervention (PCI) is the most complex, multi-disciplinary, and time-sensitive therapeutic intervention in the world of medicine.

- Our process is measured in **Minutes**
- Our outcomes are measured in terms of **Mortality**
- **Teamwork** and smooth **Transitions** are essential