Hit the road Jack…..
Improving quality of care and patient velocity in transfer angioplasty

Dr Paul M Bailey MB BS FACEM PhD

Deputy Director
Emergency Department
Joondalup Health Campus

Senior Lecturer
Discipline of Emergency Medicine
University of Western Australia

How to successfully arrange a prompt interhospital transfer

Preferred reperfusion therapy in STEMI

- Time delay plays the major role in determining optimum therapy

- Definitive opening of the coronary artery with angioplasty is the preferred technique
  - Sooner the better
  - Door to balloon time
    - <60 minutes if patient presents < 1hr of pain
    - <90 minutes for all others

National Heart Foundation of Australia / Cardiac Society of Australia and New Zealand Guidelines for the management of acute coronary syndromes 2006

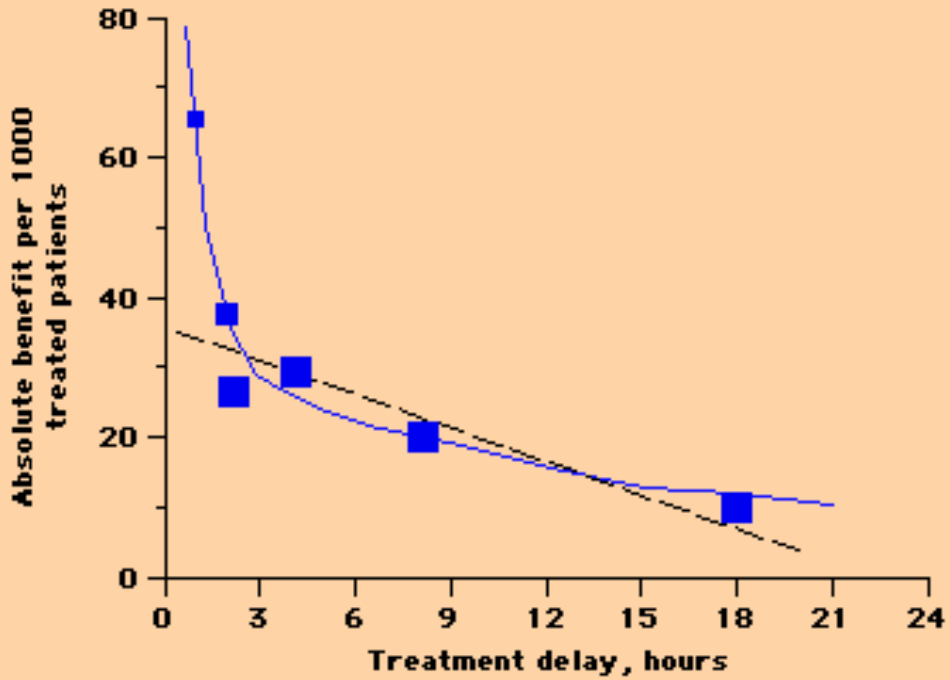
Thrombolysis – the good

- Quick and easy
- 50 lives saved per 1000 patients treated

Thrombolysis – the bad

- Contraindications
- Reperfusion in 50-60%[1]
- 20-30% will re occlude, 3-6% reinfarction[2]
- 1-2% stroke or intracerebral haemorrhage[3]
- Benefits rapidly decrease after first hour[4]

1. The effects of t-PA, streptokinase, or both on coronary-artery patency, ventricular function, and survival after acute myocardial infarction. The GUSTO Angiographic Investigators. N Engl J Med 1993;329(22):1615-22.
2. Armstrong PW et al. Acute coronary syndromes in the GUSTO-IIb trial. Circ 1998;98(18):1860-8.
3. Gurwitz JH et al. Risk for intracranial hemorrhage after tissue plasminogen activator treatment for acute myocardial infarction. Participants in the NRMI 2. Ann Intern Med 1998 Oct ;129(8):597-604
4. Boersma E et al. Early thrombolytic treatment in acute myocardial infarction. Lancet 1996;348:771-5.



Time to thrombolysis and 35-day mortality The importance of time to thrombolysis in acute myocardial infarction and the absolute reduction in 35 day mortality in a meta-analysis of over 50,000 patients. The benefit from thrombolytic therapy is greatest when it is administered within two hours of symptom onset. The survival benefit is progressively reduced as the delay in therapy increases; after two hours, the benefit from thrombolytic therapy fits a linear function (black line) in which the benefit falls by approximately 1.6 lives per 1000 patients per hour of treatment delay. (Data from Boersma, E, Maas, ACP, Simoon, ML, Lancet 1996; 348:771.)

Primary PTCA

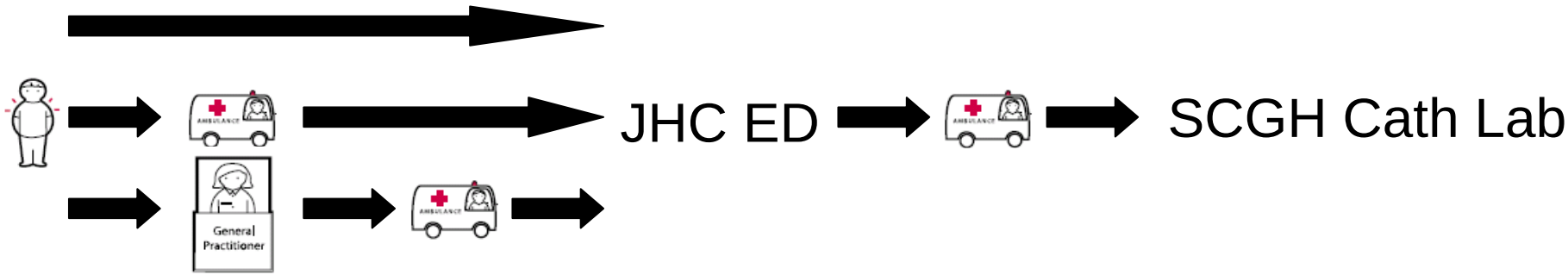
- Mortality benefit - 4.4% vs 6.5% at 30 days[1]
- TIMI 3 blood flow in 90-95%[2]
- Reduced recurrent reinfarction (2.0% vs 4.7%) and stroke (0.2% vs 0.8%)[3]
- Early angiography may alter treatment plan

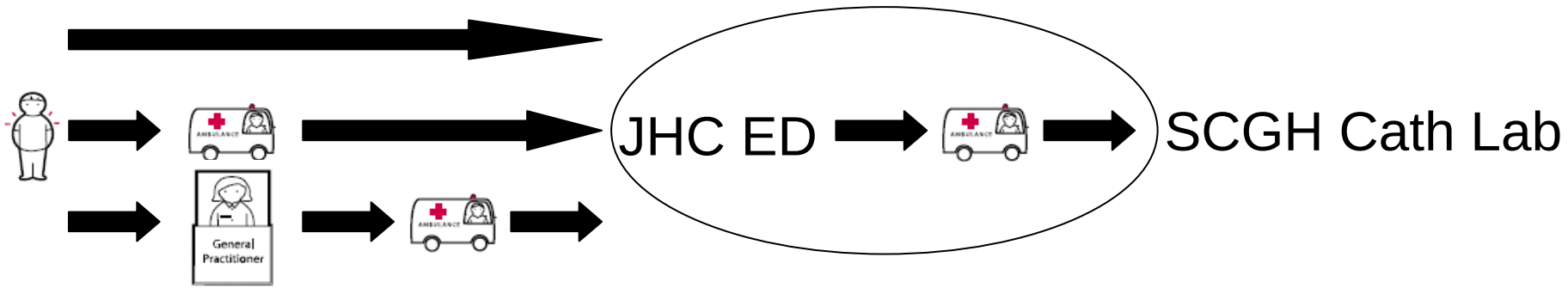
1. Keeley EC et al. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review of 23 randomised trials. Lancet 2003;361:13-20.
2. Stone GW et al. Comparison of angioplasty with stenting, with or without abciximab, in acute myocardial infarction. N Engl J Med 2002;346(13):957-66.
3. The Global Use of Strategies to Open Occluded Coronary Arteries in Acute Coronary Syndromes (GUSTO IIb) Angioplasty Substudy Investigators. A clinical trial comparing primary coronary angioplasty with tissue plasminogen activator for acute myocardial infarction. N Engl J Med 1997; 336: 1621-28.

Transfer PTCA Literature

- Appears safe
- Evidence for improved outcomes comes from:
  - RCTs with relatively short transfer times (door-to-balloon time <2hrs)
  - significant differences with current practice eg. lack of routine GIIb/IIIa inhibitor use peri-PTCA
  - Non use of clopidogrel in thrombolysis groups
- Good evidence for reduced reinfarction and combined CV end-points with transfer for primary PTCA
- Limited evidence for improved short-term mortality with transfer for primary PTCA
- Ideal strategy:
  - Prehospital ECG and direct diversion PTCA facility

Review of current practice – mapping the patient journey


JHC ED
SCGH Cath Lab
General Practitioner


JHC ED
SCGH Cath Lab
General Practitioner

STEMI at JHC pre change – the good

- Nursing processes in place
- Time to ECG good
- Time to Dr good
- Diagnosis of STEMI good

- And then…….

STEMI at JHC pre change – the bad

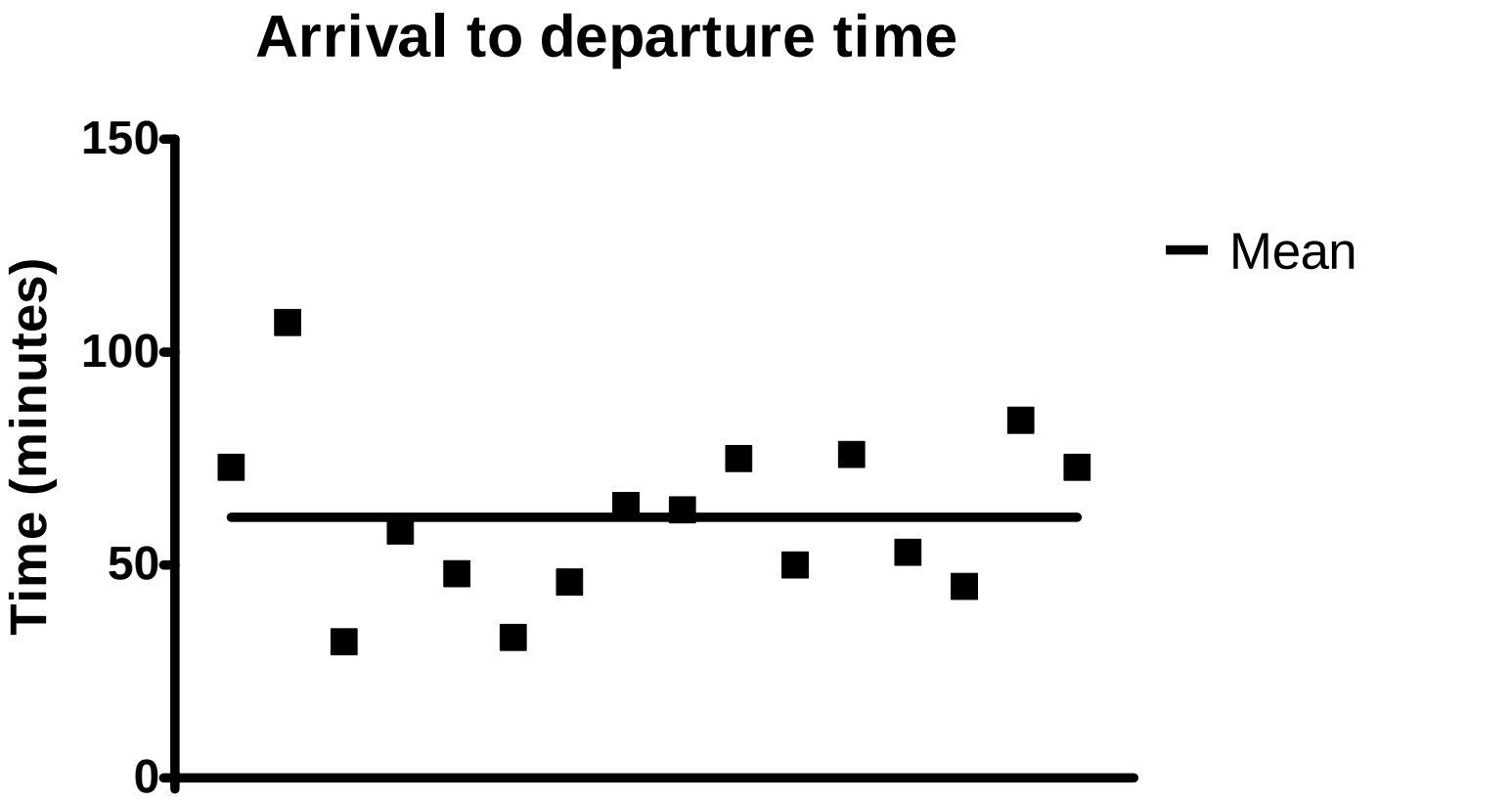
- Variable approach to thrombolysis vs transfer PTCA
  - The wrong patients were being transferred
- No clear guidelines in place to assist management
- Tasks being performed in a serial rather than parallel fashion
- Process for acceptance of patient transfer at SCGH variable
  - “fax me the ECG and I’ll talk to my boss”
- Variable Ambulance response times

Jan – Sep 06

- 16 patients
- Average age: 55
- 14/16 Male
- 13/16 to SCGH
- 5/16 “Office Hours”
- 6/16 Within 1hr of symptom onset
- 9/16 arrived at JHC “privately”
- 3/16 referred from GP

Jan – Sep 06

- 16/16 Clopidogrel
- 13/16 Heparin, 1/16 Clexane, 2/16 None
- 2/16 Beta blocked
- 14/16 Aspirin



- Mean 61 minutes
- SD 19 minutes
- Median 60 minutes

Process change

Meetings with ‘key stakeholders’

- Cardiologists at both JHC and SCGH
- Ambulance Medical and Paramedic Directors
- ED Medical staff
- ED Nursing staff

Key outcomes of each meeting

- Cardiologists
  - Pre defining the group of patients suitable for transfer PTCA
  - Pre defining the process for activation of cath lab at SCGH
  - Pre defining standard adjuvant therapies

Key outcomes of each meeting

- Ambulance
  - Patients treated “on stretcher” when arrive by ambulance and clearly infarcting
  - Activation process for transfer

Key outcomes of each meeting

- ED Medical staff
  - Outlining new process
  - Strong encouragement to multi-task with two doctors rather than one
  - Feedback loop
  - Each registrar given an individual ‘tutorial’

Key outcomes of each meeting

- ED Nursing staff
  - Outlining new process
  - Clear instructions of standard ‘adjuvant therapies’ so that they can be prepared prior to being ‘ordered’
  - Feedback loop
  - Via regular nursing education sessions

Improving the process

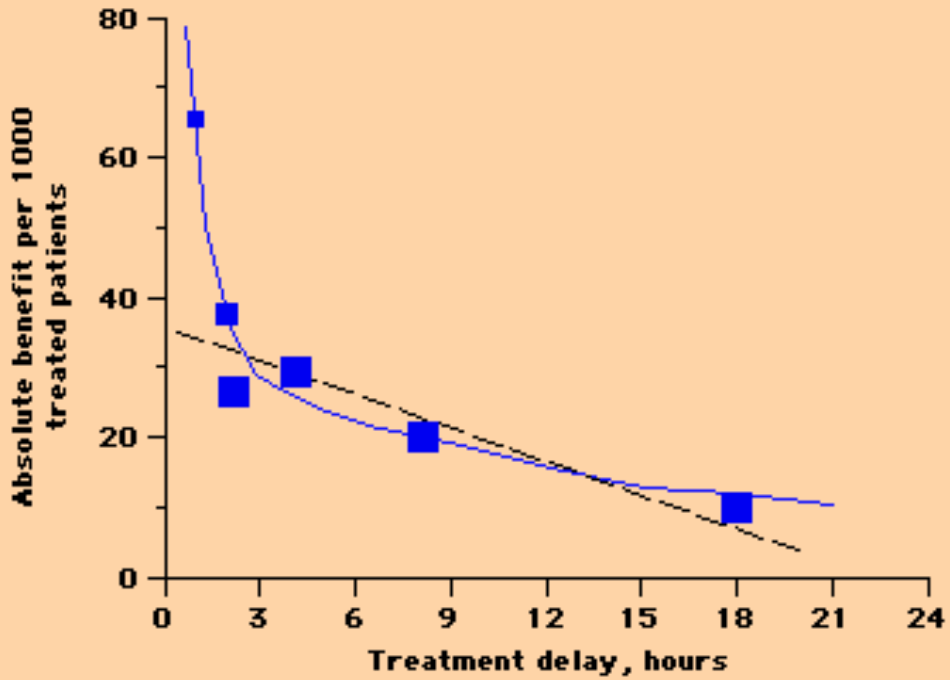
- The greatest amount of time is wasted from symptom onset to hospital presentation
  - JHC Average 2h 22 minutes

Patients should be encouraged to:

- Present early
- Present to a hospital rather than their GP
- Present by SJA

JHC Transfer Angioplasty in STEMI Protocol:

All patients presenting with AMI and <1hr of symptom onset are to be thrombolysed provided no contraindications



Time to thrombolysis and 35-day mortality The importance of time to thrombolysis in acute myocardial infarction and the absolute reduction in 35 day mortality in a meta-analysis of over 50,000 patients. The benefit from thrombolytic therapy is greatest when it is administered within two hours of symptom onset. The survival benefit is progressively reduced as the delay in therapy increases; after two hours, the benefit from thrombolytic therapy fits a linear function (black line) in which the benefit falls by approximately 1.6 lives per 1000 patients per hour of treatment delay. (Data from Boersma, E, Maas, ACP, Simoon, ML, Lancet 1996; 348:771.)

Suggested JHC Transfer Angioplasty in MI Protocol:

Chest pain patients brought to JHC by SJA who **clearly** appear to be infarcting and are >1hr from symptom onset:

- Manage on SJA Stretcher in resuscitation area
- Vital signs / full non invasive monitoring / assessment of haemodynamic stability
- Early ECG demonstrating AMI
- Doctor not involved directly in patient care to:
  - D/W JHC Cardiologist who will recommend transfer and
  - Inform SCGH Cardiology Reg that patient is on their way
- IV Access x1 essential x2 preferred
- IV Heparin bolus 80 Units/kg
- IV Morphine if required
- PO Clopidogrel 600mg
- PO Aspirin 300 mg
- JHC Doctor to accompany patient to SCGH Cath Lab
- Anticipation of complications
  - Atropine 600 mcg drawn up
  - N Sal 1L connected to patient
  - Defibrillator available at all times

JHC Transfer Angioplasty in STEMI Protocol:

Chest pain patients brought to JHC by **private transport** and are >1hr from symptom onset:

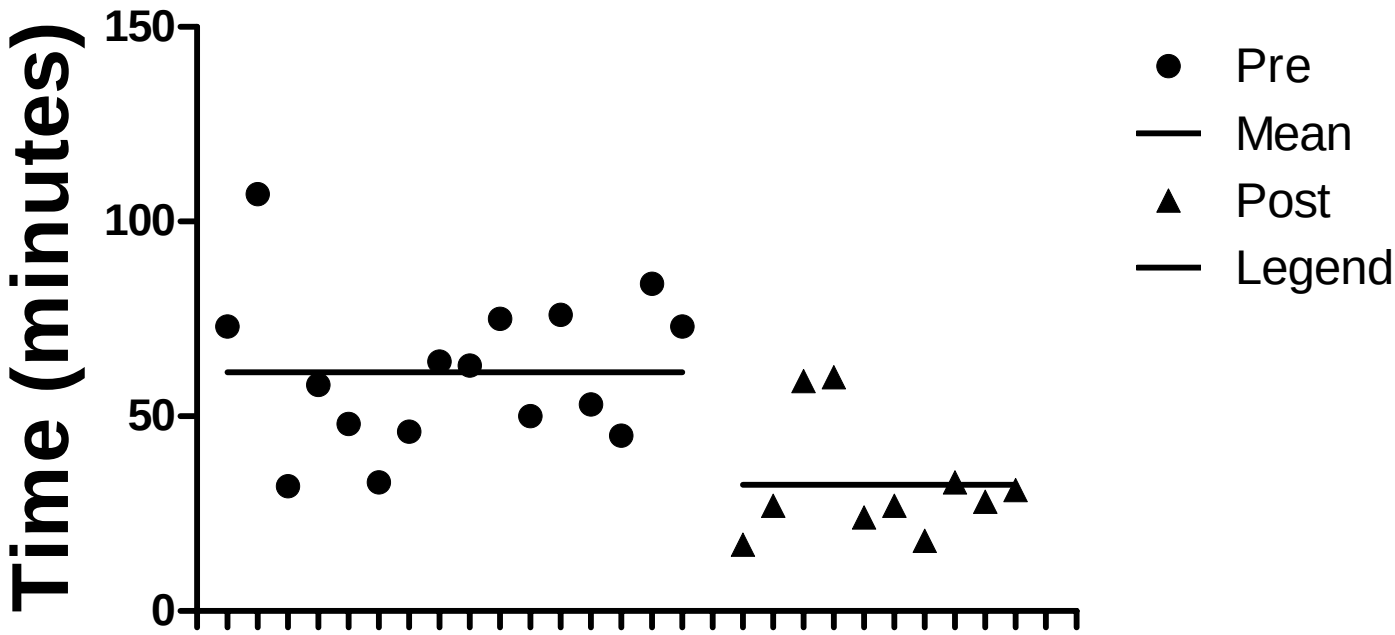
- Manage in resuscitation area
- Vital signs / full non invasive monitoring / assessment of haemodynamic stability
- Early ECG demonstrating AMI
- Doctor not involved directly in patient care to
  - 1. **Notify SJA of transfer angioplasty**
  - 2. D/W JHC Cardiologist who will recommend transfer and
  - 3. Inform SCGH Cardiology Reg that patient is coming
- IV Access x1 essential x2 preferred
- IV Heparin bolus 80 Units / kg
- IV Morphine if required
- PO Clopidogrel 600mg
- PO Aspirin 300mg
- JHC Doctor to accompany patient to SCGH Cath Lab
- Anticipation of complications
  - Atropine 600 mcg drawn up
  - N Sal 1L connected to patient
  - Defibrillator available at all times

Traffic considerations

- If patient expected to leave JHC between the hours of 0700 and 0830, thrombolyse

Results to 1/5/07

Arrival to departure time



- Mean 61 minutes
- SD 19 minutes
- Median 60 minutes

- Mean 32 minutes
- SD 15 minutes
- Median 31 minutes

Quality improving too

- ALL patients under new protocol
  - Aspirin
  - Clopidogrel
  - Heparin

Issues, topics of interest

- VF arrest x2 in 1 patient en route
- Cardiologists sometimes difficult to contact
- Overall, a spirit of competition emerging amongst registrars
- Protocol has been taken up by SDH, AHS

My thoughts – greatest benefit

- Multi tasking
- Getting everyone singing off the same songsheet
- Phone calls in order of tasks likely to create the longest delay
- Pre established protocol