NZ STEMI pathway: why do we need it?

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St John
Drip and ship

Total ischaemic time

Patient delay | EMS delay | System delay |
---|---|---|
FMC: EMS

<10'

STEMI diagnosis

≤120 min

Time to PCI?

Primary PCI strategy

<90'

Reperfusion (Wire crossing)

Fibrinolysis

<10'

Reperfusion (Lytic bolus)

>120 min

≥10'

Reperfusion (Wire crossing)

FMC: Non-PCI centre

<10'

FMC: PCI centre

<10'

STEMI diagnosis

Primary PCI strategy

<60'

Reperfusion (Wire crossing)

Patient delay | System delay |
---|---|

Total ischaemic time

©2017 Code STEMI
**ESC guidelines 2017**

### Pre Hospital treatment

It is recommended that ambulance teams are trained and equipped to identify STEMI (with the use of ECG recorders and telemetry as necessary) and administer initial therapy including fibrinolysis when applicable.

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### Transfer after fibrinolysis

Transfer to a PCI capable centre following fibrinolysis in all patients immediately after fibrinolysis

It is recommended that EMS transfer STEMI patient to a PCI capable centre, bypassing non PCI centres

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Box Plot showing Door to Needle Times for Nelson Marlborough DHB pre and post introduction of STEMI pathway

Door to Needle Time (minutes)

Year 2011 and 2013

Base Hospital
Nelson
Wairau
p=NS

30 minutes
20 minutes

312
240
165
230
95
52
87
89
312
240
165
230
95
52
87
89
Nelson Marlborough STEMI care

Box plot to show ambulance transfer and reperfusion times for Nelson and Marlborough patients 2013-14

FMC to Needle > 80 minutes

FMC to Rescue times 5 hours
Relationship between reperfusion therapies and myocardial salvage in NMDHB 2013-14 (n=72)
Misgivings about NZ STEMI pathway
How old are STEMI patients in 2017?

40%

Alawami et al. Heart, Lung and Circulation, Volume 26, S14 - S15
Can we afford a STEMI pathway?
### Czech Republic vs New Zealand

<table>
<thead>
<tr>
<th></th>
<th>Czech Republic</th>
<th>New Zealand</th>
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<tbody>
<tr>
<td><strong>Comptes nationaux - Government</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annual GDP [+]</strong></td>
<td>2017 216,399M.$</td>
<td>2016 185,380M.$</td>
</tr>
<tr>
<td><strong>GDP per capita [+]</strong></td>
<td>2017 20,456$</td>
<td>2016 39,050$</td>
</tr>
<tr>
<td><strong>Debt [+]</strong></td>
<td>2017 77,384</td>
<td>2016 52,221</td>
</tr>
<tr>
<td><strong>Debt (%GDP) [+]</strong></td>
<td>2017 34.60%</td>
<td>2016 28.16%</td>
</tr>
<tr>
<td><strong>Debt Per Capita [+]</strong></td>
<td>2017 7,315$</td>
<td>2016 11,001$</td>
</tr>
<tr>
<td><strong>Deficit (M.$) [+]</strong></td>
<td>2017 3,460</td>
<td>2016 2,425</td>
</tr>
<tr>
<td><strong>Deficit (%GDP) [+]</strong></td>
<td>2017 1.60%</td>
<td>2016 1.31%</td>
</tr>
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Data from countryeconomy.com
Can ambulance staff deliver fibrinolysis safely?

Pre-hospital: 42 min, IQR 31-56 min
In-hospital: 65 min, IQR 39-101 min (p<.0001)

Kerr A, ANZACS-QI data 2017
### Autonomous Fibrinolysis in NZ

<table>
<thead>
<tr>
<th>Treatment Time Interval</th>
<th>Pre-Implementation Group (n = 90)</th>
<th>Post-Implementation Group (n = 75)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>From call-to-needle (CTN) time(^a)</td>
<td>Median [95% CI] IQR</td>
<td>Median [95% CI] IQR</td>
<td>&lt;0.001* (2-tailed)</td>
</tr>
<tr>
<td>52 [49, 62] 30</td>
<td>36 [33, 42] 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From EMS contact-to-needle (ETN) time(^a)</td>
<td>Median [95% CI] IQR</td>
<td>Median [95% CI] IQR</td>
<td>&lt;0.001* (2-tailed)</td>
</tr>
<tr>
<td>37 [34, 45] 30</td>
<td>20 [17, 23] 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From first diagnostic STEMI ECG to needle time(^a)</td>
<td>Median [95% CI] IQR</td>
<td>Median [95% CI] IQR</td>
<td>&lt;0.001* (2-tailed)</td>
</tr>
<tr>
<td>Inappropriate fibrinolysis</td>
<td>Median [95% CI] IQR</td>
<td>Median [95% CI] IQR</td>
<td>0.73</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td></td>
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<table>
<thead>
<tr>
<th>Accuracy Value</th>
<th>(%)</th>
<th>[95% CI]</th>
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<tbody>
<tr>
<td>Sensitivity</td>
<td>(96)</td>
<td>[89–99]</td>
</tr>
<tr>
<td>Specificity</td>
<td>(91)</td>
<td>[76–98]</td>
</tr>
<tr>
<td>Positive predictive value (PPV)</td>
<td>(96)</td>
<td>[90–99]</td>
</tr>
<tr>
<td>Negative predictive value (NPV)</td>
<td>(91)</td>
<td>[77–97]</td>
</tr>
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Surely as most STEMI patients reperfuse they would over run our tertiary centres?

Mortality Cardiac Penetrating trauma
11.5% vs 10.5% with AMI

## TAVI versus Rescue PCI

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<thead>
<tr>
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<th>TAVI</th>
<th>Rescue PCI</th>
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<tbody>
<tr>
<td>Median age</td>
<td>80.7&lt;sup&gt;1&lt;/sup&gt;</td>
<td>66&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Numbers</td>
<td>??? (66 in 2013- estimate approx. 180 in 2018)</td>
<td>176</td>
</tr>
<tr>
<td>QALY</td>
<td>18 716 GBP&lt;sup&gt;3&lt;/sup&gt;</td>
<td>8029 GBP&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

1. Wu et al. NZMJ 2016. 129:1428
2. Alawami et al. Heart, Lung and Circulation, Volume 26, S14 - S15
## Rescue PCI rates

<table>
<thead>
<tr>
<th>Population</th>
<th>% failure of lysis/rescue PCI performed*</th>
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<tbody>
<tr>
<td>TIMI (rTPA)</td>
<td>40%</td>
</tr>
<tr>
<td>GUSTO (n=1613)</td>
<td>30% closed artery at angiography</td>
</tr>
<tr>
<td>CARESS -in-AMI (n=300)</td>
<td>30.3%*</td>
</tr>
<tr>
<td>Transfer AMI (n=522)</td>
<td>35%*</td>
</tr>
<tr>
<td>STREAM (n=944)</td>
<td>36.5%</td>
</tr>
<tr>
<td>Nelson Marlborough(^1)</td>
<td>43%* (CCDHB/NMDHB)</td>
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<tr>
<td>New Zealand(^1)</td>
<td>21%*</td>
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Median needle to rescue PCI 4 hours (median 236min, IQR 181-333 min).

1. Kerr A- ANZACS-QI
Impact of NZ STEMI pathway on treatment times in NMDHB

![Graph showing improvement in treatment times from 2014 to 2016 for FMC to needle and FMC to PCI centre. The red line represents a significant decrease in treatment times, while the blue line shows a more gradual improvement.]

Code STEMI
• Unnecessary inequity of access for regional NZ patients to revascularization for STEMI
• STEMI pathway offers no new treatment
  – Cost effective
  – Reconfiguration of existing treatment to provide rapid access
• Safe and manageable
  – Treatment can be delivered safely by pre hospital staff and direct transfer to PCI centres could improve timely access to revascularization for regional patients with numbers similar to the NZ TAVI programme
“What if we don’t change at all ... and something magical just happens?”
NZ Out-of-Hospital STEMI Pathway

**Step one:** Identify STEMI (and transmit the ECG)

**Step two:** Complete fibrinolytic therapy/PCI contraindications checklist

**Step three:** Follow appropriate reperfusion pathway

- *Primary PCI* if the patient can *clearly* reach a PCI capable hospital within 90 minutes of the diagnosis being made

- *Fibrinolysis* if the patient *cannot clearly* reach a PCI capable hospital within 90 minutes, followed by transport to a PCI capable hospital
Reperfusion pathways

Fibrinolytic therapy

• Will be rolled out to designated paramedic and ICP ambulances and helicopters
• Administered ASAP irrespective of distance to hospital
• No requirement to consult if the diagnosis is clear and there are no contraindications or cautions
• Followed by transport to a PCI capable hospital for eligible patients, in discussion with a STEMI coordinator
Hospitals are designed to keep people in...
Primary PCI

• Prompt transport and pre-notification to a STEMI coordinator to activate cath lab
• Remaining on ambulance stretcher to cath lab
• Health sector boundaries cause tension
Revascularisation ASR rates
Collaboration and feedback is key

Antonia Grigg  
July 20 at 6:39 PM

Evolving Inferior STEMI job in Blenheim yesterday. 90YOM presented with non-specific Abdo Pain and lots of burping for past 3 hours. Had fainted to floor from sitting position, called 111 as couldn’t get up. Mild diaphoresis when on floor otherwise NO cardiac symptoms at all. First 12-lead showed flipped Ts only. Decision to do another 12-lead after 10mins. Pt still only c/- of 2/10 discomfort in abdo. No cardiac symptoms. Further ECGs transmitted to Nelson Cardiologist (T... See More
What we are trying to achieve with a national pathway...

Myocardial Salvage

- On scene
- At Hospital
- Fibrinolysis

Time from symptom onset to reperfusion (hrs.)

% Myocardial Salvage

A

B

C

T-fer decision for PCI

Rescue PCI