Prehospital Risk Stratification using a Modified Thrombolysis in Myocardial Infarction (PRISM-TIMI) Score

Ashley Reed
Clinical Team Leader (Paramedic)
London Ambulance Service NHS Trust
Background & Aim

Background
★ In England and Wales the ratio of NSTEMI to STEMI is roughly 3:1¹
★ In the United Kingdom (UK) in 2013 only 55% of NSTEMI patients received an angiogram with PCI (if required) within 72 hours²
★ Paramedics in the UK normally convey patients that they suspect to be suffering from a non ST elevation acute coronary syndrome (NSTEACS), to an emergency department (ED) where they are risk stratified using a risk stratification model (RSM), which determines whether to transfer the patient to a specialist heart attack centre (HAC) for an invasive procedure³
★ One ambulance service identifies potential high risk NSTEACS patients by an electrocardiogram (ECG) criteria, ischaemic sounding chest pain and looking unwell (current practice)⁴

Aim
★ To determine if paramedics’ use of a Modified Thrombolysis in Myocardial Infarction (MTIMI) RSM is more accurate than current practice at identifying and risk stratifying patients suffering from suspected high risk NSTEACS

★ If successful, this could result in more accurate primary triage to an appropriate hospital, thereby reducing secondary transfers², decreasing demand on EDs⁵,⁶, providing better patient care⁷ and reducing length of hospital stay¹ which could provide cost savings
Materials & Methods

- Retrospective Medical Record Review between Oct 2014 - Jan 2015
  - 1 Ambulance Service
  - 1 Emergency Department (ED)
  - 1 Heart Attack Centre (HAC)

- Simple random sampling without replacement

- Sample Size: 154 participants (77 from ED and 77 from HAC)

- MTIMI RSM used as complex RSMs (e.g. GRACE) requiring computation not feasible in prehospital environment at time

- MTIMI RSM adapted to fit prehospital environment – removal of blood biomarker, increased weighting & expanded ECG parameters as this resulted in RSMs with better discriminative powers in previous studies, and expanded Known CAD variable for clarity

<table>
<thead>
<tr>
<th>MTIMI Risk Stratification Model for chest pain patients</th>
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<tr>
<td>Age ≥ 65 years</td>
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<tr>
<td>≥ 3 Coronary Artery Disease (CAD) risk factors*</td>
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<tr>
<td>Known CAD (Stenosis ≥ 50%) / previous myocardial infarction (MI) / coronary artery bypass graft (CABG)</td>
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<td>Aspirin use in past 7 days</td>
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<td>Severe Angina (≥2 episodes in 24 hours)</td>
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<td>ST elevation/depression &gt;0.5mm AND/OR T wave inversion in at least two contiguous ECG leads</td>
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<td><strong>Total</strong></td>
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*Coronary Artery Disease Risk Factors:
- Hypertension
- Hypercholesterolaemia
- Family history of CAD

Current cigarette smoker
- Diabetes Mellitus
Results

- 108 patients were recruited (84 from the ED and 24 from the HAC)
- Older males from a White race with more risk factors attended the HAC compared to the ED
- Only 34.3% of patients had a final diagnosis of ACS
- The MTIMI score is from 0-7, it was best when the cut off was ≥5
- Logistic regression highlighted that Diabetes Mellitus, over 65 years old and an ECG that met the criteria were highly prognostic of needing an invasive procedure
- DM + >65 years + ECG criteria met = Abbreviated MTIMI RSM
Conclusions

Main Conclusion

★ The Abbreviated MTIMI RSM with only three variables provided the best accuracy (c = 0.79) at identifying high risk patients that required an invasive procedure
★ The scores are all similar as they all had the ECG component that was identified to be approximately twelve times more prognostic than any other variable

Change in Practice

★ More education should be provided to paramedics regarding ECG interpretation and how to obtain and document a full history from chest pain patients. This may result in more accurate differential diagnoses being reached and more appropriate use of ACS drugs and triage /transport decisions.
The Future

In the Future

★ Consider evaluation of dynamic clinical variables such as heart rate and systolic blood pressure as part of a prehospital RSM opposed to using CAD risk factors
★ Consider evaluation of cardiac biomarkers as part of a prehospital RSM to bring them more in line with the in hospital risk stratification models used

Next Research Study

★ Paramedics prospectively evaluating an accurate, unmodified, validated in-hospital RSM for undifferentiated chest pain patients in the prehospital environment

For more information please contact me:
Ashleyreed27@hotmail.com
@Ashleydalereed

References