Management of NSTEMI in 2018
Direct admission : Glasgow protocol

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• The magnitude of the challenge
• Patho-physiology and presentation
• Risk stratification
• Timing of invasive management
• Angio. and Functional assessment
• Direct Admission Protocol
Scotland: IHD, mortality & disability adjusted life years, July 2017

http://www.scotpho.org.uk/comparative-health/burden-of-disease/overview

Chest pain clinic attendances
650,000 – 1.3 million
Angina: 2013/2014
In-patient episodes
Men - 71,435
Women - 47,653

Angina prevalence, UK
3.9% men, 2.5% women
3.2% overall, 53 million
>2 million people with angina
>1 in 3, microvascular disease = 600,000 +

Angina drug prescriptions
55,051 (15% of all, 370,000)
Angiograms (2014)
247,363
NHS CHD costs - £954 million
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Acute Coronary Syndrome
Presentation

**ACS Symptoms**

- Acute CP
- **Backpain (atypical)**
- Indigestion
- Acute SOB
- Nil (diabetes/dementia)
- Acute dizziness
- Death

**ACS Signs**

- Tachycardia
- Distressed patient
- Hypoxia/cyanosed
- Heart Failure L+R
- Shock
- Arrhythmia / Resuscitated cardiac arrest
- nil

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**Preparation for Discharge After UA/NSTEMI**

**Antiplatelet Rx**

- ASA 75 – 162 mg/day
  - (162-325 mg/d after stents)
- Clopidogrel 75 mg/day
- Tigagrelor 90mg BD
- OR Prasugrel 10 mg/day (3-12/12)

**Beta blocker**

**ACEI/ARB**

- Especially if DM, HF, EF<40%, HTN

**Statin**

- Give statins to all UA/NSTEMI pts, regardless of LDL (IA). Target LDL <100 mg/dl (ideally <70)

**Secondary Prevention Measures**

- Smoking Cessation
- BP<140/90 mmHg or <130/80 mmHg for DM or chronic kidney disease.
- HbA1C <7%
- BMI 18.5-24.9
- Physical exercise 30-60 mins at least 5 days/week.

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TIMI Risk Score for UA/NSTEMI:
7 Independent Predictors

1. Age ≥ 65 y
2. ≥ 3 CAD risk factors (high cholesterol, family history, hypertension, diabetes, smoking)
3. Prior coronary stenosis ≥ 50%
4. Aspirin in last 7 days
5. ≥ 2 anginal events ≤ 24 h
6. ST-segment deviation
7. Elevated cardiac markers (CK-MB or troponin)
### GRACE Score

#### Early Risk Stratification

**GRACE Risk Score**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older age</td>
<td>1.7 per 10 y</td>
</tr>
<tr>
<td>Killip class</td>
<td>2.0 per class</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>1.4 per 20 mm Hg ↑</td>
</tr>
<tr>
<td>ST-segment deviation</td>
<td>2.4</td>
</tr>
<tr>
<td>Cardiac arrest during presentation</td>
<td>4.3</td>
</tr>
<tr>
<td>Serum creatinine level</td>
<td>1.2 per 1-mg/dL ↑</td>
</tr>
<tr>
<td>Positive initial cardiac biomarkers</td>
<td>1.6</td>
</tr>
<tr>
<td>Heart rate</td>
<td>1.3 per 30-beat/min ↑</td>
</tr>
</tbody>
</table>

*Gracey KA et al. JAMA 2004;291:2727–33.*

**Grace score ≥140 = high risk**

#### ACS Risk Model

- **Risk category (tertile)**
  - Low
  - Intermediate
  - High

- **GRACE risk score**
  - Low: ≤108
  - Intermediate: 109–140
  - High: >140

- **In-hospital death (%)**
  - Low: <1
  - Intermediate: 1–3
  - High: >3

- **Risk category (tertile)**
  - Low
  - Intermediate
  - High

- **Post-discharge to 6-month death (%)**
  - Low: <3
  - Intermediate: 3–8
  - High: >8
The magnitude of the challenge
Patho-physiolpgy and presentation
Risk stratification
Timing of invasive management
Angio.and Functional assessment
Direct Admission Protocol
TIMACS
Timing of Coronary Revascularisation in NSTEACS

- n = 3000
- Early (< 24h)
- Delayed (minimum 36h, median 50h)
- Non-significant reduction in D/MI/RI
- Substantial benefit in high risk group
  - GRACE>140
  - 21% vs 13% at 6 months
- No benefit in lower risk groups

TIMACS (Death/MI/Stroke)

![Graph showing cumulative hazard over time for different risk groups.](image)

Figure 3. Kaplan–Meier Cumulative Risk of the Primary Outcome, Stratified According to GRACE Risk Score at Baseline.

Patients who had a risk score of more than 140 on the Global Registry of Acute Coronary Events (GRACE) scale (high risk) benefited more from early intervention than did patients with a score of 140 or less (low-to-intermediate risk) with respect to the composite primary outcome of death, myocardial infarction, or stroke.

Invasive and Ischaemia Guided Intervention in Patients with Non-STEMI ACS

Immediate

• Within 2 hrs
• Refractory angina,
• heart failure,
• new or worsening MR
• recurrent angina on maximal medical R/

Invasive Intervention

Early

• Within 24 hrs
• High risk (e.g. GRACE score >140),
• rising Troponin level,
• new ST-segment depression.
Invasive and Ischaemia Guided Intervention in
Patients with Non-STEMI ACS

Immediate
- Within 2 hrs
  - Refractory angina,
  - heart failure,
  - new or worsening MR
  - recurrent angina on maximal medical R/

Early
- Within 24 hrs
  - High risk (e.g. GRACE score >140),
  - rising Troponin level,
  - new ST-segment depression.

- Within 25-72 hrs
  - Intermediate risk (e.g. GRACE score of 109-140,
    - ejection fraction <40%,
    - post-infarction angina,
    - diabetes, renal insufficiency, prior CABG, recent PCI

Delayed

Invasive Intervention

Ischaemia - Guided Intervention

Depends on spontaneous or provoked ischaemia

Intermediate risk
- Troponin negative
- patient or physician preference in absence of high-risk features,
unavailability of interventional facilities or expertise.
Symptoms Onset

First medical contact  NSTE-ACS diagnosis

PCI Centre  EMS or Non-PCI Centre

Risk Stratification

Immediate transfer to PCI centre

Very High

Therapeutic Strategy

Immediate invasive (<2 hr)

High

Immediate transfer to PCI centre

Very High

Same day transfer

High

Immediate invasive (<2 hr)

Early invasive (>24 hr)
Symptoms Onset

First medical contact NSTE-ACS diagnosis

PCI Centre
EMS or Non-PCI Centre

Risk Stratification

Therapeutic Strategy

Immediate transfer to PCI centre
Very High
Same day transfer
High
Transfer
Intermediate

Immediate invasive (<2 hr)
Invasive (<72 hr)
Early invasive (<24 hr)

Low

Non-invasive testing if appropriate

Immediate transfer to PCI centre
Very High
Same day transfer
High
Transfer
Intermediate

Low
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NSTEMI – Coronary Angiography
Revascularisation

NSTEMI: 2013/2014
commonest indication for cor. angio
Angiograms, n = 26,510
PCI, n = 23,053

Economic costs

2013
80,724 MIs, 61% NSTEMI
2010
£3.6 billion expenditure & losses
£9.8 billion societal loss

Practice variation in NSTEMI increases 30-day mortality

Revascularisation rate, %

Hospitals

<table>
<thead>
<tr>
<th></th>
<th>Median (IQR)</th>
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<tbody>
<tr>
<td>Sweden</td>
<td>34.8 (28.8-39.0)</td>
</tr>
<tr>
<td>UK</td>
<td>34.9 (31.3-39.4)</td>
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</table>

30-day Mortality, %

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<tr>
<td>Sweden</td>
<td>7.0 (6.3-8.1)</td>
</tr>
<tr>
<td>UK</td>
<td>9.6 (6.6-13.7)</td>
</tr>
</tbody>
</table>

Revascularisation
Half in UK (19.2%) vs Sweden (34.8%) with twice the variation (21.9% vs. 10.2%)

Practice variation was directly associated with 30-d mortality
incomplete revascularisation – 50% of NSTEMI cases in the UK

Chung, James, Gale, Hemingway et al BMJ 2015
Functional assessment-FFR

FAME - NSTEMI

MACE during 2 years follow-up

Sels et al JACC Intervention 2011
Oct. 2011
↓
May 2013

Screened
n = 174

Consent

n = 176

Randomise

350

FFR disclosed

FFR not disclosed (Angio-guided)

Possible obstructive CAD ≥ 1 stenosis ≥ 30% severity amenable to revascularization

n = 1297

Exclusions, n=444

Registry
n = 503

ESC Hotline 1 Sep 2014

Screened

n = 1297

Exclusions, n=444

Registry
n = 503

FFR-disclosure
Impact on initial treatment

Initial treatment
Change post-FFR
Final decision

FFR treatment change ~ 22% of patients
FFR-guided management increased medical therapy without PCI / CABG

ESC Hotline 1 Sep 2014 Costs and quality of life were similar

FFR in NSTEMI
FAMOUS Study

1. FAMOUS represented > 40% of NSTEMI all-comers, representative of ‘real-life practice’

2. FFR was *successful* in 100% of patients and *safe* (0.03% guidewire dissections).

3. FFR-disclosure increases consensus, changes therapy, reduced revascularisation.

4. In culprit & non-culprit arteries with preserved antegrade flow, FFR is valid.

5. Phase 3 trials of FFR in NSTEMI & STEMI
• The magnitude of the challenge
• Patho-physioloqy and presentation
• Risk stratification
• Timing of invasive management
• Angio. vs Functional assessment
• Direct Admission Protocol
Timely and evidence based care of high risk NSTEMI patients... cannot be provided via traditional hub and spoke model.
Direct NSTEMI-concept

- Direct referral of high risk NSTEMI;
- All high risk patients will have coronary angiography within 24 hours.
- Phased introduction.
- Early direct discharge or repatriation if required.

Definition- High Risk NSTEMI

Within 24 hrs

- Cardiac chest Pain
- ECG changes- ST depression or deep symmetrical T wave inversion.
- HEART score greater than 5
- High risk (e.g. GRACE score >140),
- rising Troponin level,
- new ST-segment depression.

Assessment by the SAS

- HEART Score: Risk scoring system developed for use in unselected emergency presentations with chest pain.
- History
- ECG
- Age
- Risk Factors
- Troponin

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A+E Referrals/M.A.U

- Clinical Assessment
- ECG.
- Admission HsTn
- CXR
- Routine bloods.
- HEART score.
- Re-design of Chest Pain Protocol.

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High Risk NSTE MI protocol

- Score > 5 – telemeter 12 lead ECG
- contact CCU GJNH
- agree care pathway – consider:
  - Aspirin, Clopidogrel
  - IV Heparin
  - GTN,
  - Morphine, Metoclopramide.

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Direct NSTEMI-16 Month Results

Direct NSTEMI referrals

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Performance indicators.

- Angiography 99%
- Within 24hr Guarantee 98%
- Median Time from Admission to angiography 3 hours 58 mins.

Management

- 75% revascularisation Rate (68% PCI. 7% CABG)
- 25% Intensive Medical management.
Discharge

- 30% Discharged directly from GJNH
- Median stay 1 day. (mean 1.9)
- Median stay of whole cohort 1 day (Mean 1.86 days)

Economic Benefits

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Conclusion

- Prompt clinical diagnosis and acute medical management
- Admission risk stratification, transfer when indicated
- Immediate or urgent coronary angio. in high risk patients
- Functional assessment is a vital tool in guiding management
- Direct Access high risk NSTEMI protocol is feasible
- Long term medical management; risk factor modification
Golden Jubilee National Hospital

Largest cardiothoracic centre in UK
770 STEMI, 2600 NSTEMI, 2000 elective angiograms
National Services for heart & lung disease

Preparation and planning
Patients Not Accepted

- Aug-Nov analysed
- 93 Patients
- Median Age 69 (range 28-86)
- Median Heart Score 6 (range 3-9)
- 51% subsequently underwent angiography
- 52% PCI
- 35% Medical Rx
- 12% CABG

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Our Commitments

- We could identify high risk NSTEMI patients at their presentation (A+E or S.A.S)
- We could admit this patient directly 24/7
- We would undertake Angiography within 24 hrs of admission
- This high risk group would benefit from high rates of revascularisation.
- We would aim for direct discharge/ early repatriation.