

Risk stratification in non-ST-segment elevation ACS

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Key points

- Guidelines recommend risk stratification for patients presenting with non-ST-segment elevation acute coronary syndromes (NSTEMACS).
- Both clinical and objective risk stratification tools have been developed; the latter have better predictive value but are seldom applied.
- Patients at highest risk have the most to gain from evidence-based treatment. However, cardiologists tend to underestimate the risk of adverse events and overestimate the risk of harm from investigations and therapies, and undertreat these patients.
- Wider use of objective assessment tools such as predictors of the likelihood of death or myocardial infarction and bleeding risk and frailty scores may minimise unjustified risk-averse behaviour and promote use of appropriate therapies.
- Following discharge after NSTEMACS, the patient's GP should ensure optimal secondary prevention.

The use of objective tools to determine the risk of ischaemic complications in patients with non-ST-segment elevation acute coronary syndromes helps the appropriate application of evidence-based therapies but these patients are often undertreated. GPs should check that the secondary prevention strategies patients are discharged on are optimal.

The presenting characteristics of patients who experience an acute coronary syndrome (ACS) are heterogeneous. Sometimes the diagnosis is clear, with typical symptoms in the presence of diagnostic ECG changes and/or dynamic elevation in cardiac biomarkers. Patients with ST elevation, for example, may have occlusion of a major epicardial vessel and should be urgently referred to hospital if they have not presented to an emergency department, and given reperfusion therapy. Often however, objective signs of myocardial infarction or ischaemia are not present, and the diagnosis of ACS is considered when symptoms are present with no obvious alternative explanations.

Risk assessment strategies in these patients with possible non-ST-segment elevation ACS (NSTEMACS) are directed towards identifying those patients at low risk of death or myocardial infarction in the short term so that further investigations can be performed as outpatients. This

process, which usually takes place in the emergency department but may take place in general practice, is described in an article in the December 2013 issue of *Medicine Today*.¹

If the decision is made to admit the patient to hospital, the focus changes to one of identifying those at higher risk of recurrent infarction or death. This then guides the application of evidence-based therapies such as angiography and appropriate revascularisation, powerful antithrombotic therapy, and comprehensive secondary prevention.

This article describes the different risk stratification approaches available for patients with NSTEMACS and the barriers to their use, and the implications of this for GPs managing these patients following discharge.

WHY IS IT IMPORTANT TO IDENTIFY HIGH-RISK ACS PATIENTS?

The risk of death following admission with an ACS varies from less than 1% to more than

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50%.² Patients at higher risk following an ACS have more to gain from intensive evidence-based care, including antithrombotic medications, revascularisation and application of secondary prevention strategies.³ There is strong consistent evidence that the highest risk patients, with the most to gain from evidence-based therapies, are the least likely to receive it.⁴

STRATEGIES TO IDENTIFY HIGH-RISK NSTEMACS PATIENTS

Clinical experience has allowed doctors to recognise features of a patient's background history and presentation that portend a greater likelihood of an adverse outcome during and in the months following their admission for an NSTEMACS. These clinical features have been aggregated in the Australian ACS management guidelines to allow the classification of patients into those at high, intermediate or low risk of death or myocardial infarction over the months following presentation with NSTEMACS (Box).⁵ In practice, a simplified risk algorithm is most commonly applied (Table).⁵

In addition to these clinical risk assessments (high, intermediate or low), objective risk scores have been developed from clinical trial and registry data sets. The most widely known of these are the Thrombolysis in Myocardial Infarction (TIMI) and Global Registry of Acute Coronary Events (GRACE) scores.^{2,6} Both more accurately predict outcomes among admitted patients with an ACS than the clinical risk assessments. Of the two, the GRACE risk score, which includes eight variables (age, heart rate, systolic blood pressure, Killip class, creatinine concentration, elevated biomarkers of myocardial necrosis, cardiac arrest on admission and ST deviation), has the better predictive value (and is currently recommended in the updated Australian guidelines).⁷

GAPS BETWEEN CLINICAL PRACTICE AND GUIDELINE-RECOMMENDED MANAGEMENT

Despite the wide promulgation in the ACS guidelines of the importance of risk stratification for patients with NSTEMACS, multiple studies have provided evidence for a risk-treatment paradox whereby higher risk patients are less likely to be treated with evidence-based therapies than those at lower risk.

FEATURES ASSOCIATED WITH HIGH-RISK, INTERMEDIATE-RISK AND LOW-RISK NON-ST-SEGMENT ELEVATION ACUTE CORONARY SYNDROMES (NSTEMACS)^{5*}

High-risk features

Presentation with clinical features consistent with ACS and any of the following high-risk features:

- repetitive or prolonged (more than 10 minutes) ongoing chest pain or discomfort
- elevated level of at least one cardiac biomarker (troponin or creatine kinase-MB isoenzyme)
- persistent or dynamic ECG changes of ST-segment depression ≥ 0.5 mm or new T-wave inversion ≥ 2 mm
- transient ST-segment elevation (≥ 0.5 mm) in more than two contiguous leads
- haemodynamic compromise – systolic blood pressure < 90 mmHg, cool peripheries, diaphoresis, Killip Class > 1 and/or new-onset mitral regurgitation
- sustained ventricular tachycardia
- syncope
- left ventricular systolic dysfunction (left ventricular ejection fraction < 0.40)
- prior percutaneous coronary intervention within six months or prior coronary artery bypass surgery
- presence of known diabetes (with typical symptoms of ACS)
- chronic kidney disease – eGFR < 60 mL/min (with typical symptoms of ACS)

Intermediate-risk features

Presentation with clinical features consistent with ACS and any of the following intermediate-risk features AND NOT meeting the criteria for high-risk ACS:

- chest pain or discomfort within the past 48 hours that occurred at rest or was repetitive or prolonged (but currently resolved)
- age > 65 years
- known coronary heart disease – prior MI with left ventricular ejection fraction ≥ 0.40 , or known coronary lesion more than 50% stenosed
- no high-risk changes on ECG (see above)
- two or more of the following risk factors: known hypertension, family history, active smoking or hyperlipidaemia
- presence of known diabetes (with typical symptoms of ACS)
- chronic kidney disease – eGFR < 60 mL/min (with typical symptoms of ACS)
- prior aspirin use

Low-risk features

Presentation with clinical features consistent with ACS *without* intermediate-risk or high-risk features. This includes onset of angina symptoms within the last month, or worsening in severity or frequency of angina, or lowering of anginal threshold.

ABBREVIATIONS: ACS = acute coronary syndrome; eGFR = estimated glomerular filtration rate; MI = myocardial infarction.

* Aroney C, Aylward P, et al. Guidelines for the management of acute coronary syndromes. Med J Aust 2006; 184(8 Suppl): S1-S32. © The Medical Journal of Australia. Reproduced with permission.

When clinicians are surveyed, they believe they can reliably identify high-risk patients and, indeed, appear to allocate treatment on the basis of this assessment. However, when a doctor's estimate of risk is compared with an objective assessment the correlation is poor.⁸ Part of the reason for this is the often exclusive focus on acute markers of myocardial injury (biomarker elevation, ECG changes), which

TABLE. SIMPLIFIED RISK ASSESSMENT ALGORITHM^{5*}

Symptom	Six-month risk of death or myocardial infarction [†]		
	Low risk (< 2%)	Intermediate risk (2 to 10%)	High risk (> 10%)
Any pain	Yes	Yes	Yes
Pain at rest, repetitive or prolonged pain	No	Yes	Yes
Changes on ECG or elevated troponin level	No	No	Yes

* Aroney C, Aylward P et al. Guidelines for the management of acute coronary syndromes. Med J Aust 2006; 184(8 Suppl): S1-S32.

[†] Risk categories are based on the presence of clinical factors known to increase rate of MI and death within six months.

drive evidence-based management but only partially determine the prognosis. On the other hand, the presence of intercurrent diseases (renal impairment, lung, liver or vascular disease) plus advancing age, which carry a significant burden of

risk, are associated with more conservative management decisions.⁹

BARRIERS TO EVIDENCE-BASED CARE

When evaluating their own practice, clinicians take notice of the harm perceived

to have been caused, such as bleeding events following an interventional procedure or side effects from the medications prescribed, rather than the numbers of lives saved or heart attacks prevented by applying evidence-based strategies. This experiential base then guides their subsequent clinical decisions, which become progressively more risk-averse.

The ageing population and falling mortality rates from cardiovascular disease contribute to an older cohort of patients presenting to hospital for acute coronary care. About 25 years ago, patients over the age of 80 years were refused admission to many coronary care units. Today, it would be unusual to find such a unit at any time that did not contain these patients. Clinicians often apply the subjective 'end of the bed' test when deciding on the appropriateness of therapy; there is little doubt that this biases against older patients.

IMPROVING EVIDENCE-BASED MANAGEMENT

It is difficult to change clinician behaviour. However, decision-making in the time-poor environment that characterises the consultant ward round could be made easier by the routine application of objective risk scores. Both the GRACE and TIMI scores have been converted into electronic formats and made freely available to download to handheld devices ('GRACE 2.0 ACS Risk Calculator' app and 'TIMI Scores' app) and computer systems (www.outcomes-umassmed.org/grace and www.mdcalc.com/timi-risk-score-for-uanstemi) – see the Figure. Local audit data suggest that despite this, these objective scores are applied in fewer than 20% of patients presenting to Australian hospitals (CONCORDANCE registry, unpublished observations).

A strategy to redress a risk-averse approach is to provide clinicians with objective measures of the risk of harm in individual patients, which they can then balance against the likely benefit of each treatment option. Bleeding is one of the most common adverse events in

Figure. The GRACE risk model calculator for death or myocardial infarction from admission to hospital to six months after discharge. Screen shot of opening page of web version available from www.outcomes-umassmed.org/grace. Versions for other platforms are also available from the website.

contemporary ACS, either related to interventional procedures or occurring spontaneously, due to the antithrombotic treatments used.¹⁰ Bleeding risk is often cited as a reason for avoiding coronary angiography or dual antiplatelet therapy. Several objective bleeding scores have been developed that can predict the risk of bleeding in an individual patient, such as the CRUSADE and ACUTY bleeding scores.^{11,12} It is then possible to select treatment approaches, such as radial rather than femoral access for angiography, or bivalirudin rather than heparin together with a glycoprotein IIb/IIIa antagonist as antithrombotic therapy, that mitigate against this bleeding risk while retaining clinical benefit. This approach is recommended in Australian guidelines.¹² Currently there is little information as to how effectively this has been integrated into clinical practice.

The frail elderly patient presents a particular challenge. There are more than 20 frailty assessment tools revolving around core phenotypic domains (including poor mobility and weakness) as measured by physical performance tests.¹³ Application of any one of these is likely to result in a more informed decision regarding the capacity of a patient to tolerate angiography and secondary prevention therapies than the 'gestalt' impression obtained from the end of the bed.

IMPLICATIONS FOR THE GP

It is important for the primary care physician to recognise that decisions made in hospital may not always be as well informed as expected. In the same way that high-risk patients may not be offered coronary angiography in hospital due to overestimation of risk and underestimation of benefit, these same patients are also less likely to be offered secondary prevention strategies, including cardiac rehabilitation and therapies such as antiplatelet agents, statins, ACE inhibitors and beta blockers.

Hospital clinicians may well be more familiar with the evidence base for the

management of patients with NSTEMI/ACS, but for the most part they will not know the patients as well as the relevant primary care physician. Following the patient's discharge there is an opportunity for the patient's GP to identify any therapeutic gaps, discuss the reasons for them with the treating hospital clinician and, in the more controlled post-discharge environment, ensure that an optimal secondary prevention plan is realised.

CONCLUSION

Determining a patient's risk of ischaemic complications following hospital admission with NSTEMI/ACS is an important part of management. This allows the treating clinicians to decide whether to send the patient for coronary angiography and

whether to select more intensive antithrombotic therapies in the acute phase. Hospital clinicians tend to underestimate the likelihood of an adverse outcome in high-risk patients and consequently undertreat them. This may result in these patients being discharged to the care of the GP on inadequate secondary prevention strategies. **MT**

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A list of references is included in the website version (www.medicinetoday.com.au) and the iPad app version of this article.

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