STEMI/ NSTEMI/ ACS General Management - Full Clinical Guideline

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ACS, STEMI, UA, NSTEMI, cardiology, myocardial infarction, thrombolysis, PPCI, primary PCI, fondaparinux, prasugrel, ticagrelor, cangrelor, clopidogrel, cardiac rehabilitation

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PLEASE REFER TO THE ACS GUIDELINES ON THE INTRANET

1. Intravenous Access

An intravenous cannula should be sited in all patients on admission. The use of ante-cubital and small hand veins should, if possible, be avoided. Cannula should normally be removed after 48 hours to reduce the risk of infection, or re-sited if IV access is still required. Please use the left arm where possible (to make PCI via the right radial route easier).

2. Analgesics and Pain Relief

Early and adequate reduction in pain is important, both for symptomatic reasons and to improve myocardial ischaemia, as severe pain itself has a deleterious effect on the oxygen supply/demand relationship after acute myocardial infarction.

Acute pain should be controlled with ***Morphine*** (5-20mg), which is best given intravenously, “titrating” the patient with doses of 5mg every two minutes until symptomatic relief has been obtained. A total dose of between 5 and 20mg will be needed depending on the size and age of the patient. An alternative is ***Diamorphine*** (2.5-5mg) given in doses of 2.5mg. An anti-emetic should also always be given (***Metoclopramide*** 10mg IV) as nausea and vomiting are likely with an opiate given alone.

Mild post-infarction chest discomfort is not uncommon on the second or third day, and a milder oral analgesic such as ***Paracetamol*** 500mg + ***Codeine*** 30mg or ***Paracetamol*** alone may be appropriate. NSAIDs should be avoided where possible.

3. Oxygenation

Oxygen therapy is beneficial only in patients who have significant hypoxaemia, in particular those with pulmonary oedema or low output cardiogenic shock. The oxygen must be prescribed on the drug chart and the

concentration titrated aiming for a target O2 saturations of 94-98%. In patients with pulmonary oedema use a High concentration O2 mask (10L/min), and in others a Venturi 35% mask (5L/min). In patients with COPD aim for a target O2 saturation of 88-92% using a Venturi 28% mask.

4. Anti-platelet medication

Aspirin

All patients with chest pain of presumed ischaemic myocardial origin should receive Aspirin 300mg o.d. chewed or dispersible in the absence of allergy, known active GI haemorrhage or other contra-indication. This will usually have been given by the paramedics but should be confirmed as should a history of vomitus since administration of the loading dose.

Additional anti-platelet: Clopidogrel or Ticagrelor (in ACS/NSTEMI); Prasugrel, Ticagrelor or Clopidogrel in STEMI.

All patients with ACS/NSTEMI or STEMI will receive an additional anti-platelet agent in the absence of contra-indication. Use of one of these drugs is essential for PCI to avoid stent thrombosis. Until 2012 Clopidogrel was the only ADP-receptor antagonist available for use in ACS/NSTEMI or STEMI, and remains an effective drug. Following publication of RCT evidence (PLATO for ticagrelor and TRITON TIMI-38 for Prasugrel) the newer drugs were licensed in the UK, Europe and the US on the basis of a 10-15% relative risk reduction in ischaemic events in comparison to clopidogrel with no significant increase in major bleeding. Prasugrel (like clopidogrel a thienopyridine) undergoes more rapid conversion to the active form while ticagrelor is a novel class of drug which does not require enzymatic conversion but is an immediately active compound. Both drugs exhibit more rapid platelet inhibition with more predictable anti-platelet action (up to 30% of patients have variable ‘clopidogrel resistance’).

Royal Derby hospital has issued guidance on the use of the agents which are indication specific:

Ticagrelor in ACS/NSTEMI:

Following senior cardiology review confirming the diagnosis of NSTEMI, load with Ticagrelor 180mg then 90mg bd. Duration of use post ACS/NSTEMI is ≥12 months. The majority of these patients will already have received Clopidogrel and must be re-loaded (i.e. be given a 180mg loading dose of Ticagrelor).

Other patients receive Clopidogrel 75mg od. for 12 months following an in initial loading dose of Clopidogrel 600mg. Ticagrelor interacts with potent CYp3A4 inhibitors such as clarithromycin and ketoconazole and should not be used with these.

Prasugrel is an alternative option in patients with type 2 diabetes and confirmed NSTEMI (not if previous TIA/CVA, age > 75, weight <60kg).

Prasugrel, Ticagrelor and Cangrelor in STEMI:

See flow-chart (ref CG-T/2014/143). The benefit of Prasugrel/ Ticagrelor in STEMI is thought in part to derive from more rapid platelet inhibition in comparison to clopidogrel. **Cangrelor** can be used if the patient is unable to take oral therapy at presentation. It is then switched to oral therapy. If being switched to Clopidogrel or Prasugrel, the administration of the loading dose should be delayed until the cangrelor infusion is discontinued. If being switched to Ticagrelor, the oral loading dose should be given as soon as possible and can be administered whilst still on the infusion.

Duration of antiplatelet therapy

As noted above, dual antiplatelet therapy is generally given for 12 months after an ACS with aspirin lifelong, but in some circumstances a different duration may be selected. **Please follow the advice of the** Consultant.

For example, if there is a need for anticoagulation (eg AF, previous PE or metal valve), all antiplatelets may stop after 12 months, leaving the patient just on anticoagulation. Also, Clopidogrel tends to be used, rather than Prasugrel or Ticagrelor. In certain selected patients with higher bleeding risk and lower thrombosis risk, we may opt for aspirin for just 1 month (or not at all) and use clopidogrel plus warfarin or NOAC for the first 12 months. Please also note that in these circumstances a different dose of Rivaroxaban 15mg daily may be selected as this was used in the Pioneer trial.

There is always a higher risk of bleeding when combination therapy is used. In these circumstances, ensure the patient is taking a proton pump inhibitor.

Certain stents (currently biofreedom and synergy) appear to be safer with shorter courses of antiplatelet therapy and we may select these stents in patients with an indication for anticoagulation, high bleeding risk or surgery planned, for example. The minimum duration of dual antiplatelet therapy with these stents is 1 month, but we may still recommend longer is there are no bleeding issues, especially after ACS. Bare metal stents (with no drug coating) are rarely used now as they have a higher risk of restenosis (renarrowing) and require a similar course of antiplatelet therapy to these newer stents.

In certain patients at high risk of recurrent ischaemic events and a low risk of bleeding, Ticagrelor can be continued for up to 3 years (a lower dose of 60mg bd is used after the first 12 months). This reduces recurrent ischaemic events but at the cost of higher bleeding rates.

5. Anticoagulation: Fondaparinux

Fondaparinux sodium is a synthetic pentasaccharide that inhibits activated factor X. It is recommended by NICE for use in patients with Unstable angina (UA) or non ST-elevation MI (NSTEMI). In line with European guidance and clinical trail evidence from OASIS -5 and OASIS-6 tirals we use the parenteral anticoagulant in ACS/NSTEMI **Fondaparinux 2.5mg sc. Once daily**. Fondaparinux should not be used when eGFR is <20ml/min (where IV unfractionated heparin should be used).

Fondaparinux should be administered at the point of diagnosis of presumed ACS/NSTEMI in MAU with subsequent doses administered at 6pm (this may therefore mean a >24hr gap before the second dose). The minimum recommended period between Fondaparinux administration and cardiac catheterization is 4 hours. Ideally Fondaparinux should NOT be given on the morning of cardiac catheterization, but please let the operator know if it has been given. Fondaparinux should be given for between 48 hours and up to 6 days while awaiting cardiac catheterization.

Advice should be sought from haematology in patients with significant thrombocytopaenia (PLT<100) and caution exercise in patients with other risk factors for haemorrhage (e.g alcoholic liver disease). There are few data in patients anticoagulated with warfarin or NAOCs where Fondaparinux may reasonably be omitted in INR>2.

Fondaparinux should be omitted in the morning if the patient is scheduled to undergo coronary angiography and patients should not receive Fondaparinux following coronary angiography/PCI (prophylactic dose LMWH e.g. enoxaparin 40mg sc od is often commenced the following day).

Other medical therapy in NSTEMI/UA (for STEMI refer to STEMI full guideline)

Following confirmation of an acute coronary syndrome, refer to the ACS summary flow chart to guide management in each group. Further guidance on drug therapy is given below.

6. Anti-ischaemic therapy

(a) β Blockade and calcium channel blockers

All patients with NSTEMI or unstable angina should be commenced on an oral β blocker (e.g. ***Atenolol*** 25-50mg, ***Bisoprolol*** 5-10mg) unless there is a contra-indication. Aim for a target heart rate of 50-60. In patients who are unable to tolerate a β blocker (e.g. asthmatics) use a heart rate controlling calcium antagonist such as ***Diltiazem*** 60-120mg bd orally if no heart failure. (Avoid ***Nifedipine*** because of reflex tachycardia.) It is reasonable to add ***Diltiazem*** to a β blocker in patients who do not settle after 24 hours, as many patients appear to respond better to combination, but the combination carries a significant risk of bradycardia and ***Amlodipine*** 5mg is a better option if the heart rate is less than 60.

Beta-blockers can be given iv to high risk unstable NSTEMI patients (usually on CCU) eg ***Atenolol*** 2.5-10mg i.v.

(b) **Nitrates**

It is recommended that high risk patients with NSTEMI are started on nitrates, initially IV (on CCU) then orally. Start with GTN IV using a syringe pump (load 25mls of undiluted 0.1% GTN = 1mg/ml) and commence with 1mg/hour (=1ml/hr) increasing the dosage every half-hour to a maintenance dose of 6-10mg/hr (=6-10mls/hr). Reduce the pump rate if systolic BP <100mmHg. Transfer to oral ***Isosorbide Mononitrate*** (10-20mg bd) after 24 or 48 hours.

Other patients with confirmed NSTEMI or angina, who are more stable, can be commenced on oral nitrates as above.

IV and oral nitrates should be avoided in patients who have taken a PDE5 inhibitor (***Sildenafil, Tadalafil*** or ***Vardenafil***) within 12 hours, due to possible blood pressure instability.

Nicorandil (10-20mg bd) can also be added to a combination of β blockers, calcium antagonists and nitrates and will sometimes produce symptom relief in a patient for whom intervention is not possible or inappropriate. However, there is no clear evidence that multi combination anti-anginal therapy improves prognosis.

7. Lipid lowering therapy with a statin

There is now strong evidence (Heart Protection Study) that use of a statin improves prognosis in all patients with moderate hyperlipidaemia (cholesterol >3.5) and coronary disease. There is also some evidence (MIRACL, PROVEIT-TIMI 22) that high dose statin (e.g. ***Atorvastatin*** 80mg) in acute coronary syndrome may be particularly beneficial due to plaque stabilisation. It is therefore recommended that all patients with confirmed acute coronary syndrome are started on treatment with ***Atorvastatin*** 80mg nocte (or equivalent), irrespective admission cholesterol level, and treatment should be started on admission, prior to the results of admission lipids being available. If the patient is taking a calcium channel blocker, amiodarone or other medication known to interact, commence at a lower dose eg 40mg. In patients with CKD, the starting dose should be 20mg.

Consideration should be given as to whether patients may have Familial Hypercholesterolaemia, where family screening or referral to the lipid clinic for potent therapies may be appropriate. Please refer to NICE guidelines for PCSK9 inhibitor guidance.

8. Vasodilation

Patients should be commenced on an ACE inhibitor, as their blood pressure allows. Eg ***Ramipril*** 1.25mg nocte, increased stepwise. Recheck renal function after 24-48 hours and after each dose titration, and ensure that

this will also be done after discharge. If renal impairment is present, avoid ACEi on the day of angiography and for 24-48 hours afterwards.

If the patient develops a cough, an angiotensin receptor blocker can be used instead.

If the creatinine increases by more than 20%, discontinue and consider assessment for renal artery stenosis.

9. Sedation

Many, particularly younger, patients are anxious and distressed during the early stages after myocardial infarction and ***Diazepam*** 2-5mg tds, prn, together with a hypnotic at night, may be helpful. Caution is recommended in patients who are already hypotensive or in the elderly, who may become confused.

GENERAL MANAGEMENT AND NURSING CARE AFTER MYOCARDIAL INFARCTION

1. Bed Rest

Bed rest is recommended for the first 24-48 hours, but patients can then be mobilised and at that stage are usually well enough for transfer to the main ward. Unless there are contra-indications, older patients should be mobilised early (24 hours) and patients with pulmonary oedema may be more comfortable if managed in a suitable chair.

On the main ward, progressive mobilisation is recommended and patients with stairs at home are encouraged to try ascending a flight of stairs, under supervision, prior to discharge from hospital.

2. Routine Biochemistry

Blood should be taken on admission for glucose, lipids, urea and electrolytes and LFT. Unexpected hypokalaemia is not uncommon, particularly in patients on diuretic therapy, and should be corrected. Abnormal liver function may reflect right heart failure, alcohol abuse or drug toxicity. Urea and electrolytes should be repeated on day 2 and thereafter as appropriate. Magnesium should be checked if there are any arrhythmias.

3. Assessment of left ventricular function

Echocardiography should be arranged for all patients with confirmed ACS. This should be as an inpatient if there is STEMI, multivessel disease, a murmur or clinical evidence of heart failure. In other cases it may be acceptable to arrange after discharge.

If the ejection fraction is <40%, a follow up echo at 6-8 weeks should be considered, with an ICD to be considered if EF <35% at this stage.

4. Coronary angiography (NSTEMI)

This is arranged after senior cardiology review and should be carried out within 72 hours, or sooner if the patient is high risk.

Please note that patients with ongoing chest pain, especially with dynamic ECG changes, haemodynamic instability of acute cardiac failure should be discussed with the interventional cardiologist to determine if urgent angiography is required.

5. Diet

Diet should be light in CCU and appropriate dietary advice given to all patients prior to discharge from hospital. Oily fish should be encouraged, and obese patients should receive advice about dietary weight reduction. A low animal fat intake is recommended for all patients with coronary disease, and patients with cardiac arrhythmias or significant sinus tachycardia should drink decaffeinated coffee. Constipation is common after myocardial infarction and laxatives should be given as appropriate.

6. Cardiac Rehabilitation and return to work

Patients are referred to the Cardiac Rehabilitation Department during their inpatient admission following a diagnosis of Acute Coronary Syndrome. Each individual has the opportunity to discuss their diagnosis, treatment, symptom management, lifestyle adjustment, driving, return to work and to develop a personalised activity plan.

Following hospital discharge after MI, patients receive a contact call and offer of a home visit from the Community Cardiac Liaison nurses based in Derby City and Derbyshire County PCT.

The Cardiac Rehabilitation Department offer a twice-weekly programme lasting seven weeks for patients who have sustained an MI, or have undergone CABG, angioplasty, implantation of ICD or heart valve surgery. Patients who have heart failure can access the cardiac rehabilitation programme by direct referral from the Heart Failure Nurse Specialist team, and an Angina Nurse specialist provides advice and support to patients diagnosed with Angina.

An incremental shuttle walk, monitoring blood pressure and pulse response is carried out on all individuals prior to exercise to assess initial activity level, encouraging patients to use the Borg scale of perceived exertion

Cardiac Rehabilitation classes take place at the Royal Derby Hospital (RDH) and Ilkeston. We also have a specialised group for Angina/Heart Failure patients where the emphasis is more on education, gentle graduated exercise, compliance and coping with daily activity. Specialised Seated

Exercise rehabilitation for the elderly also takes place at the RDH site. Cardiac Rehabilitation includes education, risk factor modification and graduated aerobic activity to encourage individual lifestyle changes. Patients who are having difficulty stopping smoking should be referred to the hospital based smoking cessation team.

Referrals may be made direct to Tracey Ralph, Clinical Manager, 01332 785597, Bleep 1303. Otherwise contact may be made to Cardiac Rehabilitation by bleeping the Cardiac Rehabilitation Nurse (RDH Bleep 1303).

Return to work depends on the nature of the job and clinical cardiac status. Most individuals who are in good general health return within 4-6 weeks. This is often influenced by some form of clinical assessment. Patients should not drive for 4 weeks after STEMI or NSTEMI (treated conservatively). Recent changes in DVLA guidelines (September 2009) state patients are allowed to drive 1 week after NSTEMI or STEMI if they have undergone successful and uneventful PCI with no other complications such as poor ejection fraction or incomplete revascularisation. Other contra-indications to driving are uncontrolled angina, uncontrolled cardiac arrhythmias and any major conduction defects. The DVLA need not be informed unless a HGV licence is involved.

HGV drivers should inform the DVLA and **may** be allowed to return to HGV driving if they are able to meet specific criteria. This normally requires a negative exercise (off β blockade and CA) at 9 minutes Bruce and an ejection fraction on echo of >40%. PPL pilots should inform the CAA, and are grounded for 9 months and then **may** be allowed to fly with a 'safety pilot' if they have a negative exercise test.

6. Fitness to fly as a passenger (CAA and British Airways Guidelines)

Patients who have made an uneventful recovery from myocardial infarction are usually fit to fly within 2-3 weeks. The British Airways minimal interval before flying is 7 days following an uncomplicated MI, but a longer delay is preferable. "Elective" overseas holidays are best postponed for 1 month.

After PCI, patients can fly 3-5 days post procedure but a 2-3 week delay is preferable. Patients should not fly within 2 weeks of cardiac surgery due to possible intra-thoracic air which needs time to re-absorb.

Other contra-indications to flying are CVA within 2 weeks, unstable angina, uncontrolled hypertension, de-compensated cardiac failure and uncontrolled cardiac arrhythmia.

All cardiac patients travelling should be advised about the importance of health insurance.

Documentation Controls

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