Milton Keynes University Hospital NHS Foundation Trust

Title: Acute Coronary Syndrome (ACS) – Diagnosis and Management

Classification:	Guideline		
Authors Name:	Dr Cliona Kenny		
Authors Job Title:	Cardiologist		
Authors Division:	Medicine		
Departments/Group this Document applies to:	Directorate of Medicine		
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Guideline to be followed by (target staff): Patients with NSTEMI/USA ACS All Clinical Areas All Clinicians			
CQC Fundamental standards: Regulation 9 – person centered care Regulation 10 – dignity and respect Regulation 11 – Need for consent Regulation 12 – Safe care and treatment Regulation 13 – Safeguarding service users from abuse and improper treatment Regulation 14 – Meeting nutritional and hydration needs Regulation 15 – Premises and equipment Regulation 16 – Receiving and acting on complaints Regulation 17 – Good governance Regulation 18 – Staffing Regulation 19 – Fit and proper			

Disclaimer

Since every patient's history is different, and even the most exhaustive sources of information cannot cover every possible eventuality, you should be aware that all information is provided in this document on the basis that the healthcare professionals responsible for patient care will retain full and sole responsibility for decisions relating to patient care; the document is intended to supplement, not substitute for, the expertise and judgment of physicians, pharmacists or other healthcare professionals and should not be taken as an indication of suitability of a particular treatment for a particular individual.

The ultimate responsibility for the use of the guideline, dosage of drugs and correct following of instructions as well as the interpretation of the published material **lies solely with you** as the medical practitioner.

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1.0 Introduction

1.1 Policy Statement and aim

This policy has been developed to support the treatment of patients presenting with Acute coronary syndromes. It incorporates national and European guidelines and technology appraisals. In the presence of differences or lack of clarity in the national guidelines, the European guidelines are followed.

1.2 Objectives

Standardisation of patient care throughout the trust incorporating evidence-based practice.

2.0 Scope of document

The policy applies to all adult patients across the trust who present with cardiac-sounding chest pain.

3.0 Roles and responsibilities

It is the responsibility of all clinical staff to adhere to the policy.

4.0 Diagnosis and Treatment

The current nomenclature of Acute Coronary Syndromes is as follows:

All patients presenting acutely with chest pain suggestive of angina should be considered to have Acute Coronary Syndrome (ACS). ACS includes 3 syndromes:

1. Unstable Angina (UA):
   - Increased frequency and severity (induced with less and less exercise and less responsive to sublingual nitrates) of known angina.
   - Angina at rest.
   - Angina within 2 weeks of a myocardial infarction (MI) or coronary angioplasty.
   - No evidence of myonecrosis i.e. no rise in biomarkers (TnI)
2. Non-ST elevation Acute Coronary Syndrome (NSTEACS):
   - Universal definition of MI satisfied.
   - NO ST elevation on the ECG.
3. ST elevation Acute Coronary Syndrome (STEACS):
   - Universal definition of MI satisfied.
   - ST elevation on the ECG.

Acute Coronary Syndrome (ACS) without ST segment elevation on ECG comprises UA and NSTEACS and, by definition, excludes ST segment elevation Myocardial Infarction (STEMI).

The diagnosis is based on the Universal definition of MI which is as follows:
Detection of a rise and/or fall of cardiac troponin (cTnI) with at least one value above the 99th percentile upper reference limit (URL) (19.8ng/L (M) or 11.6ng/L (f)) and with at least one of the following:

- Symptoms of ischaemia.
- New or presumed new significant ST-segment–T wave (ST–T) changes or new left bundle branch block (LBBB).
- Development of pathological Q waves in the ECG.
- Imaging evidence of loss of viable myocardium i.e. new regional wall motion abnormality
- Identification of an intracoronary thrombus by angiography or autopsy

Patients usually present with one of the following patterns of symptoms:

- Prolonged (> 20 minutes) angina occurring at rest.
- New onset (<3/12) angina at rest or exercise
- In patients with known angina, symptoms becoming more frequent, more severe, or more prolonged and less responsive to glyceryl trinitrate.
- Worsening of angina within 2 weeks of MI or PCI.

The chest pain may be typical or atypical.

- Typical pain: retrosternal sensation of pressure or heaviness ('angina') radiating to the left arm (less frequently to both arms or to the right arm), neck or jaw, which may be intermittent (usually lasting several minutes) or persistent may be associated with sweating, nausea, abdominal pain, dyspnoea, or syncope. Relief with rest if induced by exercise makes angina more likely. The relief of symptoms after nitrate administration is NOT specific for anginal pain.
- Atypical presentation: epigastric pain, indigestion-like symptoms, isolated dyspnoea or syncope. Atypical presentations are more common in the elderly, in women and in patients with diabetes, chronic renal disease or dementia.
- Older age, male gender, family history of CAD, diabetes, hyperlipidaemia, hypertension, renal insufficiency, previous manifestation of CAD as well as peripheral or carotid artery disease increase the likelihood of NSTE-ACS.

Atypical presentations are more common in older patients, in women, and in patients with diabetes, chronic renal disease, or dementia.

Conditions that may **exacerbate or precipitate** NSTEACS include anaemia, infection, inflammation, fever, and metabolic or endocrine (in particular thyroid) disorders. **It is not adequate to say the NSTEACS is excluded in the presence of these conditions i.e. TnI has risen due to these conditions and NOT NSTEACS without confirming/excluding the presence of CAD, the commonest cause of NSTEACS**.

4.1 Initial Assessment to establish the diagnosis (See Pathway below)

1. ECG performed and reviewed within 10 minutes of presentation.

The ECG may show:

- NO acute changes
- ST segment depression
- Transient ST segment elevation which resolves spontaneously or after nitro-glycerine
- T wave inversion
- Evidence of previous myocardial infarction
- Left bundle branch block
- Minor non-specific changes
- May be normal

But should NOT show persistent acute ST segment elevation

2. **If there is ST elevation suggestive of STEACS, activate the Primary percutaneous coronary intervention (PPCI) pathway.**
   If there is no ST elevation suggestive of STEACS, **repeat** the ECG in 20 mins. If there is still no ST elevation, NSTEACS is possible.

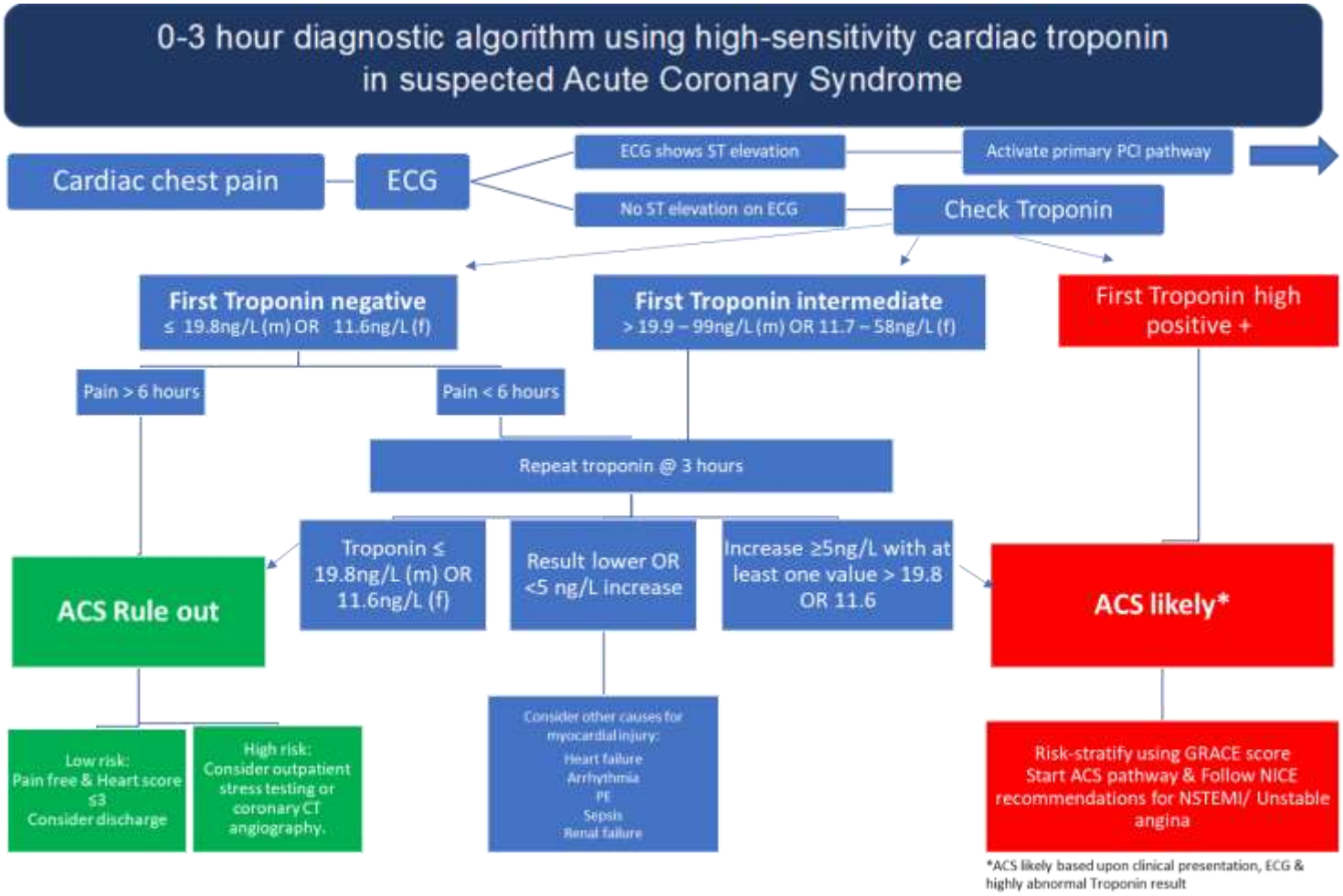
Very high-risk presentations, including STEACS, should be discussed directly with the MKUH Cardiology bleep-holder (1717) or Consultant of the day in hours M-F 9-5. Out of hours, discuss with the on- call cardiology registrar via the John Radcliffe hospital switchboard out of hours 0300 304 7777 or using #6123 from internal phone.

Very high-risk presentations include:

- Intermittent ST-elevation OR Recurrent dynamic ST depression
- Cardiogenic shock OR Haemodynamic instability
- Ventricular tachyarrhythmia OR OOH VF or VT arrest
- Acute HF with ST-T changes OR pulmonary oedema
- Mechanical complications of MI
- CP refractory to medical Rx
- Recent PCI or CABG

3. Clinical history and examination to exclude other causes of chest pain.
4. Baseline observations: blood pressure, pulse, respiration rate, bedside blood glucose & temperature. Chest X-ray.
5. Bloods should be sent for FBC, U&E, admission glucose, lipids, HbA1c, Troponin I (see below for the TnI interpretation), BNP.
6. Repeat the TnI 3 hours after the first, if first sample taken within six hours of onset of chest pain
7. Refer patients with suspected acute coronary syndrome to cardiology via Consult pool on eCare and start the ACS pathway on eCare.

Establish a diagnosis of UA or NSTEACS based on clinical assessment, ECG and TnI. Do not offer dual antiplatelet therapy to people with chest pain before a diagnosis of UA or NSTEACS is made.



4.2 NSTEMI and unstable angina – management

4.2.1 Initial supportive treatment in suspected ACS:

1. Admit to CCU for cardiac monitoring and specialist management if "Very High" or "High" risk. If "Intermediate" or "Low" risk admit to MAU/ ward 17.
2. Cardiac monitoring is recommended if there is a high risk of arrhythmia.
   - High risk of arrhythmias (prior heart failure, LV ejection fraction (LVEF) <30% and triple vessel CAD, prior cardiac disease, major comorbidities, advanced age or recent extensive myocardial necrosis): Monitor for 48 hours after the last episode of chest pain.
   - If no high-risk features: Monitor for 24 hours after the last episode of chest pain.
   - Cardiac troponin negative (i.e. unstable angina) patients without recurrent or ongoing symptoms and with normal ECG do not necessarily require rhythm monitoring or hospital admission.
3. Oxygen if SpO2 <90% or patient in respiratory distress.
4. IV cannula
5. Pain relief:
   - Nitrates: Give sublingual glyceryl trinitrate (GTN) to relieve cardiac chest pain due to myocardial ischaemia. If the pain continues, consider intravenous GTN.
   - Morphine: Consider intravenous morphine in patients whose ischaemic symptoms are not relieved by nitrates. The usual dose is 5 to 10 mg (reduce dose by half in elderly and frail patients) and patients should have respiratory monitoring. Anti emetics may be necessary (e.g. metoclopramide 10mg IV STAT). Do not use Oramorph routinely for ischaemic cardiac pain
6. Referral to cardiology is recommended. Patient management is supported by the Management of ACS Powerplan on eCare.

Once the diagnosis of NSTEMI or Unstable angina has been established:

1. Offer drug therapy as recommended by NICE, including appropriate dual anti-platelet and anticoagulant therapy (Appendix 1 & 2).
2. Formally assess individual risk of future adverse cardiovascular events using Global Registry of Acute Cardiac Events [GRACE] risk scoring system, which predicts 6-month mortality.
   - Document the GRACE Score for every patient.
   - Use the predicted 6-month risk of mortality to guide clinical management.

Categorising risk of future adverse cardiovascular events	Predicted 6-month mortality
Lowest	1.5% or below
Low	>1.5% to 3.0%
Intermediate	>3.0% to 6.0%
High	>6.0% to 9.0%
Highest	over 9.0%

4.2.2 Invasive management

Invasive coronary angiography with follow-on PCI should be considered in intermediate- or higher risk patients with NSTE-ACS (predicted 6-month mortality >3.0%). Angiography should be performed within 72 hours of first admission or sooner.
The urgency of invasive management is dependent on risk, classified as follows:

Very high (1 or more) • Haemodynamic instability or cardiogenic shock • Recurrent or ongoing chest pain refractory to medical treatment • Life-threatening arrhythmias • Cardiac arrest • Mechanical complications of MI • Pulmonary oedema • Repeated dynamic ST-T changes	**High** (1 or more) • Dynamic ST-T wave changes • GRACE score >140	**Intermediate** (1 or more) • Diabetes mellitus • LVEF <40% or CCF • Early post-infarction angina • Prior PCI • Prior CABG • GRACE risk score >109 and <140
Immediate invasive <2 hours	**Early invasive <24 hours**	**Invasive <72 hours**

Referral pathway for Invasive Management:

PCI for ACS patients may be provided at MKUH or the John Radcliffe Hospital, Oxford. Patients will be transferred to Oxford for angiography if it is considered that they may have more complex coronary anatomy or if there is inadequate capacity at MK to provide intervention in a timely way.

The **referral process** for patients admitted with an ACS who are considered suitable for an interventional management strategy is:

1. Enter the patient details on the **network** https://nww.ihtl.nhs.uk/oxford/, referring to both Oxford and Milton Keynes. They will be triaged by the cath lab staff to the most appropriate hospital.
2. Email **MKUH.PCI@mkuh.nhs.uk** to inform the cath lab of inpatient ACS cases on the network who may be suitable for MK PCI. This inbox will be monitored M-F in working hours by the cath lab staff.
3. The patient will need to be in a w17/CCU bed to proceed with MK PCI. Please inform bed manager and ward 17 nurse in charge.

Preparing a patient for coronary angiogram or angioplasty:

1. Stop parenteral anticoagulation for 24 hours before the procedure i.e. omit the morning dose on the day of the procedure or the evening dose on the day before the procedure.
2. Do not administer DOAC on the day before and on the day of the procedure.
3. If on warfarin, this should be stopped. The INR should be below 2 before the procedure is done. If necessary (eg mechanical valve), start parenteral anticoagulation when the INR is below 2. Omit LMWH on the morning of the procedure. (Parenteral bridging is not required for most patients on warfarin for VTE or atrial fibrillation)

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4. Consider the risk/ benefit of angiography +/- PCI if patient has severe renal impairment i.e., eGFR≤30ml/min, and whether an alternative management strategy is appropriate.
5. Prevent contrast induced nephropathy with appropriate pre- and post-hydration.
6. Ensure that the patient is not overtly orthopnoeic.
7. Exclude overt bleeding or significant anaemia which has not been investigated.
8. If there is a history of CABG, the cath lab team should be made aware of the graft sites from the operative notes.
9. If there is known **allergy to radiographic contrast**, the cath lab team should be made aware of the specific contrast that the patient is allergic to, when this happened and what was the exact reaction.
10. If known to be **truly allergic (rather than intolerant) to aspirin** the cath lab team should be made aware of the exact reaction. Alternative antiplatelet regimes should be considered especially if stents are being considered.
11. Stop Metformin 24 hours before procedure and restart 48 hours after, if renal function has not worsened.

Seek advice for the cardiology team if there are concerns or queries about management of a patient planned for an invasive management strategy.

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4.2.3 Conservative management with later coronary angiography if problems continue or develop.

The immediate risks of invasive treatment include:

- death within 4 months related to the procedure from causes other than MI
- procedure-related MI
- major bleeding in hospital and up to 2 years after the procedure.
- Contrast induced nephropathy

These risks of an invasive management strategy may be excessive in the following patient cohorts:

1. **Low risk patients**

Conservative management should be considered or patients with no recurrence of symptoms and a low (<3%) predicted risk of adverse cardiovascular events. Non-invasive stress imaging for inducible ischaemia is recommended before deciding on an invasive strategy.

2. **Patients at higher risk of complications of invasive treatment**

- very elderly or frail patients
- patients with comorbidities such as dementia, severe chronic renal insufficiency or cancer
- patients at high risk of bleeding complications.

4.3 Discharge planning

- If the patient has had an uneventful and uncomplicated invasive procedure, consider discharging the patient on the same evening of the procedure.
- For patients managed medically, consider discharging the patient 72 hours after the last episode of chest pain.
- Confirm the absence of any angiography access site complications before discharge.

Before discharge ensure that

- referral to cardiac rehabilitation service at MKUH has been made.
- the appropriate MINAP entries have been completed.
- the appropriate secondary prevention medications have been prescribed.
- the appropriate advice regarding driving and DVLA guidance has been provided.

Information that must be communicated to GP in the discharge summary:

- Duration of antiplatelet therapy and stop dates
- Patients on triple therapy with DOAC – plan for review of DOAC dose once triple therapy complete
- Timing of any necessary blood tests (e.g. LFTs for statin therapy, renal function for patients treated with ticagrelor)

4.3.1 Tests before discharge:

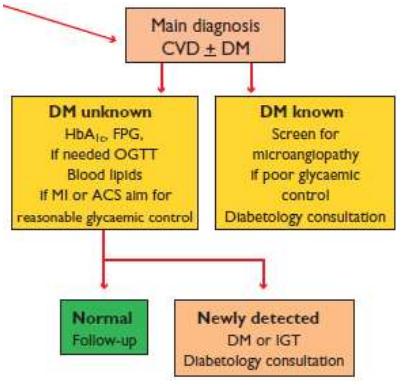
Echocardiography

Assess left ventricular function in all people who have had an NSTEMI. Record measures of left ventricular function in the person's care record and in correspondence with the primary healthcare team and the person.

INVESTIGATION AND MANAGEMENT OF HYPERGLYCAEMIA (*Eur Heart J. 2013 Oct;34(39):3035-87*)

For all patients without known diabetes should be **screened with HbA1c on admission and fasting blood glucose (FBG) no earlier than 4 days after admission**. If the patient is discharged before 4 days then they should be given a FBG request to be done as out-patient.

If the results of HbA1c and FBG are discordant or there is a suggestion of pre-diabetes (FBG 5.6-6.9 mmol/l or HbA1c 42 to 47 mmol/mol or 6.0 to 6.4%) they should have an **out-patient oral glucose tolerance test**.



4.3.2 Secondary prevention medications:

Offer people who have had MI treatment with the following drugs:

- angiotensin-converting enzyme (ACE) inhibitor
- dual antiplatelet therapy (aspirin plus a second antiplatelet) unless they have a separate indication for anticoagulation (see the section on antiplatelet therapy for people with an ongoing separate indication for anticoagulation)
- beta-blocker
- statin.

See Appendix 1 for advice on choice and duration of DAPT, and DAPT in patients on oral anticoagulation (OAC)
See Appendix 3 for additional information on secondary prevention medications.

4.3.3 Rehabilitation and return to physical activity

- All ACS patients should be referred to the Cardiac Rehabilitation team.

4.0 Statement of evidence/references

Statement of evidence: This policy is based on the European Society of Cardiology guidelines and NICE recommendations. It also based on professional consensus of clinicians within the Trust. The documents consulted are as follows:

References:

- 2020 ESC guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. European Heart Journal 2021: 42, 1289-1367
- Fourth universal definition of myocardial infarction (2018) ESC Scientific Document Group
- European Heart Journal, Volume 40, Issue 3, 14 January 2019, Pages 237–269,
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- Acute Coronary Syndromes. NICE guideline 185; 2021.
- 2017 ESC focused update on dual antiplatelet therapy in coronary artery disease developed in collaboration with EACTS: The Task Force for dual antiplatelet therapy in coronary artery disease of the European Society of Cardiology (ESC) and of the European Association for Cardio-Thoracic Surgery (EACTS). Eur Heart J. 2018 Jan:39(3): 213–260.
- 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk: The Task Force for the management of dyslipidaemias of the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS) European Heart Journal, Volume 41, Issue 1, 1 January 2020, Pages 111–188
- 2018 ESC/EACTS Guidelines on myocardial revascularization European Heart Journal, Volume 40, Issue 2, 07 January 2019, Pages 87–165
- Glyceryl Trinitrate 1mg/mL solution for infusion. Summary of Product Characteristics (Hameln) accessed via eMC, last updated 6/5/21.
- Prasugrel (Efient®). Summary of Product Characteristics accessed via eMC, last updated 10/2020.
- Ticagrelor for preventing atherothrombotic events after myocardial infarction. NICE TA 420;2016
- Ticagrelor (Brilique®) 60mg tablets. Summary of Product Characteristics accessed via eMC, last updated 16/6/2022
- Antiplatelet treatment. NICE CKS; 2018
- Fondaparinux (Atrixa®). Summary of Product characteristics accessed via eMC, last updated 10/09/2018

- Fragmin 10,000 IU/1mL. Summary of Product characteristics accessed via eMC, last updated 08/2021
- Bisoprolol: British National Formulary online, accessed 4/11/2022
- Rivaroxaban for preventing adverse outcomes after acute management of acute coronary syndrome. Technology appraisal guidance [TA335] Published date: 25 March 2015
- NHS England: Summary of National Guidance for lipid Management for primary and secondary prevention for CKD
- https://www.england.nhs.uk/aac/publication/summary-of-national-guidance-for-lipid-management/
- NHS England: Statin intolerance pathway. April 2020 https://www.england.nhs.uk/aac/publication/statin-intolerance-pathway/
- 2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD: The Task Force for diabetes, pre-diabetes, and cardiovascular diseases of the European Society of Cardiology (ESC) and the European Association for the Study of Diabetes (EASD) European Heart Journal, Volume 41, Issue 2, 7 January 2020, Pages 255–323

5.0 Governance

5.1 Document review history

Version	Date	Author	Reason
1	May 2003	Dr Mulligan	Policy Updated to include NSTEMI as per NICE Guidance
2	August 2007	Dr Kardos	Modification to Algorithm to make clearer and page 5 and 7 of wording
	September 2008	Dr Kardos	Reviewed – no change required.
3	April 2009	Dr. Alp/Chris Larmour	Introduction of Day 0 – Day 1/2 flow chart.
4	July 2012	Dr Kardos/Chris Larmour	Inclusion of Warfarin in ACS and changes to Enoxaparin
4.1	April 2018	Dr Chattopadhyay	Change of treatment pathway. Inclusion of ticagrelor and fondaparinux. OAC guidance
4.2	October 2019	Dr Boardman	Reviewed – no changes
5.0	July 2023	Dr Kenny / Dr Baher Hanna	Change of treatment pathway to include local intervention. Inclusion of ticagrelor and fondaparinux. OAC medicines guidance incorporated

5.2 Consultation History

Stakeholders Name	Area of Expertise	Date Sent	Date Received	Comments	Changes Made
Chris Larmour	Cardiac ANP		July 2012		Change Enoxaparin to Dalteparin
Busola Ade-Oji	Chief Pharmacist	July 2012		Discussion on Warfarin	
Dr Denise White	Consultant Haematologist	July 2012		Discussion on Warfarin	
Dr I Mehdi	Consultant Physician.	July 2012		Discussion on Warfarin	

	Associate Medical Director				
Dr A Kardos	Consultant Cardiologist	July 2012			
Dr Gwilt	Consultant Cardiologist	July 2012			
Cardiology CIG					
Matthew Burnett	Principal Pharmacist	July 2018	August 2018	Management of OAC and triple therapy Monitoring of statin therapy	Discharge information to GP
Pharmacy CIG		August 2018	September 2018		
Prescribing and Medicines Governance Committee		August 2018	October 2018		Further clarification of information for GP on discharge
Matthew Burnett	Principal Pharmacist	July 2023	July 2023		
Cardiology CIG		July 2023	July 2023	Agreed changes	Local PCI/ intervention pathway, change of first line antiplatelet, clarification of diagnosis.
Dr Lynn Cooke	Consultant physician in acute medicine	Septem ber 2023	September 2023		No changes
Resuscitation Training officers	ALS/ resuscitation	Septem ber 2023	September 2023	Does not affect resuscitation	No changes
Prescribing & Medicines Governance Committee	Medicines Governance		November 2023		Approved

5.3 Audit and monitoring

Document Audit and Monitoring Table	
Monitoring requirements:	a) The document will be monitored through the twice weekly meeting by the ANP Cardiac Nurses and Cardiology Registrar An Audit of the pathway will be carried out 6 months after the introduction of the policy
Monitoring Method:	Meetings Audit report
Monitoring prepared by:	a) ANP Cardiac Nurses

Monitoring presented to:	a) Cardiology directorate meeting b) Medical Directorate Audit meetings
Frequency of presentation:	a) Annually

5.4 Equality Impact Assessment

As part of its development, this Guideline and its impact on equality has been reviewed. The purpose of the assessment is to minimise and if possible remove any disproportionate impact on the grounds of race, gender, disability, age, sexual orientation, religion or belief, pregnancy and maternity, gender reassignment or marriage and civil partnership. No detriment was identified. Equality Impact assessments will show any future actions required to overcome any identified barriers or discriminatory practice.

Equality Impact Assessment			
Division		Department	
Person completing the EqIA		Contact No.	
Others involved:		Date of assessment:	
Existing policy/service		New policy/service	
Will patients, carers, the public or staff be affected by the policy/service?	Yes		
If staff, how many/which groups will be affected?	*For example: community midwives, phlebotomists, all staff*		
Protected characteristic	Any impact?	Comments	
Age	YES NO	Positive impact as the policy aims to recognise diversity, promote inclusion and fair treatment for patients and staff	
Disability	YES NO		
Gender reassignment	YES NO		
Marriage and civil partnership	YES NO		
Pregnancy and maternity	YES NO		
Race	YES NO		
Religion or belief	YES NO		
Sex	YES NO		
Sexual orientation	YES NO		
What consultation method(s) have you carried out?			
For example: focus groups, face-to-face meetings, PRG, etc			
How are the changes/amendments to the policies/services communicated?			
For example: email, meetings, intranet post, etc			
What future actions need to be taken to overcome any barriers or discrimination?			
What?	Who will lead this?	Date of completion	Resources needed

Review date of EqIA			

Appendix 1 Prescribing for Acute Coronary Syndromes: unstable angina and non-ST-segment elevation myocardial infarction

Initial antiplatelet treatment

The following advice regarding antiplatelet treatment, may also be applicable in patients who present with Acute STEMI, in parallel with immediate discussion with John Radcliffe Cardiology regarding Primary PCI. Patients being referred for Primary PCI should not receive anticoagulants.

Aspirin

- Aspirin is recommended in all patients presenting with ACS, unless contra-indicated. Prescribe an initial oral loading dose of 300mg followed by a maintenance dose of 75 mg daily.

- For patients who have a true aspirin allergy (hypersensitivity) consider monotherapy with clopidogrel or ticagrelor as advised by cardiology.

Dual antiplatelet therapy (DAPT)

After the diagnosis of UA or NSTEMI is confirmed, then dual antiplatelet therapy (DAPT) i.e., aspirin plus a $P2Y_{12}$ inhibitor should be prescribed as below.

Ticagrelor is recommended as part of DAPT for initial management if there are no contra-indications. It is indicated for patients who are being medically managed (no coronary revascularisation) or undergoing coronary angiography with follow-on percutaneous coronary intervention (PCI) as appropriate unless the patient has a high bleeding risk or on oral anti-coagulants.

- Prescribe a loading dose of 180mg followed by a maintenance dose of 90mg twice a day in combination with aspirin.

Clopidogrel may be considered as part of DAPT (instead of ticagrelor) for patients who are being medically managed if they have a high bleeding risk.

- Prescribe a loading dose of 300mg followed by 75mg daily in combination with aspirin.

In some patients aspirin alone may also be considered in this situation.

It is good practice to document the bleeding risks and rationale for choice of DAPT or single antiplatelet therapy (SAPT) in the patient's notes. For further advice on choice of antiplatelets, especially in patients with intolerances or contraindications, refer to cardiology.

Antiplatelets and oral anticoagulants

- Some patients who require antiplatelets will also have a separate indication for anticoagulation e.g., atrial fibrillation, DVT/PE. In these patients the choice and duration of antiplatelet agent(s) will depend on the management strategy (medical or PCI) together with the patient's bleeding risks and should be discussed with a Cardiologist.

- For patients undergoing PCI, DAPT consisting of aspirin and clopidogrel is preferred in combination with an anticoagulant. This is often referred to as 'triple therapy' (DAPT plus

anticoagulation). The duration of DAPT should be clearly documented in the patient's notes. Aspirin should be stopped as advised by a Cardiologist after the PCI (usually after 1 month) and clopidogrel continued with the anticoagulant for up to 12 months. After 12 months, anticoagulant alone should be continued lifelong if indicated.

- For patients who are being medically managed consider SAPT, usually aspirin (or clopidogrel for patients with a contraindication for aspirin) for up to 12 months in combination with an anticoagulant.
  *6 months of SAPT + Anticoagulant can be considered in patients with high bleeding risk.

Ticagrelor and Prasugrel should be avoided in combination with anticoagulants, unless specifically advised by a Cardiologist.

The recommended plan for antiplatelets and anticoagulants including duration must be clearly documented on the discharge letter to ensure continuity of therapy in primary care.

Duration of antiplatelet therapy

DAPT is continued for up to 12 months in the following groups of patients:

- Patients with a confirmed diagnosis of NSTEMI/STEMI (medical or PCI management)
- ACS patients managed with PCI.

After 12 months stop the P2Y12 inhibitor and continue aspirin indefinitely. For patients with aspirin hypersensitivity or intolerance continue monotherapy with ticagrelor or clopidogrel indefinitely.

*For ACS patients who have not undergone a PCI and/or do not have a confirmed diagnosis of NSTEMI, continuation of DAPT should be discussed and agreed with cardiology e.g., high-risk UA patients or those being considered for further investigations where diagnosis is uncertain (duration of DAPT will be reviewed at cardiology follow-up).

Extended ticagrelor therapy post MI

Following completion of the initial year of DAPT with aspirin and ticagrelor (or other P2Y12 inhibitor), extended ticagrelor therapy is indicated in patients who have had a previous MI and are at high risk of further atherothrombotic events (see table below for high-risk criteria). Ticagrelor, at a lower dose of 60 mg twice daily is recommended for up to a maximum of 3 years. Extended treatment is generally initiated by the patient's GP following advice from cardiology.

High risk ischaemia criteria: 1 or more of the following:
Aged 65 years or older
Multi-vessel coronary artery disease
More than one previous MI
Diabetes requiring medication
Chronic non-end stage kidney disease (Creatinine clearance less than 60ml/min)

Antiplatelets and gastroprotection

A proton pump inhibitor (PPI) should be considered for all patients on single or dual antiplatelet therapy, especially those at a high risk of gastrointestinal (GI) bleeds; these include:

- History of gastrointestinal ulcer or haemorrhage

- Dyspepsia / gastro-oesophageal reflux disease
- Helicobacter pylori infection
- Aged 65 years or over
- Chronic alcohol use
- Concomitant use of medicines known to increase risk of GI bleeding, including but not only:
  - Anticoagulants
  - NSAIDs
  - Corticosteroids
  - Nicorandil
  - Antidepressants (SSRIs)

Prescribe lansoprazole 15mg to 30mg daily or omeprazole 20mg daily (licensed doses indicated for prophylaxis of NSAID associated peptic ulcer disease). For patients taking clopidogrel, consider prescribing lansoprazole due to the potential interaction with omeprazole and clopidogrel.

Anticoagulation treatment for ACS

Fondaparinux

All patients with a confirmed diagnosis of ACS should be prescribed fondaparinux unless they have a high bleeding risk or are being considered for immediate angiography. Factors associated with a high bleeding risk include:

- advancing age
- known bleeding complications.
- renal or hepatic impairment (see below)
- low body weight (less than 50 kg)

Use of fondaparinux in these patients should be carefully considered. Contact the cardiology bleep holder (1717) for further advice if necessary. Patients prescribed fondaparinux for ACS do not need any additional anticoagulant agent for VTE prophylaxis e.g., dalteparin (a VTE risk assessment still needs to be carried out).

The **dose of fondaparinux for the treatment of UA/NSTEMI is 2.5 mg once daily administered by subcutaneous injection**. For practical purposes a stat dose of fondaparinux may be prescribed on the first day of treatment and thereafter prescribed at 6pm to avoid any complications with surgery or planned/ emergency angiograms (see below). Treatment should be initiated as soon as possible after diagnosis and continued for a maximum of 8 days or until hospital discharge if that occurs sooner.

Fondaparinux and anticoagulation tests: At a dose of 2.5 mg daily, the anticoagulant effects of fondaparinux, cannot be detected by routine anticoagulation tests such as prothrombin time (PT), APPT, activated clotting time (ACT) or international normalised ratio (INR).

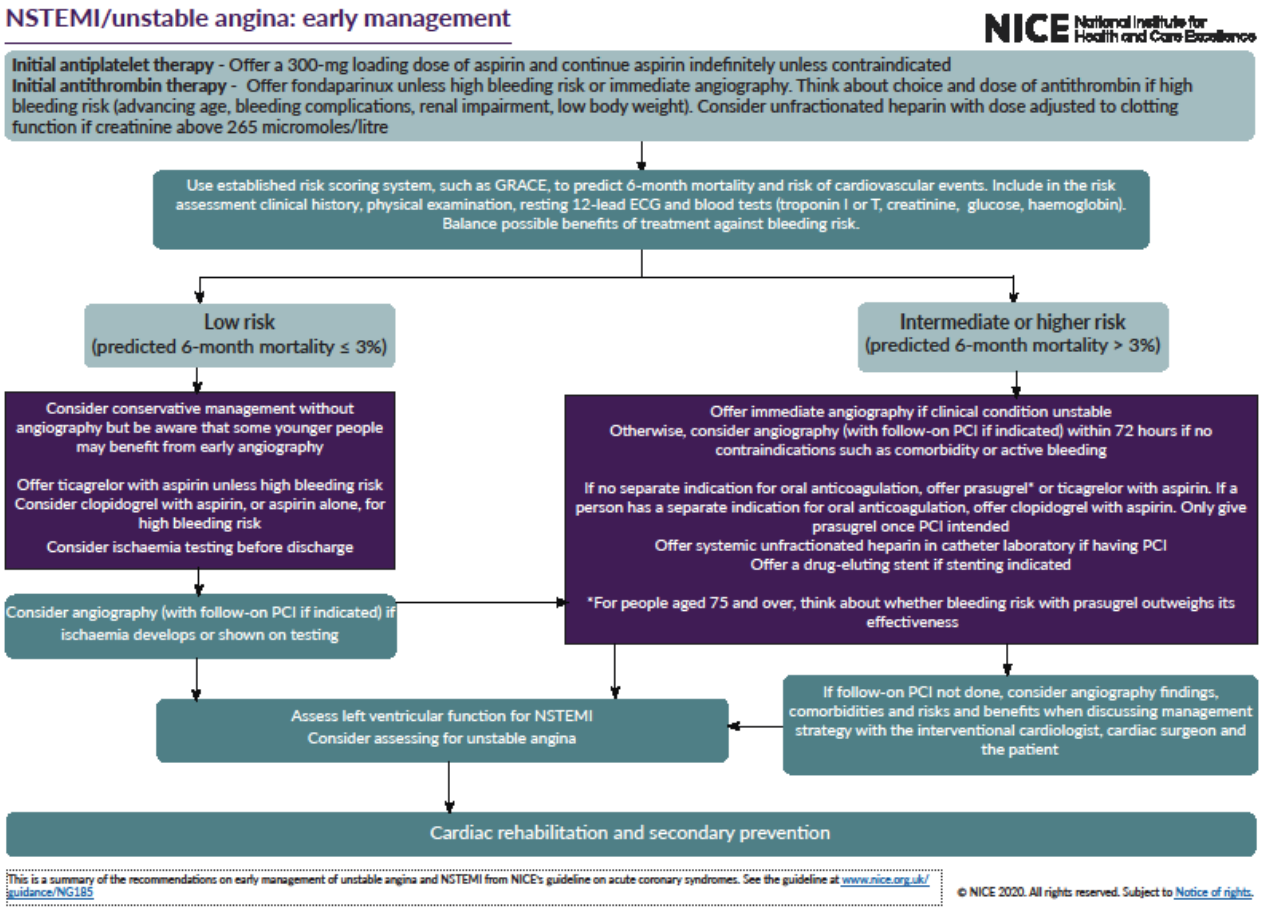
PCI and surgery: Do not give fondaparinux if the patient is due to undergo a planned PCI on the same day. Unfractionated heparin, as a bolus injection (as per local cardiac catheter lab protocol) should be administered at the time of PCI in patients pre-treated with fondaparinux. If the patient is to undergo coronary bypass graft surgery fondaparinux should be stopped, where possible, 24 hours before surgery.

Renal Impairment: Fondaparinux is contra-indicated in patients with a creatinine clearance of less than 20 ml/min. Calculate the patient's creatinine clearance using the Cockcroft-Gault equation. In these patients consider prescribing dalteparin 80 units/kg twice daily rounded to the nearest 500 units with a maximum dose of 6500 units twice daily. This is two thirds of the normal ACS dosing. This should be administered using dalteparin 10,000 units/1ml graduated syringes to allow for dose manipulation.

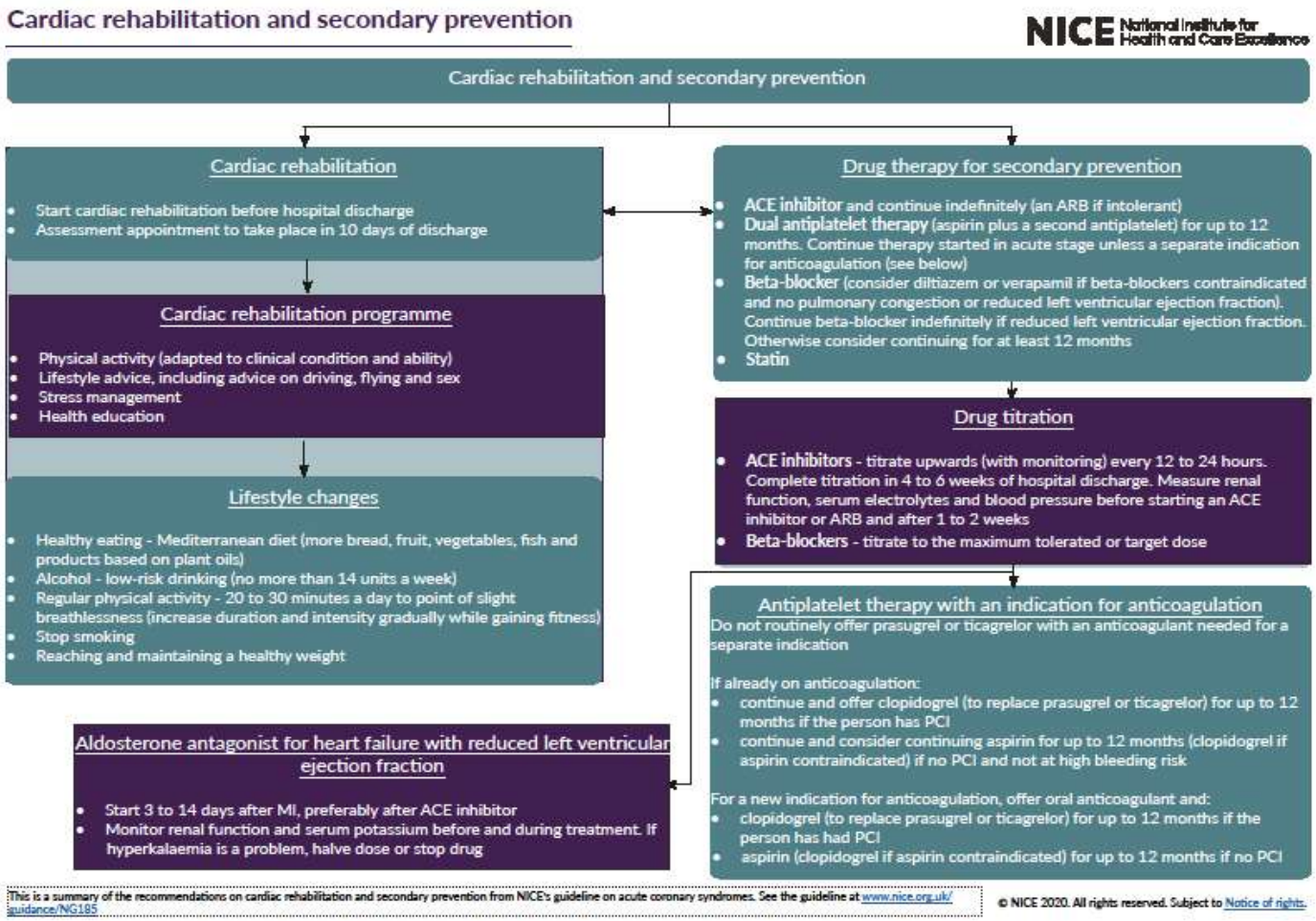
Dalteparin should be prescribed for up to eight days or until discharge, whichever is sooner. If the patient is still in hospital after eight days and is awaiting PCI, contact the cardiology SpR for advice regarding ongoing treatment. Dalteparin is renally cleared so care is required when administering to patients with severe renal impairment. Plasma anti-Xa concentration can be used to monitor the anticoagulant effect of dalteparin in these patients to ensure appropriate dosing. For further advice contact Haematology SpR.

Hepatic Impairment: No dose adjustment of fondaparinux is necessary in patients with hepatic failure. However, use with caution in patients with severe hepatic impairment. This is because there is an increased risk of bleeding due to a deficiency of coagulation factors in these patients.

Appendix 2



Appendix 3 Secondary prevention



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Statin

- Ensure that the baseline LFT is documented.
- "High intensity statin": Atorvastatin 80 mg once daily is recommended in ACS patients.
- *Consider starting patients with CKD on 20 mg daily. The dose can be increased if a greater than 40% reduction is not achieved after 3 months and if eGFR is 30ml/min/1.73m2 or more. Patients with an eGFR of less than 30 ml/min/1.73m2 should have higher doses agreed with renal specialist.
- When changing/starting "High intensity statin" there must be clear documentation in the ***discharge summary requesting the GP*** to check LFTs and renal function at 1 month, 3 months and 12 months.
- **Avoid in:**
  - Very frail and elderly.
  - Known abnormal liver function LFTs >3 times normal upper limit.

Cholesterol Targets:

- Total cholesterol <4 mmol/l and LDL-cholesterol < 2 mmol/L, and if PCI with stenting is done then target LDL should be <1.4.
- If LDL is above the target despite a maximally tolerated statin dose, consider starting ezetimibe 10 mg once daily in combination or recommend initiation of inclisiran.

Beta-Blockers (BB)

All patients with ongoing ischaemic symptoms and without contraindication should be considered for BB or have chronic beta-blocker therapy continued when the patient is haemodynamically stable.

- Beta-blockers should be continued indefinitely in patients with reduced left ventricular ejection fraction (LVEF).
- In patients without ongoing ischaemic symptoms or LVSD, long term use i.e. for secondary prevention, has not lowered risk of CV events or mortality. Therapy should be reviewed after 12 months, and potential benefits and risks of stopping or continuing beta-blockers beyond 12 months discussed with patients. In the absence of a clear indication for beta-blockers, of LVSD or fast atrial fibrillation, consider stopping beta blockers after 12 months.

Commented [MB6]: Not very clear here. In absence of LVSD or other indication, consider stopping at 12 months?

The usual starting dose is 2.5 mg daily. Patients with low blood pressure or at high risk of side effects may be started on a lower dose of 1.25mg. Gradually up titrate the dose, to achieve a resting heart rate of 60 beats per minute, to the maximum tolerated or target dose of 10 mg daily.1,4 Cardio-selective beta blockers such as bisoprolol, may be used cautiously under supervision, if no alternative, in patients with a history of asthma or obstructive airways disease.

Avoid in:

- Patients at risk of cardiogenic shock.
- Patients in pulmonary oedema i.e. ≥Killip Class III.
- Patients in whom vasospasm e.g. cocaine use is likely to be the cause

Angiotensin converting enzyme inhibitor:

- Recommended in patients with LV systolic dysfunction or heart failure, hypertension or diabetes.

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- Start an Angiotensin Converting Enzyme (ACE) inhibitor as soon as possible when the patient is haemodynamically stable and continue indefinitely.
- Ramipril is first line for patients within the Trust. The usual starting dose is 2.5mg daily and should be up titrated depending on blood pressure at short intervals for example every 12 to 24 hours before discharge until maximum tolerated or target dose is reached (see below). Patients with low blood pressure or high risk of side effects may be started on a lower dose of 1.25mg daily. Ramipril can be prescribed in the evening/at night in patients with low blood pressure. Angiotensin II receptor blocker in patients who are intolerant of ACEI.
- The usual starting dose is 2.5mg daily and should be up titrated depending on blood pressure at short intervals for example every 12 to 24 hours before discharge until maximum tolerated or target dose is reached (see below). Patients with low blood pressure or high risk of side effects may be started on a lower dose of 1.25mg daily. Ramipril can be prescribed in the evening/at night in patients with low blood pressure.
- The dose should be further up titrated to ensure the maximum tolerated or target dose (5mg twice daily) is reached within 4-6 weeks of starting.
- Consider an Angiotensin Receptor Blocker as an alternative in patients who are intolerant to ACE inhibitors.

- Baseline renal function, electrolytes and blood pressure should be taken and re-measured after 1-2 weeks of starting treatment and then as appropriate.

Mineralocorticoid Receptor Blockers

- Only if LV dysfunction (LVEF ≤40%) and heart failure or diabetes, or if needed for control of hypertension.

Commented [MB7]: OUH has some useful guidance in their MIL for ACS in terms of dosing and titration