# Diagnosis and Management of Acute Coronary Syndrome – a Case Study

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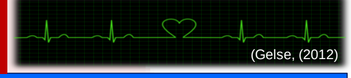
(Gelse, (2012)

## Introduction

Despite the steady decline in deaths from coronary heart disease in Scotland and the rest of the UK over the past decade, it remains one of the leading causes of death in Scotland (NHS ISD, 2020). Every three minutes, someone is admitted to a UK hospital with an acute coronary syndrome (ACS) (BHF, 2020), so chest pain management remains one of the biggest challenges facing physicians (Frisoli, *et al.* 2017).

It is therefore essential that the ANP possesses sound knowledge and excellent clinical skills to undertake thorough assessment and correct management of patients with a potential diagnosis of ACS.

## History

Cooke (2012) advises a careful history will lead to the diagnosis 80% of the time paired with concise assessment is key for the Advanced Nurse Practitioner (ANP) to accurately diagnose and determine timely treatment. As such, focused history taking was conducted using a systematic approach and using the OLD CARTS mnemonic (Onset, Location, Duration, Characteristics, Aggravating/Relieving factors, Related symptoms, Treatment and Severity) to aid evaluation of the nature of the patient's pain (Munroe. *et al.* 2015)

## Critical Evaluation of Presenting Condition

ACS encompass a spectrum of conditions including unstable angina and myocardial infarction with or without ST segment elevation (NICE, 2014) and reflects a degree of damage to the coronary arteries by atherosclerosis – plaque rupture, thrombosis and inflammation (Stepinska, *et al.* 2020). Assessment and differentiation of the various chest pain presentations can be challenging due to variation in clinical presentation and history of symptoms which is why the ANP plays a pivotal role in ensuring timely identification and treatment for ACS patients in an attempt to relieve pain, preserve myocardial function and prevent complications (BHF, 2020; and NES, 2021).

Cardiovascular disease has a multifactorial aetiology which has proven historically rich in producing numerous studies and seminal works on cardiovascular epidemiology (Andersson, *et al.* 2019). The classic modifiable risk-factors – hypertension, hypercholesterolaemia, diabetes mellitus, body weight and smoking – are still key health improvement targets which, when identified, provide the ANP with an early opportunity to engage with patients, taking a person-centred approach when planning their care (NHSL, 2017 and Scottish Government, 2017).

## Clinical Examination Factors

The 12-lead electrocardiogram (ECG) is key in aiding diagnosis for a range of cardiac conditions, many of which are life-threatening (Campbell et al, 2017). Troponin is a protein found in the body, specifically in heart muscle cells which when released indicates cardiac injury (Garg. et al. 2017) and, by using high-sensitivity troponin assays, lower diagnostic thresholds can be used (Shah, et al. 2018), meaning treatment regimens are then expedited (Vasile,et al, 2018).

Through experience, the ANP realises that a normal ECG and troponin value does not completely exclude an ACS diagnosis (Poldervaart et al, 2017) so, a full clinical assessment was undertaken identifying red flags and eliminating potential differential diagnoses (see Table 1)(Myrick & Karosas, 2019).

**Table 1. Clinical Findings**

| | |
|---|---|
| 48 year old male presents with sudden onset central chest tightness/heaviness – radiating down left arm, whilst driving to work | |
| He felt nauseous, clammy and short of breath | Pain lasted about 50 minutes – now same pain has returned with increasing severity |
| RR 18bpm P 88bpm BP 147/84mmHg SpO2 98% air T 36.6˚C | No PMH, No known allergies, No current prescribed medication |
| FH – Father died of MI aged 64, Mother has angina and type II DM | He currently smokes 20cpd and takes occasional alcohol – smoking cessation referral completed |
| ECG = normal sinus rhythm with Inferior ST depression – leads II, III, aVF | Troponin T on admission = 73; at six hours = 219. All other blood results within normal range |
| CXR = normal GRACE Score = 83 | |

- RED FLAGS: central chest pain, heavy/tight in nature, associated nausea and shortness of breath.
- DIFFERENTIAL DIAGNOSES: ACS, Pulmonary Thromboembolism, Musculoskeletal, Chest Infection.

## Critical Analysis

Relief of pain is paramount, not only for patient comfort but because pain is associated with sympathetic activation, causing vasoconstriction and increasing the workload of the heart (Ibanez, *et al.* 2017). Following IV morphine and commencement of an up-titrated IV glyceryltrinitrate (GTN) infusion, the ANP referred to local guidelines before initiating further essential treatments – aspirin, ticagrelor and fondaparinux (NHSL, 2017).

The demands of effective decision-making cannot be underestimated. Favouring a naturalistic decision-making method whilst recognising the task at hand, time constraints and the ANP's workload emphasises important intrinsic factors such as experience, confidence and autonomy which are all essential to the ANP role (Klein, 2015; and NES, 2021) .

Being cared for within CCU/MHDU allowed for continuous cardiac monitoring and serial ECG recording (Stepinska, *et al.* 2020) and analysis by the ANP to maintain patient safety and swiftly identify and effectively manage any changes in the patient's condition (Deaton, *et al.* 2017).

In order to quantify risk, the GRACE risk score was used, which was user-friendly and, by design, suitable for use in acute and emergency clinical settings. Compared with other ACS risk scores, GRACE has superior discriminative performance enabling the ANP to calculate overall risk which meant scheduling this patient for planned percutaneous coronary intervention (PCI) (see Table 2) (Everett. *et al.* 2019).

**Table 2** (Centre of Outcomes Research, 2021)

GRACE Global Registry of Acute Coronary Events — ACS Risk Model

At Admission (in-hospital/to 6 months) | At Discharge (to 6 months)

Age Years
HR bpm
SBP mmHg
Creat. mg/dL
CHF Killip Class
SI Units

Cardiac arrest at admission
ST-segment deviation
Elevated cardiac enzymes/markers

| Probability of | Death | Death or MI |
|---|---|---|
| In-hospital | -- | -- |
| To 6 months | -- | -- |

Reset | Display Score

## Critical Review of Treatment Plan

NHS Lanarkshire's ACS algorithm (NHSL, 2017) recommends using dual antiplatelet therapy (DAPT) – combining aspirin with a P2 Y12 inhibitor (ticagrelor, clopidogrel, prasugrel), one of the most intensively investigated treatment options in the field of cardiovascular medicine (Valgimigli et al, 2018). But despite recent advances, important questions remain with regards duration of maintenance therapy with DAPT (See Table 3) (Deharo and Cuisset, 2019).

**Table 3** (NHS Lanarkshire, 2017)

**Guideline for the Management of Suspected Acute Coronary Syndrome** — NHS Lanarkshire

Suspected ischaemic chest pain

Immediate ECG, IV access, Bloods in HSTnT, Cardiac Monitoring

**Non Diagnostic ECG**
Consider Aspirin 300mg sub-lingual nitrate or analgesia CXR as indicated
Rapid rule out for MI Pathway
Not suggestive of acute event
**MI ruled out**
1. Typical angina - early OP ETT, aspirin 75mg, GTN spray.
2. Atypical pain – reassure, GP follow up as needed
3. If has ongoing concerning symptoms will require admission for further assessment
Consistent with myocardial infarction
**ADMIT**
Aspirin300mg
Ticagrelor180mg*
Fondaparinux 2.5mg (unless anticoagulated)
Atenolol 25 mg unless contraindicated
Nitrate and analgaesia as required
Ensure good glycaemic control
Refer cardiology Request Echo

**Ischaemic ECG**
New horizontal down-sloping ST depression ≥2mm or deep symmetrical T wave inversion in 2 adjacent leads >3mm
**Admit to local Coronary Care Unit**
Aspirin 300mg
Ticagrelor 180mg*
Fondaparinux 2.5mg (unless anticoagulated)
atenolol 25mg unless contraindicated
Nitrate and analgaesia as needed
Ensure good glycaemic control
Repeat HSTnT at 6 hours from presentation
**GRACE** score risk stratification for consideration of early inpatient coronary angiography www.gracescore.org
Standard secondary prevention at discharge (Ace inhibitor, beta-blocker, statin +/- aldosterone antagonist)
6 months dual antiplatelet therapy (at the discretion of the consultant cardiologist) with lifelong aspirin thereafter
Cardiac rehabilitation

**ST Segment Elevation (STEMI)**
≥ 2mm in 2 adjacent chest leads
or >1mm in two adjacent limbs leads,
or new LBBB,
or >2mm ST depression V1 – V3 (posterior)
**Refer immediately for emergency PCI to Hairmyres CCU (Dedicated PCI line)**
WGH and MK – 01355 585817
HM - ext 4817
Aspirin 300mg,
Ticagrelor 180mg*
Heparin 5000u IV (unless anticoagulated),
Nitrate and analgaesia as required
* Discuss with cardiologist which P2Y12 inhibitor to prescribe in the following situations:
Age >80
Weight < 60kg
Previous Stroke or TIA
Propensity to bleed (Recent surgery, GI blood loss or severe hepatic impairment)
Concomitant use of oral anticoagulants or NSAIDS

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A DAPT treatment algorithm has been introduced within NHS Lanarkshire (NHSL, 2019) which, although helpful in format and in aiding prescribing by recognising the complexities of multi-agent use, makes no mention of a default treatment duration (Chatterjee and Hillegass, 2017). This lack of clarity is confusing for ANPs and fellow clinicians but does again reiterate the need to evaluate individual risk of ischaemic versus bleeding events to decide optimal duration of DAPT (see Table 4) (Palmerini, *et al*. 2019)

**Table 4** (NHS Lanarkshire, 2017)

**TREATMENT OF ACS – PATIENTS WITH INDICATION FOR ANTICOAGULATION OR HIGH BLEEDING RISK** — NHS Lanarkshire

STOP REVIEW — **REVIEW PATIENT'S MEDICATIONS BEFORE LOADING PATIENTS WITH ACS TREATMENT** — STOP REVIEW

Low Bleeding Risk: Fondaparinux 2.5mg + Ticagrelor 180mg + Aspirin 300mg
If Frail or High Bleeding Risk: Fondaparinux 2.5mg + Clopidogrel 300mg+ Aspirin 300mg
Indication for Anticoagulation (eg. New AF): Tinzaparin 175 u/kg (in CrCl ≤20ml/min use unfractionated heparin) + Clopidogrel 300mg+ Aspirin 300mg

| If patient is already on: | Warfarin INR therapeutic | Warfarin INR SUBtherapeutic | Warfarin INR therapeutic | DOAC (eg. Apixaban, Edoxaban, Rivaroxaban) | Clopidogrel or Aspirin 75mg |
|---|---|---|---|---|---|
| Load with... | Clopidogrel 300mg | Clopidogrel 300mg | Clopidogrel 300mg | Clopidogrel 300mg | Clopidogrel or Aspirin 300mg |
| | Tinzaparin 175 u/kg (in CrCl ≤20ml/min use unfractionated heparin) | | | High Risk Patients (ie . Unstable / Ischaemic ECG/ Ongoing Chest Pain / Recent or candidate for PCI) Will need EARLY discussion with INTERVENTIONAL CARDIOLOGY | Fondaparinux* 2.5 mg |
| | High Risk Patients (ie . Unstable / Ischaemic ECG/ Ongoing Chest Pain / Recent or candidate for PCI) Will need EARLY discussion with INTERVENTIONAL CARDIOLOGY | | | ADD Aspirin 300mg | High Risk Patients (ie . Unstable / Ischaemic ECG/ Ongoing Chest Pain / Recent or candidate for PCI) Consider switching: Clopidogrel ▸ ticagrelor |
| | Aspirin 300mg | | | | |
| Maintenance: | Warfarin Clopidogrel 75mg (daily) (± Aspirin 75 mg) | Warfarin Clopidogrel 75mg (daily) | | DOAC Clopidogrel 75 mg (daily) (± Aspirin 75 mg) | Clopidogrel 75 mg (daily) or Ticagrelor 90mg twice daily Aspirin 75 mg (daily) Fondaparinux 2.5mg (daily) |
| DO NOT GIVE | Fondaparinux & Ticagrelor | | | | Ticagrelor (except in high risk patients) |

HIGH RISK PATIENTS — ADVICE OF CARDIOLOGY — CLINICAL JUDGEMENT OF FRAILTY (i.e age >75, low BMI, falls risk) — LOAD WITH — SWITCH TO

All patients with ACS should be referred to cardiology

If PCI performed, duration of DAPT at discretion of cardiologist. Always consider PPI in combination of antiplatelets/anticoagulation

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## ANP role

With prompt recognition, the ANP planned the effective treatment of a patient presenting with ACS and continually evaluated their condition and clinical response to treatment, avoiding the risk of adverse events (Dalton et al, 2018).

Utilising evidence-based practice (SIGN (2016), NICE (2014)) for ACS management is critical for ANPs and although now a few years old, these guidelines remain relevant and are currently being updated. Moreover, readily accessible local guidelines inform staff and aid their adherence to delivering safe, standardised care (Glenngard and Anell, 2017).

The ANP can utilise this guidance to confidently validate her clinical practices, which positively impacts on care processes and patient outcomes (NES, 2021). Also, recognising the need for risk stratification and early engagement with comprehensive secondary prevention strategies can result in positive outcomes and improved quality of life for patients with heart disease while relating to the four pillars of advancing practice (See Figure 1.) (NES, 2021; and Smith, *et al* . 2018).

Figure 1. (NES, 2021)

## Conclusion

Timely recognition of ACS is necessary for immediate management, which is critical in reducing the risk of mortality and further cardiac events (Smith, *et al.* 2018). Providing expertise and having the skill-set to meet patients' needs and lead on practice encapsulates the many benefits ANPs can bring across healthcare. As seen with this case review, comprehensive assessment and autonomous decision-making by the ANP in ACS management ensures the delivery of safe, effective, person-centred care (NES, 2021; NMC, 2018; and Scottish Government, 2017)

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