

Year 3 Case-based Learning 2024-25

Case 3 Part 2 Facilitator Guide



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Case overview: Flank pain

Part 1:	Flank pain

Part 2: Dyspnoea

Student timeline

This timeline outlines when the Case materials will be released on the portal. Your CBL sessions may not coordinate exactly with this timeline as these details will be decided by each LIC site, but students should have the relevant session content available on the portal for each session.

27/1/25:	Y3 LIC2 begins
21/2/25:	Part 1 information released on portal
From 24/2/25:	Part 1 Independent Session 1
From 3/3/25:	Part 1 Facilitated Session 2
14/3/25:	Part 2 information released on portal
From 17/3/25:	Part 2 Independent Session 1
From 24/3/24:	Part 2 Facilitated Session 2

Part 2 presentation

An 82-year-old man has undergone emergency surgery for ruptured AAA and suffered a postoperative MI in HDU. In CCU he becomes unwell with dyspnoea and hypotension. Investigations reveal severe AKI, hyperkalaemia, metabolic acidosis and pulmonary oedema.

Summary

The same patient from Part 1 has moved to the Coronary Care Unit (CCU) from HDU. It is 9 days after his first presentation with ruptured AAA. He has suffered a post-operative anterior STEMI (STelevation myocardial infarction), which was managed with percutaneous coronary intervention. The session starts on the CCU ward round day 3 post-MI. He is managed for complications including heart failure and runs of non-sustained ventricular tachycardia associated with dizziness.

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The session then moves to a cardiology ward round 3 weeks later. Unfortunately, the patient has deteriorated and remained in bed with problematic shortness of breath. There is increasing difficulty managing his fluid balance, then he deteriorates acutely with cardiogenic shock, pulmonary oedema, acute kidney injury and hyperkalaemia. He is discussed with renal and intensive care, but it is decided that higher levels of care would not be in his best interests. He is too unwell to discuss ceilings of care himself, so these are discussed with his next of kin (his niece). A Hospital Anticipatory Care Plan and Do Not Attempt CPR form are completed to prioritise his comfort. His end-of-life care is managed on the ward. He dies, his death is verified and a medical certificate of cause of death is completed.

Learning outcomes

Essential

Note that not all of these will be able to be covered in every session, but students should consider:

- When approaching an acutely unwell patient, how does it differ if they are frail?
- In this case, how might we interpret his radiological images and laboratory tests?
- Are you aware of potential complications post-MI? How should we look at their prevention, assessment and management?
- What is cardiac failure?
- How does cardiac anatomy relate to the ECG?
- The patient here develops hyperkalaemia, acid-base disturbance and shock. What physiological principles contribute to this?
- What is acute kidney injury?
- Do you know the treatment algorithm for hyperkalaemia? What is the name of the guidelines?
- Are you aware of the indications for emergency renal replacement therapy?
- The ECG shows ventricular tachycardia- how do you identify this on ECG?
 - What do you know of the use and safety/monitoring issues with amiodarone?
- Consider the process of information gathering in clinical reasoning
- Can you see how clinical care is integrated across different teams in this case?
 - What are the challenges to achieving this?

- When managing complex situations, how do we achieve clear communication with colleagues, the patient and their loved ones?
- Have you seen doctors providing end of life care? What did you think about their role in this?
- What is the procedure for verification of life extinct?

Desirable

- What do you understand about the selection of place of care, and what high dependency and coronary care units provide compared to routine hospital wards?
- What is anticipatory prescribing at the end of life?
- How might we apply ethical and legal principles to end of life discussions, ceilings of care decisions and documentation
- What do you know about the completion of a medical certificate of cause of death and the indications for a coroner's discussion?
- Death can have an impact on us and our colleagues. It's not mandatory, but would anyone like to share their thoughts on how we might deal with this?
- How might we improve the holistic care of the dying person: cultural, religious and spiritual, with consideration of their individual values and beliefs?
- Are you aware of any ethical debates in end of life choices?

Student guidance

There are two types of sessions – *independent* and *facilitated*. Students have been provided with a case guide and supporting materials, which includes medical documents and investigations. They should have met prior to the facilitated session and worked through the patient materials as a group, using the framework provided in the general guide to write learning outcomes. These should reflect the cognitive processes underlying the case, and students should consider any additions they would make to the assessment and why, interpret the investigation results available, formulate a differential diagnosis, and suggest a management plan. They should have agreed how to present their learning to each other and their facilitator ahead of the facilitated session.

Key areas of discussion

• Cardiac anatomy and physiology

- Complications post-MI
- Opportunities for health promotion and intervention
- AKI and hyperkalaemia management
- Levels of care
- Ceilings of care discussions and decisions
- Professional responsibilities relating to end-of-life care

Facilitator guidance

The general guide outlines expectations about how both independent and facilitated sessions should be conducted. Students should present their learning from the independent session at the start of the facilitated session. You have been provided with a copy of the student materials, and additional materials to share as the case progresses.

In your facilitated session, there are a number of learning areas to be highlighted. The materials have intentional gaps which should be explored. Students should explore these in their discussions, facilitated by their Chair, however, we have *suggested some prompts* to stimulate discussion if required.

Note this patient is known to the students from earlier CBL cases and **this may be the first time that some students encounter a patient dying**. Facilitators should flag that student support is available (QUB contacts include student support officer Joanna Scott <u>joanna.scott@qub.ac.uk</u> or Dr Ciaran Mulholland <u>c.c.mulholland@qub.ac.uk</u>).

Coronary Care Unit Ward Round

- Place of care: Highlight integrated care in action as the patient has moved between specialties. In CCU he will undergo telemetry and monitoring for complications, which include arrhythmic, mechanical, and inflammatory.
- Heart failure management:
- MDT: Students should appreciate the multi-disciplinary nature of cardiac care, which includes cardiac rehabilitation to assess and manage lifestyle factors and psychosocial health, as well as cardioprotective therapies and medical risk factor management.
- Gender differences in heart failure: It is worth considering the gender differences in the presentation of cardiac failure. Supporting evidence can be found in the resources.

- Heart failure team: The team will manage up-titration of medications to provide the best chance of ventricular remodelling (and hence improve ejection fraction). The four pillars of heart failure treatment (ARNI, angiotensin receptor-neprilysin inhibitors; BB, beta-blocker; MRA, mineralocorticoid receptor antagonists; SGLT2i, sodium-glucose co-transporter 2inhibitors) is a hot topic in cardiology at present (Straw et al., 2021). Encourage students to consider their professional responsibility for lifelong learning to keep their knowledge up to date.
- Secondary prevention: What secondary prevention strategies are started post-MI? This includes medication and lifestyle changes. Examples of efficacious interventions including smoking cessation, exercise to reduce blood pressure in patients with hypertension, lifestyle modification (diet and/or exercise) to reduce diabetes risk, and behavioural weight loss to improve metabolic profiles in patients with obesity. Students should recognise that this is an opportunity to speak with the patient about health behaviour change, as described by the 'Making Every Contact Count' (MECC) initiative. MECC is an evidence-based approach to improve people's health and wellbeing by helping them change their behaviour, with emphasis on prevention. It uses brief and very brief interventions, delivered whenever the opportunity arises in routine appointments and contacts, and involves asking questions, listening and responding in a person-centred way to understand what type of support the person needs. This aligns with NICE guidelines on behaviour change (NICE, 2014), aiming to help people manage and improve their own health and wellbeing and ensure that behavioural interventions are available for patients, service users and staff.
- Models of health behaviour: Students should be able to apply the Health Belief Model to discuss how George's health behaviours may be modified. If the MI is considered as a 'cue to action', a conversation to elicit how susceptible George views himself to further ill health if he continued smoking, and how he views the severity of any further related episodes, alongside any benefits/barriers to health behaviour change (e.g. living alone and farm operation implications for income). George needs to believe the threat (to his health and livelihood) is outweighed by the effort / time / inconvenience involved with behaviour change, that engaging in change will actually result in a positive outcome (response efficacy), and that he has the skills/ support etc. to make the changes required in the context of the pressures and priorities of his own daily life.
- Non-sustained ventricular tachycardia (NSVT): This is an abnormal cardiac rhythm originating from the ventricles and so is not generated via normal conduction pathways. It is a recognised complication of myocardial infarction, especially if there is heart failure and

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impaired left ventricular function. The heart rate is fast (by definition >120 bpm and frequently significantly faster). At this rate cardiac output and blood pressure are compromised. Brief episodes may lead to dizziness or syncope. Faster prolonged episodes can result in cardiac arrest. Benign NSVT lasts for under 30 seconds and is very common in the first 48 hours after STEMI. Patients should be assessed for symptoms and stability. If episodes are brief and the patient is stable, electrolytes should be checked and corrected (particularly low Mg and low K) and initiation or uptitration of beta blockers could be considered. If new acute ischaemia is the cause, they may need to go back to the cath lab. If episodes are associated with instability, DC cardioversion is indicated. If episodes are prolonged but the patient is stable, antiarrhythmic drug therapy can be considered. If episodes recur for days post-STEMI, such as in this case, antiarrhythmic drug therapy and evaluation for ICD implantation for secondary prevention of sudden cardiac death is recommended according to current guidelines. In this case the patient is being managed on a palliative pathway, so implantation of an ICD would be inappropriate. Management of recurrent NSVT with drugs would be reasonable as there are distressing symptoms of dizziness during the attacks. If beta blockers fail to suppress the arrhythmia, then the antiarrhythmic drug amiodarone can be used even in those with impaired systolic function.

- Pathology: Students could review the histopathology of acute MI and its potential for becoming an arrhythmogenic focus.
- Monitoring of bloods: *Why are blood tests monitored after an MI?* Highlight the role of blood tests in monitoring bleeding and arrhythmia risk, and the impact of new medications e.g. ACEI and AKI risk
- Echocardiogram report: The echo shows severe cardiac failure. Prompt students to discuss cardiac anatomy and the contractile cycle.
- ECG: The ECG shows ST segment elevation in leads V2-V6 in keeping with anterior STEMI. The elevation extends slightly into lead I suggesting some lateral extension. There are Q waves already present suggesting necrosis/infarction is established. There are also Q waves without ST segment elevation in leads II, III and aVF, suggesting an old established (nonacute) inferior infarction. Encourage students to apply anatomy to the ECG by reviewing the coronary artery blood supply relative to the electrically mapped areas on a 12-lead ECG and how these allow prediction of likely thrombus location for PCI intervention.

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Cardiology Ward Round: 3 weeks later

- Assessment: What problems are identified? The big picture is one of a deteriorating patient. He is symptomatic of cardiac failure with shortness of breath. Holistic assessment identifies poor sleep and should explore underlying reasons – is poor sleep due to breathlessness, pain, anxiety or another reason?
- Impression: What is the impression from the ward round? Students should consider the different conclusions they may infer. The patient is deteriorating. Clinical assessment identifies fluid overload. There is the suggestion that escalation of care would not be in the patient's best interests.
- Management: Explore understanding of the management plan regarding fluid restriction, diuretics and basic knowledge of inotropes. In CCU, there would be the option of initiating peripheral vasopressors or inotropes such as dopamine or dobutamine. However this is quite complex, neither are particularly good post MI and dobutamine should be avoided alongside beta blockers. There are also major difficulties in using such agents in patients with VT. The main point is that these decisions are complex and should always be patientcentred.
- Fluid balance: Students should work their way through the chart, which shows the patient has a 2-day history of positive balance.

Foundation doctor review

- Assessment: Students should critique the foundation doctor's assessment, such as the limited history. *What is especially challenging in this assessment?* Students should identify the difficulty managing a shocked and overloaded patient at ward level.
- Problem list: Ensure students have identified all the key problems, including hypotension, hypoxia, fluid overload, frailty, AKI, metabolic acidosis and hyperkalaemia requiring urgent treatment. Students should appreciate the complexity of a patient being intravascularly deplete but extra-vascularly overloaded.
- Differential diagnosis: Students may suggest pulmonary oedema, infection, or embolism to explain the shortness of breath, but the main point is recognising that there are now multiple complex problems that require management.
- Investigations:
- U&Es: K 6.7 (severe hyperkalaemia); AKI stage 3
- NT pro-BNP: higher levels associated with poorer outcomes

- ABG: Type 1 respiratory failure and metabolic acidosis
- CXR: Severe pulmonary oedema.
- Management: What is the significance of the blood results to the management plan? Formulate a management plan at this stage of assessment. The student's plan should be guided by investigation results and should include portable CXR, hyperkalaemia management as per protocol (including telemetry), increasing oxygen therapy to 15litres NRB and discussion with senior. Guidelines are relevant, particularly regarding emergency indications for renal replacement therapy and hyperkalaemia management. They should appreciate the difficult fluid balance (treating pulmonary oedema in a hypotensive patient) and recognise that higher level interventions would be required to reverse this, but that these are not always in patients' best interests. Example 'answers' can be revealed in the registrar review in the facilitator materials.
- Physiology:
- Acid-base and hyperkalaemia: Students should review acid-base and electrolyte homeostatic mechanisms, and how these are pathophysiologically impacted to cause metabolic-lactic acidosis and severe hyperkalaemia. Students should also be prompted to consider the link between hyperkalaemia and cardiac excitability, and how insulin affects serum potassium levels.
- Shock: Students should review the physiologic mechanisms for compensation for shock (reduced baroreceptor stimulation and consequent increased sympathetic outflow to vascular system causing generalised vasoconstriction), as well as Starling's law, LV systolic function and the pathophysiological changes that lead to cardiogenic shock and pulmonary oedema.

Additional materials for facilitated session

The students have not seen the additional materials you have been provided with. Share these with the students, review them together and hand over to the students to identify what is new for them and how the materials relate to the learning outcomes.

Registrar review

• Is there anything in the registrar review that adds to your plan? Encourage reflection on any additional points the registrar review presents, such as recognition that time is short and calling the family.

Ceilings of care discussions

 Students should identify who needs to be involved in the information gathering process and discussions relating to clinical care. This includes the patient themselves (if able), those close to the patient, the team in charge of the patient, and other specialties. They should appreciate that sensitivity is required to navigate ceilings of care discussions.

HACP and DNACPR forms

• Students should identify the purposes of these forms and who is involved in the communication surrounding these decisions. Professional obligations should be considered.

Repeat registrar review

- Management: How does this management plan reflect the HACP? Interventions are now only for comfort care and non-essential interventions are stopped. Students should identify common symptoms at end-of-life and the recommended medicines and route in anticipatory prescribing, should these symptoms arise.
- Professionalism: Students should consider the relevant professional and ethical principles related to providing end of life care, as well as the impact on self and the team.
- Legal duties: Confirm understanding of the processes of verification of life extinct and death certificate completion. Students may consider a coroner's discussion given the recent surgery.
- Reflection: *If you were the doctor who had been looking after this patient, what impact do you think these events could have on you and your team?* Suggest that students reflect on the impact of a patient dying and identify potential coping strategies and sources of support.
- There's no information mentioned here about the patent's values, spiritual or religious beliefs and how these may influence end of life care. This could be an opportunity for students to explore different practices for dying. Resources are provided below with general

information about how to care for patients from different religions and cultures when dying (including resource from the Belfast Trust) but students should be reminded that these need to be tailored to the individual.

Conclusion

Ask the students to summarise the session and direct them to areas where they should undertake more research. Encourage them to identify their key learning points across the whole case and to self-assess their progress in clinical reasoning skills and understanding of integrated clinical care.

Student support

Some students may be affected by the contents of the case, which deals with sensitive issues. If you are concerned about a student's wellbeing, please liaise with the local undergraduate office and advise the student to contact Ms Perpetua Lewis (Student Support Officer, CME) on p.lewis@qub.ac.uk, or ask if you could contact her on their behalf.

Useful resources

Altman, D. (2016, September). *12-Lead ECG case: A tale of too many Q waves*. <u>https://www.ems1.com/cardiac-care/articles/12-lead-ecg-case-a-tale-of-too-many-q-waves-kZIK377opGvp4PnB/</u>

Ayers, S., & de Visser, R. (Eds.). (2021). Psychology for medicine and healthcare. SAGE.

Belfast Health and Social Care Trust Multicultural and Beliefs Handbook. <u>https://bwellbelfast.hscni.net/wp-content/uploads/2019/06/MultiCulturalBeliefsHandbook.pdf</u>

British Medical Association, Resuscitation Council (UK) & Royal College of Nursing. (2016). *Decisions* relating to cardiopulmonary resuscitation. <u>https://www.bma.org.uk/media/1816/bma-decisions-</u> relating-to-cpr-2016.pdf

Department of Health. (2018, November). *Educational Material Surrounding Death - QUB Undergraduate Students*. <u>https://www.health-ni.gov.uk/publications/educational-material-</u> <u>surrounding-death-qub-undergraduate-students</u> Department of Health. (2019, January). *Guidelines for Verifying Life Extinct*. <u>https://www.health-</u> <u>ni.gov.uk/publications/guidelines-verifying-life-extinct</u>

General Medical Council. (2020, February). *Outcomes for graduates*. <u>Outcomes for graduates - GMC</u> (gmc-uk.org)

Lam, C., Arnott, C., Beale, A. L., Chandramouli, C., Hilfiker-Kleiner, D., Kaye, D. M., Ky, B., Santema, B. T., Sliwa, K., & Voors, A. A. (2019). Sex differences in heart failure. *European Heart Journal, 40*(47), 3859–3868c. <u>https://doi.org/10.1093/eurheartj/ehz835</u>

National Health Service. (2018, October). *NHS stop smoking services help you quit*. <u>https://www.nhs.uk/live-well/quit-smoking/nhs-stop-smoking-services-help-you-</u> <u>guit/#:~:text=Stop%20smoking%20aids,)%20and%20Zyban%20(bupropion)</u>

National Institute for Health and Care Excellence. (2022). *Making every contact count.* <u>https://stpsupport.nice.org.uk/mecc/index.html#group-The-MECC-approach-Sd0eBNaUnA</u>

National Institute for Health and Care Excellence. (2010, May). *Treatment and care towards the end of life: good practice in decision making*. <u>https://www.gmc-uk.org/ethical-guidance/ethical-guidance/ethical-guidance-for-doctors/treatment-and-care-towards-the-end-of-life</u>

National Institute for Health and Care Excellence. (2013, November). *Myocardial infarction: cardiac rehabilitation and prevention of further cardiovascular disease.* <u>https://www.nice.org.uk/Guidance/CG172</u>

National Institute for Health and Care Excellence. (2014, January). *Behaviour change: individual approaches. Public health guideline [PH49].*

https://www.nice.org.uk/guidance/ph49/resources/behaviour-change-individual-approaches-pdf-1996366337989

National Institute for Health and Care Excellence. (2015, December). *Care of dying adults in the last days of life*. <u>https://www.nice.org.uk/guidance/ng31</u>

National Institute for Health and Care Excellence. (2018, September). *Chronic heart failure in adults: diagnosis and management*. <u>https://www.nice.org.uk/guidance/ng106</u>

National Institute for Health and Care Excellence. (2019, December). *Acute kidney injury: prevention, detection, and management*. <u>https://www.nice.org.uk/guidance/ng148</u>

National Institute for Health and Care Excellence. (2020, May). MI - secondary prevention. https://cks.nice.org.uk/topics/mi-secondary-prevention/ NHS Health Education England. (2022). *Making every contact count*. <u>http://www.makingeverycontactcount.co.uk/</u>

Public Health Agency: Screening for AAA

https://www.publichealth.hscni.net/directorate-public-health/service-development-andscreening/abdominal-aortic-aneurysm-aaa-screening

Regional Palliative Medicine Group. (2018, January). *Guidance for the Management of Symptoms in Adults in the Last Days of Life.*

http://www.professionalpalliativehub.com/sites/default/files/RPMG%20End%20of%20Life%20Guida nce%202018 0.pdf

Roberts, N. J., Kerr, S. M., & Smith, S. M. (2013). Behavioral interventions associated with smoking cessation in the treatment of tobacco use. *Health Services Insights*, *6*, 79–85. <u>https://doi.org/10.4137/HSI.S11092</u>

Straw, S., McGinlay, M., & Witte, K. K. (2021). Four pillars of heart failure: contemporary pharmacological therapy for heart failure with reduced ejection fraction. *Open heart*, *8*(1), e001585. <u>https://doi.org/10.1136/openhrt-2021-001585</u>

The Regulation and Quality Improvement Agency. (2021, March). *Guidelines for the Treatment of Hyperkalaemia in Hospitalised Adults*. <u>https://www.rqia.org.uk/RQIA/files/b0/b071ebc3-f2b3-48ab-</u> 8e46-c690df790177.pdf

Learning opportunities for students

Lectures

- Surgery Level of Care & Monitoring
- Medicine Cardiology Heart Failure
- Year 1 Acute coronary syndromes
- Year 1 Left ventricular dysfunction and failure
- Specialties Nephrology

Other opportunities

- Medicine Cardiology 12 Lead ECG: Myocardial Ischaemia
- Medicine Cardiology Acute Coronary Syndromes
- Medicine An introduction to ECG interpretation

- Medicine Clinical decision making
- Medicine Using laboratory tests
- Biochemistry Muscle and cardiac markers
- Cardiovascular pathology Heart failure
- Cardiovascular Pathology Ischaemic Heart Disease
- Medicine Cases Dyspnoea
- Medicine Clinical decision making
- Medicine Using laboratory tests
- Medicine Cases Nephrology
- Biochemistry Sodium and water balance
- Biochemistry BNP
- Respiratory Pathology Pulmonary oedema, pulmonary embolism and pleural effusions

Foundations for Practice

- Fundamentals of Clinical Science: Illness cognitions, health behaviour, public health, anatomy, pathology, pathophysiology, anatomy
- Blood, Cardiovascular and Respiratory Systems: Smoking cessation, acute coronary syndrome, cardiac pharmacology, anatomy and physiology, renin angiotensin system, pathology of arterial circulation, health systems
- Gastrointestinal, Endocrine, Renal and Reproductive Systems: Renal pathology, physiology, acute kidney injury, acid base balance

Previous cases

• Case 5, 'The cows still need milking.'

Acknowledgements

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