

# Acute chest pain on cruise ships

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Every day, in various forms, emergency physicians and their patients face the question: how safe is safe enough? Is the risk of something bad low enough that it is reasonable to neglect it [1]? Acute chest pain is a daily challenge and even more so for doctors on cruise ships at sea who face additional questions: is the cause something that can be treated aboard, and if not, what can be done until safe evacuation to definitive care is possible?

Although not internationally regulated, medical practice on cruise vessels has evolved over the years, mostly because of efforts by the American College of Emergency Physicians (ACEP). “Health Care Guidelines for Cruise Ship Medical Facilities” was created by consensus in the mid-1990s by ACEP’s Section for Cruise Ship and Maritime Medicine [2]. Regularly updated and last revised in July 2014, these guidelines are now actively promoted by the Cruise Lines International Association, the world’s largest cruise industry association with representation in North and South America, Europe, Asia and Australasia [3]. They can thus be considered globally accepted minimal medical requirements for international cruising.

For diagnostic work-up of acute chest pain, the ACEP Guidelines include X-ray imaging, electrocardiography (ECG) and cardiac enzymes, and there are therapeutic remedies for advanced cardiac life support including fibrinolytic agents, as well as equipment for assisted respiration, cardiac pacing and defibrillation [2]. The ship’s doctor may be able to exclude some non-cardiac causes for chest pain and to a certain degree follow established practice guidelines for diagnosis and management of acute coronary syndrome (ACS) and myocardial infarctions (MI) without ST segment elevation (NSTEMI) and with ST segment elevation (STEMI) [4].

Three case reports have recently been published in “International Maritime Health” about patients with ischaemic heart disease presenting with acute chest pain on cruise ships [5–7]. Their chest discomfort turned out to have other causes than initially suspected, and the cases demonstrate how difficult it can be to determine whether this often mild

or unclear symptom can safely be observed aboard until the end of the voyage or suggests a serious enough condition to attempt immediate medical evacuation.

The 2 described female patients both had atypical pains as well as abnormal electrocardiographic and/or cardiac enzyme findings [5, 6]. MI was suspected and anticoagulation therapy started, but the causes were found ashore to be spontaneous coronary artery dissection (SCAD) and takotsubo cardiomyopathy (“broken heart syndrome”), respectively.

The third patient, a 44-year-old previously asymptomatic and healthy male crewmember, presented after several short episodes of chest pain [7]. He was released after almost 8 h of uneventful monitoring with serial cardiac enzymes and ECGs, but just 6 h later he had another episode of chest pain. His cardiac enzymes were still normal but ECG now suggested STEMI. When unstable ischaemic heart disease is suspected or diagnosed aboard, the patient must be transferred to a proper cardiac facility ashore where further diagnostic work-up and treatment can be provided. In this case, the ship was in port when STEMI was determined. He could immediately be transferred to a shore-side hospital where angiography showed a 99% occlusion of the right coronary artery.

In all of these 3 cases, the cause could only be established in specialised facilities ashore, with diagnostic methods that are not available on cruise ships.

Initiation of anticoagulation is a central part of ACS treatment [4], but the reluctance of a ship’s doctor to start is understandable when the cause of the discomfort is unclear or possibly a condition carrying an increased risk of bleeding. The threshold for starting anticoagulation should be higher at sea where haemorrhaging is another life-threatening emergency and one that is much more difficult to handle at sea than on land. Certain groups, such as the elderly and those with renal insufficiency, are at high risk for bleeding complications [8]. Extra-cranial bleeding may require blood transfusion, which in itself may carry a risk for ischaemic outcomes [8]. Blood transfusions can only be done on some cruise vessels and then only on vital indications [9].

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The 3 maritime-medical cases further illustrate how methods of evacuation and transfer from ships must be improvised and individualised. One patient was evacuated by tender boat, escorted by a ship's physician [5]. In the second case, with more sea days ahead, a ship diversion was arranged for unrelated reasons and aeromedical transfer to a cardiac unit could be arranged from the island's airstrip [6]. In the third case, transfer was relatively simple as the ship was already in port when urgent referral was decided [7].

Hospitalisation of the 3 described cases was successful. But apart from being disruptive, work-intensive, time consuming and expensive, the various methods of transfer from ship to shore by vessel diversion, tenders, or air are not without hazards. Helicopter evacuation (medevac) is often a lifesaver, but there are many dangers involved [10].

Sometimes medevac is not possible. There may not be any helicopters available in the area, the ship is way out of helicopter range, or the medical facilities within reach ashore are substandard. The ship's captain or the local rescue coordination centre will also occasionally turn down a medevac request from the ship's doctor after general risk assessment. Ultimately, the pilot-in-command is the final authority on whether the medevac will take place [10].

Some serious cases may actually be better off aboard rather than enduring a disruptive and frightening evacuation by tender boat or helicopter. Management of lethal arrhythmias, a common cause of MI mortality, is much more difficult in a search and rescue helicopter than in a ward aboard. The key question is, does possible benefit outweigh risks of helicopter evacuation [10]?

While waiting for the best opportunity to do a safe and uneventful transfer to a hospital ashore, the principle of *primum non nocere* ("first, do no harm") should apply; stabilise and monitor the patient while avoiding measures that carry risks of unwanted side effects or can trigger adverse events.

The decision to refer a patient to a hospital ashore may be easy when the symptoms are unclear or severe and the ship is close to a port. The three cases described needed further medical work-up and stabilisation ashore prior to safe repatriation, but it is not unusual that the patient or traveling companions strongly resist referral to hospitals in areas with unfamiliar languages and culture. The communication and diplomatic skills of the ship's doctors are then taxed and in such cases it is particularly important to document recommendations given, as well as indications and contraindications regarding referral and evacuation.

Diagnostic error accounts for the majority of malpractice claims in primary care ashore and the commonest cited missed or delayed diagnosis for adults are cancer and MI [11]. Chest pain is a non-specific symptom of illness, and in MI not a constant one, thus confusing the picture even further [4].

Best medical actions at sea may differ from state-of-the-art treatment ashore. Occasionally, lawyers have their own "expert witnesses" contest decisions taken aboard. Instead, one could wish for an international panel of independent professionals with an extensive maritime-medical background that could more objectively determine whether the shipboard actions were acceptable when they were taken.

Ship's doctors live with uncertainty and must be highly adaptable to ever-changing conditions and situations. Going to sea will always involve elements of risk for both passengers and crew, depending on inconstant factors like activities while away, personal health, the ship's itinerary and location, weather conditions, etc. To help their sea-going colleagues, land-based medical professionals involved in travel medicine counselling should encourage their cruising patients to always keep, in their hand luggage, up-to-date medical file summaries with past diagnoses, current medication, allergies and adverse effects from prior medication, and their latest ECG. They should also strongly recommend travel insurance that covers not only medical expenses abroad but also safe repatriation.

It is different – and risky – out there...

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