

Cardiac arrhythmias in the critically ill

James Gray
Paul Haydock
Adrian Wong
J M Tom Pierce

Abstract

Arrhythmias are a common problem in the critically ill and they can have significant effects on patient outcome. They often require immediate and swift action and it is, therefore, essential that clinicians have a structured approach to the recognition and management of arrhythmias. Here, we provide a framework for the appropriate management of the more frequently encountered cardiac arrhythmias in critical care. We include the algorithms from the 2010 Resuscitation Council Guidelines for reference.

Keywords Arrhythmias; atrial fibrillation; bradycardia; congenital heart disease; ion channelopathies; prolonged QT supraventricular tachycardia; temporary cardiac pacing; therapeutic hypothermia; ventricular tachycardia

Royal College of Anaesthetists CPD Matrix: 3G00

Arrhythmias amongst patients who are critically ill are common (Table 1). Their clinical manifestation may range from patients being completely asymptomatic to cardiorespiratory arrest. The variety of arrhythmias may be vast and the underlying cause multifactorial, hence the management and resuscitation of patients must be performed in a systematic and methodical manner. The aim of this article is to provide a framework for the appropriate management of the more frequently encountered cardiac arrhythmias in the critically ill and illustrate them with sample ECGs.

Causes of arrhythmias

Arrhythmias can be the result of primary pathology in the cardiac conductive pathways or abnormalities in other organ systems. In

James Gray BSc (Hons) MB ChB (Hons) FRCA is an ST7 in Anaesthetics at University Hospital Southampton, UK. Conflicts of interest: none declared.

Paul Haydock MBBS MA (Cantab.) MD (Res) MRCP is a Cardiology ST6 and Heart Failure Fellow at University Hospital Southampton, UK. Conflicts of interest: none declared.

Adrian Wong BSc MBBS MRCP FRCA is a Clinical Fellow at Oxford University Hospitals Trust, UK. Conflicts of interest: none declared.

J M Tom Pierce FRCP FRCA is a Consultant Cardiac Anaesthetist and Cardiac Intensivist at University Hospital Southampton, UK. Conflicts of interest: none declared.

Learning objectives

After reading this article, you should be able to:

- recognize the clinical features of cardiac arrhythmias in the critically ill patient that demands immediate and swift action
- understand the various causes and mechanisms of arrhythmias in the critically ill
- have a systematic approach in the assessment and management of arrhythmias in critically ill patients
- appreciate the changes in the updated 2010 European Resuscitation Council guidelines

the critically ill patient, arrhythmias can be caused or potentiated by increased catecholamine levels (endogenous or exogenous), hypoxia, hypercarbia, severe acidosis, gross electrolyte disturbance, and pain or anxiety. The end result is a combination of decreased cardiac output and/or increased myocardial oxygen demand. Treatment should be targeted at the underlying cause, often revealed through a thorough history, examination and relevant investigations. Figure 1 summarizes the various mechanism of arrhythmias in the critically ill.

Assessing the patient with cardiac arrhythmia

The evaluation and treatment of critically ill patients with arrhythmias has to include supportive, diagnostic, therapeutic and, possibly, resuscitative measures encompassing not just the cause of the arrhythmia but also systemic effects, including impaired end-organ perfusion and function.

In this article we present a rational step-wise sequence of questions to guide management.

Question 1: Is the patient compromised by the arrhythmia?

The answer to this question determines the speed of treatment: the greater the compromise, the swifter the response needs to be. Irrespective of the instantaneous degree of compromise, the ever present risk of further cardiovascular deterioration or the development of life-threatening arrhythmias mandates:

- the rapid assessment of the circulation, including the presence of a pulse
- enrichment of the oxygen supply
- establishment of secure venous access
- application of monitors
 - peripheral oxygen saturation (SpO₂)
 - ECG
 - non-invasive blood pressure (NIBP)
- the application of stick-on defibrillation pads
 - right infraclavicular and left anterior axillary line over the 5th/6th intercostal spaces attached to a compatible defibrillator might have the potential for external cardiac pacing if the patient is bradycardic
- recording a 12-lead ECG as soon as the clinical situation allows.

And if the clinical condition warrants it:

- the removal or withdrawal of precipitants
- measurement of 'plasma' K⁺, Mg²⁺ and Ca²⁺

Incidence and impact of arrhythmias in patients in the intensive care unit

	Sustained supraventricular arrhythmias %	Sustained ventricular arrhythmias %	Conduction abnormalities %	No arrhythmias %
Incidence	8	2	2	88
Unadjusted in-hospital death rates	29	73	60	17
Neurological sequelae among survivors	15	38	17	6

After adjustment for prognostic factors and propensity scores, only ventricular arrhythmias increased mortality (odds ratio 3.53, 95% confidence interval 1.19–10.42).

Table 1

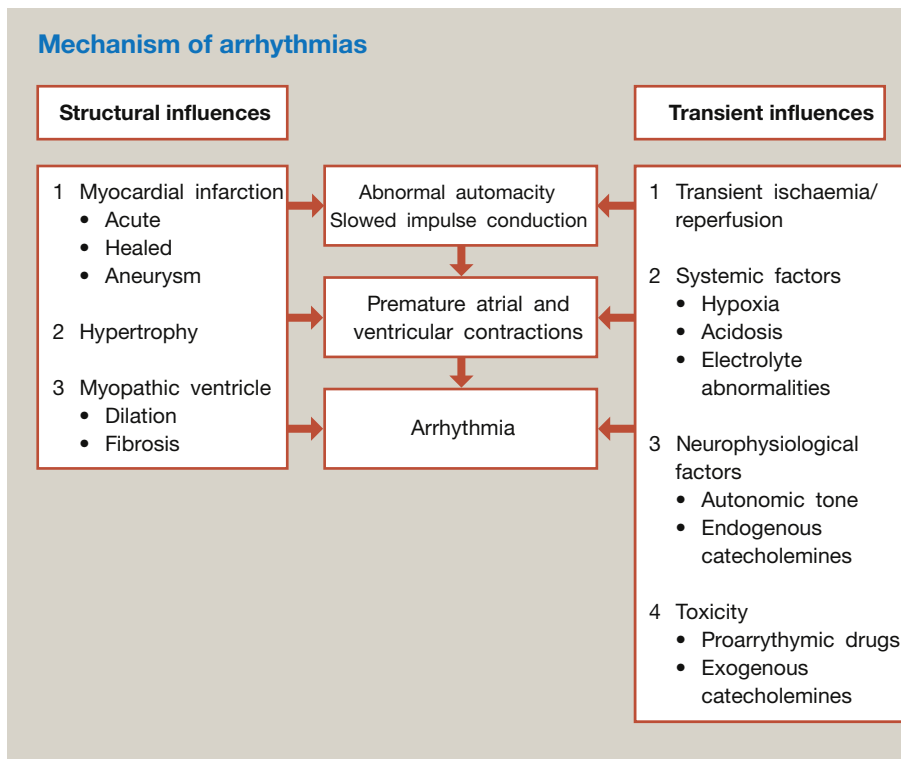


Figure 1

The relevant clinical signs of compromise are described in [Box 1](#).

Question 2: Is the heart rate slow or fast?

The normal heart rate (HR) is between 60 and 100 beats per minute (bpm). A HR below 60 is termed a bradycardia, and above 100 a tachycardia; however, this needs to be taken in context.

Question 3: Is this a primary arrhythmia or secondary to another disease process?

Are the cardiac arrhythmias normal and appropriate responses to alterations of physiology or are they pathological? The answer to this question might be swiftly obtained by means of the history, examination and appropriate investigations; for example, the profound bradycardia associated with hypothermia (ECG 1). At

other times, determining the cause of the arrhythmia might require electrophysiological studies (EPS). Categorizations based on the answers resulting from questions 2 and 3 are shown in [Table 2](#).

Features of a compromised circulation

- Absent pulse
- Signs of low cardiac output
- Hypotension (systolic blood pressure <90 mmHg)
- Heart rate <40 or >150
- Chest pain
- Ischaemia on the ECG
- Heart failure
- Reduced level of consciousness

Box 1

Download English Version:

<https://daneshyari.com/en/article/2742089>

Download Persian Version:

<https://daneshyari.com/article/2742089>

[Daneshyari.com](https://daneshyari.com)