Heart disease regulations: implications for work and play – part 1

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Regulatory authorities may exclude men with heart disease from specific occupations or activities to protect the individual and those around them. Clinicians are often asked to explain the rationale for these restrictions, and may be asked to provide advice on the safety of a diverse range of recreational activities. In the first of two articles, the authors outline the concept of acceptable risk and discuss the implications for patients with coronary artery disease and implanted devices.

Heart disease may result in sudden incapacity that can threaten the safety of the individual and those in close proximity. Some regulatory bodies therefore prevent selected patients from pursuing specific occupations and leisure activities. Arrangements vary between countries, but for the purpose of this review we will cite those that currently apply in the UK. Clinicians should be aware that guidance is frequently updated.

Doctors must always act in the best interest of their patients and have a duty of confidentiality to them. However, the General Medical Council acknowledges that if a patient places others at risk by flouting regulations (for example, driving while subject

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to recurrent blackouts), the doctor may be obliged to inform the relevant authority.¹

REGULATIONS AND THE LAW

Regulations designed to ensure safe practices carry more authority than guidelines but usually lack the force of law. On the other hand, they are often devised and implemented by organisations that are allied to government, such as the armed forces, and are therefore seldom contested. Nevertheless, we suspect that in future legal challenge will become more commonplace.

For example, human rights lawyers may successfully argue that it is unreasonable to prevent professional athletes with hypertrophic cardiomyopathy from pursuing their chosen career if they are prepared to accept the attendant personal risks and the safety of others is not compromised. Moreover, commercial organisations may find it increasingly difficult to justify restrictions on their employees and clients if these are seen to be primarily designed to minimise costs arising from duty of care.

THE CONCEPT OF ACCEPTABLE RISK

Authorities may impose restrictions on the activities of patients with heart disease in order to protect the individual, society or the interests of their institution.

Recommendations are invariably based on expert analysis of observational data pertaining to the risk of sudden incapacity. Unfortunately, even for patients with coronary artery disease, the available evidence is usually inadequate and seldom directly applicable.

It is particularly important to appreciate that while it may be possible to gauge the risk of a defined medical event, this does not equate to the risk of an accident or serious mishap. Thus, a driver who has a myocardial infarct or arrhythmia while at the wheel of a car may have sufficient warning to bring the vehicle under control without causing an accident. In contrast, far less serious medical conditions, such as drug-induced drowsiness, may cause a driver to lose control of his vehicle, with devastating consequences.

Aviation engineers have conventionally accepted a risk of component failure that is equal to or less than one per billion flying hours. After making certain assumptions relating to the critical periods of take-off and landing, it has been calculated that for pilots this is broadly equivalent to an annual risk of sudden incapacity of 1 per cent per year.² This is very similar to the annual risk of heart attack (myocardial infarction or sudden cardiac death) in a healthy 60-year-old man and has become the benchmark for determining medical fitness to fly a plane.

The potential consequences of incapacity in other circumstances are less serious and greater risks may therefore be acceptable; for example, in the UK driving is prohibited only if the annual risk of sudden incapacity is thought to exceed 20 per cent for ordinary licence holders and 2 per cent for vocational (group 2) licence holders (see part 2).³

CORONARY ARTERY DISEASE

The natural history of all forms of coronary heart disease has been studied extensively and recommendations for this group of patients are generally based on large observational studies or registries. The prevalence of angina increases with age and is present in 10–20 per cent of men aged 65–74 years.⁴ In general, the prognosis of men with angina is very good, with an annual risk of myocardial infarction and death of 7 and 3 per cent, respectively.⁵ However, individual risk in these patients may vary up to 10-fold depending on clinical, functional and anatomical factors.

The occurrence of future events is not necessarily dependent on the severity of coronary artery disease, but rather on the presence of ‘vulnerable plaques’ that are at risk of rupture. Accordingly, restrictions on work and travel are generally focused on those patients with coronary artery disease and a recent plaque rupture or myocardial infarction (Figure 1). Thus, patients who have
suffered a myocardial infarct are advised not to drive for a minimum of one week, to avoid air travel for two to three weeks, and to participate in a formal cardiac rehabilitation programme, including graded exercise, before returning to their employment.6

These recommendations are being applied to an increasing number of men because the introduction of high-sensitivity troponin assays7 means that many patients who would previously have been given a diagnosis of unstable angina, with less rigorous restrictions on return to normal activity, are now considered to have suffered a myocardial infarction.

**ARRHYTHMIAS AND DEVICES**

In the UK approximately 380,000 patients are living with a permanent pacemaker and 33,000 have an implantable cardioverter defibrillator (ICD) or cardiac resynchronisation therapy device. These devices are inherently susceptible to electromagnetic interference (EMI) from strong electric or magnetic fields. This has led to concerns that the device may interpret extraneous electromagnetic signals as cardiac in origin and inappropriately inhibit output or deliver anti-tachycardia or shock therapies (Figure 2).

In practice this occurs very rarely, if at all; this is largely because all modern devices include features to detect and reject EMI, such as feed-through capacitors or filters, and specific noise reversion modes that will default to fixed-rate pacing in the presence of EMI. Moreover, experimental studies have shown that EMI induced by metal-detector gates and other security devices is unlikely to be of any clinical significance. Accordingly, there is no need to restrict the activities of most patients with an implanted cardiac device.

Patients with an ICD may experience sudden incapacity if the device delivers an appropriate or inappropriate shock and are therefore subject to driving restrictions (see part 2).

In the next issue (part 2), the authors look at the scientific basis underpinning current advice on driving, flying and a range of sporting activities.

**KEY POINTS**

- Clinicians should give men with cardiovascular disease and their relatives clear and consistent advice
- For most men with cardiovascular disease the risk of sudden incapacity and/or death is extremely low; nevertheless the clinician may need to acknowledge that such risks exist and explain how they could jeopardise the safety of the patient and others

**REFERENCES**


