



**Association of Chartered Physiotherapists  
in Cardiovascular Rehabilitation**

# **Early Activity After Cardiac Surgery**

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**Key messages:**

- There are many benefits for patients who engage in early activity after cardiac surgery
- New evidence is emerging that an alternative approach to typically conservative sternal precautions will enable patients to be more independent earlier in their recovery
- There is a need for further research in this field to enable healthcare professionals to provide effective and safe early cardiac rehabilitation.

**Aims**

This document intends to:

- Give an overview of the available literature with regards to early activity following cardiac surgery

**Background and literature review**

Cardiac surgery is defined as any surgery that involves opening the pericardium (The Society for Cardiothoracic Surgery in Great Britain and Ireland, 2015). The most common procedures performed are coronary artery bypass grafts and valve surgery.

Early cardiac rehabilitation (CR) following cardiac surgery both whilst the patient is in hospital, and in the immediate post discharge period aims to minimise the effects of restriction to bed (De Macedo et al, 2011) and has been shown to reduce the risk of post-operative complications, improve autonomic cardiac function at discharge (Mendes et al, 2010) and reduce length of hospital stay (Wynne, 2004 & Herdy et al, 2008).

The patient population undergoing cardiac surgery is known to have increasingly complex histories with co-morbidities increasing which may adversely have the potential to slowdown recovery and increase the likelihood of in-hospital mortality (Clough et al, 2002). It should also be considered that there is an increase in the number and proportion of older people in the UK. By 2035 it is projected that those aged 65 and over will account for 23 percent of the total population (Office for National Statistics, 2012). Therefore, the importance of encouraging and prescribing appropriate physical activity in the post-operative period has never been higher.

The responsibility for early activity after cardiac surgery is shared by members of the multi-disciplinary team, but ward-based physiotherapy teams often take the lead. CR professionals (both physiotherapists and nurses) may also be involved, especially in advising on activity immediately after discharge from hospital.

The most recent guidelines from the British Association for Cardiovascular and Rehabilitation recommends early CR, suggesting that CR professionals should carry out an assessment within 10 days of discharge. If this were the case, then indeed the CR professional would be providing some form of early activity programming and advice for each patient to meet the aforementioned requirements and suggestions. The CR services (16 programmes) who participated in the BACPR Pilot Accreditation Scheme 2014-2015 achieved on average their first patient assessment around 30 days post discharge (all cardiac conditions rather than focussing on surgical patients) which is 20 days short of the target and certainly does not encompass what the authors above describe as 'early cardiac rehabilitation'. A delay in starting CR has shown to prolong physical deconditioning, sedentary behavior and increases patients dependence leading to an increased recovery period. This highlights the importance of patients receiving adequate activity advice whilst they are still inpatients.

There is limited published data available to guide physical activity in the post-operative period following cardiac surgery with scarce evidence as to the optimal intensity, timing and choice of exercises. Many inpatient protocols for physical activity following heart surgery are based on guidelines set out by the American College of Sports Medicine (Thompson et al, 2010) which recommend:

- Mobilising 3-4 times a day on days 1-3 post surgery
- Mobilising 1-2 times a day from day 4 post surgery
- Intermittent bouts of exercise lasting 3-5 minutes with rest periods
- Using the Rate of Perceived Exertion (aim for less than 13 on the 6-20 scale) and Heart Rate (resting HR plus 30 beats) to dictate intensity. (*We are not sure how betablockade was accounted for in this study*).

Following these guidelines, and historically as passed down as expert opinion, many inpatient exercise programmes are based solely on a progressive walking regime which is increased in terms of distance and intensity. However, Borges et al (2022) reported that progressive mobilization, cycle ergometer, out of bed activities, and resistance exercise can also be used as techniques when following early mobilization protocols. It was observed that the groups that started early activities presented lower rates of postoperative complications, reductions in hospital stay, and an increase of exercise capacity compared with control groups without treatment. Regarding intensity, most studies use subjective criteria such as the Borg scale aiming to achieve a low intensity (level 11 on the scale from six to 20 points). Other studies use a HR change from 20-30 bpm above resting HR following ACSM guidelines. De Macedo et al (2011) criticise the ACSM guidelines stating that determining exercise intensity by RPE and HR is subjective and not sufficiently individualised. Past medical history, signs and symptoms, functional capacity during hospital stay (Phase 1), and medications should also be considered when prescribing exercise to maximize the benefits and minimize risks during CR.

One area of post cardiac surgery rehabilitation that has the least evidence base is upper limb exercise and restrictions regarding lifting and carrying. Because of concern regarding the impact of upper limb activity on sternal wound healing after sternotomy, guidance is often very conservative with patients being advised to avoid anything more than very light upper limb activity (exercise to < 2-5 kg). This might explain why Phase III of CR is not currently started until 6 weeks after sternotomy. However, different studies have shown that overly restrictive sternal precautions may worsen health conditions as patients can easily lose

muscle and bone mass due to sedentary periods, leading to a higher risk of falls (El-Ansary et al. 2019). Additionally, it has been proven that when coughing or sneezing intrathoracic pressures can increase more than when performing the daily activities that should be avoided. Therefore, current evidence suggests postsurgical guidelines should encourage individualised and progressive upper body activity, focusing on arm range of motion, and muscle strength and endurance to optimise recovery and quality of life (QoL). The approach called “Keep your move in the tube” allows patients to perform movements previously contraindicated.

This approach is based on the ergonomics that shorten the length of the outstretched arm (lever arm reduction). By keeping their upper arms close to their body, as if they were in an imaginary truncal tube, they can perform load-bearing movements but avoid excessive sternal stresses. For non-load bearing activities patients are allowed to move their arms out of ‘the tube’ (Adams et al 2016). The SCAR trial by Ennis et al (2022) used this approach while comparing if starting CR after 2 weeks after sternotomy is as effective and safe as starting 6 weeks after sternotomy which is the routine starting time. Patients completed an individualised 8-weeks programme according to their baseline functional capacity, comorbidities, and postsurgery symptoms and limitations. Upper body exercises as light shoulder and chest mobility were introduced only when patients were able to perform them with minimal discomfort. The study showed that a supervised and individualised CR exercise training starting as early as 2 weeks after sternotomy was as effective as starting at 6 weeks. Therefore, this confirmed that controlled upper body movement, progressive and individualised exercise programme and less restrictive recommendations enhanced better and faster recovery.

Nowadays there is more evidence regarding physical activity and mobility post cardiac surgery but most advice given is still based on expert opinion and uses anecdotal rather than direct evidence. Consequently advice given varies widely between hospitals and rehabilitation centres around the country and indeed the world. Therefore, there is a pressing need for research in this field to enable healthcare professionals to provide effective and safe early cardiac rehabilitation.

## Writing Group

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