

National Heart Foundation of Australia physical activity recommendations for people with cardiovascular disease



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These guidelines are endorsed by the following organisations:



Contents

Executive summary	3
Summary of recommendations	4
Purpose and scope of the recommendations	5
How to use these recommendations	5
Terminology	6
Rating of the evidence for recommendations	7
Summary of evidence and recommendations	8
Background	10
Physical inactivity – burden and disease	10
Benefits of physical activity for people with CVD	10
The evidence for physical activity in the management of CVD	10
Limitations of current evidence	11
Risks associated with physical activity	12
Medico-legal considerations	12
Pre-activity evaluation	12
People who should not engage in physical activity	13
People who require supervision	13
Indications for a person to stop physical activity	13
Evidence and recommendations for physical activity in people with CVD	14
Physical activity and CVD	14
Broad recommendation for management	14
For people with diagnosed CHD	15
Post-discharge ACS – evidence	15
Post-discharge ACS – management	15
Chronic stable CHD – evidence	15
Chronic stable CHD – management	16
Heart failure – evidence	16
Heart failure – management	17
Pacemakers, implantable cardioverter defibrillators, congenital and valvular heart disease	17
For older people with CVD – evidence	17
For older people with CVD – management	18
Stroke, PVD or diabetes – evidence	18
Stroke, PVD or diabetes – management	18

Physical activity and additional risk factors	19
Effects of physical activity on the risk factors for CVD	19
Blood pressure	19
High-density lipoprotein cholesterol and triglyceride concentrations	19
Insulin resistance and glucose tolerance	19
Depression and social isolation	19
Risk factor management	19
Patient implementation	20
Physical activity promotion in general practice	20
Evidence for the promotion of physical activity in general practice	20
Progression and maintenance of physical activity	21
Progression	21
Maintenance	21
Practical/special considerations	21
Resuming sports participation	21
References	22
Appendices	25
Appendix 1	25
Appendix 2	26
Appendix 3	27
Appendix 4	28
Heart Foundation physical activity algorithm for people with stable CVD	30

Executive summary

National Heart Foundation of Australia physical activity recommendations for people with cardiovascular disease

In Australia, insufficient physical activity* is second only to tobacco smoking as the modifiable behavioural risk factor most associated with the burden of disease.¹ The significance of physical inactivity cannot be underestimated in an environment where cardiovascular disease (CVD) is Australia's leading cause of premature death and disability and where the proportion of adult Australians who are not sufficiently active for health benefit increased from 49% to 54% between 1997 and 2000.²

The importance of including lifestyle management in the prevention and treatment of chronic disease has been well recognised by medical practitioners, non-government organisations and governments. In the primary care setting there are a number of initiatives, policies and infrastructure systems to support general practice to deliver lifestyle interventions. This document addresses a gap in the information for physical activity in the management of people with well-compensated clinically stable CVD.

The purpose of these recommendations is to provide general practitioners (GPs) and physicians with evidence-based physical activity information for specific, stable cardiovascular conditions. These conditions include coronary heart disease (CHD), heart failure, stroke and peripheral vascular disease (PWD). The provision of accurate, safe physical activity advice by doctors to people with CVD, if followed, should improve individual health outcomes. The impact of physical activity on co-existing risk factors such as blood pressure, lipid profile, overweight and obesity, insulin resistance, depression and social isolation in

The recommendations were developed using an evidence-based consensus approach under the guidance of an expert working group and through a process of national consultation with other major stakeholders. A principal task in this process was to conduct a literature review that focused on key publications since the 1996 US Surgeon General's Report on 'Physical activity and health'.³

This document is structured to present evidence of the benefit for physical activity for each diagnostic category, which is followed by evidence-based management recommendations. The recommendations provide a general framework for appropriate practice, subject to the medical practitioner's judgment (or assessment) of each case.

Health professionals directly involved with recommending or monitoring physical activity levels for people with CVD may also find this document to be an invaluable resource.

The highest level of evidence for the recommendations is for CHD and heart failure followed by diabetes, PWD, stroke and other cardiac conditions (e.g. valvular heart disease and implantable cardiac devices).

* 'Sufficient' physical activity is at least 150 minutes of moderate-intensity activity accrued over at least five sessions (of 10 minutes or more) in the previous 7 days.

Summary of recommendations

The National Heart Foundation of Australia recommends that to benefit health, people with CVD should aim, over time, to include 30 minutes or more of moderate-intensity physical activity on most, if not all, days of the week. The amount of activity can be accumulated in short bouts; such as three 10-minute sessions each day. A person's current level of activity, the severity of their cardiovascular condition, co-morbidities and personal preferences should determine the approach and rate of progress towards these goals.

It is recommended that:

- doctors and clinicians should routinely provide brief, appropriate, written physical activity advice to people with well-compensated, clinically stable CVD
- survivors of a recent cardiovascular event should be offered participation in supervised[†] exercise rehabilitation where available and practical

- well-compensated, clinically stable people with CVD, including those with implantable cardiac devices, congenital and valvular heart disease, should progress over time to the recommended dose
- people with advanced CVD or severely impaired functional capacity may have to down-regulate the recommended dose of physical activity
- people who have recently had surgery, or angioplasty ± stenting for CVD, should take into consideration the implications of the surgery/procedure when commencing physical activity
- unless contraindicated, all people with PVD or diabetes and survivors of a stroke with sufficient residual function should progress over time to the recommended dose.

Additionally, well-compensated, clinically stable people with CVD are likely to gain additional muscle fitness from light to moderate resistance activities.

[†] 'Supervised by a trained health professional with a degree, diploma, or certificate of registration in medicine, nursing, or other allied health professional or Aboriginal and Torres Strait Islanders health worker, with additional training or work experience encompassing adult education principles and physical activity programs, as described in the National Heart Foundation of Australia & Australian Cardiac Rehabilitation Association Recommended Framework for Cardiac Rehabilitation 2004.'

Purpose and scope of the recommendations

The case for reducing future CVD risk in those with the disease is compelling. The Heart Foundation recognises the importance of what are often referred to as 'lifestyle changes' – such as increased physical activity, a balanced approach to nutrition, moderation in alcohol consumption and smoking cessation – as legitimate management strategies following diagnosis of CVD.

These recommendations provide GPs and physicians with evidence-based physical activity information for specific, well-compensated, clinically stable cardiovascular conditions. For the purposes of this document such conditions include CHD, heart failure, stroke and PVD. Persons with a pacemaker, implantable cardioverter defibrillator, congenital or valvular heart disease and/or diabetes are also briefly considered.

The recommendations are not a comprehensive review of the literature; rather they are based on key national and international scientific publications since the US Surgeon General's Report of 1996. They combine the population health and clinical evidence into one document for the benefit of GPs, physicians and other clinicians involved in recommending or promoting physical activity for people with well-compensated, clinically stable CVD.

How to use these recommendations

These recommendations provide a general framework for appropriate practice to be followed, subject to the medical practitioner or clinician's judgment in each individual case. They underpin the doctor/patient interface summary document[‡] and can be read in conjunction with other reference materials such as the Heart Foundation's best-practice guidelines. For more detailed prescriptive exercise advice refer to other resource material.^{4,5,6,7}

[‡] See page 30 or download at <http://www.heartfoundation.com.au>

Terminology

Physical activity	Any bodily movement produced by skeletal muscles that result in energy expenditure [§]
Exercise	The systematic execution of physical activity for a specific purpose
Physical fitness	A marker of the ability to perform physical activity
Dose	The total amount of energy expended in physical activity
Intensity	The rate of energy expenditure during physical activity
Low/light intensity	Physical activity associated with a slight increase in breathing rate
Moderate intensity	Physical activity associated with a moderate, noticeable increase in the depth and rate of breathing while still being able to whistle or talk comfortably
Vigorous intensity	Physical activity associated with a marked increase in depth and rate of breathing (puffing and panting), unable to whistle or talk. This level of activity is not routinely recommended for people with CVD
Mode	Type of physical activity
Frequency	The number of times physical activity is performed in a given time period (e.g. day, week)
Duration	The time in minutes of each bout of physical activity
Endurance activity	Rhythmic, repetitive physical activity that substantially increases energy expenditure over an extended duration
Resistance activity	Range-of-movement muscular activity against a light to moderate resistance (e.g. lifting weights)
Well-compensated, clinically stable condition	Persons with CVD receiving appropriate pharmacotherapy without evidence of new or progressive signs or symptoms indicative of clinical deterioration
Acute coronary syndrome (ACS)	A broad spectrum of clinical presentations, spanning ST elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (non-STEMI) through to an accelerated pattern of angina without evidence of myonecrosis ⁸
Advanced CVD or severely impaired functional capacity	People with CVD who are symptomatic with minimal exertion or at rest (NYHA Functional Class III and IV respectively) and/or whose left ventricular function is at least moderately impaired

[§] Definitions for physical activity and exercise taken from NHFA Physical activity for people with heart disease, 1999.

Rating of the evidence for recommendations

Evidence is graded according to the National Health and Medical Research Council (NHMRC)

Levels of evidence and grades of recommendation

Level of evidence*	Study design	Grade of recommendation**	Description
I	Evidence obtained from a systematic review of all relevant randomised controlled trials.	A	Rich body of high-quality RCT data.
II	Evidence obtained from at least one properly designed randomised controlled trial.	B	Limited body of RCT data or high-quality non-RCT data.
III-1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).	C	Limited evidence.
III-2	Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies, or interrupted time series with a control group.	D	No evidence available – panel consensus judgment.
III-3	Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group.		
IV	Evidence obtained from case series, either post-test or pre-test and post-test.		

RCT = randomised controlled trial

* National Health & Medical Research Council. A guide to the development, implementation and evaluation of clinical practice guidelines. Canberra: NHMRC, 1999.

** Adapted from US National Institutes of Health. Clinical Guidelines on the identification, evaluation and treatment of overweight and obesity in adults: executive summary. Expert Panel on the identification, evaluation and treatment of overweight in adults. Am J Clin Nutr 1998; 68: 899-917.

Summary of evidence and recommendations

Evidence	Level of evidence*	Recommendations	Grade
Brief physical activity advice from primary carers is effective in increasing levels of physical activity.	II	Doctors and clinicians should routinely provide brief, appropriate, written physical activity advice to patients with well-compensated clinically stable CVD.	B
Exercise rehabilitation soon after an ACS event or coronary revascularisation is effective in accelerating functional capacity and lowering subsequent risk for cardiovascular events.	I	Well-compensated, clinically stable recent (<2/52) survivors of a myocardial infarction (MI), unstable angina pectoris (UAP), coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI), should be offered and, where available, participate in a short period (up to 12 weeks) of supervised exercise rehabilitation.	A
Habitually physically active older men with CVD have a lower risk of all-cause and cardiovascular mortality.	III-2	Well-compensated, clinically stable people with CVD should progress over time to 30 minutes or more (all together or in shorter bouts), of up to moderate-intensity physical activity on most, if not all, days of the week. Those with advanced CVD may have to down-regulate the recommended dose.	B
Regular physical activity increases the functional capacity of people with heart failure.	I	Well-compensated, clinically stable people with heart failure should progress over time to 30 minutes or more (all together or in shorter bouts), of up to moderate-intensity physical activity on most, if not all, days of the week.	A
Regular physical activity increases the functional capacity of people with implantable cardiac devices, congenital or valvular heart disease.	IV	Well-compensated, clinically stable people with valvular heart disease, congenital heart disease or implantable cardiac devices should progress, over time, to 30 minutes or more (all together or in shorter bouts), of up to moderate-intensity physical activity on most, if not all, days of the week.	D

Evidence	Level of evidence*	Recommendations	Grade
Older habitually physically active people with CVD show improved functional capacity and mental wellbeing.	II	Unless contraindicated, all older people with CVD should progress, over time, to 30 minutes or more (all together or in shorter bouts), of moderate-intensity physical activity on most, if not all, days of the week.	B
Regular physical activity improves functional capacity among people with stroke, PVD or diabetes.	II	Unless contraindicated, all people with PVD, diabetes and stroke survivors with sufficient residual function should progress over time to 30 minutes or more (all together or in shorter bouts) of up to moderate-intensity physical activity on most, if not all, days of the week.	B
Prescriptive light to moderate resistance activity is safe and improves muscle fitness among people with CVD.	II	Well-compensated, clinically stable people with CVD should initiate resistance activity under supervision by a trained health professional.	B

Background

Physical inactivity – burden and disease

Each year, 8,000 deaths with annual direct costs conservatively estimated at \$377 million can be attributed to physical inactivity.⁹ Physical inactivity is a major modifiable risk factor that is impacting on the health of all Australians, accounting for 6.7% of the total disease burden attributable to risk factors.¹ Insufficient physical activity is the primary modifiable behavioural risk factor associated with disease burden in women, and is second only to tobacco smoking for men.

Australia has experienced major falls in CVD death rates over the past 30 years and this has mainly been due to advances in the treatment and care of heart, stroke and vascular diseases.² Despite this improvement, heart, stroke and vascular diseases remain Australia's leading cause of premature death and disability. Also of concern is the trend that has seen the proportion of adult Australians who are not sufficiently active for health benefit increase from 49% to 54% between 1997 and 2000.²

Benefits of physical activity for people with CVD

All people with CVD can benefit from habitual and regular physical activity unless otherwise contraindicated.¹⁰ Research shows that regular endurance physical activity produces cardiovascular adaptations that increase work capacity, endurance and vascular function.⁴ Further, resistance activity can improve muscular strength.¹¹ Regular physical activity may improve an individual's cardiovascular risk profile by lowering blood pressure, modulating lipids, reducing insulin resistance, managing unhealthy body weight and enhancing psychosocial status/mental wellbeing. Habitual physical activity also reduces the risk of developing CHD and ameliorates symptoms in those with the disease.

There is also evidence that habitual physical activity reduces the risk of developing numerous chronic diseases, including CVD, type 2 diabetes, osteoporosis, obesity, depression, and breast and colon cancer.¹²

In the sections that follow, specific information about the evidence for physical activity in the management of CVD, the risks associated with physical activity, medico-legal considerations, contraindications to physical activity, pre-evaluation and specific recommendations for increasing activity are outlined. It is important to remember that regular moderate physical activity should be part of an overall approach to risk factor modification incorporating smoking cessation, healthy eating, managing depression and social isolation, while treating biomedical risk factors such as dyslipidaemia, high blood pressure and diabetes.

The evidence for physical activity in the management of CVD

Regular physical activity incorporating large muscle groups (such as walking, cycling and swimming and, in certain circumstances, resistance work) is instrumental in the prevention and treatment of heart, stroke and PVD.^{4,11,13} Associated benefits of regular physical activity for those with CVD include:

- augmented physiological functioning and improved quality of life⁴
- a survival benefit with exercise training among patients with heart failure,¹⁴ with further studies required⁷ to confirm these data
- further research is required to elucidate potential survival benefits with physical activity for older patients with CHD.⁴

Figure 1: Potential cardioprotective effects of regular physical activity¹

Anti-atherosclerotic	Psychological	Anti-thrombotic	Anti-ischaemic	Anti-arrhythmic
Improves lipids	↓ Depression	↓ Platelet adhesiveness	↓ Myocardial O ₂ demand	↑ Vagal tone
↓ Blood pressure	↓ Stress	↑ Fibrinolysis	↑ Coronary flow	↓ Adrenergic activity
Reduces adiposity	↑ Social support	↓ Fibrinogen	↓ Endothelial dysfunction	↑ HR variability
↑ Insulin sensitivity		↓ Blood viscosity		
↓ Inflammation				

¹ Moderate ≥ 55% maximum heart rate.

Reproduced with permission of Franklin B, et al. Fitness and mortality in the primary and secondary prevention of coronary artery disease: Does the effort justify the outcome? Am J Med Sports. 2004;6:23–7. © 2004 by Le Jacq Communications, Inc.

In a Cochrane review,¹⁵ regular endurance physical activity in patients following an acute coronary syndrome (ACS) event, coronary revascularisation or with angiographic coronary disease provided a 27% (95% CI; 2% to 40%) reduction in total mortality and 31% (95% CI; 6% to 49%) decline in cardiac mortality.

Limitations of current evidence

Functional and quality of life gains aside, the survival benefits of habitual physical activity for people with CVD are largely drawn from studies based on exercise training involving mostly men engaging in light to moderate-intensity physical activity, with varying degrees of supervision, and ongoing medical review. The majority of these studies pre-date the recent major interventional and pharmacological advances in CVD management. Further research is warranted to confirm the survival benefit of regular physical activity in those people with established CVD receiving contemporary medical therapy.

Risks associated with physical activity

It is well established that the benefits of moderate-intensity physical activity outweigh the risks. The most common risk associated with physical activity in the general population is musculoskeletal injury,¹⁶ with a particularly low estimated prevalence of injury for walking, gardening and cycling.¹⁷

The risk of a major or fatal cardiac event occurring among participants attending supervised cardiac rehabilitation programs in the United States is estimated to be 1 for every 117,000 and 750,000 hours of participation in physical activity, respectively.¹⁸ People with CVD, who are least physically active and/or are performing above the physical activity dose recommended, are more likely to experience a recurrent cardiovascular event compared with compliers.^{18,19,20} Typically, injury risk and the risk of a cardiovascular event can be reduced if the dose of physical activity is increased gradually over time.⁴

In healthy people the greatest health improvements occur when a person of any age moves from participating in little or no regular physical activity to undertaking regular light to moderate-intensity physical activity.²¹ The same may also be true of persons with CVD. Nevertheless, it is important to tailor physical activity to an individual's co-morbidities, including diminished functioning associated with prolonged immobilisation and in older persons with reduced muscle mass, muscle strength, muscle power, balance, flexibility and sensory function.

Medico-legal considerations

This document is intended to assist GPs in providing specific evidence-based physical activity advice to their patients with well-compensated, clinically stable CVD. Where GPs feel unable to provide detailed advice, they may of course refer patients to tertiary services.

Pre-activity evaluation

A detailed clinical assessment prior to recommending low to moderate physical activity is generally unwarranted and counterproductive. The extent of a pre-activity evaluation depends on the intensity of anticipated physical activity and on the person's symptoms, signs, overall CVD risk, clinical CVD and other co-morbidities. Any pre-activity evaluation should involve a medical review, physical examination and a history of physical activity to ensure there is no contraindication to becoming more active. Further, patients should be taking relevant

pharmacological therapies and reducing their overall coronary risk profile in accordance with national guidelines.¹⁰ It is not necessary that individuals starting a low to moderate progressive program of physical activity perform an exercise tolerance test.⁴

If there is uncertainty about the safety of physical activity, or for those aspiring to regular vigorous exercise, exercise testing with echocardiography or radionuclide scintigraphy should be considered.²²

People who should not engage in physical activity

People with any of the following contraindications should not engage in physical activity without medical review prior to commencing physical activity:²³

- unstable angina
- symptoms such as chest discomfort and shortness of breath on low activity
- uncontrolled cardiac failure
- severe aortic stenosis
- uncontrolled hypertension or grade 3 (severe) hypertension e.g. systole ≥ 180 and diastole ≥ 110 mmHg
- acute infection or fever, or feeling unwell (not limited to but including acute myocarditis or pericarditis)
- resting tachycardia and/or arrhythmias
- uncontrolled diabetes
- change in clinical status (e.g. symptoms occurring at lower levels of exertion or at rest)
- diabetes with poor blood glucose level control e.g. <6 mmol/L or >15 mmol/L.

People who require supervision

Those with advanced CVD, who are psychologically impaired by the disease or who request group support will benefit most from a time-limited period of supervised cardiac or exercise rehabilitation incorporating endurance and resistance activity. A short period of supervision (up to 12 weeks) may be beneficial to reduce anxiety, monitor symptoms/arrhythmias and establish appropriate physical-activity intensity following an acute cardiac event or coronary revascularisation. The recommendation for supervision may also apply to survivors of stroke and to those with diabetes or PVD.

Direct supervision with or without electrocardiographic monitoring of moderate-intensity physical activity is not necessary for the majority of people with CVD.

Indications for a person to stop physical activity

Clinical advice should be given to stop physical activity if any of the following occur:²³

- squeezing, discomfort or typical pain in the centre of the chest or behind the breastbone \pm spreading to the shoulders, neck, jaw and/or arms
- symptoms reminiscent of previous myocardial ischaemia
- dizziness, light-headedness or feeling faint
- difficulty breathing
- nausea
- uncharacteristic excessive sweating
- palpitations associated with feeling unwell
- undue fatigue
- leg ache that curtails function
- physical inability to continue
- for people with diabetes: shakiness, tingling lips, hunger, weakness, palpitations.

People who experience these signs or symptoms should be advised to follow their chest pain/discomfort or diabetes management plan or discontinue physical activity until reviewed by their GP.

All people with CHD and/or diabetes should be provided with a written action plan for chest pain/discomfort or diabetes symptom management (Appendices 1, 2). It should document a stepwise course of action to managing symptoms, in particular if exercise-induced.¹⁰

To maximise the safety and benefits of physical activity, the GP, when advising physical activity, should re-state:

- the risks and benefits of physical activity for the individual
- the importance of keeping intensity at or below a moderate level
- the importance of following the chest pain/discomfort and/or diabetes symptom management plan.

Evidence and recommendations for physical activity in people with CVD

Physical activity and CVD

Increased physical activity in people with well-compensated, clinically stable CVD offers:

- diminution of symptoms
- improved functional capacity
- enhanced coronary reactivity
- decreased use of medication
- greater mental wellbeing
- enhanced quality of life
- in the case of acute coronary syndrome survivors, a reduction in cardiovascular mortality.¹⁵

The greatest potential for functional benefits is in those people who were least active prior to commencing regular physical activity, and these benefits may be achieved even at relatively low levels of physical activity.⁴

Broad recommendation for management

The National Heart Foundation of Australia (NHFA) recommends that, over time, people with established CVD should aim to achieve 30 minutes or more of moderate-intensity physical activity (such as brisk walking) on most, if not all, days of the week. The amount of activity can be accumulated in shorter bouts, such as three 10-minute sessions. Where appropriate, this recommendation has been modulated for specific cardiovascular conditions, the habitually inactive and those with low physical fitness. These functionally diminished groups typically commence with even shorter bouts of activity, punctuated with frequent rest periods. In particular, those with advanced CVD may not tolerate the recommended dose.

Resistance activity is well accepted in developing and maintaining muscular strength, endurance, power and muscle mass among healthy adults.

There is increasing recognition that low to moderate-level resistance activity improves muscular strength and endurance, and enhances mental wellbeing in well-compensated, clinically stable people with CVD.^{5,11,24} Responses to resistance activity are largely determined by the relative intensity of physical activity and are no greater than those experienced during endurance physical activity at a similar relative intensity.²⁵ Importantly, low to moderate-intensity resistance activity provides people with CVD the physical strength and self-confidence to perform most activities of daily living.

Level of evidence II; grade of recommendation B

Additional research is warranted to establish the efficacy of resistance training in non-supervised settings and to elicit other physiological and metabolic benefits among those with CVD.

Resistance activity is best initiated under the supervision of a trained health professional where, according to clinical status, direction can be given with its introduction and progression.

For people with diagnosed CHD

Post-discharge ACS – evidence

Survivors of acute myocardial infarction (AMI) are usually progressed through a staged walking or equivalent activity schedule according to their clinical status, personal preference and functional limitations. (See Recommended Framework for Cardiac Rehabilitation 2004 for more detail⁶.) Over time, attainment of daily low to moderate physical activity for at least 30 minutes is recommended during this post-discharge recovery phase. Where available or indicated, this goal may be achieved at a healthcare facility under the supervision of a trained healthcare professional. The benefit to survivors of AMI is accelerated functional improvement, enhanced quality of life and surveillance during recovery, while lowering subsequent risk for cardiovascular events.

Level of evidence I; grade of recommendation A

Post-discharge ACS – management

The recommended physical activity schedule will depend on the patient's clinical condition. If appropriate, advise patients to continue any physical activity program that was given in hospital or from a cardiac procedures centre. When tailoring physical activity advice for these patients, consideration should be given to the implications of the surgery/procedure when commencing physical activity. It is also recommended that for post-surgical patients who suffer wound complications and/or sternal movement, their physical activity should be reviewed by the treating surgical team. Those who have undergone angioplasty ± stenting should be advised to curtail any structured physical activity for several days, or longer in the case of a large post-procedural hematoma. All post-discharge ACS patients should be advised to ambulate at home within their musculoskeletal pain-free range.

Level of evidence IV; grade of recommendation D

It is recommended that patients attend supervised exercise rehabilitation where this is available.

Level of evidence I; grade of recommendation A

Survivors of ACS who have undergone successful coronary stenting and with little or no residual left ventricular impairment may undertake an accelerated physical activity schedule, particularly if habitually active.

Level of evidence IV; grade of recommendation D

Notwithstanding a change in clinical status, most patients should be encouraged towards achieving the recommended dose.

A typical walking program for AMI survivors is shown in the text box.

Week	Minimum time (minutes)	Times per day	Pace
1	5–10	2	Stroll
2	10–15	2	Comfortable
3	15–20	2	Comfortable
4	20–25	1–2	Comfortable/stride out
5	25–30	1–2	Comfortable/stride out
6	30	1–2	Comfortable/stride out

NHFA Physical activity after heart attack and surgery, 2003.

Chronic stable CHD – evidence

Physical activity is effective in reducing all-cause mortality among well-compensated, clinically stable MI survivors, following CABG surgery or PCI, with angina pectoris, or with coronary artery disease (CAD) identified by angiography.¹⁵ Regular physical activity alone reduced mortality by 27% (95%CI; 2% to 40%).

Level of evidence 1; grade of recommendation B

Typically, people who are well conditioned experience reduced myocardial oxygen demand at rest and for any level of submaximal work. Peak oxygen uptake also increases. Thus, exercise conditioning allows people with CHD to:

- function further from their ischaemic threshold
- increase their submaximal endurance time to the onset of symptoms and improve overall capacity.⁶

Chronic stable CHD – management

All people with CHD are considered to be at high absolute risk of recurrent cardiovascular events compared with those without disease. People with advanced CHD, defined as having at least moderate left ventricular impairment and symptomatic with minimal exertion or at rest,²⁶ have the highest rate of recurrent events.

Physical activity management and recommendations are presented firstly for people with well-compensated stable CHD and then for those with advanced CHD.

People with well-compensated stable CVD

- Aim for the recommended dose of physical activity.

Level of evidence I; grade of recommendation B

Commence with multiple short duration (5–10 minute) sessions of low to moderate-intensity physical activity (e.g. comfortable walk on a flat or gentle slope) interspersed with short rest periods. Gradually increase the session duration; thereafter lift intensity to moderate until the recommended dose is achieved. Note that people who were physically active immediately prior to developing CHD may commence at an increased dose and progress more expeditiously.

People with advanced CHD

- Progress towards the recommended dose of physical activity subject to achieving lower dose (low intensity, shorter duration, less frequently) and interim targets.

Level of evidence IV; grade of recommendation D

Commence with multiple short duration (2–10 minute) sessions of light-intensity physical activity (e.g. stroll on flat ground) interspersed with regular rest periods, on alternate days. Gradually increase the session duration or frequency (through the day and number of days) of light physical activity, as tolerated, towards accumulating 30 minutes on most days. Those with advanced heart disease will inevitably progress more slowly, taking many weeks to achieve interim targets. Initially, the emphasis should be centred on frequency and duration, followed by intensity once interim targets are met.

Heart failure – evidence

Heart failure relates to the inability of the heart to meet the metabolic demands of the tissues, which results in symptoms of fatigue or dyspnoea on exertion, progressing to dyspnoea at rest. Evidence-based definitions of chronic heart failure (CHF) are available in *Guidelines for the prevention, detection and management of people with chronic heart failure in Australia 2005*.²⁷

From the available evidence, physical activity conditioning, inclusive of resistance training, appears safe for people with well-compensated, clinically stable heart failure, with no deaths reported in over 60,000 patient-hours of exercise training.⁷ Different trials incorporating differing doses of exercise for people with heart failure have reported the following improvements:

- a mean increase in peak oxygen consumption (peak $\dot{V}O_2$) of 20% (range 12% to 31%)²⁸

- exercise training for people with heart failure predominantly affects peripheral adaptations,^{29,30} with some limited evidence for an improvement in cardiac function³¹
- exercise training has also been associated with amelioration of symptoms²⁸ and enhancement of psychosocial functioning.³²

Level of evidence I; grade of recommendation A

Further, findings from a recent meta-analysis indicate improved clinical outcomes in CHF patients who are physically active, especially if they adhere to physical activity for more than 28 weeks, are older or more deconditioned with advanced disease (New York Heart Association [NYHA] III–IV; Appendix 3).¹⁴

Heart failure – management

The functional ability of people with heart failure varies greatly, and is poorly correlated with resting ejection fraction,^{33,34} necessitating the modulation of the recommended dose.

- People with NYHA Functional Class I or II: these people with heart failure should progress gradually, as tolerated, to at least 30 minutes (continuously or in intervals of exercise) of up to moderate-intensity physical activity on most, if not all, days of the week.
- People with NYHA Functional Class III or IV: Class III people will require shorter intervals of activity at lower intensity, with more frequent rest days. Class IV people should be encouraged to undertake gentle mobilisation as symptoms allow.
- Regular physical activity for people with symptomatic heart failure is best initiated under the supervision of a trained exercise professional where, according to clinical status, direction can be given with its introduction, progression and maintenance, and where levels of supervision increase as functional class deteriorates.

- Importantly, deterioration in a person's clinical status may necessitate a reduction, including brief abstinence, in the dose of physical activity until clinical stability is achieved.

Level of evidence IV; grade of recommendation D

Pacemakers, implantable cardioverter defibrillators, congenital and valvular heart disease

Consensus expert opinion underpins that persons with any of the above cardiac conditions aim for the recommended dose of physical activity, recognising down-regulation where appropriate to meet the needs and clinical status of the individual.

Level of evidence IV; grade of recommendation D

For older people with CVD – evidence

The prevalence of CVD is highest among older Australians.² Older men with heart disease show improved functional capacity and mental wellbeing from engaging in regular physical activity.^{35–37}

Exercise therapy in these studies was reported as being safe, without significant complications or adverse outcomes. Similarly, regular low to moderate exercise is safe in older people with well-compensated, clinically stable heart failure.³⁸

Level of evidence II; grade of recommendation B

Whether exercise training improves survival among the elderly with CHD is unclear. In the British Regional Heart Study, older men with CHD who undertook low to moderate physical activity had significantly lower all-cause mortality over the 5-year follow-up than their sedentary controls.³⁹

Level of evidence III-2; grade of recommendation C

For older people with CVD – management

Consider modifying the dose to include low to moderate intensity and emphasise multiple shorter bouts daily. Older people with heart disease or co-morbidities will inevitably progress more slowly, and may take many weeks to achieve interim targets. Initially, the emphasis should be centred on frequency (through the day and number of days), followed by increasing duration.

Level of evidence IV; grade of recommendation D

Consideration should be given to any continuing neurological deficits or co-morbidities when tailoring physical activity advice for a stroke survivor.⁴² Secondary mediators of physical activity participation include depression, family/career support, post-stroke fatigue and cultural issues.⁵

Level of evidence II; grade of recommendation B

Stroke, PVD or diabetes – evidence

Regular moderate physical activity has been recognised as an essential therapy to assist with risk reduction for the prevention and treatment of stroke,⁵ diabetes⁴⁰ and PVD.¹³ It is well recognised that people with PVD and diabetes, as well as stroke survivors, will benefit from modification of multiple risk factors through a combination of intensive lifestyle interventions and pharmacotherapy.

Currently, there are no Australian prevalence data for PVD. However, between 1993–94 and 2001–02 there was a 21.4% increase in the age-standardised hospitalisation rate for PVD, with 24,288 hospitalisations for PVD in 2001–02.² Recent high-quality literature reviews of people with exercise-induced claudication demonstrated that progressive physical activity is an effective treatment for improving walking distance.^{4,13}

Level of evidence II; grade of recommendation B

Based on measured blood glucose levels, about 945,600 Australians aged 25 years and over (7.6% of the population) had diabetes in 1999–2000.² People with either type 1 or type 2 diabetes of all ages, with good glycaemic control and free of complications, benefit from accumulating 30 minutes or more of moderate physical activity on most if not all days of the week.⁴³ The presence of macro- and microvascular complications may necessitate down-modulation of the recommended dose to minimise further problems inherent to this condition.

Level of evidence II; grade of recommendation B

Stroke, PVD or diabetes – management

Physical activity recommendations for stroke survivors with sufficient residual function are equivalent to the general dose recommendation. For the more than 40,000 Australians who suffer a stroke each year, approximately one-third will make a complete recovery; a third will die within 12 months; and the remaining survivors will be permanently disabled, with some degree of paralysis of one side of the body, difficulty in communicating, or a range of other problems that may affect their quality of life and their ability to function in society.⁴¹

Physical activity and additional risk factors

Effects of physical activity on the risk factors for CVD

Physical activity favourably alters a number of established atherosclerotic risk factors, including elevated blood pressure, raised triglyceride concentrations, low high-density lipoprotein cholesterol (HDL-C) concentrations, insulin resistance and glucose intolerance, and obesity. Evidence is also emerging for physical activity as a treatment for depression and social isolation in patients following AMI.⁴⁴ The effect size of physical activity on individual risk factors is modulated by the dose of activity, individual variation and any accompanying reductions in body mass secondary to kilojoule restriction. Importantly, the influence of physical activity on cardiovascular risk factors is transient, with expedited diminishing effect following cessation of physical activity. Further, more substantial changes to these biomedical risk markers are likely to be achieved with appropriate concomitant pharmacological therapy.

Blood pressure

Blood pressure lowering effects of endurance physical activity is largest in those people with hypertension, declining approximately 5 and 7 mmHg systole and diastole, respectively.⁴⁵

Level of evidence I; grade of recommendation B

Similar reductions in blood pressure lasting for many hours have also been demonstrated among hypertensive people following an isolated exercise session.⁴⁶

High-density lipoprotein cholesterol and triglyceride concentrations

A meta-analysis of studies involving adults who participated in at least moderate-intensity aerobic physical activity for >12 weeks showed an average increase in HDL-C levels of 4.6% and reductions in triglyceride of 3.7%.⁴⁷

Level of evidence I; grade of recommendation A

Insulin resistance and glucose tolerance

There is accumulating evidence that physical activity, especially when accompanied by weight loss, reduces insulin resistance and glucose intolerance.⁴⁰

Level of evidence II; grade of recommendation B

Physical activity can also be the basis for achieving and maintaining a healthy weight in persons with diabetes.⁴⁸

Depression and social isolation

Depression and social isolation have recently been identified as independent risk factors for the prognosis of CHD.⁴⁹ The increased risk contributed by these psychosocial factors is of similar order to the more conventional CHD risk factors such as smoking, physical inactivity, dyslipidaemia and hypertension.

The merit of habitual physical activity in managing depression and social isolation in those with CVD is largely unknown. However, the landmark Recovery in Coronary Heart Disease (ENRICHD) trial⁴⁴ demonstrated potential value in that regular physical activity, combined with conventional medical management, improved mental health outcomes in depressed and socially isolated patients recovering from AMI.

Level of evidence IV; grade of recommendation D

Risk factor management

People with stable CVD and with coronary risk factors modifiable by physical activity should be encouraged to aim to achieve the recommended activity dose, co-morbidities notwithstanding.

Level of evidence IV; grade of recommendation D

Patient implementation

Physical activity promotion in general practice

General practice is an important setting for promoting physical activity, given its population-wide access by people of all ages. In 2002, 85% of the Australian population attended a GP at least once.⁵⁰ GPs are regarded as a reliable source of health information, and the consultation represents a unique opportunity to provide personalised counselling on behaviour change. Many of the patients with chronic conditions that GPs and practice nurses regularly see will benefit from being more physically active. A recent study of Australian doctors has shown that GPs feel it is part of their role to discuss physical activity with their patients and increase their patients' activity levels.⁵¹

Future opportunities for implementation exist with government, non-government organisations and industry for lifestyle initiatives. For people with cardiovascular conditions, the chronic disease management framework is one such opportunity where physical activity can be incorporated as a management strategy. The integrated approach to chronic disease management and the recent advances in information technology and medical software development will enable the seamless incorporation of lifestyle interventions into the medical treatment and prevention of chronic conditions. CVD is just one of many conditions that will benefit from this approach.

Evidence for the promotion of physical activity in general practice

Currently there are three reviews of physical activity interventions delivered through general practice.⁵²⁻⁵⁴ They conclude that brief physical activity interventions involving verbal advice, in combination with supporting written material, can lead to modest (up to 10%) short-term increases in physical activity participation.⁵⁵ The practical application can be achieved through the '5 As' approach identified in Appendix 4. This combines motivational interviewing with a tailored approach to increasing an individual's level of physical activity.

Progression and maintenance of physical activity

Progression

People commencing activity for the first time or re-establishing activity after a period of sedentarism should be encouraged to build up gradually to the recommended dose. Progression of physical activity will be slower for those with advanced CVD or co-morbidities. Initially, the emphasis should be centred on frequency (through the day and number of days) followed by duration. Having achieved at least 30 minutes on most and preferably all days of the week, consideration may be given to progressing to moderate-intensity activity. Progressing physical activity too quickly carries an increased risk of injury, particularly of the musculoskeletal system.

Maintenance

GPs can play a pivotal role with a person's adherence to physical activity. Having achieved the recommended dose, people should be actively encouraged and supported to continue the habit. Missing an occasional day each week is understandable and there is no need to play catch-up. If for any reason a person's habitual physical activity is curtailed for several weeks it is prudent to resume at a lower intensity and for a shorter duration. Longer disruptions associated with progression of disease or new co-morbidities will require greater modulations in intensity, duration and frequency, including brief abstinence in some cases.

Practical/special considerations

During physical activity, everyone should be advised to:

- maintain adequate hydration prior, during and following physical activity. People on fluid restrictions and diuretics may be required to increase their level of hydration slightly or reduce their diuretic dose, especially during warmer times of the year. In this event care should be taken to closely monitor body weight and changes in signs and symptoms suggestive of peripheral/pulmonary oedema.

- wear comfortable footwear and loose clothing suitable for the prevailing conditions. They should also be advised to apply sunscreen and wear a hat when undertaking physical activity outdoors.
- curtail the time and intensity of physical activity during temperature extremes, including high humidity.
- refrain from drinking alcohol prior to accumulating the day's physical activity and from consuming a large meal in the hours immediately prior to activity.
- take medicines as prescribed, with particular consideration given to anti-anginal medicines timed for optimal therapeutic benefit during physical activity.

Resuming sports participation

Those people with well-compensated, clinically stable CVD interested in beginning or resuming competitive sport should discuss the appropriateness of such actions with their medical practitioners. Part of the assessment should include identifying the intensity level of the sport, the person's current level of physical activity and physical activity history, and any additional cardiovascular or other co-morbidity that may impact on their ability to safely participate.

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Appendices

Appendix 1

Chest pain/discomfort action plan

Always carry your nitrate medication when you engage in physical activity.

If you develop angina, chest pains or discomfort while doing physical activity, you should:

1. Stop and rest immediately
2. If rest does not bring rapid relief of the chest pain/discomfort, take your nitrate medication (e.g. 'Anginine' or 'Isordil' sub-lingual tablets placed under your tongue or 'Nitrolingual' spray) and if the pain/discomfort goes away with rest and 1 tablet or spray, then
3. Inform your doctor as soon as possible about this episode of chest pain/discomfort.

If the pain/discomfort does not go away with rest and 1 tablet or spray, then:

4. The dose of nitrate medication may be repeated 5 minutes after the initial dose
5. If symptoms are not relieved completely within 10–15 minutes by medication and rest, call 000 for an ambulance immediately, and rest quietly while waiting for transport or assistance – regard this pain/discomfort as a heart attack
6. Take aspirin (150–300 mg) unless your doctor has advised you not to take it.

Note: in particular circumstances where an ambulance is not readily available, such as in a rural environment:

- Quickly notify the nearest hospital, health clinic or doctor for advice, and
- It may be appropriate to arrange for someone to drive you to the hospital.

Appendix 2

General physical activity safety advice for people with diabetes

- Instruct patients to check their blood glucose level (BGL) before, during and after prolonged physical activity if using insulin or oral insulin secretagogue for extra carbohydrate needs and/or delayed hypoglycaemia**
- Advise patients on how to prevent or manage hypoglycaemic events, including potential post-exercise hypoglycaemia (i.e. need for carbohydrates and fluids)
- Advise patients against physical activity if they are unwell or if their BGL is elevated, e.g. >15 mmol/L
- Advise patients to carry a rapid-acting sugar source at all times, e.g. jelly beans
- Advise patients that if their pre-exercise BGL is <6 mmol/L, to eat before engaging in physical activity, e.g. sandwich, fruit
- Advise patients to wear correct supportive footwear
- Advise patients to check their feet after physical activity for blisters, warm areas or redness.

** Active practice: taking the lead in prescribing physical activity. Moderator's Guide, National Heart Foundation of Australia, NSW Division, December 2003

Appendix 3

New York Heart Association grading for heart failure^{††}

NHYA grading		Metabolic equivalent [#]
Class I	No limitations. Ordinary physical activity does not cause fatigue, dyspnoea or palpitations (asymptomatic left ventricular dysfunction)	>7
Class II	Slight limitation on physical activity. Ordinary physical activity results in fatigue, palpitations, dyspnoea or angina pectoris (mild CHF)	5
Class III	Marked limitation on physical activity. Less than ordinary physical activity leads to symptoms (moderate CHF)	2–3
Class IV	Unable to carry on any physical activity without discomfort. Symptoms of CHF present at rest (severe CHF)	1.6

^{††} adapted from the Criteria Committee of the New York Heart Association: *Nomenclature and criteria for the diagnosis of the heart and great vessels* (6th edition). Boston: Little, Brown and Co 1964.

[#] MET (Metabolic equivalent) is defined as the resting $\dot{V}O_2$ for a 40-year-old 70 kg man. 1 MET = 3.5 ml.kg⁻¹.min⁻¹

Appendix 4

Key components of successful intervention strategies

Several international reviews have assessed the effectiveness of physical activity interventions in the general practice setting. These reviews conclude that brief interventions involving verbal advice in combination with supporting written material can lead to modest (about 10%) short-term increases in physical participation.^{53,54} Therefore, it is realistic to expect that one in ten patients who receive a physical activity intervention will increase their physical activity. Key findings from these reviews showed that:

- interventions that focused on physical activity alone were more successful than those that included multiple risk factor intervention
- brief counselling was as effective as more lengthy counselling
- provision of written materials was associated with better outcomes
- tailoring the intervention to patient characteristics (readiness to exercise, baseline activity levels and physical activity preferences) was also beneficial
- improvements were seen with interventions by GPs, nurses and health educators.

Based on these findings, the '**5 As**' should be used to develop a physical activity intervention.⁵³

Ask: identify target patients with risk factors, i.e. those who would benefit from a physical activity intervention (patients with CVD, hypertension, stroke, diabetes, osteoarthritis, osteoporosis, hypercholesterolaemia, overweight, and those recovering from a fall or fracture).

Assess: screen patients to identify current physical activity levels, habits and preferences, and identify any barriers to participation. It is essential to assess each patient's risk factor profile and ensure that there are no contraindications to initiating or increasing physical activity. It is also important to tailor the program towards each patient's readiness to change. Strategies that target individuals in this way can help to provide education that is appropriate for each patient's needs and situations (see below for assessment questions).

Advise: provide brief advice or counselling about the benefits of physical activity (tailored to each patient's situation) and outline appropriate ways in which they may initiate or increase physical activity levels. Address some of the barriers that may have been identified earlier.

Assist: provide written materials such as pamphlets or leaflets. To tailor the materials to each patient, consider a written exercise prescription that outlines individual goals and recommendations.

Arrange: follow-up and/or referral to allied health professionals or to community providers of appropriate exercise programs.

The '5As' are an evidence-based framework for structuring smoking cessation in healthcare settings and part of the 'US Treating Tobacco Use and Dependence clinical practice guidelines'.⁵⁶

The following questions should be used when assessing a patient's physical activity levels and will be used as part of the National Lifestyle Prescription initiated by the Commonwealth Department of Health. The aim is to find out how many periods of 30 minutes of moderate (20 minutes of vigorous) physical activity the patient would do in a week. One hour of continuous moderate physical activity counts as two periods of 30 minutes.

1. How many times a week do you usually do 20 minutes or more of vigorous-intensity physical activity that makes you sweat or puff and pant? (e.g. heavy lifting, digging, jogging, aerobics or fast bicycling)

0	1	2	3	4	5	6	7+	Score
---	---	---	---	---	---	---	----	-------

2. How many times a week do you usually do 30 minutes or more of walking? (e.g. walking from place to place for exercise, leisure or recreation)

0	1	2	3	4	5	6	7+	Score
---	---	---	---	---	---	---	----	-------

3. How many times a week do you usually do 30 minutes or more of moderate-intensity physical activity that increases your heart rate or makes you breathe harder than normal? (e.g. carrying light loads, bicycling at a regular pace or playing doubles tennis)

0	1	2	3	4	5	6	7+	Score
---	---	---	---	---	---	---	----	-------

Thank you for your help. Total

Activity scoring key

To determine the patient's score for each of the three questions, add the scores for questions 1, 2 and 3 to obtain a total activity score. For example, if the patient has circled 2 for question 1, their score for that question will be 2, and so on.

0, 1 = Low
2–4 = Nearly there
5+ = Active

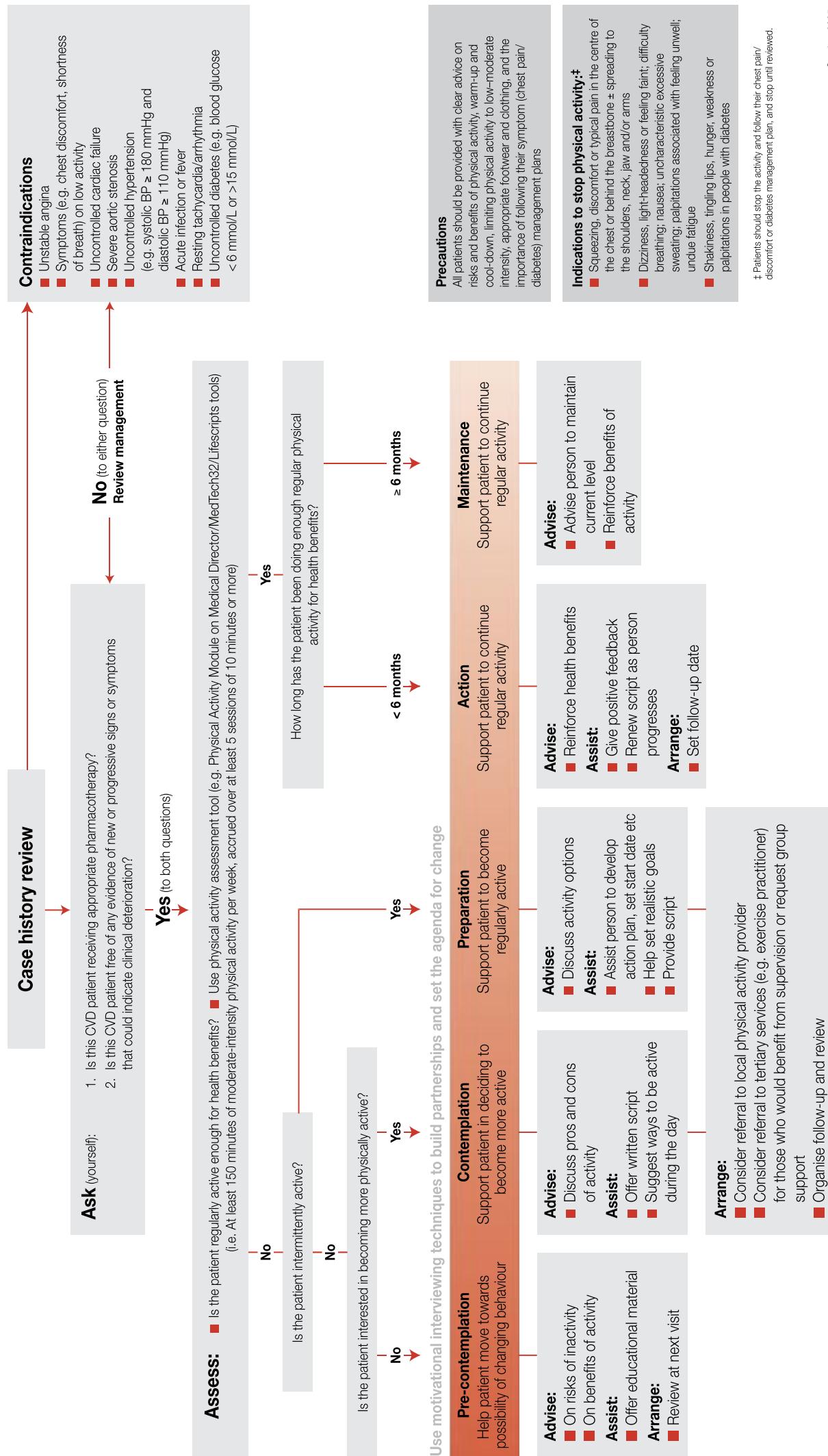
The recommended level of physical activity is equivalent to 5 or more points.

A score of 5 or more indicates that the patient is doing the recommended amount of physical activity per week, that is, at least two and a half hours of moderate-intensity activity, as per the National Physical Activity Guidelines.

A GP should of course take into account their own knowledge of the patient when making their activity assessment and prescription.

Heart Foundation physical activity algorithm for people with stable CVD

The National Heart Foundation of Australia recommends that, **over time**, people with well-compensated, clinically stable cardiovascular disease (CVD) should aim to include 30 minutes or more of moderate-intensity physical activity on most, if not all, days of the week for health benefits.



Notes



National Heart Foundation of Australia physical activity recommendations for people with cardiovascular disease

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