HSE Cardiac Rehabilitation Clinical Action Guide

CCO Forum - Cover Sheet

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HSE Cardiac Rehabilitation Clinical Action Guide working group members

Name	Role
Dr Susan Connolly - Chair	Consultant Cardiologist, University Hospital Galway and ICPCD Galway City Chronic Disease Hub, HSE
Dr Irene Gibson	Subject Matter Expert, National Institute for Prevention and Cardiovascular Health
Prof Jennifer Jones	Director of Training and Education, National Institute for Prevention and Cardiovascular Health
Dr Matthew Barrett	Consultant Cardiologist, St. Vincent's University Hospital
Ms Orla Brady	Senior Dietitian, ICPCD Self-Management Education Office
Ms Gay Castles	Deputy Physiotherapy Manager, Cork University Hospital
Ms Eimear Dolan	Senior Physiotherapist Cardiology, ICPCD, Chronic Disease Hub , Dublin South, Kildare & West Wicklow Community Healthcare
Dr Eimear Farrell	Senior Clinical Psychologist, ICPCD, Chronic Disease Hub, Ennis
Ms Margaret Humphreys	National Self-Management Education lead, ICPCD Self-Management Education Office
Ms Victoria Jones	Clinical Specialist Physiotherapist Oncology, St. Vincent's Private Hospital
Ms Liz Murphy	Cardiac Rehabilitation Coordinator, ICPCD, Chronic Disease Hub, Enniscorthy
Ms Sophie O'Connell	Cardiac Rehabilitation Coordinator, ICPCD, Chronic Disease Hub, Dublin North West
Ms Suzanne Seery	Clinical Specialist Dietitian, National Clinical Programme for Obesity, HSE
Ms Mary Sinnott	Cardiac Rehabilitation Coordinator/CNS, Wexford General Hospital
Ms Aoife Ward	Senior Dietitian, ICPCD Self-Management Education Office

Subject Matter Experts

Name	Role
Ms Elaine Buckley	National Stop Smoking Services Coordinator, HSE Tobacco Free Ireland programme.

Prevention Sub-Group of the National Heart Office Clinical Advisory Group membership

Name	Role
Prof John William McEvoy – Chair	Consultant Cardiologist, University Hospital Galway
Dr Matthew Barrett	Consultant Cardiologist, St. Vincent's University Hospital
Dr Angie Brown	Medical Director, Irish Heart Foundation
Dr Susan Connolly	Consultant Cardiologist, University Hospital Galway and ICPCD Galway City Chronic Disease Hub, HSE
Ms Annie Costello	Head of Patient & Community Engagement, Croí, the West of Ireland Heart and Stroke Foundation
Ms Eimear Dolan	Senior Physiotherapist Cardiology, ICPCD, Chronic Disease Hub , Dublin South, Kildare & West Wicklow Community Healthcare, HSE
Ms Denise Dunne	Operational Lead for ICPCD Chronic Disease Hub, West Galway and City Hub, HSE
Dr Eimear Farrell	Senior Clinical Psychologist, ICPCD, Chronic Disease Hub, Ennis, HSE
Dr Irene Gibson	Head of Clinical Innovation, National Institute for Prevention and Cardiovascular Health
Ms Mairead Gleeson	General Manager, Office of National Clinical Advisor & Group Lead (NCAGL) for Chronic Disease & ICPCD, HSE
Prof Ian Graham	Professor of Cardiovascular Medicine, Trinity College Dublin
Dr Lisa Hynes	Head of Health Programmes / Health Psychologist, Croí the West of Ireland Heart and Stroke Foundation
Prof Jennifer Jones	Director of Training and Education, National Institute for Prevention and Cardiovascular Health
Prof Kornelia Kotseva	Professor of Preventive Cardiology, National Institute for Prevention and Cardiovascular Health, National University of Ireland Galway
Mr Michael Madigan	Patient representative, Irish and European Heart Patient Advocate
Dr Vincent Maher	Consultant Cardiologist, Tallaght University Hospital

Mr Jim McComb	Patient representative
Prof Kenneth McDonald	Consultant Cardiologist, St. Vincent's University Hospital and National Heart Office
Ms Eleanor McIntyre	Cardiac Rehabilitation Clinical Nurse Specialist, Merlin Park University Hospital, Galway University Hospitals
Ms Liz Murphy	Cardiac Rehabilitation Coordinator, ICPCD, Chronic Disease Hub, Enniscorthy, HSE
Dr Laura Murphy	Consultant Cardiologist, Mater Misericordiae University Hospital
Mr Mark Murphy	Senior Policy Manager, Irish Heart Foundation
Dr Sarah M O'Brien	ICPCD National Clinical Advisor and Group Lead for Chronic Disease, HSE
Ms Sophie O'Connell	Cardiac Rehabilitation Coordinator, ICPCD, Chronic Disease Hub, Dublin North West, HSE
Dr Eamonn O'Shea	HSE/ICGP Integrated Care GP Clinical Lead for Cardiovascular Disease
Dr Lavanya Saiva	Consultant Cardiologist, Bon Secours Hospital, Dublin
Ms Suzanne Seery	Clinical Specialist Dietitian, National Clinical Programme for Obesity, HSE
Attendees	
Orla Brady	Senior Dietitian, ICPCD Self-Management Education Office, HSE
Regina Black	General Manager, National Heart Office
Linda Drummond	Programme Manager, National Heart Programme
Margaret Humphreys	National Self-Management Education lead, ICPCD Self-Management Education Office, HSE
Aoife Ward	Senior Dietitian, ICPCD Self-Management Education Office, HSE

Foreword

The Integrated Care Programme for the Prevention and Management of Chronic Disease (ICPCD) and the National Heart Office (NHO) are pleased to present this Clinical Action Guide for Cardiac Rehabilitation in Ireland, which has been formally approved by the Chief Clinical Officer Forum, HSE.

Cardiac rehabilitation (CR) is a multifaceted intervention that has consistently been demonstrated to significantly reduce morbidity, mortality and hospital admissions as well as improving quality of life in patients with cardiovascular disease (CVD). It is therefore a key component of an integrated service for chronic CVD as recommended in the National Model of Care for the Integrated Prevention and Management of Chronic Disease and the Enhanced Community Care Programme

The HSE Model of Care for Integrated Cardiac Rehabilitation clearly set out best evidence for the design, delivery, monitoring, and evaluation of phases I, II and III of CR in Ireland. The subsequent National Overview of Cardiac Rehabilitation Services has however highlighted significant variation in CR practice including the referral process, the clinical assessment and the delivery of the core components.

This Cardiac Rehabilitation Clinical Action Guide (CR CAG) has therefore been developed as a guidance to support implementation of the Model of Care for Integrated Cardiac Rehabilitation. It is not intended as a formal guideline document, rather it aims to represent best international evidence and practice distilled into a practical guide to enable delivery of high quality, equitable and person-centred CR in Ireland in line with the model of care.

This publication of the CR CAG is timely as it aligns to both national and international priorities in this area. The recent National Review of Cardiology Services in Ireland puts considerable focus on CVD prevention and rehabilitation recognising that “CVD prevention offers the most cost effective, long-term approach to cardiovascular disease control”.

More recently the first ever EU CVD Health Plan: the Safe Hearts Plan, highlights the importance of a personalised, life course approach to prevention, with treatment and care, including rehabilitation being one of its three key pillars.

Finally, this CAG aligns with the new definition of CR proposed by the World Heart Federation which is as follows (in press) *“the systematic provision of ongoing care and support for people with, or at elevated risk of, CVD, that in combination with all aspects of evidence-based prevention and rehabilitation will lead to lifelong cardiovascular well-being. Care should be person-centred and encompass all aspects of lifestyle optimization, clinical management of risk factors, psychosocial support, and adherence to guideline-directed medical therapy”.*

We would like to thank all those who have contributed to this guide which includes members of the National Prevention Subgroup, the National Institute for Prevention and Cardiovascular Health as well as an array of disciplines from both hospital and community-based cardiac rehabilitation services, and importantly patient advocates thus providing broad and expert representation.

The National Heart Office is fully committed to ensuring the best outcomes for cardiovascular patients in Ireland and this CR CAG is an important step towards achieving that aim.

Professor Ken McDonald

Clinical Co-Lead
National Heart Office

Dr Sarah M O'Brien

National Clinical Advisor & Group Lead for Chronic Disease

Executive Summary

Cardiac Rehabilitation (CR) is an evidence-based cost effective approach which helps cardiovascular patients manage their own condition in partnership with healthcare professionals and has consistently been shown to reduce morbidity, mortality, hospital admissions and improve quality of life.

The HSE Model of Care for Integrated Cardiac Rehabilitation (MOC CR) has laid out the principles of delivering high quality, evidence-based and equitable CR in Ireland. The purpose therefore of this Cardiac Rehabilitation Clinical Action Guide (CR CAG) is to now provide practical guidance for the implementation of the HSE Model of Care for Integrated Cardiac Rehabilitation across all of the CR phases with a particular emphasis on the referral process, the interdisciplinary team assessment and the delivery of the core components of CR through to the end of programme assessment and discharge.

The CR CAG is not intended as a formal guideline document. Instead, it has been written as a guide to support delivery of the MOC CR with an emphasis on the practical aspects based on best international evidence and practice. This Clinical Action Guide for Cardiac Rehabilitation in Ireland has been formally approved by the Chief Clinical Officer Forum, HSE. It is being published as an e-document due to the many embedded hyperlinks and appendices and has been specifically designed to help those using it navigate easily between the relevant sections. It is also a live document and will be updated as the evidence in this area evolves.

This CR CAG importantly starts with the philosophy of care for CR adapted from the current suite of self-management education programmes from the Integrated Care Programme for Chronic Disease (ICPCD) which clearly outlines the goals and values that underpin both the care delivered in CR and how that care is delivered.

Consistent with the MOC CR, person centred care, where patients and their families are at the centre of the shared decision-making process is a corner stone of this CR CAG offering patients flexibility and choice in how, when and where they can access services in a timely and equitable manner. The theories of health behaviour change are discussed as well as how these can be embedded in delivering patient-centred care with an emphasis on self-management.

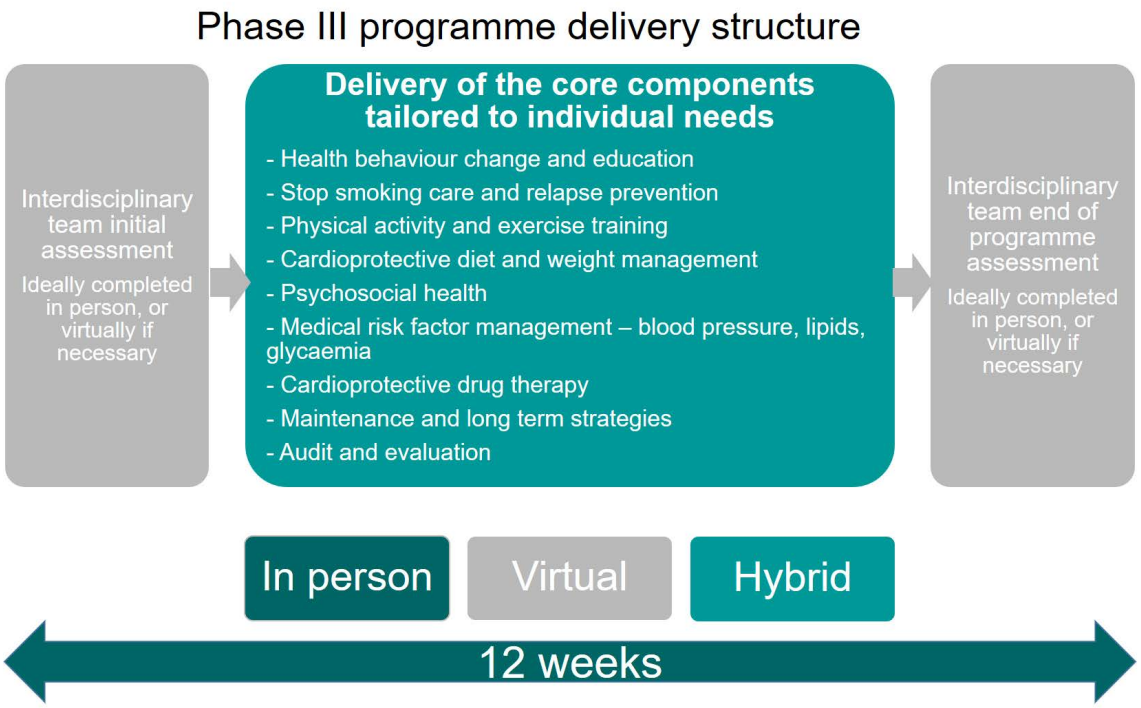
There is considerable focus on the role of the interdisciplinary team (IDT) (nurses, dietitians, physiotherapists, psychologists and administrative staff) as well as on their education, training needs and competencies. Clinical oversight for the CR programme by a Consultant Cardiologist is essential and will also support the medical management of patients as well as provide leadership in service development.

This CR CAG makes specific recommendations around managing the referral process (ideally automated), timely referrals (within 24 hours of discharge) as well as a patient review prior to discharge by a member of the CR team for delivery of education and support, recognising these are some of the most effective ways to improve patient uptake of CR.

Contact with the patient within 7 days after discharge by their CR team of choice is recommended offering an opportunity to review progress, discuss enrolment in CR, identify any potential barriers to participation and set an appointment date for the initial assessment which should be offered within

two weeks (but no later than four weeks) of discharge from hospital, unless the patients clinical condition determines otherwise or the patient themselves wish to delay commencement.

The overall structure of the CR programme (phase III) is outlined in the figure below starting with detailed interdisciplinary team assessment followed by delivery of the core components tailored to individual needs (with a choice of in-person, virtual or hybrid approach) and then the end of programme interdisciplinary team assessment all delivered over the course of 12 weeks.



The emphasis at the initial assessment (IA) is very much around the use of validated tools in the assessment of the patient across all domains including lifestyle and medical risk factors, medication use as well as psychosocial health (see summary table below). New concepts include the assessment of clinical frailty, screening for both sarcopenia and malnutrition recognising that our population is ageing with increasingly complex needs and making the IA a truly comprehensive one. An assessment template is provided as one of the appendices and it is strongly encouraged that CR teams adopt this for use in their CR programme.

The CR programme should then commence as soon as possible after the IA with a care plan informed by the assessment taking the patient's needs, preferences and goals for rehabilitation into consideration. This CR CAG provides a very practical approach to managing lifestyle (smoking, nutrition and body composition, physical activity and muscle strength) and medical risk factors (blood pressure, dyslipidaemia, dysglycaemia), to ensuring prescription of appropriate cardioprotective drug therapy and to promoting good psychosocial health. Guidance is also provided for teams without dietitians in how to provide an assessment and intervention that is feasible within the confines of their staffing.

Interdisciplinary team meetings are essential for effective delivery of the core components and should ideally be held once a week with the Consultant Cardiologist. Rolling programmes (where patients

start and finish at different times) rather than programmes with fixed start and end times for groups of patients are recommended as they offer greater flexibility and choice. Evolving modes of CR delivery, including digital technologies that can enhance and support the delivery of CR are also outlined. As many patients relapse to unhealthy habits after CR completion, a strong focus is also placed on long-term self-management, whereby CR is promoted as an entry point to lifelong CVD health as opposed to a short period of rehabilitation.

Lastly, this CR CAG acknowledges the importance of audit and evaluation in ensuring delivery of high quality CR. A list of organisational metrics as well as clinical key performance indicators and patient reported outcome measures are provided.

Core components	Essential	Where relevant (patient specific)
Demographic and social determinants of health	• Marital/relationship status • Employment status • Social support structure • Health and digital health literacy	
Medical History	• Current CV diagnosis and treatment • LV systolic function (echo) • Past medical history • Family history of premature CVD (defined as ASCVD in a 1st degree relative, male <55 and female < 65 years) • Medications • Sleep hygiene • Frailty • Hospital admissions in the last 30 days for any cause	• Sex related risk factors (for example metabolic and hypertensive disorders of pregnancy, preterm delivery) early menopause <45 years and polycystic ovarian syndrome) • Stop-Bang Questionnaire • Sexual function: International Index of Erectile Function (IIEF) • Clinical Frailty Scale for use only in patients >65 years of age
Medical risk factor management	• BP (office and ABPM/HBPM) • Lipids • HbA1C • LFTs/TFTs/eGFR • Urine ACR • ECG	• NT-proBNP (measured if symptoms of HF or abnormal LV) • LP(a) • Genetic testing for HeFH

Psychosocial Health	• HADS • EuroQOL-5D-5L	• Minnesota Living with Heart Failure Questionnaire (MLHFQ)
Stop smoking	• Smoking status • Carbon monoxide breath testing (COBT)	• Readiness to quit (if smoking) • Nicotine dependence (Fagerstrom)
Nutrition and body composition	• Weight, height, BMI • Waist to height ratio • MUST tool (malnutrition) • AUDIT-C 3 screening questions • Mediterranean diet score • Dietitian - Nutrition care process assessment and treatment*	• Edmonton Obesity Staging Score if overweight/obese BMI category • Full AUDIT-C: if audit-C screening question score ≥ 5 complete remaining 7 questions.
Physical activity and exercise training	• International Physical Activity Questionnaire -short form (IPAQ-SF) • Moderate to vigorous physical activity (MVPA) and sedentary time measured by research grade accelerometry • Submaximal functional capacity testing • Risk stratification for exercise • Strength assessment (Grip - strength and estimated 1-RM) • SARC-F (sarcopenia assessment) • Readiness to change • Physical limitations	• Timed up and go • 5 times sit to stand • Inspiratory muscle testing

Contents

1.0 Development of cardiac rehabilitation clinical action guide

1.1 Overview

This cardiac rehabilitation clinical action guide (CR CAG) has been developed by a working group of cardiac rehabilitation (CR) and cardiology healthcare professionals (HCPs) from both hospital and chronic disease hub settings as well as representation from the Prevention Sub-Group of the National Heart Office and subject matter expertise from the National Institute for Prevention and Cardiovascular Health. It has also included input from patients with lived experience of cardiovascular disease.

The CR clinical action guide aims to represent best international evidence and practice for the delivery of high quality, effective, equitable and person-centred CR in Ireland as well as provide a practical resource to support implementation of the *HSE Model of Care for Integrated Cardiac Rehabilitation* (HSE, 2023a).

The guidance and resources provided herein are the essential building blocks to both enhance and standardise CR in Ireland across both hospital and chronic disease hub settings as well as recognising other modes of delivery including home-based and digital. However, they are by no means exhaustive, and this document is intended to be a live document that will expand and develop as new evidence emerges and CR services evolve in Ireland.

1.2 Purpose

The purpose of this CR clinical action guide is to provide practical guidance to support the clinical implementation of the *HSE Model of Care for Integrated Cardiac Rehabilitation 2023* (HSE, 2023a). It addresses several of the model of care's key recommendations, including the development of care pathways and protocols to support end-to-end integrated care. It draws on exemplars of best practice, with the central focus being on ensuring an equitable, person-centred approach which addresses the internationally recommended core components of CR. Importantly, the CR clinical action guide responds to the need to address the significant variation in how CR is currently delivered in Ireland, a critical challenge identified in the recent *Overview of Cardiac Rehabilitation Services in Ireland, November 2024* (HSE, 2024a). This CR clinical action guide will help to ensure that no matter where in the country a person lives, they will receive a consistent and evidence-based standard of CR care.

1.3 Scope

1.3.1. Target users

This CR CAG is for all healthcare staff involved in referral and delivery of cardiac rehabilitation across all HSE funded hospitals and chronic disease hubs in Ireland.

1.3.1.1. Eligible Population

The eligibility criteria for CR in Ireland are derived from the *HSE Model of Care for Integrated Cardiac Rehabilitation, 2023* (HSE, 2023a) and updated based on recent evidence.

1.3.1.2. Inclusion Criteria

- Acute coronary syndrome
- Stable angina/ischaemic heart disease
- Post coronary revascularisation (PCI/CABG)
- Hospitalisation for heart failure (HF)

Where there is sufficient capacity, patient groups with the following conditions should also be offered cardiac rehabilitation:

- Chronic stable angina without revascularisation
- All chronic heart failure
- Pre- and post-implantation of cardiac defibrillators and resynchronisation devices
- Post-heart valve repair/replacement (where cardiac rehabilitation not already provided for a heart failure indication)
- Post-heart transplantation and ventricular assist devices (where cardiac rehabilitation not already provided for a heart failure indication)
- Adult congenital heart disease
- Spontaneous coronary artery dissection
- Other manifestations of atherosclerotic cardiovascular disease (peripheral arterial disease, transient ischaemic attack, post-cerebrovascular event (stroke)

1.3.1.3. Exclusion Criteria

- Unstable angina
- New ischaemic changes on resting ECG (ST segment displacement >2mm)
- Resting SBP >200mmHg or resting DBP >110mmHg should be evaluated on a case by case basis
- Orthostatic BP – drop >20mmHg with significant limiting symptoms
- Severe aortic stenosis (peak pressure gradient >50mmHg with aortic valve orifice <0.75cm^2 in average-sized adult)
- Acute systemic illness or fever
- Uncontrolled symptomatic severe atrial or ventricular arrhythmias
- Uncontrolled resting sinus tachycardia (>120bpm)
- Uncompensated CHF
- 3rd degree atrioventricular (AV) block (without pacemaker)
- Active pericarditis or myocarditis
- Recent pulmonary or major arterial embolism (<3 months)

- Severe thrombophlebitis
- Severely uncontrolled diabetes
- Other metabolic problems, such as acute thyroiditis, hypo-hyperkalaemia, hypovolaemia etc.
- Severe grade 3 rejection (cardiac transplantation recipients)

  (ASCM, 2022)

Patients deemed clinically unsuitable will be referred back to their original referrer with a written explanation as to why they were unsuitable to join the programme at this current time.

1.4 Outcome(s)

- Optimise the implementation of the *HSE Model of Care for Integrated Cardiac Rehabilitation, 2023* (HSE, 2023a)
- Deliver a timely, equitable, person-centred cardiac rehabilitation service.
- Ensure a standardised, high quality cardiac rehabilitation service is delivered removing current variation in practice.

1.5 Rationale / alignment with HSE national priorities

This project aligns to the priorities of the Integrated Model of Care for the Prevention and Management of Chronic Disease, which is being rolled out nationally as part of the Enhanced Community Care Programme. This programme endorses the need for a robust cardiac rehabilitation service as part of an integrated service for cardiovascular disease management. The development of the CR clinical action guide is timely as it aligns to the objectives of the “End to End implementation of the Model of Care for Integrated Cardiac Rehabilitation” pilot programme, providing staff with a readily available resource which will support implementation and scale-up of integrated cardiac rehabilitation.

2.0 Methodology

The CR CAG will address how to deliver standardised, high quality cardiac rehabilitation in HSE public hospitals, voluntary hospitals and chronic disease hubs. It was developed by a working group formed of experts in Ireland, drawing on evidence from national and international guidelines, with attention to hierarchy of evidence.

2.1 Resource implications

In writing this CR clinical action guide, the working group acknowledges that not all cardiac rehabilitation teams nationally are currently resourced with the necessary range of healthcare professionals required to implement its recommendations fully.

Therefore, care has been taken to ensure this document supports members of the interdisciplinary team to support patients in the absence of the full team of relevant professionals, while working within their scope of practice. This will primarily be through brief interventions, referrals to non-CR professionals and signposting. However, these services will not be fully integrated into the CR service.

However, the HSE, National Heart Office and the working group of this CR clinical action guide recognise that this situation is not optimal and fully accept the findings of the National Review of Adult Cardiology Services in terms of the recommendations and priority that has been given to CVD prevention/rehabilitation services. It is anticipated that resourcing of CR in Ireland will continue to expand implemention of this CR clinical action guide.

3.0 Philosophy of care

3.1 Our philosophy of care

This philosophy of care outlines the goals and values that underpin the care we deliver and how we deliver it. A philosophy combines a viewpoint (a perspective of how things are) and a system of values (a perspective of how things should be) (Funnell *et al.,* 1991).

Philosophy is important because it influences our professional behaviours, attitudes, satisfaction and effectiveness (Anderson, 1987). The philosophy of care within this CR clinical action guide is adapted from the current suite of self-management education programmes from the Integrated Care Programme for the Management and Prevention of Chronic Disease (ICPCD).

Development of a standardised national self-management education curriculum for phase III CR is also planned (HSE, 2024a). This should be underpinned by the same overarching philosophy of care and will facilitate embedding this philosophy into all aspects of CR service delivery, actively promoting self-management.

The underlying guiding philosophy for the National Cardiac Rehabilitation Programme is based on:

1. HSE values in action: care, compassion, trust and learning in delivery of care
2. Person centred care
3. The empowerment approach to care
4. The principles of adult learning, patient education and group facilitation
5. Theories of behaviour change
6. Integration of psychosocial care to address disease burden and convey hope
7. The health literacy, numeracy, literacy and cultural needs of the people living in Ireland
8. Attention to language used and awareness of impact
9. Integration of a person's family and social support infrastructure to all care

These elements should guide the delivery of HSE cardiac rehabilitation programmes and enable us to articulate the value of the programme to our patients, colleagues and those unfamiliar with the role of cardiac rehabilitation programmes.

Our philosophy of care for cardiac rehabilitation healthcare professionals is:

- Deliver **person centred** care.
- Have a unique relationship with their patients, respecting that the **person has 100% control** over their care.
- Encourage family involvement from the outset by inviting the person to bring their **spouse, family members and carers** to attend assessments and appropriate sessions. The integration of a person's support network can create a positive support environment, helping individuals to make and sustain health behaviour change for lifelong cardiovascular (CV) health.

4.0 Delivering person-centred care

Delivering person-centred care is internationally recognised as the goal of cardiovascular care and it is a cornerstone of this CR clinical action guide (Goldfarb *et al.,* 2024). To optimise person centredness, it is recommended that CR teams should strive to be responsive to personal needs and preferences, ensuring programmes are relevant to their lived experience and aligned to their goals and values (Redfern *et al.,* 2024). This requires a shift from the "one size fits all" service-orientated model to a person-centred approach, that offers flexibility and choice in how patients access and receive care (see "9.0 Evolving modes of cardiac rehabilitation delivery" section). Adopting a person-centred approach requires consideration of the patients' needs, including differences in age, gender, co-morbidities, functional capacity, language, learning styles and cultural background. A person-centred approach to care has been shown to positively influence self-management behaviours, patient satisfaction with the potential to improve clinical outcomes and quality of care, while decreasing healthcare costs and health disparities (Hirpa *et al.,* 2020).

4.1 Shared decision making

Person-centred care requires patients and their families to be at the centre of the shared decision-making (SDM) process. Patients are experts in their own conditions, and their voices and preferences are integral to decisions about treatment (Vrints, *et al.,* 2024). SDM is defined as a communication process by which patients and healthcare professionals collaborate to choose tests, treatments, and care plans that most align with an individual patient's preferences and values (Dennison Himmelfarb *et al.,* 2023). The goal of SDM is to ensure that patients are equipped with the necessary knowledge and tools to make the best decision about their own health, while minimising decisional regret or conflict, with assistance and clinical expertise from their healthcare professionals (Barry *et al.,* 2018). There is growing evidence to support SDM for secondary prevention, with high levels of same being associated with improved medication use, quality of life and perceptions of health. (Dennison Himmelfarb *et al.,* 2023; Okunrintemi *et al.,* 2021).

Strategies to promote SDM include effective communication, and the use of decision aids. Decision aids are tools to help people participate in decision making about health care options. They can take many formats including leaflets, videos, and interactive web-based platforms that address common medical decisions across a range of CVDs and treatments, for example "statins: should I take them to prevent a heart attack or stroke?" For more information on SDM and decision aids see the Shared Decision-Making and Cardiovascular Health: A Scientific Statement From the American Heart Association (Dennison Himmelfarb *et al*., 2024).

Effective and respectful communication is essential to establishing a good therapeutic relationship between the healthcare professional and the patient. It involves active listening, demonstrating empathy and paying attention to verbal and non-verbal communication techniques. Furthermore, to deliver successful person-centred care the language we use needs to be respectful, considering the person's values, orientation, condition beliefs and culture whilst also being non-judgemental, impartial and free of stigma (Lee, *et al.,* 2025). Language that belittles or has negative connotations, for example "patient denies chest pain" or terms such as "poorly controlled" should be avoided. Similarly, the use of "aggressive risk factor" control or management is to be avoided as aggressive is a negative connotation word. Rather "intensive risk factor" control or management is preferred.

For further suggestions on ensuring best practice in the use of respectful language please see the ESC statement "The importance of respectful language to enhance care"

4.2 Patient reported outcomes (PROs)

Assessing patient reported outcomes (PROs) is central to developing a personalised CR programme. PROs provide important insights into the patient's own perspective of their health and medical condition, facilitating better communication between the patient and the healthcare professional, enhancing shared decision making, and potentially improving overall quality of care (Moons *et al.,* 2023). PROs can also help monitor disease progression, for example the Minnesota Living with Heart Failure Questionnaire can be used to monitor symptoms. Furthermore, they can evaluate CR outcomes; thus they are closely linked to quality indicators (see "10.0 Audit and evaluation" section).

PROs help capture the patients subjective experience including; symptoms, functional status, health-related and overall quality of life and health behaviours (self-management and adherence) (Moons *et al.,* 2023). PROs are typically measured using patient-reported outcome measures (PROMs). There are three types of PROMS: generic, disease-specific, and domain-specific instruments. Examples of recommended PROMs within this CR clinical action guide include the quality of life measure EQ-5D-5L (generic), Minnesota Living with Heart Failure Questionnaire (MLHF, disease-specific) and the Hospital Anxiety and Depression scale (HADS, domain-specific).

For more information on PROs please see the ESC Statement "Placing patient-reported outcomes at the centre of cardiovascular clinical practice: implications for quality of care and management."

Key messages

- Person-centred CR requires a shift from the "one size fits all" service- orientated model to one that offers flexibility and choice in how patients access and receive care.
- Shared decision making acknowledges that patients are experts in their own conditions and their voices and preferences are integral to decisions about treatment.
- Capturing patient-reported outcome measures (PROMs) can align care plans with individuals' life context, health literacy and cultural background improving overall quality of care.

4.3 Health behaviour change and self-management education

Health behaviour change and patient self-management education are fundamental to the delivery of the core components of CR and should be central to all encounters with patients attending cardiac rehabilitation (HSE, 2023a). Making healthy lifestyle changes is challenging, particularly in complex and chronic conditions like cardiovascular disease, which often requires multiple behavioural changes (Laranjo *et al.,* 2023). Moreover, patients are tasked with not only changing behavioural patterns which have evolved over a lifetime but also maintaining these changes long-term. Maintenance of healthy lifestyle behaviours in patients with atherosclerotic cardiovascular

disease (ASCVD) remains low, with 67% not achieving physical activity targets and 48% of smokers continuing to smoke one year after coronary heart disease hospitalisation (McEvoy, *et al.,* 2024). The ability to make health behaviour change is influenced by the complex interplay of psychological factors (like low mood, stress, and lack of self-efficacy), social and environmental factors (such as low social support, financial costs), low literacy levels and the patient's own beliefs and perceptions about their cardiac condition. The CR team need to understand these complexities to support patients to change their behaviour.

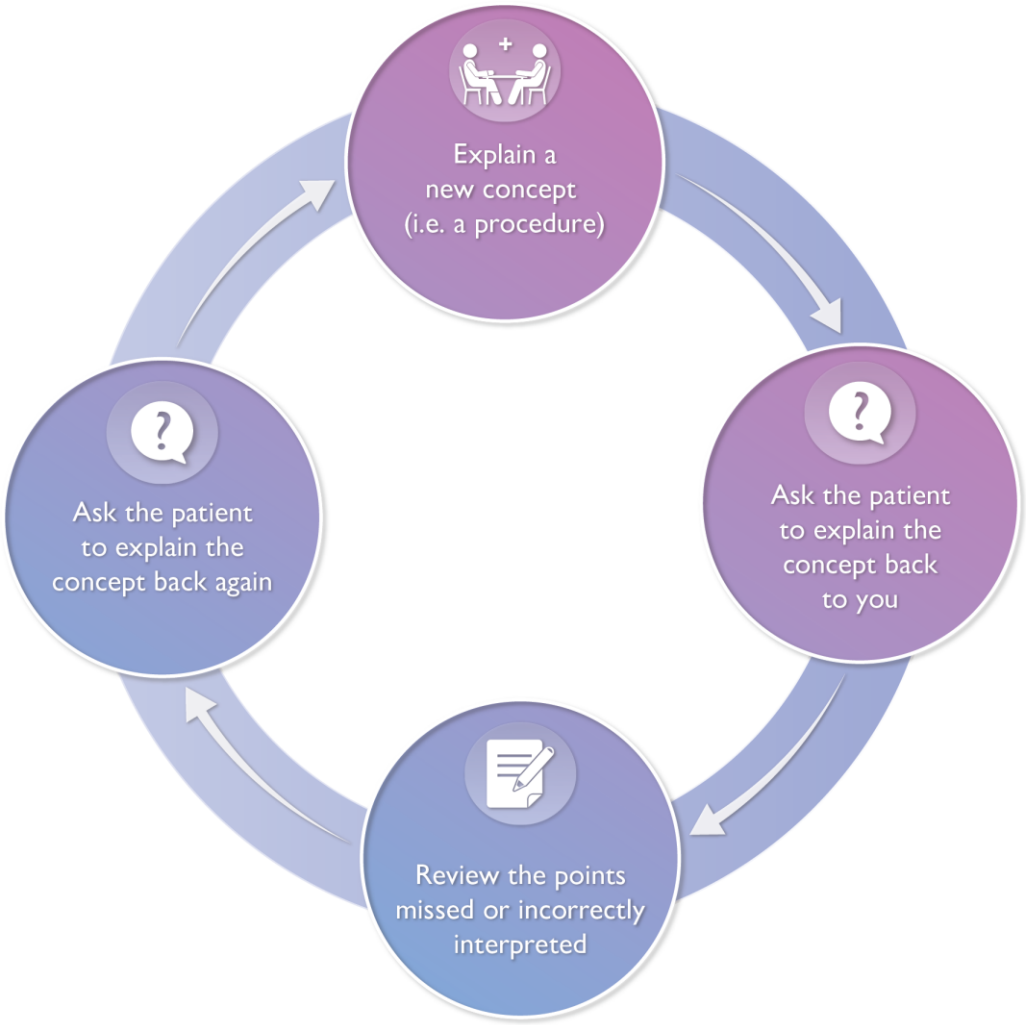
4.4 Self-management

A key goal of CR is to support and increase the patient's capacity for self-management. This requires the patient to be equipped with the knowledge and skills and confidence to recognise and monitor symptoms, manage medications, adopt health behaviours (physical activity, diet and smoking) and to communicate effectively with healthcare professionals. It involves regular assessment of progress, goal setting, and problem-solving support (HSE, 2017). Self-management education in CR is associated with improvements in disease related knowledge, likelihood of quitting smoking, consistent medication use, physical activity and exercise participation, healthy dietary behaviours, anxiety and depression (Shi *et al.,* 2023). Education should commence at the point of diagnosis and extend across the CR continuum into the future.

Health behaviour change, shared decision making and education are central to promoting long-term behaviour change. CR education should be tailored to the patients' needs and risk factor profile, emphasising the benefits of risk factor control in reducing disease progression and future CVD events. This can be aided using risk algorithms such as the use of the European Society of Cardiology (ESC) Smart risk score (U-prevent.com) which is recommended for patients with a history previous clinical CVD events. The Smart risk score tool estimates the 10-year risk of recurrent vascular events in patients with established cardiovascular disease and is available by downloading the ESC CVD Risk Calculation App. Effective education involves guiding a personalised discussion that progresses beyond passive information exchange to an interactive process that empowers the patient to take ownership over their CVD health (Ghisi, 2025). For example, while the dietitian can educate on healthy eating, it is the patient who determines how this advice can integrate into their lifestyle. This approach acknowledges the patient as an active participant in their own care, thus fostering greater motivation and long-term engagement with treatment plans.

It is important to acknowledge that self-management can be more difficult for patients with low health literacy, hence it is important to assess this at initial assessment. Health literacy refers to the skills and resources of a person to access, understand and use information to make decisions, and take action on their own health and healthcare. Strategies to improve health literacy include involving family members/partners, peer support, providing structured follow-up and using the teach-back method which helps patients understand information (Byrne, *et al.,* 2023; Visseren, *et al*., 2021). As an effective communication technique endorsed for use across multiple ESC guidelines, teach-back involves asking patients to explain in their own words what a health provider has just told them. Any misunderstandings are then clarified by the health provider and understanding is checked again. This process continues until the patient can correctly recall the information that was given (see Figure 1) (Beauchamp, *et al*., 2022).

Figure 1 Teach-back technique (Byrne *et al.*, 2023)



The following is a list of core subjects where educational input can be focused:

- What is CVD (pathophysiology and symptoms)
- Treatments e.g. revascularisation, valve replacement, device implantation etc.
- Lifestyle risk factors – smoking, diet, body composition and weight, physical activity
- Medical risk factors: blood pressure, lipids and glycaemia
- Cardio protective medications and their consistent use
- Psychosocial health (interplay between heart health and mental health, quality of life, anxiety and depression, stress management and sleep)
- Sexual health
- Making and sustaining behavioural changes

Note: this list is not exhaustive and education should be tailored to the needs of the patient and/or group.

4.5 Key components of Self-Management Education Programmes

The following key components align cardiac rehabilitation delivery with the existing accredited HSE chronic disease self-management education programmes.

- Evidence-based (HSE, 2023a)
- Individualised to the needs of the person, including language, literacy and culture (HSE, 2023a; NICE, 2020; :Goldfarb *et al*., 2024)
- Has a structured theory-driven written curriculum with supporting materials
- Delivered by trained and competent individuals
- Delivered in group or individual settings
- Aligns with the local population needs (HSE, 2023a)
- Supports the person and their family in developing attitudes, beliefs, knowledge and skills to self-manage their condition (Goldfarb *et al.*, 2024)
- Includes core content as per the Model of Care (HSE, 2023a), core components and core education subjects

4.6 Theories of behaviour change

There are several theories that aim to explain health behaviour change. The COM-B model (Michie *et al.,* 2014) categorises the patient's ability to make changes based on their capability (available knowledge skills and capacity to engage in a desired behaviour), opportunity (factors external to the individual that allow or prompt them to engage in a behaviour) and motivation (brain processes that led an individual to behave in a certain way). Specific behaviour change techniques (BCTs) such as goal setting, planning and action, self-monitoring, feedback and social support have been associated with improving CR patient outcomes (Kenny *et al.,* 2024; NICE, 2014). To support the CR team in applying these BCTs, we recommend that CR team members complete training outlined in section 5.0.

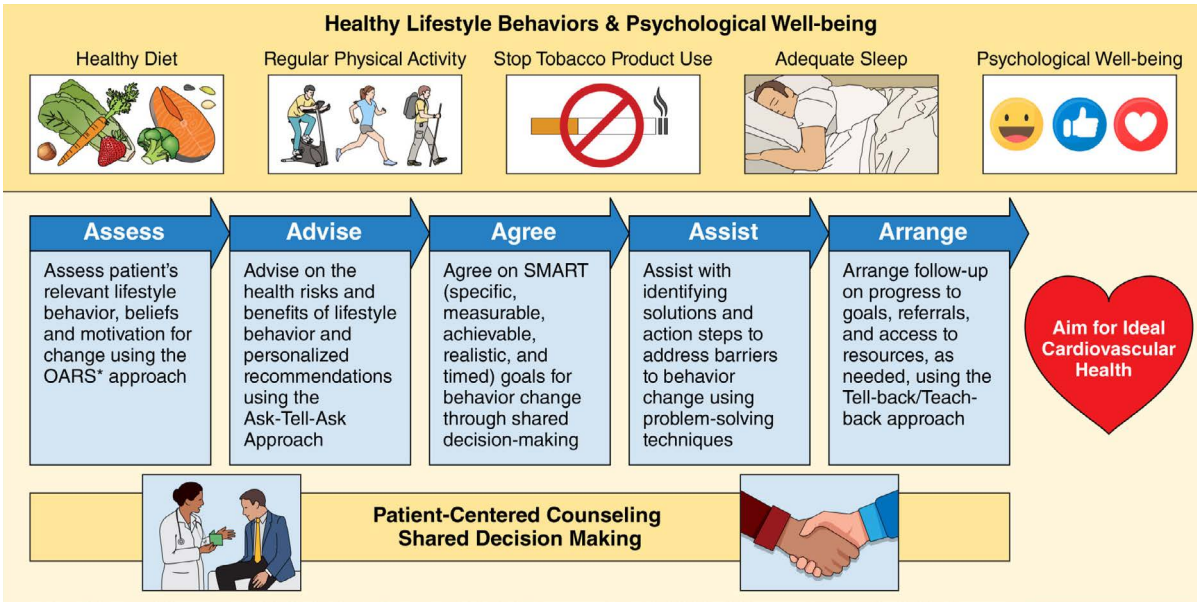
4.6.1. Approaches to facilitate behaviour change

4.6.1.1. 5As model

This model is informed by the transtheoretical model of behaviour change first proposed by Prochaska and DiClemente (1983). Its strength is in taking the individual perceived need as the starting point, which makes it possible to direct the process of care toward the patient and their personal situation. The 5As Model stands for: assess, advise, agree, assist, and arrange. The American Heart Association (Kris-Etherton et al., 2021) highlights the 5As as essential components of brief cardiovascular behaviour counselling, for sustaining behaviour change in patients at risk of or recovering from cardiac disease.

The 5As Model offers a clinical framework rooted in behaviour change principles to promote individual autonomy, relatedness, and competence through patient-centred care. It is structured and pragmatic for implementation in busy practice settings. It is action and solution oriented and is grounded in motivational principles for behaviour change based on Self-Determination Theory.

Figure 2 The 5As Model for lifestyle-related behavior change counseling in clinical settings (Kris-Etherton *et al.*, 2021)



4.6.1.2. Motivational Interviewing

Motivational Interviewing is a collaborative, goal-oriented style of communication with particular attention to the language of change. It is designed to strengthen personal motivation and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion (Miller and Rollnick, 2013). Systematic review evidence suggests that the use of motivational interviewing in cardiac rehabilitation can improve CR attendance, lifestyle behaviours, consistent medication use, and clinical outcomes like blood pressure and cholesterol control (Winkler *et al.,* 2022). Motivational interviewing uses the core communication skills of "OARS", examples of how this can be used in practice are as follows:

Open ended questions: "Tell me more about what you would like to get from cardiac rehabilitation?"

Affirmation: "It takes a lot of strength and determination to give up smoking, like you have done over the past 3 weeks"

Reflective listening (repeat, rephrase, paraphrase): "I can see that you are concerned about your high blood pressure"

Summarise: "So we have discussed a number of things today and you have decided that you would like to...."

4.6.1.3. Goal Setting

Goal setting in CR is the process of the patient establishing person-centred targets to help them to improve their CV health and overall well-being. Goal setting should be a collaborative process between the patient and the healthcare professional/ clinician that establishes goals that are attainable and correspond with the patient's health behaviours that require modification (Fernandez *et al.,* 2012).

One approach to goal setting is the SMART framework:

- **S**pecific – clearly define what the patient wants to achieve
- **M**easurable – how will the patient track their progress
- **A**ttainable/Achievable – ensure the goal is realistic for the patient
- **R**elevant – align with the patient's overall heart health goals
- **T**ime-bound – set a timeframe to achieve this goal

For further information on training to implement the philosophy of care, see further information in the following section.

5.0 Cardiac rehabilitation staff education and training

5.1 Role of the interdisciplinary team

The delivery of high quality, comprehensive CR requires the expertise of an interdisciplinary team, typically comprising of cardiovascular nurses, physiotherapists, dietitians, clinical psychologists, and cardiologists, with appropriate administrative support. Depending on patient-specific clinical needs, the interdisciplinary team may be supported by other professionals including stop smoking advisors, occupational therapists, social workers and pharmacists.

5.2 Clinical governance

In line with the Model of Care a designated Consultant Cardiologist (e.g. Integrated Care Consultant or Preventive Cardiologist) must be assigned to provide clinical governance to both the hospital and community-based CR service in each area. The designated Consultant Cardiologist will also provide leadership in service development and clinical oversight of the CR interdisciplinary team and services provided, including supporting the medical management of patients to ensure achievement of the recommended medical risk factor and therapeutic targets. The referring consultant should be kept informed of changes to the patient's medical management. In particular, adjustments to HF therapies or antiplatelet medications should not be made by the CR team without prior consultation with the patient's HF or Interventional Consultant/team, as appropriate.

Each programme should have a designated CR co-ordinator who should work closely with the designated consultant cardiologist and who should provide clinical and administrative leadership as well as vision to the programme. They should ensure that all aspects of the service are delivered according to the nationally agreed standard.

Since CR is a complex interdisciplinary intervention, with multiple components, healthcare professionals need to work collaboratively combining their specialist skills and knowledge to ensure a person-centred approach to CR is delivered. The term "interdisciplinary" versus "multidisciplinary" is deliberately used within this document to reflect the level of interprofessional collaboration required between hospital and chronic disease hub cardiac rehabilitation staff to deliver true integrated CR that spans across all settings (hospital, chronic disease hub and home). Successful interprofessional collaboration requires effective teamwork, underpinned by principles such as shared team values and goals; clearly defined roles; mutual trust and effective communication. Having clearly defined roles which adhere to professional scope of practice helps promote interdisciplinary working, however these roles should also be flexible and fluid to ensure seamless service delivery.

Importantly interprofessional teamwork acknowledges the patient as a collaborator in their own care. Accordingly, the CR team should work collectively with the patient in developing a CR care plan that aligns to the patient's goals and expectations for CR.

5.3 Education, training and competencies

It is essential that the CR team have the necessary, qualifications, knowledge, skills and competencies to deliver the recommended CR core components and meet required standards. The clinical competencies required to deliver CR have been developed by professional

organisations such as ESC (European Association for Preventive Cardiology [EAPC] Core Curriculum for Preventive Cardiology [aimed at cardiologists] and the Core Curriculum for CVD Nursing and Allied Professionals), the British Association for Cardiovascular Prevention and Rehabilitation (BACPR) and more recently the Irish Society of Chartered Physiotherapists (ISCP) (Competency Framework, Chartered Physiotherapists in Cardiac Services). A summary of these documents with relevant links is outlined in text box 1. At the time of publication of this CR CAG, the ISCP competency framework was not yet available online. Importantly these organisations provide useful frameworks to assess healthcare professionals' ability to demonstrate these competencies.

Given the significant variation in CR staffing in Ireland it is important that team members work within their scope of practice. For example, while a team approach is recommended in the delivery of the physical activity and exercise component, to achieve optimal outcomes it should be led by the physiotherapist who has the appropriate clinical competencies and qualifications. Given the increasingly complex presentation of patients with CVD, with many living with multiple co-morbidities, this CR CAG advocates for the full availability of the interdisciplinary team, with dietetic and clinical psychology specifically requiring resourcing.

- Core Curriculum for CVD Nursing and Allied Professionals (pg.44-45) (Neubeck *et al*., 2023)
- EAPC Core Curriculum for Preventive Cardiology (pg.263-267) (Wilhelm et al., 2022)
- BACPR Core Competences for the Health Behaviour Change and Education Component of Cardiovascular Rehabilitation Services (BACPR Health Behaviour Change and Education Development Working Group, 2016)
- BACPR Core Competences for the Diet Component: Healthy Eating and Body Composition (BACPR Diet Working Group, 2019)
- BACPR Core Competences for the Physical Activity and Exercise Component 2024 (3rd Edition) (BACPR Exercise Professionals Group, 2024)
- BACPR Core Competences for the Psychosocial Component for Cardiovascular Disease Prevention and Rehabilitation Services 2025 (1st Edition) (BACPR, 2025)

5.4 Recommended training for cardiac rehabilitation staff

To support healthcare professionals in delivering of high-quality, patient-centred, evidence-based CR, this CR CAG recommends the following education and training courses as a minimum requirement for all members of the interdisciplinary team. Please refer to your line manager and local induction documents for mandatory and site-specific training.

Recommended courses in addition to all HSE mandatory training
• Basic life support (BLS) training (all staff)
• Advanced cardiac life support (ACLS) training (depending on location and level of service delivery)
• Making Every Contact Count (MECC). eLearning modules to support HSE staff with implementing behaviour change. It provides a foundation in behaviour change theory and techniques, including the underlying principles of a patient-centred approach. Topics include smoking, alcohol and drugs, healthy eating and physical activity, mental health and overweight and obesity
• "Delivering Evidence-based Cardiac Rehabilitation in Practice" online course with the National Institute for Prevention and Cardiovascular Health. https://nipc.ie/education/online-courses/ • (3 months duration with 7 online modules)
• Introduction to Heart Failure module (20 minutes) on HSeLanD
• Atrial Fibrillation – detection, assessment, diagnosis and management online module on Med ilearning
• Chronic Disease Management Programme (60 minutes) on HSeLanD
• Delivering Change in Health Services - Complete Guide (70 minutes) on HSeLanD
• Stop Smoking Medicines and how to use them e-learning course (45 minutes) on HSeLanD
For CR nurses only: • HSE/National Centre for Smoking Cessation and Training (NCSCT) online training (240-360 minutes). • Following the online training the CR nurse should consider next step in training to become a Stop Smoking Advisor. This involves attendance at the HSE/National Centre for Smoking Cessation and Training (NCSCT) 2 day training course.

Recommended training to support delivery in line with the national CR programme philosophy of care

• Behaviour Change Training: level 1 and 2 • This training equips team members with skills in person centred communication and behaviour change strategies, including how to influence motivation, increase self-efficacy, set goals and support self-monitoring.
• Group facilitation skills training • Effective group facilitation is a key skill for the delivery of group self-management education and support. The training should equip facilitators with the mindset, skills and competencies necessary to facilitate groups and/or meetings effectively. Participants should learn the skills that enable effective group participation, supports improved group decision making and problem solving.
• National Healthcare Communication Programme • Online programme is designed to support healthcare staff to take a skilled, sensitive and person-centred approach to all conversations with patients, their families and with colleagues. Modules include; core consultation skills, challenging consultations, shared decision making and motivational interviewing. The learning pathway provides further information.

* The above adapted from the ECC hub induction documents, it is not intended to be an exhaustive list and does not replace national, local and profession specific mandatory and recommended training and induction

Key messages

- The delivery of high quality, comprehensive CR ideally requires the expertise of an interdisciplinary team comprising of cardiologists, nurses, physiotherapists, dietitians and clinical psychologists, with appropriate administrative support.
- Interprofessional collaboration is required between hospital and chronic disease hub based CR staff to deliver true integrated, person-centred CR that spans across all settings.
- It is essential that the CR team have the necessary, qualifications, knowledge, skills and competencies to deliver the recommended CR core components and meet required standards.

6.0 Promoting utilisation of cardiac rehabilitation

6.1 Managing the referral process

Having a standardised referral procedure, which includes automatic referral, combined with endorsement by the cardiologist and other healthcare professionals is one of the most effective ways to improve patient uptake of CR (Rasmussen *et al.,* 2024). Indeed, it is the responsibility of all healthcare professionals to promote the benefits of attending CR with patients.

Currently paper-based CR referral forms are the most common mode of referral in Ireland. This system has significant drawbacks including incomplete referral information, delays in paper form being sent, or the referral not being received by the CR team. To ensure CR teams receive all necessary clinical information, this CR CAG recommends the use of a standardised CR referral form (see "Appendix: 1a Cardiac Rehabilitation referral form template") sent via secure email. This form can be adapted by CR teams for use locally as well as being made available to other sources of referral e.g. private hospitals. Ideally, automated referral to CR should be aspired to for all eligible patients which should be possible when the electronic health record is introduced in Ireland.

Use of the CVD Discharge Care Bundle, included in the Model of Care (HSE, 2023a) can act as a prompt to support referral to CR in a timely manner at time of hospital discharge. Where possible discharge summaries should be sent electronically to the CR team, along with the referral form. The HSE has committed to the implementation of an electronic healthcare record which is anticipated to be implemented in the next 3-5 years. This should enhance automatic referral to CR in a standardised manner, and all CR teams will have access the patient's full clinical information irrespective of where they received their care.

Referral methods and pathways will vary from one centre to another depending on local information technology (IT) systems and centre structure (e.g. regional centre for cardiology or a smaller unit). However, it is recommended that every centre providing cardiovascular care have a referral system agreed with local stakeholders and implemented accordingly. An example of how this can be achieved is provided through Case Study 1. This system should be audited on a regular basis to ensure it is fit for purpose (e.g. every 6 months). In addition, all CR teams should have access to the patient's clinical information (investigations, procedures and discharge letters) through electronic systems, for example EVOLVE and CVIS.

Ultimately it is the responsibility of the discharging medical/surgical team to ensure referral is completed prior to or within 24 hours of the patients discharge from hospital.

Case Study 1

As part of their integrated cardiac rehabilitation service, 2 Integrated Healthcare Areas, HSE Galway Roscommon and HSE Mayo (includes 4 hospital-based teams and 3 chronic disease teams), worked in collaboration to develop a regional referral log. The aim was twofold:

1. To ensure that all eligible patients for CR in the region were captured electronically in one central location. Previously referrals to CR were managed by one hospital CR who in turn emailed paper-based referrals to the various CR teams in the region.
2. To support audit and assessment of CR utilisation (referral, uptake and adherence rates), a key CR quality of care indicator.

The log is hosted on a dedicated shared drive that is accessible to all CR teams through secure permissions. Details for all eligible patients are uploaded to the log as part of the in-patient liaison service (phase I) and referrals from primary care and private hospitals are logged on receipt by the receiving centre. To support implementation a Standard Operating Procedure (SOP) with instructions on how to access and use the log, together with roles and responsibilities was developed.

As cardiac rehabilitation is part of routine clinical care, explicit patient consent is not required for referral. Nonetheless, all patients should be advised that they will be automatically referred unless they choose to optout. This conversation needs to happen in the context of promoting the benefits of CR to patients as part of the in-patient contact.

6.1.1. CR referral pathway

6.1.1.1. Early in-patient contact – referral and education (Phase I)

Patients who meet the CR referral criteria should be seen by a member of the cardiac rehabilitation team (traditionally referred to as phase I) prior to discharge. This inpatient contact should provide patients with education and support on optimising their recovery journey and achieving long-term CV health. It is an ideal opportunity to promote the benefits of CR and to explore intentions to attend, as well as potential barriers to CR. Aspects for discussion should include:

- The benefits of attending cardiac rehabilitation, including what to expect from the programme. Providing this education is essential to improving uptake (Rasmussen *et al.,* 2024).
- Patient's preferred venue (e.g. hospital or chronic disease hub) and format for CR (e.g. centre-based, virtual if available, or hybrid).
- Diagnosis and treatment, including medications and the importance of sustained treatment use.
- Cardiovascular risk factors, including the importance of healthy lifestyle changes.
- Personal goals, emotional needs and expectations for the future.
- Return to work, driving, and sexual activity.
- Available social support from family members or significant others.
- Advice on when to seek medical help.

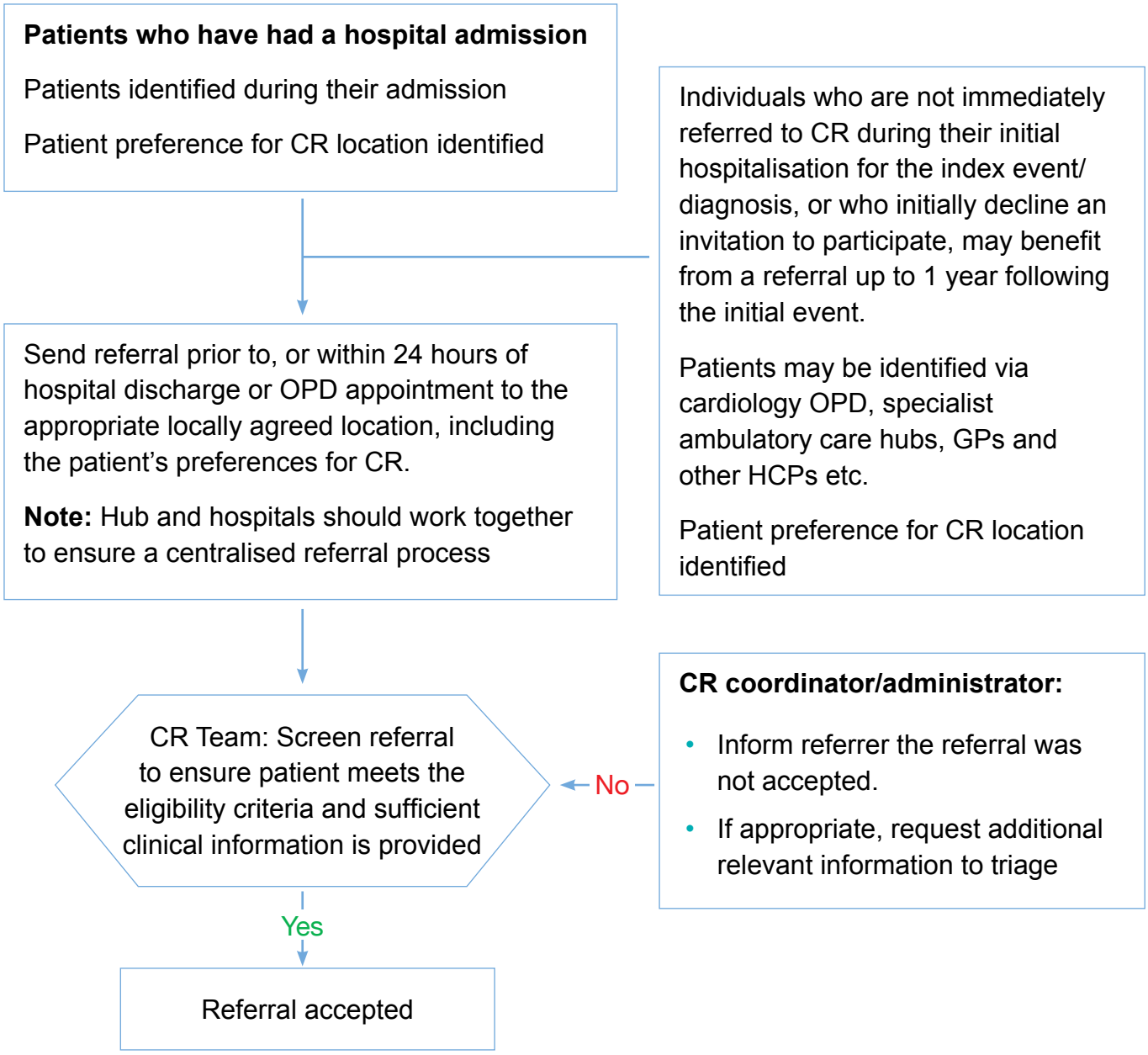
All patients should be provided with written information outlining the benefits of CR and the CR team contact details of patient choice. Supporting resources for example videos, developed by the Cork and Kerry Rehabilitation teams and the "Cardiac Rehab for All" booklet (Irish Heart Foundation), as well as any other relevant self-management support materials should be provided as part of this in-patient liaison. Details of the preferred service selected by the patient including contact numbers/email should also be provided.

6.1.2. Early discharge follow-up (phase II)

The patient should be contacted within 7 days of discharge (via telephone) by the CR team of the patient's choice. Traditionally referred to as phase II, the focus of this contact point is to review the patient's progress, discuss enrolment in CR and any potential barriers to participation. This contact point is an ideal opportunity to commence the initial assessment (for example capture demographic information, medical history etc). Following this interaction an appointment for the initial assessment should be offered within two weeks (but no later than four weeks) of discharge from hospital unless the patients clinical condition determines otherwise or the patient themselves wish to delay commencement. Commencement of CR within this time frame is associated with increased uptake of phase III cardiac rehabilitation (Abreu *et al*., 2021) and is a key recommendation in the *Model of Care for integrated Cardiac Rehabilitation* (HSE, 2023a).

The initial assessment appointment should be confirmed in writing via post or email, as per patient preference. Referrals deemed clinically unsuitable (by the CR clinical team) should be returned to the original referrer, by administrative staff (where available), with a written explanation as to why they were unsuitable to join the programme. For patients who initially decline to attend they should be informed that they can be re-referred up to 1 year post event, this should be also communicated to their GP. The referral pathway is detailed in Figure 3

Figure 3 cardiac rehabilitation referral pathway



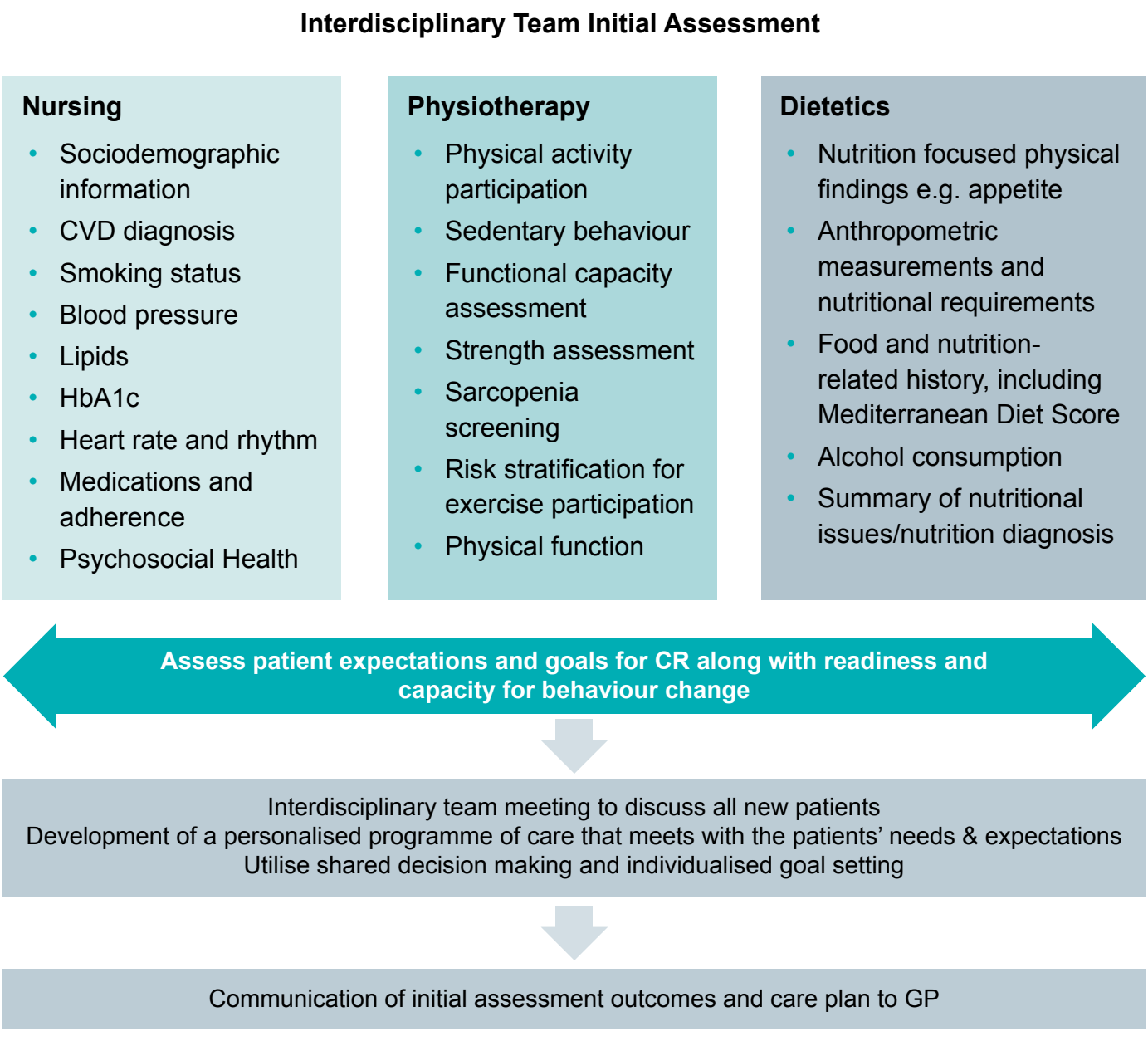
Summary of key messages:

- Automatic referral, combined with endorsement by the cardiologist and other healthcare professionals is one of the most effective ways to improve patient uptake of CR.
- It is the responsibility of all healthcare professionals to promote the benefits of attending CR with patients.
- Referral to CR should be completed prior to or within 24 hours of the patients discharge from hospital.
- Patients should be referred to their CR team of choice and should be contacted by this team within 7 days (via telephone) of discharge.
- An appointment for the interdisciplinary team initial assessment should be offered within two weeks (but no later than four weeks) of discharge from hospital.

7.0 Interdisciplinary team initial assessment

A comprehensive initial assessment is essential to developing a personalised programme of care which meets the patient's individual needs and preferences. This should be conducted (preferably at one sitting) by the interdisciplinary team including the nurse, dietitian and physiotherapist. To ensure a standardised patient assessment, the HSE interdisciplinary assessment template (Appendix 1: HSE interdisciplinary assessment template) should be used. This initial assessment should ideally be in person but if the patient has a strong preference for a virtual assessment, this should be facilitated if possible (See "9.0 Evolving modes of cardiac rehabilitation delivery" section) for details on how to arrange and conduct a virtual assessment). An overview of the key components of this interdisciplinary assessment is presented in Figure 4. Where the initial assessment cannot be completed in its entirety, for example, a temporary contra-indication to physical activity, it is recommended that this should not delay assessment of the remaining components and/or the commencement of the other components of the programme.

Figure 4 Interdisciplinary team initial assessment



7.1 Preparation for initial assessment

In preparation for their initial assessment, patients should be provided with an overview of what to expect from the assessment. This includes practical information on what healthcare professionals they will see; the duration of the assessment; what to bring (list of medications); what to wear (comfortable clothing and footwear) and directions to the centre. These details can be provided in the patient appointment letter (Appendix 2: HSE Cardiac Rehabilitation patient appointment letter). In addition, patients should be advised that they will be asked to complete some questionnaires in advance of their assessment, which will help ensure a tailored personalised programme of care is developed. These questionnaires can be self-administered on the day (Table 1) or sent in advance if no barriers to completion are anticipated, for example low literacy levels or language barriers.

With the patient's agreement, family members should be encouraged to attend the assessment, and interpreting services should be provided where required.

Table 1 initial assessment self-administered questionnaires

Questionnaire	Topic/purpose
International Physical Activity Questionnaire (IPAQ)	Captures both participation in moderate intensity physical activity as well as a sitting time measure
Hospital Anxiety and Depression Scale (HADS)	Assesses anxiety and depression symptoms
EuroQOL-5D-5L	Measures health-related quality of life.
Mediterranean Diet Score	Assesses alignment with the Mediterranean diet.

7.2 Nursing assessment

The following section outlines the key components of the nursing assessment. As part of this assessment, the patients' beliefs around their diagnosis as well as their goals for rehabilitation and potential barriers to behaviour change (See "Delivering person-centred care" section) should be explored.

7.2.1. Demographic and social determinants of health

- Marital/relationship status and living/home situation
- Employment status
- Social support structure
- Health literacy

While there are a range of health literacy screening instruments, these can be challenging to complete in a busy clinical environment, and few are validated for CVD populations. Studies have shown that asking a simple screening question such as "how confident are you filling out medical forms by yourself?" (Responses range from 5 extremely to 1 not at all) can effectively identify those with low literacy levels (Wallace *et al.,* 2006).

7.2.2. Medical History

- Current CVD diagnosis including investigations and treatment.
- Past medical history including previous CVD, procedures and co-morbid conditions (for example diabetes, obesity, hypertension, hypercholesterolaemia, chronic kidney disease, obstructive sleep apnoea, autoimmune conditions, cancers, arthritis, chronic respiratory conditions, mental health disorders, erectile dysfunction, physical and cognitive impairment).
- Risk factors for CVD, including sex related risk factors (for example metabolic and hypertensive disorders of pregnancy, preterm delivery, early menopause <45 years and polycystic ovarian syndrome) and family history of premature CVD (defined as ASCVD in a 1st degree relative, male <55 and female <65 years).

7.2.3. Current health status

- Hospital admissions in the last 30 days for any cause.
- Cardiovascular symptoms, including those related to heart failure, angina or cardiac arrythmias. Use evidence-based tools such as the New York Heart Association (NYHA) Heart Failure Classification and the Canadian Cardiovascular Society (CCS) angina classification system (Campeau, 2002; NYHAC committee, 1979).
- Wound care and pain management if post-surgery.
- Sleep hygiene, including sleep patterns, where they sleep (bed or chair) and perceived fears around sleep. If obstructive sleep apnoea (OSA) (daytime fatigue, heavy snoring, witnessed night time apnoeic episodes) is suspected administer the Stop-Bang Questionnaire (Appendix 3: Stop Bang Questionnaire).If the patient is identified at high risk for OSA, a referral for sleep studies should be made by the cardiologist and the GP should

- be informed. CR centres should liaise with sleep services regarding local referral protocols.
- Vaccination status (for example influenza, pneumococcus).
- Medications, including non-prescribed medications and supplements use and drug allergies/intolerances.
- Sexual function (administer the International Index of Erectile Function (IIEF) in males if patient indicates an issue with same and is willing to discuss).
- Frailty*

*While there is no gold standard assessment tool for measuring frailty in CR, a wide range of frailty assessment tools are available. Based on ESC recommendations and in line with current HSE practice this CR CAG recommends the use of the Clinical Frailty Scale (CFS) (McEvoy et al., 2024; Vigorito *et al*., 2017). The CFS is derived from the Canadian Study of Health and Aging Frailty Index, and it is a nine-point scale based on clinical evaluation of mobility, energy, physical activity, and function (Rockwood *et al*., 2005). This tool is easy to administer, and it is validated for use in older people >65 years of age. For a quick reference guide on using the CFS see Appendix 4: Clinical Frailty Score. In addition to using the CFS, it is important to note that sarcopenia, fatigue, exercise intolerance, nutritional status cognitive decline, depression or socio-economics factors, are all indicators of frailty status, and can act as barriers for older patients accessing CR. The assessment of these indicators are discussed separately in the nursing, physiotherapy and dietetic assessment sections.

7.2.4. Smoking

Almost a half of patients continue to smoke a year after their coronary event (McEvoy *et al.,* 2024). Stopping smoking after a CVD event is associated with a reduction of one-third in the risk of recurrent CVD events and deaths from CVD (Wu et al., 2022b) and it is the single most important thing a patient can do to reduce their risk. Addressing tobacco use is therefore an integral component of CR and key to achieving and maintaining a quit status. For patients who have stopped smoking at the time of their event the focus should be on relapse prevention.

The first step is to engage patients in an open and non-judgemental discussion. As part of this process, carbon monoxide breath testing (COBT) using a validated monitor such as the Bedfont should be routinely completed for all patients regardless of their smoking status and in advance of asking their smoking status. If the result is positive (>6 parts per million (ppm), explain that the reading is at a level consistent with someone who smokes or has been exposed to carbon monoxide (CO). This then presents an opportunity to further enquire about smoking status.

It is helpful to frame the discussion around tobacco using with the 3As:

- **Ask** them about their smoking status.
- **Advise** them on the risks of smoking, the benefits of quitting and the most effective ways of quitting.
- **Act** by providing stop smoking care in CR or by referring to HSE stop smoking services.

The basis for a successful quit attempt is a comprehensive assessment which includes the following:

- Smoking status, including COBT
- Nicotine dependence
- Readiness to quit
- Motivation - importance and confidence
- Past quit attempts
- Psychological co-morbidities
- Smoking in the household

Smoking status should be assessed using the following questions:

"Do you smoke any tobacco products?"

- "Never smoked"
- "Yes, daily"
- "Yes, occasionally (less than daily)"

"Have you quit smoking within the last six months?"

"Have you quit smoking longer than six months?"

If the patient has recently quit (less than six months), encourage them on their success, positively re-enforce the importance of staying smoke-free, and discuss whether they would like support to stay a non-smoker.

Breath carbon monoxide testing validates self-reported smoking status and by visually demonstrating the harms of tobacco to patients, it can help motivate a quit attempt. It is important to note that while the most common reason for high CO levels (>6 ppm or above) is usually active or passive smoking, there may be other reasons that need to be explored like a faulty heating or kitchen appliance.

Nicotine dependence

For all patients who smoke or have recently quit smoking their dependence on tobacco should be assessed using the validated Fagerstrom Test for Nicotine Dependence (Appendix 5: Fagerstrom Test). The most important indicators of dependence are time of the first cigarette of the day, and the number of cigarettes smoked per day. Determining nicotine dependence will help inform the level of pharmacological supports that the patient may require. This will be discussed further in "Use of pharmacotherapy" section.

Assessing readiness and motivation to quit

While most patients want to quit, they are often ambivalent and lack confidence. An important role for the CR nurse is to explore this ambivalence and build the patients capacity for behaviour change. This can be done by using scaling questions such as:

- "On a scale of 1-10, how important is it for you to quit?"
- "Using the same scale, how confident are you that you can quit?"
- "So why are you on a .... on the scale and not 10?"
- "What would it take to move you from ... to 10?"

Past quit attempts

Exploring past quit attempts can provide an understanding as to why patients lack confidence when quitting. For example, it may be due to sub optimal pharmacotherapy or a life event. This exploration provides an opportunity to reframe perceptions and to view a past attempt which may have lasted months or years as a success to build on rather than a failure which cannot be redeemed. Quitting smoking with a spouse or a family member in the same household contributes greatly to success. Therefore, it is important to involve spouses and family members in supporting patients to attempt to quit. Evidence based strategies to support smoking cessation are discussed in "Smoking" section.

If following the assessment, the patient is not ready to stop smoking it is important to respect their decision, maintaining a supportive, non-judgmental stance. Avoid reminding them of the health risks as they may feel like you are judging them. Instead ask if you can revisit the conversation at a future date during the CR programme "I understand quitting can be hard, but I am here to support you. Would it be ok if we discuss in a few weeks time?"

Key messages:

- Stop smoking support should be integrated into all CR programmes.
- Effective stop smoking care begin by comprehensively assessing smoking history and current tobacco use.
- The 3As (Ask, Advise, Act) is an effective tool to engage patients in an open and non-judgemental discussion on their smoking status.

Go to **section 8.2.1** for treatment and management

7.2.5. Psychosocial health

Psychosocial risk factors such as low socio-economic status, social isolation, stress, anxiety, and depression increase the risk of CVD and contribute to poorer health-related quality of life and prognosis in patients with established CVD (Jennings et al., 2022). Furthermore, these factors can directly impact the patient's ability to engage with CR, behaviour change and use medications as prescribed. Therefore, assessment of psychosocial health is recommended for all patients with coronary heart disease (CHD) to guide appropriate referral and management (Bueno *et al*., 2025; Visseren *et al*., 2021). Psychosocial screening can be guided by the 5As Model for behavioural change (Kris-Etherton *et al.*, 2021) (Table 2) as well as the use of measures of health-related quality of life (HRQOL) and anxiety and depression.

Table 2: 5As Model

5As Model	**Assess:** "*Do you mind if I ask how you are feeling about your recent health event?*" **Advise:** Explain how stress, anxiety and depression (refer to HADS Score and EQ-5D-5L if relevant) impacts on our heart health and our behaviours. **Agree:** Goals and a plan to address any specific issues **Assist:** Provide ongoing support, resource booklet and explore options. **Arrange:** Follow up support, with a referral to Psychology. Liaise with GP if needed.

7.2.5.1. Health related quality of life

The EuroQOL-5D-5L (Appendix 6: EuroQOL-5D-5L) is a standardised questionnaire used to measure HRQOL (Oldridge *et al.,* 2014). It consists of the EQ-5D descriptive system and the EQ visual analogue scale (EQ VAS). The descriptive system comprises five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has five levels: no problems, slight problems, moderate problems, severe problems, and extreme problems.

The EQ VAS records the patient's self-rated health on a vertical visual analogue scale where the endpoints are labelled "The best health you can imagine" and "The worst health you can imagine." The visual analogue scale (VAS) can be used as a quantitative measure of health outcome that reflects the patient's own judgement.

For further instructions on how to uses the EURQOL click here https://euroqol.org/information-and-support/documentation/user-guides/

7.2.5.2. Anxiety and Depression

The Hospital Anxiety and Depression Scale (HADS) can screen for both anxiety and depression (Zigmond and Snaith, 1983).

There are 14 items on the HADS (Appendix 7: Hospital Anxiety and Depression Scale (HADS) with seven relating to anxiety symptoms and seven to depressive symptoms. A score of 0 to 3 can be assigned to each item. Therefore, a minimum score of 0 and a maximum of 21 can be obtained for both the anxiety and depression subscales.

Scores on either the depression or anxiety subscale can indicate as follows:

- 0-7 are considered in the normal range
- 8-10 indicates a mild level of symptomatology
- 11-14 is considered in the moderate range
- 15-21 is deemed in the severe range

It is important to note that the HADs is just one data source for assessing mental health and like other areas of health, a complete assessment involves triangulation of multiple data points and consideration of the person's individual circumstances. For example, a score in the severe range for anxiety would not require clinical intervention if someone with a strong family history of cancer was waiting for the results of a biopsy. Similarly, a score in the severe range for depression might be completely understandable following a recent family bereavement or diagnosis of terminal illness in a close relative/partner and may not be an indicator of an underlying depression.

7.2.5.3. Minnesota Living with Heart Failure Questionnaire (MLHFQ)

In patients whose recruiting diagnosis is heart failure it is recommended to utilise the Minnesota Living with Heart Failure Questionnaire (MLHFQ) (Appendix 8: Minnesota living with Heart Failure Questionnaire). The MLHFQ is a 21-item self-administered questionnaire that assesses the physical, emotional and social ways health failure can adversely affect a patient's life. A Likert scale of 0 (no limitations) to 5 (very much) is used to rate how strongly each item impacts a person's life (Rector *et al*., 1987). Higher scores indicate a worse quality of life, thus highlighting the need for the team to monitor symptoms and review treatment approaches.

To score and interpret the results:

1. Sum the points for all 21 questions. The maximum possible score is 105.
2. Interpret the total score:
    - Mild impact: 0-24
    - Moderate impact: 25-45
    - Severe impact: 46-105

Key messages:

- Psychosocial risk factors can directly impact the patient's ability to engage with CR, behaviour changes and use medications as prescribed.
- Assessment of psychosocial health is recommended for all patients to guide appropriate referral and management.
- Psychosocial screening can be completed using structured interviews guided by the 5As Model and using health related quality of life and anxiety and depression questionnaires.

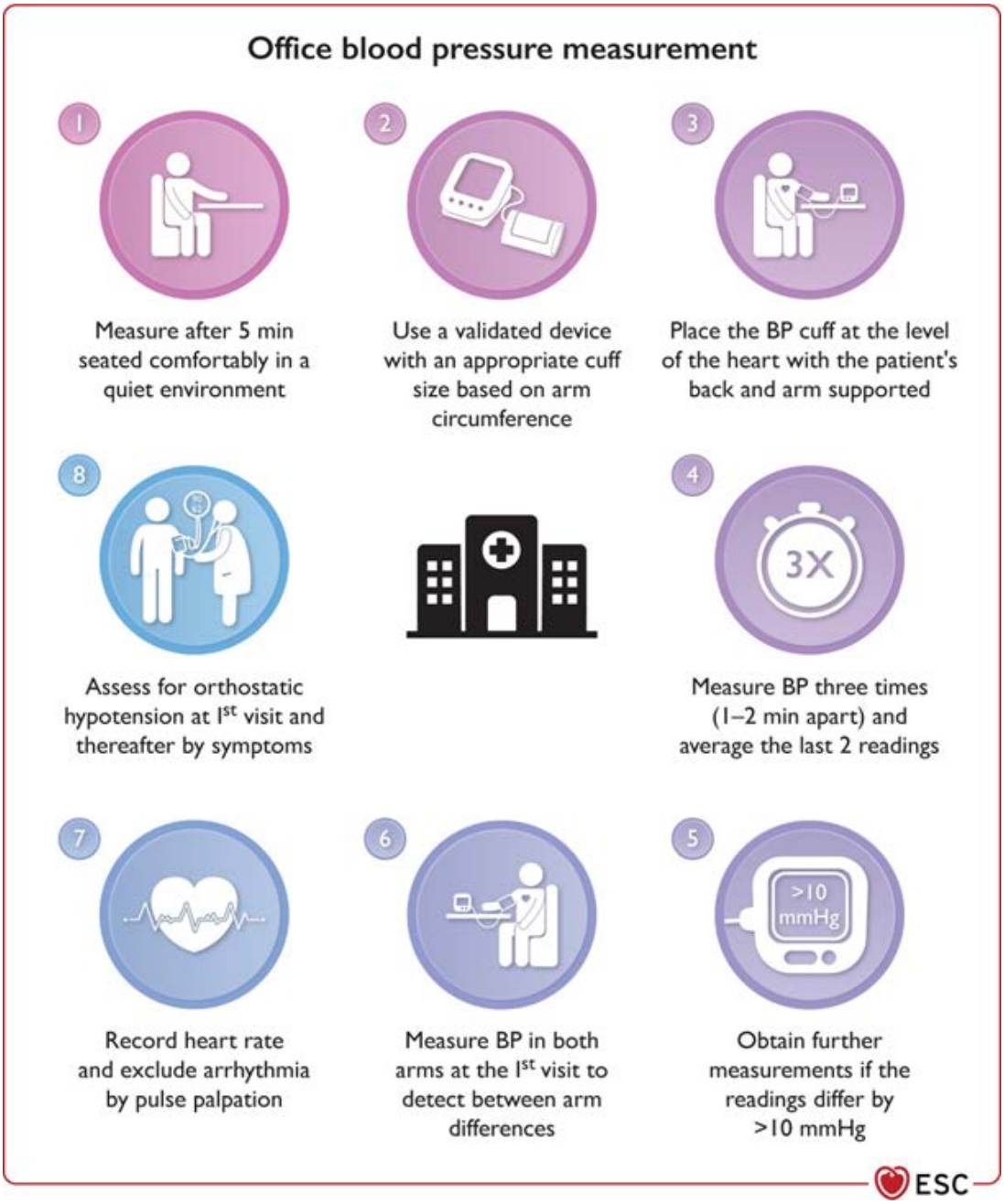
Go to **section 8.2.2** for treatment and management

7.2.6. Blood pressure measurement

7.2.6.1. Office/Clinic Blood Pressure

It is recommended that office (clinic) blood pressure (BP) should be assessed as per the recommendations (Figure 5) from the 2024 ESC guidelines for the management of elevated blood pressure and hypertension (McEvoy et al., 2024). A prerequisite of BP measurement is that it must be undertaken using a device that has been clinically validated and confirmed to be accurate (see www.stridebp.org, or www.validatebp.org). It should be recognised that all BP measurements can be influenced by circumstances of measurement, including position, ambient temperature, the technique of measurement, accuracy of equipment, and physical condition of the patient.

Figure 5 Summary of office BP measurement as per 2024 ESC guidelines for the management of elevated blood pressure and hypertension



It should also be noted that the 2024 ESC guidance emphasises a shift away from reliance on office BP towards out of office BP measurements. This reflects the increasing evidence for the relationship of home (HBPM) and ambulatory monitoring (ABPM) with outcomes as well as the ability to detect the white-coat effect on BP.

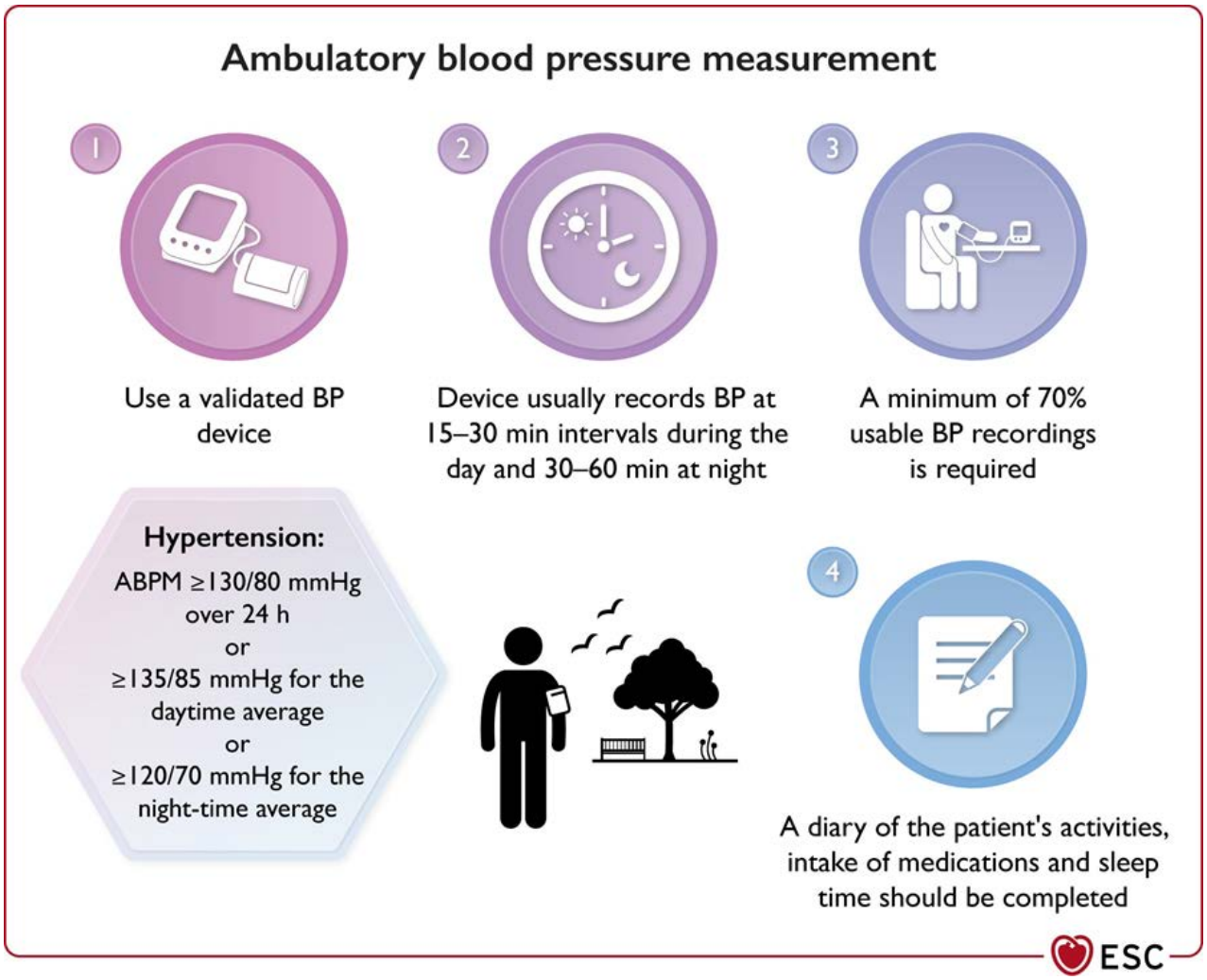
The guidance therefore states that the diagnosis of hypertension requires confirmation using out-of-office measurements (HBPM or ABPM) or at least one additional subsequent office measurement.

7.2.6.2. Ambulatory Blood Pressure Monitoring

Ambulatory Blood Pressure Monitoring (ABPM) (summarised in Figure 6) uses a fully automated device programmed to measure BP at set intervals over a 24-hour period (typically every 15-30 minutes from 7am to 11pm and 30-60 minutes from 11pm to 7 am). The software usually provides average BP measurements for daytime, night-time, and 24 hours.

A minimum of 70% useable BP recordings is required for a valid measurement session, typically numbering ≥27 measurements over 24 hours. Preferably, seven nocturnal readings should also be obtained. However, ≥8/≥4 wake/sleep readings may be adequate if more cannot be obtained.

Figure 6 Summary of ambulatory blood pressure measurement as per 2024 ESC guidelines for the management of elevated blood pressure and hypertension



7.2.6.3. Home Blood Pressure Monitoring

With HBPM (summarised in Figure 7) the patient measures their own BP at home using a validated monitor (usually an upper-arm oscillometric cuff device). Patients should be counselled to follow the same preparation steps as used for clinic BP (Figure 5).

Two measurements should be taken at each measurement session, performed 1–2 minutes apart. Measurements should be made twice a day (morning and evening) at the same time for a minimum of 3 days and up to 7 days. At the end of the measurement period, all readings are averaged. If the average after 3 days is close to the treatment threshold, then measurement should continue for the full 7 days.

Figure 7 Summary of home blood pressure measurement as per 2024 ESC guidelines for the management of elevated blood pressure and hypertension

7.2.6.4. Ambulatory Blood Pressure Monitoring

There are advantages and disadvantages to both methods as outlined in Table 3.

Table 3 Comparison of ambulatory and home blood pressure monitoring as per 2024 ESC guidelines for the management of elevated blood pressure and hypertension

Ambulatory monitoring

Advantages

- Can identify white-coat and masked hypertension
- Measurement in real-life settings and during usual activities
- Stronger prognostic evidence
- Night-time readings
- Abundant information from a single investigation, including short-term diurnal BP variability
- Additional BP phenotyping (e.g. nocturnal dipping status)

Disadvantages

- Relatively expensive and sometimes limited availability
- Can be uncomfortable and affect sleep

Home monitoring

Advantages

- Identify white-coat and masked hypertension
- Cheap and widely available
- Measurement at home, which may be more relaxed than at doctor's office
- Patient engagement in BP measurement and telemedicine potential
- Easily repeated and used over longer periods to assess day-to-day BP variability

Disadvantages

- Only static BP at rest is typically available
- Potential for measurement error due to improper measurement technique or unvalidated or poorly calibrated device
- Nocturnal readings not usually possible

BP, blood pressure.

In Ireland ABPM is often accessible in primary care but there may be a cost for a non-GMS patient. HBPM may be a more cost-effective alternative, and it is recommended that CR teams have access to their own stock of validated BP monitors that can be provided to patients on the programme. These should be procured through normal HSE arrangements and under governance of the local clinical engineering department for quality control, hygiene measures etc.

7.2.6.5. Orthostatic hypotension

Postural or orthostatic hypotension is common, affecting 10% of all hypertensive adults and up to 50% of older institutionalised adults (Juraschek *et al*., 2023; Juraschek *et al*., 2024; McEvoy *et al*., 2024; Raber *et al*., 2022). Orthostatic hypotension is defined as a BP drop of ≥20/10 mmHg 1 and/or 3 min after standing following a 5-min period in the seated or lying position. An assessment for orthostatic hypotension should be considered at least at the initial assessment and thereafter if suggestive symptoms arise. This is particularly important when cardioprotective drugs are being optimised and especially in older/frail patients.

7.2.6.6. Blood Pressure Classification

The 2024 ESC Guidelines continue to define hypertension as office systolic BP of ≥140 mmHg or diastolic BP of ≥90 mmHg. However, a new BP category called “elevated BP” has been introduced. Elevated BP is defined as an office systolic BP of 120–139 mmHg or diastolic BP of 70–89 mmHg. It is important to note that lower thresholds are used to diagnose hypertension of “elevated BP” if out of office blood pressure measurement is used. A comparison of office, home, and ambulatory blood pressure measurement thresholds for elevated blood pressure and hypertension is outlined in Table 4.

Table 4 Comparison of office, home, and ambulatory blood pressure measurement thresholds for elevated blood pressure and hypertension as per 2024 ESC guidelines for the management of elevated blood pressure and hypertension

	Office BP (mmHg)[a]	Home BP (mmHg)	Daytime ABPM (mmHg)	24 h ABPM (mmHg)	Night-time ABPM (mmHg)
Reference					
Non-elevated BP	<120/70	<120/70	<120/70	<115/65	<110/60
Elevated BP	120/70–<140/90	120/70–<135/85	120/70–<135/85	115/65–<130/80	110/60–<120/70
Hypertension	≥140/90	≥135/85	≥135/85	≥130/80	≥120/70

Key messages

- Measurement of BP at the initial assessment should be performed as recommended in ESC guidance to obtain as accurate a measurement as possible.
- Hypertension should be confirmed with out of office BP measurements using ABPM and/or HBPM or at least one additional subsequent office measurement.
- CR teams should have access to validated home BP monitors to be provided to patients to assist accurate measurement of BP.

Go to **section 8.2.4** for treatment and management

7.2.7. Lipid Measurement

In clinical practice, the concentration of plasma lipoproteins is not usually measured directly but is instead estimated by measuring cholesterol content. Total cholesterol is distributed primarily among three major lipoprotein classes: very low density lipoprotein (VLDL), low density lipoprotein (LDL), and high density lipoprotein (HDL). A standard serum lipid profile measures the concentration of total cholesterol (TC) and HDL-C, as well as triglycerides (TG). With these values, the LDL-C concentration can be estimated using the Friedewald formula: LDL-C = TC - HDL-C - (TG/2.2) in mmol/L.

In the vast majority of patients it is no longer recommended to undertake fasting lipid levels. Non fasting lipid levels are fairly representative of a patient's habitual levels except in the case of patients with significant hypertriglyceridaemia. With high TG values (>4.5 mmol/L) the Friedewald formula cannot be used, and a fasting sample should be considered.

It is important to review the patient's lipid profile from the time of their hospital admission and any previous levels (preferably prior to treatment). This can help potentially identify:

- Patients with a genetic dyslipidaemia (where the pre-treatment levels were high e.g. LDL-C >5 mmol/L. See "Additional if indicated" section for further information.
- Patients who are possibly not following their prescribed lipid-lowering therapy (suggested by no change in lipid levels since initiation of same).

Whilst the most recent ESC 2025 guidelines "Focused Update of the 2019 Guidelines for the management of Dyslipidaemias" recommend checking LDL-C 4-6 weeks after initiation or intensification of lipid-lowering therapy (Mach *et al.*, 2025), this CR CAG is recommending that the patient's lipid profile is checked just prior to or at the initial assessment.

The aim is then to manage that patient's lipid to target over the course of the next 12 weeks.

Remember:

- Patient's lipids levels drop within 24 hours of an acute cardiovascular event or major surgery due to a stress response and don't return to habitual levels for 8 weeks. Therefore, don't assume that if someone is at target at their initial assessment (if <8 weeks from their event) that this will remain this way.
- Make sure that thyroid function has been measured within the last 3 months. Hypothyroidism can elevate both LDL- and triglycerides and makes the patient more vulnerable to a statin-induced myopathy.
- Other common causes of high TGs include high alcohol consumption, dysglycaemia and central adiposity.

Key messages

- Review historical lipid levels to identify a possible genetic dyslipidaemia or not taking medication as prescribed.
- Non-fasting lipid profiles are sufficient unless severe hypertriglyceridaemia is present.
- With elevated triglycerides consider hypothyroidism, alcohol, central adiposity and dysglycaemia.

Go to **section 8.2.5** for treatment and management

7.2.8. Glycaemia

The prevalence of both prediabetes and type 2 diabetes mellitus (T2DM) is increased among patients with CVD and results in worse clinical outcomes compared with individuals with normal glucose metabolism. Moreover, many patients have undiagnosed dysglycaemia prior to their CV event. Therefore, ESC guidelines recommend, screening for diabetes in all individuals with cardiovascular disease, using fasting glucose and/or HbA1c (Marx *et al*., 2023).

The advantages of an HbA1c include ease of measurement, limited within-individual variability, and the convenience of anytime testing without the need for fasting. Accordingly, this CR CAG recommends that all patients have an HbA1c measurement checked prior to or at the CR initial assessment unless there is one available within the last 3 months.

As per the "HSE Integrated Model of Care for People with Type 2 Diabetes Mellitus 2024" (HSE, 2024b), a value greater than/equal to 48 mmol/mol indicates type 2 diabetes mellitus and should be confirmed; either with a different test on the same day, or the same test on a different day. A value of 42-47 mmol/mol should be regarded as prediabetes.

Go to **section 8.2.6** for treatment and management

7.2.9. Heart rate and rhythm

All patients should have a 12 lead ECG recorded at their initial assessment and their heart rate and rhythm documented as well as presence of any ECG changes. The ECG from the time of their admission should also be reviewed if possible.

7.2.10. Other Laboratory Investigations

7.2.10.1. Essential

Full blood count, renal function, liver function, thyroid function (as above). In addition all patients with ASCVD should have a urine ACR checked. This is because there is a high prevalence of CKD in patients with same and if only eGFR is measured ~50% of patients with chronic kidney disease will be missed (Al-Azzawy, *et al*., 2026).

7.2.10.2. Additional if indicated

NTproBNP - If the patient has symptoms suggestive of heart failure (for example shortness of breath/ankle swelling) or has evidence of left ventricular (LV) dysfunction on their echo a NT-BNP level should be measured.

Lipoprotein (a)

Lipoprotein (a) (Lp(a)) is an LDL particle with an Apo(a) moiety covalently bound to its ApoB component. Epidemiologic and genetic studies strongly support a likely causal and direct continuous association between high plasma levels of Lp(a) and higher risk of ASCVD (Kronenberg *et al*., 2022). Lp(a) concentration is predominantly determined by genetics (>90%) and one in 5 adults will have an elevated level although levels can vary by ethnicity. A level > 105nmol/L should be considered a CVD risk enhancer (Mach *et al*., 2025).

ESC guidelines recommend that Lp(a) measurement should be considered at least once in every adult's lifetime (Mach *et al*., 2025). However, current resourcing in Ireland does not facilitate this recommendation and in general Lp(a) measurement is not available in primary care. In addition, these guidelines advise screening is particularly relevant in younger patients with premature ASCVD or a family history of premature ASCVD. Therefore, this CR CAG recommends (until resources allow for every adult) that Lp(a) should be checked in:

- Patients with personal or family history of premature atherosclerotic disease
- Patients with recurrent CVD whose risk factors are otherwise controlled

Heterozygous familial hypercholesterolaemia genetic testing

Heterozygous familial hypercholesterolaemia (HeFH) is a common codominant monogenic dyslipidaemia (estimated prevalence 1/250) causing premature CVD due to lifelong elevation of plasma levels of LDL-C (Mach *et al.,* 2020). It remains frequently under recognised and hence undertreated.

Whilst HeFH is a disorder requiring specialist care outside the scope of a CR team, the CR initial assessment can provide an opportunity for HeFH to be diagnosed. This is important for 2 reasons

i. A diagnosis of HeFH substantially adds to patient's risk of a recurrent CV event and so they merit very intensive secondary prevention measures.
ii. There is a 1:2 chance their first degree relatives also have HeFH and identification therefore of an index case can lead to further diagnoses through cascade screening (though this is not the responsibility of the CR team).

It is recommended therefore that a diagnosis of HeFH be considered in patients with premature CVD attending CR (aged <55 years for men and <65 years for women) and with an untreated LDL-C of >5 mmol/L. A familial hypercholesterolaemia (FH) score should be recorded using the Dutch Lipid Network Criteria (Appendix 9: Dutch Lipid Criteria) and if the score is 6 or greater the patient should have a blood sample sent for genetic testing. If FH is identified the patient should be referred for management to a specialist service.

7.2.10.3. Echocardiogram

All patients should have had an echocardiogram in advance of programme commencement to review in particular their ventricular function and rule out any valvular abnormalities. CR teams should have the ability to refer a patient for same to their local service if required.

Key messages

- Every patient attending CR should have a measurement of their FBC, renal function, liver function, thyroid function, lipids and HbA1c.
- An NT-proBNP should be measured if symptoms of HF or abnormal LV function.
- In patients with premature CVD or a family history of same additional blood tests include lipoprotein(a) and genetic testing for FH may be required.
- All patients must have a 12 lead ECG and an echocardiogram prior to CR.

Go to **section 8.2.3** for treatment and management

7.3 Physiotherapy assessment

7.3.1. Introduction:

There is compelling evidence of overwhelming health benefit provided by reducing sedentary behaviour, increasing physical activity participation, gaining cardiorespiratory fitness and optimising muscle strength and endurance in people living with ASCVD (Ajufo *et al.,* 2024; Biswas *et al.,* 2015; Chacon and Fiani, 2020; Collins *et al.,* 2022; Ekelund *et al.,* 2016; Garcia *et al.,* 2023; Hupin *et al.,* 2015; Lang *et al.,* 2024; Mcleod *et al.,* 2019; Paluch *et al.,* 2023; Torun ,2024). Changing physical activity status, across any of these important parameters, requires behaviour change as well as appreciation of functional ability and possible limitations. As such, the assessment of physical activity status is multicomponent.

This comprehensive evaluation at baseline, carried out by the CR physiotherapist, provides an important starting point for the physical activity intervention and must be administered by a healthcare professional who meets the essential competencies and minimum qualifications (Appendix 10 - Essential Competencies and minimal Qualifications to lead the exercise component of Cardiac Rehabilitation).

Assessment of physical activity status is underpinned by 5 key pillars (Figure 8), as follows:

- Habitual physical activity and sedentary behaviour (both prior to and subsequent to their CV diagnosis)
- Functional capacity and risk stratification
- Muscle strength and function
- Behaviour change status (including beliefs around physical activity, their readiness for change, barriers and motivators)
- Physical function (including physical limitations)

Figure 8 The 5 Key Pillars to the Physiotherapy Assessment

1. Physical activity participation and assessment of sedentary behaviour	2. Functional capacity and risk stratification	3. Muscle strength and function	4. Physical activity and behaviour change	5. Physical function
• International Physical Activity Questionnaire (IPAQ) • Research-grade accelerometry	• Functional capacity test e.g. Maximal Exercise Stress Test, Chester Step Test, Six-Minute Walk Test, Incremental Shuttle Walk Test, Incremental Cycle Ergometry • BACPR risk stratification tool	• Hand grip strength via dynamometry • Submaximal assessment of 1 repetition maximum • Sarc-F questionnaire to screen for sarcopenia	• Stage of change • Readiness for change • Importance and confidence • Barriers • Activity preferences • Physical limitations • Key goals	• Physical limitations to activity • Timed up and go (where relevant) • 5 times sit-to-stand test (where relevant) • Inspiratory muscle testing (where relevant)

Following this assessment, findings should then be accurately interpreted to risk stratify the patient and devise a safe, clinically effective and individualised exercise/physical activity prescription. This prescription should be monitored and evaluated using reproducible standardised measures. Supporting tangible changes in any of these health-related fitness measures is an important part of a comprehensive cardiac rehabilitation programme, with the patient and what matters most to them at the heart of the programme.

7.3.2. The five pillars assessment

7.3.3. Pillar 1: Physical activity participation and assessment of sedentary behaviour

Cardiac rehabilitation programmes should measure a patient's physical activity and sedentary behaviour through self-reported tools and also objectively through accelerometry. This is to ascertain if individuals are meeting the current physical activity targets and limiting their sedentary time, as recommended.

Every Move Counts National Physical Activity and Sedentary Behaviour Guidelines for Ireland recommends participation in 2 hours 30 minutes - 5 hours of moderate to vigorous physical activity (MVPA) per week (Department of Health, 2024). This is also reflected in international guidelines specific to CR populations (Brown *et al.,* 2024; Verdicchio *et al.,* 2023; Visseren *et al.,* 2021).

Sedentary behaviour is not the same as physical inactivity. Sedentary behaviour is defined as "any waking behaviour characterised by an energy expenditure less than or equal to 1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture" (Bull *et al*., 2020). Research shows us that high sedentary time carries an independent risk for CVD, cancelling out some of the benefits of physical activity (Husu *et al.,* 2025; Onagbiye *et al.,* 2024; Salman *et al.,* 2019).

Both physical activity participation and sedentary behaviour need to be measured, as a patient could be meeting the physical activity guidelines but for the remainder of their awake time be highly sedentary. Whilst all sedentary time matters, sitting time specifically has a strong evidence base with both high overall daily sitting time and prolonged sitting time being associated with adverse cardiovascular outcomes (Ajufo *et al.,* 2024).

Physical activity and sitting time should be measured by both self-report using validated questionnaires and objectively via research grade triaxial accelerometry and this CR CAG recommends both approaches.

Self-reported Measure of Physical Activity and Sedentary Behaviour

The CR CAG recommends the International Physical Activity Questionnaire (IPAQ) as a self-reported measure that is validated to capture both participation in moderate intensity physical activity as well as a sitting time measure (Craig *et al*., 2003). The IPAQ has several versions (long-form (LF), short-form (SF) questionnaire, interview and telephone administered version). Given the CR CAG includes accelerometry measured physical activity and sedentary behaviour, the IPAQ-SF has been recommended. This is a simple questionnaire, comprising of 4 question areas (vigorous, moderate, walking and sitting) and takes less than 5-minutes to complete. It can be sent out within a pre-assessment questionnaire pack but must be checked and answers

validated in the assessment. If one question is not answered it is not possible to score. How to administer the IPAQ-SF, score the data from the questionnaire and interpret the findings is shown in Appendix 11 - International Physical Activity Questionnaire.

The IPAQ-SF has four areas of questioning; vigorous activity, moderate activity, walking and sitting. From this the scoring produces an overall total activity score and a categorical score

The total activity score:

- This is expressed in MET minutes per week.
- This is calculated using the formula: MET Mins = MET Level x Minutes of Activity x Days of Activity.
- Walking is assigned a MET value of 3.3, moderate-intensity activities 4, and vigorous-intensity activities 8.

The categorical score:

- **Low Activity Level**: Individuals who do not meet the criteria for moderate or high activity levels.
- **Moderate Activity Level**: Achieved by meeting any of the following criteria:
  Engaging in 5 or more days of any combination of walking, moderate-intensity, or vigorous-intensity activities, totalling at least 600 MET minutes per week.
- **High Activity Level**: Achieved by meeting any of the following criteria:
  Engaging in 7 or more days of any combination of walking, moderate-intensity, or vigorous-intensity activities, totalling at least 3000 MET minutes per week.

Case Study 2: At the initial assessment: Using the IPAQ-SF patient reports no vigorous activity participation, no moderate intensity activity outside of walking and walking four days a week for 30 minutes. They report a typical sitting time of 9 hours a day.

Evaluation:

a. Total energy score

Vigorous = 0

Moderate = 0

Walking = Frequency (days per week) x Intensity (3.3 METs) x Time (Minutes)

Walking = *4 (days) x 3.3 (METs) x 30 (mins/day) = 396 MET minutes per week*

Total = ***= 396 MET minutes per week***

b. Categorical score **= Low activity level**

c. Sitting time **= 9 hours per day on average**

This tool provides a baseline measurement and then more personalised goal setting accordingly. At the end of programme both the total energy score and the categorical score can be compared. In this tool it is important to be aware that sitting time, whilst captured, is often underestimated. Global data highlights when using self-reported measurement of sitting time, the recommended target is less than 8 hours per day (Li *et al.,* 2022).

Objective Measurement of MVPA and Sedentary Time

Whilst self-reported measures such as the IPAQ are useful, they are prone to several biases that typically result in over estimation of physical activity levels in some individuals and (as highlighted above) an underestimation in sitting time. As such, this CR CAG endorses the use of digital technologies, which often include wearable devices such as accelerometers, integrated within modern CR programmes (Golbus *et al.,* 2023; Scherrenberg et al., 2025)

Using triaxial accelerometry as an assessment tool enables CR programmes to robustly measure physical activity participation, overall sedentary time and sitting time specifically. This is a more robust measurement and recommended in international guidelines. In the context of MVPA, a device, such as the activPAL, can measure all participation at a minimum threshold intensity but it can also distinguish more purposeful MVPA, which lasts for more than a minute and is at an intensity of greater than 100 steps per minute.

Accelerometry also measures overall sedentary time and specifically sitting time, with devices able to distinguish sitting from standing being more robust. In activPAL measured sitting time, all-cause mortality increased gradually between accumulating 7.5 to 9 hours of daily sitting time and attaining a threshold equal to 9.5 hours or more daily was associated with a significantly higher mortality risk (Ekelund *et al.,* 2019).

Ultimately this requires CR practitioners to be suitably trained and supported in downloading accelerometery data and then being equipped to select the most robust measurements within the dataset provided. Some examples of devices that can more robustly measure physical activity participation and sedentary behaviour include:

- 1. ActivPAL
- 2. ActiGraph
- 3. Axivity
- 4. GENEActiv
- 5. Sensewear

Ideally aim for this accelerometry measurement to be completed 1-week prior to the patient attending the initial assessment (IA), but this is not always practical. In these instances, the device would be fitted at the time of the IA and worn for seven consecutive days. Importantly the patient would be asked to behave as they normally would for this period.

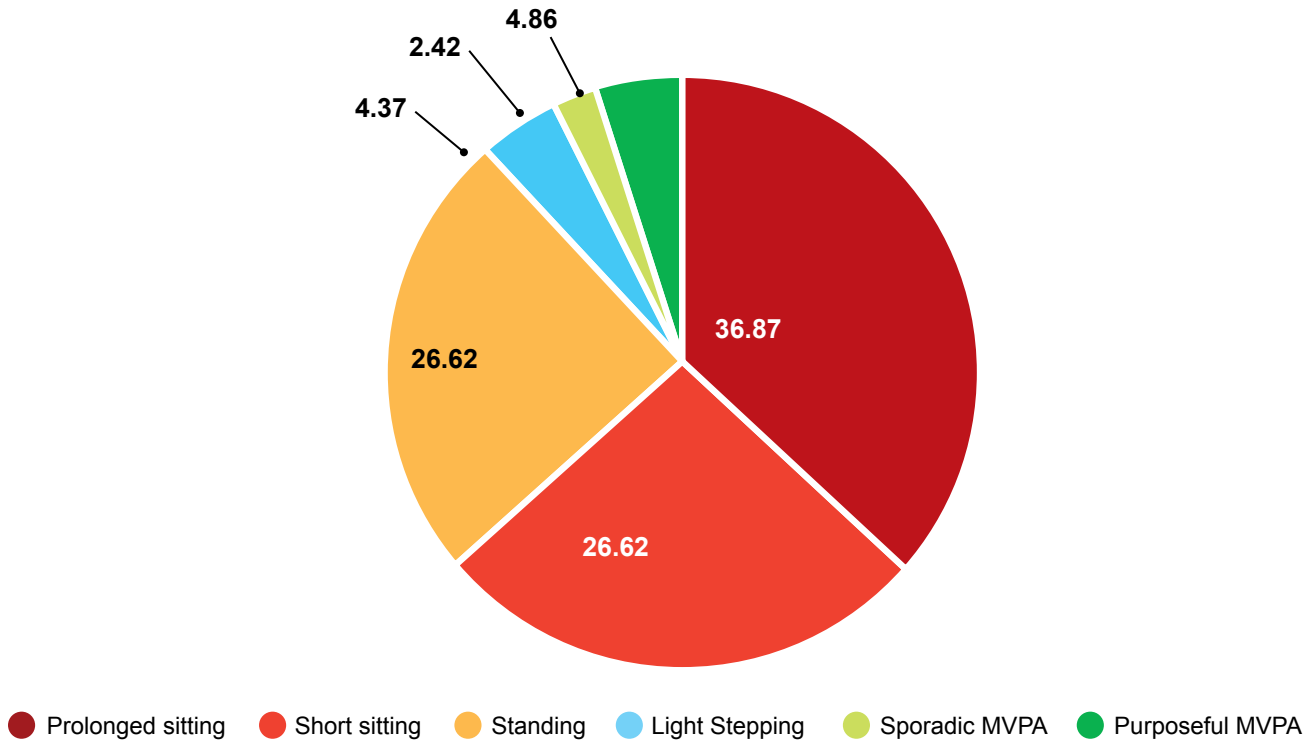
These devices allow robust measurement of:

- All MVPA (both sporadic and purposeful): Being able to distinguish all MVPA from purposeful is important. Identifying MVPA that is lasting more than a minute at a time at an ideal intensity threshold (lasting more than 1 minute at a step cadence of 100 steps or more) gives a more objective measurement.
- Total sitting time (prolonged and sporadic): Both total sitting time and prolonged sitting time are important measurements because breaking up prolonged sitting time as well as reducing total sitting time have meaningful positive health outcomes.

- Standing time: Recording this formally is important because the goal would be to replace sitting and reclining time with more standing and light activity time. As highlighted earlier, every move counts and so replacing sedentary time with any level of activity is beneficial.
- Light activity: The same applies. There is no lowest threshold for movement to be beneficial to health.

The software analysis programme of a triaxial accelerometer can often support both summative and visual feedback. One method, which considers the every move counts approach presents the percentage of time spent in each domain (Figure 9) and repeat assessments enable a visual representation of shifting activity status overall. Replacing sedentary time with any level of physical activity is beneficial and the focus therefore should not be purely on the achievement of MVPA targets. Presenting patients with a summary of their "physical activity status" determined by the initial assessment can support goal setting, and subsequent comparisons over time (Table 5).

Figure 9 Interpreting accelerometry data (% breakdown)



Case Study 3: The patient wears an activPAL (one example of a triaxial accelerometer) at the initial assessment. They wear it for seven consecutive days and are advised to continue as normal for them. At the final week of the programme, they wear the device again. This device is a pure measurement tool and gives no feedback. Their initial results are used to inform personalised goals. The pre-post comparison can be used to give objective feedback. An example of a pre-post report is shown below (Table 5).

Table 5 Example of a pre and post programme accelerometry data report

	1st Measure	Follow-Up Measure	Summary Of Changes
Light stepping time	18 mins/day 126 mins/week	24 mins/day 168 mins/week	**+06 mins/day** **+42 mins/week**
Moderate to vigorous stepping time (all)	15 mins/day 105 mins/week	19 mins/day 133 mins/week	**+04 mins/day** **+28 mins/week**
Average moderate to vigorous stepping time (more than 100 steps/minute)	09 mins/day 63 mins/week	11 mins/day 77 mins/week	**+02 mins/day** **+14 mins/week**
Average daily number of steps	2,236 steps	2,840 steps	**+604 steps**
Average daily sitting time	16 hours	14 hours	**-02 hours**
% Sitting time in your awake time	88%	73%	**-15%**
Average daily standing time	02 hours	05 hours	**+03 hours**
Average number of times you changed from sitting to standing in a day	60 per day	54 per day	**-06 per day**

Physical Activity and Sedentary Behaviour Informing Risk Stratification: The data collected from the IPAQ-SF and accelerometry ultimately inform goal setting, exercise prescription, activity programming and form part of the patient's assessment of their category of risk stratification for exercise. For example, a patient may present with a good cardiorespiratory fitness (>7 METs) placing them potentially in the "low risk" category. However, if they are unaccustomed to MVPA this needs to also be considered. Consequently, this component of the assessment also informs the overall approach to safe and effective physical activity programming.

7.3.4. Pillar 2: Functional capacity and risk stratification

Functional capacity is the ability of an individual to perform aerobic work as defined by the maximal oxygen uptake (V̇O2max) (Arena et al., 2007), commonly referred to as cardiorespiratory fitness (CRF). The assessment of functional capacity reflects the ability to perform activities of daily living that require sustained aerobic metabolism, which is dictated by the integrated efforts and health of the pulmonary, cardiovascular, and skeletal muscle systems. It is essential to determine functional capacity prior to commencing a structured CR programme, as it provides important diagnostic and prognostic information, including being utilised for risk stratification, and is central to guiding a tailored exercise prescription (Brown et al., 2024).

The gold standard assessment of V̇O2max involves direct measurement of pulmonary gas and requires the participants to engage in a maximal exercise test until exhaustion (i.e. Cardiopulmonary Exercise Testing (CPET)). This approach however is not without significant limitations including that not all CVD patients achieve a near maximal effort during CPET (Reeves *et al*., 2016; Hansen *et al*., 2022). Furthermore, the test itself is costly, requires the expertise of highly trained personnel and in Ireland its availability is limited to a few select specialist centres.

As such, indirect estimations of V̇O2 max using maximal exercise tolerance testing (ETT) without direct pulmonary gas measurement is currently recommended in most guidelines (Verdicchio *et al*., 2023; Hansen *et al*., 2022; Brown *et al*., 2024) whilst acknowledging its limitations.

But availability of maximal ETT testing within 2 weeks of the recruiting event can also be variable/ limited resulting in significant delays to commencement of CR and in turn loss of motivation for patients to attend.

Submaximal functional capacity testing is a widely used safe and alternative approach to maximal exercise testing for the purposes of risk stratification and initiating a moderate intensity exercise prescription. A significant advantage of submaximal testing is that it can be conducted by the CR team in the field (Hansen *et al*., 2022; HSE, 2023a; Reeves et. 2016; Verdicchio *et al*., 2023) therefore enabling an efficient and uncomplicated transition from acute care to CR.

In addition, with our aging population many patients now present with multiple co-morbidities and limited functional capacity resulting in often inconclusive maximal exercise test results or use of alternative approaches, such as pharmacological perfusion stress tests. Such tests fail to provide information on exercise-related physiologic responses and functional capacity that facilitate exercise prescription and enhance prognostic stratification (Reeves *et al*., 2016).

Prior to commencing the exercise training component of cardiac rehabilitation, it is essential to include a measure of functional capacity. Importantly the same CRF needs to be repeated at the end of programme to objectively evaluate programme efficacy. This essential requirement of pre-post measurement often makes timely maximal testing approaches unfeasible. Hence submaximal testing protocols are typically used for pre-post evaluation regardless of whether patients have had a maximal exercise test prior to commencing a cardiac rehabilitation programme (ACSM, 2022; Reeves et al., 2016; Verdicchio *et al*., 2023).

Submaximal testing provides the necessary information required for risk stratification categorisation, prescription of moderate intensity exercise training and effective home-programming. It is also advantageous as it offers a functional assessment, and this is more

relevant than ever in the growing population of patients with advanced ages, multi-morbidity, frailty, and obesity (Reeves *et al*., 2016). In instances where a recent maximal stress test has been performed and done so under appropriate conditions (e.g. on current medications, post-procedure etc), the physiotherapist should incorporate the report findings into their assessment, as the data could assist with further personalisation of exercise prescription.

As serial assessments of physical function before and after a CR programme are required, this provides further rationale as to the inclusion of submaximal testing approaches to evaluate functional capacity in CR delivery in this CR CAG. Serial assessments add value as they clarify relative improvements as a result of the intervention, guide refinement of exercise prescription as functional performance improves, and often provide patients with useful perspectives in regard to recreational goals, work duties, sexual activity, symptoms, as well as improvements in prognosis on the basis of CRF (Hansen *et al*., 2022; Reed *et al.,* 2020; Verdicchio *et al.,* 2023).

7.3.4.1. Submaximal exercise testing

The following range of submaximal functional capacity tests have all been shown to be reliable and valid to use in cardiac rehabilitation settings. (Reed *et al.,* 2020).

- Cycle Ergometry Tests (such as the Astrand-Rhyming, Ekblom-Bak, ramp/graded cycling) (Gerlach *et al*., 2020; Reed *et al.,* 2020)
- Chester Step Test (CST) (Sykes, 1998)
- Incremental Shuttle Walk Test (ISWT) (Singh *et al.,* 1992; Pepera and Sandercock 2022)
- Six-Minute Walk Test (6MWT) (Bittner *et al.,* 2007)

The choice of test within these options will partly be dependent on the patient's presentation e.g. for patients with overt limitations such as significant breathlessness or considerable mobility issues, the 6MWT may be a more appropriate test, allowing for rests and being self-paced in nature, but also available space and equipment. The physiotherapist should select an appropriate test that considers all these factors. Appendix 12: Functional capacity testing frameworks, outlines protocols for these submaximal tests. Table 6, Table 7, Table 8 and Table 9 below outline the advantages and disadvantages of each submaximal test and includes some helpful practice points regarding to each test

7.3.4.2. Monitoring during the submaximal test

Rating of Perceived Exertion (RPE) and heart rate (ideally both wherever possible) should be collected during the submaximal test, combined *always* with direct observation. RPE is a valuable, reliable and recommended indicator in monitoring exercise tolerance (Hansen *et al*., 2022; Verdicchio *et al.,* 2023). Either the Borg 6-20 RPE Scale and Category Ratio 10 Scale (CR-10) (Borg, 1998) (Appendix 13: Rate of Perceived exertion (RPE)) are appropriate to use in CR settings. It can often take time for patients to become familiarised to RPE. As such, the importance of direct observation and use of simple tools, such as the "Talk Test" are also recommended (Hansen *et al*., 2022; Verdicchio *et al.,* 2023).

Heart rate can be effectively collected using a validated heart rate wearable or via pulse oximetry. In some cases, heart rate is not an accurate marker of exercise intensity (e.g. for people in atrial fibrillation). In such cases RPE and direct observation still provide the necessary information required to estimate aerobic capacity.

Telemetry during assessment of functional capacity using submaximal testing approaches is not routinely required (Brown *et al.,* 2024). These submaximal assessments use established protocols that have been found to be clinically safe and effective. Submaximal assessments exercise individuals to levels no higher than would be encouraged independently at home.

All these submaximal assessments of functional capacity are based on the principle that there is direct relationship between workload and heart rate, oxygen uptake and RPE and thus allow an estimation of maximal aerobic capacity. They should all be carried out in a standardised way and in accordance with their protocol. Resources for all aspects of carrying out functional capacity tests (pre-screening checklist, instructions, equipment needed, test record sheets, tester competency checklists) are available in Appendix 12: Functional capacity testing frameworks.

7.3.4.3. Conducting a submaximal exercise test

7.3.4.3.1. Safety protocol

See section 1.3.1.3 Exclusion Criteria

Whilst the risk of adverse events is minimal, both exercise testing and supervised exercise training do carry a small risk, and as such a clear local safety protocol should be in place for each centre. All CR interdisciplinary team members must ensure that this is adhered to and sign off on their awareness of their local policy. All CR staff must also be up to date with basic life support training and ensure there is readily available access to an automated external defibrillator (AED).

7.3.4.3.2. Prior to test

- Establish patient is clinically stable. The physiotherapist should review the diagnosis, investigations and treatment as well as cardiac symptomatology, presence of significant coronary disease, LV systolic function, history of arrhythmia and use of heart rate lowering medication.
- Review any other past medical history including physical limitations e.g. osteoarthritis, chronic obstructive pulmonary disease (COPD).
- Undertake pre-exercise test checklist (Appendix 12: Functional capacity testing frameworks).
- Ensure there are no contraindications to exercise testing.

7.3.4.3.3. The following parameters should be recorded

- Pre exercise heart rate.
- Heart rhythm (manual pulse check/ECG, noting this may have already been determined within the nursing assessment if this has occurred prior to exercise testing).
- Pre exercise blood pressure.
- Maximum and target heart rate calculations (Appendix 14: Heart Rate and determining target heart rates).

- For most the target range is 40-70/75% of heart rate reserve (HRR) for moderate intensity, for low-risk individuals who are accustomed to regular moderate to vigorous activity this can be extended to 80% HRR.

Ensure patients are:

- Fitted with a recommended heart rate monitor - check measuring accurately prior to commencing test.
- Given a standardised explanation of test (Appendix 12: Functional capacity testing frameworks).
- Familiar with relevant RPE to be used (spend time educating for good understanding and increased accuracy of test).

7.3.4.3.4. During the test

Standardised testing procedure should be followed (Appendix 12: Functional capacity testing frameworks) which will vary as per test selected e.g. with ISWT walk with patient for first minute, with CST step with patient until step rate corrects etc.

- Give standardised encouragement.
- Record HR and RPE every minute.
- Undertake continual observation for signs and symptoms of exertion (e.g. breathlessness, sweating, reduced quality of technique).

7.3.4.3.5. Ending the test

For most patients the end point is when they achieve 70-75% HRR (40 –70% HRR is moderate intensity). For low-risk individuals who are regularly accustomed to moderate to vigorous physical activity it may be appropriate to extend to an end point of 80% HRR (this represents the lower range of vigorous intensity).

Otherwise, the test should be stopped at any point if the patient:

- Experiences chest pain, dizziness, colour change, severe breathlessness
- Is unable to maintain the required workload
- RPE 15
- At the patient's request
- When time is elapsed (For self-paced tests for example, 6MWT, or if CST or ISWT completed)

7.3.4.4. Interpreting the submaximal test result

Irrespective of which test is used the following should be calculated

i. MET levels achieved (Appendix 15 Submaximal functional capacity test worked examples).

ii. An estimated maximal MET should also be calculated to give an approximate value of the individual's maximal aerobic capacity (Appendix 16: MET calculations).

This maximal estimation can be used to guide:

- Risk stratification for exercise.
- Guide an exercise prescription of activities suitable for that individual (40-70/80% of estimated maximal exercise capacity).
- Identify exercises and activities that may be contraindicated, need caution or adaptation for that individual (i.e. If they want to return to activities that require a higher MET level than their indicated capacity).
- Evaluation of the individual's physiological response to exercise.

Low CRF or aerobic capacity is a strong predictor of risk and hence this measure features in risk stratification tools. To be categorised as "low risk" requires a functional capacity greater than 7 (Appendix 17: Risk stratification).

7.3.4.5. Which submaximal test to use?

It is essential that the physiotherapists consider which of the testing modalities is most suited to the patient presentation. In the ideal situation, CR programmes should have the full choice of options for testing modalities, necessary space and equipment required. This however is often not the case, mostly due to space restrictions or available equipment. As a minimum, every CR programme should have *at least one* submaximal test option available for higher functioning patients (e.g. incremental cycle ergometry or the Chester Step Test) and one alternate test more suited to lower functioning individuals (Incremental Shuttle Walk Test or Six-Minute Walk Test). Each of the submaximal tests have advantages and disadvantages outlined in the tables below. Ultimately the test selected should be the one most suitable for the patient and which can be administered within the CR setting available.

Table 6 Incremental cycle ergometry testing - advantages and disadvantages

Incremental Cycle Ergometry	
Advantages	**Disadvantages**
Minimal space	Orthopaedic limitations can exclude this
Incremental (2 mins, steady state achieved)	Can be unsuitable in severe obesity (check bike weight limit)
Stable position	Less familiar activity for some

Practice points

- The only submaximal test that allows for in-test blood pressure measurements- useful if blood pressure response to exercise warrants assessment.
- Use the 25-watt protocol for lower functioning individuals.
- Maintain as close to 60 reps per minute as possible.

Table 7 Chester Step Test (CST) - advantages and disadvantages

Chester Step Test	
Advantages	**Disadvantages**
Minimal space required	Orthopaedic limitations can exclude this testing modality
Time (maximum 10 minutes)	Can be unsuitable for those with reduced co-ordination or cognitive impairment
Incremental (2 minutes which more readily allows for steady state to be achieved)	Can be less accurate in people with BMI >30 kg/m^2

Practice points

- Use pre-test physical activity levels to choose step height. The 20cm step will be appropriate for most people. Consider the 25cm step for individuals who engage in regular mod-vigorous physical activity (jogging). Use the 15cm step for those who have low baseline levels of physical activity or are frail.
- Most people should end their test on levels 3 or 4. If your participant stops before or after these levels consider your choice of step height or whether a different submaximal test may have been more suitable.
- The participant can hold on to a support/rail, but this must be to the side and not in front. Record the type and position of the support in test documentation.
- Ensure good technique with the whole foot being placed on the step at each indication and throughout the duration of the test.

Table 8 Incremental Shuttle Walk Test (ISWT) - advantages and disadvantages

Incremental Shuttle Walk Test	
Advantages	**Disadvantages**
Minimal equipment	Needs space (10m)
Familiar activity	Time
Incremental (In built warm up and standardised speeds)	1-minute stages (steady state in most cases not achieved)

Practice points

- Requires a 9m route - place markers (typically cones) 0.5m in from the 10m point to allow for turning.
- Ideally the patient should achieve reaching the cone by the beep in one continuous walk (i.e. not be waiting at the cone for the next beep (this is because HR and RPE interpretations are for a given speed on each level).
- Ensure HR and RPE are recorded before the end of each level (i.e. not at the start of the next level).
- After 2 episodes of not maintaining pace (not reaching the cone by the beep) the test should be discontinued.
- The patient can run at higher levels. In doing so METs values need to be adjusted accordingly from walking values to running values.

Table 9 6-Minute Walk Test (6MWT) - advantages and disadvantages

6 Minute walk test	
Advantages	Disadvantages
Minimal equipment	Needs space (30m)
Familiar activity	No in-built warm up/ not incremental
Less time than ISWT	Ceiling effect
Self-paced, able to rest if required	

Practice points

- Most suitable for individuals with low functional capacity e.g. due to heart failure or severe arthritis or those with peripheral arterial disease (PAD), or individuals with co-morbidities that result in significant difficulty complying with externally paced stepping/walking/cycling.
- Encourage the patient to walk at a “comfortable speed” (moderate intensity) not as fast as they can - it is not a maximal test.
- Ensure the tester does not walk with the individual being tested.
- If >400m achieved, then it suggests a higher level of functional capacity and this test may not give accurate representation of sub maximal aerobic capacity (consider an alternative submaximal test).
- The protocol indicates a 30m track and for many CR settings this is not available. If this is the case aim to use the maximum distance available in your facility but make sure to use the same distance for post assessment.

7.3.4.6. Risk Stratification

Participating in exercise training in cardiac rehabilitation settings (whether centre-based, home based or virtually) is very safe with very low rates of adverse events reported (Taylor *et al.,* 2022). Nonetheless, participating in exercise training does present a small risk and as such it is mandatory to formally assess and document each patient’s “risk stratification”. This is a categorisation of a risk of a cardiac event during exercise (high, moderate or low) and enables CR practitioners to provide an individual exercise prescription, suitable level of monitoring and a tailored progression plan that ensures every patient receives a safe and effective personalised programme accordingly.

This CR CAG recommends the use of the BACPR risk stratification tool (Table 10 and Appendix 17: Risk stratification), which is based on implementing the latest AACVPR guidelines (AACVPR, 2021) and supports decision making regarding classification of low, moderate or high risk.

Table 10 BACPR Risk Stratification Tool

Criteria that increase risk when exercising	Y or N If all are N: = Low risk	If any Y but NO High risk apply: = Moderate	If any ONE applies tick Y against it: = High Risk
Reduced Left Ventricular Function/ Heart Failure:			
• EF <35% poor LVF (severely impaired)	N	N	**Y**
• EF 35-49% moderate LVF	N	Y	N
• Heart failure	N	N	**Y**
Ischaemia:			
• Ongoing angina symptoms	N	**Angina at ≥ 7 METS**	**Angina at < 5 METS**
Ventricular Arrhythmias:			
• History of ventricular arrhythmias at rest or exercise	N	N	**Y**
• Implanted ICD	N	N	**Y**
• History of cardiac arrest	N	N	**Y**
Depression:			
• Clinically significant depression treated with medication	N	N	**Y**
Functional Capacity:			
• Maximal functional capacity <7METS	N	**<5METS**	**<3METS**
• Risk Stratification	**Low**	**Moderate**	**High**

Look at the columns in the Risk Stratification Tool.

- To identify **Low** Risk: all the criteria must be N.
- To identify **High Risk:** one Y in any of the criteria automatically classifies as high risk.
- **Moderate Risk**: If they are not high or low, then moderate risk applies, clarified by the criteria in orange boxes.

BACPR Tool based on AACVPR (2021) Stratification of risk for cardiac events during exercise participation.

Case Study 4: At the initial assessment: Your patient post MI with now chronic heart failure performs a 6MWT and achieves 270 metres at 60% of their HRR and an RPE of 13. They needed to stop once and rest for 30 seconds, due to SOB.

Evaluation:

Using the BACPR Reference Tables:

- This patient achieved on average 45 metres per minute (3.2 METs)
- This estimates a functional capacity of ~5 METs (estimated METmax)
- This patient is therefore not eligible for the low-risk stratification category and is either moderate risk or high risk depending on other parameters, such as ejection fraction (EF), presence of symptoms etc.
- Exercise prescription based on this individual's lower functional capacity will be between 2 – 3.5 METs (40-70% of METmax) and need to be individualised accordingly. This can be used to prescribe exercise as well as advise on home programming.

Key messages:

- Submaximal assessments of functional capacity are based on the principle that there is a linear relationship between workload and heart rate / V02 / RPE and thus allow an estimation of maximal aerobic capacity.
- Choice of test is individualised to each patient.
- Tester must ensure competency in functional capacity testing (Appendix 12: Functional capacity testing frameworks).
- Functional capacity testing should be carried out in a standardised way and in accordance with their protocol.
- Test end point is determined in advance.

7.3.5. Pillar 3: Muscle strength and function (including sarcopenia assessment)

Resistance training is an important component of cardiac rehabilitation. It aims to enhance muscular adaptations such as strength, mass and endurance, reduce cardiovascular risk factors and improve functional performance (Paluch *et al.,* 2023). This component forms an essential part of a comprehensive CR programme as it is associated with numerous cardioprotective properties (Mcleod *et al*., 2019).

Muscle strength testing, as part of the initial and follow up assessments, is therefore recommended as a standard part of the physiotherapy assessment. Initial findings guide individual exercise prescription in terms of the resistance training component.

Muscle strength testing is also part of sarcopenia screening (discussed below).

Measures used in strength assessment:

1. SARC-F sarcopenia screening questionnaire (all patients)
2. Hand grip measured via hand-held dynamometry (all patients)
3. Estimation of 1-repetition maximum (1-RM) (all patients)

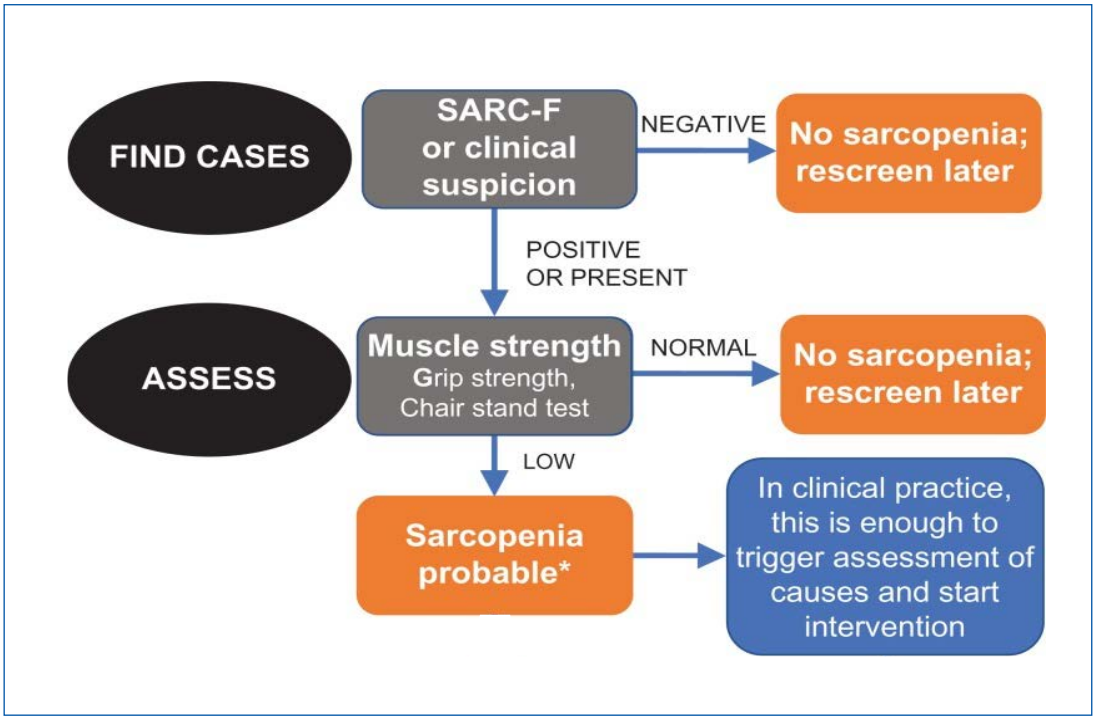
7.3.5.1. Sarcopenia screening

Sarcopenia is a progressive and generalised skeletal muscle disorder associated with adverse outcomes including falls, fractures, physical disability and mortality (Cruz-Jentoft *et al*., 2019). Sarcopenia is also associated with faster progression of cardiovascular diseases (Yoshimura *et al.,* 2025). Due to the high incidence of sarcopenia in older adults, and those living with obesity or heart failure (prevalence can range up to 66% in those hospitalised for acute decompensated HF), it is important to screen for sarcopenia in patients in cardiac rehabilitation (Zhang *et al.,* 2021).

Sarcopenia is probable when low muscle strength is detected. A diagnosis is confirmed by the presence of low muscle quantity or quality. When low muscle strength, low muscle quantity/ quality and low physical performance are all detected, sarcopenia is considered severe.

Cruz-Jentoft *et al*. (2019) recommend a pathway of Find, Assess, Confirm, Severity for cases of Sarcopenia. Figure 10.

Figure 10 Find, Assess, Confirm, Severity for cases of Sarcopenia (adapted from Cruz-Jentoft *et al.*, 2019)



As part of the physiotherapy assessment in cardiac rehabilitation, the first 2 elements (Find and Assess) are carried out. The next element – (Confirm) is outside the scope of the cardiac rehabilitation physiotherapist, but information gained on physical performance during the functional capacity test (Severity) will be useful to include if referring the patient onward to GP and dietitian.

Sarcopenia screening - Find:

Complete SARC-F Questionnaire (Malmstrom and Morley, 2013), see Figure 11, with all patients as part of subjective assessment. This tool scores self-reported information on signs that are characteristic of sarcopenia.

Any difficulty with?

S*trength*	Lifting and carrying
A*ssistance with walking*	Walking across a room
R*ise from chair*	Getting up from a chair
C*limb Stairs*	Walking upstairs
F*alls*	Any falls in the past year

Figure 11 SARC-F Questionnaire (Malmstrom and Morley, 2013)

A score of 4 or more on SARC-F is indicative of sarcopenia.

Component	Question	Scoring	Score
Strength	How much difficulty do you have in lifting and carrying 4.5 kgs?	None = 0 Some = 1 A lot or unable = 2	
Assistance in walking	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2	
Rise from a chair	How much difficulty do you have transferring from a chair to bed?	None = 0 Some = 1 A lot or unable without help = 2	
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2	
Falls	How many times have you fallen in the past year?	None = 0 1-3 falls = 1 4 or more falls = 2	
		TOTAL SCORE	

Sarcopenia screening - Assess:

- If SARC-F positive (≥ 4): document hand grip (already performed in all patients) and Five Times Sit to Stand (5 STS) (see Pillar 5).
- If grip strength <27 kg (men), <16 kg (women), and / or 5 STS > 15 seconds sarcopenia is probable.

Sarcopenia screening - Action: Inform GP and refer to dietitian as local processes allow.

1. Hand-held dynamometry:

A valid time time-efficient method to assess muscle strength is hand grip (Vaishya et al., 2024). One of the most universally accepted and scientifically approved handheld dynamometers is the Jamar Hydraulic Hand Dynamometer, which provides both accuracy and repeatable results. See here for protocol.

Grip strength is a predictor of overall muscle strength. Normative values are shown in Appendix 18 (Patterson Medical, 2025). The results of this test can be used to ensure that an individualised resistance training programme is provided for patients. Repeat measures, during and upon programme completion, allow for analyses of programme effectiveness.

2. Estimation of 1-repetition maximum (1-RM):

Regardless of muscle strength and function scores at baseline, all CR patients benefit from prescribed resistance training at optimal intensities. To do this effectively requires the measurement or estimation of a 1-RM for all major muscle groups (Hansen *et al.,* 2022). This is typically achieved during the exercise training sessions themselves.

The gold standard measure of muscle strength is to assess 1-RM across all the key muscle groups using weights or to use isokinetic dynamometry testing. However, both approaches are currently impractical in typical cardiac rehabilitation settings as they require specific equipment, time and expertise. Throughout guidelines, an accepted and valid alternative approach is to use an estimate of 1-RM through predictive equations that extrapolate how many times a particular movement can be performed with a given weight (Hansen *et al.,* 2022; Verdicchio *et al.,* 2023) e.g. using the Holten Diagram, calculating the 1-RM based on the number of repetitions performed with moderate weight (Karvonen and Vuorimaa, 1988; Verdicchio *et al*., 2023).

These predictive equations can be applied within exercise training sessions, where the ultimate aim is for an individual to be able to perform a specific muscle strengthening exercise 10 times and reach volitional fatigue. Essentially the number of repetitions a person can perform can be used to predict the 1-RM. Each major muscle group will differ. It is impractical to measure each major muscle group and hence the inclusion of a surrogate measure of overall strength using grip strength through hand-held dynamometry as an overall outcome measure.

Key messages:

Resistance training is an important component of cardiac rehabilitation.

Muscle strength testing, incorporating sarcopenia screening is recommended as a standard part of the physiotherapy assessment.

7.3.6. Pillar 4: Physical activity and behaviour change

Health behaviour change is an integral part of empowering individuals to manage their CVD risk in the long-term (See "Health behaviour change and self-management education" section). The following should be explored when assessing an individual's health behaviours and readiness to change in relation to their physical activity and exercise:

1. Barriers to physical activity
2. Motivators (what encourages them to exercise?)
3. Interests and preferences (what are they most likely to enjoy?)
4. Previous experiences (what has worked/not worked in the past?)
5. Readiness to change (Use transtheoretical model or COM-B models)
6. Confidence (how confident are they in making the change) (Use ruler)
7. Importance (how important is making the change to them) (Use ruler)

Explore their baseline physical activity levels using Frequency, Intensity, Time and Type (FITT) (captured in physical activity participation questionnaire).

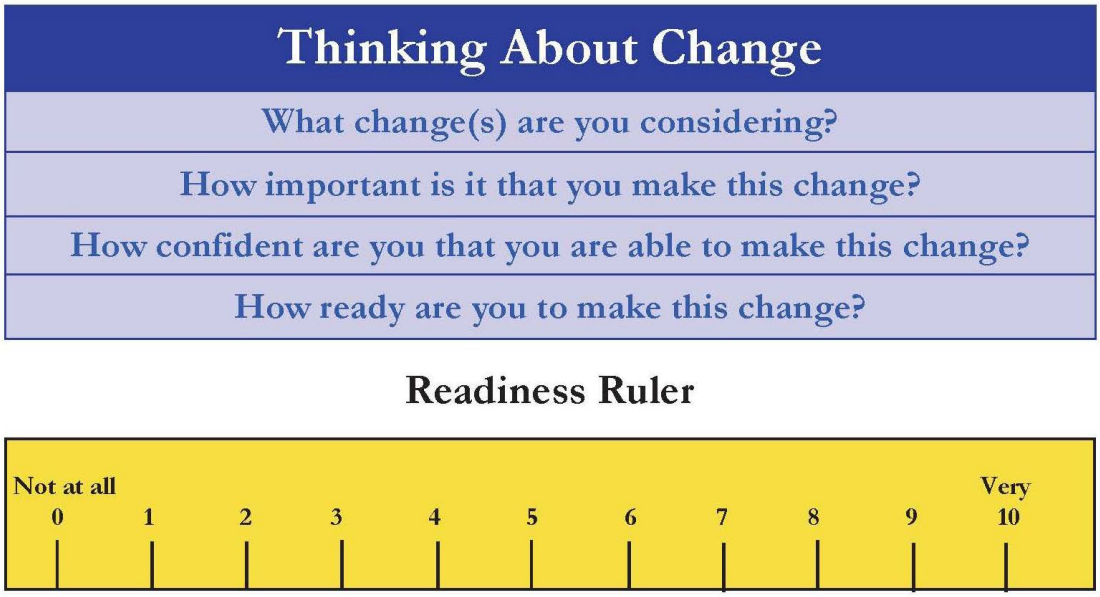


Figure 12 Applying Readiness for Change Tools to Physical Activity Assessment

(Readiness to change ruler (Flinders University, 2020)

- "What matters to you?"
- "Are there reasons you find it hard to exercise?"
- "What stops you from being as active as you might like?"
- "What has helped you be consistent / successful in the past?"
- "What exercise / activity do you enjoy / have you enjoyed in the past / do you think you might enjoy?"
- "Are you aware of physical activity opportunities in your area – is this something you would be interested in knowing more about?"
- "Do you have someone to exercise with? Would you find it easier to be more active with other people?"

Set SMART goals as described in the behaviour change section (See "Goal Setting" section) to help create an individualised plan for addressing health behaviour change. Supporting the patient to become an active participant in their care and utilising shared decision making will empower them to sustain lifestyle change and long-term self-management.

Key message:

Supporting the patient to become an active participant in their care and utilising shared decision making will empower them to make sustained lifestyle change and long-term self-management.

7.3.7. Pillar 5: Physical function

7.3.7.1. Assessment of physical limitations

All patients should be asked if they are experiencing any pain, joint or muscle discomfort and present with any physical movement limitations. The physiotherapist should also identify any relevant previous injuries or other medical considerations that could restrict movement or contraindicate exercises. These are recorded using a body chart as is in the accompanying assessment document.

7.3.7.2. Other potential functional capacity assessment tools

In very low functioning individuals, those who present with frailty or in those with marked symptomology (such as breathlessness) alternative and additional assessment tools may be warranted if unable to perform one of the recommended functional capacity tests named in pillar 2. In these instances, consider other valid measures that can capture a pre-post measurement of physical function. The two recommended examples are the "Timed Up and Go" and the "5-Times Sit to Stand" assessments (Bellet *et al.,* 2013; Bohannon, 2006; Tsubaki *et al.,* 2024; Wang *et al.,* 2022).

Timed up and go (TUG)

While the TUG cannot be used as a measure of functional capacity, it is sometimes a useful additional outcome measure for low functioning patients. It is sensitive and specific for screening falls risk. It gives an overview of balance, sit to stand and walking ability. It can be used to measure improvements over the course of the cardiac rehabilitation programme. See here for this assessment protocol.

Five Times Sit to Stand Test (5 STS)

There are other similar approaches, such as the 30-second and 1-minute "Sit to Stand" assessment. The 5-Sit to Stand has been selected as it is most time efficient. Essentially the patient does as the name implies and you time how long it takes the patient to complete the task. Noting the chair, as the same conditions need to be considered for any reviews and end of programme assessments. See here for this assessment protocol.

Inspiratory Muscle Strength in Patients with Significant Breathlessness

A useful adjunct to cardiac rehabilitation in those with evidence of respiratory muscle dysfunction is to carry out inspiratory muscle testing to aid prescription of inspiratory muscle training (IMT). (Appendix 19: Inspiratory muscle testing & training (IMT)).

Key Messages

The physiotherapist must draw on their clinical knowledge, experience, skills and clinical reasoning to determine appropriate assessment tools for each individual patient and presentation.

Following this 5 pillar assessment, findings need to be interpreted and then applied to the synthesis of a personalised physical activity and exercise programme, incorporating patient-centred goals, what matters most to the patient, their preferences and what will work best practically (e.g. face to face group sessions, 1:1 gym or home programming, virtual exercise sessions or combinations within these).

7.3.8. Closing Summary of Key Points in Assessment of Physical Activity Status and Interpretation of Findings

As highlighted, a multifactorial assessment is required as goals relating to physical activity and exercise span several key domains. It is essential that interpreting the assessment findings is beyond the physical measurements themselves and absolutely aligns to what matters most to the patient and their goals. With the collective assessment information, a personalised delivery plan can then be put into place, with regular review and follow up.

Go to **section 8.3** for treatment and management

7.4 Nutrition and dietetic assessment

7.4.1. Introduction:

Dietary interventions are key in the prevention and management of cardiovascular disease, through their significant influence on modifiable cardio-metabolic risk factors including hypercholesterolaemia, hypertension, hyperglycaemia and overweight and obesity. The need for all patients attending CR to be offered high quality, evidence-based dietary advice and support is endorsed across multiple international guidelines (BACPR, 2019, Brown *et al.*, 2024; MOC, 2023; Visseren *et al*., 2021). The 2021 ESC prevention guidelines included specific dietary recommendations including; a healthy diet is a cornerstone of CVD prevention in all individuals and adoption of a Mediterranean or similar cardio-protective diet to lower risk of CVD (Class IA recommendation) (Visseren *et al*., 2021).

There is a significant body of evidence demonstrating that increased alignment with a cardio-protective dietary pattern improves lipid profile, reduces blood pressure (Gay *et al*., 2016, Visseren *et al*., 2021) and improves glycaemic control (Evert *et al.*, 2019). In addition, a combination of medical nutrition therapy and behavioural supports, can result in clinically meaningful weight reductions (ASOI, Breen *et al*., 2022), and can enhance and sustain the benefits of medical and pharmacotherapy management of obesity for individuals in the longer term (for example body composition, cardio-metabolic and bone health).

Nutrition behaviour is complex and is influenced by a range of factors many of which are outside of an individual's control. These include but are not limited to; socio-economic status, education, culture, the food environment in which the person lives and works and access to affordable food. Evidence-based nutrition intervention in CR at an individual level needs to align with the person's values, preferences, and social determinants of health.

7.5 Dietitian assessment

The following section outlines the role of the cardiac rehabilitation dietitian. Dietitians are the only qualified and regulated healthcare professionals who should assess, diagnose and treat dietary and nutritional problems at an individual and wider public health level.

Footnote: Sections marked with an * indicate screening and assessment tools that can be completed by other members of the CR team where a dedicated CR dietitian is not available

7.5.1. The nutrition care process

The Nutrition Care Process (NCP) is an internationally recommended systematic approach to providing high quality nutrition care. Accordingly dietetic and nutrition care in CR should follow this four step nutrition care process:

1. Nutrition Assessment
2. Nutrition Diagnosis
3. Nutrition Intervention
4. Nutrition monitoring and evaluation.

(Writing Group of the Nutrition Care Process/Standardised Language Committee, 2008).

This section specifically addresses step 1: nutrition assessment and step 2: nutrition diagnosis. Steps 3 and 4 will be addressed in the section “8.4 Dietitian delivery”.

Step 1: Nutrition assessment

The purpose of nutrition assessment in cardiac rehabilitation is to collect and interpret data to identify nutrition-related problems, their causes and significance as they relate to cardiovascular health and co-morbidities. The nutrition assessment will review information gathered the following headings;

1. Medical Tests, Surgical History and Procedures
2. Biochemistry
3. Prescribed Medications
4. Nutrition Focused Physical Findings
5. Anthropometric measurements and nutritional requirements

The following section has been developed to support the CR dietitian completing their NCP assessment. It is not an exhaustive list, as other factors may need to be considered for individual patients, due to the diverse population attending a CR programme. See Appendix 20: Guidance for individualised Dietetic assessment and nutritional interventions for specific cardiac rehabilitation population sub-groups.

It is important to note that some of the assessment information may already be obtained by the nurse and physiotherapist, therefore please refer to the other sections of the assessment document to review as appropriate.

Nutrition care process with a focus on key considerations for CR

1. Medical Tests, Surgical History and Procedures

- Review CV diagnosis, treatment, co-morbidities as already outlined in the nursing section.
- Note other medical conditions and management e.g. coeliac disease, cancer, arthritis, type two diabetes etc.
- Review psychosocial health (as above) and if any related psychological disorders e.g. anxiety, depression, diabetes distress, disordered eating and if receiving support for same.
- Summarise any other investigations/observations/tests/recommendations if relevant to dietetic intervention.

2. Biochemistry

- Review and note relevant biochemistry and compare to individualised clinical targets. Lipid profile, HbA1c, blood glucose, thyroid function, liver function, renal function, urine albumin: creatinine ratio if available. Note actual result and date taken. Comment on change since last test i.e. normal result or if out of target, note increase/decrease.
- Cross reference with relevant medicines if appropriate e.g. impact of last medicine on biochemistry.
- Check person's awareness and knowledge of health results and if advised on individual targets.

3. Prescribed Medications

- Include all relevant prescribed medicines and electrolyte supplementation.
- Interpret and review biochemistry results in context of prescribed medications e.g. lipids level and statin therapy.
- Review use of obesity and /or diabetes management medications (e.g. GLP-1 RA) or medicines that may predispose to weight gain e.g. anti-depressants, corticosteroids etc.

4. Nutrition Focused Physical Findings

- Appetite.
- Medicines related signs and symptoms e.g. taste changes, dehydration.
- Gastrointestinal function including; bowel habit, nausea, vomiting.
- Respiratory function e.g. dyspnoea, OSA.
- Pain, fatigue, sleep time and quality.
- Oral health, dentition.
- Mobility and functional capacity from findings of physiotherapy assessment.
- Consider behavioural investigations/observations/tests.
- Identify a person's perception of diagnosis of CVD/cardiac event, referral to the dietitian and how they envisage the CR programme/dietitian to support them.

- Identify their expectations regarding CV risk factor management, weight loss/gain, and other treatments.
- Use interpersonal skills and tools to assess the person's willingness/ability to make diet and lifestyle changes e.g. importance and confidence, reasons for change, pros and cons of change, ambivalence grid, readiness, potential barriers to change, goal setting, problem solving, self-monitoring and rewards.
- Consider persons social support, social situation.
- Nutrition focused physical exam (NFPE) is a physical assessment of the patient specifically looking for clinical symptoms of nutrient-related deficiencies as appropriate:
  - General physical appearance (signs of distress, ability to communicate, how is patient dressed?)
  - Hair, skin, eyes, oral cavity, finger-nails
  - Muscle and subcutaneous fat wasting
  - Body positioning, posture, body language (lack of eye contact, fidgeting etc)
  - Fluid status and hydration status, skin turgor, oedema, ascites
  - Handgrip strength result from physiotherapist

7.5.2.

5. Anthropometric measurements and nutritional requirements

Anthropometry is the measurement of the different component parts of the human body. Body composition refers to the anatomical makeup of the body in terms of bone, muscle, water and adipose tissue.

The following measurements should be made as part of the initial assessment.

7.5.2.1. Weight and height measurements:*

Weight and height should be measured using standardised techniques and equipment. Ensure that the correct measurement units are used, height in metres (m) to two decimal places i.e. 0.15 m and weight in kilograms (kg) to one decimal place, i.e. 0.1 kg.

Weight

- Measure with the individual wearing only light clothes.
- Ask them to remove keys, phones, wallets etc. from their pockets.
- Both feet should be placed firmly on the centre of the scales.
- Frequency of weight checks during the programme can be agreed by the team and with the individual.

Height

- Height should be measured without shoes if possible and with the heels together and with the so-called "Frankfurt plane of the head" in a horizontal position (The Frankfurt plane is an imaginary line with the top of ear canal in line with the bottom border of the eye).

- The individual should breathe in deeply and reach up to a maximum height with the legs stretched by the feet flat on the ground (this procedure is recommended to reduce variability).
- If a person's height cannot be directly measured or reliably reported for example, due to immobility or recent surgery, ulna (forearm) length can be used as an alternative. See MUST for instruction on measuring and interpreting ulna length.

Body mass index (BMI)*

BMI is calculated as weight (kg) divided by body height in metres (m) squared = kg/m²

Example: BMI = 80 kg / (1.83m x 1.83m) = 23.9 kg/m²

Table 11 Recommended Classification of BMI (ASOI Duggan *et al.*, 2022).

Category	BMI (kg/m²)
Caucasian, Europid and North American ethnicity	
Underweight	< 18.5
Ideal range*	18.5–24.9
Overweight	25–29.9
Obesity Class 1	30–34.9
Obesity Class 2	35–39.9
Obesity Class 3	40–49.9
Obesity Class 4	50–59.9
Obesity Class 5	≥ 60
South-, Southeast- or East Asian ethnicity	
Underweight	< 18.5
Ideal range*	18.5–22.9
Overweight—At risk	23–24.9
Overweight—Moderate risk	25–29.9
Overweight—Severe risk	≥ 30

*The term "ideal" is the weight range associated with a lower risk of obesity complications in population studies, but it is not intended to imply that it is "ideal" for every individual.

BMI measures body size for population-level surveillance, but is only a surrogate for excess body fat. It does not accurately reflect individual health, distinguish between fat and muscle, or provide information about fat distribution. See ASOI obesity assessment chapter for further information (ASOI Duggan *et al*., 2022).

Resources:

- NHS BMI online calculator
- HSE BMI chart

7.5.2.2. Malnutrition screening*

Malnutrition screening is important for all patients referred to CR. The incidence of chronic disease related malnutrition in patients with cardiovascular disease is 29% and higher again with heart failure at 42% (Álvarez-Hernández *et al.,* 2012). There are many factors that increase risk for malnutrition in heart failure including reduced intake related to disease related symptoms and catabolic disease effects (Sze *et al*., 2019; Esteban-Fernández *et al*., 2023).

The Malnutrition Universal Screening Tool (MUST) is a validated, rapid, simple tool that can be completed by all trained healthcare professionals and should be completed at the initial assessment (BAPEN, 2003). The MUST tool uses the anthropometric information gathered including, weight, height and BMI calculation.

For non-dietitians, see Table 32, for next steps if MUST score is positive. If malnutrition is likely, it is not appropriate to provide dietary advice to increase their Mediterranean Diet Score.

When using the MUST in heart failure patients, consider fluid status distortion and ensure to use accurate records of dry weight and dry weight trends.

7.5.2.3. Sarcopenia screening results assessed by physiotherapy

Review results of sarcopenia screening completed by physiotherapist, see "Sarcopenia screening" section. Physical inactivity, inadequate nutrition, advancing age and chronic disease are all risk factors for development of sarcopenia. If sarcopenia identified as "probable" on screening, then individualised dietitian led nutritional assessment is required using the nutrition care process. If dietitian not available on the CR team referral to local dietetic service is indicated.

7.5.2.4. Identifying Central Adiposity

As mentioned previously, BMI does not account for fat distribution. Central adiposity specifically is linked to increased cardiovascular risk. Therefore, for some patients there is benefit from assessing this also, specifically those with a BMI 25-35 kg/m^2. Those with a BMI >35 kg/m^2 are likely to be at an increased risk of cardio-metabolic risk factors irrespective of their waist circumference (WC) (ASOI Duggan *et al*., 2022; Lopez-Jimenez *et al*., 2022) and therefore measurement is not necessary.

While measurement of waist circumference in individuals with a BMI ≥ 35 kg/m^2 does not usually provide additional clinical information to guide management, it may still have value in supporting longer-term monitoring of body composition and can offer meaningful feedback on treatment effectiveness. Some individuals may observe changes in central adiposity or fat distribution before a significant change in body weight or BMI occurs, which can be motivating and informative during ongoing follow-up (ASOI Duggan *et al*.., 2022).

7.5.2.5. Waist Circumference (WC)*

In individuals with a BMI between 25 and 35 kg/m², WC can be used as a simple and practical screening tool to identify those at higher risk of cardio-metabolic disease, serving as a proxy measure of abdominal adiposity.

7.5.2.5.1. Method for measuring waist circumference:

Asking for permission to take a waist circumference measurement from a person living with obesity requires a sensitive, patient-centered approach that prioritises comfort, privacy, and respect.

Preparation:

- If possible, measure without clothing directly over the skin. If this is not possible, thick or bulky clothing must be removed and document this on the assessment form.
- Posture position is also important for accuracy. Ask the patient to stand with arms at the sides, feet positioned close together, and weight evenly distributed across the feet.
- Use a stretch-resistant tape.

Method:

- Palpate the abdomen to locate inferior margin of the last rib at the level of the mid-axillary line. Allow the patient to assist by pointing out their lowest rib and top part of the hip bone (iliac crest).
- Palpate and identify the crest of the ileum (iliac crest) in both sides. Use the area between the thumb and index finger to feel for the hip bone at the level of the mid-axillary line. This is the part of the hip bone at the side of the waist, not at the front of the body.
- Ask the patient to breathe normally, the reading of the measurement should be taken at the end of gentle expiration. This will prevent subjects from contracting their abdominal muscles or from holding their breath.
- Measure the waist circumference in centimetres (cm) midway between the inferior margin of the last rib and the crest of the ileum in a horizontal plane and record to the nearest 1 centimetre (cm). Tighten the tape measure so it is snug but not digging into the skin.
- To increase comfort, the patient can initially hold one end of the tape measure instead of reaching around the patient's waist.
- Repeat the measurement twice; if the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated.

See method for measuring waist circumference and Appendix 21: waist circumference cut-off points (ASOI Duggan *et al.*, 2022)

7.5.2.6. Waist to height ratio*

Once waist circumference has been measured, it can be used to assess waist to height ratio. In people with a BMI of less than 35 kg/m², the waist-to-height ratio, provides a practical estimate of central adiposity (NICE, 2025). This can help to assess and predict health risks, such as T2DM, hypertension or cardiovascular disease in all ethnicities and sexes, including adults with high muscle mass (NICE, 2025).

To calculate the waist to height ratio, divide waist measurement in centimetres (cm) by height measurement in cm. For example:

WC 96.5 cm / Height 170 cm = waist-to-height ratio of 0.57.

If the height measurement is in metres (m) multiple by 100 to convert the height measurement in m to centimetres (cm). For example:

1.70 m (Height in m) x 100 = 170 cm (height in cm)

Table 12 Classification of the degree of central adiposity and health risk based on waist-to-height ratio (NICE, 2025)

Central adiposity degree	Waist-to-height ratio	Level of health risk
Healthy central adiposity	0.4 to 0.49	no increased health risks
Increased central adiposity	0.5 to 0.59	increased health risks
High central adiposity	0.6 or more	further increased health risks

Note other methods of body composition measurement exist and include Bioelectrical Impedance Analysis (BIA) and Dual-Energy X-Ray Absorptiometry (DEXA) and can be used as appropriate if available.

Practice Points:

Before starting to take any physical measurements:

- Always ask the patient for permission, explain what is involved and the clinical rationale.
- Be mindful that some patients may consider it intrusive or triggering.
- Ensure there is a private space and appropriate calibrated equipment. See Appendix 22: Assessment of Clinical Space Checklist, (ASOI O'Malley *et al*., 2022).
- All measurements and assessments should be completed in a sensitive and non-judgemental way, using language that is respectful and inclusive.

7.5.3. Further assessment if obesity/central adiposity identified

7.5.3.1. Obesity staging*

Obesity is a complex chronic disease, characterised by excess or dysfunctional adiposity that impairs health (ASOI Courtney *et al.,* 2022; Busetto *et al.,* 2024; WHO, 2018). Obesity has traditionally been viewed as a risk factor for a wide range of health issues but is now considered to be a chronic disease in its own right, like type 2 diabetes mellitus and hypertension (ASOI Courtney *et al.,* 2022; Busetto *et al.,* 2024). A BMI ≥ 25 kg/m^2 in Caucasian and ≥ 23kg/m^2 in Black, Asian and other minority ethnic groups represent an increased risk and requires further evaluation. Therefore, obesity staging should be completed to evaluate obesity related complications.

Practice point:

- When discussing weight explore factors relevant to the person's weight history. These may include previous weight loss attempts, contributory factors to weight changes e.g. life events, pregnancy, smoking cessation, changes in mobility, changes in social circumstances, mental health etc.
- Interdisciplinary team members should assess their own attitudes and beliefs regarding obesity and consider how their attitudes and beliefs may influence care delivery.
- Avoid using judgemental language when working with patients living with obesity.
- Avoid making assumptions that an ailment or complaint a patient presents with is related to their body weight (ASOI Heary *et al*., 2022).

7.5.3.2. Edmonton Obesity Staging system (EOSS)

The EOSS is a clinical assessment tool not a diagnostic tool that evaluates obesity-related co-morbidities and complications according to a 5-stage scale in addition to BMI classification (Table 13) and can be assessed using an online tool. The EOSS assesses the effect of obesity-related co-morbidities, beyond weight including metabolic, physical, and psychosocial health parameters (ASOI Duggan *et al*., 2022). The assessment of obesity staging can be shared and discussed within the IDT team and guide care planning. Depending on the severity of obesity related complications, onward specialist referral and management options will need to be considered. See Table 33 Guidance on actions to support obesity management based on EOSS staging and assessment for information on obesity management pathways.

Table 13 Edmonton Obesity Staging System

Stage	Description	Management
0	No apparent obesity-related risk factors (e.g., blood pressure, serum lipids, fasting glucose, etc. within normal range), no physical symptoms, no psychopathology, no functional limitations and/ or impairment of wellbeing.	Identification of factors contributing to increased body weight. Counselling to prevent further weight gain through behavioural measures, including healthy eating and increased physical activity.
1	Presence of obesity-related sub-clinical risk factors (e.g., borderline hypertension, impaired fasting glucose, elevated liver enzymes, etc.), mild physical symptoms (e.g., dyspnea on moderate exertion, occasional aches and pains, fatigue, etc.), mild psychopathology, mild functional limitations and/or mild impairment of wellbeing.	Investigation for other (non-weight-related) risk factors. More intense behavioural interventions, including nutrition therapy, exercise and psychological treatments to prevent further weight gain. Monitoring of risk factors and health status.
2	Presence of established obesity-related chronic disease (e.g., hypertension, type 2 diabetes, sleep apnoea, osteoarthritis, reflux disease, polycystic ovary syndrome, anxiety disorder, etc.), moderate limitations in activities of daily living and/or wellbeing.	Initiation of obesity treatment, including considerations of all psychological interventions, pharmacological and surgical treatment options. Close monitoring and management of complications as indicated.
3	Established end-organ damage, such as myocardial infarction, heart failure, diabetic complications, incapacitating osteoarthritis, significant psychopathology, significant functional limitations and/or impairment of wellbeing.	More intensive obesity treatment, including consideration of all psychological interventions, pharmacological and surgical treatment options. Aggressive management of complications as indicated.
4	Severe (potentially end-stage) disabilities from obesity-related chronic diseases, severe disabling psychopathology, severe functional limitations and/or severe impairment of wellbeing.	Aggressive obesity management as deemed feasible. Palliative measures including pain management, occupational therapy and psychosocial support.

Adapted from: Sharma AM, Kushner RF. A proposed clinical staging system for obesity. Int J Obes. 2009;33(3):289–295[21].

Key messages:

- Anthropometric and body composition measurements are important for all patients as they contribute to assessment of cardiovascular risk, guide CR treatment plans and can be used in the assessment of CR effectiveness.
- Risk of malnutrition can only be identified using a validated nutrition screening tool. The MUST Tool is recommended in both acute and community settings.
- Low muscle mass and malnutrition are important factors contributing to sarcopenia. Early detection and intervention are essential for all CR patients.
- Central adiposity is associated with CVD risk more closely than weight and body mass index.
- Waist-to-height ratio is a simple, universal way to assess body composition that correlates moderately well with body fat levels in people with a BMI up to 35 kg/m^2 across all ethnicities and sexes.
- Be mindful of your language when discussing weight and shape with patients.

7.5.4. Nutrition requirements

Chronic disease states impact the body differently and often require variation in calorie, protein, and fluid needs compared to the general healthy population. In clinical practice, the dietitian estimates requirements using evidence-based prediction calculations, e.g. Henry Oxford equation (Todorovic *et al.,* 2018).

Both disease-specific clinical guidelines and general population recommendations inform nutritional requirements for CVD populations and sub-groups, this includes macronutrient and micronutrient requirements, and dietary patterns. Predictive equations should be named e.g. Henry Oxford or by full equation documented, e.g. 10.2(64) + 572. Calculations should be adjusted to include activity and stress factors as appropriate and include any adjustments for recommended weight loss/gain e.g. HF, COPD.

Indicate use of food pyramid and portion sizes in estimating requirements. Estimate energy, protein, lipid/fat (total and type breakdown saturated fatty acids (SFA), polyunsaturated fatty acids (PUFA), monounsaturated fatty acids (MUFA)), carbohydrate (refined, wholegrain), fluid, micronutrient, non-nutrient (e.g. fibre/caffeine) requirements if relevant.

Refer to the dietetic delivery "Step 3 – Nutrition intervention" section and Appendix 23: Cardio-protective diet components and targets for a summary of relevant nutrient targets for a CR population.

6. Food and nutrition related history

7.5.5. Mediterranean diet score tool*

The Mediterranean diet score tool is a screening questionnaire to assess the cardio-protective dietary quality of a person's current dietary pattern. It comprises 14 questions relating to the key components that make up the Mediterranean style cardio-protective dietary pattern. Scores range between 0 (weak alignment) to 14 (very good alignment).

Table 14 Mediterranean diet score result interpretation

Score	Level of alignment to cardio-protective eating pattern
≤5	Weak
6–9	Moderate to fair
≥10	Good or very good

This CR CAG recommends the validated Mediterranean diet score (MDS) tool, an adapted version of the PREDIMED MDS tool, to accommodate Northern European population food choices (McEvoy *et al.,* 2018; McEvoy *et al.,* 2022). The patient should be provided with a copy to complete in advance of their CR programme initial assessment, unless a potential barrier to completing has been identified. If there are barriers to the patient completing, e.g. language, literacy, the patient should be supported to complete the questionnaire during their initial assessment.

As with all nutrition screening tools it does not replace a full dietetic assessment.

See Appendix 24: Mediterranean diet score (MDS) for the MDS, instructions on how to calculate the MDS and advice linked to the MDS score to improve cardio-protective dietary quality and CVD risk reduction.

7.5.6. Alcohol*

The Alcohol Use Disorders Identification Test (AUDIT-C) is the gold standard of screening tools and was developed by the World Health Organization (Babor *et al.,* 2001). The screening tool is based on the first three questions of the full AUDIT-C questionnaire;

- "How often do you have a drink containing alcohol?"
- "How many units of alcohol do you drink on a typical day when you are drinking?"
- "How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?"

The remaining AUDIT-C questions can be asked if someone scores five or above. See Appendix 25: Alcohol Use Disorders Identification Test (Audit Tool) for the full questionnaire and instructions on how to complete.

The results of the AUDIT-C score will determine the action required, see Table 15.

Table 15 Audit-C score and associated risk category and recommended action (HSE MECC)

AUDIT Score	Risk Category	Desired Action
0 –7	Lower Risk	Positive reinforcement of low risk drinking guidelines
8 –15	Increasing Risk	Brief intervention, reinforce low risk guidelines and explore strategies for cutting down
16-19	Higher Risk	Extended Brief Intervention and /or referring to local counselling supports
20+	Possible Dependence	Referral to Specialist Services

7.5.7. Step 2: Nutrition diagnosis

A nutrition diagnosis is a structured statement that describes the specific nutrition problem that the dietitian has identified. Dietitians formulate a Problem, Etiology, Signs and Symptoms (PES) statement to describe the nutrition problem, its root cause and the assessment data that provide evidence for the nutrition diagnosis. The problem is selected from the nutrition diagnosis terminology. A patient may have more than one nutrition diagnosis or "no nutrition diagnosis at this time." The nutrition diagnosis is important, as it will inform the patient's nutrition care plan (INDI Nutrition Care Process Ireland, 2019; Writing Group of the Nutrition Care Process/ Standardised Language Committee, 2008).

Table 16 Terminology for nutrition diagnosis is organised in 3 domains (categories)

Intake	Clinical	Behavioural-Environmental
Too much or too little of a food or nutrient compared to actual or estimated needs	Nutrition problems that relate to medical or physical conditions	Knowledge, attitudes, beliefs, physical environment, access to food, or food safety

Go to **Section 8.4** for treatment and management

7.6 Non-dietitian nutrition screening/assessment

The CR CAG acknowledges that not all CR interdisciplinary teams are resourced with a dietitian. In the absence of a dietitian some screening and assessments can be completed by appropriately trained members of the team.

The following section details these screening and brief assessments (Table 17), including which patients require referral to local dietetics in the absence of a dedicated CR dietitian.

Table 17 An overview of screening and assessment tools that can be completed by other members of the CR team where a dedicated CR dietitian is not available. These are highlighted in the dietitian section above with an*

Screening / Brief Assessment Tool:	Parameters:	How
Anthropometry, body composition	• Weight • Height, or ulna length if unable to measure height • Body mass index (BMI) • MUST • Waist circumference (BMI 25-35 kg/m^2 only) • Waist to height ratio (BMI < 35 kg/m^2 only)	In-person ideally MUST: Follow the HSE community algorithm for management of malnutrition and nutrition support training available on HSeLanD - e-based training
Alcohol – hazardous drinking screener	The Alcohol Use Disorders Identification Test (AUDIT- C) provides 10 alcohol screening questions.	See Appendix 25: Alcohol Use Disorders Identification Test (Audit Tool)
Mediterranean Diet Score tool (MDS)	MDS tool is used to assess the cardio-protective dietary quality of an individual's dietary pattern.	Provide patient questionnaire in advance, review responses with patient during assessment. See Appendix 24 Consider patients' individual needs e.g. language, literacy, culture before providing questionnaire.
Screen for conditions requiring dietitian input	As part of IDT assessment, the identification of co-morbidities and their signs and symptoms requiring dietetic input should be highlighted and prompt a referral as appropriate.	If no access to a dedicated CR dietitian resource, refer to local guidance on community nutrition and dietetic referral criteria or hospital dietetics department as appropriate.

7.6.1. Patient groups requiring individual dietitian assessment:

General cardioprotective dietary advice may not be appropriate for all patients or may need to be tailored to their individual health needs and related co-morbidities.

For example, in the case of patients who have malnutrition, general cardioprotective dietary advice may worsen their nutritional status further. Patients attending CR may be at risk of malnutrition related to their CVD symptoms and complications (Chronic Heart Failure, cardiac surgery etc), other co-morbidities (e.g. COPD, stroke) or another reason. Therefore, it is important to screen all patients for malnutrition risk and refer to their GP for further investigation and local dietetics for malnutrition treatment as per local policy.

Aside from malnutrition, general cardioprotective dietary advice may be inappropriate for patients with chronic kidney disease (CKD), especially those with stage 3b CKD and onwards.

If in doubt if referral to dietitian required, discuss with local dietetic service.

Please note: Access to dietetics services can vary nationally. Please check with local nutrition and dietetic departments regarding referral acceptance criteria.

Key Messages:

- Non-dietitian members of the interdisciplinary team, with appropriate training, can carry out a nutrition screening/brief assessment of patients in the absence of a dedicated dietitian.
- However, this does not replace the role of a registered dietitian, who use a systematic approach to providing high quality nutrition care, including comprehensive holistic nutrition assessment and formulation of an individual nutrition diagnosis.
- If malnutrition is identified inform the GP as the cause of weight loss may warrant further investigation and refer to local dietetics, as per local policy.

Go to **section 8.5** for treatment and management

8.0 Delivery of the cardiac rehabilitation core components

8.1 Delivery of the cardiac rehabilitation programme

Delivering a person-centred CR service that meets with the patient's needs, priorities and preferences is a key principle underpinning the model of the care. This requires offering patients choice in how when and where they can access services in a timely and equitable manner. Modes of cardiac rehabilitation delivery are discussed in "9.0 Evolving modes of cardiac rehabilitation delivery" section.

8.1.1. The programme

The CR programme should commence as soon as possible after the initial assessment. The patient's care plan should be informed by the interdisciplinary team assessment and the patient needs, preferences and goals for rehabilitation. Interdisciplinary team meetings play an important role in ensuring a team-based approach to medical and lifestyle risk factor management and should ideally be held once a week.

To address the wide variability in the duration of CR programme delivery in Ireland, (ranging from six to 12 weeks) (HSE, 2024a), it is recommended that the standard duration should be 12 weeks, inclusive of the initial and end of programme assessment. This is to allow sufficient time to optimise risk factor control and to enable patients to make successful behavioural change (Shi *et al.,* 2023). This standard builds on recommendations from the *Model of Care for Integrated Cardiac Rehabilitation, 2023* (HSE, 2023a) and acknowledges that within the programme structure a more individualised approach, based on clinical needs, functional status and patient preferences may be required.

Furthermore, to ensure a flexible, person-centred approach to CR, the CR CAG recommends that CR programmes are delivered as "rolling programmes" (i.e. where patients join the programme at a date of their choosing and where different patients on the programme start and finish at various time points) rather than a fixed programme (set start and finish date for a selected group of patients) to improve participation rates.

An overview of the phase 3 delivery structure, including the core components is outlined in Figure 13.

All programme components should be underpinned by a behaviour change strategy for example, motivational interviewing, supported self-monitoring and flexible goal setting (SMART goals) (See "Approaches to facilitate behaviour change" section). The delivery of the core components are discussed in the following section.

Figure 13 Phase III programme delivery structure

8.2 Nursing delivery

8.2.1. Smoking

Patients who are smoking or have just recently quit tobacco should be supported to become and stay tobacco free. CR provides an ideal opportunity to support a quit attempt, with the most effective intervention being a combination of behavioural support and pharmacotherapy.

8.2.1.1. Behavioural support

The focus of behavioural support should be on supporting patients through the process of quitting by increasing their confidence and motivation to quit and developing personal coping skills to sustain the quit attempt over time.

There are also a wide range of health promotion resources, including posters and patient information leaflets (in multiple languages) available to motivate and support patient to stop smoking. These can be ordered from www.healthpromotion.ie., see also instructions on how to place an order.

Practice Points:

- Ask patients to identify and record their personal reasons for quitting – they will be able to revisit these in moments of weakness and to re-invigorate their quit attempt.
- Ensure that patients are realistic about the challenges they face in making the quit attempt, the importance of using pharmacotherapy and identify ways of coping with withdrawal.
- Encourage patients to set a quit date and reinforce the importance of not having one puff of a cigarette. Encourage patients to prepare for the attempt by disposing of ashtrays, cigarettes, letting friends and family know that they are quitting and asking for their support etc.
- Remind patients of the benefits of their decision to quit and how important it is to remain abstinent especially during the challenging first few weeks.
- Monitor breath carbon monoxide (CO) readings and chart the decline to normal after the quit date. With the patient's agreement record a CO reading each time the patient attends the programme. This also provides an opportunity to discuss lapses and avoid long term relapse.
- Ask patients to identify smoking "triggers" for lapsing and discuss ways to manage them.
- Discuss medication choices (see below) and explain how to use. Monitor tolerance and consistent use of same.
- On completion of CR, refer to HSE services through QuitManager (see below).

8.2.1.2. Use of pharmacotherapy

As per national clinical guidelines for stop smoking Varenicline +/- nicotine replacement therapy (NRT) is the first line treatment for stop smoking care (Department of Health, 2022). The HSE "*stop smoking medications at a glance"* summary provides a comprehensive overview of stop smoking medicines and how to use them (HSE, 2023b). Training on the use of stop smoking medication is available on HSeLanD at www.hseland.ie, you can find it by searching for "Stop Smoking" and it takes approximately 45 minutes to complete.

Varenicline

Varenicline is a nicotine receptor partial agonist, and is reported to be the most effective pharmacological treatment to support smoking cessation. It works by binding to the nicotine acetylcholine receptors in the brain, providing relief from withdrawal symptoms and reducing the desire to smoke.

Varenicline is recommended as a 12-week course and should be started one to two weeks before the quit date. On week one, the dose is gradually increased from 0.5 mg once daily to twice daily. On the quit date (week two or three), the patient should be commenced on a maintenance dose of 1 mg twice daily. Varenicline can also be continued for a further 12 weeks to help maintain abstinence from smoking.

For heavily dependent smokers (20+ cigarettes each day/20 pack-years) varenicline can be used in combination with high dose combination NRT (21 mg or 25mg patch plus a faster acting nicotine product for example nicotine gum)

Side effects may include:

- Nausea
- Gastrointestinal upset such as constipation or diarrhoea
- Headaches
- Abnormal dreams
- Difficulty sleeping

For patients who cannot tolerate adverse reactions of Varenicline they may have the dose lowered temporarily or permanently to 0.5 mg twice daily. For patients with severe renal impairment (estimated creatinine clearance < 30 ml/min) or those with moderate renal impairment who experience intolerable adverse effects, the recommended maximum dose is 1 mg once daily.

Varenicline is available under General Medical Scheme (GMS) and Drugs Payment Scheme (DPS), and also FREE for anyone engaging in the HSE stop smoking services (either in-person or over the phone).

Combination Nicotine Replacement Therapy (NRT)

In the instances where varenicline is not appropriate including the patient being unable to self-fund, combination NRT is the second, first line treatment to stop smoking. This means using a fast-acting form of NRT (gum, lozenges or nasal spray) at the same time as the patch (slow-acting form of NRT). The patient's level of dependence on nicotine (based on the Fagerstrom test) should inform the strength of NRT.

NRT relieves craving and physical withdrawal symptoms and is most commonly used for eight to 12 weeks.

Patients should be advised that they can receive **free** NRT by the following means

- If they engage in a quit attempt with a HSE stop smoking service either in the community or via the national Quit Team.
- If they have a medical card it can be prescribed by their GP.
- If a member of the CR team is trained as a Stop Smoking Advisor they can arrange same.

NRT monotherapy, or bupropion (alone or in combination with NRT) can also be recommended, but not as first-line.

Buproprion

Bupropion has a number of actions that are thought to contribute to its ability to help smokers quit. These include inhibition of neuronal reuptake of dopamine and noradrenaline, non-competitive inhibition of nicotinic acetylcholine receptors and effects on serotonin reuptake. From a clinical perspective, it helps smokers by reducing the severity of withdrawal symptoms, including urges to smoke.

Referral to HSE Quit Smoking Services

In addition to the direct support provided by the CR nurse, who should be trained in stop smoking care, a referral (with the patient's permission) to this service should be considered to ensure long-term support beyond the phase III CR programme. The HSE national stop smoking service is free of charge and is available in the community or over the phone with the national Quit Line.

A referral should be completed using QuitManager, an electronic national patient management system for the HSE stop smoking services. QuitManager allows healthcare professionals to record and manage patient level data and track progress. For example, if a patient stops attending the service this can be viewed on the system prompting the CR professional to re-engage with the patient. All CR centres should therefore request to be set up on this system by completing a request on IVANTI.

8.2.1.3. What about vaping and alternative nicotine products?

Using e-cigarettes or nicotine pouches is not recommended as a method to stop smoking. The potential harms of these products should be highlighted, and patients should be encouraged to transition away from all forms of other non-medicinal nicotine products to support a quit attempt (Awad, *et al.,* 2024). For patients who wish to stop vaping, the HSE national stop smoking service offers behavioural support. Where patients are dual users of tobacco and electronic-cigarettes, NRT can be used in combination with behavioural support.

8.2.1.4. Suggested resources

- HSE Stop Smoking National Clinical Guideline

8.2.2. Psychosocial Health

Management of psychosocial health is a core component of CR and should be tailored to the patient's individual needs, values and preferences (Ski *et al.,* 2024).

Managing an elevated HAD score

Psychological distress tends to be highly prevalent in patients with cardiovascular disease (Karami *et al.,* 2023) and elevated scores on the HADs may be due to the stress associated with having a cardiac event, particularly if the event is recent (i.e. in last 2-6 weeks) and may reflect an adjustment reaction rather than an underlying depressive episode or anxiety disorder.

Participating in a comprehensive CR programme which addresses psychosocial risk factors and stress management will often reduce the level of psychological distress patients are experiencing. Furthermore, it is well established that a healthy diet, regular physical activity and peer support can positively impact on quality of life and symptoms of anxiety and depression (Visseren *et al.,* 2021). Therefore, a watchful waiting approach using clinical judgment should be employed whereby patients who are presenting with symptoms of anxiety and depression are monitored over the course of their cardiac rehabilitation to ensure appropriate psychological interventions are offered at the right time and are tailored to the patient's needs. This approach aligns to the stepped care approach to managing psychosocial health as recommended in the ESC consensus statement on Mental Health and CVD. (Bueno *et al.,* 2025). See Figure 14 for an overview of the stepped care approach.

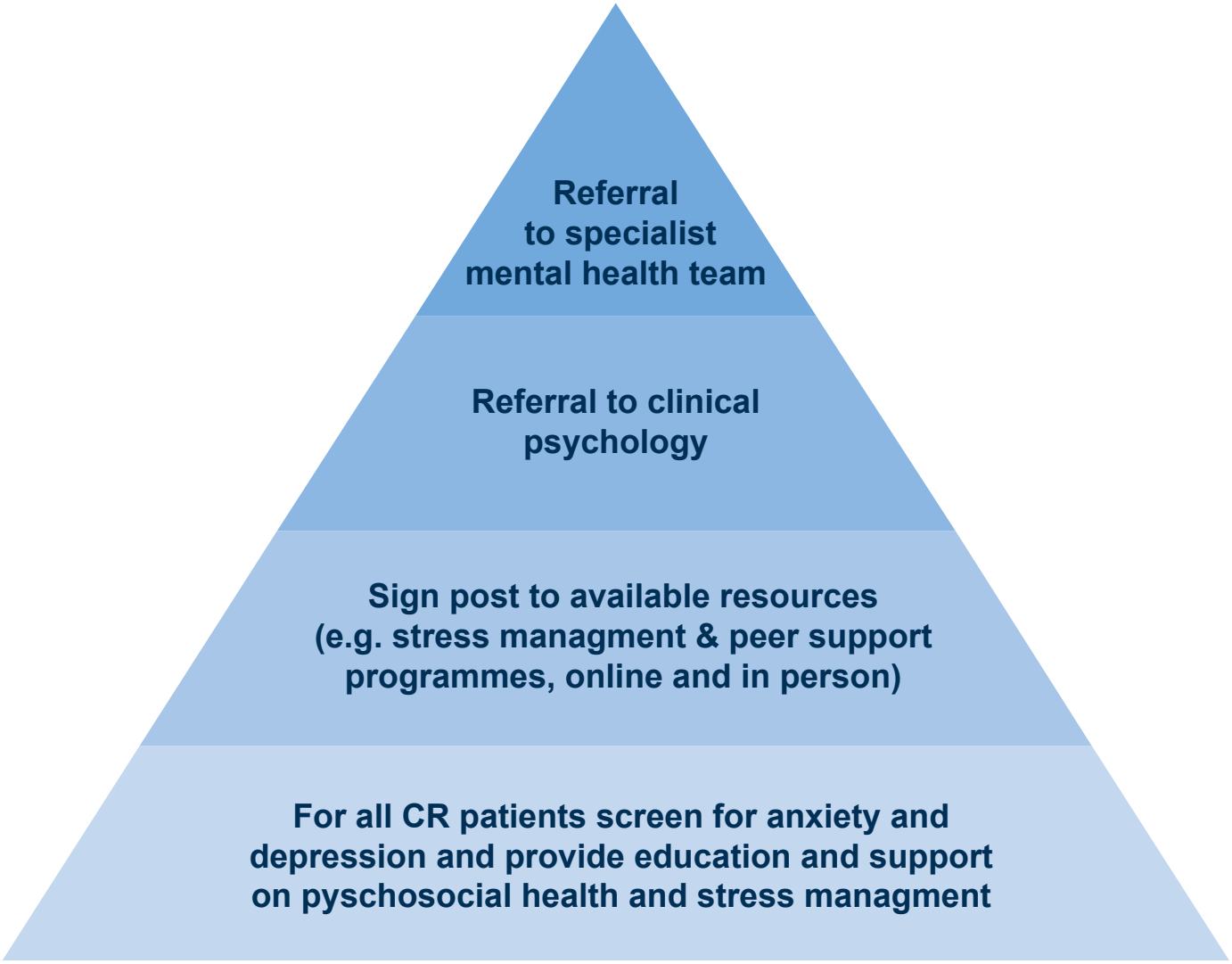
Stepped care approaches take into account patients' individual preferences and can be adapted to symptom severity and resources available. Stepped care does not mean that all earlier steps need to be done before accessing higher level support (Bueno *et al.,* 2025). For example, where a patient presents with a HADS score in the mild range (a score between 8-10) actions on the lower level of the stepped care model may be appropriate, whereas for patients presenting with scores in the severe range (≥15) it is likely they may require direct referral to clinical psychology. The stepped care approach involves:

- Routinely assessing psychosocial health (including screening for anxiety and depression) (see "Anxiety and Depression" section).
- Providing education on psychosocial health and stress management as part of the overall CR education programme.

- Providing reassurance and the opportunity to discuss concerns throughout the programme. This should be supported by signposting to available resources, for example the HSE "Balancing Stress Programme" and support services offered by patient organisations such as Croí and the Irish Heart Foundation.
- Where patients continue to experience significant levels of anxiety and depression (HADS ≥11) and/or persistent distress and difficulty in adjusting to their diagnosis during and or after completing their CR programme, a referral to the CR clinical psychologist should be considered for further intervention.
- Where the CR has no direct access to psychology services, it is best practice to liaise with the patient's GP (with the patient's consent) to recommend a referral to psychology services.
- Where complex mental health needs are identified a referral to secondary mental health services may be required.

This CR CAG recommends that all CR interdisciplinary teams should be resourced with a clinical psychologist. Psychologists can provide psychological assessment, formulation and tailored psychological interventions to meet the particular needs of the person referred. They are trained in a range of evidence based therapeutic approaches including Cognitive Behavioural Therapy (CBT), Acceptance and Commitment Therapy (ACT), Compassion Focused Therapy (CFT), Eye Movement Desensitisation and Reprocessing (EMDR) and Motivational Interviewing (MI).

Figure 14 Stepped Care Model of Psychological Management



Key messages

- A stepped Care approach helps to ensure that the patients individual needs, values and preferences are considered in the management of psychosocial health.
- All patients should be provided with reassurance and the opportunity to discuss concerns throughout the programme.
- For patients with high levels of anxiety and depression (HADS ≥11) and/or presenting with distress and difficulty in adjusting to their diagnosis which persists during and/or on completion of their CR programme, a referral to clinical psychology should be considered.
- Where a CR service has no direct access to psychology services, it is best practice to liaise with the patient's GP (with the patient's consent) to recommend a referral to psychology services be made by the GP.

8.2.3. Medical risk factor management and medication optimisation

Evidence shows that CR programmes which manage 6 or more risk factors and prescribe and monitor medications reduce not only CVD mortality and myocardial infarction but all-cause mortality and cerebrovascular events (van Halewijn, 2017).

Yet despite clear guideline recommendations, a significant proportion of patients with CHD do not receive optimal guideline directed medical therapies. European survey data shows furthermore that despite high levels of prescribing, over half of all patients with CHD do not achieve guideline recommended blood pressure targets, with more than two thirds not achieving the recommended LDL cholesterol targets (Kotseva *et al.,* 2019). It is the responsibility of the CR nurse/coordinator, with the support of the consultant cardiologist, to support eligible patients in achieving their recommended blood pressure, lipid and glycaemic targets (Gebremichael *et al*., 2023; Wu *et al*., 2022a) as well as appropriate cardioprotective drug therapy at optimal doses by end of programme.

A CR programme duration of 12-weeks is recommended. This is to allow sufficient time to commence and adjust pharmacotherapy based on laboratory results (e.g. U&Es, lipid profiles), clinical parameters (e.g. BP and HR) and patient tolerance. This CR CAG also recommends that all new patients, together with those requiring continuous review should be discussed at a weekly interdisciplinary team meeting with the consultant cardiologist who has governance for the programme. This provides an opportunity for medical risk factors and current medications to be reviewed, and a therapeutic plan personalised to that patient to be developed. While the consultant cardiologist has overall responsibility for patient's medical care, including the prescription of cardio protective medications, nurse prescribing can help ensure efficient guideline-driven management, particularly where access to a cardiologist and General Practice is limited. The recent National Review of Cardiac Services also makes the recommendation with regards to advanced nurse practitioners being involved in CR (Department of Health, 2023). This would also help deliver more autonomous decision-making with regards to the medical management from a nursing perspective.

All discussions regarding the prescription of cardioprotective medications should be in consultation with the patient through a process of shared decision making. To ensure an integrated care approach, recommendations for medical management should be communicated to the GP, and where prescriptions are provided directly to the patient, the GP should be informed. Guidance on the management of medical risk factors and medication optimisation within this CR CAG are informed by relevant ESC Guidelines (Byrne *et al.,* 2023; Mach *et al.,* 2020; Marx *et al.,* 2023; McDonagh *et al.,* 2021; Mc Evoy *et al.,* 2024; Visseren *et al.,* 2021; Vrints *et al.,* 2024).

The following section provides an overview of pharmacological treatment and guidance on cardio-protective medication optimisation for patients attending CR.

8.2.3.1. Cardioprotective Drug Therapy Optimisation

A patient's cardioprotective drug therapy requirements will vary depending on their diagnosis and for the purposes of this CR CAG the terms acute coronary syndrome (ACS) and chronic coronary syndromes (CCS) are used.

CCS is a term introduced by the *2024 ESC Guidelines for the management of chronic coronary syndromes* (Vrints *et al.,* 2024) and refers to the clinical presentations of coronary artery disease (CAD) during stable periods, particularly those preceding or following an ACS and incorporates the following presentations;

1. The symptomatic patient with reproducible stress-induced angina or ischaemia with epicardial obstructive CAD.
2. The patient with angina or ischaemia caused by epicardial vasomotor abnormalities or functional/structural microvascular alterations in the absence of epicardial obstructive CAD (ANOCA/INOCA).
3. The non-acute patient post-ACS or after a revascularization.
4. The non-acute patient with heart failure (HF) of ischaemic or cardiometabolic origin.
5. Asymptomatic individuals in whom epicardial CAD is detected during an imaging test for refining cardiovascular risk assessment, screening for personal or professional purposes, or as an incidental finding for another indication.

1. Beta blockers

Beta blockers have the following effects:

- Reduction in heart rate
- Reduction in cardiac output
- Reduction in BP
- Reduction in arrhythmia

Indications for beta blockers differ depending on whether the patient is post ACS or can be classified as having CCS and are summarised in Table 18.

Chronic coronary syndromes (CCS)

Beta-blockers can be used for symptomatic relief of angina with the aim to lower resting heart rate to 55–60 beats per minute. There is no prognostic benefit for beta blockers in asymptomatic patients with CCS and preserved LV systolic function.

Post acute coronary syndrome (ACS)

Beta blockers are also recommended post ACS for prognostic benefit with the main evidence of benefit being in patients with EF<40%. The evidence for beta blockers post MI with an EF>40% is less well established (hence the class IIa recommendation).

Table 18 ESC guidelines recommendations on the use of beta blockers in CCS and ACS (Byrne *et al.*, 2023; Vrints *et al.*, 2024)

Recommendations	Class	Level
Beta-blockers are recommended in ACS patients with LVEF≤40% regardless of heart failure (HF) symptoms	I	A
Routine beta-blockers for all ACS patients regardless of LVEF should be considered	IIa	B
Initial treatment with beta-blockers and/or CCBs to control heart rate and symptoms is recommended for most patients with CCS	I	B

Update on beta blockers post MI since publication of ACS 2023 guidelines

Since the ACS guidelines were published 3 important trials of beta blockers post MI in those with an EF>40% (Ibanez *et al*., 2025) and an EF>50% (Munkhaugen et al., 2025; Yndigegn *et al*., 2024) have been published. Two subsequent individual patient level meta-analyses of these 3 trials and including a 4th beta blocker trial were undertaken in patients with LVEF 40-49% and >50% respectively and have just been published. The first meta-analysis clearly shows a benefit of beta blockers post MI in patients with mildly reduced EF 40-49% (Rossello *et al*., 2025) but the second meta-analysis found no benefit in patients with an EF>50% (Kristensen *et al*., 2025). These important publications will likely change recommendations in the next iteration of the ESC ACS guidelines.

Key message

Beta blockers should be prescribed for symptoms of angina and post ACS especially in patients with EF< 50%.

2. Renin-angiotensin-aldosterone system (RAAS) system inhibitors

These include ACE Inhibitors/Angiotensin receptor blockers (ACE-Is/ARBs), angiotensin receptor-neprilysin inhibitors and mineralcorticoid receptor antagonists

ACE Inhibitors/Angiotensin receptor blockers

There is strong evidence to recommend ACE-Is/ARBs for the treatment of patients post ACS *and* with CCS with the following co-existing conditions (unless contraindicated e.g. severe renal impairment, hyperkalaemia, etc.):

- Hypertension
- LVEF ≤ 40%
- Type 2 diabetes mellitus
- Chronic kidney disease

Based on the available evidence ACE-Is/ARBs in CCS patients without the above co-morbidities is not generally recommended, unless required to meet BP targets.

The added cardio-protective role of ACE-Is/ARBs in post-ACS patients without reduced LVEF on otherwise optimal medical therapy needs to be clarified.

Therefore, use of ACE-Is/ARBs in all post ACS patients irrespective of LVEF is a Class IIa recommendation.

In patients with established symptomatic heart failure with reduced ejection Fraction (HFrEF) (EF<40%) sacubitril/valsartan has been shown to reduce HF hospitalisation and cardiovascular death compared with ACE-Is. However, it should be noted that sacubitril/valsartan is not superior to ACE-Is in post-MI patients with a reduced ejection fraction but without symptoms and clinical signs of heart failure.

In Ireland sacubitril/valsartan is reimbursed when patients meet the following criteria:

- LVEF of ≤ 35%
- Symptomatic with NYHA functional class II to IV symptoms
- Established on an ACE inhibitor or an ARB
- Systolic blood pressure ≥ 100 mmHg
- Serum potassium (K+) ≤ 5.4 mmol/L

Prescribing, up titration and monitoring of ACE-Is/ARBs

ACE-Is/ARBs should be started at a low dose and increased gradually to reach the target dose. The Medications Management Programme in Ireland advises that the preferred ACE-I is Ramipril as this is licensed for use in both heart failure and hypertension and the preferred ARB is candesartan. Recommended dosing and administration of these drugs are outlined in Appendix 26: Information on dosing and monitoring of cardioprotective medications. For further information on dosing and monitoring of ACE-Is/ARBs see HSE Medicines Management "Prescribing Tips for Ramipril."

Monitoring of renal function (creatinine and eGFR) and serum potassium is needed to reduce the incidence of renal insufficiency and hyperkalaemia (K+> 5.5 mmol/L) during treatment. Renal function and potassium should be checked:

- Before initiating treatment
- Within 2 weeks of commencing treatment
- Within 2 weeks of last dose increase
- Annually

Pseudohyperkalemia (due e.g. to excessive shaking of the sample or hameolysis because of delayed testing) is common and should be excluded before reduction or cessation of ACE-Is/ARBs is considered.

Mineralocorticoid receptor antagonists

Mineralocorticoid receptor antagonists (MRAs) such as spironolactone or eplerenone block receptors that bind aldosterone with eplerenone being more specific and therefore causing less gynaecomastia. Both have a Class I indication in all patients with HFrEF to improve symptoms,

reduce mortality and the risk of HF hospitalisation. Eplerenone specifically is indicated in patients with recent MI and LV dysfunction with symptoms of either HF or diabetes as it has been shown to be associated with reduced mortality and CV hospitalisations in these patients. Whilst MRAs are added for prognostic benefit it should be noted they have a substantial BP-lowering benefit.

Caution should be exercised when MRAs are used in patients with impaired renal function (eGFR< 30 ml/min/1.73 m^2) and in those with serum potassium concentrations >5.0 mmol/L and specialist advice is required. Therefore, careful monitoring of renal function and electrolytes (particularly K^+) is required at baseline and at 1 and 4 weeks after starting/increasing dose and at 8 and 12 weeks; 6, 9, and 12 months; 4-monthly thereafter.

ESC guideline recommendations on RAAS system inhibitors are outlined in Table 19.

Table 19 ESC guidelines recommendations on RAAS system inhibitors (Byrne et al., 2023; McDonagh *et al.*, 2021; Vrints *et al.*, 2024).

Recommendations	Class	Level
In CCS patients, ACE-Is (or ARBS) are recommended in the presence of specific co-morbidities, such as hypertension, diabetes or HF	I	A
ACE-Is should be considered in CCS patients at very high risk of cardiovascular events	IIa	A
Angiotensin–converting enzyme (ACE) inhibitors are recommended in ACS patients with HF symptoms, LVEF≤40%, diabetes, hypertension, and/or CKD	I	A
Mineralocorticoid receptor antagonists (MRAS) are recommended in ACS patients with an LVEF≤40% and HF or diabetes	I	A
Routine ACE inhibitors for all ACS patients regardless of LVEF should be considered	IIa	A
An ARB is recommended to reduce the risk of HF hospitalisation and CV death in symptomatic HF patients (LVEF 40%) unable to tolerate an ACE-I or ARNI (patients should also receive a beta-blocker and an MRA)	I	B
An MRA may be considered for patients with heart failure with mildly reduced ejection fraction (HFmrEF) to reduce the risk of HF hospitalisation and death	IIb	C

Sodium–glucose co-transporter 2 inhibitors

Sodium–glucose co-transporter 2 (SGLT2) inhibitors were initially intended as medications for patients with T2DM, but have since been found to confer cardiovascular benefits beyond their glucose-lowering potential including reduction in major cardiovascular events in patients with both ASCVD and T2DM with this protective effect being independent of baseline HbA1c and other glucose-lowering medication. They therefore have Class I indication in all patients with ASCVD and T2DM (Marx *et al.,* 2023).

In patients with HF regardless of their LVEF, SGLT2 inhibitors such as dapagliflozin and empagliflozin have been shown to significantly reduce the risk of worsening HF or CV death, both

in the presence or absence of T2DM (McDonagh *et al.,* 2023). ESC guideline recommendations on SGLT2 inhibitors are outlined in Table 20 .

Practical tips on prescribing SGLT2 inhibitors

- It is important that the patient is advised of side effects including increased risk of urinary tract infection (UTI) and genital thrush.
- If a patient has recurrent UTIs (common in older women) this should not preclude the use of same due to their overwhelming clinical benefit.
- Advice on how to minimise risk of recurrent UTIs should be given including:
  - Hygiene of the bladder and external genitalia
  - Topical vaginal oestrogen in post-menopausal females
  - D-mannose supplementation
- It is crucial to educate patients on the sick day rules – please see National Medicines Information Centre - TYPE 2 DIABETES MELLITUS: NON-INSULIN GLUCOSE-LOWERING PHARMACOTHERAPY Bulletin 2023 (NMIC, 2023).
- SGLT2 inhibitors are contraindicated in patients with Type 1 DM due to the risk of diabetic ketoacidosis. They can be used in certain circumstance (including ketone monitoring) but only under specialist endocrinologist supervision.
- It is common for the eGFR to drop in the early phase of starting SGLT2I inhibitors. This is not a cause for alarm, and it is not an indication to stop the therapy.
- SGLT2 inhibitors also have a modest weight loss effect (~3 kg) and a modest BP-lowering effect.
- Whilst their use in frail, older adults should be on a more considered basis a recent systematic review and meta-analysis of SGLT2I treatment in 77,000 older adults continued to show evidence of a net benefit and without significant risk of harm (Aldafas *et al.,* 2024).

Table 20 ESC guidelines recommendations on SGLT2 inhibitors (Marx *et al.,* 2023; McDonagh *et al*., 2023; Vrints *et al.,* 2024).

Recommendations	Class	Level
SGLT2 inhibitors with proven CV benefit are recommended in patients with type 2 diabetes mellitus (T2DM) and ASCVD to reduce CV events, independent of baseline or target HbA1c and independent of concomitant glucose lowering medication.	I	A
SGLT2 inhibitors (dapagliflozin, empagliflozin, or sotagliflozin) are recommended in all patients with HFrEF and T2DM to reduce the risk of heart failure hospitalisation and CV death.	I	A
SGLT2 inhibitors (dapagliflozin or empagliflozin) are recommended in patients with T2DM and LVEF >40% (HFmrEF and HFpEF) to reduce the risk of HF hospitalisation or CV death.	I	A

4. Glucagon-like peptide-1 receptor agonists

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are commonly used in the treatment of T2DM and overweight and obesity. Similar to SGLT2 inhibitors, GLP-1 RAs have been shown to reduce major adverse cardiovascular events in patients with established ASCVD and T2DM irrespective of the baseline HbA1c and other glucose-lowering medication and have a Class I recommendation in same.

GLP-1 RAs improve outcomes across glucose control, dyslipidaemia, blood pressure and inflammation, with many of these benefits being seen before any significant weight loss occurs (Lincoff *et al.,* 2023) and there therefore appears to be a cardioprotective benefit independent of weight loss. This has been further supported by a recent study that has shown a reduction in major CV events with the GLP-1 RA receptor agonist semaglutide in patients with ASCVD and a BMI >27 kg/m^2 but without diabetes (Lincoff *et al.,* 2023). It is likely the guidelines will change as a result of this seminal study but currently the only way in Ireland for patients to be prescribed these drugs in ASCVD with reimbursement is if they have T2DM. ESC guideline recommendations on GLP-1 RAs are outlined in Table 21.

Key message

Ensure patients with ASCVD and T2DM are prescribed either a GLP-1 RA or an SGLT2 inhibitor or both.

Table 21 ESC guidelines recommendations on GLP-1 RAs (Marx *et al.,* 2023; McDonagh *et al.,* 2023).

Recommendations	Class		Level
GLP-1 RAs with proven CV benefit are recommended in patients with T2DM and CCS to reduce CV events, independent of baseline or target HbA1c and independent of concomitant glucose-lowering medication.	I		A
GLP-1 RA semaglutide should be considered in overweight (BMI ≥27 kg/m^2) or CCS patients living with obesity, without diabetes to reduce CV mortality, MI, or stroke.	IIa		B
GLP-1 RA (lixisenatide, liraglutide, semaglutide, exenatide extended release, dulaglutide, efpeglenatide) have a neutral effect on the risk of HF hospitalisation, and should be considered for glucose-lowering treatment in patients with T2DM risk of or with HF.	IIa		A

8.2.3.2. Antiplatelet regimens

Most patients presenting with acute coronary syndrome (ACS) or undergoing elective percutaneous coronary intervention (PCI) will likely have an antiplatelet regimen prescribed by the treating cardiologist prior to discharge. It is important to continue antiplatelet therapy as prescribed without interruption to reduce the risk of stent thrombosis or repeat ACS. Patients should have the importance of consistent medication use reinforced during engagement with CR.

Temporary or permanent discontinuation of antiplatelet therapy may be warranted in some circumstances but should only be performed in conjunction with the supervising clinical team.

8.2.3.2.1. Aspirin

Aspirin is recommended to be taken at a dose of 75mg once daily and usually continued indefinitely unless changed to an alternative antiplatelet agent. Patients should be advised to take aspirin with food and usually in conjunction with a proton pump inhibitor if co-administered with a second antiplatelet. Hypersensitivity to aspirin may occur in up to 2% of the population, but true aspirin-related angioedema is rare.

8.2.3.2.2. Clopidogrel

Indicated as additional antiplatelet in addition to low dose aspirin as short term secondary preventative therapy post ACS or elective PCI to reduce risk of stent thrombosis. Clopidogrel may be indicated as antiplatelet monotherapy in patients intolerant of aspirin. It is associated with a lower GI side effect profile than aspirin and may be recommended in cases of dyspepsia and gastric ulceration, or in cases of aspirin allergy.

As clopidogrel is a prodrug which undergoes two metabolic steps to produce its active metabolite, clopidogrel metabolism has been found to be variable within populations. Patients experiencing repeat ACS whilst on clopidogrel may benefit from changing to an alternative second antiplatelet with a more predictable metabolism profile.

Recommended to be taken at a dose of 75mg once daily for a duration specified by supervising cardiologist.

8.2.3.2.3. Prasugrel

Prasugrel is an irreversible $P2Y_{12}$ inhibitor. It is indicated as an additional antiplatelet to low dose aspirin and as a short term secondary preventative therapy post ACS in high-risk patients (e.g. diabetes, complex disease). It has higher potency and more predictable metabolism than clopidogrel due to a single metabolic step prior to conversion from prodrug to active molecule.

It is not recommended in patients over 75 years of age, ≤60kg body weight, severe hepatic impairment, prior history of stroke or transient ischemic attack (TIA) or in patients with active bleeding.

Prasugrel is only licensed in cases in which coronary anatomy has been delineated by angiography and as such is not recommended in primary prevention or pretreatment prior to angiography.

Recommended to be taken at a dose of 10mg once daily (standard dose) or 5mg once daily (reduced dose for patients over 75 years of age or ≤60kg body weight) for a duration specified by supervising cardiologist.

8.2.3.2.4. Ticagrelor

Ticagrelor is a reversible $P2Y_{12}$ inhibitor. It is indicated as an additional antiplatelet to low dose aspirin as short term secondary preventative therapy post STEMI or high-risk NSTEMI to reduce risk of stent thrombosis or repeat ACS.

Patients and healthcare providers should be aware that dyspnoea related to ticagrelor use may affect 10-20% of patients. In these individuals, it may be appropriate to switch to an alternative second antiplatelet such as clopidogrel or prasugrel.

Recommended to be taken at a dose of 90mg twice daily for a duration specified by supervising cardiologist.

8.2.3.2.5. Switching antiplatelets

In some instances, it may be necessary to switch a patient from one antiplatelet to another. Aspirin is generally used as long-term single antiplatelet therapy (except in some instances such as gastrointestinal disturbance).

Switching from prasugrel to clopidogrel may be indicated in situations where bleeding risk is a concern. Switching from clopidogrel to prasugrel may be indicated in patients having repeat ACS on clopidogrel therapy.

Switching from ticagrelor to prasugrel or clopidogrel may be indicated in patients experiencing ticagrelor-related dyspnoea or if there are concerns around taking medication twice daily dosing.

Switching between clopidogrel and prasugrel

Prasugrel ® Clopidogrel

If switching early (<30 days) after initiation of prasugrel, a loading dose (LD) of 600mg clopidogrel is required, 24 hours after last prasugrel dose, and continue with a maintenance dose of 75mg daily thereafter.

If switching late (>30 days) after initiation of prasugrel, it is safe to switch directly to 75mg daily of clopidogrel without administering a loading dose.

Clopidogrel ® Prasugrel

A loading dose (60mg) of prasugrel is always required at 24 hours after last clopidogrel dose, followed by maintenance dose of 10mg (standard dose) or 5mg (reduced dose) daily.

Switching between ticagrelor and clopidogrel/prasugrel

Ticagrelor ® Clopidogrel/Prasugrel

A loading dose of clopidogrel/prasugrel is always required at 24 hours after last ticagrelor dose, followed by maintenance dose.

Clopidogrel/Prasugrel ® Ticagrelor

A loading dose of ticagrelor (180mg) is always required at 24 hours after last clopidogrel/ prasugrel dose, followed by maintenance dose.

Table 22 Switching antiplatelets

From	To	Loading Dose (LD)?	Dose	Timing after last dose
Clopidogrel	Prasugrel	Yes	Prasugrel 60 mg LD → 10 mg OD	24 h
Clopidogrel	Ticagrelor	Yes	Ticagrelor 180 mg LD → 90 mg BD	24 h
Prasugrel	Clopidogrel	Early (<30 d): 600 mg LD Late (>30 d): 75 mg OD	Clopidogrel 75 mg OD	24 h
Prasugrel	Ticagrelor	Yes	Ticagrelor 180 mg LD → 90 mg BD	24 h
Ticagrelor	Clopidogrel	Yes	Clopidogrel 600 mg LD → 75 mg OD	24 h
Ticagrelor	Prasugrel	Yes	Prasugrel 60 mg LD → 10 mg OD	24 h

Key Messages

- Aspirin is recommended to be taken at a dose of 75mg once daily and usually continued indefinitely unless changed to an alternative antiplatelet agent.
- Ticagrelor is indicated as an additional antiplatelet to low dose aspirin as short term secondary preventative therapy post STEMI or high-risk NSTEMI to reduce risk of stent thrombosis or repeat ACS (clopidogrel may be prescribed if intolerant ticagrelor).
- For elective PCI/CABG, the duration of dual antiplatelet therapy (DAPT) can vary and the referring consultant's recommendation should be reviewed in that regard.

8.2.4. Blood Pressure

Management of the patients with BP to target is an essential part of a comprehensive CR programme. It is the responsibility of the CR nurse to lead this aspect but also working with the dietitian (if available) and the physiotherapist as lifestyle measures can have a very powerful effect on BP reduction, about the same as one BP drug which can be very motivating for patients (McEvoy *et al.,* 2024).

Patients attending CR with hypertension can be a more select group than the general adult patient with hypertension as they typically have ASCVD, HF, CKD or type 2 diabetes mellitus and therefore their medical management of blood pressure may already have been addressed by optimisation of cardioprotective therapy as discussed above. Nonetheless the new BP targets (see below) as recommended in recent ESC guidance (McEvoy *et al.,* 2024) are quite stringent to achieve and often additional blood pressure-lowering therapy is required.

8.2.4.1. Achieving blood pressure targets

The blood pressure treatment goal for all patients with ASCVD is **120-129/70-79mmHg.**

Exceptions are:

- Intolerance to treatment-in this case target treatment to a BP that is as low as reasonably achievable (ALARA principle)
- Symptomatic orthostatic hypotension (see initial assessment)
- Age ≥85 years
- Moderate to severe frailty

In these patients BP should be treated to a more lenient target <140/90 mm Hg or ALARA.

8.2.4.2. Lifestyle modification:

Patients should be educated on the importance of healthy lifestyle changes in achieving and maintaining an optimal BP. Based on ESC guidelines (McEvoy *et al.,* 2024), the following is a brief summary of the main lifestyle changes to reduce BP:

- Sodium restriction to approximately 2 g per day [equivalent to about 5 g of salt (sodium chloride) per day or about a teaspoon or less]. Note a large part of daily salt intake comes from processed foods (McEvoy *et al.,* 2024).
- Increase dietary intake of potassium (consuming fruit and vegetables). Note, this should be individualised for patients with CKD.
- Regular aerobic exercise (as recommended in physical activity targets) can reduce systolic BP by up to 7-8mm Hg and diastolic BP by up to 4-5mmHg.
- Hypertension and obesity (BMI ≥ 30kg/m^2) are commonly co-morbid conditions. An average weight loss of 5kg has been associated with an average systolic and diastolic BP reduction of 4.4 and 3.6 mmHg respectively. Refer to "Obesity" section for care pathways for overweight and obesity.
- Reduce alcohol intake to less than 100g/week (most drinks contain 8-14 g of alcohol).

8.2.4.3. Pharmacotherapy:

The most recent ESC guidelines (McEvoy *et al.,* 2024) recommend a combination approach to BP-lowering therapy with ACE-I/ARBs, calcium channel blockers (CCBs) and thiazide/thiazide-like diuretics (TLD) used first line.

However as referenced previously in patients with CVD the first step should be to optimise cardioprotective therapies that lower BP e.g. beta-blocker, ACE/ARB/ARNI/MRA therapy as

just discussed. In some cases that may be sufficient to achieve the recommended BP targets. Then additional BP-lowering drugs such as CCBs and TLDs can be introduced if required and preferably as single pill combinations to support effective and sustained treatment use.

The algorithm outlined in Figure 15, has been developed to support BP management in all patients attending CR as the sequence of their medication for their BP depends on the presence of ASCVD or not and LV systolic function.

Remember

- Doubling any anti-hypertensive drug from half standard dose e.g. amlodipine 5 mg to 10 mg only results in about a further 2 mm Hg blood-pressure lowering effect. This holds true for other BP drug classes e.g. CCBs, BB, ACE-Is/ARB/ARNI/diuretics.
- Unlike ACE inhibitors and angiotensin receptor blockers, the risk of side effects with calcium channel blockers, thiazide-like diuretics and beta blockers increases with increasing dose.
- Combining drugs from different drug classes can have additive or synergistic effects which lead to greater BP reduction than increasing the dose of one drug.
- Use single pill combinations where possible to support effective and sustained treatment use.

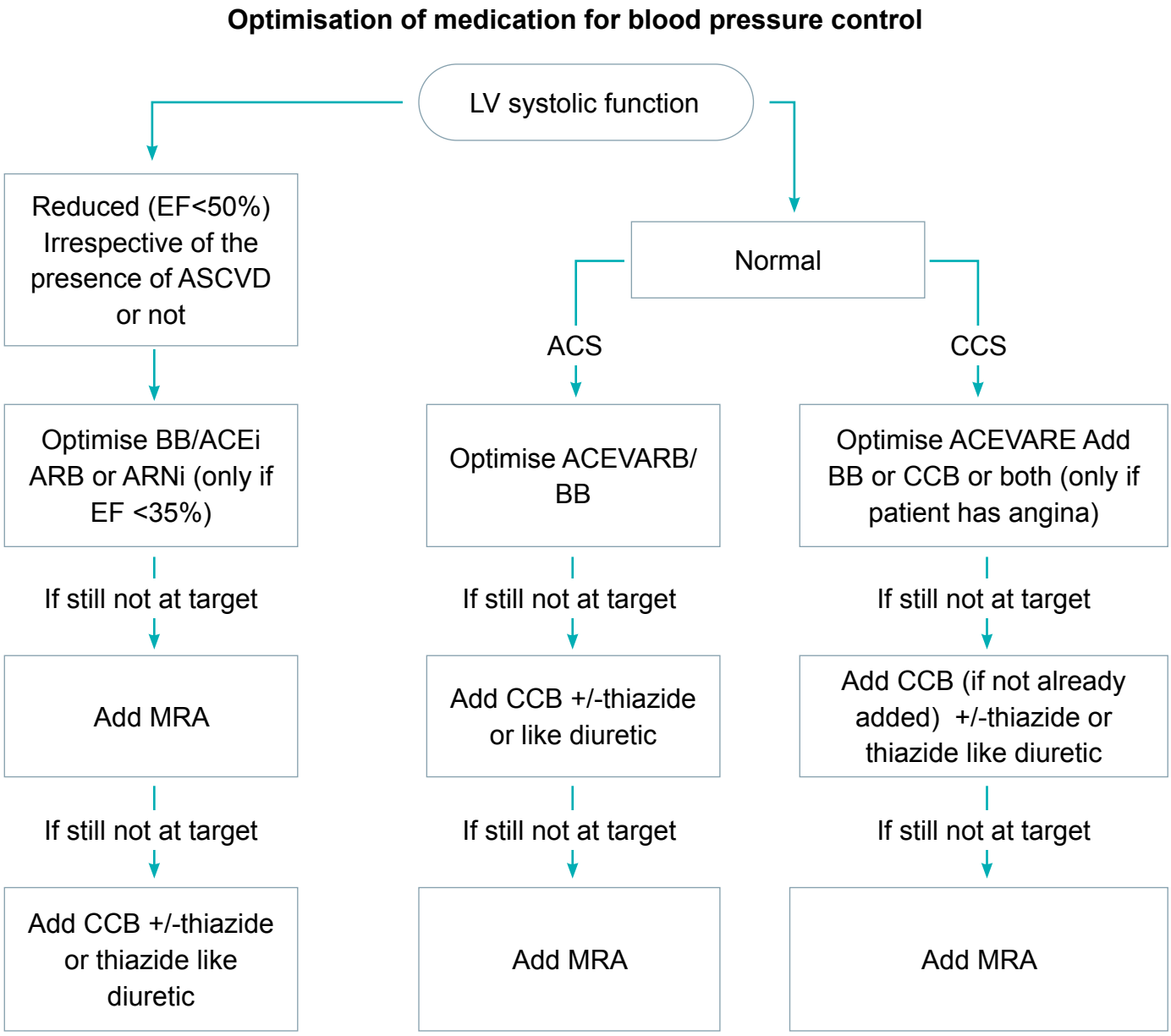
8.2.4.4. Monitoring BP

To monitor BP in response to therapy, home or ambulatory monitoring is advised to ensure the patient is achieving their BP target. This has been discussed in "Blood Pressure Measurement" section. Providing the patient with their own BP monitor is a useful way to empower the patient to achieve their target. If the patient is still not reaching BP targets after following the steps in Figure 15, consider the presence of resistant hypertension.

8.2.4.4.1. Resistant hypertension

Hypertension is defined as resistant when a treatment strategy including appropriate lifestyle measures and treatment with maximum or maximally tolerated doses of a diuretic (thiazide or thiazide-like), a RAAS blocker, and a calcium channel blocker fail to lower office systolic and diastolic BP values to <140 mmHg and/or <90 mmHg, respectively and this is confirmed by out-of-office BP measurements (HBPM or ABPM). Patients with suspected resistant hypertension should be referred for specialist advice (McEvoy *et al.,* 2024).

Figure 15 Optimisation of medication for blood pressure control



*SGLT2 inhibitors have modest BP-lowering effect and should be started in all patient with ASCVD and Type 2 Diabetes or with clinical HF (irrespective of phenotype)

Abbreviations:
LV. Left Ventricular; ASCVD, Atherosclerotic CVD; ACS, Acute Coronary Syndrome; CCS, Chronic Coronary Syndrome; BB, Beta Blocker; ACEi, Angiotensin-converting enzyme inhibitors; ARB, Angiotensin II receptor blockers; ARNi, Angiotensin Receptor-Neprilysin Inhibitor; EF, Ejection Fraction; MRA, Mineralocorticoid Receptor Antagonists; CCB, Calcium Channel Blocker.

For further information on the management of hypertension please see the ESC Guidelines for the management of elevated blood pressure and hypertension (McEvoy *et al.,* 2024)

Clinicians should be aware of the major contraindications to the use of particular classes of antihypertensive medications, these are outlined in Table 23 .

Table 23 Contraindications to the use of specific antihypertensive drugs (Williams *et al.*, 2018).

Drug	Contraindications	
	Compelling	Possible
Diuretics (thiazides/thiazide-like, e.g. chlorthalidone and indapamide)	• Gout	• Metabolic syndrome • Glucose intolerance • Pregnancy • Hypercalcaemia • Hypokalaemia
Beta-blockers	• Asthma • Any high-grade sinoatrial or atrioventricular block • Bradycardia (heart rate <60 beats per min)	• Metabolic syndrome • Glucose intolerance • Athletes and physically active patients
Calcium antagonists (dihydropyridines)		• Tachyarrhythmia • Heart failure (HFrEF, class III or IV) • Pre-existing severe leg oedema
Calcium antagonists (verapamil, diltiazem)	• Any high-grade sinoatrial or atrioventricular block • Severe LV dysfunction (LV ejection fraction <40%) • Bradycardia (heart rate <60 beats per min)	• Constipation
ACE inhibitors	• Pregnancy • Previous angioneurotic oedema • Hyperkalaemia (potassium >5.5 mmol/L) • Bilateral renal artery stenosis	• Women of child-bearing potential without reliable contraception
ARBs	• Pregnancy • Hyperkalaemia (potassium >5.5 mmol/L) • Bilateral renal artery stenosis	• Women of child-bearing potential without reliable contraception

Key messages

- The treatment goal for all patients, inclusive of patients with cardiovascular disease is **120-129/70-79mmHg** with a more lenient target **of <140/90mmHg** or as low as reasonably achievable for patients who are elderly (over 85 years), moderate-to-severely frail, or who have orthostatic hypotension.
- ABPM of HBPM should be utilised to help achieve these targets.
- Patients should be educated on the importance of healthy lifestyle changes in achieving and maintaining an optimal BP.
- Cardioprotective therapies that lower BP e.g. beta-blocker and ACE-Is/ARB/ARNI therapy should be optimised to target dose and if BP remains uncontrolled then additional therapy will be needed.

8.2.5. Lipid Management

In patients with ASCVD, the primary goal is an **LDL-C of <1.4mmol/L** and a **≥ 50% reduction in LDL-c from baseline.** For very high-risk patients (patients with a recurrent event within 2 years), target < 1.0 mmol/L can be considered (Vrints *et al.,* 2024). Despite these clear targets, observational studies have demonstrated less than one third of CVD patients are achieving same (Curneen *et al.,* 2021; McEvoy *et al.,* 2024).

Why are LDL-C targets not being achieved in clinical practice?

- Perceived statin side effects, mostly due to the nocebo effect rather than true statin intolerance (Moriarty *et al.,* 2015).
- Suboptimal medication use – it is estimated that up to 50% of CVD patients stop or reduce therapy (Moriarty *et al.,* 2015, Nissen *et al.,* 2016).
- Use of moderate-intensity statin therapy (instead of high intensity) (Mach *et al.,* 2025).
- Use of statin monotherapy rather than combination therapy (Cannon *et al.,* 2015).

Recommended lipid-lowering approach

To achieve this stringent LDL-c target only high intensity statin (HIS) therapy i.e. Atorvastatin 40mg-80mg or Rosuvastatin 20mg-40mg (which lower LDL-C by ~50%) should be used in established ASCVD (Chou *et al.,* 2016) unless the patient has a specific statin intolerance in which case lower doses or alternative statins may be used (with the reason for same clearly documented in the patient's record).

It is important to remember **the rule of 6,** i.e. doubling the statin dose only yields 6% additional LDL-C reduction (Chou *et al.,* 2016). The average LDL-C in middle-aged Irish adults is 3.1mmol/l as per the recent TILDA update (O'Connor *et al.,* 2025). To achieve an LDL-C < 1.4mmol/l, a 55% reduction is required which is above what high intensity statins can achieve in most patients. (Cannon *et al.,* 2015). Therefore, combination therapy with ezetimibe is now becoming an increasingly standard approach in lipid-lowering.

Ezetimibe inhibits intestinal cholesterol absorption, producing an additional 15-20% reduction in LDL-C when added to statin therapy (Cannon *et al.,* 2015). It is very well tolerated and available in Ireland in single pill combination therapy with high intensity statin therapy.

Why combination therapy?

Modelling from the SWEDEHEART registry clearly shows that statin monotherapy achieves target LDL-C in only 20% of CVD patients, however the addition of ezetimibe increases this to about 50% (Leosdottir *et al.,* 2025). Furthermore, recent data have shown that early initiation of combination therapy post-MI is linked with better outcomes rather than a stepwise approach to same (Leosdottir *et al.,* 2025). This approach with combination therapy from the outset is supported by updated ESC guidance on statin plus ezetimibe combination therapy post-ACS, see Table 24.

While initiating combination therapy is generally encouraged, clinical judgement remains essential. For instance, in frail elderly or those with co-morbidities, a stepwise strategy may still be more appropriate. Further recommendations from the recent ESC focussed update include intensification of lipid-lowering therapy during the index ACS hospitalisation, see Table 24 (Mach *et al.,* 2025).

Table 24 ESC recommendations for lipid lowering therapy in patients with acute coronary syndromes (Mach *et al.*, 2025)

Recommendations	Class	Level
Intensification of lipid-lowering therapy during the index ACS hospitalisation is recommended for patients who were on any lipid-lowering therapy before admission in order to further lower LDL-C levels.	I	c
Initiating combination therapy with high-intensity statin plus ezetimibe during index hospitalisation for ACS should be considered in patients who were treatment-naïve and are not expected to achieve the LDL-C goal with statin therapy alone.	IIa	B

Other LDL-c lowering options:

Bempedoic Acid

Bempedoic acid is an adenosine triphosphate citrate lyase (ACL) inhibitor that lowers LDL-C by inhibition of cholesterol synthesis in the same hepatic pathway (upstream) as statins, but as it is a prodrug requiring hepatic activation it does not cause muscle side effects (Nissen *et al.,* 2023). Bempedoic acid has evidence of benefit in major cardiovascular outcomes in a statin intolerant population (Nissen *et al.,* 2023). In Ireland, bempedoic acid can be prescribed by GPs and it is available/reimbursed for patients with ASCVD not at target despite maximally tolerated statin and ezetimibe for minimum 3 months. The HSE Medicines Management Programme Managed Access Protocol – Bempedoic Acid is available online. Applications can be made via www.pcrs.ie

The effectiveness of bempedoic acid is affected by concomitant lipid-lowering therapy. For example, in statin naïve patients one would expect an LDL-C lowering effect of 25% and up to 38% in patients on bempedoic acid/ezetimibe combination. However, in patients already on maximal statin therapy and ezetimibe the additional LDL-C lowering effect is only a further 8%, see Figure 16.

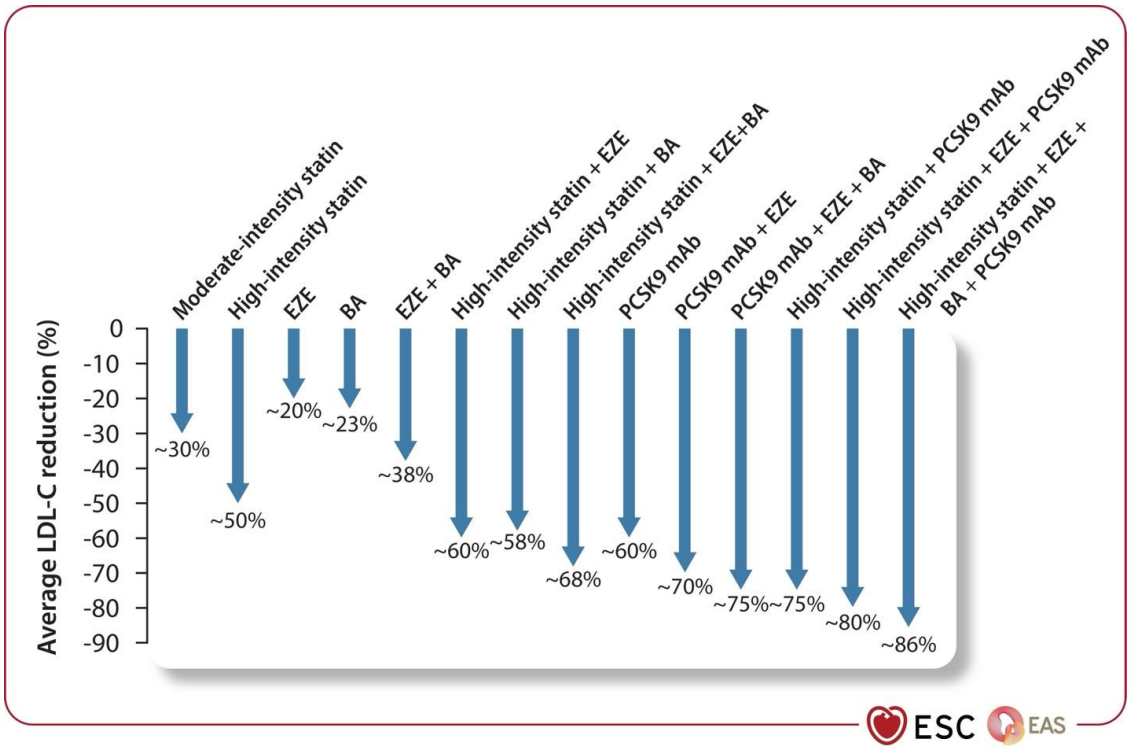
Recommended Dose:

- 180mg orally once daily
- Available as monotherapy or as single combination therapy (SPC) with Ezetimibe (180mg/10mg)

Side effects:

- Increased uric acid levels- can trigger a flare up in people prone to gout.
- Indigestion or constipation (usually when taken in combination with Ezetimibe)

Figure 16 Average reduction in LDL-C with different pharmacological therapies with proven CVD benefits (Mach *et al.*, 2025).



PCSK9 inhibitors

PCSK9 is a protein involved in LDL receptor metabolism and monoclonal antibodies that block PCSK9 upregulate hepatic LDL-receptor expression thus lowering LDL-C (Nissen *et al.,* 2016) by 60% when used as monotherapy and by about 75% when added onto statin therapy. As monoclonal antibodies are large, they must be given as a subcutaneous injection but due to their very long half like this can be every 2 weeks or 4 weeks.

ESC guidelines recommend PCSK9 inhibitors in patients with ASCVD at high or very high CVD risk who do not achieve LDL-C targets despite maximal tolerated statin therapy plus ezetimibe or are statin intolerant and not achieving targets on other therapies (Mach *et al.,* 2020). However, due to cost their use in Ireland is limited by specific reimbursement criteria and thus PCSK9 inhibitors can only be prescribed by a specialist that has been approved by the Medicines Management Programme.

The HSE PCSK9 Inhibitors reimbursement pathway is outlined in Appendix 27 – PCRS Criteria and the full HSE Medicines Management Programme Managed Access Protocol for PCSK9 Inhibitors is available online. Applications can be made via www.pcrs.ie

The recommended dose of **Evolocumab (brand name Repatha)** is 140mg injected every 2 weeks or 420mg injected once monthly. Side effects may include mild injection site reactions (redness, pain, swelling), cold or flu-like symptoms (nasopharyngitis), back pain or mild muscle pain, and rarely: allergic reaction.

Hypertriglyceridemia

Whilst triglyceride levels are associated with CV risk independent of LDL-C levels, the recent ESC update continues to recommend statins as the first drug of choice to reduce CVD risk in high-risk patients with respect to pharmacological treatment of hypertriglyceridemia (can lower triglycerides by 30-40%) (Mach *et al.,* 2025). Lifestyle measures including physical activity, weight loss and moderating alcohol consumption can also have a significant impact on triglycerides. In patients with T2DM particular focus must be on glycaemic control to address same.

Targeted drug therapies for hypertriglyceridemia

Fibrates

Fibrates work by activating PPAR-alpha (a nuclear receptor) which increases breakdown of triglyceride-rich particles and enhance HDL production. Currently available fibrates (fenofibrate, bezafibrate, gemfibrozil) have moderate triglyceride-lowering effects (~30-35%) and lead to small decreases in LDL-C (~10%) and increases in HDL-c (5-15%) but have not been shown to reduced major cardiovascular outcomes or total mortality in patients treated with statins.

The ESC focussed update on recommendation on fibrates remains the same as the 2019 dyslipidaemias guidelines, whereby fibrates are recommended in combination with statins in high-risk patients who are at LDL-C goal with TG levels >2.3 mmol/L (class IIb level c) (Mach *et al.,* 2020).

Potential side effects:

- Dyspepsia, abdominal discomfort, elevated liver enzyme
- Gallstones (this is rare)
- Myopathy (especially combined with statin therapy - gemfibrozil specifically is contraindicated with concomitant statin use due to risk of same)

N-3 Polyunsaturated fatty acids (N-3 PUFA)

The only recommended N-3 PUFA for hypertriglyceridemia is high-dose icosapent ethyl. (a highly purified eicosapentanoic acid ethyl ester) for high-risk or very high-risk patients with elevated triglyceride levels (fasting triglyceride level 1.52 to 5.63 mmol/L). This drug is currently not available in Ireland.

Over the counter supplements and functional foods

Fish oils/Polyunsaturated fatty acids (PUFAs):

Many health food shops, supermarkets and pharmacies sell fish oils/PUFAs either alone or in combination with other supplements. Patients should be advised that there is no evidence to support their use in CVD prevention as the formulations/concentrations of PUFAs that are available over the counter do not reflect those used in clinical trials where there was evidence of efficacy.

Functional foods containing phytosterols (plant sterols and stanols):

Whilst plant stanols/sterols are effective in lowering LDL-C levels by an average of 10% when consumed in amounts of 2 g/ daily for 2-3 weeks, there are no studies showing benefit of phytosterols on CV outcomes. They can be used as an adjunct to LDL-c lowering in patients with ASCVD but if a patient is already taking ezetimibe (see section on combination therapy) they are of no added benefit as they work through similar mechanism of action (reducing intestinal cholesterol absorption) (Mach *et al*., 2019; Mach *et al*., 2025.)

Vitamin and minerals supplements:

Dietary supplements and vitamins in general are not recommended for CVD prevention (Mach et al., 2025).

Special considerations in lipid management

Statin Intolerance

Statin intolerance is defined as clinically significant adverse effects from statins that pose an unacceptable risk or threaten consistent medication use (Stroes *et al.,* 2015). Statin intolerance is reported in up to 25% of patients in practice, but RCTs show true statin intolerance is much rarer (<5%) and often due to the nocebo effect. The majority of patients deemed statin intolerant can generally tolerate low-dose statin on rechallenge (Moriarty *et al.,* 2015).

Key points to note:

- A small percentage of patients will report muscle pain (myalgia) affecting proximal, bilateral muscle aches in large muscle groups; onset usually within 4–6 weeks post initiation of statin.
- There is no good evidence that statins cause joint pain, insomnia, “brain fog”, cancer, or dementia (and may actually be protective against vascular dementia). While statins can slightly increase risk of diabetes, this risk appears to be largely in persons with prediabetes and the risk-benefit balance of statins remains firmly on the benefit side, especially for CR patients with CVD.

Management of Statin-Associated Muscle Symptoms (SAMS)

Assess history and symptoms, these usually occur 4–6 weeks post-initiation and can include bilateral muscular pain, proximal aches in thighs/shoulders. If weakness suggestive of myopathy (rare) is reported the following steps should be taken (Stroes *et al.,* 2015):

- Exclude other causes including exercise, trauma, polymyalgia rheumatic hypothyroidism, vitamin D deficiency.
- Check for possible drug interactions (macrolides, azoles, amiodarone, and grapefruit juice).
- Perform laboratory testing of CK is symptoms suggestive of myopathy
- Dechallenge and rechallenge:
    - Stop statin for 1–2 weeks.

- Restart at low dose (e.g., rosuvastatin 5 mg daily) and titrate. Intermittent dosing (e.g., rosuvastatin 5 mg once weekly) can lower LDL-C by 15% and is often tolerated (Moriarty *et al.,* 2015).

Key Messages

- In patients with established ASCVD the primary LDL goal is <1.4mmol/L and >50% reduction from baseline and <1.0mmol/l if recurrent event within 2 years.
- High-intensity statin therapy (atorvastatin 40-80mg or rosuvastatin 20-40mg) + ezetimibe (extra 15-20% LDL-C reduction) is the first line treatment but will achieve target in minority (~20%).
- Early combination with ezetimibe post ACS is now recommended rather than a step wise approach.
- Escalation to bempedoic acid or PCSK9 inhibitors is recommended if still above target despite statin + ezetimibe.
- True statin intolerance is rare (<5% in RCTs) assess carefully before changing therapy.
- Fibrates are mainly for severe hypertriglyceridemia and are not a statin substitute.

8.2.5.1. Consistent medication use

There are a number of factors which contribute to poor medication taking. These include polypharmacy, complexity of drug regimes, beliefs about medication, patient experience of their illness and recovery, sociodemographic factors (age and health literacy) and costs (Kennan *et al.,* 2022).

The first step is to assess medication use in a non-judgemental manner as part of the initial assessment. A simple question might be “how many days out of 7 do you take your medicine?”

There are different type of strategies that can help enhance medication use, these can be used depending on whether it is unintentional or intentional.

These include:

- Exploring the individual’s barriers to taking their medication as prescribed.
- Education on the specifics of the medication, including why they are needed, duration, timing and dose, along with potential side effects and what to do if they miss a dose.
- Reminders or cues that prompt patients to take their medications, for example mobile alarms or apps.
- Advice on how to integrate into daily habits, for example while having breakfast, this will help make medication taking habitual.
- Medication organisation systems (for example pill boxes or blister packs) that separate medications so that patients can easily see what medication they have taken.
- Use of motivational interviewing to explore how medication taking fits into their health and life goals.
- Use single pill combinations where possible (e.g. statin/ezetimibe combination).

Medication misinformation

Patients should be advised to be aware of the risks posed by medical misinformation that can circulate through social media and print media. Treatment decisions should not be made based on information from these sources. For safe and effective care, patients are encouraged to consult their treating healthcare providers or refer to reputable medical resources when seeking advice or making decisions about their health. Such resources may include the patient version of ESC guidelines, which have been developed to describe diagnosis and treatment recommendations based on medical and scientific evidence. It is worth noting that many of these patient friendly guidelines are available in multiple languages. Furthermore, the Irish Heart Foundation and Croí, provide useful patient resources on heart medicines which are available online.

8.2.6. Management of Dysglycaemia

CR provides an ideal opportunity to adopt a multifactorial approach to management of dysglycaemia.

8.2.6.1. Prediabetes

In patients with prediabetes (HbA1c 42-47 mmol/mol) the focus should be on weight management (target 5-10% of body weight). Patients can also be referred to the National Diabetes Prevention Programme a 12-month group programme delivered in Chronic Disease hubs by dietitians.

In Ireland the GLP-1 RA liraglutide is available via the Medicines Management Programme as an adjunct to a reduced-calorie diet and increased physical activity for patients with an initial body mass index of ≥35 kg/m^2 with prediabetes and high-risk of cardiovascular disease.

8.2.6.2. Type 2 diabetes mellitus

Guidance for type 2 diabetes mellitus management in patients with established CVD is provided in Table 25. This guidance is based on the ESC CVD and Diabetes guidelines (Marx *et al.,* 2023) and the HSE Integrated Model of Care for People with Type 2 Diabetes Mellitis 2024 (HSE, 2024b). To ensure an integrated care approach, CR teams should have access to multidisciplinary diabetes teams for specialist advice particularly where patients are not achieving their HbA1c target.

Table 25 Guidance on type 2 diabetes mellitus management in patients with established ASCVD

Glycaemic control
The general HbA1c target is 53mmol/mol, however this should be individualised based on age, co-morbidities, frailty and adverse effect of therapy (e.g. hypoglycaemia and weight gain).
Monitor HbA1c quarterly until treatment goal is reached, then every 6 months as per CDM programme.
All measures should be undertaken to avoid hypoglycaemia, especially in older adults or those with prior CV events.
Lifestyle
Participating in an exercise programme positively enhances insulin sensitivity and CV outcomes.
Dietary counselling should optimise nutrition, glycaemia, and health (HSE Integrated Model of Care for People with Type 2 Diabetes Mellitus, 2024) (HSE, 2024b). See dietetic sections and self-management and ongoing support below for further information.
Glucose lowering medication
Prioritise agents with proven CV benefit: • SGLT2 inhibitors: Empagliflozin, Dapagliflozin • GLP-1 RAs: Semaglutide • Metformin • Minimise use of sulfonylureas or insulin unless required, due to hypoglycaemia risk. Note: In patients with CVD and T2DM, SGLT2I and/or GLP-1 RA now have a Class 1 recommendation in all patients irrespective of their baseline HbA1c or glucose-lowering therapy.
Self-management and ongoing support
Self-management support should be guided by the HSE Integrated Model of Care for People with Type 2 Diabetes Mellitis 2024 (HSE, 2024b). This document provides information and guidance on appropriate referral to: self-management education and support courses; specialist ambulatory care hub multidisciplinary team; acute hospital multidisciplinary team.
Advise patients on their entitlements, including enrolment on the chronic disease management (CDM) programme in General Practice. This entitles eligible patients (diagnosis of type 2 diabetes mellitus who are aged 18 years and over, with a medical or doctor visit card) to two scheduled reviews with their GP per annum, and a preceding visit with their practice nurse for physical examination, bloods and education. In addition, patients should be advised to ask their GP to refer them for their regular renal, retinal, and foot assessments.

Key messages

- In patients with T2DM and ASCVD the general HbA1c target is 53mmol/mol, however this should be individualised based on age, co-morbidities, frailty and adverse effect of therapy.
- In patients with CVD and T2DM, SGLT2I and/or GLP-1 RA are a Class 1 recommendation, irrespective of their baseline HbA1c or glucose-lowering therapy.
- Liaise with local diabetes MDT services to ensure an integrated approach to care.

8.2.7. Heart Failure

The benefits of CR for patients living with heart failure (HF) are well established and include improved functional capacity, reduced hospitalisations, enhanced quality of life and increased survival rates (McDonagh *et al.,* 2021). Patients with HF should be offered CR tailored to their needs and preferences. This involves:

- Consideration of specific limitations and co-morbidities, whilst ensuring safety and effectiveness.
- Education on HF management, medication use, dietary modifications, fluid management, and recognition of worsening symptoms.
- Regular assessment of patient progress, including functional capacity and symptom management, adjust the CR programme as needed.
- Addressing psychological aspects such as depression and anxiety, which are common in HF patients.

In line with the principles of the Integrated Model of Care for Heart Failure (HSE, 2021), a partnership approach to care delivery between the patient, GP, community and acute hospital service is required throughout CR. Therefore, it is important to be familiar with the heart failure services in your area.

8.2.8. Frailty

Frailty is defined as an age-related loss or reduction of the ability to react to stressors or events, it not considered a disease, but it is a high-risk condition for developing chronic co-morbidity and disability (Rockwood and Mitnitski, 2011). Frailty and CVD in the older person share pathophysiological mechanisms and associated conditions, such as malnutrition, sarcopenia, anaemia, polypharmacy leading to a negative impact on outcomes (Giallauria *et al*., 2021). The combination of CVD and frailty is associated with an increased risk of morbidity and mortality (Aida *et al.*, 2020; Kunimoto *et al*., 2019; Nozaki, *et al*.,2020). Frailty is more prevalent in patients with CVD and it is reported to be as high as 40-50% among those referred to CR.

There is growing evidence to show that integrating the management of frailty into CR can improve functional status and quality of life of patients with CHD (MacEachern *et al.,* 2024). Data shows that the frailest of patients tend to benefit most from completing CR (MacEachern *et al.*, 2024). Therefore, early identification is key to developing a tailored CR programme that meet with the individual patient needs and clinical complexity in terms of functional capacity, nutritional status and co-morbidities, cognitive status, and social support (Giallauria *et al.*, 2021).

The prevention and management of frailty requires an interdisciplinary team approach acknowledging that frailty is a complex, multidimensional condition. As there is an overlap between risk factors for frailty and CVD, the combination of the CR core components has been shown to be an effective method of improving frailty.

The following is a brief overview:

- Multicomponent exercise training based on a combination of strength and aerobic exercise, plus balance and flexibility training, can improve functional status, muscle function, mobility, gait ability and reduce fall risk (Giallauria *et al.*, 2021).
- The psychological component of CR can reduce distress associated with frailty.
- As an abnormal BMI and suboptimal nutrition are associated with a higher risk of frailty, the CR focus of lowering adiposity while increasing muscle strength can prevent sarcopenia and improve frailty.

The delivery of the physical activity and exercise component along with diet and nutrition provides guidance on the above. For further information on the frailty and CVD, see the following American Heart Association review (James *et al.*, 2024)

8.2.9. Obesity

Consistent with global data almost 41% of patients with ASCVD are living with obesity in Ireland (Curneen *et al.,* 2021). Given its critical role in impacting several CVD risk factors and subsequent outcomes, obesity management should be integrated into CR care, recognising that more intensive specialist care may be required to manage obesity related complications. All members of the interdisciplinary team should work collectively to provide behavioural and medical support to manage cardiovascular risk factors in the context of living with multi-morbid obesity. Consistent with the philosophy of care patients with obesity should be offered CR tailored to their needs and preferences, avoiding reinforcement of weight stigma/bias and ensuring a weight inclusive approach that emphasises health gain versus weight loss alone.

For patients living with obesity the following are key considerations:

- Assess specific functional limitations and co-morbidities, to ensure safety and effectiveness.
- Regular assessment of patient progress, including functional capacity and adjust the CR programme as needed.
- Addressing psychological aspects such as depression and anxiety, which are common in patients living with obesity.
- Ensure referral to obesity management services as per clinical guidelines and model of care recommendations (see “Obesity” section).

8.2.10. Implantable cardiac devices in cardiac rehabilitation

Patients participating in a cardiac rehabilitation programme may require a cardiac implantable electronic device (CIED) or may have previously been fitted with a CIED if they meet guideline-based criteria, including:

- **Permanent pacemakers (PPM) -** used for clinically significant bradycardia or atrioventricular block.
- **Implantable Cardioverter Defibrillators (ICDs**) are indicated for secondary prevention after ventricular tachyarrhythmias/cardiac arrest, or for primary prevention in those with persistently reduced left ventricular systolic dysfunction (LVEF ≤ 35%) despite optimal medical therapy. They may also be indicated in patients with a family history of sudden cardiac death (SCD) in the setting of a genetic cardiomyopathy or channelopathy (e.g. hypertrophic cardiomyopathy, long QT syndrome).
- **Cardiac Resynchronisation Therapy (CRT-P/CRT-D)** is considered in patients with symptomatic heart failure (NYHA II–IV), LVEF ≤ 35%, and evidence of ventricular dyssynchrony (QRS ≥ 130 ms), or in patients with a diagnosis of heart failure who require PPM implantation in whom a high percentage of pacing is anticipated (e.g. high degree atrioventricular block).
- **Conduction System Pacing (CSP)** may be considered in patients for indications similar to CRT above but, using a right-sided pacing lead which is affixed to the heart's intrinsic conduction system (His or left bundle).

Patients with implantable cardiac devices should be considered appropriate for enrolment in CR programmes and not excluded solely on basis of concerns around impacting device functionality or potentially triggering adverse events such as inappropriate device therapies/shocks (Pedretti *et al.,* 2021). CR programmes have been shown to be safe and effective with implantable devices, similar to cardiology patients in whom an implantable device is not indicated (Steinhaus *et al.,* 2019).

For CIED recipients CR programmes offer substantial benefit including modifying morbidity of their underlying conditions (Kim *et al.,* 2021) (e.g. heart failure, coronary artery disease, arrhythmia) whilst also importantly improving psychological adaptation to CIED implantation, such as encouraging exercise and reducing healthcare anxiety around device therapies/shocks (Nielsen *et al.,* 2019).

8.2.10.1. Practical considerations when enrolling a patient with a CIED to CR

Patients should be advised to avoid heavy lifting or excessive use of the ipsilateral arm on the side of implant in the first 6 weeks post device implantation to reduce risk of lead dislodgement or fracture. It is therefore recommended to avoid commencing the exercise component of CR until 2-4 weeks after implantation to ensure lead stability and wound healing. All patients with a recent CIED implant are recommended to have a device interrogation at 2-12 weeks post implantation to review wound healing, device parameters and optimise settings (in case of CRT / CPS) (Ferrick *et al.,* 2023). It may be prudent to conduct this check prior to enrolling the patient in a CR programme, or in line with local policy on routine post-implant follow-up procedures. For the types of training appropriate for patients with CIED see the physiotherapy section "Adaptations and Considerations in Those Living with Multiple Conditions or Devices"

8.2.10.2. Assessment of CIED at enrolment for CR:

All patients should have the following CIED-specific assessment at baseline:

- Medical history, CIED indication (pacing, primary prevention ICD, secondary prevention ICD, CRT), implant type, and date of implant.
- Information regarding the device parameters, and settings (e.g. antitachycardiac pacing threshold) should be obtained from the cardiac physiology department where the device is monitored and include
  - Device type and programming - pacing mode, ICD therapies.
  - Heart rate thresholds (pacing rate, rate-response settings).
  - Arrhythmia detection / VT and VF therapy zones
  - Battery status and lead function.
- 12 lead ECG

8.2.10.3. Patients who have a shock or other therapy during CR:

- Moderate intensity, high intensity interval training and resistance/strength training is safe and effective provided the patient exercises within prescribed heart rate limits (see physiotherapy section "Adaptations and Considerations in Those Living with Multiple Conditions or Devices" for information on exercise prescription in patients with a CIED).
- CR has NOT been shown to increase risk of appropriate or inappropriate shocks in patients with ICD / CRT-D, however some patients may experience device therapy during their CR sessions or between CR sessions.
- Patients experiencing shocks during their CR programme should be managed in the same fashion as patients not on a CR programme – namely immediate referral to their local cardiology unit for device interrogation and cardiologist review.
- There may be significant anxiety and distress related to resuming activities for patients who have had a recent ICD shock, however patients should in most instances be encouraged to return to CR when deemed appropriate by their cardiology team.

Key messages

- Patients with CIEDs benefit from participation in CR and should not be excluded on the basis of concerns around impacting device functionality or potentially triggering adverse events.
- All patients should have a CIED-specific assessment with baseline device interrogation to be completed by a cardiac physiologist prior to commencing the exercise component.

8.2.11. Resumption of activities

Resuming prior activities, including returning to work, engaging in personal (e.g. sexual activity) and social activities, driving and travelling are important components of recovery after a cardiac event.

8.2.11.1. Return to driving

Driving advice in accordance with the Road Safety Authority (RSA) Sláinte agus Tiomáint Medical Fitness to Drive Guidelines (Group 1 and 2 Drivers), April 2025 should be given to all patients prior to their discharge from hospital (see Phase I CR). The National Driver Licence Service (NDLS) guidance Cardiac-Conditions-and-Driving provides patient-level information on this advice and the provision of this advice should be documented in the patient's medical record. In some instances, patients must notify the NDLS with regards to their cardiovascular diagnosis particularly if they have a Group 2 license where the restrictions are more stringent. Patients should be warned that if they drive against advice, and evidence is found of this, the NDLS and the Gardaí can take action to revoke their licence.

8.2.11.2. Return to work

CR can play an important role in supporting patients return to work after a cardiac event. Returning to work is influenced by multiple factors that go beyond clinical and physical status to include demographic, social and psychological factors (O'Brien *et al*., 2018). For example, level of education, depression, and patient beliefs and perceptions of their condition are key predicators of whether they will return to work (Mital *et al*., 2004). While contemporary data on the most effective interventions to support a return to work are lacking, psychosocial support which addresses stress and depression together with a return to work plan is recommended (O'Brien *et al*., 2018).

8.2.11.3. Sexual Counselling

All patients following a cardiac event should be offered sexual counselling, guided by the inital assessment and use of the IIEF questionaire (males only). Sexual health is a key component of psychosocial adjustment after a cardiac event (Inayat *et al.,* 2024) and is identified as an important concern for patients and their partners (D'Eath *et al*., 2018). Spousal fear and uncertainty can adversely affect relationships and sexual heath after a cardiac event, and this is often due to limited knowledge and awareness about of the effects of their cardiac disease and medication on sexual activity (Inayat *et al.,* 2024). Therefore, patients and their partners should be provided with information on when they can resume activity, with reassurance that sexual activity is safe provided they are not symptomatic at low-to moderate physical activity levels. A good gauge is if the patient can climb two flights of stairs without symptoms, this is the equivalent to the amount of expended energy needed during sexual activities.

8.2.11.4. Facilitating the discussion

Utilisation of the **PLISSIT** model (Annon 1976) can be useful in facilitating discussions about sexual activity at an individual level initially. This step-by-step approach helps health care providers to bring up the topic, provide relevant education, offer practical solutions, and determine if more specialist support is needed. The PLISSIT model refers to:

- **P**ermission: The health care professional provides a safe and confidential environment for the patient to discuss their sexual concerns without fear of judgement.
- **L**imited **I**nformation: The health care professional provides the patient with relevant and specific information directly related to their concerns for example when they can resume sexuality activity after their event and medication effects. Medication that adversely affects sexual activity includes betablockers, class 1 calcium channel blockers, vasodilators, diuretics and loop diuretics.
- **S**pecific **S**uggestions: tailored and more in-in-depth advice depending on the patient's specific concerns or needs should be offered. For example, strategies to reduce anxiety or varying sexual routines or positions.
- **I**ntensive **T**herapy; this involves signposting or referring the patient on to specialist psychology support. Generally, at this stage sexual problems stem from deeper psychological, emotional, or relational issues.

Information on pharmacotherapies should be provided, and patients should be advised that Phosphodiesterase type 5 (PDE-5) inhibitors (Sildenafil, Viagra) are generally safe, however they should not be taken in combination with nitrate medications because of risk of severe hypotensive response (Kloner *et al.,* 2018).

For further information please review the AHA and the ESC CCNAP consensus statement Sexual Counseling for Individuals With Cardiovascular Disease and Their Partners (Steinke *et al.,* 2013)

Practice Points

- Discussions about sexual dysfunction should be initiated as part of the CR nursing /medical risk factor assessment.
- Factors that affect sexual activity include age, disease, lack of knowledge, anxiety and fear. Avoid making assumptions about current or future sexual activity when providing information.
- Offer to include partners in couple education sessions. Findings from the CHARMS Intervention Study suggest that a group setting for discussing sexual activity is acceptable to patients and the inclusion of partners is important (D'Eath *et al*., 2018).
- Schedule group education sessions on sexual activity towards the end of the cardiac rehabilitation programme to allow rapport to develop between staff and patients.
- Provide contact options for follow up or more intensive help if require.

Key messages

- Sexual counselling is an important aspect of rehabilitation following a cardiac event and should be included in medical/risk factor assessment.

8.3 Delivery of the physical activity and exercise component

8.3.1. Physical activity participation and sedentary behaviour:

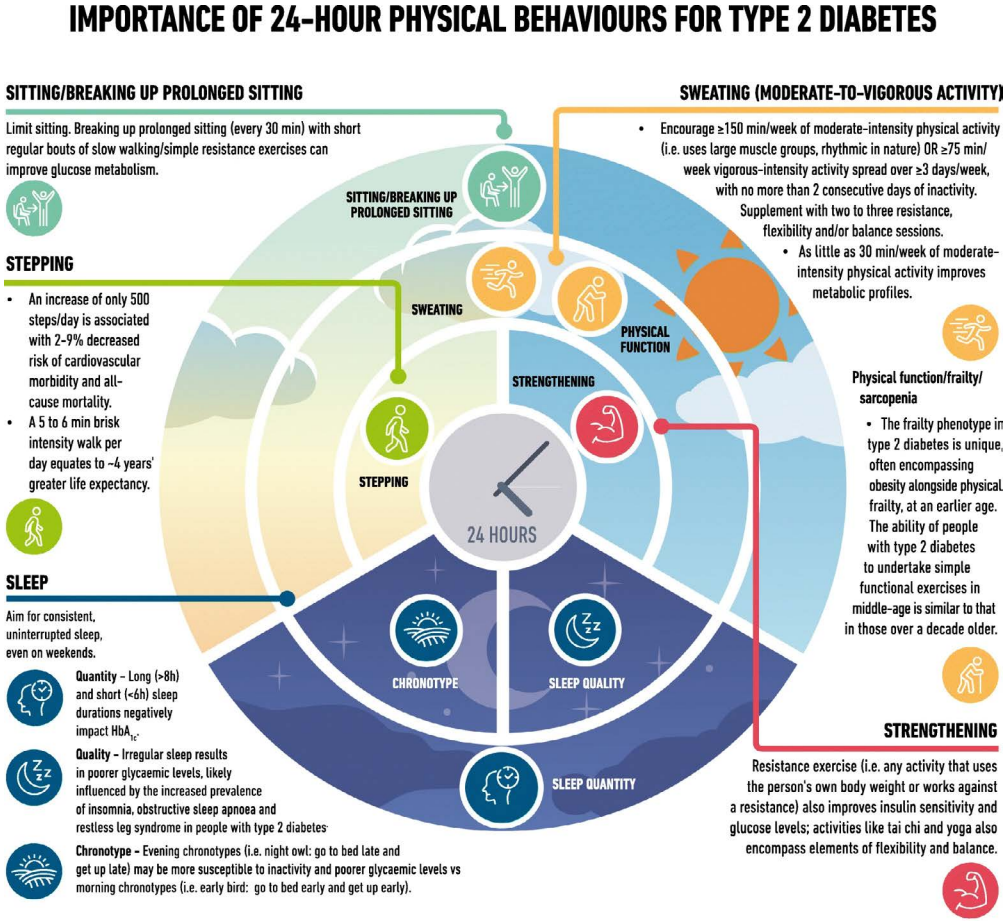
Whilst achieving 2 hours 30 minutes - 5 hours of MVPA a week is one important goal; there is growing recognition of the need to address physical activity behaviours within the context of the overall daytime and 24-hour cycle.

Reducing sitting time is as important as addressing MVPA participation. Replacing sedentary behaviour with any level of physical activity, including standing and light stepping, is associated with an array of health benefits. Muscle strengthening is also strongly associated with positive health outcomes.

In applying this holistic thinking, a framework initially designed for the management of type 2 diabetes mellitus can be applied similarly to cardiac rehabilitation (Figure 17). This illustrated framework focusses on a **five "S"** approach - Sweating (which represents MVPA), Sitting, Stepping, Strengthening and Sleep (Davies *et al.,* 2022).

The accelerometry data collected at the initial assessment provides much of this information and is consequently very useful for highly personalised goal setting that aligns to patient preferences, readiness for change and capabilities. Replacing sitting time with additional steps (at any intensity) is beneficial to health. Likewise ensuring strength training is given sufficient attention is also important. Hence the focus in this clinical action guidance is not on achievement of MVPA minutes per week but on a more holistic approach of activity patterns throughout the waking day.

Figure 17 Importance of 24-hour physical behaviours for type 2 diabetes mellitus (Davies *et al.,* 2022).



Incorporating Physical Activity into Daily Life

Whilst the next section will focus on how to design a safe and effective structured activity programme, it is important to include physical activity and movement during the day more broadly.

Exploring with the patient opportunities that they may be open to trying can effectively achieve important health benefits in combination with a structured exercise programme. Examples include:

- Park the car in the furthest car parking space or the next street and walk to the destination. If using a bus, get off at a bus stop earlier and walk the remainder of the journey.
- Walk to the local shops to collect the newspaper and other essentials. On the return journey imagine being late for an appointment and increase the walking pace, slowing down towards the end.
- Play ball in the park with the children/grandchildren or take them swimming.
- When doing a boring task, such as housework or DIY, put some motivating music on. Not only will it make the task more enjoyable but it will also speed up movements.
- When doing the ironing, iron a couple of clothes and then put them away, so doubling the activity.
- In the garden, every 10 minutes take a brisk walk around the garden before returning to the task.
- While talking on the phone, do some knee bends or walk around if possible.
- Never use the lift or escalator, take the stairs and as fitness improves take the stairs at a faster pace.
- Take the dog for a walk (borrow a friend's dog if necessary!).

Structured Exercise

Exercise programming, using sound principles, is core to cardiac rehabilitation. There is a strong emphasis in guidelines to include both aerobic endurance and resistance training. (Hansen *et al.,* 2024). By designing an effective programme there are a number of physiological effects that have been shown to result in positive health outcomes (Table 26).

During exercise, there is an integrated physiological response from various systems including respiratory, central, peripheral and muscular. Exercise training in cardiac patients aims to target improvements in how each of these systems respond to exercise.

Table 26 Physiological effects of exercise training

Respiratory	Increased V/Q matching Attenuation of ergoreflex
Central	Improvements in stroke volume Improvements in endothelial function
Peripheral	Improved capillary density- reduced peripheral resistance Oxygen carrying capacity of blood improved Improved vasodilation
Muscular	Muscle hypertrophy Increased mitochondria Increased endurance, reduced fatigue Increased arteriovenous oxygen difference (A/V O_2) difference

8.3.2. Exercise prescription

Aerobic Exercise

Utilising the information gained at the initial assessment the physiotherapist should prescribe exercise for the patient that is tailored to their ability, needs and preferences. In general, moderate intensity exercise is beneficial and safe for all patients with cardiovascular disease whilst also being the most feasible and cost-effective aerobic training modality and it is well supported in both research and guidelines (Ambrosetti *et al.,* 2020; BACPR, 2023; HSE, 2023a, Hansen *et al., 2022*).

Aerobic exercise should be prescribed according to the Frequency, Intensity, Time and Type (FITT) model for the given patient population. The *HSE Model of Care for Integrated Cardiac Rehabilitation 2023* (HSE, 2023a) advises the following for aerobic exercise in a CR population (Table 27):

Table 27 FITT principle for aerobic exercise reproduced from the HSE CR model of care 2023 (HSE, 2023a)

FITT principle for aerobic training	
Frequency	Minimally 3 days a week, preferably up to 5 days a week
Intensity	With an exercise test, use 40-80% of exercise capacity using HRR, VO^2R or VO^{2peak}. Without an exercise test, use seated or standing resting heart rate +20 to +30 beats per minute or RPE of 12-16 on a scale of 6-20
Time	20-60 minutes
Type	Arm ergometer, combination of upper and lower (dual action) extremity cycle ergometer, upright and recumbent cycle ergometer, recumbent stepper, rower, elliptical, stair climber, treadmill

Training ranges for aerobic exercise in CR, as per the MOC, are 40-80% of exercise capacity, namely, HRR and estimated maximal METs. However, this needs to be highly individualised, taking into account the person's risk category, habitual physical activity and exercise capacity which should be determined from thorough assessment. Accordingly, some individuals may warrant prescription on the lower or higher end of this range.

Whilst the same principles for exercise training apply for all individuals, some adaptations may be required for specific groups, including those with implantable devices. Further information on these groups can be found in the Association of Chartered Physiotherapists in Cardiovascular Rehabilitation (ACPICR) Standards for Physical Activity and Exercise in the Cardiovascular Population 2023 4th Edition (ACPICR, 2023). FITT models for different patient populations have also been outlined in the American College of Sports Medicine (ACSM) 2022 "Guidelines for Exercise Testing and Prescription" and are summarised for different clinical populations commonly encountered in CR in Appendix 28: Exercise prescription FITT tables for specific conditions.

Heart Rate Range (HRR)

As stated above, training intensities of 40-80% are recommended within the model of care for aerobic exercise. Ranges between 40-70% are deemed moderate intensity and will be suitable for most individuals. As 70-80% represents the lower range of vigorous intensity, this may be appropriate for low-risk individuals who are regularly accustomed to moderate to vigorous PA, whilst significantly deconditioned individuals may require a lower intensity prescription (30-50% HRR). The Karvonan formula should be utilised when calculating training heart rate ranges for CR participants to work within (Appendix 14: Heart Rate and determining target heart rates). Care should be taken to align this prescription with the individuals RPE (Appendix 13: Rate of Perceived exertion (RPE)) when exercising to ensure correct intensities are being reached. Focus should be on adequate education on RPE throughout so that the individual can continue to monitor own intensity of exercise without definitive need for HR monitoring on programme completion.

METs

Maximum METs, calculated from functional capacity test, should be used to prescribe different activities within the 40-80% range (ensuring individualisation as outlined for HRR above). See Appendix 15 and Appendix 16 for details on same. This can also be used to guide settings for gym equipment such as treadmill speed, bike watts, rowing splits etc.

It is imperative that prescription is tailored to each individual, taking into consideration realistic and collaborative goal setting as well as subjective and objective assessments. Progression can be made in line with the participants exercise capacity gains throughout the programme. Exercises can be adjusted to ensure they are maintaining exercise intensities within their respective recommended ranges for RPE and HR. Start slowly and progress gradually, aiming to achieve 30 minutes before increasing intensity. Increasing intensity and duration of 5-10% every 1-2 weeks is typically well tolerated in cardiac patients.

Resistance Training

As per aerobic training, resistance training (RT) should also follow the FITT principle. As described earlier, ACSM have FITT recommendations for resistance training in different clinical groups. The general principles can be summarised as follows:

Table 28 FITT principle for resistance training reproduced from the HSE CR model of care 2023 (HSE, 2023a)

FITT principle for resistance training	
Frequency	2-3 non-consecutive days per week
Intensity	Perform 10-15 repetitions of each exercise without significant fatigue; RPE 11-13 on a 6-20 scale or 40%-60% of 1RM
Time	1-3 sets; 8-10 different exercises focused on major muscle groups
Type	Select equipment that is safe and comfortable for the individual to use

- Of note:
  - Low intensity is recommended for those new to resistance training or where building endurance is the primary goal: 15-20 repetitions, < 40% 1-RM, RPE < 11.
  - Moderate intensity as progression or where building strength is the primary goal: 8-12 repetitions, 40-60 % 1 RM, RPE 11-13.

Progression of RT can be achieved by progressing volume (reps, sets) and intensity before progressing the type and frequency of activity. Resistance training prescription components summarised by the AHA (Paluch *et al.,* 2023) below highlights prescription options for different populations.

Figure 18 Resistance training prescription

Resistance training	Muscle adaptation	Reps	Frequency	% 1 RM	Patient group
Low	Endurance	15-20	≥ 2 days / week	< 40 %	New to resistance training
Moderate	Strength and endurance	8-12 reps	≥ 2 days / week	40-60%	Progression

Flexibility:

Improving flexibility is associated with improved joint range of motion, enhanced muscular performance, postural stability and balance. (Garber *et al.,* 2011). A programme of stretching exercise can be incorporated into the CR exercise programme-usually as part of the warm up and cool down. Care should be taken to avoid sustained periods of time in a static position throughout the warm up/cool down to minimise a drop in HR. Ensure guidance on correct technique for each stretch and modify to the individual if required. FITT for Flexibility should be as follows:

Table 29 FITT principle for flexibility training reproduced from the HSE CR model of care 2023 (HSE, 2023a)

FITT principle for flexibility training	
Frequency	≥2-3 days per week, with daily being the most effective
Intensity	To the point of feeling tightness or slight discomfort
Time	10-30 second hold for static stretching; ≥4 or more repetitions of each exercise
Type	Static and dynamic stretching focused on the major joints of the limbs and the lower back. Consider PNF technique

8.3.3. Supervised Exercise Sessions

The following section will explore the key considerations when delivering a supervised exercise session. Regardless of the setting (hospital, chronic disease hub, home or virtual), the level of equipment (gym based or minimal equipment) and whether delivered individually or to a group, the same principles of supervised exercise apply. Further guidance on delivering exercise sessions virtually is provided in Appendix 32 Example of a group exercise class delivered virtually. Where a supervised approach is being used the physiotherapist, in combination with the cardiac rehabilitation team collectively need to ensure the following:

8.3.3.1. Assessment before an exercise session:

It is essential in supervised exercise sessions to determine suitability to participate, essentially ensuring the patient is clinically stable. This involves:

- Assessing pre-exercise HR: This should be ≤ 100 beats per minute in most cases.
- Assessing blood pressure: This is purely to assess the participant's readiness for and response to exercise and is not a replacement for managing BP overall (see "Blood Pressure" section) Prior to each supervised exercise session, it is recommended to assess the patient's resting blood pressure. However, as patients progress and their cardiac disease is stable with no symptoms, these pre-exercise measurements are not necessary and may be counterproductive to the patient's feelings around exercise and physical activity in an unsupervised state (Verdicchio *et al.,* 2023). If after two weeks of checks all readings are within normal range, it is reasonable to discontinue routine BP measurement for exercise purposes.

- All CR programmes should have a dedicated protocol for monitoring and managing blood glucose levels for patients with diabetes prior to and during cardiac rehabilitation exercise sessions. This protocol should be guided by the consensus statement Acute glycaemic management before, during and after exercise for cardiac rehabilitation participants with diabetes mellitus (Buckley *et al.,* 2020). In November 2025, the HSE published the HSE National Clinical Guideline for the Diagnosis and Treatment of Hypoglycaemia in Adults with Diabetes Mellitus in Acute and Non-Acute Settings (HSE, 2025).
- Enquiring if medications have been taken – heart rate may be higher than usual if heart rate lowering medication has not been taken that day.
- Ensuring they haven't had a heavy meal in the immediate period prior to attending, whilst also communicating the important of having something to eat. (Ideally, they have eaten in the preceding 3 hours but also ensuring adequate time (depending on meal size) for digestion prior to commencing exercise).
- Ask if anything to report e.g. how did patient feel after last session, any new symptoms to report?
- Specific HF questions as applicable: any significant increase in dyspnoea, fatigue, development of orthopnea/paroxysmal nocturnal dyspnoea, weight (2kg over 2-3 days), worsening oedema.

Practice points:

If HR or BP is higher than usual when attending the supervised session, ask about the following;

- Were they rushing or stressed getting there?
- Have they taken their usual medications that morning?
- Caffeine consumption.
- Smoking / vaping prior to class.
- General health status including hydration, sleep, pain.

Where the patient may have forgotten to take their medication, this does not necessarily preclude them from participating in the class. However, it may impact on supervision level as well as the intensity at which the patient can exercise for that session, especially if heart rate or BP is higher than usual. This needs to be explained to the patient because the HR / RPE relationship they are accustomed to will be altered.

If BP is repeatedly elevated or where BP is > 180mmHg systolic or > /110mmHg diastolic this should be reviewed by the CR nurse who can review as part of the overall blood pressure management plan for the patients (see "Blood Pressure" section).

Borderline blood pressure or blood glucose readings should be viewed as precaution rather than contraindication to exercise. Exercise choice, duration and intensity can be modified. Readings can be checked again after the warm up to give an indication of status (should have improved – if not improved use clinical judgement to determine whether the patient can continue in the class or not).

8.3.3.2. Monitoring and Exercise Intensity Determination during Supervised Exercise Session:

CR is generally safe with a low risk of cardiac events. A study by Pavy *et al.,* (2006) showed that in 25,420 CR participants studied, the event rate was 1 per 49,565 patient hours of exercise training and the cardiac arrest rate was 1.3 per million patient-hours of exercise. Individualised exercise prescriptions are typically based on frequency, intensity, time, and type. Exercise intensity determination is an important principle for aerobic exercise prescription because it is a main part of medical safety and training effectiveness (Hansen *et al.,* 2022). Monitoring of exercise intensity includes use of HR response, Rating of Perceived Exertion (RPE), direct observation and simple tools such as the "Talk Test" (Hansen *et al.,* 2022).

Telemetry is not routinely required to monitor exercise intensity (Brown *et al.,* 2024; Verdicchio *et al.,* 2023). For most asymptomatic patients, continuous ECG monitoring can be counterproductive by exacerbating feelings of anxiety around exercise that delays development of patient self-efficacy (Verdicchio *et al.,* 2023).

8.3.3.3. Heart rate response:

Using a heart rate monitor or pulse oximetry. Ensure individuals are working within their pre-determined training heart rate range to achieve the correct intensity of exercise (this should be used in conjunction with RPE range). Monitor for appropriate rise within session and recovery in cool down to near resting level. In some cases, HR alone may not be wholly accurate as a monitoring tool (e.g. arrythmias like atrial fibrillation, cardiac transplant or some HR control medications). As such, it is important that other tools to monitor exercise intensity are used in conjunction. These are direct clinical observation, RPE and the talk test (Hansen *et al.,* 2022).

8.3.3.4. Clinical observation and subjective reporting:

Instructors should be mindful of signs of over-exertion that can be monitored through observation and appropriate questioning of participants. The following signs may be indicative of this:

- Excessive breathlessness including overuse of accessory muscles
- Excessive fatigue or sweating
- Dizziness/light-headedness
- Chest pain or other signs of cardiac ischemia (e.g. Jaw tightness)
- Nausea
- Cyanosis or reduced pallor
- Poor quality movement/form/posture during exercise

RPE: Ensure individuals are exercising at their prescribed RPE range. Patient's understanding and use of these scales (Appendix 13: Rate of Perceived exertion (RPE)) is paramount to effective use- ensure time is spent educating on appropriate use. Keep an RPE chart in view at all times and encourage the patient to report on a combination of how the exercise is affecting breathing and overall muscle response. Anchor to known exertions (i.e. no exertion is sitting still) and encourage use of the descriptor words for the patient rather than the numbers.

Walk Talk: For those who struggle with the concept of RPE interpretation the "walk talk" test is an effective alternative. If they are exercising at a moderate intensity they should be able to walk and talk but not be able to whistle or sing. If they are able to whistle a full tune or sing a song, they are working at too low an intensity. Conversely if they are unable to speak a sentence, they are working at too high an intensity.

Practice points:

- Monitoring intensity effectively requires a combination of methods to capture the workload of the cardiorespiratory system holistically. Where people are very accustomed to a movement for example, they may do so at lower energy costs. Hence using METs in isolation is also not recommended but also provide essential information to activity programming and exercise prescription.
- Observation gives very useful information above and beyond a guide to exercise intensity. For example, ability to follow instruction, hearing deficit, mobility and balance impairment / limitation.
- HR is a useful indicator of exercise intensity but in some cases gives an inaccurate guide. For example, patients with atrial fibrillation often present with a fluctuating heart rate that does not accurately reflect exercise intensity. Patients post heart transplant demonstrate resting sinus tachycardia and blunted response to exercise due to loss of vagal input to the sinoatrial node. In these individuals, the emphasis should be on direct observation and RPE.
- It is important that both pre-assessment data and data collected during the exercise session is logged and documented. Each centre should also have a documented process to follow in the event of an adverse event. Supervision during the exercise component is a team-based approach, therefore each member of the team should be familiar with both how to monitor exercise intensity effectively and in the unlikely event manage an adverse or emergency event.

8.3.3.5. Components of a structured exercise session – warm up, conditioning, resistance, cool down, flexibility

There are five components in standard cardiac rehabilitation sessions. These are warm up, conditioning, resistance, cool down and flexibility. A sixth component, balance, may be incorporated into the session for individual patients.

Warm up

The warm up prepares exercising muscle, including the heart, for the increased workload and oxygen demand that will follow and is an important part of the safety of the supervised exercise session. It allows the body to adapt to the physiological demands that accompany exercise by stimulating vasodilation, allowing an increased blood flow to all organs and muscles, optimising metabolic response. Increasing muscle temperature improves muscle metabolism, performance and oxygen uptake leading to reduced muscle and joint stiffness and enhanced power, postural control and balance.

Typically, the warm up should:

- Last 10-15 minutes.
- Ensure a graduated transition from rest to lower end of training range (HR within 20bpm of training range or RPE of 11 (6-20 RPE scale).
- Mobilise joints and warm up all large muscle groups.
- Consider available space / equipment / setting. A seated warm up or support (e.g. rail, chair back) may be required for some patients.

Conditioning

The conditioning component comprises of cardiovascular exercise(s), performed at prescribed target heart rate range / RPE range. The aim of this section is to improve cardiovascular fitness and is integral to reducing CVD risk.

- Format will depend on each CR centre's space, available equipment and setting.
- Examples for gym based, home and virtual options for the conditioning component are available in Appendix 29: Class design, Appendix 30: Sample gym setting programme, Appendix 31 home based cardiac rehabilitation exercise programme, Appendix 32 Example of a group exercise class delivered virtually.
- It is imperative this component is tailored to the needs, abilities and goals of the participant.
- Intensity and time should be guided by the relevant FITT principle (as described above) but also individualised to each patient depending on their baseline fitness/response to exercise etc (may need to start lower and gradually increase).

An interval approach is recommended in the conditioning component. This involves alternating between periods of relatively higher intensity and periods of low intensity (active recovery). This has been shown to improve cardiorespiratory fitness and overall cardiovascular health in a safe and effective way. In addition, for those who are deconditioned or who are unaccustomed to exercise, it is generally easier to accept and is more enjoyable, which can enhance attendance and participation.

Progression: How to progress the conditioning component to ensure continuous improvement in cardiovascular fitness

- Start with an interval approach and gradually progress to a more continuous approach as training benefits are observed.
- Increasing ratios of work: rest duration.
- Increase duration first before intensity (up to 20-30 minutes).
- Introducing steady (continuous) state (i.e. eliminate active recovery).
- Adapt exercise prescription for "good" and "bad" days.
- Caution with "over activity / rest cycle" with exercise.

Resistance Training:

The resistance section is designed to promote improvements in muscle strength and/or endurance with benefits already highlighted above

Resistance exercise can be completed using the following:

- Body weight
- Free weights
- Machine weights
- Resistance bands

How much? Dose can be manipulated by varying the number of sets and / or repetitions and the weight used.

- 15–20 repetitions approaching fatigue, progressing to 8-12 approaching fatigue
- 1–3 sets
- 8–10 different exercises focused on major muscle group

Resistance Training considerations post Sternotomy

Sternotomy should not delay the initiation of all relevant core components of CR. In relation to the exercise intervention, this can still be initiated with modification as necessary. After sternotomy, strategies for safe movements for adults have traditionally been based on expert opinions. Typically, patients are encouraged to avoid heavy lifting and overhead loaded activities in the first 6 weeks to encourage early bone healing. They are then encouraged to progress with lifting gradually with full bone healing expected at 3 months. However, routinely restricting upper limb and truncus movements has little support in evidence-based international guidelines for cardiac rehabilitation, and a systematic review and meta-analysis from 2019 reveal that resistance training is likely safe and feasible with positive physical outcomes improving the rehabilitation (Pengelly *et al*., 2019). The restrictions in traditional movements post-surgery can contradict the goal of a quick return to the daily life activities and optimal healing. An alternative approach yielding a safe recovery is the movements strategy, Keep Your Move in the Tube (KYMITT), has become part of practice in the USA and Canada (Adams *et al*., 2016; Danielsen *et al.,* 2024). Using this approach for the first six weeks post sternotomy enables selected resistance exercises to be achieved and consequently if the sternum is stable, progressing accordingly to include all major muscle groups.

Practice point:

- RT can be completed in the same session as the aerobic exercise or in a “stand-alone” session.
- If RT is being completed in a stand-alone session, there should be a warm up by performing the exercises 10 times without a weight and cooling down should be done by stretching the muscles Resistance Training A guide for heart patients (ACPICR, 2015)

- If completed after the conditioning component, a partial cool down will be required to reduce HR and RPE before the resistance section.
- Consideration may be given to perform resistance after the warm up and before the conditioning component. This has the advantage of participants being less tired and reduces errors in technique.
- 3 sets of 8-10 exercises will usually not be possible in the timeframe of a CR class, unless sessions are dedicated to resistance. When combined with conditioning component, class structure may be adjusted e.g. target 2-3 muscle groups per session with instruction for home programme. Compound exercises, using multiple joints and muscles are useful alternatives for time efficiency and building functional strength.
- Vary the exercises included in sessions.

Interpretation of intensity (resistance)

- Rating of perceived exertion of 11–13 on 6–20 Borg scale

Technique

Patients often have limited exposure to resistance training prior to CR therefore it is important to provide clear, simple instructions for each exercise to allow patients to develop good basic technique and ensure safe progression of load and intensity.

The following should be considered when demonstrating and educating patients:

- Posture
- Slow controlled movement
- Through comfortable ROM
- Avoid breath holding

Cool down

The purpose of the cool down is to allow gradual reduction in heart rate, blood pressure and circulating catecholamines. Stopping exercise suddenly carries a risk of arrhythmia. It can also result in post exercise hypotension (actual or relative) with symptoms of dizziness, light-headedness. HR should be measured at the end of the cool down period, prior to sitting.

- Graduated reduction in intensity
- Minimum of 10 minutes
- Should result in the heart rate returning to within 10 beats of pre-exercise levels
- A post class period of observation of 15 minutes is recommended

Flexibility

If time allows, flexibility exercises are included at the end of the session and patients are advised to incorporate them into their home exercise.

Static stretches of major muscle groups held at an intensity of comfortable stretch, for 10-30 seconds.

8.3.3.5.1. Adaptations and Considerations in Those Living with Multiple Conditions or Devices

People attending cardiac rehabilitation often attend with other health considerations. For example, chronic respiratory diseases, chronic kidney disease, diabetes, peripheral arterial disease and TIA/stroke are interconnected and can often accompany the patient presentation. Many of this population are often older adults and consideration needs to also be given to other conditions more common in elderly populations (e.g. musculoskeletal, balance etc).

The below considers two some specific examples (chronic respiratory diseases and those with CIEDs), where some practical aspects are particularly noteworthy. The fuller spectrum is provided in the Association of Chartered Physiotherapists in Cardiovascular Rehabilitation (ACPICR) Standards for Physical Activity and Exercise in the Cardiovascular Population 2023 4th Edition (ACPICR, 2023).

- For those with significant respiratory muscle dysfunction, this guide recommends carrying out inspiratory muscle training (Appendix 19:Inspiratory muscle testing & training (IMT).
- **For those with pacemakers:**
  - Upper exercise heart rate limit should be set 10–15 bpm below the device's upper tracking rate to avoid pacemaker-induced 2:1 block.
  - Rate response should generally be switched to ON.
- For those with Implantable Cardioverter-Defibrillators (ICDs, including CRT-D)
  - Exercise HR should remain ≥10–15 bpm below the lowest ICD detection zone (set at specific thresholds for individual patients – confirm with device check prior to commencing exercise programme) (See "Implantable cardiac devices in cardiac rehabilitation" section).

8.3.4. Structured Activity Programming independent of attending CBCR

As previously presented encouraging movement, interspersed throughout the waking day, is a key goal. Coupled with this, if the patient is to gain improvements in health-related fitness, this requires a structured activity approach that meets the FITT principles. For example, if the patient is attending a once weekly supervised exercise session, they will require at least two additional sessions in a home setting. Often what is being prescribed in the supervised setting can be adapted and repeated in a home environment. The mode of home-based structured activity can take many effective approaches that all share the same principles. For example, a structured walking programme, a home-based circuit of prescribed activities or following a video purposefully designed for the needs of the individual. Typically, in the home setting, the ultimate aim is to enable the patient to be equipped with the necessary skills for safe and effective activity

behaviours long-term. As such, often the emphasis in the home setting of independent exercise, is recording rating of perceived exertion. Hence enabling effective use of RPE is an essential goal in the supervised component. In the growing era of technology and wearables, this offers opportunity for patients to track their activity, which can be then shared with the physiotherapist and used to review and goal set accordingly in a more personalised way.

Practice point:

One of the most important aims of Phase III is that on completion, participants are competent and confident to exercise independently having regard for safety and efficacy of their chosen activity. In particular:

- To understand the requirement for extended warm up and cool down periods
- To use RPE appropriately
- To avoid types of circuit training that include rapid posture shifts during conditioning. Floor exercises, if used, should be completed only after extended cool down and may not be appropriate for some patients
- To ensure they are exercising at a moderate intensity:
    - For some individuals with a highly active baseline, a return to higher intensity exercise or competitive sport may be the goal. See the 2020 ESC guidelines on Sports Cardiology and Exercise in patients with CVD for guidance (Pelliccia *et al.* 2020).

See Appendix 31 home based cardiac rehabilitation exercise programme, for further information.

8.3.5. Long-term planning

Throughout the CR programme, it is important to discuss with each patient strategies for long term maintenance of their exercise and physical activity and formulate an individualised plan on how to achieve it. This involves planning and prioritising how exercise and activity can be incorporated into everyday life. Furthermore, depending on patient preference, signposting to relevant community supports where available may be appropriate. These may include but are not limited to:

- Local Phase IV Instructors
- Local Sports Partnerships
- Local walking groups
- Local gyms
- Trusted online video resources e.g.
    - Irish Heart Foundation
    - Croí
    - HSE Health and Wellbeing exercise videos for people with chronic disease
    - British Heart Foundation exercise videos
- Social Prescribers
- Ex-Well/ Siel Bleu or other chronic disease management exercise classes

When attending an exercise class led by other exercise professionals, patients should be encouraged to tell the instructor that they have had a cardiac event so that exercises can be appropriately modified. Ideally the patient should watch the class if possible before participating.

The HSE Physical Activity Pathways in Healthcare Model 2024 can guide the physiotherapist to direct patients to the appropriate level (O'Brien and Casey, 2024). In addition, the physiotherapist should link with their region's self-management support coordinator regarding locally available supports.

Self-management tools can include:

- Wearable devices – step count, movement reminders, activity tracking, fitness apps
- Simple exercise diaries
- Goal setting

8.3.6. Closing Summary of Key Points in Physical Activity and Exercise Programming

Regardless of setting, the same principles apply in the devising of a safe and effective activity programme. This requires a combination of structured activity that meets FITT principles and progresses as the patient responds to exercise training, coupled with increasing physical activity and reducing sedentary time overall. Ultimately the aim is for the patient to be equipped to self-manage and continue with lifelong habits that meet physical activity and structured exercise guidelines.

8.4 Dietitian delivery

Step 1 “nutrition assessment” and step 2 “nutrition diagnosis” (See “Dietitian Assessment” section) will inform step 3 “nutrition intervention” and step 4 “nutrition monitoring and evaluation”, of the nutrition care process (NCP).

8.4.1. Step 3 – Nutrition intervention

The aim of the nutrition intervention is to provide a patient-centred, safe and clinically effective nutrition care plan with measurable outcomes. Nutrition intervention strategies are selected to change nutritional intake, nutrition-related knowledge or behaviour, environmental conditions, or access to supportive care and services. Nutrition intervention goals provide the basis for monitoring progress and measuring outcomes.

Note: The dietetic assessment has been addressed in “The Nutrition Care Process” section.

An individualised nutrition care plan is based on the following 4 domains

1. Food and Nutrient delivery

Food and/or Nutrient Delivery refers to an individualised approach for food/ nutrient provision and is informed by evidence-based healthy eating patterns including the Mediterranean diet and dietary approaches to stop hypertension (DASH) and a heart-healthy pattern of eating meals and snacks consists of (Mach *et al.,* 2025; McEvoy *et al.,* 2024; Visseren *et al., 2021)*:

- Vegetables and fruits
- Limited total saturated fats from red meat and sweets/confectionary
- Main dietary fats sourced from unsaturated fats (monounsaturated fatty acids, omega-3 and omega-6 polyunsaturated fatty acids)
- Wholegrains
- Low fat dairy products
- Low in salt
- Low in added sugars and sugar sweetened beverages
- High quality lean protein sources (from plants or animals with saturated and trans fats removed and limited processing)
- Nuts, seeds and legumes

The Mediterranean diet includes the above patterns with an emphasis on the main source of fat being mono-unsaturated fats (olive and rapeseed oils). Overall, there is a higher total fat intake (≥ 35%) compared to the dietary pattern in the Irish healthy eating guideline patterns. However, an important distinction is that the type of fat is predominantly mono and poly-unsaturated fats (22% MUFA, 6% polyunsaturated (PUFA), and <10% SFA) which are associated with LDL lowering, anti-inflammatory effects and reduction of atherosclerosis (Delgado-Lista *et al.*, 2022). The lowest rates of CVD mortality are observed with this dietary pattern. As there is a higher percentage of energy from total fat there may be a perception of increased risk of weight gain,

however evidence suggests that this dietary pattern is not linked with weight gain and has a positive impact on reducing central adiposity longer term (Guasch-Ferré and Willett, 2021).

See Appendix 23: "Cardio-protective diet components and targets", for information on specific cardio protective nutrients, dietary sources and how to improve dietary intake of these nutrients.

2. Nutrition education

Providing nutrition education and nutrition related skill development is an important aspect of CR nutrition care. There are three main categories of nutrition education; nutrition education and knowledge, food skills, and relationship with food, as described further in Table 30:"Nutrition education categories" that should build or reinforce the person's nutrition-related knowledge. Advice should be based on an individual's nutrition diagnosis.

The person's cardiovascular risk should be discussed, including relevant health results and offering explanation and checking of understanding of their results' relationship with their food/ nutrient intake. The emphasis is on the key role the person can play in the self-management of dietary risk factors for secondary prevention.

Table 30 Nutrition education categories

Nutrition knowledge	Food skills	Relationship with food
Knowledge of principles and components of a cardio-protective dietary pattern Role of nutrients and food groups in heart health Recommended portion sizes, target intakes and balanced meals Addressing diet fads/myths and nutrition misconceptions	Meal planning Food shopping Healthy choices when eating out of the home Understanding food labels Modifying meals to improve diet quality	Supporting a positive relationship with food and eating behaviours Principles of mindful eating Improved awareness of eating behaviours related to hunger, satiety, cravings, emotional drive to eat, and palatability of foods.

3. Nutrition Counselling

Supporting patients with self-management skills and incorporating behaviour change techniques is critical to helping patients sustaining a cardio-protective dietary pattern in the longer-term. This can be delivered as part of group based or one-to-one behavioural support. For individuals with complex co-morbidities the dietitian will need to tailor education and goal setting to align with condition specific nutrition guidelines.

As discussed in "Approaches to facilitate behaviour change" section, a range of evidence-based behaviour change techniques (BCTs) can be utilised in CR. Specific BCTs used in nutrition and dietetic interventions to empower patients to make and sustain nutrition related behaviour changes include, but are not limited to:

- Exploring importance, confidence, readiness and ambivalence.

- Goal setting (behaviour): encourage a behavioural resolution to make or maintain a change. Collaboratively set realistic SMART goals linked to a nutrition related behaviour and encourage a behavioural resolution to make or maintain a change e.g. an extra portion of vegetables with dinner at least four days per week.
- Self-monitoring e.g. a food and mood diary.
- Demonstration of the behaviour: showing or providing a visual demonstration on how to perform a behaviour either in person or remotely e.g. visual aide to demonstrate recommended serving sizes.
- Problem solving: The individual is prompted to think about possible barriers to planned behaviour change goals and consider how they would overcome barriers identified (ASOI Breen *et al*., 2022).

4. Coordination of Nutrition Care

Provide the patient with details of the jointly agreed nutrition care plan, this supports self-management.

Care may include;

- Additional individual dietetic appointments during the phase III CR programme. This may be required to address malnutrition, sarcopenia, complex obesity, CKD.
- Referral to other chronic disease self-management education programmes as required e.g. the National Diabetes Prevention Programme, Best Health Weight Management Programme, DISCOVER DIABETES- Type 2.
- And/or specialist obesity services, community or hospital dietetics services as appropriate.
- Signposting to other community programmes e.g. Healthy Food Made Easy.

It is important to adopt a collaborative approach to care by working with the interdisciplinary team, keeping them informed of the patient's nutritional needs and jointly agreeing management plans for example for sarcopenia, CKD etc.

Liaise with the wider network as required e.g. GP, practice nurse, family, carers to co-ordinate nutrition care plan.

8.4.2. Step 4: Nutrition Monitoring and Evaluation

Nutrition monitoring and evaluation is designed to determine the amount of progress made and if goals/expected outcomes have been met. Nutrition outcome indicator(s) should be chosen that will monitor a change due to nutrition care. Dietitians should consider factors such as the nutrition diagnosis and its etiology and signs or symptoms, the nutrition intervention and medical diagnosis. The change in specific nutrition outcome indicator(s) between initial and end of the programme (EOP) assessments should be measured and compared. The use of standardised indicators and criteria increases the validity and reliability in the outcome data collected. It can also facilitate electronic charting, coding, and outcomes measurement.

Table 31 Nutrition monitoring and evaluation outcomes

Food/Nutrition-Related History Outcomes	Anthropometric Measurement Outcomes	Biochemical Data, Medical Tests, and Procedure Outcomes	Nutrition-Focused Physical Finding Outcomes
Food and nutrient intake, food and nutrient administration, medication/herbal supplement use, knowledge/beliefs, food and supplies availability, physical activity, nutrition quality of life	Height, weight, BMI, growth pattern indices/percentile ranks, and weight history	Biochemistry data (e.g., electrolytes, glucose) and tests (cardiac CT, MRI, ECG, stress test etc)	Physical appearance, muscle and fat wasting, swallow function, appetite, and affect

Section "10.0 Audit and evaluation" provides details of the monitoring and evaluation of the whole CR programme and includes specific dietary and anthropometric outcome measures.

8.5 Non-dietitian brief intervention guidance

The following section outlines how non-dietitian members of the IDT can support brief nutrition intervention based on the interpretation of the screening and assessment tools' results as outlined in assessment section.

Table 32 An overview of screening and assessment tools that can be completed by other members of the CR team where a dedicated CR dietitian is not available. These are highlighted in the dietitian section above with an*

Screening / Brief Assessment Tool:	Parameters:	Action
Anthropometry, body composition	Weight Height, or ulna length if unable to measure height Body mass index (BMI) Waist circumference (BMI 25-35 kg/m^2 only) Waist to height ratio (BMI <35 kg/m^2 only)	MUST: Follow the HSE community algorithm for management of malnutrition and nutrition support Training available on HSeLanD - e-based training Edmonton obesity staging system (EOSS) as per BMI cut-offs
Alcohol – hazardous drinking screener	Complete AUDIT-C – three screening questions and if score ≥ 5 complete remaining seven questions.	Based on the results of the AUDIT C follow recommendations for action required. See Appendix 25: Alcohol Use Disorders Identification Test (Audit Tool)
Mediterranean Diet Score tool (MDS)	14-point questionnaire assessing cardio-protective diet quality	See Appendix 24: Mediterranean diet score (MDS)
Screen for conditions requiring dietitian input	Heart failure, chronic kidney disease, COPD, malnutrition, sarcopenia, frailty	Dietitian and/or GP as required

8.5.1. Obesity

When obesity is identified using assessment of anthropometry, body composition and obesity related health impairments using the Edmonton obesity staging system (EOSS) tool. The following table (Table 33) summarises the appropriate steps to support obesity management in a CR setting.

Action: Irrespective of EOSS, in each case, the healthcare professional should seek consent to discuss weight. All members of the CR team can provide self-management education and support for obesity related health behaviours that are included in the core components of the CR package of care.

Table 33 Guidance on actions to support obesity management based on EOSS staging and assessment

BMI / Waist to height ratio	EOSS	Action
BMI >25 kg/m^2(BMI >23 kg/m^2) and Waist to height ratio (up to BMI 35 kg/m^2 only): 0.5 to 0.59 = increased health risks 0.6 or more = further increased health risks	Note all patients who meet criteria for CR will automatically have an EOSS stage of at least 2 or greater	Provide signposting to local and primary care supports.
BMI >30 kg/m^2 BMI 27.5 kg/m^2 or above and Waist to height ratio (up to BMI 35 kg/m^2 only): 0.5 to 0.59 = increased health risks 0.6 or more = further increased health risks.	≥ 2 = established obesity-related chronic disease	Consideration of initiation of obesity pharmacotherapy. Onward referral to the Best Health Programme for obesity self-management support is indicated if: BMI ≥30 kg/m^2 /27.5 kg/m^2 and presence of two of the following co-morbidities: type 2 diabetes mellitus, hypertension, hyperlipidaemia, obstructive sleep apnoea, polycystic ovarian syndrome and osteoarthritis.
BMI >30 kg/m^2 and Waist to height ratio (up to BMI 35 kg/m^2 only): 0.5 to 0.59 = increased health risks	3 = Established end-organ damage, such as myocardial infarction, heart failure, diabetes complications,	Onward referral to obesity specialist MDT Level 3 and 4 care for more intensive obesity treatment, including consideration of all psychological interventions, pharmacological and surgical treatment options. Aggressive management of complications as indicated.

8.5.2. Malnutrition

Malnutrition risk is screened using the MUST tool. Based on the result patients identified with/or at risk of malnutrition should be referred to their GP for medical review as well as referred to the appropriate dietetic service as per local policies. If a dietitian is present within the CR team the MUST score will be reviewed by the dietitian as part of the dietetic assessment, and they will co-ordinate a nutrition care plan.

Where a dietitian is not present within the CR team, community dietitian referrals are accepted (Note: referral to dietitian may need to be directed through the GP) for management of malnutrition based on the following criteria:

- Malnutrition Universal Screening Tool (MUST) Score ≥2
- Body Mass Index (BMI) ≤18.5 kg/m²
- BMI <22 kg/m² in 70 year olds
- BMI < 20 kg/m² AND Unintentional Weight Loss > 5% in the past 3 6 months
- Unintentional Weight Loss >10% in past 3 6 months
- On oral nutritional supplements

8.5.3. If sarcopenia is suspected the following steps should be taken

- First line nutrition counselling can be initiated by healthcare professionals using the following resources
  - INDI healthy Aging
  - The Malnutrition Pathway UK Frailty Guide

- If a dietitian is present within the CR team results of the sarcopenia positive screening will be reviewed by the dietitian as part of the dietetic assessment and they will co-ordinate a nutrition care plan.
- Where a dietitian is not present within the CR team, community dietitian referrals are accepted (Note: referral to dietitian may need to be directed through the GP) for nutritional management of sarcopenia based on the following criteria:
  - Probable Sarcopenia with evidence of nutrition concern defined by:
    - SARC-F Score ≥4
    - Chair Stand Test x5 rises >15 seconds OR
    - Hand Grip Dynamometry Males <27kg; Females <16kg

8.5.4. Alcohol

In line with ESC guidelines, patients should be advised to restrict alcohol to less than 100g / approximately 10 units (note alcohol content in standard drinks varies from 8-14 g) of alcohol per week for men and women (Byrne et al., 2023; McEvoy *et al.,* 2024; Vrints et al., 2024). Reducing alcohol consumption to ≤3 units (≤30 grams of alcohol) per week is recommended as part of comprehensive risk factor management to reduce AF recurrence (Van Gelder *et al.,* 2024). It is Important to note that the guidelines for alcohol consumption for people with CVD are lower than the HSE low-risk alcohol guidelines (11 standard drinks per week, for women and 17 standard drinks per week, for men).

In addition, based on the patient's AUDIT-C risk category, which screens for excessive drinking, the appropriate action should be taken, as detailed in Table 34.

Table 34 AUDIT C score management

AUDIT Score	Risk Category	Desired Action
0 –7	Lower Risk	Positive reinforcement of low risk drinking guidelines
8 –15	Increasing Risk	Brief intervention, reinforce low risk guidelines and explore strategies for cutting down
16-19	Higher Risk	Extended Brief Intervention and /or referring to local counselling supports
20+	Possible Dependence	Referral to Specialist Services

The recommended "Making Every Contact Count" training (See "Recommended training for cardiac rehabilitation staff" section), provides training on how to discuss alcohol, completing the AUDIT-C and implementing the appropriate action.

A range of resources are also available on HSE Alcohol

8.5.5. Mediterranean Diet Score (MDS)

In all patients an MDS should be calculated.

Note: regardless of MDS score, in cases where complex co-morbidities are present, the individual may require specific individualisation to meet energy requirements and disease specific nutrition therapy goals. See Table 35. If no dietitian on the CR team for CVD risk factor management e.g. hyperlipidaemia and/or hypertension, refer to the dietitian as per community and or hospital dietitian referral criteria and note the presence of any co-morbidities.

Table 35 Mediterranean diet score result and recommended actions

Score	Level of alignment to cardio-protective eating pattern	Recommended action plan:
≤5	Weak	Trained members of interdisciplinary team provide general guidance and behavioural support, aiming for a 2-point increase in MDS. See Appendix 24: Mediterranean diet score (MDS). and Refer to dietitian for individualised medical nutrition and behavioural support
6–9	Moderate to fair	Trained members of interdisciplinary team provide general guidance and behavioural support, aiming for a 2 point increase in MDS. See Appendix 24: Mediterranean diet score (MDS).
≥10	Good or very good	Patient attends standard group-based nutrition education component to support maintenance and enhancement of cardio-protective diet long term, aiming for a 2-point increase in MDS score. See Appendix 24: Mediterranean diet score (MDS).

- (adapted from Martínez-González *et al.,* 2012)

Practice Points:

- For individuals without complex co-morbidities all members of the interdisciplinary team should be able to provide nutrition counselling on the cardio-protective dietary pattern.
- Discuss with the patient the positive nutrition behaviours related to the yes answers and ask them to reflect on the “no” answers.
- Pick one or two areas they think are a priority for them to work on to improve their score by 2 points. Inform them of the benefits of a 2 point increase:
  - 8-9% reduction in overall mortality
  - 9-10% reduction in mortality from CVDs
  - 4-6% reduction in incidence of, or mortality, from cancer
  - 13% reduction in incidence of Parkinson disease and Alzheimer’s disease
  - 31% reduction in risk of metabolic syndrome
  - 32% reduced risk of depression (Dietitians of Canada, 2018)
- Appendix 24: Mediterranean diet score (MDS) includes an MDS tool with specific suggestions for improving alignment with cardio-protective dietary pattern, linked to each question.
- Providing support, education and signposting or referral to address any knowledge and skill deficits identified to improve diet quality.

8.6 End of programme assessment

The end of the programme (EOP) assessment should be conducted ideally in person but can be done virtually if required. The purpose of this EOP assessment is to:

- Determine whether patients have achieved their lifestyle and medical risk factor targets.
- Determine whether their cardioprotective medication has been optimised.
- Reassess the patient's psychosocial health before they exit the programme in case there are ongoing needs for further support.
- Determine whether the patient has met their own goals and objectives.
- Discuss and devise a strategy for long term maintenance of their cardiovascular health.

The assessment should follow a similar process as the initial interdisciplinary team assessment, including the same outcome measures and patient questionnaires for completion. (Figure 19). The outcomes from the EOP assessment should inform the development of a discharge care plan, which should include details of clinical issues requiring ongoing management as well as long-term strategies for supporting and maintaining health behaviour change (See "Long term self-management" section). A programme discharge letter should summarise this care plan as well as provide a pre and post programme comparison of the following:

- Lifestyle (smoking status, exhaled CO), engagement with cardioprotective diet, anthropometrics, functional capacity, accelerometry-derived MVPA and sitting time).
- Medical risk factors (blood pressure, LDL cholesterol, HbA1c).
- Cardioprotective medications.
- Psychosocial health (quality of life, anxiety and depression scores).

This letter should be sent to the patient's GP and copied to the patient and their referring consultant for reference.

Importantly the EOP assessment should be used as an opportunity to reinforce the patient's own role in the long-term self-management of their condition, communicating the message that lifelong CVD goes beyond a period of "rehabilitation". Data from the final assessment should be formally recorded for evaluation of outcome measures and audit (See "10.0 Audit and evaluation" section).

Capturing the patient experience of CR, through the use of patient reported experience measures (PREMs) is recommended to identify areas of improvements in the quality and delivery of care (Moons *et al.,* 2023). By focusing on non-clinical aspects such as communication, co-ordination and access to care PREMs can help create a more patient centred CR programme. There is a strong association between positive patient experiences (as measured by PREMs) and better clinical and service outcomes, including improved use of medication as prescribed, and reduced readmission rates (Doyle *et al.,* 2013). As the development of a national approach to capturing PREMS for all enhanced community care programmes is ongoing, CR centres are encouraged to use their own PREMS in the meantime. If patients do not speak English, it is possible to give feedback in 26 other language through, "your service your say."

Figure 19 Interdisciplinary End of Programme Assessment

Interdisciplinary Team End of Programme Assessment

Nursing

- Recent hospital admissions or change in OVD diagnosis
- Smoking status
- Blood pressure
- Lipids
- HbA1c
- Heart rate and rhythm
- Medications and adherence
- Psychosocial Health

Physiotherapy

- Physical activity participation
- Sedentary behaviour
- Functional capacity assessment
- Strength assessment
- Physical activity and behaviour change
- Physical function

Dietetics

- Nutrition focused physical findings e.g. appetite
- Anthropometnic measurements and nutritional requirements
- Food and nutrition-related history, including Mediterranean Diet Score
- Summary of nutritional issues/nutrition diagnosis

Future goal setting and planning for long-term self-management
Patients reported experience measures-programme evaluation completed

Discharge and end of programme summary letter sent to GP

8.6.1. Long term self-management

A major challenge in CR is that many patients relapse to unhealthy habits after programme completion (De Bacquer *et al.,* 2022; Garcia-Lunar *et al*, 2022). Therefore, a key objective of CR is to equip patients with the necessary tools, knowledge, and confidence to help sustain health behaviour change long-term. This involves promoting CR as an entry point to lifelong CVD health as opposed to a short period of rehabilitation. The ultimate goal is that by the end of the programme the patient feels prepared and empowered to take responsibility in ensuring that they achieve optimal life-long health, with reduced risk of future disease progression.

While this CR CAG recommends various self-management support interventions (for example, education, health behaviour change, use of self-monitoring tools), ongoing support and follow-up are vital to maintaining momentum after rehabilitation finishes. It is the responsibility of each CR interdisciplinary team to familiarise themselves with local resources/supports and to signpost patients accordingly. This signposting should happen throughout the CR programme so that by the end the patient has a support plan in place. The HSE has a self-management support webpage for people living with heart conditions, it provides a repository of resources for people living with CVD. It includes details of patient organisations such as Croí and the Irish Heart Foundation; peer support groups; telephone support services and other educational resources. Teams should work closely with their local Self-Management Support Co-Ordinator, Health Promotion and stop smoking advisors and social prescribers (where available), who can advise on other supports for example local Sports Partnerships, walking and active retirement groups and Phase IV instructors.

Long-term support needs to integrate seamlessly into the patient's life. This can be enhanced by using digital tools such as apps and wearables which can support with self-monitoring. Family members or carers play an important role by creating a supportive environment and should be engaged throughout the programme. Moreover, families tend to share the same risk factors and individuals are more likely to succeed in long-term behaviour change if the whole family embraces lifestyle modification together (Taylor *et al.,* 2023).

Management of cardiovascular risk factors is a life-long task and requires an integrated approach to care. Outcomes from the IA and EOP assessment as well as recommendations and changes to medications should be communicated to the GP in a timely manner. Furthermore, patients should be advised of their eligibility for the "HSE Structured Chronic Disease Management Programme in General Practice" (HSE, 2020). This programme supports patients living with Cardiovascular disease including; Stable Heart Failure, Ischaemic Heart Disease, Cerebrovascular Disease (Stroke / TIA) and/or Atrial Fibrillation, who have a Medical Card, GP Visit Card or Health Amendment Act card to receive 2 free reviews in every 12 month period, thus enhancing continuity of care.

9.0 Evolving modes of cardiac rehabilitation delivery

The delivery of CR is evolving from traditional in person centre based approaches to new, flexible delivery modes offering a range of formats to better meet with patient needs and enhance health equity. The delivery of CR can take many formats including centred based programmes (hospital or chronic disease hub), home based CR, telerehabilitation and hybrid models. The latter reflect the growing use of digital technologies in enhancing and supporting the delivery of CR. These modes can be delivered using synchronous (real-time) and or asynchronous interactions using remote, virtual, or combined approaches (hybrid) (See Figure 20) (Globus *et al.,* 2023). Table 36 provides an overview of the key terms and definitions related to various modes of CR delivery. The chosen delivery method should be based on patient preference, clinical risk profile and available infrastructure and resources. Importantly while these new CR care models are expanding and evolving how CR is delivered, the quality standard and content of what is delivered i.e. the recommended CR core-components and programme duration should remain the same.

Figure 20 Digital technology and modes of CR delivery (Golbus *et al*., 2023)

Table 36 Key terms and definitions for CR delivery

Term	Definition
Centre based cardiac rehabilitation (CBCR)	Delivery of the CR components in person, in a healthcare setting (hospital or chronic disease hub).
Home-based CR (HBCR)	Delivery of the CR components (outside of the clinical setting) in the patient's home environment, as opposed to encouraging patients to exercise independently on days when not attending CBCR. HBCR can be delivered with and/or without digital technologies
Digital CR	Delivery of the CR components (outside of the clinical setting) using information and communication technologies. It is often referred to as home-based telerehabilitation, telehealth CR, virtual (synchronous), remote (asynchronous) or eHealth.
Virtual synchronous CR	Delivery of CR components using real time 2-way video enabled care (VEC) to facilitate patient and health care professional interaction, for example delivering an education or an exercise session to a group of CR patients using a live audio-visual connection.
Remote asynchronous CR	Delivery of CR components without real time communication between patients and healthcare professional, for example e.g. data related to blood pressure may be reviewed at scheduled times or in response to alerts through a web-based dashboard.
Hybrid CR	Delivery of the CR components using a combination of CBCR and other delivery methods including HBCR and virtual and remote CR delivery, for example the initial assessment may be delivered in person and other core components such as exercise delivered remotely.

Delivering of digital cardiac rehabilitation

There is growing evidence to support the use of digital health interventions (DHIs) for the delivery of CR, with data suggesting improved clinical outcomes, health related quality of life, programme participation as well as enhanced self-management among patients with CHD. Importantly, findings of digital CR programmes demonstrate equivalent health effects to those produced by traditional centre-based CR models (Ramachandran *et al.,* 2022). While the conclusions of these reviews are based on short and medium term follow-up, the longer-term benefits of digital CR (≥12months) are less well studied. International organisations such as the World Heart Federation (WHF), ESC, American Heart Association (AHA), and others endorse the use of DHIs for CR delivery, advising that digital CR should be offered to patients who cannot attend centred based programmes as well as an adjunct to CR programmes to improve long-term participation (Globus *et al.,* 2023; Scherrenbery *et al.,* 2025; Tromp *et al.,* 2022). Indeed, having a digital CR offering is one of the criteria for ESC European Association for Preventive Cardiology (EAPC) centre accreditation for secondary prevention and cardiac rehabilitation.

Within the context of this CR CAG the use of digital technologies is promoted to support a patient centred hybrid model of CR delivery that offers patients a combination of CBCR and HBCR with synchronous and/or asynchronous monitoring. While various research studies have examined the role of multicomponent CR DHIs in an Irish context for example Croí MySláinte (synchronous virtual delivery using a bespoke web-based platform (Gibson *et al.,* 2023))

and INTERCEPT (asynchronous remote delivery using a self-management app, with integrated wearable technology and clinical dashboard (Gibson *et al.,* 2025) there is no nationally agreed digital health system or application to support the delivery of CR within the Irish healthcare setting.

As CR is a complex intervention, having a robust, easy to use digital health infrastructure, that enables remote monitoring of health data (for example blood pressure, heart rate), supports behaviour change and bidirectional communication is essential for the delivery of high-quality digital CR care. The delivery of digitally enabled care is a HSE strategic priority and currently procurement of a remote monitoring platform for delivery of care in the ambulatory setting (including cardiology) that complies with the HSE national I.T. policies and standards that is in progress (see HSE Telehealth Roadmap and National Service Plan 2025). It is envisaged this will be available for use in Q2 2026 and will help facilitate the delivery of virtual CR. In the meantime, existing HSE telehealth supports such as video enabled care (VEC) can be used to enable digital CR delivery.

Video enabled care

The use of VEC enables real time consultation between patients and the CR interdisciplinary team. For advice and guidance for healthcare providers on implementing VEC visit the HSE VEC webpage and contact your local digital team (see the contacts linked here "Digital Team Contacts"). The VEC platform available for HSE staff is Attend Anywhere which is available to all HSE services (acute and community), including section 38 and 39 providers. To set up a HSE staff account you need an Attend Anywhere licence – this can be applied for through this Attend Anywhere Application link. ECC staff please see Appendix 34 – Excel 'ECC Attend Anywhere User and Equipment Request Form'

Patient support

Assessing patient needs in advance of CR enrolment can help ensure that adequate supports related to digital literacy, access and use of technology are in place to enhance participation. This is essential to minimise health disparities and avoid any unnecessary anxieties associated with using digital health (Globus *et al.,* 2023). This assessment should ideally take place at phase II and involves:

- Identifying what access the patient has to available technology (including broadband).
- Identifying the patient's social support such as a family member or other caregivers in the home. Family support is a critical enabler to engaging patients in using technology (Kenny *et al.*, 2024).
- Determining the digital literacy of both the patient and their family members/caregivers and what supports they need to use technology.
- Considering interpretation services for those with language barriers.
- Addressing privacy and confidentiality concerns ensuring informed consent.

While it is recommended that patients have their own IT equipment (tablet or laptop), the HSE tablet loan scheme is available to those who do not have either the technology or internet available. Information on the tablet loan scheme is available on slide 14 of the Telehealth Equipment Catalogue. Other patient resources that should be provided to the patient are outlined in Table 40 Infrastructure for cardiac rehabilitation delivery.

Patient access to wearable devices and VEC should be accompanied by supports so they can utilise the technology. Patients can be signposted to the HSE website which provides practical guidance on how to use VEC as well as technical trouble shooting tips (please see HSE webpage on Video health appointments).

Delivery of the core components

The following section outlines how CR can be delivered using existing HSE telehealth supports. Guidance is based on the ESC scientific statement on standards for cardiac telerehabilitation (Scherrenberg *et al.,* 2025).

Assessment

Regardless of the mode of delivery the initial assessment (IA) should be conducted in person. This offers the opportunity to orient the patient to the CR programme, to meet the interdisciplinary team and introduce the digital technologies that are being used. Where the IA in its entirety cannot be completed in person, the following measurements should be prioritised:

- Functional capacity to determine risk stratification for exercise
- Lipids, glycaemia and other essential laboratory investigations
- A 12 lead ECG
- Carbon monoxide breath testing

All other components can be assessed using a combination of telehealth methods (VEC, phone calls or email) e.g. medical history and symptoms, smoking habit, nutritional status, can be assessed using VEC. Validated questionnaires such as mediterranean diet score can be administered through web-based formats. Measurement of blood pressure (following recommended HBPM guidance as outlined in the section Home Blood Pressure Monitoring), weight (using the same weighing scale throughout CR) and waist circumference can be completed by the patient. For assessment of physical activity, a research grade accelerometer, which can measure moderate to vigorous activity (MPVA) and sedentary time is recommended (See section Conducting a submaximal exercise test section).

Programme delivery

Hybrid programmes can be used to provide CR that is tailored to the patients' preferences and needs, aiming to improve participation, and long-term outcomes. Determining which components are delivered digitally should be established through shared decision making, acknowledging that this may change over time based on patient progress and needs e.g. a patient may choose to commence the first few exercise sessions in the centre and then attend virtual sessions. The ESC standards for cardiac telerehabilitation emphasise that all CR components can be effectively delivered using a combination of telehealth consultations (individual or group based) along with wearable devices which through integrating with a digital health system/application can enable continuous data monitoring. Importantly regular communication with the patient, to review progress and the patient's personal health plan/goals and address concerns is critical to ensure an individualised person centred programme of care that supports self-management and improved health outcomes (de Araújo Pio *et al.,* 2019).

Physical activity and exercise training

Evidence suggests that virtual delivery of the exercise component of CR is safe, clinically effective and cost-efficient (Shah *et al.,* 2024; Lee *et al.,* 2023; Dalal *et al.,* 2021). To deliver digital cardiac rehabilitation safely and effectively the Canadian Association of Cardiovascular Prevention and Rehabilitation (CACPR) have produced an extensive guidance document "Virtual Cardiovascular Prevention and Rehabilitation Implementation Toolkit" (McGuff et al. and CACPR, 2021). The following is a brief summary of key considerations from this guide:

- Before virtual programme commencement agree an emergency plan should be in place and have the patient explain it back. This includes having mechanisms to address issues (such as symptoms) which may arise during exercise.
- At the beginning of each virtual CR session, confirm the patient's in case of emergency contact information, including postcode. Patients should be advised to have a family member or caregiver in the home while participating in supervised exercise.
- Ask the patient if they experienced any issues or symptoms in performing exercises since last session.
- Provide the patient with a tip sheet/list of items that they will need for the session. (e.g., hydration, appropriate shoes, safe space, home items that can be used for exercise equipment).
- Provide clear step-by-step instructions and demonstrations, for example break exercises into smaller parts and allow individual to demonstrate back to ensure understanding and mastery.
- If using telephone only or asynchronous modalities for sessions, consider mailing out hard copies of step-by-step instructions with illustrations or referring to online resources, such as pre-recorded videos. Advise the patient to watch the pre-recorded session in full prior to participation.
- Ensure that healthcare provider's camera setup provides clear view of all exercises being demonstrated (e.g., if demonstrating a lower body exercise, ensure the camera is pointing to your lower body).
- Provide exercise modifications and alternatives to promote inclusiveness.
- Ensure the patient is aware of how to self-manage device therapy (e.g., normal vs abnormal symptoms, who to contact for trouble shooting, heart rate thresholds if ICD or pacemaker present).
- Provide patients with education on how to assess and gradually increase their exercise intensity.
- A second member of the CR team should be present observing throughout.

Appendix 32 Example of a group exercise class delivered virtually provides one of many examples of a circuit used in a group-based live virtual class.

The CR interdisciplinary team

The delivery of virtual CR requires new work practices and care pathways to be developed. This requires dedicated resources (administrative and technological support), and staff who are equipped with skills and competencies in digital health delivery. The HSE have a number of resources to support staff deliver care virtually. These resources vary from practical advice on implementing telehealth to key communication skills for effective individual consultation and group facilitation:

1. HSeLanD online module – Telehealth - this training provides healthcare providers with guidance in implementing telehealth in hospital and chronic disease hub settings. It is available on HSeLanD at: https://www.hseland.ie/dash/Account/Login see Appendix 33 – HSeLanD Telehealth Training accessed on HSeLanD for acute and chronic disease hub staff
2. Video Consultations Module RCSI - this course contains 1 hour of video and a combined 2 hours of audio, reflection, quiz, additional reading and resources, available at the following link: http://www.rcsivirtual.ie/video-consultations/story.html
3. HSE Staff Attend Anywhere Support and Training – check the HSE webpage for up to date support and training details. Training is provided on individual consultation and group consultations. Bespoke training is also available by emailing virtualhealth@hse.ie

Staff Attend Anywhere Training videos are also available and can be viewed at the links below;

- 19 minute Attend Anywhere training for Health Care provider
- 4 minute Attend Anywhere refresher training for Health Care provider

Enhanced Community Care Telehealth Resources

The National Enhanced Community Care (ECC) Programme have a suite of telehealth resources developed specifically for ECC staff available on HSeLanD in the “ECC learning hub” within the “Hubs and Resources” section. These include;

- “Appendix 34” ‘ECC Attend Anywhere User and Equipment Request Form’
- “Appendix 35” ‘ECC Telehealth Implementation Guide’
- “Appendix 36” ECC Telehealth Attend Anywhere Quick Guides Templates_V1.0*
- “Appendix 37” ECC telehealth Attend Anywhere templates
- “Appendix 38” - Health Service Executive, Ireland Enhanced Community Care (ECC) Programme, Attend Anywhere , Frequently Asked Questions (FAQs)

Most of the documents are templates, so services can modify / amend for their specific requirements - and the draft watermarks can be removed by services, once it has been localised for their service

10.0 Audit and evaluation

The delivery of high-quality cardiac rehabilitation, regardless of the delivery model (centre based, virtual or hybrid) (Brown *et al.,* 2024), requires regular monitoring of quality indicators to ensure the programme being delivered is clinically effective, acceptable to the patient and improves patient-reported outcomes. Measuring these quality indicators can also drive improvements to address the wide variation in delivery of CR throughout the country, and to ensure a patient-centred service, which offers a standard set of evidence-based core components.

With 38% of CR sites in Ireland reporting that they are not in a position to audit and evaluate their activity (HSE, 2024a) (due to staff shortages including administrative support, lack of supporting IT structures, time constraints and competing priorities), establishment of a national body to support collection, collation, analysis and reporting of a suite of quality metrics, as recommended by the national model of care for CR is urgently required (HSE, 2023a).

While the development of a national audit system is awaited, this CR CAG recommends that a standard set of organisational metrics Table 37 as well as clinical and patient reported outcome measures (Table 38) are collated by each service and formal audit completed on an annual basis. (Abreu *et al.*, 2021; Brown *et al.,* 2024). A minimum dataset to be collected by CR services is also recommended (Table 39).

Table 37 Organisational metrics for phase III CR

1	N referrals received and % accepted for CR
2	Average time between discharge date and receipt of referral
3	Average time (days) between receipt of referral and initial assessment (IA)
4	Uptake: % of referred patients offered cardiac rehabilitation who attend an initial assessment (IA)
5	Enrolment: % of patients who attend IA who agree to participate in programme
6	No of sessions attended
7	Completion: % of patients who attend both IA and end of programme (EOP) assessment

Table 38 Clinical key performance indicators and patient reported outcome measures

Clinical Indicator	Indicator statement
Waiting time from referral to date of initial assessment for patients in priority groups (Process measure)	% of patients in priority groups having an IA within two weeks of referral per year
Waiting time from referral to date of initial assessment for patients in priority groups (Process measure)	% of patients in priority groups having an IA within four weeks of referral per year
Smoking quit rate and relapse prevention (Outcome measure)	% of patients smoking at time of event who stopped prior to IA and who remain non -smokers by EOP (confirmed by breath CO) % of patients who were smokers at IA who quit by end of programme (confirmed by breath CO)
Dietary and anthropometrics (Outcome measure)	% of patients achieving a 2 point increase in Mediterranean Diet Score from IA to EOP Change in weight, waist circumference and BMI between IA and EOP % of those whose BMI >25 kg/m^2 at IA who achieve >=5% loss in body weight by EOP
Physical activity (Outcome measure)	% of patients achieving the physical activity targets (MVPA and sitting time) measured objectively by accelerometer data at IA and EOP Change in functional capacity (estimated Met max) between IA and EOP
Blood pressure (Outcome measure)	% of patients achieving BP target[i] at IA and EOP Change in systolic/diastolic BP between IA and EOP
LDL-C (Outcome measure)	% of patients achieving LDL-C target[ii] at IA and EOP Change in LDL-C between IA and EOP
Glycaemic control (Outcome measure)	% of patients achieving HbA1c target[iii] between IA and EOP % of patients attending IA in whom newly diagnosed prediabetes or type 2 diabetes mellitus is detected Change in HbA1c between IA and EOP in those with type 2 diabetes mellitus and prediabetes

Cardioprotective drugs (Outcome measure)	% of patients on high intensity statin therapy at IA and EOP % of patients on ACE-Is/ARB at IA and EOP % of patients with CVD and T2DM on SGLT2I at IA and EOP Proportion of patients with CVD and T2DM on GLP-1 RA at IA and EOP
Emergency cardiovascular re-admission (outcome measure)	% of patients with an emergency CV readmission within 12 months of index event
Patient reported outcome measures	
Anxiety and depression (outcome measure)	% of patients achieving hospital anxiety score< 8 at IA and EOP % of patients achieving hospital depression score < 8 at IA and EOP Change in hospital anxiety and depression score (HADS) between IA and EOP
Quality of life (outcome measure)	Change in EQVAS between IA and EOP Change in EQ-5D-5L
Patient reported experience measures	As per local procedures

Table 39 Minimum dataset for each cardiac rehabilitation service (HSE, 2023a)

Minimum dataset for cardiac rehabilitation		
Demographics		
1	Unique ID	
2	Year of birth	
3	Sex	
4	Insurance status	
5	Full address	
6	Personal/family history of premature cardiovascular disease	
Cardiac rehabilitation programme		
7	Referral date	
8	Initiating event /diagnosis	
9	Initiating event date	
10	Cardiac rehabilitation phase III start date	
11	Location of cardiac rehabilitation programme	
12	Site of cardiac rehabilitation programme (i.e. hospital/community/home/hybrid)	
	Initial assessment	
13	Smoking status	
14	Weight (kg)	
15	Height (m)	
16	Body mass index (kg/m^2)	
17	Waist circumference	
18	AUDIT-C screening tool	
19	Blood pressure systolic	
20	Blood pressure diastolic	
21	Cholesterol LDL, HDL	
22	Diet Quality Score e.g. Mediterranean diet score	
23	HbA1c	
24	HADS depression or anxiety scores (or PHQ9, GAD7 or CORE as appropriate)	
25	Quality of life score	
26	Heart Failure (NYHA)	
27	Fitness level (METS)	
28	Aspirin or dual antiplatelet	Y/N/Contraindicated
29	Beta-blocker	Y/N/Contraindicated
30	ACE/ARB	Y/N/Contraindicated

31	Direct-acting oral anticoagulant	Y/N/Contraindicated
32	Other medications (free text)	Y/N/Contraindicated
33	Statin	Y/N/Contraindicated
34	Other lipid-lowering therapy (Ezetimibe, Bempedoic Acid, PCSK9)	Y/N/Contraindicated
End of programme assessment		
35	Smoking status	
36	Weight (kg)	
37	Height (m)	
38	Body mass index (kg/m^2)	
39	Waist circumference	
40	AUDIT-C screening tool	
41	Blood pressure systolic	
42	Blood pressure diastolic	
43	Cholesterol LDL, HDL	
44	Diet score	
45	HbA1c	
46	HADS depression or anxiety scores (or PHQ9, GAD7 or CORE as appropriate)	
47	Quality of life score	
48	Heart Failure (NYHA)	
49	Fitness level (METS)	
50	Aspirin or dual antiplatelet	Y/N/Contraindicated
51	Beta-blocker	Y/N/Contraindicated
52	ACE/ARB	Y/N/Contraindicated
53	Direct-acting oral anticoagulant	Y/N/Contraindicated
54	Statin	Y/N/Contraindicated
55	Other lipid-lowering therapy (Ezetimibe, Bempedoic Acid, PCSK9)	Y/N/Contraindicated
56	Cardiac Rehabilitation phase III completed date	
57	Number of sessions completed	
58	Survival status at end of programme	
Data relating to organisation of cardiac rehabilitation course		
59	Duration of cardiac rehabilitation course (weeks)	
60	Number of sessions per course	
61	Data on staffing per course (further elaboration with managers)	
62	Telemetry offered by local team during exercise component of cardiac rehabilitation	(Y/N)

11.0 Cardiac rehabilitation Infrastructure

Provision of safe, functional and effective environment for cardiac rehabilitation, requires a number of infrastructural components. These are outlined in Table 40 which is based on Table 10 of the *Model of Care for Integrated Cardiac Rehabilitation 2023* (HSE, 2023a) and informed by ESC standards for secondary prevention and rehabilitation (Abreu *et al.,* 2021) and cardiac telerehabilitation (Scherrenberg et al., 2025).

Table 40 Infrastructure for cardiac rehabilitation delivery

Space and facilities
Space must meet the requirement of the activity (exercise area, education room and consultancy room).
Furthermore, there should be a confidential area where patient records and charts can be securely stored.
There must be emergency access to all patient areas.
Floor space must allow easy access of personnel and equipment (recommended 3.7-4.2 sq.m per patient) and ceiling height in exercise areas at a minimum of 3 metres.
Humidity at or below 60% and temperature not in excess of 22°C.
Water source immediately available to exercising patients and sound levels kept to comfortable level for patients.
Regularly checked telephone and emergency call system available in all exercise areas.
Separate office for cardiac rehabilitation staff equipped with phones, computers, office furniture.
Separate education room for cardiac rehabilitation.
Accessible toilet and shower facilities for patients.
Confidential space to facilitate: • In person and remote patient consultations • Initialising patients with wearable equipment • Delivery of remote CR sessions

Equipment
Working and correctly maintained AED should be available (Resuscitation trolley available if in an acute hospital setting). (203-205)
Equipment should be commercial grade, with rigorous maintenance guidelines to ensure patient safety. Scheduled maintenance, preventive maintenance and cleaning programmes for all medical and exercise equipment should be documented. Damaged equipment or equipment not functioning should be designated as out of service until repairs are completed.
Regular calibration for all medical and exercise equipment should occur as per manufacturer. Each CR team should keep a log of all equipment and when calibration is required, as appropriate
Staff should be thoroughly trained in the use of the equipment and manufacturer information and advice on use, calibration and troubleshooting should be readily available.
An examination plinth and chair suitable for higher weight capacities should be available for comfort and safety.
Equipment for patient assessment should be available and accessible including: • stethoscope • weighing scales (minimum weight capacity of 227 kg) • measuring tape • height measure • portable sphygmomanometer with a range of cuff sizes including a bariatric cuff • 12 lead electrocardiogram (ECG) machine • pulse oximeters • portable oxygen • rating of perceived exertion (RPE) charts • carbon monoxide monitor • glucose monitoring device • home blood pressure monitor • heart rate monitor • accelerometer • hand dynamometer
Where available, equipment for functional capacity testing and exercise training can additionally include telemetry monitoring

IT infrastructure
IT hardware for example docking stations, headset, monitors and high-quality audio-visual equipment to enable video consultations, virtual exercise and education group sessions. This will also enable development of pre-recorded education and exercise sessions.
Access to a secure digital platform to support the delivery of cardiac rehabilitation sessions. This platform should: • Integrate with a reliable, secure, HSE-approved tele-conferencing system. • Include a health care professional dashboard which integrates with wearable data and remotely connected devices such as blood pressure monitors to enables remote monitoring. • Include a patient portal to support personalised goal setting, self-monitoring and communication with the healthcare professional. • Act as an information repository for patient information and resources for example educational videos. Include a structured data capture system, in which all patient assessment, training and monitoring data is stored in a structured format to easily allow for audit and evaluation.
An electronic booking system to facilitate efficient management of referrals and scheduling.
Patient wearable devices as appropriate with the supporting hardware and software.
Relevant IT license tools.
All data should be processed on data-secure platforms that are compliant with General Data Protection Regulation (GDPR).
Patient resources
Patients should be provided with: • A summary of recent lipid, HbA1c and BP measurements, this will be enabled in the future through electronic health records. • A hard copy or digital resource to support setting and tracking of personal goals across medical and lifestyle risk factors and psychosocial health. • Educational resources and materials which align to HSE plain language guidelines, these can be web based or made available in traditional leaflet format. • A home blood pressure monitoring device (only if the patient does not have a validated and recently calibrated one). • Wearable devices/accelerometers for physical activity and other measurements with supporting hardware. • Remotely connectable (e.g. Bluetooth, 4G/5G) weighing scales and blood pressure cuffs • Technical support to access IT platforms.

Service accessibility

The CR interprofessional team should have access to:

- Echocardiography
- Ambulatory ECG Holter monitoring
- Phlebotomy and appropriate laboratory tests
- The patient's clinical information (investigations, procedures and discharge letters) through electronic systems, for example EVOLVE and CVIS.

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13.0 Glossary

1RM - 1-Repetition Maximum

3As Model – Ask, Advise Act – used in stop smoking care in Ireland when discussing tobacco use.

5STS - Five Times Sit To Stand

5As Model – Assess, Advise, Agree, Assist, Arrange - model for behavioural change

6MWT - Six-Minute Walk Test

ABPM - Ambulatory Blood Pressure Monitoring

ACE-Is - Ace Inhibitors

ACLS - Advanced Cardiac Life Support

ACR - Albumin-to-Creatinine Ratio

ACS- Acute Coronary Syndrome

ACPICR - Association of Chartered Physiotherapists in Cardiac Rehabilitation

Acute coronary syndrome (ACS) - the term for a group of conditions that suddenly stop or severely reduce blood from flowing to the heart muscle. When blood cannot flow to the heart muscle, the heart muscle can become damaged. Heart attack and unstable angina are both acute coronary syndromes.

Acute myocardial infarction (heart attack) - The damage or death of an area of the heart muscle (myocardium) resulting from a blocked blood supply to the area. The affected tissue dies, injuring the heart.

AED - Automated External Defibrillator

AF - Atrial Fibrillation

AHA - American Heart Association

ALARA principle - As Low As Reasonably Achievable

Alcohol Use Disorders Identification Test (AUDIT-C) - gold standard of screening tools and was developed by the World Health Organization to review alcohol intake.

Angina or angina pectoris - Chest pain that occurs when diseased blood vessels restrict blood flow to the heart.

Angiography - An x-ray technique in which dye is injected into the chambers of the heart which lets doctors measure the blood flow and blood pressure in the heart chambers and see if the coronary arteries are blocked.

ANOCA - Angina with Non-Obstructive Coronary Arteries

ARBs - Angiotensin Receptor Blockers

ARNI - Angiotensin Receptor Neprilysin Inhibitor

Arrhythmia (or dysrhythmia) - An abnormal heartbeat.

ASCVD - Atherosclerotic Cardiovascular Disease

ASOI - Association for the Study of Obesity Ireland

AV - Atrioventricular

BACPR - British Association for Cardiovascular Prevention and Rehabilitation

BAPEN - British Association for Parenteral and Enteral Nutrition

BCTs - Behaviour Change Techniques

Best Health Weight Management Programme – dietitian led, 12 month group programme for adults with obesity

BIA - Bioelectrical Impedance Analysis

Blood pressure - The force or pressure exerted by the heart in pumping blood; the pressure of blood in the arteries.

BLS - Basic Life Support

Body mass index (BMI) - A number that indicates an increased risk of cardiovascular disease from a person being overweight. BMI is calculated using a formula of weight in kilograms divided by height in meters squared (BMI =Weight [kg]/Height [m2]).

BP - Blood Pressure

CABG - Coronary Artery Bypass Graft

CACPR - Canadian Association of Cardiovascular Prevention and Rehabilitation

CAD - Coronary Artery Disease

Cardiac catheterisation - A procedure that involves inserting a fine, hollow tube (catheter) into an artery, usually in the groin area, and passing the tube into the heart.

Cardiomyopathy - A disease of the heart muscle that leads to generalised deterioration of the muscle and its pumping ability.

Cardiovascular disease (CVD) - A general term referring to conditions affecting the heart (cardio) and blood vessels (vascular system).

CCB - Calcium Channel Blockers

CCS Angina Classification System - Canadian Cardiovascular Society Angina Classification System

CCS - Chronic Coronary Syndrome

CDM - Chronic Disease Management

Centimetres (cm) - unit of measurement.

CFS - Clinical Frailty Scale

CHF - Congestive Heart Failure

Cholesterol - An oily substance that occurs naturally in the body, in animal fats and in dairy products, and that is transported in the blood. Limited amounts are essential for the normal development of cell membranes. Excess amounts can lead to coronary artery disease.

Chronic Disease Hub – hubs support access to diagnostics, specialist services and specialist opinions and aligned to a local hospital.

CIED - Cardiac Implantable Electronic Device

CKD - Chronic Kidney Disease

COBT - Carbon Monoxide Breath Testing

CO - Carbon Monoxide

COM-B - Capability, Opportunity, and Motivation as three key factors capable of changing Behaviour

COPD - Chronic Obstructive Pulmonary Disease

Coronary artery bypass (CAB) - Surgical rerouting of blood around a diseased vessel that supplies blood to the heart. Done by grafting either a piece of vein from the leg or a piece of the artery from under the breastbone.

Coronary Heart Disease (CHD) - Disease of the heart caused by a build-up of atherosclerotic plaque in the coronary arteries that can lead to angina pectoris or heart attack, also known as ischemic heart disease (IHD).

CPET - Cardiopulmonary Exercise Testing

CR CAG - Cardiac Rehabilitation Clinical Action Guide

CR - Cardiac Rehabilitation

CRF - Cardiorespiratory Fitness

CRT - Cardiac Resynchronisation Therapy

CSP - Conduction System Pacing

CST - Chester Step Test

CV - Cardiovascular

CVD - Cardiovascular Disease

CVIS - electronic based patient record system

DAPT - Dual Antiplatelet Therapy

DASH - Dietary Approaches To Stop Hypertension

DBP - Diastolic Blood Pressure

DEXA - Dual-Energy X-Ray Absorptiometry

Diabetes (diabetes mellitus) - A disease in which the body doesn't produce or properly use insulin. Insulin is needed to convert sugar and starch into the energy used in daily life.

Diabetes Prevention Programme - dietitian led, 12 month group programme for adults with prediabetes

Diastolic blood pressure - The lowest blood pressure measured in the arteries. It occurs when the heart muscle is relaxed between beats.

DISCOVER DIABETES - Type 2 – a group self-management education programme for people living with type 2 diabetes mellitus.

EAPC - European Association for Preventive Cardiology

EASO - European Association for the Study of Obesity

ECC - Enhanced Community Care

ECG - Electrocardiogram

EF - Ejection Fraction

eGFR - Estimated Glomerular Filtration Rate

End of Programme (EOP) assessment – an assessment at the end of a CR programme.

EOSS - Edmonton Obesity Staging System

EQ visual analogue scale (EQ VAS) - records the patient's self-rated health on a vertical visual analogue scale where the endpoints are labelled "The best health you can imagine" and "The worst health you can imagine."

EQ-5D-5L - EuroQOL-5D-5L

ESC - European Society of Cardiology

ETT - Exercise Tolerance Testing

EuroQOL-5D-5L - is a standardised questionnaire used to measure health related quality of life.

EVOLVE - electronic based patient record system

Exercise stress test (EST) - A common test to help doctors assess blood flow through coronary arteries in response to exercise, usually walking, at varied speeds and for various lengths of time on a treadmill. A stress test may include use of electrocardiography, echocardiography, and injected radioactive substances.

Fagerstrom test – a validated test to assess dependence on tobacco.

FBC - Full Blood Count

FH - Familial Hypercholesterolaemia

FITT - Frequency, Intensity, Time and Type

GLP-1 RA - Glucagon-Like Peptide-1 Receptor Agonists

GMS - General Medical Scheme

Grams (g) – unit of measurement.

HADS - Hospital Anxiety and Depression Scale

HbA1c -Haemoglobin A1c

HBPM - Home Blood Pressure Monitoring

HCP - Healthcare Professional

HDL - High Density Lipoprotein

HeFH -Heterozygous Familial Hypercholesterolaemia

HF - Heart Failure

HFmrEF - Heart Failure With Mildly Reduced Ejection Fraction

HFrEF - Heart Failure With Reduced Ejection Fraction

High density lipoprotein (HDL) - A component of cholesterol, HDL helps protect against heart disease by promoting cholesterol breakdown and removal from the blood; hence, its nickname "good cholesterol."

HIS - High Intensity Statin Therapy

Hospital Anxiety and Depression Scale (HADS) – a questionnaire that can screen for both anxiety and depression. There are 14 items on the HADS

HRQOL - Health Related Quality of Life

HSE - Health Service Executive

HSeLanD - Irish Health Service's national online learning and development portal

Hypertension - High blood pressure.

IA - Initial Assessment

ICDs - Implantable Cardioverter Defibrillators

ICPCD - Integrated Care Programme for the Management and Prevention of Chronic Disease

IDT - Interdisciplinary Team

IIEF - International Index of Erectile Function

IMT - Inspiratory Muscle Training

INDI - Irish Nutrition and Dietetic Institute

INOCA - Ischemia with No Obstructive Coronary Arteries,

IPAQ - International Physical Activity Questionnaire

IPAQ-SF - International Physical Activity Questionnaire – Short-Form

ISCP - Irish Society of Chartered Physiotherapists

ISWT - Incremental Shuttle Walk Test

Kilograms (kg) - unit of measurement.

LFT - Liver Function Tests

Low density lipoprotein (LDL) - The body's primary cholesterol-carrying molecule. High blood levels of LDL increase a person's risk of heart disease by promoting cholesterol attachment and accumulation in blood vessels; hence, the popular nickname "bad cholesterol."

Lp(a) - Lipoprotein (A)

LV - Left Ventricular

MDS - Mediterranean Diet Score

MECC - Making Every Contact Count

METS - Metabolic Equivalents

Metres (m) - unit of measurement.

Mililitres/minute (ml/min)

Milligram (mg)

Minnesota Living with Heart Failure Questionnaire (MLHFQ) - is a 21-item self-administered questionnaire that assesses the physical, emotional and social ways health failure can adversely affect a patient's life.

MOC - Model of Care

Mortality - The total number of deaths from a given disease in a population during an interval of time, usually a year.

MRAs - Mineralocorticoid Receptor Antagonists

MUFA - Monounsaturated Fatty Acids

MUST - Malnutrition Universal Screening Tool

MVPA - Moderate To Vigorous Physical Activity

N-3 PUFA - N-3 Polyunsaturated Fatty Acids

National Centre for Smoking Cessation and Training (NCSCT) - is a social enterprise committed to supporting the delivery of effective evidence-based tobacco control programmes and smoking cessation interventions provided by local stop smoking services, and by colleagues in the NHS and HSE

NCP - Nutrition Care Process

NCSCT - National Centre for Smoking Cessation Training

NFPE - Nutrition Focused Physical Exam

NHS - National Health Service (UK)

NICE - National Institute for Health and Care Excellence

Non-ST segment-elevation myocardial infarction (NSTEMI) - The milder form of the 2 types of heart attack, an NSTEMI does not produce an ST-segment elevation on an electrocardiogram. See also STEMI.

NRT - Nicotine Replacement Therapy

NTproBNP - N-Terminal Prohormone Of Brain Natriuretic Peptide Test used to diagnose and assess the severity of acute and chronic congestive cardiac failure

NYHA - New York Heart Association

OARS - Open Ended Questions, Affirmation, Reflective Listening, Summarise

Obesity - A complex chronic disease characterised by excess or dysfunctional adiposity that impairs health.

OSA - Obstructive Sleep Apnoea

Pacemaker - A surgically implanted electronic device that helps regulate the heartbeat.

Parts Per Million (ppm)

PCI - Percutaneous Coronary Intervention

PCRS - Primary Care Reimbursement Services

Percutaneous coronary intervention (PCI) - Any of the non-invasive procedures usually performed in the cardiac catheterization laboratory.

PLISSIT - Permission, Limited Information, Specific Suggestions, and Intensive Therapy

PPM - Permanent Pacemakers

Prevalence - The total number of cases of a given disease that exist in a population at a specific time.

Problem, Etiology, Signs and Symptoms (PES) statement - is a structured format used by dietitians to write a nutrition diagnosis, identifying a specific Problem (the nutrition issue), its Etiology (root cause), and the Signs/Symptoms (evidence) supporting it. It's a core part of the Nutrition Care Process (NCP) used to guide interventions and monitor patient progress.

PROMs - Patient-Reported Outcome Measures

PROs - Patient Reported Outcomes

PUFA - Polyunsaturated Fatty Acids

QuitManager - an electronic national patient management system for the HSE stop smoking services.

RAAS - Renin-Angiotensin-Aldosterone System System Inhibitors

Revascularization - A procedure to restore blood flow to the tissues. Coronary artery bypass surgery is an example of a revascularization procedure.

Risk factor - When referring to heart and blood vessels, a risk factor is associated with an increased chance of developing cardiovascular disease, including stroke.

RPE - Rating Of Perceived Exertion

SARC-F - Strength, Ambulation, Rising From A Chair, Stair Climbing And History Of Falling–Tool Used In The Evaluation Of Sarcopenia

SBP - Systolic Blood Pressure

SDM - Shared Decision-Making

SFA - Saturated Fatty Acids

SGLT2 - Sodium–Glucose Co-Transporter 2 Inhibitors

SMART - Specific, Measurable, Attainable/Achievable, Relevant, Time-Bound

SOP - Standard Operating Procedure

Specific, Measurable, Attainable/Achievable, Relevant, Time-bound (SMART) – one of the frameworks that can be used as an approach to goal setting.

ST - ST Segment:

Stop-Bang - Snoring, Tiredness, Observed apnea, Pressure (high blood pressure), Body Mass Index (BMI), Age, Neck circumference, and Gender

Stroke - A sudden disruption of blood flow to the brain, either by a clot or a leak in a blood vessel.

ST-segment-elevation myocardial infarction (STEMI) - The more severe form of the 2 types of heart attack. See also NSTEMI. A STEMI produces a characteristic elevation in the ST segment on an electrocardiogram.

SWEDEHEART registry - Swedish Web-System for Enhancement and Development of Evidence-Based Care in Heart Disease Evaluated According to Recommended Therapies

Systolic blood pressure - The highest blood pressure measured in the arteries. It occurs when the heart contracts with each heartbeat.

T1DM - Type 1 Diabetes Mellitus

T2DM - Type 2 Diabetes Mellitus

TC - Total Cholesterol

TFT - Thyroid Function Test

TG - Triglycerides

TILDA - The Irish Longitudinal Study on Ageing

TLD - Thiazide/Thiazide-Like Diuretics

Transient ischemic attack (TIA) - A stroke-like event that lasts only for a short time and is caused by a temporarily blocked blood vessel.

TUG - Timed Up and Go

UTI - Urinary Tract Infection

VAS - Visual Analogue Scale

VLDL - Very Low Density Lipoprotein

V̇O2max - Maximum Volume of Oxygen

WC - Waist Circumference

WHO - World Health Organisation

14.0 Appendices

14.1.1a. Appendix: 1a Cardiac Rehabilitation referral form template

To be completed by the referring health care professional.

PATIENT DETAILS	
Name:	
Address:	
Hospital record #:	
Contact Tel:	
DOB:	

REFERRAL BY	
Name:	
Profession:	
Tel No:	
Consultant Name:	
Address:	
GP Name:	
GP Address:	
Tel No:	

Interpreter support required Yes/No

REASON FOR REFERRAL			
Most recent event/diagnosis:		Date:	
		Complications:	☐ Yes ☐ No
Details:		Details of complications:	

PRIOR CARDIAC HISTORY	
No previous cardiac history	
Please tick those applicable for all previous events giving dates.	
☐ STEMI	Date:
☐ NSTEMI	Date:
☐ CABG	Date:
☐ Cardiac Arrest	Date:
☐ PCI	Date:
☐ Valve Repair/Replacement	Date:
☐ Angina	Date:
☐ Heart Failure	Date:
☐ NYHA Classification	Date:
☐ I II III IV	
Other:	

CURRENT CARDIAC HEALTH		
Current Angina		
☐ Yes ☐ No		
Date of onset:		
Details of Angina:		
Triggers:		
Relieved by rest or GTN ☐ Yes ☐ No		
Arrythmias	**Devices**	
☐ Yes ☐ No	☐ Yes ☐ No	
Date of onset:	ICD Fitted	☐ Yes ☐ No
Details of arrythmias:	Pacemaker	☐ Yes ☐ No
	Details/Settings:	
Implantable Loop Recorder	☐ Yes ☐ No	

MEDICATION (Please attach list) Drug allergies Yes NKDA
Comments:

INVESTIGATIONS/REPORTS			
Please include and/or attach the following investigations/reports:			
Coronary Angiogram		HOLTER Monitoring	
☐ Yes ☐ No	Date:	☐ Yes ☐ No	Date:
Exercise ECG/ETT		24 hour Blood Pressure Monitor	
☐ Yes ☐ No	☐ Full ☐ Modified	☐ Yes ☐ No	Date:
Echocardiogram			
☐ Yes ☐ No	Date:		
LV Function:	☐ Good ☐ Moderate ☐ Poor ☐ Unknown EF: %		
Other			
☐ Most recent clinic letter	☐ Cardiac MRI	☐ CT Coronary Angiogram	☐ Other
☐ Recent blood results (please include U&E's, FBC, LFT's, Lipids, HbA1c and fasting glucose)			

OTHER MEDICAL HISTORY			
☐ Stroke	☐ TIA	☐ Epilepsy	☐ COPD/Asthma
☐ PVD	☐ Claudication	☐ Musculoskeletal problems	☐ Neurological problems
☐ Other:			

PROFILE OF RISK FACTORS (tick those applicable)			
☐ Hypertension	☐ High Cholesterol	☐ Anxiety	☐ Depression
☐ Physical Inactivity	☐ Diabetes ☐ Type 1 ☐ Type 2		
Smoking Status	☐ Yes ☐ No Ex-smoker		
Alcohol Units/Week:			

BMI:	Weight:	Waist circumference:	Height:	BP: (L) (R)

PATIENT STATUS
☐ Informed of referral to cardiac rehabilitation Preferred venue for CR • Hospital based programme • Community hub programme
☐ is awaiting further cardiology investigations or treatment
☐ is awaiting further follow-up treatment
Please specify:
Please comment on any relevant social circumstances, for example return to work:

REFERRER SIGNATURE	
Signature	
Print Name:	
Date:	

PATIENT SIGNATURE	
Signature	
Print Name:	
Date:	

This form can be posted or emailed to: (insert relevant centre details)

14.1.1. Appendix 1: HSE interdisciplinary assessment template

Name _____ DOB _____ PID _____

Cardiac Rehabilitation Interdisciplinary Assessment Form

Phase III Initial Assessment (IA)

General Initial assessment details	
Date and Time:	Location:
Informed consent to Phase III IA	☐ Yes ☐ No
Did patient attend Phase III IA For patients who initially decline to attend they should be informed that they can be re-referred up to 1 year post event	☐ Yes ☐ No If no outline reason why: ☐ Clinically unstable/inappropriate (e.g. mental incapacity, palliative care, ongoing investigations) ☐ unable to contact ☐ Not interested/declined returned to work, ☐ Times unsuitable ☐ Other *include details:* Virtual programme offered ☐ Yes ☐ No

Patient Details					
Forename*		DOB*	YYYY-MM-DD	PID (local #)	
Surname*				PPSN*	
PCRS (Medical card) #				Expiry	
Address Line 1*				Eircode*:	
Address Line 2					
Address Line 3					

Name DOB PID

Sex* *(at birth)*	M=Male F=Female U=Unknown	**Ethnicity:** **White** ☐ Irish ☐ Irish Traveller ☐ Any other white background **Black or black Irish:** ☐ African ☐ Any other Black background **Asian or Asian Irish:** ☐ Chinese ☐ Any other Asian background ☐ **Roma** **Other** ☐ (including mixed background)
Contact Number	Landline	Mobile*
Email		Mothers Birth Family Name*
In Case of Emergency (ICE) Contact	Name: Relationship to patient:	ICE Contact Number
Language spoken: Translator required		Translator Present: ☐ Yes ☐ No
Others present: ☐ yes, details ☐ No		
Demographics and social determinants of health		
Employment status	Employed ☐ Self-employed ☐ Unemployed ☐ Retired ☐ Employment details: Currently working: ☐ Yes ☐ No If no, how long since worked? weeks	
Marital status (please circle)	Single ☐ Married ☐ Civil partnership ☐ Widowed ☐ Separated ☐ Divorced ☐	
Lives with (please circle)	Spouse/partner/family member/alone Any Children in home? ☐ Yes ☐ No	

Name DOB PID

Accommodation Details	2+ storey / apartment / bungalow *Include any accessibility issues*
Social Support *Do you feel you are supported socially?*	☐ Yes ☐ No Details: Consider: isolation, financial resources e.g. receiving disability allowance.
Independent with ADLs	☐ Yes ☐ No Details:
Drives	☐ Yes ☐ No Driving advice given Yes No
Literacy	*"How confident are you filling out medical forms by yourself?'* 1----------2----------3----------4----------5 Not at all extremely

Printed name:	**Signature**	**Registration No.**

Healthcare Professional Details			
Referrer details			
Referrer details: name, profession, location		Date of referral:	
Consultant details		**GP details**	
Name: Phone number Address Email		Name: Phone number Address Healthmail	
Future cardiology appointment details (location and date)		Pharmacy	

Name DOB PID

In-patient / Phase I details			
Date of discharge:			
Date of receipt of referral:			
CR Phase II	☐ Yes Location:	Date:	☐ No
Initial assessment within 2 weeks (but no later than 4 weeks) of discharge	☐ Yes ☐ No If no, reason;		
Readmission to any Health Facility within 30 days of D/C? Comments:	☐ Yes ☐ No	**Status:** ☐ Planned ☐ Unplanned ☐ Unknown **Reason:** ☐ Planned ☐ Unplanned ☐ Unknown	
Printed name:	**Signature**	**Registration No.**	

Name DOB PID

Nursing initial assessment		
Date and Time:		Location:
Nurse details		
Reason for Referral		
Initiating event/CVD diagnosis: (include date as relevant)		
Acute Coronary Syndrome ☐	STEMI ☐	NSTEMI ☐
Stable angina ☐		
Heart Failure ☐		
Valvular heart disease ☐		
Other (please specify)		
Treatment/procedure		
PPCI ☐ date		
PCI ☐ date		
CABG ☐ date		
Valve surgery ☐ date		
CRT/ICD/PPM ☐ date		
Medical Management ☐		

Name _____ DOB _____ PID _____

Investigations/Reports	
Coronary Angiogram	☐ Yes ☐ No
Date: Result:	
Holter Monitoring	☐ Yes ☐ No
Date: Result:	
12 Lead ECG	☐ Yes ☐ No
Date: Result:	
Exercise ECG/ETT	☐ Yes ☐ No
Date: Result:	
24 hour BP Monitor	☐ Yes ☐ No
Date: Result:	
Echocardiogram	
Date: EF: % Other relevant findings for example valvular abnormalities	
☐ Most recent clinic letter ☐ Cardiac MRI ☐ Other investigations:	

Name _____ DOB _____ PID _____

Past Medical History (free text):			
Condition	**Yes** *If yes, include details and date of diagnosis*	**No**	**Don't know**
Cardiac			
Previous MI			
Previous PCI			
CABG			
Cardiac Arrest			
Angina (stable/unstable)			
Atrial Fibrillation			
Heart Failure			
Vascular			
Stroke			
PVD			
Varicose Veins			
Claudication			
Dementia			
Other			
Respiratory			
Chronic Bronchitis			
COPD			
Asthma			
Sleep Apnoea (OSA)			
Emphysema			
Other			
Skeletal System			
Rheumatoid Arthritis			
Osteoporosis			

Name DOB PID

Osteoarthritis Joints affected			
Chronic Pain			
Other			
Mental Health Issues			
Schizophrenia:			
Anxiety:			
Depression**:**			
Other:			
Other:			
Cancer:			
Previous Surgery: Site::			
Hernias:			
GI Disorder:			
Cognitive impairment:			
Renal Failure:			
Epilepsy:			
Autoimmune disorders *(for example psoriatic arthritis, inflammatory bowel disease):*			
Hypo- thyroidism:			
Hyper-thyroidism:			
Printed name:	**Signature**	**Registration No.**	

Name DOB PID

Risk Factors profile	
Family history	
ASCVD in a 1st degree relative (male<55, female<65 yrs) Family history of hypercholesterolemia in a first degree relative(Defined as Adult with LDL > 4.9 mmol/L or child (< 18) with LDL> 4.0 mmol/L	Yes No Don't know Additional information Yes No Don't know Additional information
Smoking	
Carbon monoxide breath testing Smoking status:	_____ppm ☐ No ☐ Ex-smoker Period ceased ☐ <6 months ☐ >6months age stopped _years ☐ Yes (Defined as smoking in the last 30 days)
Fagerstrom Test Score: Score 8+ = high dependence Score 5-7 = moderate dependence Score 3-4 = low to moderate dependence Score 0-2 = low dependence	
Readiness and motivation to quit	On a scale of 1-10 how important is it for you to quit? (/10) Using the same scale, how confident are you that you can quit? (/10) So why are you on a .... on the scale and not 10? What would it take to move you from ... to 10?

Printed name:	**Signature**	**Registration No.**

Name DOB PID

Lipids		
Have you ever been diagnosed with high cholesterol? ☐ Yes ☐ No Have you previously had treatment for high cholesterol? ☐ Yes ☐ No		
Lipid profile	Date __/__/__	Date __/__/__
Calculate FH score (Dutch Lipid Network Criteria) *only if history of premature ASCVD and LDL-c>5* FH Score *If FH score >6 refer for genetic testing* Total cholesterol LDL-C Non-HDL-C HDL Triglycerides		
Lipo A *(if premature ASCVD, family history of premature CVD or recurrent ASCVD)*: _____date __/__/__		
Printed name:	**Signature**	**Registration No.**

Blood pressure						
Have you ever been diagnosed with high BP? ☐ Yes ☐ No Have you previously had treatment for high BP? ☐ Yes ☐ No						
Blood Pressure		**Reading 1**	**Reading 2**	**Reading 3**	**Average**	Lying: Standing: Sitting
	Left:					
	Right:					
Do you have a home BP monitor (type)	☐ Yes ☐ No If no, has one been provided ☐ Yes ☐ No	Do you measure BP at home ☐ Yes ☐ No				
SpO2:						
Printed name:	**Signature**	**Registration No.**				

Name _____ DOB _____ PID _____

Diabetes			
Diabetes ☐ Type 1 ☐ Type 2 ☐ Pre-diabetes	Age at diagnosis: HbA1c: date: Diabetes education completed ☐ Yes ☐ No *If no, refer if appropriate*		
Treatment	☐ Yes	☐ No	☐ No response
Diet	☐ Yes	☐ No	☐ No response
Oral	☐ Yes	☐ No	☐ No response
Insulin	☐ Yes	☐ No	☐ No response
Other *(e.g. GLP-1)*	☐ Yes	☐ No	☐ No response
Printed name:	**Signature**		**Registration No.**

Heart Failure

Do you have Heart Failure? ☐ Yes ☐ No

If Yes to above:

Have you experienced Orthopnoea? ☐ Yes ☐ No

Have you experienced PND? ☐ Yes ☐ No

NYHA Class _____

Do you have an action plan? ☐ Yes ☐ No

HF managed by / next appointment:

Printed name:	**Signature**	**Registration No.**

Sex related risk factors

For women who have been pregnant

Have you been told that you had high blood pressure/hypertension in pregnancy?
☐ Yes ☐ No ☐ Don't know

Have you been told that you had diabetes in pregnancy (gestational diabetes)?
☐ Yes ☐ No ☐ Don't know

For post-menopausal women

What age were you when you became post-menopausal (Age of your last menstruation) __years

Please list other risk factors *(e.g. polycystic ovarian syndrome)*

Name DOB PID

Recreational drug use: ☐ Yes ☐ No	
Sleep Health	On average, how many hours of sleep do you get per night? Hours Including sleep patterns, where they sleep (bed or chair), perceived fears around sleep. _____ If sleep apnoea is suspected administer the Stop-Bang Questionnaire o OSA (STOP Bang Score): low☐ moderate☐ high☐ Details:
Sexual Function **IIEF** No erectile dysfunction = 22☐25 Mild erectile dysfunction = 17☐21 Mild to moderate erectile dysfunction = 12☐16 Moderate erectile dysfunction = 8☐11 Severe erectile dysfunction = 5☐7	Administer the International Index of Erectile Function (IIEF) in males if patient indicates an issue with same and is willing to discuss
Frailty **Clinical Frailty Scale**	

Name DOB PID

Psychosocial Health		
EuroQOL-5D-5L No problem =1 Slight problem =2 Moderate problem=3 Severe problem=4 Extreme problem=5	Mobility _ Self Care _ Usual activities_ Pain/discomfort _ Anxiety/depression_ EQ VAS___/100	
HADs Score: 0-7 = normal 8-10 = mild level 11-14 = moderate 15-21 = severe	HADs Anxiety HADs Depression	
Minnesota Heart Failure Score: Mild = 0-24 Moderate =25-45 Severe = 46-105		
Additional comments		
Printed name:	**Signature**	**Registration No.**

Physical Assessment/ Measurements		
Manual Heart Rate:		☐ Regular ☐ Irregular
Peripheral oedema		
Symptoms Chest discomfort Other	☐ Yes ☐ No If yes, At rest: On exertion: Relived by: rest / GTN Last episode: **Heart Failure symptoms** *EF:* *PPM* *ICD* *ICD threshold:*	

Name DOB PID

Wound Healing (if relevant)**:** ☐ CABG ☐ ICD/PPM ☐ Valve repair ☐ Vein harvest site ☐ Sternotomy	☐ Signs of non-union ☐ No redness ☐ No gapping(intact) ☐ No ooze ☐ clicking ☐ grating ☐ dehisence ☐ swelling ☐ neurogenic symptoms	
Printed name:	**Signature**	**Registration No.**

Bloods		
TFTs		K+:
Ferritin T sat Iron		Urea mmol
Liver Function (Potentially Fib4):		Creat umol/L
FBC		Albumin-to-Creatinine Ratio
NT BNP *if appropriate*		eGFR: ml/min/1.73m^3
Other:		
Printed name:	Signature	Registration No.

Medications	**NKDA:**
Vaccination status	Flu ☐ Yes Date ☐ No ☐Unsure Covid ☐ Yes Date ☐ No ☐Unsure
Medication reconciliation	Meds seen / verified w/pharmacy / med list / prescription

Name _____ DOB _____ PID _____

Medication taken as instructed	☐ Yes ☐ No ☐ occasionally misses doses Reasons: • cost • side effects • other, please state_____ ☐ managed by carer ☐ blister pack

Name	**Dosage**	**Frequency**	**Recommended change**
Antiplatelet therapy: 1. 2.			
Beta Blocker:			
ACE inhibitors			
Angiotensin II receptor antagonists			
Mineralcorticoid receptor antagonists			
Angiotension Receptor-Neprilysin			
Calcium channel blockers			
Diuretics 1 2 3			
Sodium–glucose co-transporter 2 inhibitors			
Nitrates			

Name DOB PID

Lipid Lowering Statins: Fixed dose combination			
Bempodoic Acid PCSK9 inhibitors Fibrates N-3 Polyunsaturated fatty acids Other			
Anti-coagulants			
Diuretic:			
Anti-arrhythmics			
Glucose lowering Oral Metformin Sulphonylurea GLP-1 receptor agonists DPP-4 inhibitors/Gliptins Glitazones SGLT2 inhibitors Insulin			
Smoking cessation (if relevant)			
Hormone replacement therapy Oestrogen (N/A for men) Testosterone (N/A for women)			
Other medications (specify)			
Non-prescribed medications including supplements			
Recreational drug use	☐ No ☐ Yes, if so provide details		
Printed name:	**Signature**	**Registration No.**	

Name DOB PID

Medical management care plan	
Informed consent to join P III programme	Programme duration and logistics explained ☐ Yes ☐ No

Assessment summary:

Patient-centred care plan: *Agree a personal plan for health summarising process/planning goals aligned to the timelines of Phase III, including SMART goals. "what would you most like to get from attending this CR programme"*

Goals	**Details**	**Timeline**
1		
2		
3		
4		

Initial assessment letter sent to GP (please include any recommended medication changes) - ☐ Yes ☐ No

Onward referral *(where relevant, for example Diabetes Education):*

Signposting (for example local patient support programmes)

Printed name:	**Signature**	**Registration No.**

Name _____ DOB _____ PID _____

Physical Activity Initial Assessment			
Clinician		**Date & Time**	
Informed Consent ☐ **Yes** ☐ **No**			
Pillar 1: Patient's habitual physical activity and sedentary behaviour (both prior to and subsequent to their CV diagnosis)			
Physical Activity weekly patterns			
IPAQ • Level of activity • MET minutes per week	Low Moderate High		
Tri-axial accelerometry: • MVPA ◦ Purposeful MVPA • Sedentary time	Date range of Assessment:		
Achieving guidelines • 150 minutes moderate intensity/75 minutes vigorous ◦ 2 strength sessions ◦ General flexibility & balance	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No		
Pillar 2. Functional capacity and risk stratification			
Functional Capacity test (FCT)	☐ Incremental cycle ergometery ☐ Chester step test (Step height _____ cm) ☐ Incremental shuttle walk test ☐ 6 min walk test		
FCT results	METs Achieved		
	Estimated Max METs		
	Reason for stopping		
Risk stratification	☐ High ☐ Moderate ☐ Low		

Name DOB PID

Pillar 3: muscle strength			
Hand-grip:	Right:	Left:	
Sub maximal assessment of 1RM			
Muscle group assessed			
Sarcopenia screening:			
Component	**Question**	**Scoring**	**Score**
Strength	How much difficulty do you have in lifting and carrying 4.5kg?	None = 0 Some = 1 A lot or unable = 2	
Assistance in walking:	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2	
Rise from a chair	:How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2	
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2	
Falls	How many times have you fallen in the past year?	None = 0 1ess than 3 falls = 1 4 or more falls = 2	
Sarc-F score = _____			
5 times sit to stand if Sarc F ≥ 4		Time in seconds _____	

Name _____ DOB _____ PID _____

Pillar 4: Physical Activity and Exercise Behaviour change status	
Beliefs/ Misconceptions	
Readiness for change	0 1 2 3 4 5 6 7 8 9 10 Not at all ready … Very ready
Importance *(How important is changing PA habits for you)*	0 1 2 3 4 5 6 7 8 9 10 Not at all Important … Extremely Important
Confidence *(How confident are you in changing PA habits*	0 1 2 3 4 5 6 7 8 9 10 Not at all Confident … Extremely Confident
Barriers	
Activity preferences	
Stage of change	☐ Pre-Contemplation ☐ Contemplation ☐ Preparation ☐ Action ☐ Maintenance ☐ Relapse

Pillar 5: Physical function (including physical limitations)	
Physical limitations to activity (joint/muscle pain or injury)	Comments:
Exercise equipment/ considerations	
Timed Up and Go (TUAG) *(if applicable)*	

Name _____ DOB _____ PID _____

5 times sit-to-stand (5STS) *(if applicable)*	
Inspiratory muscle testing *(if applicable)*	

Clinical impression

Flexible Shared SMART Goals

Physical Activity Plan	
Exercise prescription	HRR range: _____ to _____% = _____ to _____bpm MET range: _____ to _____% = _____ to _____bpm RPE range: _____ to _____
Machine settings if applicable	Treadmill _____ Rower _____ Bike _____ Step _____

Name _____ DOB _____ PID _____

Exercise considerations: e.g. activity planning, precautions, setting etc

Printed name:	Signature	Coru Registration No.

Name _____ DOB _____ PID _____

Dietitian Initial Assessment	
Informed Consent ☐ Yes ☐ No	
Date & time Location	
Other Persons Present	

Medical Tests, Surgical Hx & Procedures ☐ Nil of dietetic relevance

2. Biochemistry ☐ No recent biochemistry ☐ Biochemistry not available ☐ Nil of dietetic relevance

HbA1c _____ Date_____ Fasting Glucose _____Date_____

Total Chol _____F/NF Date _____ LDL _____F/NF Date _____

Trig _____F/NF Date _____ HDL _____ F/NF Date _____

Other relevant biochemistry: (e.g. Thyroid, Liver kidney function tests etc.)

3. Prescribed Medications ☐ Nil prescribed ☐ Medications not available ☐ Nil of dietetic relevance

4. Nutrition Focused Physical Findings ☐ N/A

Appetite, changes, medicines related signs and symptoms

GI function: gut health, bowels, nausea, vomiting

Respiratory e.g. Dyspnoea, OSA

Pain ☐ N/A

Fatigue, Sleep time and quality

Mental well-being

Dentition ☐ N/A

Mobility ☐ N/A

Name DOB PID

5. Anthropometry ☐ N/A					
Height (m)		Weight (Kg)* Check for any fluid retention and estimate weight adjustment accordingly		BMI (Kg/m^2)	
Waist circumference (BMI 25-35kg/m^2 only)					
Waist to height ratio (BMI < 35kg/m^2 only)					
MUST: Ulna length, Mid Upper arm circumference (MUAC), handgrip strength, Nutrition focused Physical examination as appropriate: muscle and subcutaneous fat wasting, fat mass % fat free mass BIA/other body composition measurement results:					
Explore factors relevant to their weight history Consider diagnosis of obesity (EOSS staging) and impact of excess adiposity on health:					

Nutritional Requirements ☐ N/A	**☐ Predictive equations used:**		
Energy	Protein	Fluid	Other:

6. Food and Nutrition Related History	
Cooking, shopping and eating outside of home	
Dieting history	
OTC supplements	
Relationship with food	
Eating behaviour patterns	

Name DOB PID

Dietary Intake/Diet history ☐ N/A ☐ Typical Day ☐ 24 hr recall ☐ Food Diary attached ☐ Other:_____

Mediterranean Diet Score _/14	AUDIT-C:

Nutrient / food group
Vegetables
Fruit
White fish
Oily fish
Shellfish
Dairy
Dietary Fats Sat, MUFA, PUFA, Ghee ,Other
Wholegrains
Red meat & processed meats
Cheese
Snacks
Salt
Functional foods e.g plant stanol/sterol ester containing foods

Physical Activity- details of current levels of activity:

Goals discussed with Physiotherapist:

7. Summary/Nutrition Diagnosis:

8. Plan: Written information and sign-posting to other useful resources provided.

Printed name:	Signature	Registration No.

Name DOB PID

Initial assessment – nutrition screening and brief intervention (Non-dietitian)				
Informed Consent ☐ Yes ☐ No				
Date & time Location				
HCP details				
Other Persons Present				
Anthropometry ☐N/A				
Height (m)	Weight (Kg)* *Check for any fluid retention*		BMI (Kg/m^2)	
MUST				
Step 1: BMI score BMI kg/m^2 Score >20(>30 Obese) =0 18.5 -20 =1 <18.5 =2	**Step 2: Weight loss score** Unplanned weight loss in past 3-6 months % Score <5 = 0 5-10 = 1 >10 = 2	**Step 3: Acute disease effect score** If patient is acutely ill and there has been or is likely to be no nutritional intake for >5 days Score 2	**Step 4 Overall risk of malnutrition** Add scores for steps 1-3 together to calculate overall risk of malnutrition	**Step 5: Action** 0: low risk - no action 1: medium risk - observe 2+: High risk – refer to GP and dietitian
Waist Circumference (cm) (BMI 25-35kg/m^2):				
Waist to height ratio (BMI < 35kg/m^2 only)				
EOSS				
MDS _/14				
AUDIT-C:				
Screen for conditions requiring dietitian input: ☐ Yes ☐ No Yes, yes provide details				
Summary:				

Name DOB PID

Plan: Written information, actions, referrals and sign-posting to other useful resources		
Printed name:	**Signature**	**Registration No.**

IDT Initial Assessment Meeting:		
Date & time: **Location:**		
HCPs present:		
Summary of discussion:		
Action: *(include person responsible)*		
Printed name:	**Signature**	**Registration No.**

14.1.2. Appendix 2: HSE Cardiac Rehabilitation patient appointment letter

Bainisteoir Ginearálta,
Seirbhís Meabhairshláinte
Ionad Cathrach, Bóthar Bhaile Munna
Baile Átha Cliath 9, D09 C8P5

General Manager
Mental Health Service
Civic Centre, Ballymun Road,
Ballymun, Dublin 9, D09 C8P5

www.hse.ie
@hselive
t 01 612 3346
e mary.bloggs@hse.ie

Date xx/xx/xxxx

Dear xxx

Invitation to join our Cardiac Rehabilitation Programme – start improving your heart health today

Appointment details:

Date:

Time:

Location:

(see overleaf for directions and arrival instructions)

What is Cardiac Rehabilitation?

- Cardiac Rehabilitation is a structured programme designed to help you recover from your heart event and to get you back to living a normal healthy life.
- It is a FREE service, delivered over 12 weeks by a team of health care professionals including a cardiologist, nurse, physiotherapist, dietitian and others.

The programme involves:

- An individual appointment at the start for you to meet the team and to look at your needs and health goals.
- Weekly programme sessions of exercise, and education on topics such as medicines, safe exercise and diet.
- An individual appointment at the end to plan the next steps for you.

Why join?

- The programme will significantly reduce your risk of having a heart event again in the future.
- Your care will be designed with you, to meet your needs.
- You can attend in-person, online, or a combination of both
- The programme will help you to start making the right changes for you that you can work on into the future.

What to expect at your first appointment

- You will meet the nurse, the physiotherapist and the dietitian.
- They will ask you some questions, check your blood pressure, your weight and height, and they may also take some bloods (fasting is not required).
- The first appointment will last around 2 hours.

What to bring to your first appointment	✓
This Letter.	
Fill out the questionnaires included with this letter and bring with you. If you need any help with the questionnaires, we can help you on the day.	
Bring your medicines list or boxes.	
If you have diabetes and measure your blood glucose, please bring your blood glucose monitor and diary with you.	
GTN spray / inhaler if you have one	
Wear comfortable clothes and shoes, as there will be some short exercises with the physiotherapist	
A drink and a snack	
You are welcome to bring a family member, carer or friend with you.	

If you are unable to attend or have any questions or concerns, please contact me on ……

Yours sincerely,

_____

xxx

Cardiac Rehabilitation Co-Ordinator

xxxx Integrated Chronic Disease Hub

contact details xxxx phone / email

14.1.3. Appendix 3: Stop Bang Questionnaire

Please see the STOP-Bang Questionnaire linked here

STOP - Bang Questionnaire

Is it possible that you have Obstructive Sleep Apnea (OSA)?

Please answer the following questions below to determine if you might be at risk.

Snoring? **Yes ☐ No ☐**

Do you **Snore Loudly** (loud enough to be heard through closed doors or your bed-partner elbows you for snoring at night)?

Tired? **Yes ☐ No ☐**

Do you often feel **Tired, Fatigued, or Sleepy** during the daytime (such as falling asleep during driving or talking to someone)?

Observed? **Yes ☐ No ☐**

Has anyone **Observed** you **Stop Breathing** or **Choking/Gasping** during your sleep?

Pressure? **Yes ☐ No ☐**

Do you have or are being treated for **High Blood Pressure**?

Body Mass Index more than 35 kg/m^2? **Yes ☐ No ☐**

Age older than 50? **Yes ☐ No ☐**

Neck size large? (Measured around Adams apple) **Yes ☐ No ☐**

Is your shirt collar 16 inches / 40cm or larger?

Gender = Male? **Yes ☐ No ☐**

For general population
OSA - Low Risk : Yes to 0 - 2 questions
OSA - Intermediate Risk : Yes to 3 - 4 questions
OSA - High Risk : Yes to 5 - 8 questions
or Yes to 2 or more of 4 STOP questions + male gender
or Yes to 2 or more of 4 STOP questions + BMI > 35kg/m^2
or Yes to 2 or more of 4 STOP questions + neck circumference 16 inches / 40cm

14.1.4. Appendix 4: Clinical Frailty Score

https://apps.nhslothian.scot/files/sites/2/Clinical-Frailty-Score.pdf

NHS
Acute Frailty Network

The Clinical Frailty Scale (CFS)

A Quick Reference Guide

Background

The Clinical Frailty Scale (CFS) was developed in 2005 and is now used in more than 20 countries. It is employed both in routine clinical care and in research. The key idea behind the CFS is that as people age they are more likely to have things wrong with them. Those things they have wrong with them begin to impact on their function.

The CFS is derived from the Canadian Study of Health and Aging Frailty Index. Following assessment of a patient, a clinician can grade the degree of frailty present using the brief descriptions given on the tool (in addition to what they have ascertained from their overall assessment). The CFS is a nine-point scale based on clinical evaluation of mobility, energy, physical activity, and function. It is a quick and easy way to assess a person's level of frailty.

This fact sheet is designed as a 'quick reference' guide, to help staff calculate CFS scores and identify the level of frailty present.

Using CFS in practice

DO remember that the CFS has only been validated in older people; it has not been widely validated in younger populations (below 65 year of age), or in those with learning disability. It may not perform as well in people with stable long term disability such as cerebral palsy, whose outcomes might be very different compared to older people with progressive disability. We would advise that the CFS is not used in these groups.

However, the guidance on holistic assessment to determine the likely risks and benefits of critical care support, and seeking critical care advice where there is uncertainty, is still relevant.

Ask the patient, their carer/next of kin/paramedics/care home staff what the patient's capability was **TWO** weeks ago. The assessment should **NOT** be based on how the patient appears before you today - it is intended to describe their baseline, which in turn informs treatment goals. Decision makers using the CFS to inform clinical management **MUST** check the score to ensure that it is accurate. Please note the CFS score is an *aide memoir* for clinicians and does not replace clinical judgment.

The questions below have been devised to help staff calculate a CFS score with patients/carers, and the page has been designed to be printed for use as a poster.

For more information on frailty and application of the CFS go to
www.acutefrailtynetwork.org.uk

A version of the CFS is now available on the App Store, designed to help frontline staff calculate a clinical frailty score.

NHS
Acute Frailty Network

The Clinical Frailty Scale (CFS)

A Quick Reference Guide - Flowchart

Is this person terminally ill with a life expectancy of <6 months? **Yes** →  → **CFS Score 9** - Terminally Ill

No

Is this person completely dependent and approaching the end of their life? **Yes** →  → **CFS Score 8** - Very severely frail

No

Is this person completely dependent for personal care? **Yes** →  → **CFS Score 7** - Severely frail

No

Does this person need help with all outside activities, keeping house and/or bathing? **Yes** →  → **CFS Score 6** - Moderately frail

No

Does this person need help with IADLs e.g. finances, banking, transportation, heavy housework, meal preparations or medications? **Yes** →  → **CFS Score 5** - Mildly frail

No

Whilst not dependent on others, does this person's symptoms limit their activities? **Yes** →  → **CFS Score 4** - Vulnerable

No

Does this person have medical problems that are well controlled but they are not regularly active beyond routine walking? **Yes** →  → **CFS Score 3** - Managing well

No

Does this person have no active disease symptom and exercise only occasionally? **Yes** →  → **CFS Score 2** - Well

No

Is this person over-exercising regularly and fittest in their age group? **Yes** →  → **CFS Score 1** - Very fit

Severe Frailty CFS 7-9 Think about supportive care versus cure, advance care planning, recognition that enhanced supportive care is an active intervention in itself offering improved quality of life and, sometimes quantity of life. Comprehensive Geriatric Assessment must be completed.

Moderate Frailty CFS 6 Actively seek out and manage frailty syndromes e.g. falls, fragility fractures, cognitive impairment, continence and/or polypharmacy issues. Use the 4AT to screen for delirium in patients with dementia and/or delirium. The presence of one or more frailty syndromes should trigger Comprehensive Geriatric Assessment (CGA).

Fit/Mild Frailty CFS 1-5 Plan care as usual but address reversible issues such as sarcopenia and nutrition. Consider social prescribing and where relevant, e.g. elective care, make a plan for "prehabilitation".

Align this with guidance on management of Acute Frailty at www.acutefrailty.org.uk

A version of the CFS is now available on the App Store, designed to help frontline staff calculate a clinical frailty score.

14.1.5. Appendix 5: Fagerstrom Test

Fagerstrom Test for Nicotine Dependence

Score 8+ = high dependence
Score 5-7 = moderate dependence
Score 3-4 = low to moderate dependence
Score 0-2 = low dependence

QUESTION	RESPONSE	SCORE
1. How soon after you wake up do you smoke your first cigarette?	After 60 minutes 31-60 minutes 6-30 minutes Within 5 minutes	0 1 2 3
2. Do you find it difficult to refrain from smoking in places where it is forbidden?	No Yes	0 1
3. Which cigarette would you hate most to give up?	The first in the morning Any other	1 0
4. How many cigarettes do you smoke per day?	10 or less 11-20 21-30 31 or more	0 1 2 3
5. Do you smoke more frequently during the first hours after waking, than during the rest of the day?	No Yes	0 1
6. Do you smoke even if you are so ill that you are in bed most of the day?	No Yes	0 1
Total		

Adapted from Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. British Journal of Addictions 1991; 86:1119-27.

The most distinctive indicators of nicotine dependence are:

- Time to first cigarette after waking
- The number of cigarettes smoked per day

14.1.6. Appendix 6: EuroQOL-5D-5L

Health Questionnaire

English version for Ireland

Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

I have no problems in walking about ❑
I have slight problems in walking about ❑
I have moderate problems in walking about ❑
I have severe problems in walking about ❑
I am unable to walk about ❑

SELF-CARE

I have no problems washing or dressing myself ❑
I have slight problems washing or dressing myself ❑
I have moderate problems washing or dressing myself ❑
I have severe problems washing or dressing myself ❑
I am unable to wash or dress myself ❑

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems doing my usual activities ❑
I have slight problems doing my usual activities ❑
I have moderate problems doing my usual activities ❑
I have severe problems doing my usual activities ❑
I am unable to do my usual activities ❑

PAIN / DISCOMFORT

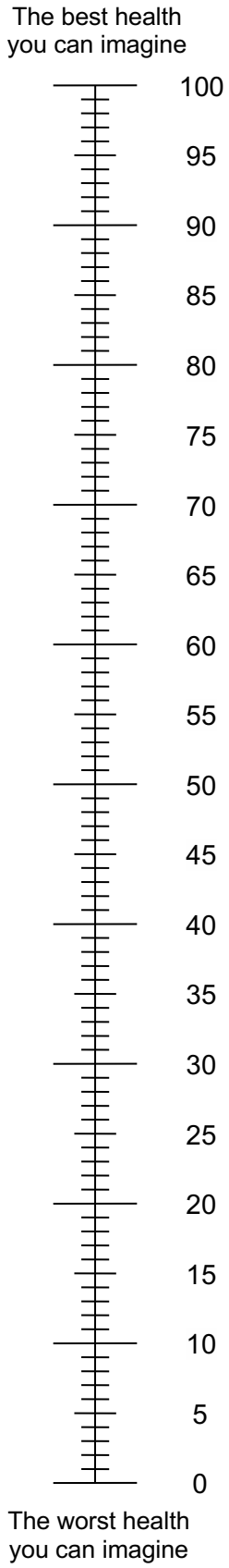
I have no pain or discomfort ❑
I have slight pain or discomfort ❑
I have moderate pain or discomfort ❑
I have severe pain or discomfort ❑
I have extreme pain or discomfort ❑

ANXIETY / DEPRESSION

I am not anxious or depressed ❑
I am slightly anxious or depressed ❑
I am moderately anxious or depressed ❑
I am severely anxious or depressed ❑
I am extremely anxious or depressed ❑

- We would like to know how good or bad your health is TODAY.
- This scale is numbered from 0 to 100.
- 100 means the <u>best</u> health you can imagine.
  0 means the <u>worst</u> health you can imagine.
- Mark an X on the scale to indicate how your health is TODAY.
- Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY = ☐



14.1.7. Appendix 7: Hospital Anxiety and Depression Scale (HADS)

Hospital Anxiety and Depression Scale (HADS)

Instructions: Doctors are aware that emotions play an important part in most illnesses. If your doctor knows about these feelings he or she will be able to help you more. This questionnaire is designed to help your doctor know how you feel. Read each item and circle the reply which comes closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate reaction to each item will probably be more accurate than a long thought out response.

I feel tense or 'wound up':	**A**
Most of the time	3
A lot of the time	2
Time to time, occasionally	1
Not at all	0

I feel as if I am slowed down:	**D**
Nearly all of the time	3
Very often	2
Sometimes	1
Not at all	0

I still enjoy the things I used to enjoy:	**D**
Definitely as much	0
Not quite so much	1
Only a little	2
Not at all	3

I get a sort of frightened feeling like 'butterflies in the stomach':	**A**
Not at all	0
Occasionally	1
Quite often	2
Very often	3

I get a sort of frightened feeling like something awful is about to happen:	**A**
Very definitely and quite badly	3
Yes, but not too badly	2
A little, but it doesn't worry me	1
Not at all	0

I have lost interest in my appearance:	**D**
Definitely	3
I don't take as much care as I should	2
I may not take quite as much care	1
I take just as much care as ever	0

I can laugh and see the funny side of things:	**D**
As much as I always could	0
Not quite so much now	1
Definitely not so much now	2
Not at all	3

I feel restless as if I have to be on the move:	**A**
Very much indeed	3
Quite a lot	2
Not very much	1
Not at all	0

Worrying thoughts go through my mind:	**A**
A great deal of the time	3
A lot of the time	2
From time to time but not too often	1
Only occasionally	0

I look forward with enjoyment to things:	**D**
A much as I ever did	0
Rather less than I used to	1
Definitely less than I used to	3
Hardly at all	2

I feel cheerful:	**D**
Not at all	3
Not often	2
Sometimes	1
Most of the time	0

I get sudden feelings of panic:	**A**
Very often indeed	3
Quite often	2
Not very often	1
Not at all	0

I can sit at ease and feel relaxed:	**A**
Definitely	0
Usually	1
Not often	2
Not at all	3

I can enjoy a good book or radio or TV programme:	**D**
Often	0
Sometimes	1
Not often	2
Very seldom	3

Questions relating to anxiety are indicated by an 'A' while those relating to depression are shown by a 'D'. Scores of 0-7 in respective subscales are considered normal, with 8-10 borderline and 11 or over indicating clinical 'caseness'

14.1.8. Appendix 8: Minnesota living with Heart Failure Questionnaire

Attach Patient Label Here

MINNESOTA LIVING WITH HEART FAILURE® QUESTIONNAIRE

The following questions ask how much your heart failure (heart condition) affected your life during the past month (4 weeks). After each question, circle the 0, 1, 2, 3, 4 or 5 to show how much your life was affected. If a question does not apply to you, circle the 0 after that question.

Did your heart failure prevent you from living as you wanted during the past month (4 weeks) by -	**No**	**Very Little**				**Very Much**
1. causing swelling in your ankles or legs?	0	1	2	3	4	5
2. making you sit or lie down to rest during the day?	0	1	2	3	4	5
3. making your walking about or climbing stairs difficult?	0	1	2	3	4	5
4. making your working around the house or yard difficult?	0	1	2	3	4	5
5. making your going places away from home difficult?	0	1	2	3	4	5
6. making your sleeping well at night difficult?	0	1	2	3	4	5
7. making your relating to or doing things with your friends or family difficult?	0	1	2	3	4	5
8. making your working to earn a living difficult?	0	1	2	3	4	5
9. making your recreational pastimes, sports or hobbies difficult?	0	1	2	3	4	5
10. making your sexual activities difficult?	0	1	2	3	4	5
11. making you eat less of the foods you like?	0	1	2	3	4	5
12. making you short of breath?	0	1	2	3	4	5
13. making you tired, fatigued, or low on energy?	0	1	2	3	4	5
14. making you stay in a hospital?	0	1	2	3	4	5
15. costing you money for medical care?	0	1	2	3	4	5
16. giving you side effects from treatments?	0	1	2	3	4	5
17. making you feel you are a burden to your family or friends?	0	1	2	3	4	5
18. making you feel a loss of self-control in your life?	0	1	2	3	4	5
19. making you worry?	0	1	2	3	4	5
20. making it difficult for you to concentrate or remember things?	0	1	2	3	4	5
21. making you feel depressed?	0	1	2	3	4	5

FAX to RPM nurse at 902-620-3267

14.1.9. Appendix 9: Dutch Lipid Criteria

Dutch Lipid Clinic Network Score (DLCNS) for FH

The DLCNS is a validated set of criteria based on the patients family history of premature cardiovascular disease (CVD) in their first degree relatives, their own CVD history, their untreated lipid levels and physical signs such as the presence of tendon xanthomata or arcus cornealis prior to the age of 45. The subsequent score categorizes patients by the likelihood of **Familial Hypercholesterolaemia (FH)** diagnosis.

Patient Name _____ DOB _____ Date _____

Criteria		Score	Patient Score
Family history			
First degree relative with known premature coronary and/or vascular disease (men aged <55 years, women aged <60 years) OR First degree relative with known LDL-cholesterol above the 95th percentile for age and gender		**1**	
First degree relative with tendinous xanthomata and/or arcus cornealis OR Children aged <18 years with LDL-cholesterol above the 95th percentile for age and gender		**2**	
Clinical history			
Patients with premature coronary artery disease (men aged <55 years, women aged <60 years)		**2**	
Patients with premature cerebral or peripheral vascular disease (men aged <55 years, women aged <60 years)		**1**	
Physical examination			
Tendinous xanthomata		**6**	
Arcus cornealis before 45 years of age		**4**	
Investigation			
LDL-cholesterol (mmol/L)	LDL-C ≥8.5	**8**	
NB. This is the **untreated** LDL-cholesterol concentration. See supporting documentation for method of calculation.	LDL-C 6.5–8.4	**5**	
	LDL-C 5.0–6.4	**3**	
	LDL-C 4.0–4.9	**1**	
		Patient total	

Diagnosis	Total
Definite FH	**>8**
Probable FH	**6-8**
Possible FH	**3-5**
Unlikely FH	**<3**

14.1.10. Appendix 10 - Essential Competencies and minimal Qualifications to lead the exercise component of Cardiac Rehabilitation

BACPR Exercise Professionals Group (EPG) Position Statement 2019 (version three) Essential competences and minimum qualifications required to lead the supervised exercise component in (early) core cardiac rehabilitation. Linked here

BACPR Core Competencies for the Physical Activity and Exercise Component of Cardiovascular Disease Prevention and Rehabilitation Services (2024) (3rd edition). Linked here

14.1.11. Appendix 11 - International Physical Activity Questionnaire

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the last **7 days. Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____**days per week**

   ☐ **No vigorous physical activities** → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____**days per week**

   ☐ **No moderate physical activities** → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ **No walking** → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day?**

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Score and Interpret the Following Completed IPAQ SF Physical Activity Questionnaire

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

☑ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

2 **days per week**

☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

1 **hours per day**
15 **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

5 **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

0 **hours per day**
30 **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

11 **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

1. How many MET minutes per week?

Convert all activity to minutes before calculating MET minutes. It is recommended that activity bouts of greater than 3 hours are truncated. That is to say that a bout cannot be longer than 3 hours (180 minutes). This means that in each category a maximum of 21 hours of activity are permitted a week (3 hours X 7 days)

To calculate MET minutes a week multiply the MET value given (walking = 3.3, moderate activity = 4, vigorous activity = 8) by the minutes the activity was carried out and again by the number of days that that activity was undertaken.

For example if someone reports walking for 30 minutes 5 days a week then the total MET minutes for that activity are 3.3 X 30 X 5=495 Met minutes a week.

MET minutes vigorous
MET minutes moderate
MET minutes walking
TOTAL :

2. Categorise their physical activity participation as HIGH, MODERATE or LOW

- Those who score **HIGH** on the IPAQ engage in:
  - Vigorous intensity activity on at least 3 days achieving a minimum total physical activity of at least 1500 MET minutes a week

    OR
  - 7 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 3000 MET minutes a week.
- Those who score **MODERATAE** on the IPAQ engage in:
  - 3 or more days of vigorous intensity activity and/or walking of at least 30 minutes per day

    OR
  - 5 or more days of moderate intensity activity and/or walking of at least 30 minutes per day

    OR
  - 5 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET minutes a week.
- Scoring a LOW level of physical activity on the IPAQ are those not meeting any of the criteria for either MODERATE of HIGH levels of physical activity.

Category:

14.1.12. Appendix 12: Functional capacity testing frameworks

Introduction and Overview

This booklet provides the background protocols to four specific submaximal exercise tests and the necessary competency frameworks (assessments) required to perform these tests to ensure the results are as reliable and valid as possible.

For any of the tests with which you have little experience, it is recommended that you familiarise yourself and practice these protocols and applications below, following this course, on at least 10 healthy individuals before performing with patients.

To benefit your patients and your service needs most effectively, the application elements of carrying out these assessments should include the following:

- A pre-assessment health and readiness-to-participate screening
- Checking the collected data shows the appropriate congruency between work-rate (metabolic equivalents; METs), heart rate (HR) and ratings of perceived exertion (RPE)
- Estimating maximal aerobic capacity (METs-max or $\dot{V}O_2$max):
  - As an important element in risk stratifying of the patient
  - As an additional means of setting the target intensities using METs
- Discussing with your patient about activities in daily life and other leisure pursuits that relate to the METs range in which they can safely and effectively work

Example of a Pre-Submaximal Exercise Test Checklist

Medical consent gained	☐
Resting pulse regular and less than 100bpm	☐
BP controlled (SBP<180) (DBP < 110)	☐
No angina at rest or change in angina pattern	☐
Patient taken all prescribed medication	☐
Patient free from cold, sore throat or other temporary illness	☐
Patient not on antibiotics	☐
No other hospital admissions in the past 4 weeks	☐
No orthopaedic problems that could be exacerbated by exercise	☐
If patienthas diabetes, no hypoglycaemic episodes in past week	☐
No signs of acute heart failure	☐

No excessive alcohol consumed in the past 24 hours	☐
No caffeine/ tobacco in the past 2 hours	☐
No heavy meal in the past 2 hours	☐
No strenuous activity 24 hours preceding the test	☐
Patient is wearing suitable clothing / footwear	☐
Patient gives informed consent	☐

Other:

Access to telephone and cardiologist in emergency	☐
Resuscitation equipment accessible and checked	☐
Tester competent in basic life support	☐
Tester competent in assessment method	☐

The Six-Minute Walk Test

The 6-min walk test was originally described by Guyatt *et al. (1985).* It is simple to conduct, has excellent patient acceptance because exercise levels during the test closely resemble usual patient activities, and costs of administration are low. In the context of people with cardiovascular disease the six-minute walk test is commonly used in the following patients:

1. People referred with **Peripheral Arterial Disease (PAD)** (Claudication) due to the nature of its available outcome data, specifically in relation to '**initial** and **absolute** claudication distances'. These measures are recognised nationally and internationally as validated outcomes in the field of PAD.
2. Individuals with co-morbidities that result in significant difficulty in the movement of externally paced incremental stepping, walking, cycling etc.
3. Individuals with low functional capacity.

How to carry out a six-minute walk test in a cardiac population

Table 1 summarises the 6-min walk protocol and the current data collection sheet is reproduced in Fig. 1. The presence of a member of staff with basic life support training and access to a defibrillator are mandatory.

Studies have shown that the instructions provided to the patient at the beginning of the walk, the length of the walking track, the use of encouragement, the provision of a time frame (by calling out to

the patient at the 2-min and 4-min time points), and positioning of the tester (walking with the patient versus being stationary in one area of the track) can all significantly influence distance walked *(ATS, 2002).* Therefore, standardisation of the 6-minute walk test administration is critically important, if valid data are to be obtained.

Table 1: Six-Minute Walk Test Protocol

Purpose

To provide a simple, inexpensive, and non-invasive method for assessing functional capacity with PAD or low exercise capacity or complex co-morbidities that result in more accurate tests being inappropriate or unfeasible.

Set Up and Equipment

1. Level walking surface that is at ideally 30 metres in length and free from obstruction.
2. A cone set in by half a metre at each end of this measured distance to allow for walking around the cone.
3. Mark the track at the half way point.
4. A chair should be available at each end.
5. Stopwatch.
6. Six-minute walk documentation form.
7. Blood pressure monitor.
8. Heart rate monitor.
9. Rating of perceived exertion scale.

Exclusion criteria

- Persons with musculoskeletal problems that *significantly* limit walking such as paralysis, pain, and other problems that would contribute to suboptimal walking performance;
- Uncontrolled angina
- Resting systolic BP > 200mmHg, diastolic >110mmHg
- > 20 mmHg BP drop on exercise
- Critical aortic stenosis
- Uncontrolled arrhythmias
- Acute pericarditis or myocarditis
- Acute or unstable heart failure
- Fever and acute systemic illness
- New or recurrent symptoms of:
    - Breathlessness/chest pain
    - Palpitations
    - Dizziness
    - Lethargy
    - Uncontrolled diabetes
    - Recently altered ECG response

Procedure

1. Screening for any exclusion criteria.
2. The patient is fitted with a heart rate monitor
3. Resting vital signs are recorded before walk: blood pressure and heart rate.
4. 40-70/75/80% age adjusted heart rate reserve (adjusted for beta blockers where indicated) is calculated for the purposes of ensuring 'moderate' intensity.
5. The walks should be carried out in an area with minimal traffic.
6. The following instructions are given to participants:

    a. "The purpose of this test is to find out how far you can walk in 6 minutes. You will start from this point (indicate marker at one end of the course) and follow the path until the 6-minute period is complete. The results of this test allow us to provide you with a really personalised exercise and activity plan.

    b. If you need to stop during this time please do, until you can go again.

    c. Every minute I will ask you your heart rate (indicating).

    d. Every minute I will ask you to rate how hard the activity is using the rating of perceived exertion scale (this should be familiarised to the patient using the standardised instructions).

    e. This is not a maximal test. You should **not** walk as fast as you can. You should walk at a '*comfortable speed' (moderate intensity),* in that your breathing is deeper and faster but you can speak a whole sentence.

    f. You should not experience any chest pain, dizziness or feel at all unwell, so if you do please tell me.

    g. It is normal for your breathing to be faster and deeper but you should not get out of breath.

    h. During this test please report as soon as you experience any pain in your legs (this **must** be emphasised for PAD patients).

    i. The test is repeated at the end of the programme and by doing this we will be able to show you changes in your fitness (and improvements in your circulation if applicable) that have resulted from all your efforts.

    j. Participants should then be asked to repeat their understanding of the instructions."

The Test Starts

7. The stop watch is started and the test begins.
8. The tester may walk behind (*but not with*) the patient so as not to influence the participant's pace.
9. The tester **must count** the number of laps each minute to the nearest half (using the half way mark) and record this for each minute.
10. During the walk, the following words of encouragement are provided at 30-s intervals: "everything alright?" "You're doing fine" (particularly looking for noting the initial claudication distance in PAD patients). The distance at onset of any symptoms should be noted. In the instance of cardiac related symptoms the test would be stopped.
11. In the last 10-15 seconds of each minute heart rate and RPE should be collected and recorded.
12. If patient had to stop and rest, the duration of the rest time is recorded.

On Test Completion

13. The patient should participate in a cool down, noting at 1 minute that heart rate is lowered. If heart rate has sufficiently lowered following a cool down period blood pressure is checked and recorded.
14. Heart rate should be monitored to ensure full recovery back to pre-exercise levels.

Scoring the test

15. Total metres should be calculated for the test and equated to MET's achieved; all documentation completed.

References:

American Thoracic Society. ATS Statement: Guidelines for the Six-Minute Walk Test. *Am J Respir Crit Care Med*. 2002;166:111–117.

Guyatt GH, Sullivan MJ, Thompson PJ, Fallen EL, Pugsley SO, Taylor DW, Berman LB. The 6-Minute Walk: A New Measure of Exercise Capacity in Patients with Chronic Heart Failure. *Can Med Assoc J. 1985;132:919*

6 minute walk test

Name:	Age:	Date:
Patient consent: **Y / N**	**Check list complete:** **Y / N**	**Procedure explained:** **Y / N**

Resting HR: Regular / irregular	BP Right: Left:	Beta Blockers: Y/N

Predicted HR max:		
40%HRRmax:	50%HRRmax:	60%HRRmax:
70%HRRmax:	75%HRRmax:	80%HRRmax:

Distance of shuttle =	Number of shuttles	Metres per minute	Rest required Y/N	HR	RPE
Minute 1					
Minute 2					
Minute 3					
Minute 4					
Minute 5					
Minute 6					

Total Metres		**Comments:**
Average metres per minute		
METS achieved		
Estimated MET max		
Heart Rate Walking Speed Index		

Rest Periods Required:

Total number of rests required	
Rest duration/s	

For Claudication Patients:

Initial Claudication Distance (metres) (distance patient first experiences exertional pain)	
Absolute Claudication Distance (metres) (furthest distance patient is able to walk)	

Competency assessment for the 6-minute walk test adapted to a cardiac population

Competency √ = competent A = competent but action point recommended X = not yet competent		Comments
Was all the equipment set up correctly before the test? The distance should be measured precisely including half a metre to walk around cones.		
Was the pre-test checklist completed?		

Was an appropriate heart rate range calculated? (40-70/75%HRRmax is calculated beforehand)		
Was the heart rate monitor fitted appropriately?		
Were Pre-exercise HR and BP collected appropriately?		
Was RPE familiarised correctly?		
Was there a pre-test explanation that included: • Purpose • Walking at *comfortable* speed for 6 minutes • Allowed to stop and rest if required • At the end of each minute HR, RPE will be collected • Normal S & S – patient should not get out of breath – this is moderate intensity only. • Warnings? • Explain test end point		
The tester should not walk with the patient (where required the tester should walk behind). Was this the case?		
Did the tester use standardised encouragement and discourage talking		
The tester should not advise how many minutes have lapsed as this can affect performance. Was this the case?		

Were HR and RPE collected at the correct times in the test? i.e. in the last 15 seconds of each minute and avoiding the turning phase of the walk.		
Was the patient well observed during the test?		
Was the tester appropriately positioned during the test?		
Did the tester use volume and pitch of voice effectively?		
Did the tester check regularly on the participant's ability to cope with test?		
Did the tester give clear and understandable verbal instruction?		
Was the test stopped appropriately?		
Did the patient perform a short cool down?		
Was recovery monitored appropriately?		
Was the test scored correctly and documented clearly?		

Chester Step Test (CST) Protocol

Equipment Needed:

- An adjustable height step (15/20/25cm)
- Metronome or audio recording with step cadence cues for CST
- Stopwatch or timer
- Heart rate monitor (preferabbly chest strap or fingertip pulse monitor)
- Recording sheet (see below)
- Blood Pressure monitor
- RPE chart

Test Preparation

1. Explain the test to the participant, including what will happen, the stepping pace with an increase every 2 minutes, and when to stop
2. Level 1 has a stepping rate of 12 steps per minute, this increases by 2 steps a minute on each stage (Level 2 = 14 spm, level 3 = 16 spm etc)
3. Ensure the participant has an adequate understanding of RPE and how to score it
4. Carry out pre-testing check list
5. Get baseline measurements of resting HR and BP. Have %HRR calculations documented

Test Procedure

1. Position the participant facing the step. They can hold on to a support if needed but this must be located to the side of the step and not in front of it
2. Begin the CST recording or metronome
3. The participant then steps up and down in pace with the cues
    a. Ensure each foot is placed fully on the step and back down again
    b. Ensure participant is maintaining pace with the cues. Verbal cues of ‘up, up, down, down’ may be given initially and at each change of level to aid transitions but only on the first couple of steps
    c. If the participant cannot maintain the pace of stepping the test should be stopped
4. Each stage lasts 2 minutes.
5. Record HR and RPE 15 seconds before the end of each stage (ie before the next level is started)

End Point

The test should be ended if the participant:

- Can no longer maintain the required pace (2 missed beats are allowed but they should be stopped on third one)
- RPE of 15 is reached
- Pre-determined End point of designated HRRmax% is achieved
- Participant request
- Chest pain or marked shortness of breath

On Test completion:

- The patient should participate in a cool down, noting at 1 minute that heart rate is lowered. If heart rate has sufficiently lowered following a cool down period blood pressure is checked and recorded.
- Heart rate should be monitored to ensure full recovery back to pre-exercise levels
- Ensure all documentation is filled, including MET's achieved and an estimation of Max MET's

Chester step test

Name:	**Age:**	**Date:**
Patient consent: **Y / N**	**Check list complete:** **Y / N**	**Procedure explained:** **Y / N**

Resting HR: **Regular / irregular**	**BP** **Right:** **Left:**	**Beta Blockers: Y/N**

Predicted HR Max:	**40%HRRmax:** **60%HRRmax:** **75%HRRmax:**	**50%HRRmax:** **70%HRRmax:** **80%HRRmax:**	**Step Height** **15 / 20 / 25cm**

1 minute recovery heart rate:_____

Step test summary: Completed stages: Total Minutes and Seconds:

METS achieved: Estimated MET Max:

Reason for stopping (select appropriate reason/s)

- Unable to maintain required speed
- Achieved end point heart rate (specify value)
- Rating of perceived exertion of 15
- Chest pain
- Marked shortness of breath
- Leg fatigue
- Other (please specify)

HR Response Normal / Abnormal **BP Response** Normal / Abnormal / Not assessed

LEVEL	MINS	Step rate	HR	RPE	Symptoms / comments	METS 15 cm	METS 20 cm	METS 25 cm
1	*1*	15				3.1	3.4	4.0
	2							
2	*3*	20				4.0	4.8	5.4
	4							
3	*5*	25				5.1	6.0	6.9
	6							
4	*7*	30				6.0	7.4	8.3
	8							
5	*9*	35				7.1	8.3	9.4
	10							

COMPETENCY ASSESSMENT FOR CHESTER STEP TEST

Competency √ = competent A = competent but action point recommended X = not yet competent		Comments
Was all the equipment set up correctly before the test?		
Was the pre-test checklist completed?		
Was an appropriate end point determined and calculated?		
Was the heart rate monitor fitted appropriately?		
Were Pre-exercise HR and BP collected appropriately?		
Was RPE familiarised correctly?		
Was there a pre-test explanation that included: • Purpose • Incremental, levels of 2 mins stages • Stepping Rate and Step Height • At the end of each stage HR, RPE observation of Normal S & S • Warnings? • Test end point		
Did the tester familiarise the individual to correct stepping technique and check ability to step with right and left side?		
Was the correct step height selected?		

Was the step positioned appropriately?		
Did the tester step with the patientto correct any mismatch in pace with the recording/metronome		
Did the tester use standardised encouragement and discourage talking?		
Did the tester warn the next level approaching (cue effectively) and provide appropriate instruction?		
Were HR and RPE noted every 30 to 45 seconds and then collected at the correct times at the end of each stage? Was HR and RPE noted down with 15-20 seconds before end of stage before the pace was increased?		
Was the patientwell observed during the test?		
Was the tester appropriately positioned facing the patient during the test?		
Did the tester use volume and pitch of voice effectively?		
Did the tester check regularly on the participant's ability to cope with test?		
Did the tester give clear and understandable verbal instruction?		
Was the test stopped appropriately?		
Did the patient perform a short cool down?		
Was recovery monitored appropriately?		
Was the test scored correctly and documented clearly?		

Aerobic exercise cycle assessment protocol

For use in exercise referral and cardiac rehabilitation

Adapted from Buckley *et al.* (1999) Exercise on Prescription;

Cardiovascular Activity for Health (Chapters 7 and 8), Butterworth Heinemann, Oxford

This protocol can be used for both assessing changes in aerobic fitness from baseline to follow-up, prescribing aerobic exercise and giving guidance related to physical activity capabilities.

It is assumed that the exercise practitioner carrying out this assessment is qualified in assessing and prescribing fitness and that all necessary health screening will have taken place prior to commencing the assessment, which is adapted from recognised assessment protocols (e.g. ACSM, 2000; Astrand, 1986)

From a perspective of exercise and physical activity advice, it is assumed that the exercise practitioner is aware of the health promotion message approach to physical activity (Chief Medical Officer's Report, 2004) and the FITT principle towards enhancing aerobic fitness (ACSM Position Stand, 1998).

Equipment required

- Cycle ergometer that accurately measures pedal work-rate in Watts
- Heart rate monitoring system
- Rating of perceived exertion scale (RPE, Borg, 1998)

Exercise assessment stages

There are up to 5 x 2-min stages for the cycle test,

- Start each test at Stage I for all patients.
- For those patients you feel are quite unfit choose Protocol A (starting at 25 Watts cycling and incrementing by 25 Watts each 2 mins).
- Make sure the person has been sitting down for at least 10 mins prior to testing and that their HR is below 100 bpm. Smoking or a main meal should have been avoided within the last 2-3 hours and alcohol avoided in the last 12 hours.
- Describe the RPE scale as per appropriate instructions.
- Then commence the test.
- As a means of patient care, get the patient to give an RPE at the end of every minute, even though you will only record it at the end of each two-minute stage; more frequent ratings will help increase the accuracy of the RPEs given.
- In the last 15 seconds of each 2 min stage, record HR and RPE on the data sheet before increasing the intensity to the next stage.
- Continue with the test until the individual either attains 75-80% HRR (or pre-determined end point) or an RPE or 15; unless the patient is feeling unwell do not bring them to an abrupt stop just reduce the loading on the cycle and get them to pedal gently.

- The heart rate and RPE in the last 15 seconds of the final stage will be data used for the summary profile data.
- If the person gives an RPE of 13 or 14 before attaining 70% HRR 80%HRmax this must be respected as the end point of the test.

CYCLE ERGOMETRY SUBMAXIMAL TEST RECORD SHEET

Name:	**Age:**	**Date:**
Height cm:	**Weight kg:**	
Patient consent: **Y / N**	**Check list complete:** **Y / N**	**Procedure explained:** **Y / N**
Resting HR: **Regular / irregular**	**BP** **Right:** **Left:**	**Beta Blockers: Y/N**

40%HRRmax:	**50%HRRmax:**	**60%HRRmax:**	**70%HRRmax:**
75%HRRmax:	**80%HRRmax:**		

Time	Work Rate (WATTs) Protocols: A. 25 Watt increments B. 30 Watt Increments	METs	HR	%HRR	RPE	Syst BP	RPP
1							
2							
3							
4							
5							

6							
7							
8							
9							
10							

COMPETENCY ASSESSMENT FOR CYCLE ERGOMETER TESTING

Competency √ = competent A = competent but action point recommended X = not yet competent		Comments
Was all the equipment set up correctly before the test?		
Was the pre-test checklist completed?		
Was an appropriate end point determined and calculated?		
Was the heart rate monitor fitted appropriately?		
Were Pre-exercise HR and BP collected appropriately?		
Was RPE familiarised correctly?		
Was there a pre-test explanation that included: • Purpose • Description of pedal speed, resistance and 2 min stages • At the end of each stage HR, RPE Normal S & S • Warnings? • Test end point		
Did the tester ensure the correct pedal speed was adhered to?		

Did the tester use standardised comments to inform patient of upcoming increases in resistance prior to each stage?		
Were changes in HR and RPE observed at least every 30 to 45 seconds?		
Were HR and RPE written down with in last 15 – 20 seconds of each stage prior to increasing resistance?		
Was the patient well observed during the test?		
Was the tester appropriately positioned by facing the patient during the test?		
Did the tester use volume and pitch of voice effectively?		
Did the tester check regularly on the participant's ability to cope with test?		
Did the tester give clear and understandable verbal instruction?		
Was the test stopped appropriately?		
Did the patient perform a short cool down?		
Was recovery monitored appropriately?		
Was the test data double checked for errors/corrections?		

Incremental Shuttle Walk Test Protocol

Equipment Required

- 10-meter flat, straight, marked walking course
- 2 cones (to mark turning points- place eac cone half a meter in from the 10m end point to allow for turning)
- Audio player with the standardised ISWT audio (with beeps and instructions)
- Audio speaker or headphones (loud enough for the participant to hear clearly)
- Stopwatch (for backup)
- Recording sheet (below) and pen
- Rate of Perceived Exertion (RPE) scale
- Blood pressure monitor

Pre-Test Preparation

1. **Consent**: Obtain informed consent.
2. **Rest**: Ensure the participant has rested for at least 10 minutes before the test.
3. **Instructions**:
    a. Explain the purpose of the test.
    b. Demonstrate how to turn around the cones.
    c. Emphasise the need to walk at the pace dictated by the beeps (i.e. Not arriving before the beep and stopping to wait for the next beep before starting again. The participant should continuously be moving to achieve a steady state)
    d. Instruct that the test ends if they cannot keep up with the beeps or feel too breathless/tired to continue.
4. **Clothing**: Participant should wear comfortable clothing and appropriate footwear.
5. **Screening**: Carry out pre testing checklist
6. **Baseline measurements**: Record resting HR, BP and RPE

Test Procedure

1. Position the participant at one end of the 10-meter course.
2. Start the **ISWT audio**.
3. The participant begins walking when the first beep sounds and should reach the opposite cone by the next beep.
4. The speed increases every minute (12 levels total), dictated by increasingly frequent beeps.
5. The test continues until the participant:
    a. Cannot reach the cone before the beep (allowed 1 warning)
    b. Stops due to symptoms (e.g., breathlessness, fatigue, chest pain)
    c. Completes the test (level 12)
4. Record the total distance walked (number of shuttles × 10 meters). Equate to METs achieved and estimated maximum MET's.

INCREMENTAL SHUTTLE WALK TEST RECORD SHEET

<table>
<tr><td>Name and Date:</td><td rowspan="4">PREDICTED HRmax:

40% HRRmax:

50% HRRmax:

60% HRRmax:

70%HRRmax:

75% HRRmax:

Test end point:</td><td>Reason for stopping:</td></tr>
<tr><td>Pre-Exercise Heart Rate</td><td>Total Metres Scored:</td></tr>
<tr><td>Pre-Exercise BP</td><td>METs achieved</td></tr>
<tr><td>1-Minute Recovery Heart Rate</td><td>Estimated MET max</td></tr>
</table>

Level	**Speed (mph)**	**No.b shuttles in level**	Total ***no***	METS Cardiac Patients	**METs Non-cardiac**	**Score**	HR	RPE	Symptoms
1	1.12	3	*(3)*	2.1	2.1	□ □ □			
2	1.5	4	*(7)*	2.8	2.3	□ □ □ □			
3	1.88	5	*(12)*	3.5	2.6	□ □ □ □ □			
4	2.26	6	*(18)*	4.2	3.0	□ □ □ □ □ □			
5	2.64	7	*(25)*	4.9	3.3	□ □ □ □ □ □ □			
6	3.02	8	*(33)*	5.6	3.8	□ □ □ □ □ □ □ □			
7	3.40	9	*(42)*	6.3	4.3	□ □ □ □ □ □ □ □ □			
8	3.78	10	*(52)*	7.0	4.8	□ □ □ □ □ □ □ □ □ □			
9	4.16	11	*(63)*	7.7	5.3	□ □ □ □ □ □ □ □ □ □ □			
10	4.54	12	*(75)*	7.9*	7.9*	□ □ □ □ □ □ □ □ □ □ □ □			
11	4.92	13	*(88)*	8.5*	8.5*	□ □ □ □ □ □ □ □ □ □ □ □ □			
12	5.30	14	*(102)*	9.1*	9.1*	□ □ □ □ □ □ □ □ □ □ □ □ □			

* Based on running

FUNCTIONAL CAPACITY (INCREMENTAL SHUTTLE WALK TEST) RECORD SHEET

Name and Date:	**PREDICTED HRmax:** **40% HRRmax:**	**Reason for stopping:**
Pre-Exercise Heart Rate	**50% HRRmax:**	**Total Metres Scored:**
Pre-Exercise BP	**60% HRRmax:**	**METs achieved**
1-Minute Recovery Heart Rate	**70%HRRmax:** **75% HRRmax:** **Test end point:**	**Estimated MET max**

Level	**Speed (mph)**	**No. shuttles in level**	Total ***no***	METS Cardiac Patients	**METs Non-cardiac**	**Score**	HR	RPE	Symptoms
1	1.12	3	*(3)*	2.1	2.1	☐			
2	1.5	4	*(7)*	2.8	2.3	☐☐☐☐			
3	1.88	5	*(12)*	3.5	2.6	☐☐☐☐☐			
4	2.26	6	*(18)*	4.2	3.0	☐☐☐☐☐☐			
5	2.64	7	*(25)*	4.9	3.3	☐☐☐☐☐☐☐			
6	3.02	8	*(33)*	5.6	3.8	☐☐☐☐☐☐☐☐			
7	3.40	9	*(42)*	6.3	4.3	☐☐☐☐☐☐☐☐☐			
8	3.78	10	*(52)*	7.0	4.8	☐☐☐☐☐☐☐☐☐☐			
9	4.16	11	*(63)*	7.7	5.3	☐☐☐☐☐☐☐☐☐☐ ☐			
10	4.54	12	*(75)*	7.9*	7.9*	☐☐☐☐☐☐☐☐☐☐ ☐☐			
11	4.92	13	*(88)*	8.5*	8.5*	☐☐☐☐☐☐☐☐☐☐ ☐☐☐			
12	5.30	14	*(102)*	9.1*	9.1*	☐☐☐☐☐☐☐☐☐☐ ☐☐☐☐			

* Based on running

COMPETENCY ASSESSMENT FOR SHUTTLE WALK TEST

Competency √ = competent A = competent but action point recommended X = not yet competent		Comments
Was all the equipment set up correctly before the test?		
Was the pre-test checklist completed?		
Was an appropriate end point determined and calculated?		
Was the heart rate monitor fitted appropriately?		
Were Pre-exercise HR and BP collected appropriately?		
Was RPE familiarised correctly?		
Was there a pre-test explanation that included: • Purpose • Incremental, levels • Walking and bleeps etc • At the end of each level HR, RPE and walk a little faster • Normal S & S • Warnings? • Test end point		
Did the tester walk with the patient for the first level and then withdraw?		
Did the tester use standardised encouragement and discourage talking		

Did the tester warn the next level approaching (cue effectively) and provide appropriate instruction?		
Were HR and RPE collected at the correct times in the test?		
Was the patient well observed during the test?		
Was the tester appropriately positioned during the test?		
Did the tester use volume and pitch of voice effectively?		
Did the tester check regularly on the participant's ability to cope with test?		
Did the tester give clear and understandable verbal instruction?		
Was the test stopped appropriately?		
Did the patient perform a short cool down?		
Was recovery monitored appropriately?		
Was the test scored correctly and documented clearly?		

14.1.13. Appendix 13: Rate of Perceived exertion (RPE)

Borg's RPE Scale Instructions

While exercising we want you to rate your perception of exertion, i.e. how heavy and strenuous the exercise feels to you. The perception of exertion depends mainly on the strain and fatigue in your muscles and on your feeling of breathlessness or aches in the chest. Look at this rating scale: we want you to use this scale from 0 to 10 or 6 to 20, where:

0 or 6	means "no exertion at all"
1 or 9	corresponds to "very light" exercise For a normal healthy person it is like walking slowly at his or her own pace for some minutes
4 or 13	is "a little intense" or "somewhat hard exercise, but it still feels OK to continue
7 or 17	"Very intense" or "very hard" It is very strenuous. A healthy person can still go on but he or she has to push him or herself. It feels very heavy and the person is very tired.
9 or 19	On the scale this is an extremely strenuous exercise level. For most people this is the most strenuous exercise they have ever experienced
10 or 20	means 'maximal exertion'

Try to appraise your feeling of exertion as honestly as possible, without thinking of what the actual physical load is. Don't underestimate it either. It's your own feeling of effort and exertion that's important, not how it compares to others.

RATING OF PERCEIVED EXERTION (RPE)

BORG'S RPE 6 – 20 SCALE

6	No exertion at all
7	Extremely light
8	
9	Very light
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	Extremely hard
20	Maximal exertion

BORG'S CR–10 SCALE

0	Nothing at all (no "P")
0.3	
0.5	Extremely weak (just noticeable)
1	Very weak
1.5	
2	
2.5	
3	Moderate
4	
5	Strong (heavy)
6	
7	Very strong
8	
9	
10	Extremely strong
11	
ϟ	
•	Absolute maximum (highest possible)

The CR-10 scale was mainly designed for evaluating more specific individualised responses such as breathlessness, muscle soreness and pain.

14.1.14. Appendix 14: Heart Rate and determining target heart rates

Determining a Target Heart Rate

Step 1

Measure resting HR (patient should be at rest and quiet x 10 minutes)

Step 2

Determine a maximum HR from one of the methods below

a. From maximal exercise test (rare but the only way to truly determine)
b. If over 45 years use 206 – (0.7 x age); *subtract 30 bpm if *beta-blocked*
c. Under 45 years use 220 – age; *subtract 30 bpm if beta-blocked*
d. Ready reckoner Table 3 using Inbar calculation method (HRmax from age category)

Table 3

Age	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
HR max	192	189	185	182	178	175	171	168	164	161	157	154	150	147	143	140
B-blocked HR max	162	159	155	152	148	145	141	138	134	131	127	124	120	117	113	110

Step 3

Use the Karvonen formula to determine desired percentage of heart rate reserve (HRR)

HRR= Max HR – resting HR

%HRR= (HRR x % required) + resting HR

Tables 4a-k from BACPR reference tables document can be used for quick reference calculations

Each individual should have their THR calculated based on a thorough assessment and risk stratification. Training intensities of 40-80% of HRR are recommended as per the model of care. 40-70% is deemed moderate intensity and will be suitable for most individuals. 70-80% represents the lower range of vigorous intensity and may be appropriate for low risk individuals who are regularly accustomed to moderate to vigorous physical activity. Whilst a significantly deconditioned individual may require lower intensities (30-50%)

Examples of calculating THR

Example 1

60 year old with resting HR of 55bpm not on beta blockers (40-70% HRR)

1. Est HRmax (Inbar) = 206 - (0.7 x 60) = 164
2. HRR= 164- 55 = 109
3. Calculate required % HRR
    a. 40% HRR = 0.4 x 109 = 43.6
    b. 70% HRR = 0.7 x 109 = 76.3
4. Add resting HR
    a. 43.6 + 55 = 98.6
    b. 76.3 + 55 = 131.3

Training HR range of 40-70% HRR = 99-131 bpm

Example 2

75 year old with resting HR of 50bpm on beta blockers. 30-50% HRR- as very deconditioned

1. Est HRmax (Inbar) = 206 - (0.7 x 75) = 153.5 (-30 for beta blockers) = 123.5
2. HRR= 123.5- 50 = 73.5
3. Calculate required % HRR
    a. 30% HRR = 0.3 x 73.5 = 22
    b. 50% HRR = 0.5 x 73.5 = 36.75
4. Add resting HR
    a. 22 + 50 = 72
    b. 36.75 + 50 = 86.75

Training HR range of 30-50% HRR = 72-87 bpm

14.1.15. Appendix 15 Submaximal functional capacity test worked examples

Chester Step Test

Age: 60	Patient Consent: (Y)/N	Procedure explained: (Y)/N
Resting HR: 55	BP pre: 118/65	Beta Blockers: (Y)/N
Predicted HR max: 134 (206-0.7 age) (-30 if BB)	70% HRR max: 110 75% HRR max: 114	Step Height: 15 / 20 / 25 cm

Level	Mins	Step rate	HR	RPE	Symptoms/ comments	METs 15cm	METs 20cm	METs 25cm
1	1	15	79	9		3.0	3.6	4.2
	2		82	11				
2	3	20	87	11		4.0	4.8	5.5
	4		95	12				
3	5	25	107	13		5.0	5.5	6.9
	6		111	14				
4	7	30				6.0	7.2	8.3
	8							
5	9	35				7.0	7.8	9.1
	10							

Reason for stopping: (achieved end point HR, RPE 15, unable to maintain pace etc)
Patient request, RPE approaching 15

Recovery	HR	BP
1 minute	95	148/77
2 minutes	79	129/71
3 minutes	61	116/67

Prescription
THR: 87-118bpm / RPE 12-16
Bike: 50 Watts
T'mill: 3.6 kph
Rower: 3.40 500m split

Summary	
Completed stages	3
Total time completed	6 minutes
METs achieved	5.5
Estimated MET max	7.9
HR response (normal/abnormal)	Normal
BP response (normal/abnormal)	Normal

Submaximal Cycle Ergometry Test

Age: **63**	Patient Consent: Y/N	Procedure explained: Y/N
Resting HR: **55**	BP pre: **118/67**	Beta Blockers: Y/N
Predicted HR max: **132** (206-0.7 age)(-30 if BB)	70% HRR max: **109** 75% HRR max: **113**	Height: **165cm** Weight: **75kg**

WATT 25 / 30 increments	Time Mins	METs	HR	RPE	BP	Comment
30	1	**2.06**	**69**	**10**	**123/69**	
30	2	**2.06**	**75**	**11**	**132/70**	
60	3	**3.81**	**97**	**12**	141/71	
60	4	**3.81**	**99**	**13**	**142/75**	
90	5	**4.95**	**107**	**14**	**151/75**	
90	6	**4.95**	**113**	**15**	**158/79**	
	7					
	8					
	9					
	10					

Recovery	HR	BP
1 minute	**95**	**138/75**
2 minutes	**72**	**133/74**
3 minutes	**60**	**122/68**

Prescription *(titrate based on RPE)*
THR: **86-113bpm / RPE 12-15**
Bike: **50 Watts**
T'mill: **3.0 kph**
Rower: **3.40 500m split**

Summary	
Completed stages	3
Total time completed	6 minutes
METs achieved	~5 METs
Estimated MET max	6.7
HR response (normal/abnormal)	Normal
BP response (normal/abnormal)	

Incremental Shuttle Walk Test

Age: 74	Patient Consent: (Y)/N		Procedure explained: (Y)/N	Total metres: 440		Level completed: 7
Resting HR: 70	BP pre: 127/73		Beta Blockers: Y/(N)	Recovery	HR	BP
				1 min	109	152/82
Predicted HR max:154 (206-0.7 age)(-30 if BB)	70% HRR: 129 75% HRR: 133 80% HRR: 137		Prescription THR: 104-137bpm / RPE 12-16 Bike: 60 Watts T'mill: 4.0 kph Rower:3.25 500m split	2 min	85	146/79
				3 min	70	130/75

Level	Speed (mph)	# shuttles per level	Total # shuttles	METs Cardiac	METs non cardiac	Score /	HR	RPE	Comments/ symptoms
1	1.12	3	(3)	2.1	2.1	①②③	71	10	
2	1.5	4	(7)	2.8	2.3	①②③④	89	10	
3	1.88	5	(12)	3.5	2.6	①②③④⑤	93	11	
4	2.26	6	(18)	4.2	3.0	①②③④⑤⑥	109	11	
5	2.64	7	(25)	4.9	3.3	①②③④⑤⑥⑦	115	12	
6	3.02	8	(33)	5.6	3.8	①②③④⑤⑥⑦⑧	121	13	Missed line
7	3.4	9	(42)	6.3	4.3	①②③④⑤⑥⑦⑧⑨	131	14	
8	3.78	10	(52)	7.0	4.8	①②③④⑤⑥⑦⑧⑨⑩			Missed line
9	4.16	11	(63)	7.7	5.3	①②③④⑤⑥⑦⑧⑨⑩⑪			
10	4.54	12	(75)	7.9*	7.9*	①②③④⑤⑥⑦⑧⑨⑩⑪⑫			
11	4.92	13	(88)	8.5*	8.5*	①②③④⑤⑥⑦⑧⑨⑩⑪⑫⑬			
12	5.3	14	(102)	9.1*	9.1*	①②③④⑤⑥⑦⑧⑨⑩⑪⑫⑬⑭			

*based on jogging

6 Minute Walk Test

Age: 67	Patient Consent: (Y)/N	Procedure explained: (Y)/N
Resting HR: 65	BP pre: 127/73	Beta Blockers: Y/(N)
Predicted HR max: 159 (206-0.7 age)(-30 if BB)	70% HRR: 130 75% HRR: 136 80% HRR: 140	Length of shuttle: 30m

Distance of shuttle:	Number of shuttles	HR	RPE	Spo2	Comments (rest req'd?)
Minute 1	3	90	11	97	
Minute 2	2	102	12	96	
Minute 3	3	115	12	96	
Minute 4	3	116	12	95	
Minute 5	2	118	13	96	Rest x 10 secs
Minute 6	3	120	13	96	

Total distance (m)	480
Peak HR	120 (~60% HRR)
Peak RPE	13
Avg metres per minute	80
No. of rests	1
METs achieved	5.4
Estimated MET max	9.2

Recovery	HR	BP
1 minute	105	145/82
2 minutes	87	139/75
3 minutes	72	121/70

Prescription *(titrate based on RPE)*
THR: 103- 130bpm / RPE 12-16
Bike: 70 Watts
T'mill: 4.1 kph
Rower: 3.15 500m split

14.1.16. Appendix 16: MET calculations

Calculating estimated maximal METs from submaximal exercise testing requires interpretation using the BACPR reference tables, available here.

The METs achieved in any given submaximal test are used in conjunction with either associated RPE or % HRR achieved to determine the participants estimated maximal exercise capacity in terms of METs.

For example:

METs achieved on a submaximal functional capacity test are 6 with an RPE of 14 reached

Table 7

METs achieved ↓	11 RPE	11-12 RPE	12 RPE	12-13 RPE	13 RPE	13-14 RPE	14 RPE	14-15 RPE	15 RPE
3.0	7.5	6.7	6.0	5.5	5.0	4.6	4.3	4.0	3.8
3.5	8.8	7.8	7.0	6.4	5.8	5.4	5.0	4.7	4.4
4.0	10.0	8.9	8.0	7.3	6.7	6.2	5.7	5.3	5.0
4.5	11.3	10.0	9.0	8.2	7.5	6.9	6.4	6.0	5.6
5.0	12.5	11.1	10.0	9.1	8.3	7.7	7.1	6.7	6.3
5.5	13.8	12.2	11.0	10.0	9.2	8.5	7.9	7.3	6.9
6.0	15.0	13.3	12.0	10.9	10.0	9.2	8.6	8.0	7.5
6.5	16.3	14.4	13.0	11.8	10.8	10.0	9.3	8.7	8.1
7.0	17.5	15.6	14.0	12.7	11.7	10.8	10.0	9.3	8.8
7.5	18.8	16.7	15.0	13.6	12.5	11.5	10.7	10.0	9.4
8.0	20.0	17.8	16.0	14.5	13.3	12.3	11.4	10.7	10.0
8.5	21.3	18.9	17.0	15.5	14.2	13.1	12.1	11.3	10.6
9.0	22.5	20.0	18.0	16.4	15.0	13.8	12.9	12.0	11.3
9.5	23.8	21.1	19.0	17.3	15.8	14.6	13.6	12.7	11.9
10.0	25.0	22.2	20.0	18.2	16.7	15.4	14.3	13.3	12.5
10.5	26.3	23.3	21.0	19.1	17.5	16.2	15.0	14.0	13.1
11.0	27.5	24.4	22.0	20.0	18.3	16.9	15.7	14.7	13.8
11.5	28.8	25.6	23.0	20.9	19.2	17.7	16.4	15.3	14.4
12.0	30.0	26.7	24.0	21.8	20.0	18.5	17.1	16.0	15.0
12.5	31.3	27.8	25.0	22.7	20.8	19.2	17.9	16.7	15.6
13.0	32.5	28.9	26.0	23.6	21.7	20.0	18.6	17.3	16.3
13.5	33.8	30.0	27.0	24.5	22.5	20.8	19.3	18.0	16.9
14.0	35.0	31.1	28.0	25.5	23.3	21.5	20.0	18.7	17.5
14.5	36.3	32.2	29.0	26.4	24.2	22.3	20.7	19.3	18.1
15.0	37.5	33.3	30.0	27.3	25.0	23.1	21.4	20.0	18.8
15.5	38.8	34.4	31.0	28.2	25.8	23.8	22.1	20.7	19.4
16.0	40.0	35.6	32.0	29.1	26.7	24.6	22.9	21.3	20.0

This individuals estimated maximal exercise capacity in terms of METs is 8.6

MET's can then be used to set exercise prescription for the individual dependent on the chosen intensity range for that person. Using the example above, 40-70% would be activities ranging from 3.4 to 6 METs for this person.

This can be equated to rowing speed, bike watts and walking/running speed (BACPR tables 9 and 10) which can be useful if using this equipment in class or setting prescription for the individual to exercise independently in a gym setting.

MET tables for equating activities (like the one below) are useful in giving specific advice to participants about what activities they can carry out to achieve their exercise prescription.

Table 8:
Approximate energy requirements in METs for task of daily living / hobbies / sports
Adapted from Herrmann et al 2022

TASK	METS *(min)*	METS *(max)*	*Environmental effects*
Walking 2 mph	2	3	Possible
Dressing	2	3	Rarely
Bathing	2	3	Frequent
Washing Dishes	2	3	Rarely
Ironing	2	4	Rarely
Dusting	2	4	Rarely
Bed Making	2	6	Rarely
Walking 3 mph	3	3.5	Possible
Shower	3	4	Frequent
Sexual Intercourse	3	5	Rarely
Raking Leaves	3	5	Possible
Housework gen	3	4	Rarely
Cleaning Windows	3	4	Possible
Walking Upstairs	4	7	Rarely
Washing Car	6	7	Frequent
Sailing(small)	2	5	Frequent
Cycling 5 mph	2	3	Frequent
Croquet	2	3.5	Possible
Fishing (boat)	2	4	Frequent
Billiards	2	3	Rarely
Hand Drilling	2.7	4.6	Possible
Fly Fishing	3	4	Frequent
Cricket	3	7.5	Frequent
Ballroom Dancing	4	5	Rarely
Golf (carrying clubs)	4	5	Frequent
Swimming (slow)	4	5	Frequent
Tobogganing	4	8	Frequent
Figure Skating	4	10	Frequent
Badminton	4	9	Rarely
Roller Skating	5	11	Possible
Judo	6	12	Rarely
Swimming (Crawl)	9	10	Possible

A comprehensive resource for MET levels for all activities can be found in the 2024 compendium of physical activities here

14.1.17. Appendix 17: Risk stratification

Risk stratification utilises both exercise test and non-exercise test findings in order to stratify individuals as high, moderate or low risk of future cardiac events. The tool below should be utilised to stratify each participant's risk for cardiac events during exercise participation prior to CR commencement. This can help to identify relevant information for individual management and appropriate levels of supervision

BACPR Risk Stratification Tool

Criteria that increase risk when exercising	Y or N If all are N: = Low risk	If any Y but NO High risk apply: = Moderate	If any ONE applies tick Y against it: = High Risk
Reduced Left Ventricular Function/ Heart Failure:			
♥ EF <35% poor LVF (severely impaired)	N	N	**Y**
♥ EF 35-49% moderate LVF	N	Y	N
♥ Heart failure	N	N	**Y**
Ischaemia:			
♥ ongoing angina symptoms: light headedness, dyspnoea at low workload	N	**Angina at ≥ 7 METS**	**Angina at < 5 METS**
Ventricular Arrhythmias:			
♥ History of ventricular arrhythmias at rest or exercise	N	N	**Y**
♥ Implanted ICD	N	N	**Y**
♥ History of cardiac arrest	N	N	**Y**
Depression:			
♥ Clinically significant depression treated with medication	N	N	**Y**
Functional Capacity:			
♥ Maximal functional capacity <7METS Derived from a **MAXIMAL** test only	N	**<5METS**	**<3METS**
Risk Stratification	**Low**	**Moderate**	**High**

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Look at the columns in the Risk Stratification Tool.

- To identify **Low** Risk: all the criteria must be N.
- To identify **High Risk:** one Y in any of the criteria automatically classifies as high risk.
- **Moderate Risk**: If they are not high or low, then moderate risk applies, clarified by the criteria in orange boxes.

BACPR Tool based on AACVPR (2021) Stratification of risk for cardiac events during exercise participation.

14.1.18. Appendix 18: Normative grip strength data (Patterson Medical, 2025)

NORMATIVE GRIP STRENGTH DATA:

		Males		Females		Males		Females	
Age	Hand	Mean (lbs)	SD	Mean (lbs)	SD	Mean (kg)	SD	Mean (kg)	SD
6-7	R	32.5	4.8	28.6	4.4	14.7	2.2	13.0	2.0
	L	30.7	5.4	27.1	4.4	13.9	2.4	12.3	2.0
8-9	R	41.9	7.4	35.3	8.3	19.0	3.4	16.0	3.8
	L	39	9.3	33	6.9	17.7	4.2	15.0	3.1
10-11	R	53.9	9.7	49.7	8.1	24.4	4.4	22.5	3.7
	L	48.4	10.8	45.2	6.8	22.0	4.9	20.5	3.1
12-13	R	58.7	15.5	56.8	10.6	26.6	7.0	25.8	4.8
	L	55.4	16.9	50.9	11.9	25.1	7.7	23.1	5.4
14-15	R	77.3	15.4	58.1	12.3	35.1	7.0	26.4	5.6
	L	64.4	14.9	49.3	11.9	29.2	6.8	22.4	5.4
16-17	R	94	19.4	67.3	16.5	42.6	8.8	30.5	7.5
	L	78.5	19.1	56.9	14	35.6	8.7	25.8	6.4
18-19	R	108	24.6	71.6	12.3	49.0	11.2	32.5	5.6
	L	93	27.8	61.7	12.5	42.2	12.6	28.0	5.7
20-24	R	121	20.6	70.4	14.5	54.9	9.3	31.9	6.6
	L	104.5	21.8	61	13.1	47.4	9.9	27.7	5.9
25-29	R	120.8	23	74.5	13.9	54.8	10.4	33.8	6.3
	L	110.5	16.2	63.5	12.2	50.1	7.3	28.8	5.5
30-34	R	121.8	22.4	78.7	19.2	55.2	10.2	35.7	8.7
	L	110.4	21.7	68	17.7	50.1	9.8	30.8	8.0
35-39	R	119.7	24	74.1	10.8	54.3	10.9	33.6	4.9
	L	112.9	21.7	66.3	11.7	51.2	9.8	30.1	5.3
40-44	R	116.8	20.7	70.4	13.5	53.0	9.4	31.9	6.1
	L	112.8	18.7	62.3	13.8	51.2	8.5	28.3	6.3
45-49	R	109.9	23	62.2	15.1	49.8	10.4	28.2	6.8
	L	100.8	22.8	56	12.7	45.7	10.3	25.4	5.8
50-54	R	113.6	18.1	65.8	11.6	51.5	8.2	29.8	5.3
	L	101.9	17	57.3	10.7	46.2	7.7	26.0	4.9
55-59	R	101.1	26.7	57.3	12.5	45.9	12.1	26.0	5.7
	L	83.2	23.4	47.3	11.9	37.7	10.6	21.5	5.4
60-64	R	89.7	20.4	55.1	10.1	40.7	9.3	25.0	4.6
	L	76.8	20.3	45.7	10.1	34.8	9.2	20.7	4.6
65-69	R	91.1	20.6	49.6	9.7	41.3	9.3	22.5	4.4
	L	76.8	19.8	41	8.2	34.8	9.0	18.6	3.7
70-74	R	75.3	21.5	49.6	11.7	34.2	9.8	22.5	5.3
	L	64.8	18.1	41.5	10.2	29.4	8.2	18.8	4.6
75+	R	65.7	21.	42.6	11	29.8	9.5	19.3	5.0
	L	55	17	37.6	8.9	24.9	7.7	17.1	4.0

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14.1.19. Appendix 19: Inspiratory muscle testing & training (IMT)

IMT can be a useful adjunct within CR for those with evidence of inspiratory muscle weakness, and has been shown to improve exercise capacity and quality of life in this cohort. It is particularly useful for dyspnoea management in those with HF and/or may provide an initial alternative for those who are severely deconditioned.

Before commencing IMT, maximum inspiratory pressure (MIP) should be measured using an appropriately calibrated device by a professional trained in its use (alternatively can be done in PFT lab). Apply the following principles to training:

- Start at 30% of the MIP
- Alter intensity every 7-10 days up to a maximum of 60%
- Training should be 20-30 minutes per day, 3-5 times per week, for 8 weeks

*Ensure to educate on correct techniques throughout and encourage diaphragmatic breathing with minimal accessory muscle use. Educate on the importance of avoiding breath hold/valsalva.

14.1.20. Appendix 20: Guidance for individualised Dietetic assessment and nutritional interventions for specific cardiac rehabilitation population sub-groups

Adapted from Table 9 in the *HSE Model of Care for Integrated Cardiac Rehabilitation* (HSE, 2023a).

Patient sub groups	Special nutrition considerations	Aims of nutrition intervention
Chronic Heart Failure	• Abnormalities in body composition e.g. obesity, chronic disease related malnutrition and sarcopenia • Macronutrient and micronutrient deficiencies, for example anaemia. • Electrolyte imbalance (medication related, for example diuretics) • Gastrointestinal dysfunction impacting appetite, digestion and absorption of nutrients. • Fatigue and dyspnoea limiting functional ADL capacity	• Screen, treat and monitor malnutrition and sarcopenia as indicated • Manage Fluid Balance • Ensure adequate nutrition to meet macronutrient and micronutrient needs • Prevent, manage and treat malnutrition • Optimise cardiovascular health through counselling on cardio-protective dietary patterns • Support the minimisation of gastrointestinal side effects of symptoms and medications
Type 2 Diabetes Mellitus:	• Carbohydrate intake, distribution and quality, particularly in relation to insulin or glucose lowering medications. • Meal timing and eating pattern • Assess for restrictive eating behaviours, excessive exercise, and purging can lead to irregular and unpredictable blood glucose levels. • Chronic disease related malnutrition and sarcopenia	• Medical nutrition therapy to optimise glycaemic control, blood pressure, and cholesterol levels (goals differ for individuals based on age, duration of diabetes, health history, and other present health conditions. • Access to diabetes self-management education and support (DSMES) • Screen, treat and monitor chronic disease related malnutrition as appropriate

Chronic Kidney Disease (Kramer *et al*. 2018; National Kidney Foundation, 2025)	• Fluid and electrolyte distortion and abnormalities • Energy and protein adequacy • Chronic disease related malnutrition	• Stage based medical nutrition therapy interventions to slow/ preserve the progression of CKD. Management of reduction in intake of electrolytes (phosphate, potassium) as indicated. • Micronutrient status, risk of deficiency and need for supplementation • Fluid management • Screen, treat and monitor chronic disease related malnutrition as appropriate
Obesity (ASOI Breen *et al*., 2022; Wharton *et al*., 2022; Mozaffarian *et al*., 2025; Al-Najim *et al*., 2025)	• Consider root causes/drivers of obesity • Psychological wellbeing (internalised weight bias and stigma) • Relationship with food, eating behaviours and dieting history • Risk of vitamin and mineral deficiencies, related to restrictive dietary practices/dieting history • Obesity pharmacotherapy and nutrition counselling to minimise gastrointestinal side effects, optimise dietary intake, monitor for over-suppression of appetite, risks of undernutrition and impaired muscle function due to inadequate protein and energy intake	• Develop a personalised nutrition plan based on eating preferences, values, and psycho-social and financial abilities of the individual. • Support and promote a positive relationship with food and eating behaviours for overall health and wellbeing. • Promote a health gains approach to eating behaviours that support alignment with a cardio-protective dietary pattern rather than a sole focus calorie restriction for weight loss.

Sarcopenia, Malnutrition and frailty (Khor *et al*., 2022; Popescu *et al*., 2021)	• Oral health/dentition which can impact on chewing and limitations on range of food intake. • Bowel function/habit - constipation can lead to reduced appetite. • Risk of micronutrient deficiencies: ◦ B12 or folate deficiency risk in older adults due to diet, malabsorption (medication related (for example anticonvulsants and proton pump inhibitors (PPIs)) or chronic inflammation. • Vitamin D status review and supplementation • Assess mood (loss of appetite as a marker of depression) and cognition / function (inability to prepare or obtain adequate diet). • Limited mobility impacting appetite and gastrointestinal function, for example constipation • Assess for staging of sarcopenia • Polypharmacy and impact on appetite/ gastrointestinal function / oral intake	• 'Food first' approach to optimise protein and energy intake • Protein equally distributed across three main meals • Criteria for oral nutrition supplements (ONS) initiation • Identify, treat and monitor for any micronutrient deficiencies in conjunction with prescribing nurse/consultant. • First line nutrition advice for sarcopenia
Transient Ischaemic attack / Stroke	• Malnutrition and sarcopenia • Dysphagia and hydration, overall physical function (motor and cognitive) and presence of masticatory dysfunction • Greater risk for developing nutrition-related chronic disease, including type 2 diabetes and osteoporosis • Presence of anxiety, depression and impact on nutritional intake	• Screen, treat and monitor malnutrition and sarcopenia as indicated • Review indication for modified consistency diet and fluids / link with the speech and language therapist as appropriate • Dietary strategies and/or artificial nutrition support regimens to optimise nutritional intake as appropriate /indicated • Vitamin D status review and supplementation • Optimise alignment to cardio-protective dietary pattern

Cardiac surgery	• Risk of malnutrition and sarcopenia risk screening, diagnosis, treatment, and monitoring (pre, peri and post-operatively) • Wound healing (up to 6 months post-op) • Heart failure sodium and fluid management post-op • Drug-nutrient interactions; anticoagulation and vitamin K rich food and other drugs, for example warfarin • Risk of micronutrient deficiencies monitor micronutrient status as appropriate (iron, folate, vitamin B12) and need for supplementation • On recovery, focus on long-term secondary prevention	• Screen, treat and monitor malnutrition and sarcopenia as indicated • Optimise wound healing via adequate energy, protein and micronutrient intake • Drug-nutrient interactions advice if indicated • Post recovery phase - optimise cardiovascular health through counselling on cardio-protective dietary patterns

14.1.21. Appendix 21: waist circumference cut-off points (ASOI, 2022)

Table 3: **Proposed Waist Circumference Cut-Off Points (cm) to Define Increased Abdominal Adiposity by Predominant Ethnicity**

Predominant ethnicity	Increased abdominal adiposity/ cardiovascular risk		Significant abdominal adiposity/ greater cardiovascular risk	
	Women	Men	Women	Men
Caucasian Europid/United States/Mid-East Mediterranean[79]	80	94	88	102
Latino Central/South American[80]	83	88	90	94
Sub-Saharan African[79]	80	94		
African American	90	80	99	95
African	71.5	76.5	81.5	80.5
Asian	80	85		
Chinese[81]	81	83		
Korean[82]	75	80	85	90

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14.1.22. Appendix 22: Assessment of Clinical Space Checklist

Table 1: **Assessment of Clinical Space Checklist** (adapted from[26], ASOI, 2022)

Type of space	Considerations
Waiting Areas	
Reading material, health promotion posters and artwork	✓ Avoid images and content that could stigmatise, exclude and/or discriminate against individuals with obesity ✓ Display posters signposting advocacy groups e.g., Irish Coalition for People Living with Obesity
Seating (chairs, stools and sofas)	✓ Adequate weight capacity (minimum 136 kg) ✓ Chairs with and without armrests ✓ 15cm–20cm spacing between chairs ✓ (Arm) chairs width greater than 51 cm ✓ Chair seat depth greater than 46 cm ✓ Firm cushions (with pressure relief integrated preferable) ✓ Seat height minimum 41cm ✓ Mix of chairs so that there is not a perceived section for people with obesity that is separate from other seating ✓ Availability of fresh water and adequate ventilation to help with recovery from physical activity in accessing the clinic
Washroom	
Toilet	✓ Minimum weight capacity of 136kg ✓ Floor mounted ✓ Ensure enough room surrounding toilet to allow for sitting or straddling of toilet ✓ Professionally installed, wall-mounted grab bars nearby to support getting on and off the toilet ✓ Split (U-shaped) toilet seat ✓ Consider placement of toilet paper roll within reach (i.e., not behind toilet)
Specimen container	✓ Urine specimen container with option to use wide-neck sterile container or sterile bowl
Examination rooms	
Weigh scale	✓ Minimum weight capacity of 227 kg ✓ Wide standing surface ✓ Supportive handlebars on scale or professionally installed wall-mounted grab bars close by ✓ Built-in ramp for wheelchair or individuals with mobility difficulties ✓ Seating and long-handled shoehorn nearby ✓ Located in an area that provides privacy
Exam table	✓ Minimum weight capacity 227kg ✓ Firm cushioned surface ✓ Wide enough to support various body shapes ✓ Consider having split legs to accommodate electronic supported access to the lower limbs for lymphoedema and pressure ulcers assessments and treatments ✓ Positioned close to structures, such as wall-mounted grab bars ✓ Electric bed with adjustable settings, including back rest ✓ Step stool (see below)
Step stool	✓ Minimum weight capacity 227kg ✓ Wide surface ✓ Equipped with supportive handlebar(s)
Clinic equipment	
Gowns	✓ Have a range of large sizes available.
Blood pressure cuffs	✓ Large and extra-large cuffs readily available
Tape measure	✓ Appropriate length for waist and hip circumference measurement ✓ Available up to 304cm long
Needles	✓ 5cm safety needles available for intra-muscular injection
Speculum	✓ Large or extra-large speculum ✓ Available with 17.8cm blade
Phlebotomy	✓ Longer tourniquet up to 81cm long
Onward referral pathways	✓ Additional considerations for in-patient hospital stays such as commodes, hospital beds, hoists, seating, shower chairs, mobility aids, TEDS, SCDs should also be assessed and provided for patients as indicated

ASOI Adult Obesity Clinical Practice Guideline adaptation (ASOI version 1, 2022): Enabling Participation in Activities of Daily Living 6

14.1.23. Appendix 23: Cardio-protective diet components and targets

Cardio-protective diet components and targets				
Nutrient / food group	**Target / Clinical Guideline**	**Mechanism of impact on Cardiovascular health**	**Dietary sources**	**Behavioural goals/targets**
Saturated Fat	<10% of total energy intake for primary prevention. <7% of total energy intake in presence of dyslipidaemia.	Saturated fat intake raises LDL-C concentration and negatively increases coagulation, inflammation, adiposity and insulin resistance.	Red meats Processed meats for example salami, sausages Fat spreads and oils e.g. lard, ghee, suet, butter, coconut oil Biscuits, cakes, confectionary	Reduce saturated fat through replacement with polyunsaturated fats and mono-unsaturated fats e.g. vegetable, olive and rapeseed oils and carbohydrates from wholegrains Use olive or rapeseed/vegetable oil in cooking instead of lard, ghee, suet, butter, coconut oil. Reduce added butter and consider choosing olive or vegetable oil-based spreads over butter Choose lean meat and low-fat dairy Reduce or substitute discretionary snack foods like confectionary, cakes and biscuits for chopped or tinned fruit, handful of nuts or seeds, low fat low sugar yogurt. When eating meats, trim visible fat, choose lower % fat mince. To reduce red processed meat intake, choose smaller portions, eat less often or swap them for leaner, less processed alternatives (FSAI, 2019; SACN, 2019)

Trans Fat (TFA)	Avoid dietary trans fats <1% of total energy intake as low as is possible (FSAI, 2019; Visseren *et al.,* 2021; Mach *et al.,* 2020)	Dietary trans fatty acids increase LDL-C and decrease HDL-C levels. TFAs are formed when liquid oils (e.g. sunflower oil) are made into solid fats like shortening and hard margarines through a process known as hydrogenation. TFAs are also formed during heating and frying oils at high temperatures.	Found in fried foods and processed baked goods containing partially hydrogenated oils. Small amounts of TFA naturally occur in meat and dairy products,	Read food labels and avoid foods containing hydrogenated oils. Choose low fat dairy and lean cuts of meat. Limit intake of deep fried takeaway foods and processed baked goods e.g. biscuits, pies, cakes/ highly processed baked goods

Dietary Cholesterol	< 300mg / day – limited via total saturated fat intake reduction (Mach *et al.*, 2020)	Dietary cholesterol modestly increases total and LDL-cholesterol (Carson *et al.,* 2020).	Found in foods from animals. Foods that contain cholesterol and are high in saturated fat: Full fat dairy foods such as milk, cheese, yogurt and cream. Animal fats, such as butter, ghee, margarines and spreads made from animal fats, lard, suet and dripping. Fatty meat and processed meat products such as sausages. Foods that contain cholesterol but are low in saturated fat: Lean meat, especially offal, such as liver, kidney, sweetbreads, heart and tripe. Prawns, crab, lobster, squid, octopus and cuttlefish. Eggs (the cholesterol is in the yolk). (Heart UK, 2024)	While egg yolks are high in dietary cholesterol, they are also an important source of high quality protein and micronutrients e.g. Vitamin B12, selenium. Pay special attention to the foods eaten alongside eggs such as butter, salt, and/or processed meats, like bacon or sausages which are sources of saturated fat and salt/ sodium. A moderate egg consumption is recommended (~7 per week) Patients with dyslipidemia, particularly those with diabetes mellitus or at risk for heart failure, should be cautious in consuming foods rich in cholesterol. For older normocholesterolemic patients, given the nutritional benefits and convenience of eggs, consumption of up to 2 eggs per day is acceptable within the context of a heart-healthy dietary pattern (Carson *et al.,* 2020).

Polyunsaturated Fats (PUFAs), including omega-3 fatty acids (EPA and DHA)	Adequate Intake (AI) for alpha-linolenic acid (ALA) of 0.5 E%. AI for Linoleic acid (LA) 4 E%. Fat intake should predominantly come from sources of monounsaturated fatty acids, including both n-6 and n-3PUFAs. Not enough data are available to make a recommendation regarding the optimal n-3:n-6 fatty acid ratio (Mach *et al*., 2020) AI for general population/ primary prevention of CVD 250 mg for eicosapentaenoic acid (EPA) plus docosahexaenoic acid (DHA) for adults (EFSA, 2010). Dietary recommendations for EPA and DHA based on cardiovascular risk for European adults are between 250 and 500 mg/day (EFSA, 2012).	Omega 3 fatty acid consumption is associated with lower risk of CV death and stroke, but has no major effects on plasma lipoprotein metabolism. EPA and DHA have a role in: • lowering triglycerides (a fat that enters your blood after a meal) • improving circulation • preventing blood clots • Lowering blood pressure • keeping the rhythm of the heart steady.	ALA: Nuts and seeds, and their oils e.g. walnuts, flaxseeds and rapeseed oil. EPA and DHA: Oily fish: mackerel, kippers, pilchards, trout, sprats, salmon, herring, sardines	Add nuts and seeds to yoghurts, cereals, smoothies and soups. Consume a handful of raw nuts a day, or ≥3 servings/week, as a healthy replacement for processed snacks for example, instead of biscuits, crisps etc. Include oily fish at least 1 per week.

Mono-unsaturated Fats	No Dietary Reference Value (DRV) set by EFSA (2010) Fat intake should predominantly come from sources of monounsaturated fatty acids, including both n-6 and n-3PUFAs. (Mach *et al.*, 2020)	Modest total and LDL cholesterol-lowering effect, increases HDL cholesterol concentrations and decreases the blood total to HDL cholesterol ratio. Reduction in fasting blood triglycerides.	Found in both plant and animal-derived foods. Olive, high oleic acid sunflower and rapeseed oils. Seeds and nuts. Fish.	Use monounsaturated fat rich oils for cooking e.g. rapeseed and olive oils, Include unsalted nuts as a snack for example tree nuts like almonds and walnuts. 30g = 1 portion.
Protein	0.83 g per kg of body weight per day. (EFSA, 2012). Older adults at risk of frailty, sarcopenia and undernutrition: minimum of 1.0–1.2 g/kg body weight of protein per day to preserve muscle mass (FSAI, 2021).	Protein is essential for the growth, maintenance and repair of all body cells. Not all protein-rich foods for cardiovascular health are the same. Some contain higher amounts of saturated fat and salt.	Found in fish, poultry, beans, peas, pulses, eggs, nuts, tofu. Lean red meat is a rich source of iron. Recommended intake: maximum of 350 - 500 g a week Processed meat should be minimised as much as possible (bacon ham, sausage, salamis/luncheon meats (Visseren et al., 2021). Include fish at least x 2-3/ week, 1 of which to be oily fish.	• Try substituting ham or other processed red meat for tinned/fresh fish, unprocessed meats as part of meal. • Substitute half the meat portion of a main meal with plant based protein sources e.g. add kidney beans, chickpeas to stews, curries, salads. • To make poultry a low fat choice remove the skin. • Substitute meat for vegetarian protein sources 1-2 days per week. • Unsalted nuts (30g serving) are a great high-fibre, high-protein snack.

Dairy	3 servings per day (FSAI, 2019)	Dairy foods provide riboflavin (vitamin B2) and calcium which help blood pressure control. Dairy foods are also a source of protein. Low-fat dairy foods provide the same amount of calcium and other nutrients with less saturated fat.	Dairy foods include; milk, yogurts and cheese. Dairy is a source of saturated fat.	• Choose low-fat dairy, include milk and yogurt more often and enjoy cheese occasionally. • Higher fat dairy products can be replaced with lower fat alternatives, e.g. replace full fat with low fat milk, lower fat cheeses, low fat yogurt or kefir. • Limit intake of very high fat dairy products for example cream. • Natural low fat yogurt with chopped fruit is a healthy snack.
Fruit and Vegetables	Fruit: ≥200 g (≥ 2–3 servings) per day Vegetables: ≥200 g (≥ 2–3 servings) per day	Protect against atherosclerosis and cardiovascular disease through several mechanisms via the actions of the dietary fibre, polyphenols, vitamins, minerals, and their protective effects including decrease in oxidative stress and-inflammation, vaso-dilation properties and improved endothelial function.	Variety of different colour fruits, vegetables and salad, for a variety of vitamins and minerals.	• Aim for a minimum of 5 servings of fruit and vegetables per day. See "Healthy eating, food safety and food legislation A guide supporting the Healthy Ireland Food Pyramid" (FSAI, 2019) for further information on serving recommendations. • Base meals on vegetables, salad and fruit. Add salad vegetables to sandwiches. • Choose fruit and raw vegetables as healthy snacks.

Carbohydrate	45 - 55% of total energy, mainly from high fibre/ wholegrain sources.	Neutral effect on LDL-C, although excessive consumption can have negative effects on plasma TGs and HDL-C levels. The detrimental effects of a high-carbohydrate diet on TGs occur mainly when refined carbohydrate-rich foods are consumed, while they are much less prominent if the diet is based largely on fibre-rich, low-glycaemic index foods. This applies particularly to people with DM or MetS. (Mach *et al.* 2020)	Starchy foods are the main source of carbohydrate e.g. wholegrain breakfast cereal, pasta, rice, potatoes, sweet potatoes, yams, breads, naan bread, crackers, grains like couscous and bulgur wheat	• Choose wholegrain/wholemeal rice and pasta instead of white/refined versions. • Leave potato skins on where possible, to keep more of the fibre and vitamins. For example, eat the skin when you have boiled or baked potatoes. • Include 3-7 servings per day, depending on age, gender and activity level. See "Healthy eating, food safety and food legislation A guide supporting the Healthy Ireland Food Pyramid" (FSAI, 2019) for further information on serving recommendations.

Added sugars (Mono- and disaccharides)	Added sugar should be < 5% and not exceed 10% of total energy (in addition to the amount present in natural foods such as fruits and dairy products). Sugar sweetened beverages e.g. cola should be discouraged	High intakes of added sugars, particularly from sugar sweetened beverages are linked with raising triglycerides levels, lowering of HDL levels and increased risk of metabolic syndrome and T2DM (Johnson *et al.,* 2009; SACN, 2015). "Added sugars are defined as mono- and disaccharides added to foods as ingredients during processing or preparation at home, and sugars eaten separately or added to foods at the table" (EFSA, 2022).	Sucrose is found in table sugar, fruit juices, honey and maple syrup Many processed foods contain added sucrose for sweetness and texture for example confectionary, some breakfast cereals and yogurts Fructose is a monosaccharide that naturally exists in fruits and some vegetables in small amounts and is absorbed slowly. However, when it is added as part of manufacturing of processed foods it can lead to excess intakes.	• Avoid added sugar to drinks e.g. tea • Choose tins of fruit in juice rather than syrup. • Choose unsweetened wholegrain breakfast cereals that are not frosted or coated with chocolate or honey.

Fibre	> 25g-45g per day Soluble fibre ≥ 7-13g per day (Mach *et al.,* 2020; Visseren *et al.,* 2021).	It can help lower cholesterol and blood glucose levels and may also aid appetite regulation and weight management by promoting feelings of satiety /fullness. Adequate fibre is also important for bowel health.	Dietary fibre is the part of plants that is eaten but which doesn't get digested in the small intestine. Instead, it is completely or partially broken down (fermented) by bacteria in the large intestine. Soluble fibre is the soft, sticky kind of fibre including pectins and beta glucans and is found in foods like fruit (citrus fruits, banana, apple), porridge oats, barley, peas, beans. Insoluble fibre including cellulose is found in wheat bran and nuts.	Choose a higher-fibre breakfast cereal e.g. wheat biscuits or Shredded wheat, or porridge. Add pulses like beans, lentils or chickpeas to stews, curries and salads. Include plenty of vegetables with meals, Increase fibre at lunch: A baked jacket potato with the skin on (4.7g) with around half a can (about a 200g portion) of reduced-sugar and reduced-salt baked beans in tomato sauce (9.8g) followed by an apple (1.2g) will give you around 15.7g of fibre. (BDA, 2021; Safefood, 2025). Check food labels, high fibre foods contain 6g or more of fibre per 100g.
Alcohol	See "Alcohol" section	Alcohol stimulates the nervous system, raising heart rate and narrowing blood vessels, causing a short-term increase in blood pressure. Regular excessive alcohol disrupts brain receptors that regulate blood pressure, leading to long-term high blood pressure.		• Choose smaller sizes e.g. bottled beer instead of pints, or a small glass of wine instead of a large one. • Swapping strong beers or wines for ones with a lower strength (ABV in %). • Alternate alcoholic drinks with water or other non-alcoholic low/no sugar drinks. • See HSE Living Well Alcohol page for more information.

Caffeine	Discourage excessive consumption (NICE, 2019) Up to 400 mg of caffeine a day is safe for most adults. Single doses of caffeine of up to 200 mg also do not raise any safety concerns. (EFSA, 2015)	Caffeine is a stimulant and can increase in blood pressure. Moderate coffee (caffeinated and/ or decaffeinated) consumption (2–3 cups/ day)—was associated with significant reductions in incident CVD and mortality) (Chieng *et al.,* 2022) Energy drinks can contain higher single doses of caffeine. Excessive consumption in a short period of time has been associated with negative CVD related effects e.g. arrhythmias (EFSA, 2015; Wassef *et al.,* 2017).	Caffeine is present in coffee and coffee-flavoured foods, tea e.g. green and black teas (except rooibos and herbal teas), chocolate and chocolate-flavoured foods and beverages. Caffeine is also added to some beverages (e.g. colas and energy drinks), supplements (e.g. sport and weight loss supplements), and medicines.	If reduction in caffeine is recommended: • Start by drinking one fewer, or a smaller cup of coffee (or equivalent) each day. • Switch to decaf during one or more of your daily coffee breaks. • Create a “deadline” to stop consuming caffeine late in the day. • Note that an abrupt decrease in caffeine may cause withdrawal symptoms including headaches, fatigue, irritability, and difficulty focusing. These symptoms are usually mild and resolve after a few days.

Sodium /Salt	< 5g per day of salt (McEvoy *et al.,* 2024) General population < 6 g per day (FSAI, 2019)	Salt acts like a sponge in the body, soaking up liquid and retaining fluid. When you eat too much salt, it pulls water into your blood vessels, increasing the total amount of blood volume and increasing your blood pressure (Irish Heart, 2020).	Most of the salt we eat is already added to the foods we buy. Some foods have salt in them naturally and others have salt added during manufacturing. Top sources: • Processed meat and fish such as ham, sausages, salami, smoked salmon, bacon, lunch meats • Breads and wraps • Soups and sauces such as soy sauce, ketchup, packet soups, stock cubes, ready-made sauces or marinades • Savoury snacks e.g. crisps, salted popcorn, crackers and nuts • Sweet snacks such as biscuits, cakes, pastries, some breakfast cereals.	• Avoid adding salt when you are cooking or at the table. • Gradually reduce your salt intake to let your palette adjust • Read food labels (0.3g per 100g and below is considered a low salt food) • Use herbs and spices for flavour

14.1.24. Appendix 24: Mediterranean diet score (MDS)

Name _____ DOB _____ Date_____

Visit: Initial assessment ☐ End of Programme assessment ☐

Note: If you are unsure how to complete the questionnaire or are unsure how to answer any question, you can discuss this at your appointment.

Questions	Self-reported	Criteria for 1 point	BL Point:	EOP Point:
1. Do you use olive oil or rapeseed oil as your main cooking fat?		Yes		
2. Do you use olive or rapeseed oil-based spreads (e.g. Golden olive, Olivio, Bertolli)?		Yes		
3. How much olive/ rapeseed oil do you consume in a given day? Including oil used for frying, salads, out-of-house meals etc (in tablespoons) • How much olive or rapeseed oil-based spread do you consume in a given day? (in teaspoons)		≥4 tbsp oil / day **and/or** 3 tsp spread/ day		
4. How many portions of fruit (including natural fruit juices) do you consume per day? (1 portion = 1 apple/banana (80g), small glass juice (150ml)		≥2 portions/ day		
5. How many vegetable servings do you consume per day? Including raw/ cooked vegetables, salad but not including potatoes (1 serving: 3 tablespoons/80g)		≥3 portions/ day		
6. How many servings of legumes (peas, beans and lentils including kidney beans, baked beans, chickpeas, red lentils etc) do you consume per week? (1 serving :3 tablespoons/ 80g)		≥3 servings/ week		
7. How many servings of red meat including beef, pork, lamb and minced beef do you consume per week? (1 serving: medium portion/ 100–150 g)		≤2 servings / week		
8. How many servings of processed meat including ham, bacon, sausages, meat pies and other meat products etc.) do you consume per week? (1 serving: medium portion/ 100–150 g)		≤1 serving / week		
9. How many servings of chicken/ turkey do you consume per week? (1 serving: medium portion/ 100-150g)		2 servings / week		

10. How many servings of fish (tuna, cod, haddock, salmon, mackerel, herring, and sardines etc, including tinned varieties, excluding crumbed or battered fish) or shellfish do you consume per week? (1 serving: 1 fillet/small fish or 140g)		≥3 servings / week		
11. Do you preferentially consume wholegrain bread and/ or cereal and/ or rice and/ or pasta instead of non-wholegrain (white) varieties?		Yes		
12. How many servings of natural nuts do you consume per week? (1 serving: 1 small handful/ 30 g)		≥3 servings / week		
13. How many times per week do you consume sweet foods (including biscuits, buns, pastries, chocolate, sweets, sweet or carbonated beverages or desserts)?		≤3 times/ week		
14. How often would you consume up to 3 small glasses of wine or equivalent other alcoholic beverages per week? (1 small glass:125ml)		1-3 glasses or equivalent ≥ 3 days/ week		
Total office use only				

Instructions for completing the 14 Point Mediterranean diet score (MDS)

For each question, apply 1 point for a 'Yes' answer and '0' for a 'No' answer. The total is then calculated and the level of alignment with a cardio-protective eating pattern can be assessed as per table 14 below.

Discuss with the patient the positive nutrition behaviours related to the yes answers and ask them to reflect on the "No" answers and pick one or two areas they think are a priority for them to work on to improve their score by 2 points. Inform them of the benefits of a 2 point increase.

Alcohol scoring: Apply 1 point if up to 1-3 units of alcohol are consumed ≥ 3 times over a week **not exceeding 100g of alcohol per week** as per the 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice and having 2 to 3 alcohol free days per week. Note, a binge drinking episode is drinking 6 standard drinks on any 1 occasion and a 0 score should be applied if this is reported.

Table 14 Mediterranean diet score result interpretation

Score	Level of alignment to cardio-protective eating pattern
≤5	Weak
6–9	Moderate to fair
≥10	Good or very good

Mediterranean Diet score tool with suggestions for improving alignment with cardio-protective dietary pattern (adapted from 'Table 8 Healthy diet characteristics' in section '4.3.2. Nutrition and alcohol' from '2021 ESC Guidelines on cardiovascular disease prevention in clinical practice' (Visseren *et al*., 2021)

Questions	Criteria for 1 point	Score applied	Suggestions to improve alignment with cardio-protective diet
1. **Do you use olive oil or rapeseed oil as your main cooking fat?**	**Yes**		Choose unsaturated Fats Olive and rapeseed oil are high in monounsaturated fat and a healthy choice for cooking and preparing foods
2. **Do you use olive or rapeseed oil-based spreads (e.g. Golden olive, Olivio, Bertolli)?**	**Yes**		Swap from butter to olive or rapeseed oil-based spreads
3. **How much olive/ rapeseed oil do you consume in a given day? Including oil used for frying, salads, out-of-house meals etc (in tablespoons)** How much olive or rapeseed oil-based spread do you consume in a given day? (in teaspoons)	**≥4 tbsp oil / day** **and/or** **3 tsp spread/ day**		Aim for 4 tablespoons and/or 3tsp olive or rapeseed oil and spreads per day Emphasis is on lowering overall saturated fat and substituting with unsaturated fats when adding fats or oils to foods. For example: • Using olive oil–based spreads instead of butter on bread • Dressing salads or cooked vegetables with oil instead of creamy dressings or added butter The message is to replace saturated fats with healthier ones, not adding extra fat overall.
4. **How many portions of fruit (including natural fruit juices) do you consume per day? (1 portion = 1 apple/banana (80g), small glass juice (150ml)**	**≥2 portions/ day**		**Aim for a** variety of fruits every day, this provides vitamins, minerals, phytochemicals and fibre and offers protection for heart disease and cancer

5. How many vegetable servings do you consume per day? Including raw/ cooked vegetables, salad but not including potatoes (1 serving: 3 tablespoons/80g)	**≥3 portions/ day**		**Aim for a** variety of vegetables every day, this provides vitamins, minerals, phytochemicals and fibre and offers protection for heart disease and cancer
6. How many servings of legumes (peas, beans and lentils including kidney beans, baked beans, chickpeas, red lentils etc) do you consume per week? (1 serving :3 tablespoons/ 80g)	**≥3 servings/ week**		Legumes are inexpensive, filling and low fat source of protein. They can be used as a substitute for meat to help lower saturated fat and add fibre or added to meals to stretch meat further. Examples: Beans on wholegrain toast with olive oil-based spread Add chickpeas to stews, lentils to bolognaise, and kidney beans to chilli.
7. How many servings of red meat including beef, pork, lamb and minced beef do you consume per week? (1 serving: medium portion/ 100–150 g)			Substitute servings of red meat for fish, chicken, turkey or vegetarian protein sources. If having more than 150g at a single sitting, reduce to 100-150g
8. How many servings of processed meat including ham, bacon, sausages, meat pies and other meat products etc.) do you consume per week? (1 serving: medium portion/ 100–150 g)	**≤1 serving / week**		Instead of ham as a sandwich filling try chicken, turkey, or tinned fish. If having a cooked breakfast, substitute the rashers and sausages for poached eggs and baked beans.

9. How many servings of chicken/ turkey do you consume per week? (1 serving: medium portion/ 100-150g)	**2 servings / week**		Choose lean proteins with little visible fat or skin. Instead of red or processed meats choose lean chicken or turkey in stews and curries.
10. How many servings of fish (tuna, cod, haddock, salmon, mackerel, herring, and sardines etc, including tinned varieties, excluding crumbed or battered fish) or shellfish do you consume per week? (1 serving: 1 fillet/small fish or 140g)	**≥3 servings / week**		Eat more oily and white fish - aiming for at least 1 portion of oily fish per week. Tinned and frozen fish are good options Choose lower-fat cooking methods for example baking, and opt for uncoated fish.
11. Do you preferentially consume wholegrain bread and/ or cereal and/ or rice and/ or pasta instead of non-wholegrain (white) varieties?	**Yes**		Choose wholegrain/wholemeal bread, rice, pasta and cereals instead of white/refined versions.
12. How many servings of natural nuts do you consume per week? (1 serving: 1 small handful/ 30g)	**≥3 servings / week**		Include at least 3 x 30g servings of unsalted nuts per week Substitute biscuits or crips for a 30g handful of unsalted nuts.
13. How many times per week do you consume sweet foods (including biscuits, buns, pastries, chocolate, sweets, sweet or carbonated beverages or desserts)?	**≤3 times/ week**		Reduce intake gradually and replace with lower sugar, less processed nutritious snacks such as fruit, vegetable sticks, yoghurt or unsalted nuts or seeds
14. How often would you consume up to 3 small glasses of wine or equivalent other alcoholic beverages per week? (1 small glass:125ml)	**1-3 glasses or equivalent ≥ 3 days/ week**		Refer to AUDIT- C result to guide advice.

14.1.25. Appendix 25: Alcohol Use Disorders Identification Test (Audit Tool)

AUDIT Screening Tool

The following questions are validated as screening tools for alcohol use

AUDIT- C Questions	Scoring system					Your score
	0	1	2	3	4	
How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times per month	2-3 times per week	4+ times per week	
How many units of alcohol do you drink on a typical day when you are drinking?	1 -2	3-4	5-6	7-9	10+	
How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
					TOTAL :	

A score of **less than 5** indicates *lower risk drinking* (see overleaf)

Scores of 5+ requires the following 7 questions to be completed:

AUDIT Questions (after completing 3 AUDIT-C questions above)	Scoring system					Your score
	0	1	2	3	4	
How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
How often during the last year have you failed to do what was normally expected from you because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
How often during the last year have you needed an alcoholic drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
How often during the last year have you been unable to remember what happened the night before because you had been drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
Have you or somebody else been injured as a result of your drinking?	No		Yes, but not in the last year		Yes, during the last year	
Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested that you cut down?	No		Yes, but not in the last year		Yes, during the last year	
					TOTAL	

SCORING: ADD the 2 scores together to identify necessary action

AUDIT C_____+ AUDIT_____=

14.1.26. Appendix 26: Information on dosing and monitoring of cardioprotective medications

Table 1. Practical guidance on the use of cardio protective medications in heart failure (Ponikowski *et al.*, 2016).

Table 7.2 Evidence-based doses of disease-modifying drugs in key randomized trials in heart failure with reduced ejection fraction (or after myocardial infarction)

	Starting dose (mg)	Target dose (mg)
ACE-I		
Captopril[a]	6.25 t.i.d.	50 t.i.d.
Enalapril	2.5 b.i.d.	10–20 b.i.d.
Lisinopril[a]	2.5–5.0 o.d.	20–35 o.d.
Ramipril	2.5 o.d.	10 o.d.
Trandolapril[a]	0.5 o.d.	4 o.d.
Beta-blockers		
Bisoprolol	1.25 o.d.	10 o.d.
Carvedilol	3.125 b.i.d.	25 b.i.d.[d]
Metoprolol succinate (CR/XL)	12.5–25 o.d.	200 o.d.
Nebivolol[c]	1.25 o.d.	10 o.d.
ARBs		
Candesartan	4–8 o.d.	32 o.d.
Valsartan	40 b.i.d.	160 b.i.d.
Losartan[b,c]	50 o.d.	150 o.d.
MRAs		
Eplerenone	25 o.d.	50 o.d.
Spironolactone	25 o.d.	50 o.d.
ARNI		
Sacubitril/valsartan	49/51 b.i.d.	97/103 b.i.d.
If-channel blocker		
Ivabradine	5 b.i.d.	7.5 b.i.d.

ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; ARNI = angiotensin receptor neprilysin inhibitor; b.i.d. = bis in die (twice daily); MRA = mineralocorticoid receptor antagonist; o.d. = omne in die (once daily); t.i.d. = ter in die (three times a day).

[a]Indicates an ACE-I where the dosing target is derived from post-myocardial infarction trials.

[b]Indicates drugs where a higher dose has been shown to reduce morbidity/mortality compared with a lower dose of the same drug, but there is no substantive randomized, placebo-controlled trial and the optimum dose is uncertain.

[c]Indicates a treatment not shown to reduce cardiovascular or all-cause mortality in patients with heart failure (or shown to be non-inferior to a treatment that does).

[d]A maximum dose of 50 mg twice daily can be administered to patients weighing over 85 kg.

Table 2: Practical guidance on the use of angiotensin-converting enzyme inhibitors (or angiotensin II receptor blockers) in patients with heart failure with reduced ejection fraction (Ponikowski *et al.*, 2016).

Web Table 7.4 Practical guidance on the use of angiotensin-converting enzyme inhibitors (or angiotensin II receptor blockers) in patients with heart failure with reduced ejection fraction[a]

WHY?

To improve symptoms and exercise capacity, reduce the risk of HF hospitalization and increase survival.

IN WHOM AND WHEN?

Indications:
1. Potentially all patients with HF and an LVEF <40%.
2. First-line treatment (along with a beta-blockers and an MRA) in patients with HF NYHA Class II–IV, start as early as possible in the course of disease.
3. ACE-Is are also of benefit in patients with asymptomatic LV systolic dysfunction (NYHA Class I).

Contra-indications:
1. History of angioedema.[b]
2. Known bilateral renal artery stenosis.
3. Pregnancy/risk of pregnancy.
4. Known allergic reaction/other adverse reaction (drug-specific).

Cautions/seek specialist advice:
1. Significant hyperkalaemia (K+ >5.0 mmol/L).
2. Significant renal dysfunction (creatinine >221 μmol/L [>2.5 mg/dL] or eGFR <30 mL/min/1.73 m²).
3. Symptomatic or severe asymptomatic hypotension (systolic blood pressure <90 mmHg).
4. Drug interactions to look out for:
   - K+ supplements/ K+-sparing diuretics, e.g. amiloride and triamterene (beware combination preparations with furosemide).
   - MRAs.
   - Renin inhibitors[c].
   - NSAIDs[d].
   - Trimethoprim/trimethoprim-sulfamethoxazole.
   - 'Low-salt' substitutes with a high K+ content.

WHICH ACE-INHIBITOR AND WHAT DOSE? – see also Table 7.2

Captopril: starting dose 6.25 mg t.i.d., target dose 50 mg t.i.d.
Enalapril: starting dose 2.5 mg b.i.d., target dose 20 mg b.i.d.
Lisinopril: starting dose 2.5–5.0 mg o.d., target dose 20–35 mg o.d.
Ramipril: starting dose 2.5 mg o.d., target dose 10 mg o.d.
Trandolapril: starting dose 0.5 mg o.d., target dose 4 mg o.d.

WHERE?

- In the community in stable patients (NYHA Class IV/patients with severe HF and those with a current/recent exacerbation should be referred for specialist advice).
- In patients hospitalized with worsening HF – after stabilizing, relieving congestion, and, if possible, restoring 'euvolaemia' (but ideally before discharge).
- Other exceptions – see 'Cautions/seek specialist advice'.

HOW TO USE?

- Check renal function and electrolytes.
- Start with a low dose (see Table 7.2).
- Double the dose at not less than 2-week intervals in the community. More rapid dose up-titration may be carried out in patients in hospital or who are otherwise closely monitored, tolerability permitting.
- Aim for target dose (see above) or, failing that, the highest tolerated dose (remember: some ACE-I (or ARB) is better than no ACE-I).
- Re-check blood chemistry (urea/BUN, creatinine, K+) 1–2 weeks after initiation and 1–2 weeks after final dose titration.
- Monitor blood chemistry 4 monthly thereafter.
- When to stop up-titration, reduce dose, stop treatment–see PROBLEM SOLVING.
- It is very rarely necessary to stop an ACE-I (or ARB), and clinical deterioration is likely if treatment is withdrawn. Ideally, specialist advice should be sought before treatment discontinuation.
- A specialist HF nurse may assist with education of the patient, follow-up (in person or by telephone), biochemical monitoring and dose up-titration.

PROBLEM SOLVING

Asymptomatic low blood pressure:
- Does not usually require any change in therapy.

Symptomatic hypotension:
- Dizziness/light headedness is common and often improves with time–patients should be reassured.
- Reconsider need for nitrates, calcium-channel blockers,[e] and other vasodilators and reduce dose/stop, if possible.
- If no signs or symptoms of congestion, consider reducing diuretic dose.
- If these measures do not solve problem, seek specialist advice.

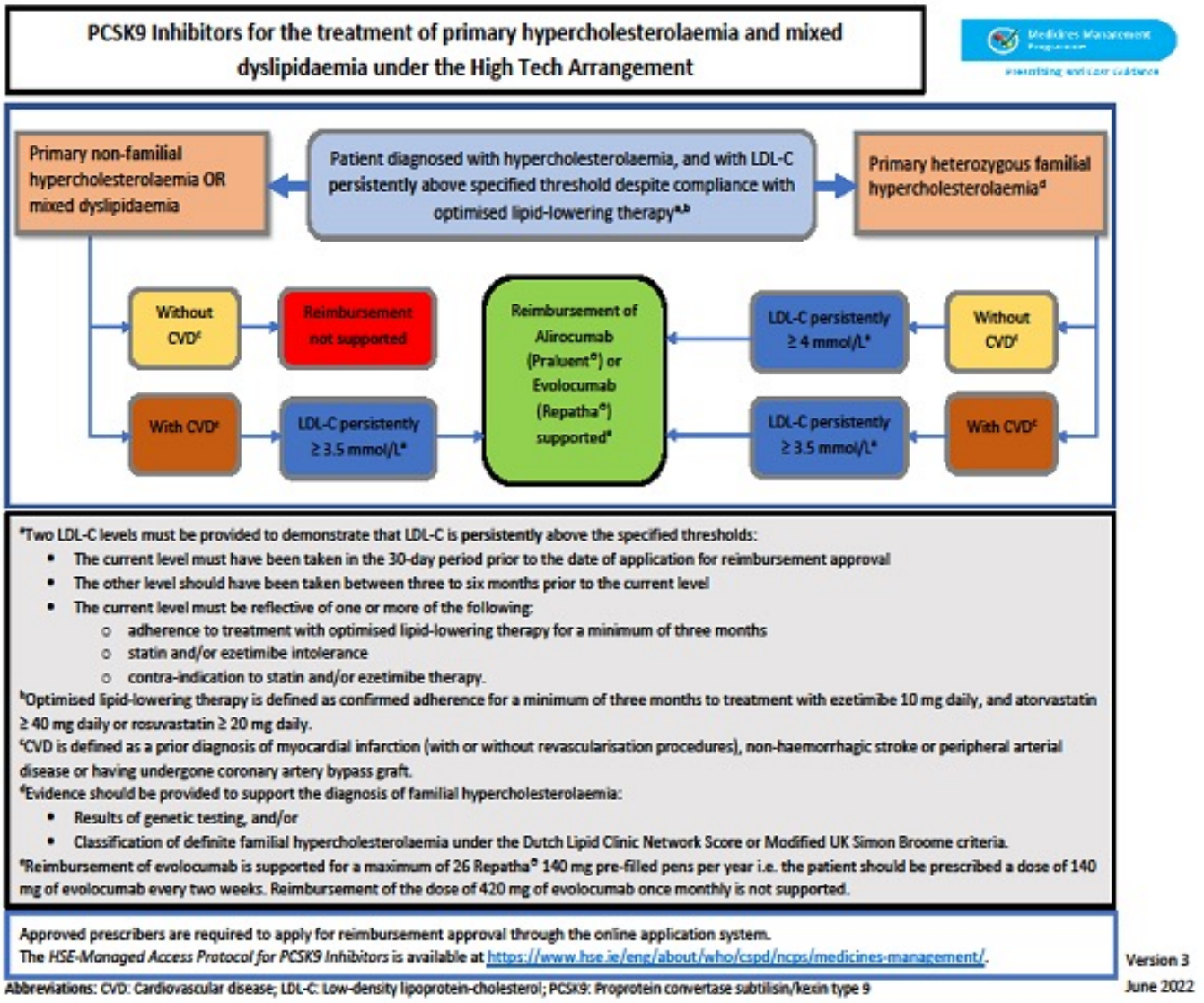
Cough:
- Cough is common in patients with HF, many of whom have smoking-related lung disease.
- Cough is also a symptom of pulmonary oedema, which should be excluded when a new worsening cough develops.
- ACE-I-induced cough does not always require treatment discontinuation.
- When a troublesome cough does develop (e.g. one stopping the patient from sleeping) and can be proved to be due to ACE-inhibition (i.e. recurs after ACE-I withdrawal and re-challenge), substitution of an ARB is recommended.

Table 3: Summary of dosing and monitoring of ACE-Is and ARBs

Drug	Indications	Dose	Dose adjustments	Comments
ACE inhibitors				
Ramipril	HF, HTN	Start: 2.5 mg oral QD Target dose: 5 mg BID	CrCl < 40ml/min: start 1.25 mg QD, max 5 mg/daycaution in elderly and hepatic impairment	Check renal function, electrolytes and drug interactions: • Potassium-sparing diuretics, potassium supplements or salt substitutes may lead to an increase in serum potassium and serum creatinine. • Non-steroidal anti-inflammatory drugs use may lead to increased risk of renal impairment and loss of antihypertensive effect. • Start at low doses and increase gradually (after at least 2 weeks) until the target dose is achieved. Monitor renal function and serum potassium closely. Common adverse effects: dry cough, hypotension, deterioration of renal function, hyperkalaemia.
Captopril	HF	Start: 6.25 mg oral TID Target dose: 50 mg TID	CrCl > 50 ml/min: 75-100% of the normal dose CrCl 10-50ml/min: 25-50% CrCl < 10ml/min: 12.5%	
	HTN	Start: 12.5 mg oral BID Target dose: 25-50 mg TIDMax 450 mg/day		
Enalapril	HF, HTN	Start: 2.5 mg oral BID Target dose: 10-20 mg BID	CrCl 30-80ml/min: start 5 mg/day CrCl 10-30ml/min: start 2.5 mg/day	
Lisinopril	HF	Start: 2.5-5.0 mg oral QD Target dose: 20-35 mg QD	CrCl 31-80ml/min: start 5-10 mg/day CrCl 10-30ml/min: start 2.5-5 mg/day CrCl < 10ml/min: start 2.5 mg/day	
	HTN	10-20 mg oral QD Max: 80 mg QD		
Perindopril	HF	Start: 2.5 mg oral QDMax: 5mg QD	CrCl > 60ml/min: start 5 mg/day CrCl 31-60ml/min: start 2.5 mg/dayCrCl 15-30ml/min: start 2.5 mg alternate days CrCl < 15ml/min: start 2.5 mg/day on the dayof dialysis	
	HTN	Start: 2.5-5 mg QD Target dose: 10 mg QD		
Trandolapril	HF	Start: 2.5 mg oral QD Max: 5mg QD	CrCl > 60ml/min: start 5 mg/day CrCl 31-60ml/min: start 2.5 mg/dayCrCl 15-30ml/min: start 2.5 mg alternate days CrCl < 15ml/min: start 2.5 mg/day on the dayof dialysis	
	HTN	Start: 2.5-5 mg QD Target dose: 10 mg QD		

ARBs				
Candesartan	HF, HTN	Start: 4-8 mg oral QD Target dose: 32 mg QD	if renal or hepatic impairment: start 4 mg/day	Check renal function, electrolytes and drug interactions: • Potassium-sparing diuretics, potassium supplements or salt substitutes may lead to increases in serum potassium and in serum creatinine. • Non-steroidal anti-inflammatory drugs use may lead to increased risk of renal impairment and loss of antihypertensive effect Start at low doses and gradually increase (after at least 2 weeks) until the target dose is achieved. Monitor renal function and serum potassium closely after drug initiation and uptitration. Common adverse effects:hypotension, deterioration of renal function, hyperkalaemia
Losartan	HF	Start: 50 mg oral QD Target dose: 150 mg QD	CrCl < 20ml/min: 25 mg QD caution if hepatic impairment	
	HTN	50-100 mg oral QD		
Valsartan	HF	start: 40 mg oral Bid target dose: 160 mg Bid	if mild-moderate hepatic impairment: max dose 80 mg/day	
	HTN	>80-160mg QD		

14.1.27. Appendix 27 – PCRS Criteria



Reimbursement Information – Bempedoic Acid film-coated tablets (Nilemdo®) & Bempedoic Acid plus Ezetimibe film-coated tablets (Nustendi®)

Medicines Management Programme

Adults with primary hypercholesterolaemia (heterozygous familial and non-familial) or mixed dyslipidaemia who:

- do not reach the LDL-C target levels for their total cardiovascular risk category, **and**
- have confirmed adherence to the maximum-tolerated dosages of statins and ezetimibe.

Very-high-risk cardiovascular risk category[a]

High-risk cardiovascular risk category[b]

LDL-C persistently ≥ 1.4 mmol/L[c]	**Reimbursement supported**	LDL-C persistently ≥ 1.8 mmol/L[c]
LDL-C persistently < 1.4 mmol/L[c]	**Reimbursement not supported**	LDL-C persistently < 1.8 mmol/L[c]

Cardiovascular risk category	People with any of the following:
[a]**Very-high-risk**	• Documented ASCVD, either clinical or unequivocal on imaging • DM with target organ damage[¥], or at least three major risk factors, or early onset of Type 1 DM of long duration (> 20 years) • Severe CKD (eGFR < 30 ml/minute/1.73 m^2) • A calculated SCORE ≥ 10% for 10-year risk of fatal CVD • FH with ASCVD or with another major risk factor
[b]**High-risk**	• Markedly elevated single risk factors, in particular total cholesterol > 8 mmol/L, LDL-C > 4.9 mmol/L, or blood pressure > 180/110 mmHg • FH without other major risk factors • DM without target organ damage[¥], with DM duration ≥ 10 years or another additional risk factor • Moderate CKD (eGFR 30 – 59 ml/minute/1.73 m^2) • A calculated SCORE ≥ 5% and < 10% for 10-year risk of fatal CVD

[c]**Two LDL-C levels** must be provided to demonstrate that LDL-C is **persistently** above the specified thresholds:

- The **current LDL-C level** must have been taken in the 30-day period prior to the date of application for reimbursement approval.
- The **previous LDL-C level** should have been taken at least three months prior to the current LDL-C level.
- **The current LDL-C level must be reflective of confirmed adherence to ezetimibe 10 mg daily for a minimum of three months and one of the following:***
  - adherence to high-dose statin therapy for a minimum of three months
  - adherence to maximum-tolerated statin therapy for a minimum of three months, where the individual was unable to tolerate high-dose statin therapy
  - statin intolerance
  - contraindication to statin therapy.
- A copy of the blood test results showing the **current LDL-C level** must be provided as part of the application for reimbursement approval.

****see the HSE-Managed Access Protocol for further details***

A Managed Access Protocol (MAP) is in place through the Health Service Executive (HSE)-Medicines Management Programme (MMP): https://www.hse.ie/eng/about/who/cspd/medicines-management/managed-access-protocols/.
Prescribers, once user-registered with the Primary Care Reimbursement Service (PCRS), are required to apply for reimbursement approval on an individual patient basis through the PCRS online application system (www.pcrs.ie). This can be accessed for GPs via the 'GP Application Suite' and for hospital prescribers via 'Services for Hospitals'.

Abbreviations: ASCVD: Atherosclerotic cardiovascular disease; CKD: Chronic kidney disease; CVD: Cardiovascular disease; DM: Diabetes Mellitus; eGFR: estimated glomerular filtration rate; FH: Familial hypercholesterolaemia; LDL-C: Low-density lipoprotein-cholesterol; SCORE: Systematic coronary risk estimation. [¥]Target organ damage is defined as microalbuminuria, retinopathy, or neuropathy.

Version 1 August 2024

14.1.28. Appendix 28: Exercise prescription FITT tables for specific conditions

FITT recommendation for individuals with Heart Failure (Piepoli *et al.*, 2021; Williams *et al.*, 2007)			
	Aerobic	**Resistance**	**Flexibility**
Frequency	Minimally 3 d-wk^{-1}, preferably up to 5 d-wk^{-1}	1-2 non-consecutive d-wk^{-1}	>2-3 d-wk^{-1} with daily being most effective
Intensity	Start at 40-50% and progress to 70-80% of VO2 reserve (of HRR); titrate based on perceived exertion. If atrial fibrillation is present, use perceived exertion only, such as RPE (11-14 on a 6-20 scale) or talk test.	Begin at 40% 1-RM for upper body and 50% 1-RM for lower body exercises. Gradually increase to 70% 1-RM over several weeks to months.	Stretch to the point of feeling tightness of slight discomfort.
Time	Progressively increase to 20-60 min-d^{-1}	1-2 set of 10-15 repetitions focusing on major muscle groups	10-30 s hold for static stretching; 2-4 repetitions of each exercise.
Type	Aerobic exercise, focusing on treadmill or free-walking and stationary cycling as capable	Weight machines, dumbbells, elastic bands, and/or body weight can be used.	Static, dynamic, and/or PNF stretching.

1-RM, one repetition maximum; HRR, heart rate reserve; PNF, proprioceptive neuromuscular facilitation; RPE, rating of perceived exertion; VO2, volume of oxygen consumed per unit time.

FITT recommendation for individuals with diabetes (Colberg 2010; Dunstan *et al.,* 2002; Dunstand *et al.,* 2005;Kemps *et al.,* 2019)			
	Aerobic	**Resistance**	**Flexibility and balance**
Frequency	3-7 d-wk^{-1} No more than 2 consecutive days without activity	A minimum of 2 non-consecutive d-wk^{-1}, but preferably 3 d	>2-3 d-wk^{-1} for both
Intensity	Moderate to vigorous (based on subjective experience of "Moderate to very hard")	Moderate (50%-69% of 1-RM) to vigorous (70%-85% 1-RM) to improve strength	Stretch to the point of feeling tightness of slight discomfort. Balance exercises light to moderate intensity
Time	Type 1 diabetes mellitus (T1DM) and T2DM 150 min wk^{-1} at moderate to vigorous intensity	At least 8-10 exercises with 1-3 sets of 10-15 repetitions to near fatigue per set early in training	Hold for static stretch for 10-30 s; 2-4 repetitions of each exercise. Balance for any duration
Type	Prolonged rhythmic activities using large muscle groups (e.g. walking, cycling, swimming Continuous activity of HIIT	Resistance machines, free weights, resistance bands, and/or body weight can be used.	Static, dynamic, and/or other stretching. yoga

Unstructured activity (errands, housework, yard work) is encouraged in those with diabetes to aid in reducing sedentary time, increasing daily energy expenditure and assisting with weight management (10).

1-RM, one repetition maximum; HITT, high-intensity interval training; T1DM, type 1 diabetes mellitus; T2DM, type 2 diabetes mellitus

FITT recommendation for individuals with lower extremity, symptomatic peripheral arterial disease (Askew *et al.,*2014; Bulmer *et al.,*2004; Hirsch *et al.,* 2006)			
	Aerobic	**Resistance**	**Flexibility**
Frequency	Minimally 3 d-wk^{-1} Preferably up at 5 d-wk^{-1}	At least 2 d-wk^{-1}, performed on non-consecutive days.	>2-3 d-wk^{-1} with daily being most effective
Intensity	Moderate intensity (*i.e.,* 40-59% VO_2R) to the point of moderate pain (*i.e.,* 3 out of 4 on the claudication pain scale) or from 50%-80% of maximum walking speed.	60%-80% of 1-RM	Stretch to the point of feeling tightness of slight discomfort.
Time	30-45 min – d^{-1} (excluding rest periods) for a maximum of 12 wk; may progress to 60 min – d^{-1}	2-3 set of 8-12 repetitions; 6-8 exercises targeting major muscle groups.	10-30 s hold for static stretching; 2-4 repetitions of each exercise.
Type	Weight bearing (*i.e.,* free or treadmill walking: intermittent exercise with seated rest when moderate pain is reached and resumption when pain is *completely* alleviated.	Whole body focusing on large muscle groups; emphasis on lower limbs if time is limited.	Static, dynamic, and/or PNF stretching.

1-RM, one repetition maximum; HRR, heart rate reserve; PNF, proprioceptive neuromuscular facilitation; VO_2R_1, oxygen uptake reserve

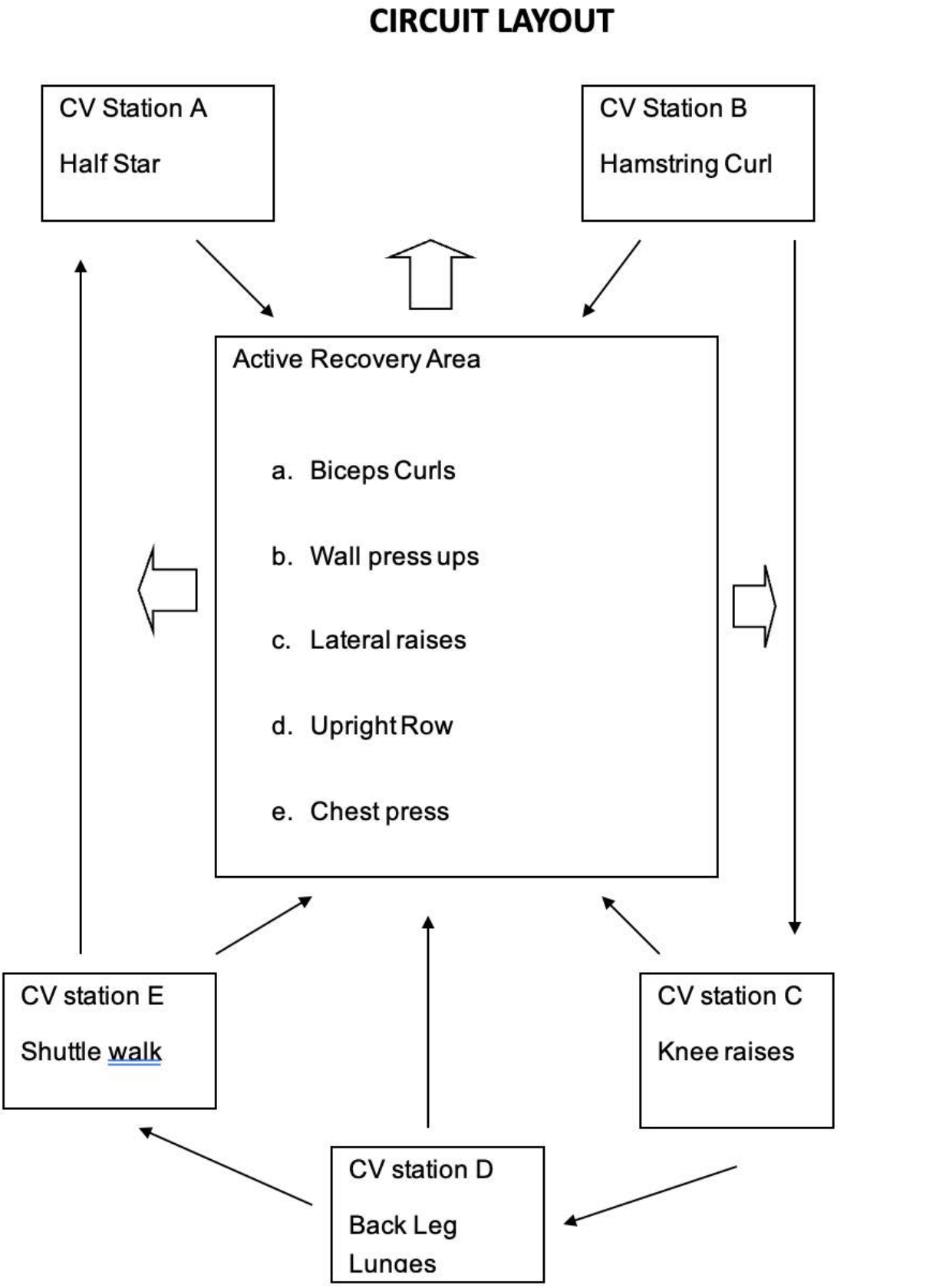
FITT recommendation for individuals with overweight and obesity (Donnelly *et al.,* 2009; Macfarlane *et al.,* 2006)			
	Aerobic	**Resistance**	**Flexibility**
Frequency	≥5 d-wk^{-1}	2-3 d-wk^{-1}	≥5 d-wk^{-1}
Intensity	Initial intensity should be moderate (40%-59% O_2R or HRR); progress to vigorous (≥60% O2R or HRR) for greater health benefits	60%-70% of 1-RM; gradually increase to enhance strength and muscle mass.	Stretch to the point of feeling tightness of slight discomfort.
Time	30 min d-^{1} (150 min wk^{-1}); increase to 60 min d-^{1} or more (250-300 min wk^{-1})	2-4 sets of 8-12 repetitions for each of the major muscle groups	Hold for static stretch for 10-30 s; 2-4 repetitions of each exercise.
Type	Prolonged rhythmic activities using large muscle groups (e.g. walking, cycling, swimming	Resistance machines and/or free weights.	Static, dynamic, and/or PNF

1-RM, one repetition maximum; HRR, heart rate reserve; O_2R_1, oxygen uptake reserve; PNF, proprioceptive neuromuscular facilitation

FITT recommendation for individuals with chronic obstructive pulmonary disease (Kortianou *et al.,* 2010; Langer *et al.,* 2009; Nici *et al.,* 2006; Ries *et al.,* 2007; Spruit *et al.,* 2013)			
	Aerobic	Resistance	Flexibility
Frequency	Minimally 3 d-wk^{-1} Preferably up at 5 d-wk^{-1}	At least 2 d-wk^{-1}, performed on non-consecutive days.	>2-3 d-wk^{-1} with daily being most effective
Intensity	Moderate to vigorous intensity (50%-80% peak work rate or 4-6 on the BORG CR10 scale).	Strength; 60%-70% of 1-RM for beginners, ≥80% for experienced weight trainers. Endurance; <50% of 1-RM.	Stretch to the point of feeling tightness of slight discomfort.
Time	20-60 min – d^{-1} at moderate-to-high intensities as tolerated, if the 20 to 60 min durations are not achievable, accumulate ≥20 min of exercise interspersed with intermittent exercise rest periods of lower intensity work or rest.	Strength; 2-4 set; 8-12 repetitions Endurance; ≤2 sets. 15-20 repetitions.	10-30 s hold for static stretching; 2-4 repetitions of each exercise.
Type	Common aerobic modes including walking (free or treadmill), stationary cycling, and upper body ergometry.	Weight machines, free weight, or body weight exercises.	Static, dynamic, and/or PNF stretching.

1-RM, one repetition maximum; PNF, proprioceptive neuromuscular facilitation

14.1.29. Appendix 29: Class design



Level	Half Star	Hamstring Curl	Knee Raises	Back Leg lunges	Shuttle Walk
1/ Assisted standing	Abduct alternate legs. No arms	Hamstring curl alternate legs. No arms	Knee raise 45 degrees. No arms	Leg extension alternate legs No arms	Gentle walk Or March On spot
2	Abduct alternate legs with slight bend of supporting leg. Arms abduct hip height	HC alternate legs with slight bend of supporting leg Arms bicep curl	Knee raise 45 degrees with slight bend of supporting leg. Low hand to opposite knee	Leg extension with slight bend of supporting leg. Extend arms forward hip height.	Walk with slight swinging arm mvt Or march on spot with swinging arms
3	Abduct alternate legs with deeper bend of supporting leg. Arms abducted waist height	HC alternate legs with deeper bend of supporting leg. Arms upright row curl	Knee raise 45 degrees with deeper bend of supporting leg. Waist height hand to opposite knee	Leg extension with deeper bend of supporting leg. Extend arms forward waist height.	Walk faster with significant swinging arm mvt Or March on spot with abduction & jazz arm mvt hip height
4	Abduct alternate legs with significant bend of supporting leg. Arms abducted shoulder height	HC alternate legs with significant bend of supporting leg. Arms upright row curl	Knee raise 90 degrees with significant bend of supporting leg. Shoulder height hand to opposite knee	Leg extension with significant bend of supporting leg. Extend arms forward shoulder height	Walk briskly with aggressive swinging arm mvt Or march on spot with abduction & jazz arm mvt shoulder height

5	Abduct alternate legs with greater bend of supporting leg. Arms raised above head height. • Full jack	HC alternate legs with greater bend of supporting leg. Arms upright row curl • Add impact	Knee raise 90 degrees with greater bend of supporting leg. Above head hand to opposite knee • Add impact	Leg extension with greater bend of supporting leg. Extend arms forward above head height • Spotty dogs	Walk briskly alternate with jog Or March on spot with alternate arm above head • Jog on spot

Level 1 CV station and 1 AR station

Total CV 10 mins and AR 10 mins

Level 2 2 CV stations and 1 AR station

Total CV 14 mins and AR 6mins

Level 3 3 CV stations and 1 AR station

Total CV 15 mins and 5 mins AR

Level 4 4 CV stations and 1 AR

Total CV 16mins and 4 mins AR

Level 5 5 CV stations with no AR station

Total CV 20mins-continuous with no AR

Monitor Heart Rate, reaction, RPE

If very low level can do 5mins CV stations and 5mins AR stations

14.1.30. Appendix 30: Sample gym setting programme

Examples of gym equipment:

- Treadmill
- Stationary bike
- Cross trainer
- Rowing machine
- Stairmaster
- Steps
- Weight machines, free weights, resistance bands

Gym Equipment Exercise Session Design: Circuit example:

- Equipment can be set up as a circuit if space allows. Aim to alternate muscle groups where possible – e.g. avoid having step following stairmaster, or cross trainer following rower.
- Number of stations depends on equipment and space available as well as appropriate staff: patient ratio determined after assessment.
- This example refers to 10 aerobic and 10 active recovery / muscle strength and endurance (AR/MSE) stations. Some of the AR/MSE examples can be modified to aerobic stations by varying intensity, speed, range etc.

(insert nice visual of circuit instead of table version below?):

Treadmill (CV)	⇨	Wall press (AR/MSE)	⇨	Bike (CV)
⇧				⇩
Lateral lunge (AR/MSE)				Calf raises (AR/MSE)
⇧				⇩
Step (CV/MSE)				Rower (CV)
⇧				⇩
Bicep curl (AR/MSE)				Ball around body (AR/MSE)
⇧				⇩
Shuttle walk / jog (CV)				Shuttle walk / jog (CV)
⇧				⇩
Upright row (AR/MSE)				Tricep kickback (AR/MSE)
⇧				⇩
Bike (CV)				Step (CV/MSE)
⇧				⇩
Arm lifts (AR/MSE)				Band pull apart (AR/MSE)
⇧				⇩
Treadmill (CV)	⇦	½ squat (AR/MSE)	⇦	Crosstrainer (CV)

Advantages of Gym Equipment circuit design:

- Introduces a variety of machine options for those who have never tried them before.
- Instils confidence in the use of varied gym equipment which might lead to participants choosing to attend a gym on programme completion
- Allows for accuracy in intensity progression, in particular on machines where speed, watts can be recorded.

Disadvantages of Gym Equipment circuit design:

- Multiple stations – time for set up before and tidy up / cleaning equipment afterwards
- Multiple stations – can be confusing for participants until they become familiar.
- AR stations in particular can be difficult for staff to supervise as participants are doing different exercises and may be exercising at different levels.

Gym Equipment Exercise Session Design: Pods example:

- Equipment can also be set up as Pods.
- Each pod contains 1 Aerobic machine (treadmill, bike, rower, crosstrainer) and other equipment – step, weights, bands, ball.
- Number of Pods depends on equipment and space available as well as appropriate staff: patient ratio determined after assessment.

Pod 1	Pod 2	Pod 3	Pod 4	Pod 5
Treadmill	Bike	Rower	Stairmaster	Crosstrainer
Step	Step	Step	Step	Step
Weights	Weights	Weights	Weights	Weights
Ball	Ball	Ball	Ball	Ball
Bands	Bands	Bands	Bands	Bands

Advantages:

- Patients can all exercise on an aerobic machine at the same time. This allows for greater flexibility in duration of time spent on aerobic station. Time can be individualised in intervals (AR at lower speed) progressing to continuous.
- Patients can all do the same MSE exercise at the same time. This facilitates teaching points for each exercise for each patient at the same time.
- May be preferable from an infection control perspective (depending on local policy) as there is less movement of patients between equipment.
- If desired, half the group can use machines (either interval or continuous) while the other half use a mixture of steps and AR exercises (e.g. lunges, squats) performed at moderate intensity. Groups can swap half way through the session.

Disadvantages:

Compared to circuit set up, less variety in machine use within each session, though the machine used can vary from session to session. Depending on patient preference, this can be an advantage or disadvantage.

14.1.31. Appendix 31 home based cardiac rehabilitation exercise programme

Advantages:

- Accessibility – suitable for those who may not be able to travel to supervised classes
- Convenience – facilitates those who may not be able to attend specific classes due to time constraints

Disadvantages:

- No individual supervision
- More limited selection of CV equipment to vary exercise

Equipment suggestions:

- Chair
- Step
- Seated pedals/static bike
- Weights (may use bottles with water/tinned foods as alternative)
- Resistance bands

Style of class – circuit based with progression as per other CR exercise environments

Warm up and cool down as per all other CR exercise environments

As per supervised circuit, aim to alternate muscle groups

Examples of aerobic (CV) exercises:

- Marching on spot
- Shuttle walk/jog
- Step ups
- Table top/chair mountain climbers
- Sit to stand
- High knees/knee to elbow
- Heel kicks
- Half stars

Examples of active recovery / muscle strength and endurance (AR/MSE) exercises:

- Wall press
- Bicep curl
- Front raise
- Lateral raises
- Tricep kickback
- Forward lunge
- Side lunge
- Squat

Sample circuit:

Sit to stand

↓

Wall press

↓

High knees/knee to elbow

↓

Forward lunge

↓

Half stars

↓

Bicep curl

↓

Table top/chair mountain climbers

↓

Lateral raises

↓

Shuttle walk/jog

↓

Squat

↓

Heel kicks

↓

Side lunge

↓

Step ups

↓

Tricep kick back

↓

Marching on spot

↓

Front raise

14.1.32. Appendix 32 Example of a group exercise class delivered virtually

15-minute group warm up

Exercise 1:

Side taps / half jacks with arms to the sides for 1 minute

Alternatives offered to increase and decrease intensity

Followed by 40 seconds of AR (slow walk, marching on spot, running on spot or around safe space available)

Exercise 2:

Tap backs with arms to the front for 1 minute

Alternatives offered to increase and decrease intensity

Followed by 40 seconds of AR (slow walk, marching on spot, running on spot or around safe space available)

Exercise 3:

“V-Step” with “V” arms for 1 minute

Alternatives offered to increase and decrease intensity

Followed by 40 seconds of AR (slow walk, marching on spot, running on spot or around safe space available)

Exercise 4:

Side stepping / side translations with punches for 1 minute

Alternatives offered to increase and decrease intensity

Followed by 40 seconds of AR (slow walk, marching on spot, running on spot or around safe space available)

Exercise 5:

Hamstring curls for 1 minute

Alternatives offered to increase and decrease intensity

Followed by 40 seconds of AR (slow walk, marching on spot, running on spot or around safe space available)

And this continues with a variety of non-equipment-based exercises that require little space for 20–30 minutes, with consideration for overall muscle balance. The AR time also allows for the instructor to observe and engage with the group

The conditioning component is followed by an initial 5-minute cool down and then a resistance section, where the feet remain engaged in slow movement as intensity is gradually lowered.

Following the resistance exercise section, a final cool down occurs for a further 5 minutes, followed by a stretch section (5 minutes).

14.1.33. Appendix 33 – HSeLanD Telehealth Training

HSE staff online training available on HSeLanD (HSeLanD accessed on the 12.06.25)

Screen snip from HSeLanD Telehealth online modules

Telehealth

0 Reviews Skip to Session

Background

During the COVID- 19 pandemic, all efforts should be made to reduce face to face contact including working with patients in healthcare facilities. Among other aspects Telehealth (TH) makes use of internet-based technologies to support remote consultations, providing a reasonable alternative to an office visit for many patients in all specialties.

Telehealth implementation teams often face challenges that can hinder the successful transition. Key to the success and sustainability of telehealth are staff acceptance and confidence in the benefits telehealth can provide and competence using the technology. Adequate training specific of health professionals is vital in successful implementation of telehealth.

Aim of the course

Aim of this module is to provide practitioners with guidance in the implementation of Telehealth in acute hospital setting and community settings.

Learning Outcomes

On completion of this module, the learner will be able to

- State the definition, basic history and background of telehealth
- Consider legal and regulatory issues when conducting telehealth
- Identify various indications of telehealth service delivery
- Use basic etiquette and ethical best practice guidelines when conducting telehealth
- Demonstrate basic skills necessary to provide telehealth services using a secure video conferencing platform

Learning Type: Programme

Available Languages:
- English

Click on the Enrol button to enrol on the complete group of learning modules listed below.

Session(s): Telehealth - Online Seats: Unlimited

- Module1 - Telehealth Overview
- Module 2-Elements of Telehealth & Evidence of Telehealth
- Module 3- Professional, Ethical and Regulatory Considerations
- Module 4 - Best Practices and Etiquette
- Module 5a - Attend Anywhere
- Module 5b- Webex meeting

Enrol

14.1.34. Appendix 34 – Excel 'ECC Attend Anywhere User and Equipment Request Form'

The excel contain 4 tabs

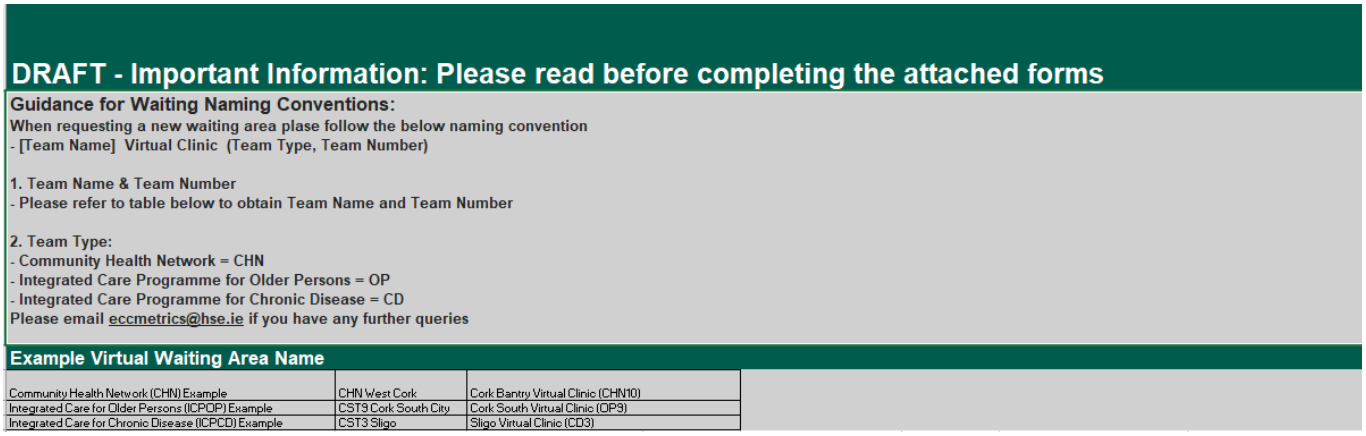
Tab 1. Instructions on how to request a new waiting area for Attend Anywhere

Tab 2. New Attend Anywhere Licence Request

Tab 3. Remove – Change – Additional Attend Anywhere Licence - an existing licence holder needs to be removed/changed/added to or from a waiting area on Attend Anywhere to support VEC

Tab 4. Equipment Request Form - this request form is only for ordering equipment to support Video Enable Care (VEC).

1. Screen snip of 'Instructions on how to name a new waiting area on Attend Anywhere



DRAFT - Important Information: Please read before completing the attached forms

Guidance for Waiting Naming Conventions:
When requesting a new waiting area plase follow the below naming convention
- [Team Name] Virtual Clinic (Team Type, Team Number)

1. Team Name & Team Number
- Please refer to table below to obtain Team Name and Team Number

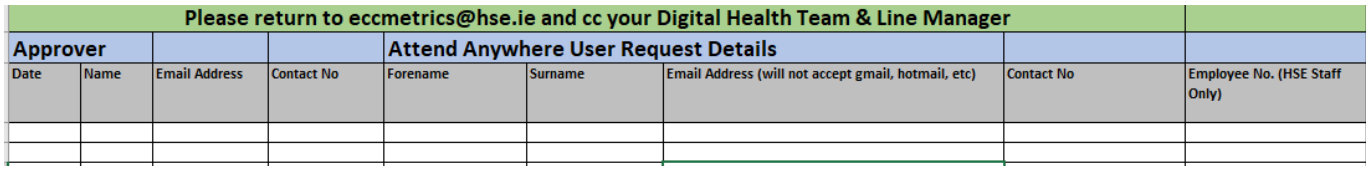
2. Team Type:
- Community Health Network = CHN
- Integrated Care Programme for Older Persons = OP
- Integrated Care Programme for Chronic Disease = CD

Please email eccmetrics@hse.ie if you have any further queries

Example Virtual Waiting Area Name

Community Health Network (CHN) Example	CHN West Cork	Cork Bantry Virtual Clinic (CHN10)
Integrated Care for Older Persons (ICPOP) Example	CST9 Cork South City	Cork South Virtual Clinic (OP9)
Integrated Care for Chronic Disease (ICPCD) Example	CST3 Sligo	Sligo Virtual Clinic (CD3)

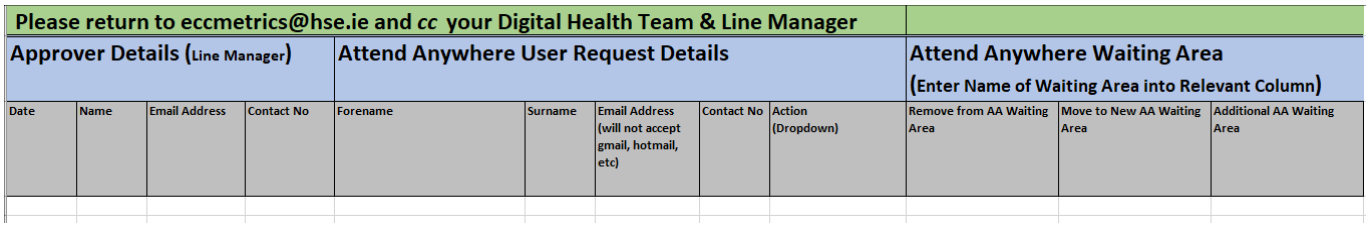
2. Screen snip of part of the 'New Attend Anywhere Licence Request' form



Please return to eccmetrics@hse.ie and cc your Digital Health Team & Line Manager

Approver				Attend Anywhere User Request Details				
Date	Name	Email Address	Contact No	Forename	Surname	Email Address (will not accept gmail, hotmail, etc)	Contact No	Employee No. (HSE Staff Only)

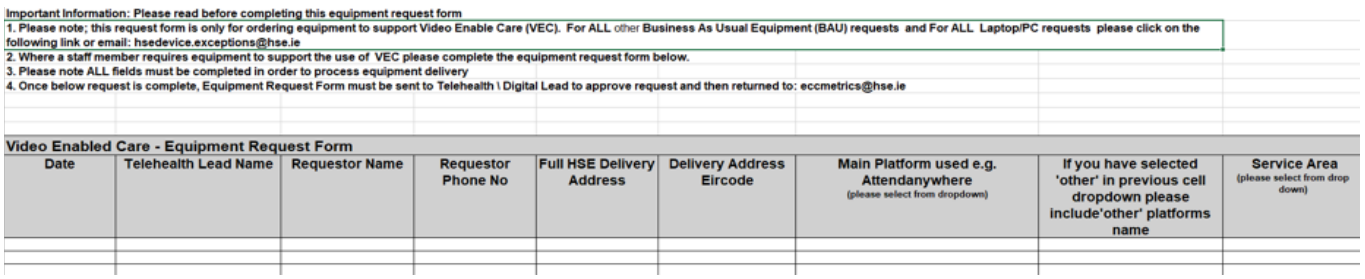
3. Screen Snip of part of the 'Remove – Change – Additional Attend Anywhere Licence' form



Please return to eccmetrics@hse.ie and *cc* your Digital Health Team & Line Manager

Approver Details (Line Manager)				Attend Anywhere User Request Details					Attend Anywhere Waiting Area (Enter Name of Waiting Area into Relevant Column)		
Date	Name	Email Address	Contact No	Forename	Surname	Email Address (will not accept gmail, hotmail, etc)	Contact No	Action (Dropdown)	Remove from AA Waiting Area	Move to New AA Waiting Area	Additional AA Waiting Area

4. Screen Snip of Equipment Request Form - this request form is only for ordering equipment to support Video Enable Care (VEC)



Important Information: Please read before completing this equipment request form
1. Please note; this request form is only for ordering equipment to support Video Enable Care (VEC). For ALL other Business As Usual Equipment (BAU) requests and For ALL Laptop/PC requests please click on the following link or email: hsedevice.exceptions@hse.ie
2. Where a staff member requires equipment to support the use of VEC please complete the equipment request form below.
3. Please note ALL fields must be completed in order to process equipment delivery
4. Once below request is complete, Equipment Request Form must be sent to Telehealth \ Digital Lead to approve request and then returned to: eccmetrics@hse.ie

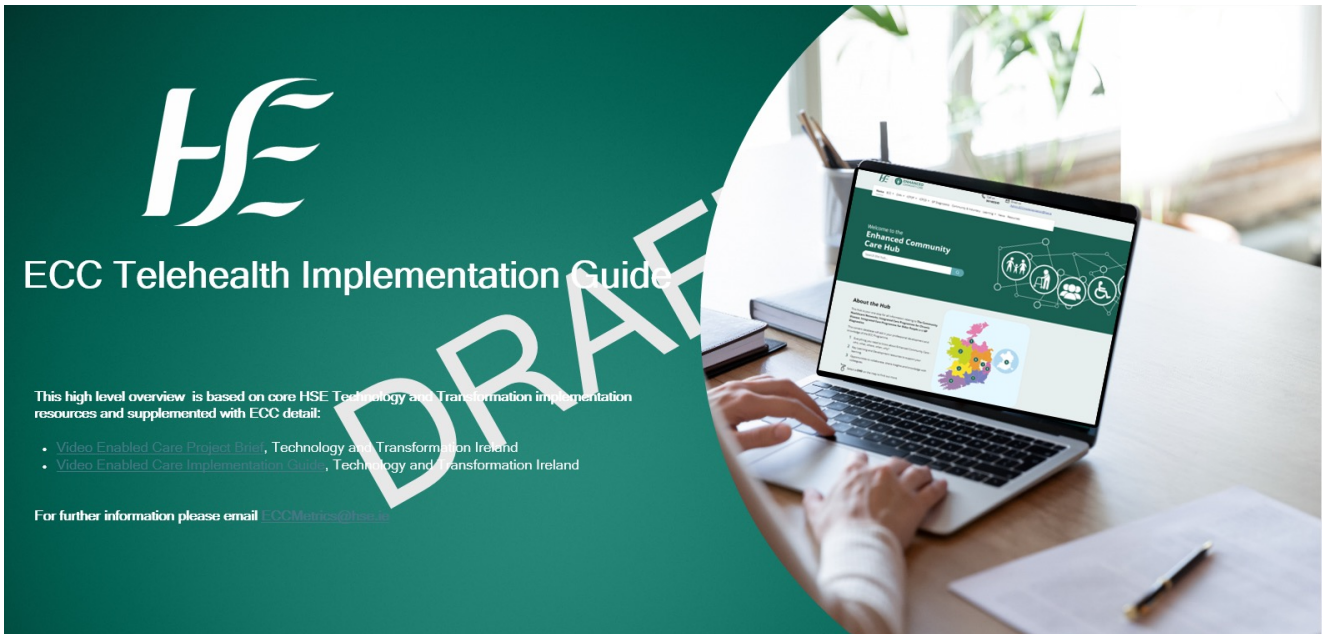
Video Enabled Care - Equipment Request Form

Date	Telehealth Lead Name	Requestor Name	Requestor Phone No	Full HSE Delivery Address	Delivery Address Eircode	Main Platform used e.g. Attendanywhere (please select from dropdown)	If you have selected 'other' in previous cell dropdown please include'other' platforms name	Service Area (please select from drop down)

14.1.35. Appendix 35: ECC Telehealth Implementation Guide

Screen snip of ECC Telehealth Implementation Guide* available on HSeLanD

- This document is a powerpoint document.
- *the draft watermarks can be removed by services, once it has been localised for their service.



This document contains information

- ECC Telehealth Project Background, Resources and Implementation Steps
- Case Studies
- Sample Process Maps
- Training Guides
  - Patient's Suitability, Contingency & Consent Management
  - Attend Anywhere - Clinician Guide for 1:1 Video Consultations
  - Attend Anywhere - Clinician Guide for Group Consultations
  - Attend Anywhere - How to Guide - Admin Staff
  - Attend Anywhere - How to Guide - Management (Administrator) Staff
- HSE Technology & Transformation Information Links

14.1.36. Appendix 36 ECC Telehealth Attend Anywhere Quick Guides Templates_V1.0*

- powerpoint document available on HSeLanD (HSeLanD accessed on the 12.06.25)

- This document is a Powerpoint document.
- *the draft watermarks can be removed by services, once it has been localised for their service.

14.1.37. Appendix 37: ECC telehealth Attend Anywhere templates

DRAFT - Telehealth Attend Anywhere Quick Guides

Enhanced Community Care
Care closer to home

Table of Contents

Please note; there are two types of Waiting Areas:

1. **Peer to peer virtual Waiting Areas** – Designed for 1:1 consultations
2. **Group virtual Waiting Areas** – Designed for group education delivery or multidisciplinary team meetings

Please note these types of Waiting Areas are not interchangeable.

These are editable templates, as such QR codes will need to updated to reflect service specific Waiting Area.

All guides pertaining to 'Group Virtual Waiting Areas' are denoted with a purple background.

14.1.38. Appendix 38 - Health Service Executive, Ireland Enhanced Community Care (ECC) Programme, Attend Anywhere , Frequently Asked Questions (FAQs)

Word document available on HSeLanD (HSeLanD accessed on the 12.06.25)

- Word document
- General Information; General Platform Information; Group Consultations; Troubleshooting and Support; Training; Resources and Equipment

Health Service Executive, Ireland

Enhanced Community Care (ECC) Programme

Attend Anywhere

Frequently Asked Questions (FAQs)

2nd April 2025