NATIONAL CLINICAL PROGRAMME RESPIRATORY

A Guidance Document For Healthcare Professionals Setting Up A Pulmonary Rehabilitation Programme

Version 5

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Integrated Care Programme for the Prevention and Management of Chronic Disease

National Clinical & Integrated Care Programmes
Person-centred, co-ordinated care

HSE

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Abbreviations

PR	Pulmonary Rehabilitation
COPD	Chronic Obstructive Pulmonary Disease
AECOPD	Acute exacerbation of COPD
NCP Respiratory	National Clinical Programme Respiratory
KPI	Key Performance Indicator
VPR	Virtual Pulmonary Rehabilitation
CNSp	Clinical Specialist Nurse
MDT	Multidisciplinary team
HCP	Healthcare Professional
AOT	Ambulatory Oxygen Therapy
ICPCD	Integrated Care Programme for Chronic Disease
ECC	Enhanced Community Care
PPPG	Policy, Procedure, Protocols and Guidelines
SOP	Standard Operating Procedure
RHA	Regional Health Area
SABA	Short-acting beta-agonist
SAMA	Short- acting muscarinic-agonist

1. Background And Context

It is estimated that 380,000 people are living with COPD in Ireland, yet only 110,000 are diagnosed. As set out in the National Healthcare Quality Report System (NHQRS 2023), Ireland had the fourth highest rate of hospital admission with COPD in the OECD in 2021. The national age-sex standardised hospitalisation rate for COPD in 2021 was 259.31 per 100,000 population. The latest data from the OECD (2021 or nearest year) reports that Ireland's rate of hospitalisation for COPD (219.23) was above the OECD average (118.8) (NHQRS, DOH 2023).

There are approximately 450,000 people with doctor-diagnosed asthma in Ireland (approx. 1 in 10 of population), of whom approximately 240,000 are estimated to have uncontrolled asthma (HSE 2020). In 2022, the age-sex standardised hospitalisation rate for asthma was 33.4 per 100,000 population. In the latest data reported by the OECD, 2021 or nearest year, Ireland reported a rate of 28.56 hospitalisations per 100,000 population, which was higher than the OECD average of 23.3 hospitalisations per 100,000 population. As set out in the National Healthcare Quality Report System (NHQRS DOH 2023), Ireland had the 10th highest rate of hospital admission with asthma in the OECD in 2021. Evidence suggests that the prevalence of asthma within the Irish population is rising; for example, one study reported that there was a 42% relative increase in the prevalence of asthma in Irish teenagers between 1998 and 2003 (Kabir et al 2011). Hence, obstructive lung disease places a huge burden on Irish Healthcare.

The impact of COPD on healthcare facilities is profound, but it also has wider social and economic effects. For the individual patient, COPD is associated with a significant economic burden in terms of the direct medical costs associated with it and indirect costs including care provided by family members. Patients with severe disease may suffer frequent exacerbations and debilitating breathlessness requiring medical attendance, potential hospitalisation and severe disruption of their quality-of-life.

Hospital admissions for exacerbations of COPD have significant cost implications for the management of COPD. The opportunity to treat suitable patients closer to home including in the Specialist Ambulatory Care Hubs instead of in the hospital is attractive from both an economic and an organisational perspective.

Many studies including the 2015 Health Technology Assessment by HIQA on self-management services identified Pulmonary Rehabilitation as one of the most cost effective methods of supporting patients to self- manage and improve service user outcomes.

Pulmonary Rehabilitation is an important element in the long-term management of chronic respiratory disease and is part of a wider integrated respiratory pathway including community services and secondary care services, which should support patient flow and care across the healthcare system.
Pulmonary Rehabilitation programmes improve quality of life, mobility and decreases hospital utilisation in COPD patients. For asthma patients, Pulmonary Rehabilitation also improves quality of life and improves exercise capacity, but it has minimal effect on asthma control (Osadnik et al, 2022).

Pulmonary Rehabilitation therefore plays an integral role in the management of patients with obstructive airways disease and in the management of other chronic respiratory conditions where symptoms of breathlessness impacts negatively on exercise capacity and quality of life. This Pulmonary Rehabilitation guidance document follows international best practice and recommends investment in an integrated service to support the effective delivery of Pulmonary Rehabilitation programmes.

The HSE "National Framework for integrated prevention and management of chronic disease in Ireland 2020- 2025", the "End-to-End Model of Care for COPD 2019" and the "End-to-End Model of Care for Asthma 2021" support the implementation of an integrated care programme for COPD and asthma. They focus on community investment to reduce the pressure on acute services and deliver increased quality of care for patients delivered closer to home. This supports the realignment of care towards the community called for in Sláintecare and prioritises services in the community. The End-to-End Models of care for COPD and Asthma (HSE 2019, 2021) showed the progression of end-to-end models across the spectrum of care into the enhanced community setting to reduce hospital admission rates and hospital bed usage.

Figure 1a. End-to-End Model of Care for COPD

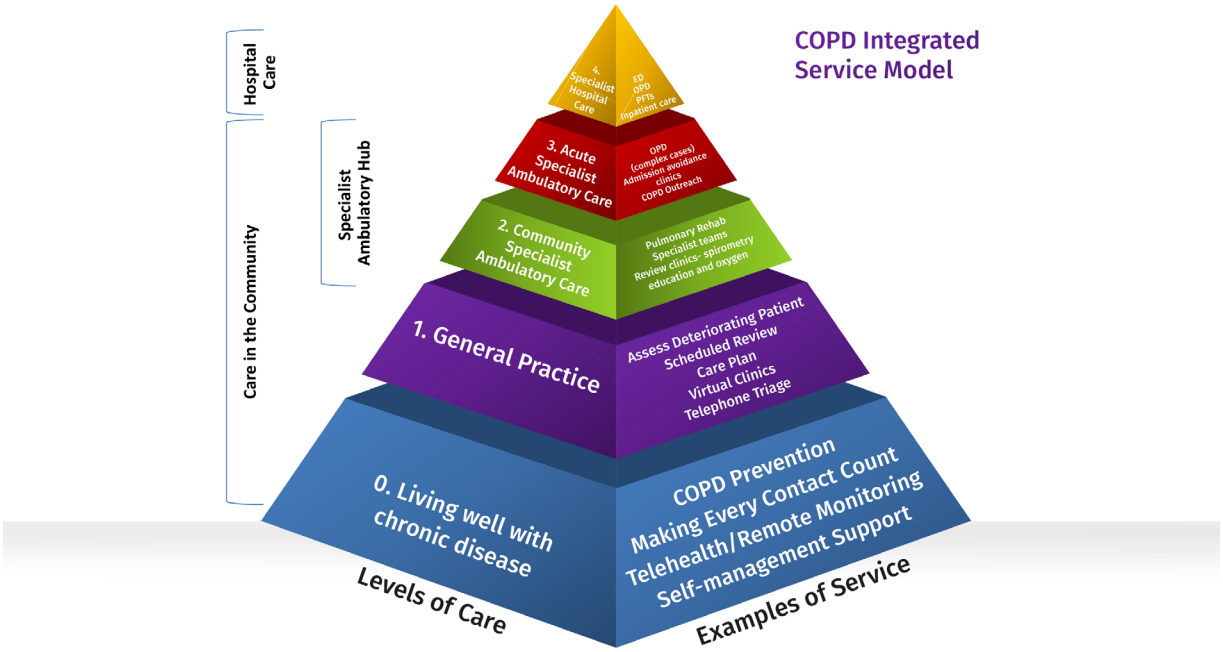
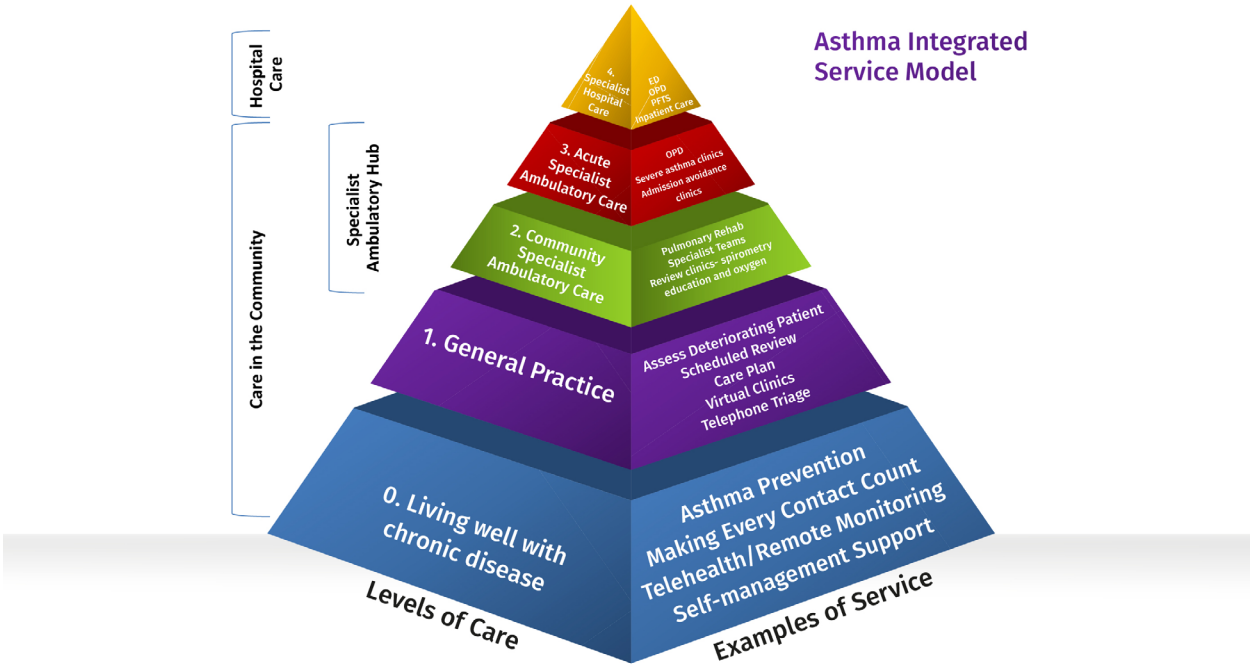


Figure 1b. End-to-End Model of Care for Asthma



One of the common ambulatory care strategies for prevention of admission for chronic lung disease is the facilitation of Pulmonary Rehabilitation in the Specialist Ambulatory Care Hubs.

Pulmonary Rehabilitation is one of the most cost-effective treatments available for lung disease at a cost of 2000- 8000 euros per Quality Adjusted Life Year; it is known to be effective at both improving quality of life and reducing the number of hospital

admissions. A comprehensive national needs assessment for Pulmonary Rehabilitation services published in 2017 reported that services were considered well below capacity at national level. Significant gaps in service provision and regional variation were identified. It recommended that at a minimum the capacity for Pulmonary Rehabilitation needed to be increased by 89% in order to meet the existing requirement for patients discharged following an acute exacerbation.

The enhancement of Pulmonary Rehabilitation in the Specialist Ambulatory Care Hubs will improve the healthcare offered to people living with chronic respiratory disease. Pulmonary Rehabilitation services will provide timely integrated rehabilitation post-acute event and will compliment other ambulatory services such as COPD Outreach in acute hospitals to enable earlier hospital discharge in a safe manner with better patient outcomes and healthcare experience.

2. Specialist Ambulatory Care Hub Model

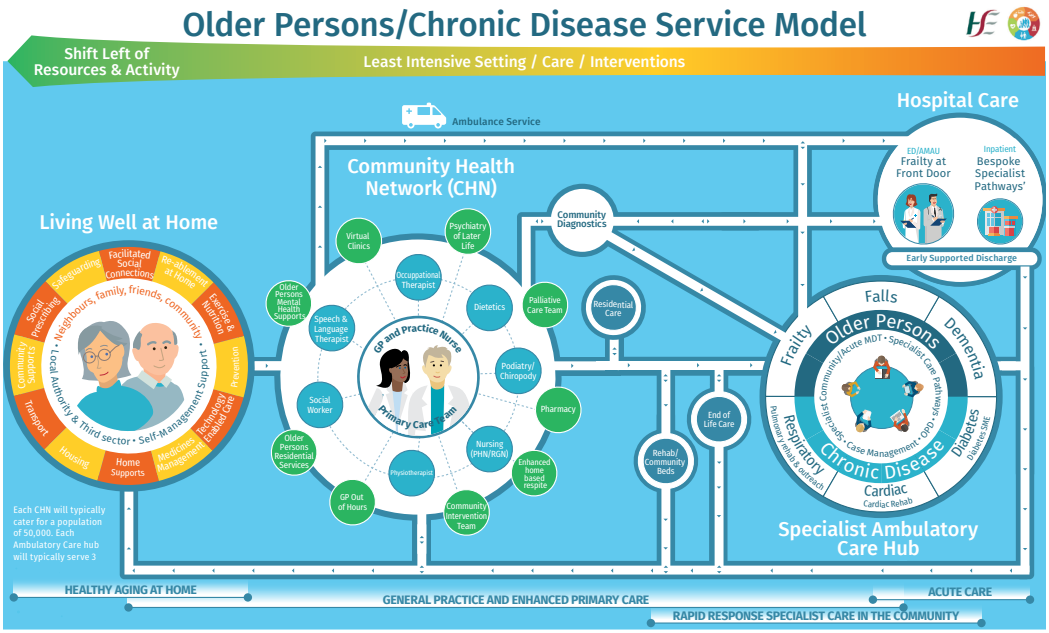
Community Healthcare Networks (CHN) provide the foundation and organisational structure through which integrated care for COPD and asthma is provided locally within the new Regional Health Areas (RHA). The CHN supports the GP- led chronic disease management framework.

Each CHN covers a population of 50,000 people. Specialist Ambulatory Care Teams work within Specialist Ambulatory Care Hubs in a community setting. Each Hub team is affiliated to a local acute hospital service and caters for three geographically adjoined CHNs (total population 150,000).

The CHNs together with the Chronic Disease Specialist Ambulatory Care Hub Teams provide specialist support to the GP in managing COPD and asthma in the community, ultimately preventing unnecessary hospital admissions, supporting early discharge and bringing care closer to the patient's home. The full spectrum of services that are available to patients with chronic disease in any given network is outlined in Fig 2. While level 1 and level 2 services are specific to that network, self-management support services and levels 3 and 4 services should be available in adequate capacity to the network.

To improve access to Pulmonary Rehabilitation (PR), each Hub has a designated PR team providing PR services for its associated three CHNs. This facilitates clear pathways to provide a continuum of care for COPD and asthma in keeping with the NCP Respiratory "End-to-End Model of Care for COPD" and the NCP Respiratory "End-to-End Model of Care for Asthma".

Figure 2. Older Person/Chronic Disease Service Model



3. Pulmonary Rehabilitation Teams

The Pulmonary Rehabilitation (PR) teams are part of the Specialist Ambulatory Care Hub Teams. Care pathways have been developed in line with the NCP Respiratory "End-to-End Model of Care for COPD" and the NCP Respiratory "End-to-End Model of Care for Asthma".
The priority is to provide PR programmes to patients with a recent admission for an exacerbation of COPD, to enable them to regain respiratory functionality along with the skills and confidence needed to manage their condition in the community.
The Pulmonary Rehabilitation team consists of:

- Integrated Respiratory Consultant (or specified Respiratory Consultant until Integrated Respiratory Consultant is in post)
- Clinical Specialist Physiotherapist Pulmonary Rehabilitation Programme Coordinator (1WTE)
- Staff Grade Physiotherapist (rotational) (1WTE)
- Clinical Nurse Specialist (rotational) (1WTE)
- Administration (0.5WTE)

3.1. Interdependencies With Other Services

Pulmonary Rehabilitation (PR) is part of the Integrated End-to-End COPD Models of Care for both COPD and Asthma, which propose a spectrum of services for patients that are individually tailored and designed to optimise each patient's physical and social performance and autonomy. The role of various services across the health service continuum and patient care pathway required to achieve targets in both primary and secondary prevention, and effective chronic disease management can be seen in Figure 1. Patients with chronic diseases are active partners when accessing these services. Pulmonary Rehabilitation is co-dependent on other services including ambulatory clinics such as Oxygen Assessment and Review Clinics and COPD Outreach teams. Together they provide the ability to support the patient and act promptly in the presence of deterioration or exacerbation and to facilitate rehabilitation promptly thereby allowing a swift return to baseline.

The Pulmonary Rehabilitation team work as part of a multi-disciplinary team, thus creating opportunities for interaction and mutual learning between acute and community professionals, successful partnership and working between organisations.
Working together the Pulmonary Rehabilitation team, the COPD Outreach team, Respiratory Integrated team and the diagnostic team can identify "at risk patients" and collaborate with GPs and Consultants and other specialists to ensure pathways are in place for admission avoidance, as well as essential readmission to inpatient care where indicated. This risk stratification involves aligning the multidisciplinary teams with GP network leads and local GP practices, allowing interventions agreed at the team meetings to be co-ordinated with GPs across the local area.

Admission avoidance is achieved by providing direct access to patients, known to the service, experiencing exacerbations of their respiratory disease. This guides the patient through their exacerbation management.

Patients with COPD and asthma at risk of suboptimal outcomes are identified proactively and managed by the Pulmonary Rehabilitation team with other integrated team members to improve outcomes without the need for hospital referral.
Having one integrated respiratory team located in the Specialist Ambulatory Care Hubs also gives the GPs a single point of access to seek the advice of multidisciplinary teams and request support from specialist teams who are able to visit patients in their own homes.

As well as admission avoidance, another pathway in the Integrated Respiratory Service is the Active Recovery Pathway. Patients needing rehabilitation support after discharge from the acute hospital or recovering at home are referred into an active recovery pathway. This service is collaborative with interdisciplinary referral and delivered by the Pulmonary Rehabilitation team.
A further aspect of the Integrated Respiratory service is the ability to collaborate between services in relation to discharge planning, on-going patient education and self-management planning when appropriate.

The COPD Outreach team collaborate with the Pulmonary Rehabilitation team to identify patients post exacerbation for fast tracking for rehabilitation in line with International guidance.

A pathway to refer to smoking cessation advice and for health and wellbeing advice is in place. This ensures that patient care and flow is not fragmented.

The Integrated Respiratory Service also allows for shared learning interorganisationally, between primary and secondary care, and interdisciplinary within the multidisciplinary teams. It facilitates case conferences and Multidisciplinary Team (MDT) meetings.

This PR guidance identifies the essential elements to ensure delivery of a high quality, patient-centered integrated service. Other additional recommended reading includes 'How to set up a Pulmonary Rehabilitation Programme' by Jenkins et al. (2010).

4. Purpose

4.1 Aims

The aim of a Pulmonary Rehabilitation (PR) service is to provide the following:

- A structured and supervised exercise programme.
- Patient education and behavioural programme.
- Patient assessment and outcome measures.
- Recommendations for home based physical activity and self-management strategies.
- Ongoing research and audit in collaboration with third level institutes.

This guidance document aims to provide support and guidance to healthcare professionals to assist in setting up and developing standards for PR programmes, and to ensure a continuum of audit and improvement in the quality of services. This will include:

- The referral pathway for the PR programme.
- Assessment and outcome measures.
- Outlining the structure of the PR programmes.

4.2 Objectives

The following objectives are required to assist the Pulmonary Rehabilitation (PR) programmes achieve the above aims:

- Put systems in place that will ensure the safe and effective delivery of a service that meets the specific medical and rehabilitation needs of the client.
- Identify appropriate setting for PR programmes including virtual components if appropriate.
- Identify outcome measures which are safe and easy to collect.
- Outline the role of each key stakeholder in the programme.
- Ensure standards of practice are maintained in line with national and international guidelines.
- Ensure evidence based practice.
- Facilitate the sharing of information for future service development.
- Comply with GDPR (technology and information sharing and consent).

4.3 Scope

The guidance contained is this document is intended for line managers and clinicians working to establish Pulmonary Rehabilitation (PR) programmes services including:

- Integrated Respiratory Consultants & Respiratory Consultants.
- Clinical Specialist Physiotherapist Pulmonary Rehabilitation Co-ordinators.
- Respiratory Physiotherapists.
- Respiratory Clinical Nurse Specialists (CNS).
- Physiotherapist Managers.
- Nurse Professional Managers.
- Members of the MDT who deliver the educational components of PR programmes.
- GPs referring to the service.
- Operational Leads.

4.4 Patient Population

Pulmonary Rehabilitation (PR) programmes are designed for patients with COPD and asthma who meet the inclusion criteria as outlined below (Table 1).

Table 1: Criteria for PRP Inclusion and Exclusion

Inclusion Criteria	Exclusion Criteria
• Confirmed diagnosis of chronic lung disease by Spirometry and functionally limited by dyspnoea despite optimal management (mMRC2). • Motivated to participate and change lifestyle. • Ability to exercise independently and safely i.e. balance ABC score >67% or other validated Balance assessment tool. • Able to travel to venue or access to appropriate equipment if virtual Pulmonary Rehabilitation.	• Uncontrolled cardiovascular conditions limiting participation in an exercise programme. • Significant orthopaedic, psychological or neurological conditions that reduce mobility or cooperation with physical training. • Suspected underlying malignancy.

*Consideration for those with hearing or eyesight impairment who may require further support to access the service.

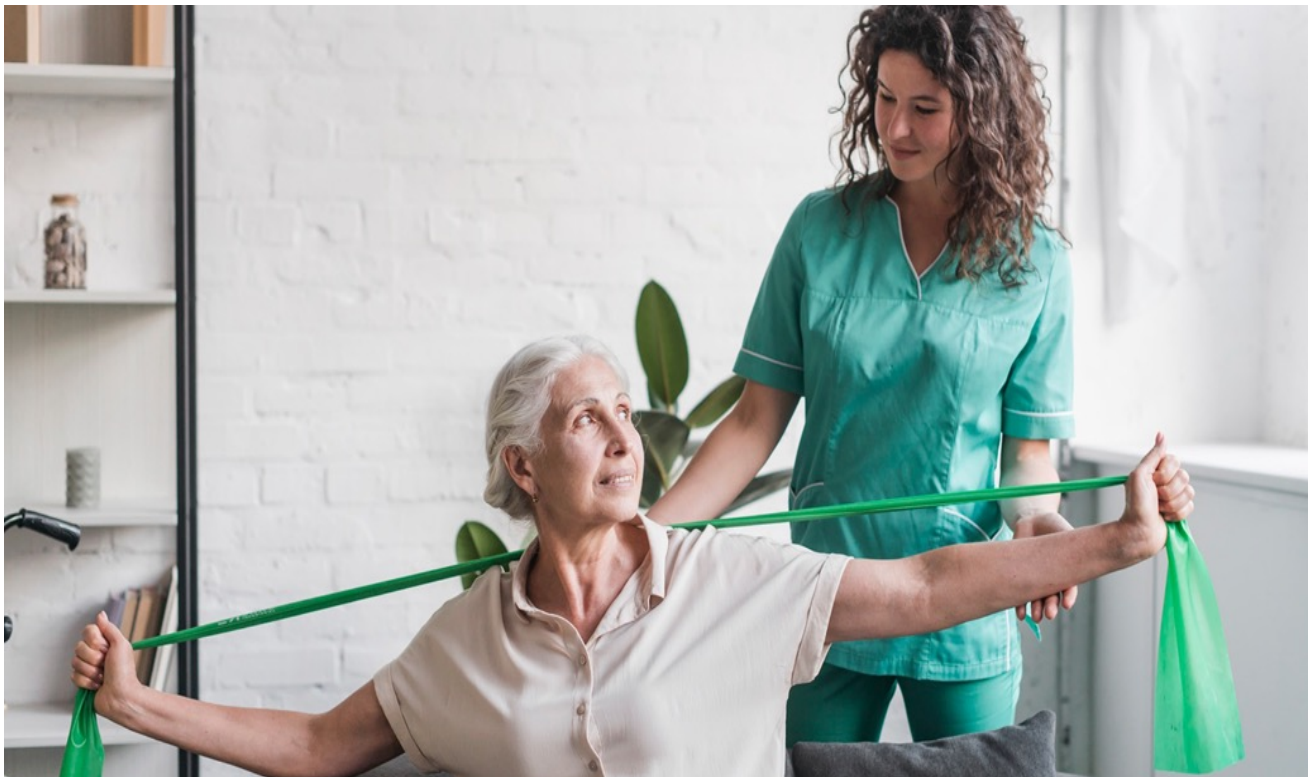
4.5 GP Referrals To Pulmonary Rehabilitation

Historically GPs have had limited access to direct referral to Pulmonary Rehabilitation programmes in Ireland. With the development of the Pulmonary Rehabilitation (PR) teams in the Specialist Ambulatory Care Hubs, there is now direct access to PR for GPs via Healthlink. It is estimated that in the past year, 1 in 4 referrals to the hub PR team has been from GPs using Healthlink (NCP Respiratory data 2024). Access to this service supports the ongoing success of the Chronic Disease Management Programme as well as care closer to home and admission avoidance for hospitals.

In general, GPs will use the same inclusion and exclusion criteria as per Table 1 with the following observations:

- For a new diagnosis of COPD or asthma, spirometry, if available, must be performed to confirm the diagnosis prior to patient referral for Pulmonary Rehabilitation.
- For a historical diagnosis of COPD or asthma, the historical diagnosis should be honoured by the team who received the

referral. If, on receipt of the Healthlink referral, the PR team have concerns regards medical optimisation of the patient prior to PR, the suggested best practice following assessment would be to discuss with the Respiratory Consultant at the multidisciplinary team meeting. Relevant investigations and management can then be optimised as per international guidance (GOLD 2024) prior to commencing the PR programme.



4.6 Governance And Leadership For Pulmonary Rehabilitation

Pulmonary Rehabilitation is governed by a Respiratory Consultant and includes a multidisciplinary team of health care professionals. The design and implementation of a Pulmonary Rehabilitation (PR) programme requires clear leadership, management, governance and accountability to ensure the quality and delivery of a safe patient focused service. The National Framework for Chronic Disease describes the delivery of services through an integrated service model, with services being provided in the community but governed as an integrated service between hospital and community teams.

The National Clinical Programme for Respiratory "End-to-End Model of Care for COPD" and "End-to- End Model of Care for Asthma", combines these services under an integrated governance arrangement with common standards, improved access for patients and with the aim of achieving good clinical outcomes.

Integrated Respiratory Consultants have a specific remit to provide governance to the Pulmonary Rehabilitation service design, implementation and clinical governance and aligning with the Hub model, whilst also ensuring service design in key pathways is aligned with deliverables. In the absence of a supervising Respiratory Consultant, clinical governance is with the referrer.

4.7 Operational Governance In The Specialist Ambulatory Care Hub

The Specialist Ambulatory Care Hub Operational Lead/Head of Primary Care for integrated clinical care services for Chronic Disease Management (CDM) has a remit to support the delivery of key enablers including workforce recruitment, data to drive service improvement, operational function and reporting role to relevant heads of care in their RHA. This individual is also tasked with overseeing the operational function of the local steering group. The Specialist Ambulatory Care Hub Operational Lead/Head of Primary Care ensures an interdisciplinary approach, whilst also monitoring case load and reporting to the Primary Care Service

Manager (General Manager) in the Community. Work force planning/case load management needs to be joint between clinical/ professional manager and operational lead- as clinical managers have greater understanding of profession specific workforce needs/roles/responsibilities/scope of practice and complexity of caseload.

4.8 Professional Governance

All health care professionals who work in the Specialist Ambulatory Care Hubs continue to report to respective professional line managers based within the community for the purposes of professional registration and scope of practice requirements. Individual professional governance is per discipline.

4.9 Roles And Responsibilities

Roles and Responsibilities should be discussed and adapted locally as appropriate. The following disciplines may be involved in Pulmonary Rehabilitation (PR) delivery:

Integrated Respiratory Consultant	Provides support and clinical governance to PR programme. They will oversee and maintain clinical responsibility for the PR programme and will be available to discuss patient care if required. The Respiratory Consultant is responsible for decisions made by the team and for the performance of the service. Sign off PPPG/SOP and supporting service documentation.
GP	Where agreed locally, GP will maintain clinical responsibility for patients they refer to the PR programme.
Clinical Specialist Physiotherapist	• Lead and manage the PR team (ISCP career framework 2022-clinical specialist competencies). • PR Service Co-Ordinator. Overseeing referral management, patient assessment, programme implementation and educational component of PR. • Driving and promoting a performance management culture. In conjunction with line management assist in developing a performance management system for your profession or service. • Act as representative clinical lead at local and national strategic development meetings. • Disseminating information and acting on initiatives and improvements within the resources available. • Act as expert clinical resource offering supervision education and ongoing support to staff and teams managing PR patients. • Evaluation and review of the PR service keeping abreast of latest research in PR evidence and inform the future development of the service locally.
Staff Grade Physiotherapist (may be a rotational post) The level of input in the PR service from the Physiotherapist will depend on their roles and responsibilities and local arrangements. The following list of roles and responsibilities may vary in different teams.	• PR service planning. • Assist in the organisation and implementation of the PR programme to include triaging referrals, patient assessments and overall day-to-day delivery of PR. • Exercise design, delivery, prescription and modification. • Develop and deliver educational content of PR. • Deliver care in line with programme local PPPG guideline. • Record dataset for patients. • Exercise prescription. • Provide feedback as required to Respiratory Consultant/GP providing governance in collaboration with Local Governance/Oversight Group. • Please see NCP Respiratory Competency Framework for Physiotherapists.

Respiratory Clinical Nurse Specialist (may be a rotational post) The level of input in the PR service from the Respiratory CNS will depend on their roles and responsibilities and local arrangements. The following list of roles and responsibilities may vary in different teams	• PR service planning. • Assist in the organisation and implementation of the PR program to include patient assessments, writing patient reports and overall day-to-day delivery of PR. • If Registered Nurse Prescriber, may provide rescue prescriptions as part of management and in alignment with locally agreed policy and national nurse prescribing of medicinal products policy. • One to one sessions with patient when indicated for additional management e.g. inhaler technique. • Work with the Physiotherapist in the delivery of PR exercise classes and be responsible for monitoring patients in the PR class while exercising (to include taking 02 saturations, HR and BORG at specified intervals during the class). • Organise delivery of the educational and self-management components of the program. • Manage and give advice to patients who present to class unwell or become unwell during the class. • For Virtual Pulmonary Rehab (VPR) patients nominate an emergency contact and provide own Eircode for safety reasons. If a patient becomes unwell during a VPR class, the CNS (or another member of the team) phones the patient and assesses the situation. • Evaluation and review of the PR service keeping abreast of latest developments in PR evidence and inform the future development of the service locally. • Keep up-to-date with Continued Professional Development (CPD) and evidence-based-practice relevant to the role. Please see NCP Respiratory Nurse Competency for Pulmonary rehabilitation 2024 document to support this. • Deliver care in line with local PPPG. • Record a local dataset for patients. • Provide feedback as required to the Respiratory Consultant providing governance in collaboration with Local Governance/Oversight Group. • Refer patients to other services as appropriate / as needs arise. • Develop and analyse Patient Experience Questionnaires / feedback forms and adapt the service as appropriate to ensure delivery of a quality service. • Undertake and analyse auditing of the service and note any areas for improvement.
Physiotherapist Manager	• Support the PR programme and PR Physiotherapy team. • Workforce planning. • Clinical professional development planning. • Part of the Respiratory Steering Committee locally.
Director/ Assistant Director of Public Health Nursing	• Support, advise and guide the PR programme and PR Nursing team. • Part of the Integrated Respiratory Steering Committee locally. Delegate local attendance to the CNS if appropriate. • Ensure recruitment and retention interventions are progressed, when required.
Operational Team Lead	• Support the PR programme and PR team. • Workforce Planning.

5. The Evidence Base For Pulmonary Rehabilitation

The National Audit Survey for Pulmonary Rehabilitation (PR) service needs in Ireland (Petty-Saphon, 2016) as part of the National Framework and Implementation Plan for Self-management Support for Chronic Conditions: COPD, Asthma, Diabetes and Cardiovascular Disease (HSE Working Group, 2017) confirmed that there was a considerable lack of PR provision in Ireland, with the capacity to meet only 11% of need for patients following an admission with an acute exacerbation of COPD (AECOPD). It concluded that if other internationally recognised eligibility criteria for referral to PR (e.g. patients with stable COPD) were included in the needs assessment, the deficits in the provision of PR programmes would be even greater. Some of the recommendations were:

- PR programmes should be an integral part of the management of people with COPD and asthma.
- The expansion of capacity of PR programmes.
- Improvement of access.
- A reduction in inequities in service provision together with improvement in the quality of programmes being delivered.
- The strongest evidence suggests that standardised and increased provision of PR for early intervention will likely have maximum beneficial impact.

Robust evidence has repeatedly demonstrated improved exercise capacity and health related quality of life measures including decreased breathlessness, fatigue and healthcare utilisation for patients following a PR programme. In 2015, the Cochrane Airways Board made a decision to no longer update reviews comparing Pulmonary Rehabilitation to conventional intervention due to consistent beneficial findings (Lacasse et al., 2015).

One factor identified as having an impact on PR programmes outcomes is the skillset of the person delivering the programme. Ongoing training is required for staff delivering such programmes in order that they remain up-to date with the best evidence in this area to ensure quality evidence is shared for the ongoing development of services.

As part of PR programmes it is expected that the following will be reviewed as part of ongoing research;

- To review to what degree supervision of the PR programmes impacts on outcomes.
- To explore which intensity of training produces the best results.
- To determine how long the treatment effect persists.
- To determine which component of the programme (i.e. exercise versus education/self-management) produces the desired changes in selected outcome measures.
- To compare the different programme settings i.e. community versus hospital setting; virtual rehabilitation versus other settings.
- To explore outcomes and adherence to maintenance PR programmes. (McCathy et al., 2015; Spruit et al, 2013; BTS, 2013; Ries et al. 2007; Connor et al, 2001; Griffiths et al, 2000).

6. Clinical Considerations

6.1 Points To Consider When Setting Up A Pulmonary Rehabilitation Programme:

1. Programme provision by suitably qualified members of the multidisciplinary team, paying attention to the individual needs of patients and carers.
2. Defined role of individuals running the programme.
3. Inclusion of individualised physical training, disease education, self-management, nutritional management, psychological, social and behavioural intervention.
4. Development/adoption of Quality Standards for Pulmonary Rehabilitation (PR) and review.
5. Development of standardised education and training of workforce.
6. Continuous audit of effectiveness in terms clinical outcome measures, and both clinical and cost effectiveness.
7. The programme should be patient centric and accessible to all that need it.
8. Prioritise investment in PR services to include virtual technology.
9. To explore new opportunities for research.
10. If using a non-HSE venue local arrangements need to be in place for risk assessment, insurance agreement and local payment agreement.

6.2 Risk Assessment

It is recommended that a full risk assessment of the PR venue be undertaken and be an integral part of the local guideline.

For guidance on completing the Risk Assessment Matrix please see the 2008 HSE Document 'Risk Assessment Tool and Guidance (Reference # OQR012) (HSE 2008). Local risk assessment templates also available.

If medical gases i.e. oxygen are required to be stored on site, the following are recommended as a minimum requirement at local level:

- Liaise with relevant oxygen company on requirement for safe storage of the equipment.
- Local Safety Statement on storing oxygen equipment in the environment.
- Link with the local Risk Officer.
- Link with local Fire Officer.
- Relevant staff members to complete the HSELand module on oxygen.

6.3 Medical Emergency

Readers are referred to local guidelines and policies on infection control and Basic or Advanced Life Support (ALS). Pulmonary Rehabilitation (PR) teams should have access to an AED on site. An emergency pathway for deteriorating patients should be drafted and agreed upon locally. In the case of an emergency, dial 112/999 for an ambulance.

Special considerations for all staff working in PR:

- All staff must be qualified and up to date with Basic Life Support training.
- A first aid kit with a CPR mask, gloves and rescue medications is recommended.

- A[1] spacer device (e.g. Volumatic) should be kept on site (funded locally).
- Clients with Type II Diabetes Mellitus should be advised to bring a small carbohydrate drink with them if one is not kept onsite.
- All clients should bring water to exercise classes to avoid dehydration.
- Appropriate dress required: i.e. wearing of cotton layers and comfortable walking or gym shoes.
- Clients who need a chaperone/ family/translator present will be facilitated.

6.4 Prescribed Medications

In the spirit of self-management, patients should be advised that they are responsible for checking and bringing their relevant medications when attending all PR assessments and classes.

A local PPPG or SOP is recommended to manage the risk of the use of medications during PR in conjunction with the governing Integrated Respiratory Consultant. This PPPG/SOP should include defining "an emergency situation" and what the arrangements are between the governing Consultant and physiotherapist/non-prescribing nurse to address any emergencies that may occur.

These include giving medications- prescribed or un-prescribed in an emergency and addressing the following:

- Assisting a patient when they are unable to administer their own SABA/SAMA.
- Patient is prescribed SABA/SAMA and requires it to continue PR but has forgotten it.
- Patient is prescribed SABA/SAMA and brings it to PR however, the device is empty and it is required to continue PR.

6. 5 Infection Control

Universal Infection Control precautions should be written into the local guideline. Local guidelines should include information on the disinfectant/sterilising agent to be used, the strength of the solution, safety wear when mixing solutions, storage and mixing area for chemicals, and individual equipment requirements.

All staff and patients should be aware of HSE cough etiquette and hand washing instructions. For further information, please see the HSE website Hand Washing and Cough Etiquette. Clinical staff should have completed mandatory HSELand online training in this area.

No patient should be participating in a class with a suspected or diagnosed viral infection or bacterial infection. Staff and patients will be encouraged to undertake seasonal vaccination programmes

6.6 Medication Optimisation

Ideally, all patients' medication must be optimised four weeks prior to enrolling on a Pulmonary Rehabilitation (PR) programme. As these guidelines change annually, please refer to the latest GOLD Guidelines for COPD and GINA Guidelines for Asthma for the most up-to-date recommendations.

If a patient is medically optimised but nevertheless continues to experience uncontrolled symptoms, the HCP should screen patients for suitability for a review by other HSCP colleagues; for example an Occupational Therapy for a cognitive review or Speech and Language Therapy for a swallow assessment and discussion with consultant or primary physician.

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[1] For links to Hand Hygiene and Respiratory Etiquette, please see https://www2.hse.ie/wellbeing/how-to-wash-your-hands.html. and https://www.hse.ie/eng/about/who/ healthwellbeing/our-priority-programmes/hcai/resources/dental/sop-2-respiratory-hygiene-and-cough-etiquette.pdf

[2] For a quick guide to the exercise response to cardiac medications, please see Heart online Heart Education Assessment Rehabilitation Toolkit

6.7 Oxygen Therapy

Patients who are prescribed long-term oxygen therapy and/or ambulatory oxygen should have this continued during exercise training. Local guidelines need to be established in the event of an unexpected finding of hypoxia during the Exercise Field Testing; for example, the patient is referred into an oxygen clinic for optimisation of long- term and ambulatory oxygen therapy needs.

Ambulatory Oxygen Therapy (AOT) should be offered to patients for use during exercise in a Pulmonary Rehabilitation (PR) programme or during an exercise programme following a formal assessment demonstrating improvement in exercise endurance (Hardinge et al. 2015)[3]. Upon completion of PR, ongoing AOT prescription should be discussed locally with the Integrated Respiratory Consultant.

7. Guiding Principles

7.1 Referral Criteria For Pulmonary Rehabilitation Programmes

The overall vision of the National Clinical Programme Respiratory, demonstrated within the End-to-End Models of Care for COPD (NCP Resp 2019) and Asthma (NCP Resp 2021) is to provide Pulmonary Rehabilitation (PR) programmes and Virtual Pulmonary Rehabilitation (VPR) in an integrated fashion, ideally in a community setting. However, we acknowledge how some existing PR services are currently delivered in the footprint of an acute hospital. Regardless of the setting, all PR services should aspire to the provision of a single point of referral for PR within their wider Respiratory Integrated Care Services. Please see A Guide for Referral of Patients to the Chronic Disease Specialist Integrated Services 2024 for further information.

Patients who have had a recent exacerbation of COPD should be referred to a PR programme and be enrolled within one month of discharge from hospital (IMPRESS 2011).

Patients with stable COPD should be referred to PR if their exercise capacity is limited by breathlessness, i.e. MRC 3-5 (mMRC 2-4). Patients who fall outside of these dyspnoea parameters may be individually discussed for inclusion as appropriate. In addition, those who have significant disability or have been discharged from hospital with an MRC score of 2 (mMRC score of 1) should be offered a place if suitable. It is recommended that all patients be offered a place within three months of receipt of referral (BTS Quality Standards, 2014).

The inclusion and exclusion criteria for PR programmes are displayed in Table 1. Locally agreed inclusion/exclusion criteria, together with a clear group understanding of the contraindications to exercise is vital and should be clearly documented in local departmental guidelines.

[3] For Irish Guidelines on oxygen therapy please see the attached link (https://irishthoracicsociety.com/wp-content/uploads/2017/12/O2-Guidelines-Final.pdf)

Table 1: Criteria for PRP Inclusion and Exclusion

Inclusion Criteria	Exclusion Criteria
• Confirmed diagnosis of COPD or Asthma by Spirometry and functionally limited by dyspnoea despite optimal management (mMRC2). • Motivated to participate and change lifestyle. • Ability to exercise independently and safely. • Able to travel to venue or access to appropriate equipment if Virtual Pulmonary Rehabilitation programmes.	• Uncontrolled cardiovascular conditions limiting participation in an exercise programme. • Significant orthopaedic, psychological or neurological conditions that reduce mobility or cooperation with physical training. • Suspected underlying malignancy.

*Consideration for those with hearing or eyesight impairment who may require further support to access the service.

Where patients do not meet the referral criteria, they may be suitable for another exercise programme on offer i.e.: no transport suitable for home exercise programme or Virtual Pulmonary Rehabilitation.

Where more than one Pulmonary Rehabilitation service is operating in an RHA the PR coordinator should triage to programmes appropriately. This will depend on the level of need and services available and clinical decisions will be based on the individuals' stage of disease or severity of respiratory symptoms, which limit physical activity.

7.2 Referral Sources

The referral source will be determined locally as hospital and community sources may differ. These include

- General Practitioners via Healthlink.
- Respiratory specialists including physicians, surgeons, physiotherapists and nurses.
- General physicians.

In all cases, a standard Pulmonary Rehabilitation (PR) programme referral form should be completed.

Locally agreed inclusion/exclusion criteria, together with a clear understanding of the contraindications to exercise is vital and should be clearly documented in local departmental guidelines

Table 2. Pulmonary Rehabilitation Referral Sources to Specialist Ambulatory Care Hub

Specialist Service	Who can refer?	Referral Guideline	Clinical Governance of the patient	Guideline for discharge/ return to referrer
Integrated Pulmonary Rehabilitation Service • Clinical Specialist Pulmonary Rehabilitation Coordinator • CNS • Staff grade Physiotherapist	The pulmonary rehab service can accept direct referrals from: • The GP if patient has had full respiratory workup and is stable (Level 1) • Members of the Community Specialist Respiratory Team including IC Consultant (Level 2) • The COPD outreach Level 3. • The acute hospital Respiratory • Consultants (Level 3 / 4).	Patients resident within the CDCST/CHN catchment area and: • Stable medically optimised COPD and Asthma • Motivated to participate and change lifestyle • Ability to exercise independently and safely • Able to travel to venue or access to appropriate equipment if virtual Pulmonary Rehabilitation. • Patients resident within the Hub/ CHN catchment area.	Clinical governance of patients referred to the Pulmonary Rehab service is with the Respiratory Consultant leading the service. In the absence of a supervising Respiratory Consultant, clinical governance is with the referrer.	• Patient discharged and letter sent to referrer with copy filed in the Healthcare Record. • The Specialist Community Team interventions are intended to be focused, time-limited interventions to support the GP to care for the patient in the community.

Ref: A Guide for Referral of Patients to the Chronic Disease Specialist Integrated Services 2024

7.3 Assessment

A comprehensive initial assessment is performed after the patient is deemed suitable for Pulmonary Rehabilitation (PR). The clinical assessment should cover the components of the WHO categories (WHO 2001) of Body function, Activity and Participation, and Health. In addition to the minimum standards and outcome measures required by the NCP Respiratory, the assessment should help to determine levels of frailty, coordination, adherence to respiratory inhalers and identify ambulatory oxygen therapy needs. All clients should ideally be medically optimised four weeks prior to commencing the exercise part of the programme.

The following need to be completed as a minimum, and where possible a measure of quadriceps muscle strength is highly recommended. After this, other outcomes may be chosen for individual patient needs and specific research purposes.

Physiological baseline measures

- Heart rate.
- Blood pressure.
- Respiratory rate.
- Oxygen saturations.
- Height.

- Weight.
- Estimate body mass index (BMI).

The results of these outcomes pre and post exercise field-testing will guide the lead physiotherapist in determining patient suitability for inclusion onto the PR programme.

Measures of Dyspnoea

- Modified BORG Score, Modified Medical Research Council Score for Breathlessness (mMRC).

Measure of Balance

- A Static Balance Test. Example: Four Point Balance Test (Rossiter-Fornoff et al. 1995). Activity and Participation.

Exercise Field Tests

- 6Minute Walk Test.

OR

- Shuttle Walk Test (Holland et al. 2014, Singh et al. 1992).
- For exercise testing, at least one measure is required from measures of functional exercise capacity such as the Six-Minute Walk Test (6MWT) or the Incremental Shuttle Walk Test (ISWT) (15-21). Each test should be repeated twice with appropriate rest period in-between to rule out a learning effect.
- Using a Rate of Perceived Breathlessness (RPE) scale (Borg 1998) during exercise and exercise testing may be an alternative to the mBORG score.
- Where space is a premium the following may be considered bearing in mind that the percent-predicted formulas will no longer apply (Beekman 2013).
  - » 4MWT.
  - » 10m 6MWT.
  - » Alternatively, the 1min Sit to stand may be considered (Vaidya et al. 2016).

Health Related Quality of Life

- Agreed goals.
- One disease specific quality of life questionnaire.
  - » The COPD Assessment Test (CAT) (Recommended by the NCP Respiratory for COPD patients). (Jones et al. 2009).
  - » Generic QOL Measure: St. George Respiratory Questionnaire, Chronic Respiratory Disease Questionnaire (CRDQ).
  - » Asthma Quality of Life Questionnaire (AQLQ for Asthma). (Everhart et al. 2010).
  - » Bronchiectasis Health Questionnaire (BHQ) for Bronchiectasis. (Spinou et al. 2017).

- One generic QOL questionnaire.
  - » The EuroQol 5D-5L (EQ-5D-5L). (Herdman et al. 2011).

- Psychiatric Questionnaires.
  - » The Hospital Anxiety and Depression scale (HADs). (Zigmond and Snaith 1983).
  - » General Anxiety Disorder 7-item (GAD-7).
  - » The Patient Health Questionnaire (PHQ-9). (Schwaighofer et al., 2014).

N.B. It is the responsibility of each service to obtain licenses for use where applicable

Other aspects of patient assessment may include Physical Activity, Respiratory Muscle Function, Fatigue, Functional Status, Nutritional Screen, Cognitive Impairments, Self-Efficacy and Social Supports.

7.4 Pre-screening Procedures/Inductions:

The initial face-to-face session for each participant will include:

- Check patient details.
- Assessment of motivation and commitment to the exercise programme.
- Discussion about expectations for the programme and realistic, achievable individual goal setting.
- Education about the Borg Scale.
- Setting of realistic target outcomes.
- Provision of general information materials i.e. smoking cessation handout.
- Explanation of the structure of the sessions.
- Information including use of changing facilities and contact numbers for queries.

A patient information resource pack should be considered which should include the following items:

- Participant Pre-Exercise Check List.
- Breathing techniques.
- Advice on how to avoid the Valsalva manoeuvre during lifting of weights.
- Explanation on warning signs to guide on the need to decrease intensity of exercise.

7.5 Exercise Prescription

Exertional dyspnoea experienced by COPD patients is multifactorial in origin, partly reflecting peripheral muscle dysfunction, the consequences of dynamic hyperinflation, increased respiratory load or defective gas exchange. These limitations are aggravated by an age-related decline in function, the effects of physical deconditioning and compounded by the presence of co-morbidities (Spruit et al. 2013). The physiotherapist, taking the above into consideration, may need to either modify an individual's prescribed exercise programme as required throughout the programme or, if the limitation to exercise is outside the scope of practice, discuss with the lead respiratory Consultant and/or referring GP.

Individual exercise prescription is required to address findings such as:

- Muscle atrophy
  - » A reduction in peripheral muscle mass compared to normal subjects predominantly in the quadriceps and distal lower limbs with the upper limbs relatively preserved from these structural changes in patients with COPD (Maltais et al. 2014; Whittom et a 1998).
- Sarcopenia
  - » A muscle disease that can occur over a lifetime [readers are referred to the revised European Definition and Diagnosis paper (2019)].[4]
- Cachexia
  - » Results in altered metabolism and muscle maintenance [readers are referred to the pathophysiology of Cachexia in COPD (2009)].[5]

For any patient considering Pulmonary Rehabilitation with a BMI less than 19, it is vital that they are referred to a Dietitian for a one on one assessment prior to commencing rehabilitation. This is in order to avoid negative energy expenditure because of participating in the class.

The exercise dosage should increase over time (the overload principle) to facilitate improvements and can be modulated by increasing the resistance, the repetitions per set, increasing the number of sets per exercise and/or the rest period between sets or exercises (FITT principle - frequency, intensity, time and type). The following also needs to be considered:

- Optimise medical management- progressed over time.
- Bronchodilator therapy and oxygen therapy.

- Optimal management of co-morbidities.
- Individualised exercise programme.
- To include aerobic and resisted training.
  - » Two supervised exercise sessions of 1-hour duration plus one unsupervised session.
- Home exercise programme (HEP)
  - » A HEP for an addition 30mins x 3 days is prescribed in order to achieve the required 150 minutes (2hrs and 30min) of moderate intensity physical activity (PA) per week during the PR programme (US Department of Health and Human Services 2018).

Measures of heart rate, oxygen saturations and dyspnoea at rest scores should be recorded at baseline and during exercise-the field exercise test (Jenkins et al. 2010). During testing, consider stopping or resting if:

- Increased heart rate such that it approaches age predicted maximum (Age-220) or 80% of the Karvonen predicted Heart Rate (Ignaszewski et al. 2017).
- A deterioration of > 4% or SpO2 <90% may indicate a need for ambulatory oxygen therapy (Hardinge et al. 2015, Irish Thoracic Society Oxygen 2015).
- Marked wheeze or inability to finish a sentence.

In the spirit of self-management, patients should be advised that they are responsible for checking the following before attending Pulmonary Rehabilitation:

- AOT: checking the battery and/or level of oxygen gas left in their ambulatory oxygen therapy device before attending as the site may not have access to oxygen.
- Bring short-acting bronchodilators and Glycerol Trinitrate spray to the assessment/classes if prescribed, as the site may not have access to these medications.
- If diabetic, patients should be advised to bring their glucometers and a glucose supplement to encourage independent management of any hypoglycemic events.
- If allergic patients are carrying hypodermic needles, they should advise their physiotherapist/nurse.
- Increased heart rate such that it approaches age predicted maximum or 80% of the Karvonen predicted HR.
- SaO2 < 80% or as per local Respiratory Leads' clinical recommendation.
- Marked wheeze or inability to finish a sentence.

7.6 Contraindications To Exercise

Both the Pulmonary Rehabilitation (PR) coordinator physiotherapist and CNS screen referrals for suitability for the programme. It is the overall clinical responsibility of the physiotherapist to ensure all clients are exercised safely and triaged appropriately. For an in-depth discussion on the contraindications to exercise, testing and training see Piepoli et al. (2011).

Class participants should be symptom checked prior to each class and advised not to exercise if they have a fever or systemic illness or have become suddenly unwell. The patient must be made aware that they have a responsibility to monitor their own symptoms prior to attending classes and to seek medical advice when appropriate. If medical intervention is required, the individual will be able to recommence the programme upon receipt of a medical clearance note from GP or medical team.

[4] Cruz-Jentoft A et al. Sarcopenia: Revised European Consensus on Definition and Diagnosis. Age Ageing 2019:48(1):16-31
[5] Schols A and Gosker H. The Pathophysiology of Cachexia in Chronic Obstructive Pulmonary Disease Curr Opin Support Palliat Care. 2009; 3(4):282-7

8. Structure Of The Pulmonary Rehabilitation Programme

8.1 Pulmonary Rehabilitation Programme Sessions

The Pulmonary Rehabilitation (PR) programme sessions should adhere to the published recommendations and guidelines (Piepoli et al. 2011, McCreery et al. 2013). Each session should contain components of a gradual warm up to accommodate those with stable Chronic Cardiac Failure, gentle stretching of major muscle groups, cardio and strength training, and a cool down. A minimum of two supervised training sessions per week for a minimum of six weeks with the goal of on-going engagement by the client. An example is as follows:

- 10-15 minute warm up period.
- 30 minute programme of activity (moderate to somewhat severe intensity) guided by the Borg Score or RPE.
- 10-15 minute cool down period.

A relaxation/socialisation period should be incorporated into the programme that participants should be encouraged to partake in, as part of the session, before going home.

The PR programme should run with the following format but the individual classes will not be identical due to the style of the individual instructor. The content should comply with the following format.

At the start of each class, the following will be checked:

- All members of the MDT involved in the exercise component of the class will familiarise themselves with the participant's medical history and risk assessment.
- That all members of the class are well and have no new symptoms (pre exercise checklist - displayed on wall of studio).
- Participants are reminded about working at a safe and therapeutically effective intensity (Borg Scale or RPE displayed on wall of studio).
- Check that the venue is in a safe and appropriate condition for the session to commence.
- Check oxygen saturations and or blood pressure if indicated.

8.2 Warm Up

The warm up (which includes pulse raising, mobility and preparatory stretching) should be a minimum of 15 minutes in duration.

8.3 Conditioning Component

The conditioning component can be either a circuit style session or a fitness suite style session however, both sessions should comprise of the following elements:

- Have multiple cardiovascular workstations, which use the major muscle groups of the upper and lower limbs.
- Programmes should be individualised to ensure that participants work at their own individually prescribed exercise-training zone.

This will be achieved through the use of the following variables and follow the training guidelines for strength training (Piepoli et al., 2011) and the BORG breathlessness score or Rate of Perceived Exertion for cardio sessions.

Many patients will not be able to perform a 1-repetition max (1RM), therefore, this will be calculated using the Oddvar Holten Diagram and formula, which is, used with pregnant women and athletes alike (Oostdam et al. 2009, Demey and Willington 2010).

- Intensity of the activity / resistance of the individual piece of equipment.
- Duration spent at individual stations.
- The speed /range of the movement.
- The overall duration of the conditioning components.
- The number and frequency of rest periods.

The clients Heart Rate and Systolic Blood pressure will be spot monitored during strength training if this is the chosen modality. The Target Heart Rate (THR) will be estimated using the Karvonen formula (Max HR – Resting Heart rate (RHR)) x target intensity i.e. 60% + RHR = training HR). A check during continuous/endurance exercise to ensure the clients are not over exerting will be the 'talk test' (Reed and Pipe 2014); for all training programmes clients should not have a feeling of 'air hunger' which would indicate the inflection point of cardiovascular response and muscle oxygenation during exercise (Ofir et al. 2008, Dubé al 2011).

8.4 Interval Training Versus Continuous Training

Interval and continuous training are safe and equally effective modes of training to improve endurance performance in patients with COPD (Vogiatzis et al. 2002). Interval training is a modification of endurance training. Interval training may be useful in promoting higher levels of exercise training in the more symptomatic patients. This is recommended as it allows smaller bouts of high intensity work rate to be achieved with lower symptoms i.e. smaller bouts (typically lasting 30s – 180s) of high-intensity exercise (80-120% peak capacity) separated by lower-intensity exercise bouts (50-80% peak capacity) (Maltais et al. 2014, Elliot et al. 2004, Troosters et al. 2005, Vogiatzis I 2004).

Moderate intensity interval training will be the training method of choice for those who experience increased ventilatory limitation during the 6MWT. For those participants familiar with this training method, they will be commenced at a 1-minute exercise at moderate intensity followed by 1-minute passive rest for a total of 20mins. For those not use to exercising, training time will be of 30sec duration at moderate intensity followed by a 30sec passive rest for a total of 10 minutes.

Endurance training should be avoided in patients who are severely limited from a respiratory perspective during exercise and for those who fit the criteria on Spirometry for Asthma. A nasal breathing pattern will be encourage to avoid dehydration and damage of the of the airway epithelium (Kortianou et al. 2010; Ross et al. 2016).

8.5 Treadmill Walking

Treadmill walking will commence at 80% of the average 6MWT/ISWT speed (converted to kph) and increase to 100% over time. Those individuals new to the treadmill walking will have their speed reduced by an additional 0.5kph for the first time (Chandrasekaran and Reddy 2018).

8.6 Ground Walking

When possible endurance ground walking will be facilitated as the specificity of this activity will carry over well to daily life at an intensity of a BORG score of between 4 and 5. For the more severely breathless patient intervals of 1-2 minutes with a break of 1 minute may be more tolerated (Gloeckl et al. 2013).

8.7 Exercise Bike

Moderate interval training and endurance training on the bike will be determined based on levels of dyspnoea using the BORG score. Where the appropriate equipment is available, one-legged cycling will be offered to those with severe ventilatory limitation (Evans et al. 2015).

8.8 Cool Down

A gradual 10-minute cool down that encourages the maintenance of venous return with a gradual decrease in workload and gentle stretches.

8.9 Flexibility And Stretches

Brief periods (5-10 minutes) of upper and lower body flexibility exercises are recommended to maintain muscle length and prevent injury and soreness (Jenkins et al 2010). Flexibility training should also focus on improving thoracic mobility and posture to help increase the vital capacity in patients with chronic respiratory disease (Spruit et al 2013).

8.10 Inspiratory Muscle Training

Inspiratory Muscle Training (IMT) may be considered as an adjunct to the exercise training component of PR in patients with poor baseline inspiratory muscle strength as measured by inspiratory muscle testing protocols. The reported frequency and intensity of IMT training range from 30% to 80% of baseline PiMax making it difficult to make recommendations (Beaumont et al 2017).

9. Multidisciplinary Education

Patient education is a core component of a comprehensive Pulmonary Rehabilitation (PR) programme and where available MDT members with the appropriate expertise to address these issues contribute to the success of PR. Education can be provided in a variety of mediums, face-to-face sessions- for e.g. either before or after exercise class, literature or online resources (see NCP Respiratory website). Key topics recommended include:

- Respiratory anatomy, physiology and disease education.
- Nutritional advice.
- Chest clearance and breathing control techniques.
- Role of medication and inhaler therapy.
- Self-management knowledge and skills.
- Psychological and behavioral intervention, anxiety management and goal setting.
- Symptoms control and exacerbation management.
- Smoking cessation.
- Incontinence management.
- Relaxation and energy conservations.
- Swallow, voice, oral hygiene, singing for lung health.
- Advance care planning and planning for the future.

Education sessions should be supported where available by approved written information, videos or online programmes with consideration for literacy, language or vision issues.

Evidence of knowledge gained should be measured using a validated outcome measure tool.

In line with the British Pulmonary Rehabilitation Accreditation Standards (2015) (Singh and Johnston 2015), the NCP Respiratory recommend that six hours of learning be provided by members of the MDT and that patients are provided with materials, which may include documentation/videos/booklets, to support independent at home.

10. Self-management And Behaviour Change

Self-management 'refers to an individual's ability to manage symptoms, treatment, physical and psychological consequences and lifestyle changes inherent in living with a chronic condition (Meis et al. 2014). On completion of the Pulmonary Rehabilitation (PR) programme all patients should be provided with information, regarding existing voluntary groups/networks which they can contact for ongoing support and social interaction, e.g. COPD Support Ireland/ Asthma Society of Ireland / Alpha 1 Foundation Ireland / HSE Living Well Programme. Support groups allow the patient to take an active role in their health management. Patients also need information on local venues where they can continue to exercise.

11. Setting And Resources For Pulmonary Rehabilitation

Specialist Ambulatory Care Hub Pulmonary Rehabilitation teams provide Pulmonary Rehabilitation (PR) programmes in either a hub or satellite centers in community/primary care setting and patients attending PR are at varying stages of the disease in terms of severity and symptoms.

11.1 Facility And Equipment

A room/gym size of 50 square metres has been suggested as sufficient for a Pulmonary Rehabilitation (PR) programme (Daly et al 2015). The PR programme venue should have a suitable space in relation to the number of people being treated and the interventions being performed including space of either a level corridor or walking track suitable to carry out a field walking test (Holland et al 2014, Singh et al 2014). Table 3 below outlines the minimum required equipment for PR programme.

Table 3 Equipment for PR Programme

Minimum Required	
• Pulse Oximetry, Blood Pressure Monitor, Weight scale, Height Measure, BMI chart. • Stopwatch (for assessments and exercise sessions). • Aerobic Equipment (Walking track and Trundle for 6MWT/ ISWT). • Grip Strength Dynometer. • Stairs / Chair. • Weights and resistance equipment that can be progressed.	• Music system and cones. • Chairs. • Emergency Equipment i.e. access to a telephone and AED/First Aid equipment as discussed under safety. • Individual egg times or Tabata timer app if circuit based class. • Computer/printer/paper for patient handouts and Virtual PR option. Overhead projector for educational component. • Portable oxygen, nasal prongs (appropriate and safe storage must be available at local level.

Equipment used should be appropriately checked and serviced as recommended by the manufacturer guidelines. Information technology systems and platforms need to be considered and meet GDPR requirements.

11.2 Group Size

There is no recognized limit to the number of participants in an exercise session so class size will depend upon a number of factors i.e. the venue, staff available, and the profile of the class members. This will depend on the participants' risk stratification and the level of supervision required based on their cardiac status and/or co-pathologies - e.g. orthopaedic/neurological limitations. Staff to patient ratios recommended are:

- **Exercise**
  - » 1:8 (UK)
  - » 1:4 (US)
  - » In all cases two qualified persons should be present (29).
- **Education**
  - » 1:16 (UK)
  - » 1:8 (US)

The Chartered Society of Physiotherapy (CSP) developed a 'Recommendations for COPD Model' (2017) which specifies that physiotherapists are uniquely qualified to individually prescribe and progress the training regimen, and to teach appropriate breathing techniques to enable exercise in those with altered lung pathology and/ or respiratory mechanics. This is particularly important in the complex breathless patient and for those with co-morbidities requiring exercise modification (CSP 2017). One senior member of staff must be present at all times (Spruit et al). Cohort or rolling programmes are acceptable forms of delivery depending on local considerations.

11.3 Duration

The minimum duration of exercise training in Pulmonary Rehabilitation (PR) has been extensively investigated and longer programmes yield larger, more reliable training effects. The recommendation of the National Clinical Programme Respiratory is that programmes (i.e. the exercise and education component) are of at least 6 weeks duration, with the pre and post programme assessments as additional to this.

Programmes should include a minimum of twice-weekly supervised sessions (at least 12 sessions). A third session per week of prescribed exercise is recommended and can be unsupervised.

11.4 Repeat Pulmonary Rehabilitation Programmes

Repeat Pulmonary Rehabilitation (PR) programmes may be considered in patients who have completed a course of PR more than 1 year previously (BTS Guidelines 2013). Increasing patient's access to repeated courses where clinically indicated (e.g. post-acute COPD exacerbation) has the potential to improve patient's health over the course of their lives and to reduce healthcare costs (Holland et al 2014, Griffiths et al 2001).

12. Patient Satisfaction And Experience

A measurement of patient satisfaction and experience (both exercise and educational) after completion of the programme facilitates service user feedback regarding what was found to be useful. This feedback will help guide the future development of the programme. An example of a patient satisfaction questionnaire can be found on the Lung Foundation Australia Pulmonary Rehabilitation Toolkit . A friendly time out after class that encourages patients to discuss their own circumstances with others in a similar position and a certificate of completion can have a positive effect on satisfaction with the service and instill a sense of achievement.

13. Maintenance And Post Pulmonary Rehabilitation Programmes

Pulmonary Rehabilitation programmes improve quality of life, mobility and decreases hospital utilisation in COPD patients. However the benefits of a six to eight week Pulmonary Rehabilitation (PR) programmes are short-lived and may not effect long-term change in behaviour although participation is better than non-participation at maintaining the number of daily steps compared to no intervention at all (Deering et al. 2011). Research has shown that benefits achieved during a short-term exercise intervention diminish after three months. Improvement in form does not necessarily carry over to an improvement in function, i.e. an improved exercise capacity does not necessarily lead to increased activity levels after a 6-8week based programme (Egan and Deering et al. 2012). However, more recently a 3-year maintenance programme has demonstrated no deterioration in the 6MWT and the BODE prognostic score at 2 years (Güell et al., 2016).

The short-term improvement in 'form' translating to long-term maintenance of 'function' in terms of physical activity and lifestyle changes are the ultimate goals of future Pulmonary Rehabilitation programmes. Available evidence suggests that both short-term and long-term strategies must be employed for maintaining benefits. While it is recognised that continuing exercise is the responsibility of the patient, part of the health professional's role in the maintenance programmes is to assist the patient with their choice of long-term exercise (Meis et al., 2014). A lack of on-going tutoring support and care has been cited as one reason for the failure to remain physically active. It is thought that this lack of support makes it difficult for individuals to successfully transfer the exercise behaviour they learned in the short-term rehab sessions into their everyday life.

COPD Support Ireland, supported by NCP Respiratory and the HSE, has sought to address these issues by providing Peer Support & Exercise Groups for the COPD and overlap cohort throughout Ireland. In 2024 there are currently 45 groups in operation offering weekly exercise, peer support and educational sessions in the community. With a long-term plan of offering at least one group in each Community Health Network in Ireland, it is hoped that supervised maintenance strategies will be extended to a wider reach in the near future. Healthcare professionals should refer suitable candidates to these groups via the following referral form on the COPD Support Ireland website. https://copd.ie/health-professionals/hcp-referral-form/

Other add-ons to Pulmonary Rehabilitation should currently be viewed as signposting opportunities rather than referral pathways.

In conjunction with other agencies, HSE Health & Wellbeing are exploring and developing general physical activity pathways and community based general exercise programmes for people living with chronic disease.

14. Virtual Pulmonary Rehabilitation (VPR) Programmes

Virtual Pulmonary Rehabilitation (VPR) is an ideal model to support respiratory PR services during periods of service disruption. Although the Covid-19 pandemic provided serious challenges to the provision of traditional face-to-face PR throughout Ireland, it provided us with an opportunity to further develop the role of tele-rehabilitation in the area of PR. Through local innovation, several centres developed VPR. VPR was utilised to minimise the impact of restrictions on PR services and for those in quarantine or where social distancing measures were recommended. VPR now offers continued access for service users, prevents service interruption and is a viable alternative for those patients who may not be able to attend face-to-face PR. VPR is consistent with the vision of Sláintecare, VPR truly provides 'Right Care, Right Place, Right Time' (Government of Ireland, 2021).

The NCP Respiratory have previously published a Guidance on setting up Virtual Pulmonary rehabilitation 2023. This guidance provides a standardised approach to VPR and should be read in conjunction with this document.

These programmes should be incorporated alongside existing programmes. More recently it has been identified that VPR would be especially beneficial for patients recovering from COVID-19 (Vitacca et al. 2020) due to the similarity in exercise training principles used for chronic lung disease.

Both the uptake of places and resources, i.e. human and equipment, impact negatively on attendance rates in conventional PR programmes. The goal of setting up PR services in the right place at the right time is being hampered by the distances required to travel by both staff and patients to venues and results in gaps in service. VPR, which compliments conventional programmes, are the next stage in the evolution of PR programmes in Ireland.

15. Measurable Outcomes

The collection of data will help to track and plan care, identify additional care, facilitate performance monitoring and aid quality improvement efforts.

At a minimum, measures of exercise capacity, dyspnoea and health status are assessed. The Pulmonary Rehabilitation (PR) teams should also ensure that measurements to assess other elements of PR are accommodated if possible.

The aim of the PR programmes is that the majority of people are expected to achieve the Minimal Clinically Importance Difference (MCID) in the chosen exercise test, dyspnoea score and health status score.

A summary of the pre assessment should be forwarded to the GP/Consultant before the programmes commences. On completion of the programme, the post assessment results should also be forwarded to the referral source and offered to the patient.

The Enhance Community Care (ECC) programme developed new metrics in 2024 with the most recent metrics in Appendix 1. The metrics are returned by ECC staff on a monthly basis.

16. Quality Standards

In 2018, the Royal College of Physicians in England, in partnership with the National Asthma and COPD Audit Programme, developed the Pulmonary Rehabilitation Services Accreditation Scheme (PRSAS) with the aim of assuring a quality assurance process in the delivery of Pulmonary Rehabilitation services in England. To support this process, a document was developed which identified eight standards to guide the scheme. These standards were since updated and a toolkit developed. Readers are referred to this document for audit of their own service standards (Singh et al. 2015).

The NCP Respiratory (COPD & Asthma) recommends the adoption of the BTS 10 Quality Standards with the minimum recommendation being that:

1. There is clear leadership and accountability for the service.
    - » At a minimum the involvement of a respiratory Consultant for governance and a clinical specialist respiratory physiotherapist to co-ordinate referrals and have clinical responsibility for the assessment, prescription and progression of therapeutic exercises.
2. People with COPD fulfilling the inclusion criteria, if accepted, be offered Pulmonary Rehabilitation and enrolled within 3 months of receipt of referral.
3. Offer at a minimum a structured and supervised exercise programme of at least 6 weeks in duration and include at least twice-weekly supervised sessions per week.
4. Development and delivery of disease specific patient self-management programs.
    - » It is recommended that members of the MDT be involved in the development and delivery of educational components. If any member of the MDT is not available to support this then carefully selected educational videos are viewed as a second option.
5. Pre and post assessment to include outcomes of exercise capacity, dyspnoea and quality of life.
6. Provision of recommendations for ongoing maintenance exercise.
7. Audit of services annually on individual outcomes and measured against agreed standards.

17. Acknowledgements

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18. Appendices

Appendix 1 ECC Monthly Metrics 2024

- No. of patients referred and accepted onto the Pulmonary Rehab (PR) Programme
- No. of patients referred but not accepted onto the PR Programme
- No. of patients commencing the PR Programme
- No. of patient contacts with the PR Programme.

Clinical metrics can be collected as appropriate locally.

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