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From acute phase to rehabilitation: bridging the gap and improving the pathway for Chronic Obstructive Pulmonary Diseases patients (Summary of a Pulmonologists' Audit - September-December 2024)

Michele Vitacca[1], Massimiliano Beccaria[2], Luca Bianchi[3], Paolo Ceruti[4], Maurizio Marvisi[5], Monia Betti[6], Michela Bezzi[7], Francesco Tursi[8]

[1]Respiratory Rehabilitation Unit, Istituti Clinici Scientifici Maugeri IRCCS, Institute of Lumezzane (Brescia), Italy; [2]Pulmonology Unit, Poma Hospital Mantua, Italy; [3]Don Carlo Gnocchi Foundation, ONLUS, IRCCS Milan (Spalenza Hospital Rovato – BS) Italy; [4]Pulmonology Unit, ASST del Garda, Desenzano del Garda Facility (BS), Italy; [5]Internal Medicine, Cardiology and Rehabilitation Department: Istituto Figlie di S. Camillo, Cremona, Italy; [6]Pulmonology Unit, Cremona Hospital, Cremona, Italy; [7]Pulmonology Unit, ASST Spedali Civili di Brescia, Brescia, Italy; [8]Cardiorespiratory Rehabilitation Unit, Codogno Hospital (LO), Italy

ABSTRACT

Introduction: Despite the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines providing a detailed pathway for the management of chronic obstructive pulmonary disease (COPD), the Italian reality is characterized by underdiagnosis, organizational disharmony, and poor adherence to treatments. COPD entails significant economic and organizational costs, including healthcare expenses, delayed diagnoses, and fragmented management. Therapeutic approaches are often non-standardized and influenced by local practices.

Methods: The audit presented here aims to provide suggestions to optimize COPD patient management, from the acute phase to stabilization, focusing on diagnosis, therapies, respiratory rehabilitation and follow-up, while proposing a coordinated pathway that could optimize patients and healthcare needs.

Results: Eight specialists (1 internist and 7 pulmonologists) with extensive professional experience participated in the audit meetings. During three 4-hour sessions spread over three months, participants discussed background information, challenges and suggestions related to disease management. Topics were presented by designated leads, discussed by the group, and summarized into suggestions voted on using a Delphi-like process. Suggestions were approved if at least 75% of participants rated them above seven out of ten. The process produced a final list of shared suggestions. The audit group highlighted that the current management approach for COPD patients—both in the stable phase and during exacerbations requiring hospital admission, discharge, and post-acute respiratory rehabilitation—remains fragmented, inconsistent, and poorly standardized. The group approved 29 improvement suggestions (21 achieved unanimous approval) across six main areas: a) The pathway for suspected or confirmed COPD patients; b) Therapy during the stable phase; c) Exacerbations/hospitalizations; d) Intensive care admissions requiring tracheostomy; e) Hospital discharge and f) Indications for respiratory rehabilitation.

Conclusions: This work offers a unique pulmonologist's point of view and suggestions based on literature, best practices, and field experiences to improve collaboration among stakeholders and provide more effective care for COPD patients.

Key words: care continuity, hospitalizations, care network

Correspondence: dott. Michele Vitacca, Respiratory Rehabilitation Unit, Istituti Clinici Scientifici Maugeri IRCCS, Institute of Lumezzane (Brescia), Italy - E-mail: michele.vitacca@icsmaugeri.it

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Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive respiratory condition that causes airflow obstruction and breathing difficulties, primarily linked to smoking, pollutants, childhood infections, and genetic factors [1]. Symptoms include chronic cough, shortness of breath, and wheezing. It is the third leading cause of death worldwide, with rates expected to rise by 2030 [1-3]. Severe exacerbations increase mortality and the healthcare burden [1, 2]. Factors such as delayed diagnosis, limited access to care, poor treatment adherence, and lack of prevention exacerbate the issue [1].

Diagnosis relies on simple spirometry, supported by radiological and blood tests. Patients are classified into groups A, B, and E based on symptoms and exacerbation frequency [1].

Although the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines [1] propose a structured and detailed diagnostic-therapeutic pathway—both pharmacological and non-pharmacological—for managing COPD from exacerbation to stabilization and end-of-life care, the international reality, and particularly the Italian context, reveals widespread underdiagnosis of the disease, cultural indifference, limited knowledge of optimal care pathways, organizational disharmony, and poor adherence to evidence-based treatments [2].

Managing COPD entails various economic and organizational challenges that affect the healthcare system, patients, and their families [1]. Economic challenges include direct costs (medications, hospital admissions, rehabilitative therapies, home oxygen therapy) and indirect costs (loss of productivity, informal care, disparities in access). Organizational challenges include late diagnosis, fragmented management, poor treatment adherence, inadequate territorial healthcare networks, and difficulties managing exacerbations [1, 2].

Moreover, therapeutic approaches during the chronic and acute phases of the disease appear poorly standardized and are often influenced by local practices and organizational habits, which are rarely coordinated by pulmonologists. Both hospital and home care approaches are often characterized by therapeutic inertia and a lack of comprehensive care for a complex, multifaceted chronic disease such as COPD.

Given the increasing prevalence and significant socioeconomic impact of COPD, a systematic and coordinated approach is necessary placing both patient and sustainability of the healthcare system at its center.

This report summarizes the results of an Audit focused on the complete care pathway for COPD patients, from hospital admission to the need for respiratory rehabilitation and structured follow-up.

The primary objective of this audit was to explore all items of the COPD pathway, expanding on areas where there is a genuine gap in knowledge and offering clearer guidance to medical and non-medical colleagues where current evidence is limited or where real word experience is more far from guidelines.

The document and its contents reflect the opinions of experts and the consensus achieved after a review of the literature, group discussions, and efforts to reach consensus.

Specifically, the objectives were: i) to explore the best care pathway for COPD patients, from the subacute, acute, and post-acute phases requiring hospitalization to discharge to home, fostering the development of a network between rehabilitation facilities and acute care departments; ii) to focus on diagnostic, therapeutic, and educational aspects during hospital admission and the continuation of care after discharge; iii) to identify the criteria that make a COPD patient, or more broadly a patient with respiratory disease, eligible for hospitalization in specialized pulmonology units and respiratory rehabilitation; iv) to collect and compare best practices derived from the participants' experience.

Methods

Eight participants (1 internist and 7 pulmonologists, 3 affiliated with a specialized respiratory rehabilitation center and 4 with acute care pulmonology units), all heads of medical Units with 26-35 years of professional experience, met for an audit over three sessions (4 hours each) within a three-month period to develop final suggestions for optimal management of COPD patients.

In the first session, the main chairman (MV) introduced the consensus process, with different topics

presenting the background and challenges. All participants were involved in the analysis and mapping of the existing pathway, and identification of barriers to the application of clinical recommendations (structural, technological, organizational, professional).

In the second session, peer feedback was initiated to evaluate the removal of obstacles, the local adaptation of clinical guidelines, the construction of the pathway and the structuring of suggestions. Each participant presented a summary of their topic previously assigned.

In the last session the suggestions were summarized and presented and the results were shared during the session. Each topic leader invited the group to discuss their real-world practices.

Over the course of three months, the main chairman sent the final statements to the group, and the focus group was invited to vote using a Delphi-like process [4], where each participant voted independently, without influence from others in the group.

Each suggestion was considered approved if at least 75% of the group (6 out of 8 participants) rated it above 7 (on a scale of 0, completely disagree, to 10, completely agree). A final list of suggestions was then compiled.

Results

The audit group discussed and reviewed six main topics: 1. the pathway for patients with suspected or confirmed COPD 2. therapy during the stable phase 3. exacerbation/hospitalization time 4. admission to intensive care with the need for tracheostomy 5. hospital discharge 6. indications for respiratory rehabilitation. Below is a summary of the group's presentations and discussions.

The pathway for patients with suspected and confirmed COPD

All audit team participants emphasized the need for a new organizational model that integrates specialists and general practitioners through a network of services to ensure personalized and appropriate patient management. The direct benefits of this strategic solution could include reduced waiting, fewer inappropriate emergency department visits, earlier diagnosis of the disease, increased prevention, and improved access to healthcare [5].

The audit group proposed a care model (Figure 1) as Service Network in which nodes are connected by shared pathways for patient care and prevention, utilizing telemedicine tools as operational mechanisms for sharing expertise and information. In this pathway, the key nodes for patient care are represented by the General Practitioner (GP), the Hospital, the Community Home, and, most importantly, the Home which should become the primary care setting. The network nodes are related by common care and prevention pathways that recognize remote healthcare tools (teleconsultation, tele-visit, tele-nurse and telemonitoring) as an operational means for exchanging expertise and information. This process begins with smoking screening which is carried out both by the GP and in the community home: this approach aims to identify early patients at risk of developing COPD offering a baseline screening spirometry and an initial drug prescription, enabling timely intervention to prevent disease progression. The model promotes close collaboration between the GP, who plays a key role in patient monitoring and initial disease management, and the hospital, which offers second-level lung function testing, handles more complex cases, prescribes definitive drugs, oxygen therapy and ventilation, manages emergency needs and moderate/severe exacerbations. Additionally, through the use of telemedicine, the hospital shares consultation with the GP, assesses treatment adherence, follows the patient to detect exacerbations early, and prevents complications related to exacerbations and hospital admissions [6]. The management of COPD patients in groups A and B may be delegated to the GP, while the stratification of disease severity is a strategic element based on the pulmonologist with his specialized team; in this respect, hospitals closely linked to GPs, would continue managing the most complex patients (group E COPD) with or without oxygen therapy or ventilation therapy, using remote monitoring tools to assess adherence, clinical issues, and device-related challenges. The audit discussed deeply the process of patient transition and communication between the different nodes of the system and when patients would be transferred from the basic

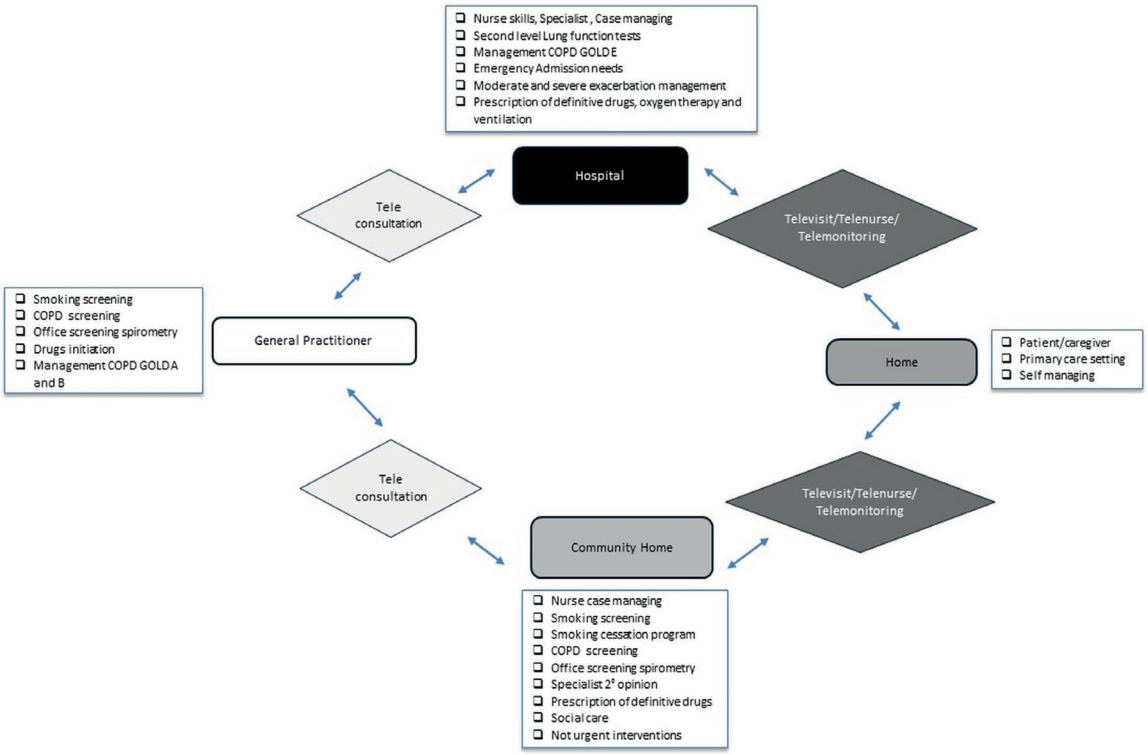

Figure 1. COPD care network for early diagnosis and optimal care.
GP: General Practitioner; COPD: Chronic Obstructive Pulmonary Disease.

level (GP) to the higher level (pulmonologist) according to clinical worsening, clinical instability, personal history of disability and poor quality of life.

Therapy during the stable phase

The audit summarized the current literature proposed in guidelines, and approved the majority of GOLD suggestions [1] as long-term symptom control, a drug therapy approach including bronchodilators with or without inhaled corticosteroids, depending on the COPD phenotype. Audit experts agreed that COPD treatment [1] requires continuous patient monitoring to evaluate, adapt, and review therapy, and that triple therapy has an added value for disease stability with promising results on survival [1, 7, 8].

Audit proposed that in patients with confirmed disease, and irrespective of the FEV_1 level, may be appropriate to initiate therapy with LABA and LAMA in combination to obtain the maximal and synergistic benefit of bronchodilatation, instead of a slow escalation from one to a second drug, considering also the difficulty of performing a strict follow-up with long waiting times for specialist visit. The audit discussed deeply the suggestion to propose early initiation of triple therapy in patients with frequent and severe exacerbations and in the presence of cardiovascular and metabolic comorbidities.

It is specific opinion by the audit of experts that patient education on the correct use of devices is a critical issue, as improper usage leads to therapy non-adherence. While there is no "optimal" device, it is important to select the appropriate device for the patient. For stable COPD home management, pressurized metered-dose inhalers (pMDIs) and dry powder inhalers (DPIs) are preferable to nebulizers, which can become contaminated if not cleaned correctly. Nebulizers are reserved for patients who have difficulty using inhalers. Proper

pMDI use involves exhaling to residual capacity, slowly inhaling the medication, and holding the breath for 3-4 seconds. Spacers improve drug distribution and reduce coordination problems, but require regular cleaning to prevent drug build-up. DPIs require rapid and deep inhalation for effective drug deposition.

The audit did not unanimously agree on the different roles of GPs and pulmonologists. Primary care would conduct clinical suspicion, perform basal spirometry, assess symptoms and exacerbations, initiate early therapy, manage comorbidities, and prescribe vaccinations. Pulmonology settings would focus on phenotyping, prescribing inhaled corticosteroids alongside dual bronchodilation (triple therapy), and ordering second-level testing (e.g., chest CT, blood tests, complete spirometry, DLCO, 6-minute walk tests, nocturnal oximetry). Follow-up of complex cases, oxygen therapy, and advanced pharmacological and non-pharmacological treatments would be also carried out in specialized settings. In both settings, device selection, patient education, smoking cessation advice, and ensuring adherence to inhaler therapy are priorities, given the dramatic real-life data that only 18% of COPD cases are adherent to regular therapy [9].

The audit did not find an agreement on the long-term use of azithromycin to reduce exacerbations [2,8] although azithromycin has been demonstrated to be usefulness in preventing COPD exacerbations in patients with frequent or severe episodes, especially non-smokers with bronchiectasis [10].

Exacerbation/Hospitalization

Audit agreed on COPD exacerbation definition as an acute event characterized by worsening dyspnea, cough, and sputum production less than 14 days, often caused by infection or pollutants, leading to increased local and systemic inflammation [1].

Audit found that a new severity classification based on objective criteria, including dyspnea, heart rate, respiratory rate and oxygen saturation, with additional symptoms including fever, accessory muscle use, peripheral edema, and reduced alertness [11], was very useful in real life. Table 1 summarizes clinical and instrumental criteria for therapeutic and care decisions [1], including the most appropriate setting in which to treat and admit patients.

Audit stressed that relapses' triggers include non-adherence to therapy, anxiety, depression, smoking, environmental irritants, pollution [12], and infections (30% bacterial, 24% viral, 25% mixed) [13]. The audit subtitled that recurrent exacerbations lead to greater functional loss (decline in FEV_1) and reduced quality of life [14], with hospital readmission rates of about 14% at 1 month, 21-34% at 3 months, and 25% at 1 year, and mortality rates of 13.4% at 6 months, 22% at 1 year, and 35.6% at 2 years [15].

The group discussed that COPD often remains undiagnosed until the first severe exacerbation, as demonstrated in an Italian study [16] which revealed that one-third of patients in the Emergency Department

Table 1. Clinical and Instrumental Values Useful for Guiding Therapeutic and Care Setting Decisions.

Severity Level	Arterial Blood Gas Analysis	Symptoms and Signs	Interventions
1st	PaO_2 = 41-55 mmHg $PaCO_2$ = 46-69 mmHg pH = 7.34-7.30	Increased dyspnea in the preceding days, sudden dyspnea, purulent sputum, cyanosis, peripheral edema, tachycardia.	Identify the cause, initiate medical treatment, oxygen therapy.
2nd	PaO_2 = 30-40 mmHg $PaCO_2$ = 70-80 mmHg pH = 7.29-7.25	Resting dyspnea, rapid and shallow breathing, accessory muscle use, cyanosis, hepatomegaly, jugular vein distension, tricuspid regurgitation, somnolence, agitation, mental confusion, flapping tremor, stupor.	Intensify medical treatment, initiate non-invasive ventilation and/or high-flow oxygen therapy, transfer to respiratory intermediate care or general intensive care.
3rd	PaO_2< 30 mmHg $PaCO_2$ > 80 mmHg pH< 7.25	Respiratory muscle fatigue, respiratory asynchrony, apnea, life-threatening arrhythmias, hypotension, shock, coma.	General intensive care admission, continue non-invasive ventilation and/or proceed to endotracheal intubation.

(ED) for exacerbations had never been diagnosed or had undergone spirometry, despite the severity of disease.

As a result of the present audit, participants proposed that after the early stabilization in the ED, patients should either be discharged and referred for pulmonary follow-up, or hospitalized in a specialized setting, or transferred to intensive care. A list of criteria is helpful to prioritize patients based on the initial identification of acute respiratory failure, especially if the patient is hypercapnic, has multiple comorbidities, or has severe cardiovascular comorbidities.

Not unanimously, the audit suggested that throughout the whole course of the exacerbation, even from the acute phase in ED, a pulmonologist would be supportive to share patient's clinical, diagnostic and prognosis condition, and to evaluate whether a transfer to a semi-intensive care unit (if available) or intensive care is indicated.

As a result of our audit, participants proposed that pulmonologist's consultation is essential before a patient with even a suspected diagnosis of COPD is discharged. The pulmonologist would then initiate inhaler therapy, recommend an appropriate vaccination schedule, providing a treatment plan, and an appointment to perform spirometry in stable condition.

Admission to intensive care with the need for a tracheostomy

Once a patient is admitted to the Intensive Care Unit (ICU), they are typically managed in an appropriate setting, often with invasive support via endotracheal intubation. The clinical course may follow one of three pathways [17]: a) Immediate weaning, if the patient is extubated within 24 hours of ICU admission; b) Difficult weaning, if the patient is not extubated within 24 hours but is successfully extubated within 7 days and c) Prolonged weaning if the patient cannot be weaned from mechanical ventilation within 7 days, requiring tracheostomy and a prolonged ICU stay. The most significant challenge for patients tracheostomized due to various conditions (e.g., degenerative neurological diseases, respiratory failure, or syndromes such as myopathies and neuropathies) is the lack of a comprehensive, multidisciplinary rehabilitation take in charge to address all emerging dependencies. These patients also require a high intensity of care and are significant consumers of healthcare resources [17].

The suggestion that the patient, once tracheostomized, requires a dedicated care pathway from the ICU to home with a specific medical team was not approved by all audit members.

The group suggested that a distinction should be made between tracheostomized patients without mechanical ventilation, typically managed by an otolaryngologist, and tracheostomized patients requiring mechanical ventilation, usually managed by a pulmonologist. The audit suggested that the care team for tracheostomized patients with dependencies related to ventilation, phonation, nutrition, and mobility should ideally include personnel with skills in chronic care, an experienced rehabilitation pulmonologist, a (respiratory) physiotherapist, and a speech & language therapist [18].

The team would warrant a personalized transition from hospital to home, ensuring appropriate assistance and treatment with the support of a specialist home care service. Establishing such a team would reduce unnecessary days of acute care hospitalization and optimize the use of ICU and semi-ICU beds. Additionally, the team (nurse, respiratory therapist, pulmonologist with specific expertise in respiratory rehabilitation) should manage tasks such as cannula and gastrostomy replacements in the home setting.

Discharge

The group unanimously suggested that once a COPD patient is admitted to an acute hospital, care should be stepwise, moving from high to medium and low intensity.

The discharge team would always consider several patient needs before returning home: smoking cessation support, personalized rehabilitation program, written information plan assistance, devices educational sessions and a clear outpatient follow-up appointment [19].

The audit group was unanimously in pointing out the importance of monitoring appropriate inhalation therapy, the level of independence in self-administration of treatment at home without supervision, and adherence to treatment, with subsequent feedback provided to the physician. Again, all participants unanimously suggested that the discharge team should

triage for personalized rehabilitation program need and/or coordinate management together with the GP responsible for proper follow-up and prescribing a pulmonology consultation with or without an office lung function test within 3 months after hospitalization.

The candidate for respiratory rehabilitation

After discussion, the working group unanimously emphasized that in order to identify the ideal candidate for post-hospitalization rehabilitation, patients should be assessed according to four domains (function, disability, social participation, personal expectations) to tailor treatment to their individual disabilities, symptoms, and impairments. The four key pillars for evaluating whether patients are suitable for rehabilitation have been identified as: a) evaluation of residual function b) evaluation of disability c) evaluation of social participation d) evaluation of personal expectations.

The audit group suggested that a comprehensive COPD management approach should consider both the patient's and the clinician's perspective.

Patient issues include disease awareness, responsibility for smoking cessation, personal goals, social participation, physical well-being, self-esteem, anxiety management, self-efficacy, social support, quality of daily life, motivation to exercise, sleep quality, sexual health, pain management, stress, balance, care dependency, and fear of relapses. The clinician typically focuses on exacerbations, blood gas abnormalities, biomarker such as endothelial dysfunction, body weight, medications, comorbidities, lifestyle factors, vital signs, lung function, and mortality.

Recent literature has focused on measuring and improving the "treatable traits" of the disease through dedicated rehabilitation pathways [20, 21]. Treatable traits have been divided into four broad categories: a) pulmonary b) extrapulmonary c) behavioral and d) risk factors related to complex dependencies that require significant care resources [20, 21].

Table 2 summarizes all the items/conditions discussed in the focus group that require attention and can be measured at the time of discharge from an acute care hospital by physicians and nursing staff, with the goal of recommending/requesting a specialized personalized rehabilitation pathway. While several measurements are not routinely performed in the acute setting at the time of discharge, 14 (highlighted in bold) (Table 2) have been posed as essential, easily measurable by any healthcare professional (nurses, physiotherapists, doctors), and could serve as mandatory criteria for recommending inpatient or outpatient complex rehabilitation. The 14 proposed mandatory conditions (Table 2) for prescribing respiratory rehabilitation include: comorbidities, residual dyspnea, a history of recurrent exacerbations, disease impact, chronic respiratory failure, severely altered pulmonary function as expressed by a low FEV_1 and hyperinflation, poor

Table 2. Recommended Items to Suggest/Request a Specialized Rehabilitation Pathway.

EXTRAPULMONARY	Peripheral fatigue; Reduced peripheral strength (<70% predicted); **Comorbidities (especially cardiovascular and neurological)**; Reduced score on Sit-to-Stand test (1 minute); Impaired balance; Cognitive deficits.
PULMONARY	**Dyspnea on exertion: MRC scale > 2**; **Frequent exacerbations**; **High clinical impact (CAT score >15)**; **Chronic respiratory failure requiring O_2,** non-invasive mechanical ventilation, or presence of a tracheostomy; **FEV_1 <50% of predicted**; **Static hyperinflation (RV >150% predicted)**; Sleep disturbances; Low values of maximum inspiratory and expiratory pressure (MIP/MEP); Bronchial hypersecretion.
BEHAVIORAL	Smoking habit; Low physical activity (<5,000 steps/day); **Poor adherence to medications/ inability to use inhalation devices**; Polypharmacy (>5 medications); **Poor disease knowledge.**
RISK FACTORS	**Poor nutritional status: Body Mass Index (BMI) <21 or >30**; **Anxiety/depression**; Poor self-care ability; **Fragility (social: no adequate caregiver)**; Poor perceived quality of life; **Advanced age**; Low socioeconomic level; Reduced daily activities (ADLs); Poor subjective well-being; **Recent hospitalization**; Low social participation.
COMPLEXITY FACTORS	Urinary catheter in place; Clinical instability; Dysphagia; Bedsores; Pain; Reduced alertness; Active infections; Delirium.

medication adherence, limited disease knowledge, poor nutritional status, anxiety/depression, frailty, advanced age, and recent hospitalization.

The audit team unanimously considered that there are multiple challenges in clinical practice, primarily due to a lack of awareness about rehabilitation, mainly inappropriate approach, especially for patients with severe comorbidities, and lack of serious rehabilitation planning. The group considered particularly inappropriate that, although Pulmonary rehabilitation (PR) has been shown to be a cornerstone of non-pharmacological therapy for chronic respiratory diseases, improving physical and psychological conditions and promoting long-term adherence to health-enhancing behaviors [22], the low implementation of PR on a broader scale remains a disappointing reality.

Not all members of the group agreed that a policy of equity in rehabilitation care is desirable to ensure equal access to high quality pathways across the country, regardless of economic or geographical factors.

Voting on suggestions

On the basis of the work carried out, the main chairman (MV) presented 30 proposals to the group (Table 3). The group approved 29 proposals, while no consensus was reached on one. Twenty-one proposals were approved unanimously (100%), eight were approved with non-unanimous consensus (75.0%-87.5%), and one suggestion was not approved, achieving only 50.0% support. Table 3 summarizes all proposed, approved, and rejected suggestions.

Discussion

This report describes an audit work on the care and continuity of care of patients with COPD; the work conducted, between specialists in pneumology and internists, has tried to put in order the care processes, evaluating the quantity and quality of the stakeholders involved, reasoning on new paths, mapping needs, consumption, types of patients, redefining standards, indicators, critical issues and possible changes.

This work critically evaluated current clinical practice considering current guidelines, best practices, and field experiences, identifying weaknesses, areas for improvement, and proposing six intervention areas with 30 suggestions, of which 29 were approved by the experts involved.

The main findings highlighted the need to standardize and improve the management chain for COPD patients, from risk factor prevention to early diagnosis, as well as the management of patients with severe exacerbations requiring hospitalization and rehabilitation.

The group agreed on the usefulness of a new organizational model based on integration between specialists and community medicine, structured into service networks supported by telemedicine. The model emphasizes the stratification of disease severity as a strategic element enabling the forecasting of healthcare needs to design precise, effective, and efficient responses. It recognizes the importance of appropriate care settings, prioritizing home care as the main site of treatment and hospitals for managing more complex cases. Telemedicine pathways [5], in their various applications, are becoming essential tools for collaboration between healthcare providers (teleconsultation), remote monitoring of oxygen saturation and ventilation parameters (telemonitoring and teleassistance), early detection of disease worsening signs, verification of adherence and correct treatment administration (teleassistance), periodic clinical check-ups (televisits) and rehabilitation interventions (telerehabilitation) [6)]. The responsibility for delivering the telemedicine service could be based on mixed actors (GPs, pulmonologists) supported by nurses as dedicated telemedicine case managers according to level of patients' severity.

Telemedicine tools could be tightly integrated into the clinical pathway to support daily decision-making and patient monitoring. The suggestion that a multidisciplinary team, based on non-medical figures such as nurses and respiratory therapists, could be involved as strong case manager in the process, especially in the prevention and follow-up phases, did not meet with unanimous agreement. The reason might lie in the fear that too broad a delegation to non-medical figures could reduce patient trust and the quality of the proposed intervention. While this approach improves patient-centered management, treatment adherence, and reduces costs [23], challenges include role definitions, workload, and

Table 3. Approved/Not Approved Suggestions with Percentage of Approval.

#	SUGGESTIONS	APPROVED/NOT APPROVED	% APPROVAL
	The Pathway for Patients with Suspected and Confirmed COPD		
1	The general practitioner, whose patient shows symptoms indicative of COPD, should perform an initial "investigative" spirometry in an outpatient setting to establish a suspected diagnosis and initiate long-acting inhalation therapy as soon as obstruction is confirmed.	APPROVED	100%
2	Investment in screening programs is necessary to identify COPD at early stages, especially in smokers and at-risk populations.	APPROVED	100%
3	It is urgent to define a new organizational model integrating specialists and general practitioners, structured within the context of a Network of Services supported by integrated pathways conducted with the help of remote technology (telemedicine), focusing on the management of COPD patients based on clinical and prescribing appropriateness.	APPROVED	100%
4	The establishment of a multidisciplinary care team where the nurse/case manager plays a central role in facilitating the planning of the care pathway and fostering collaboration among professionals contributing to the Network is essential.	APPROVED	87.50%
	Therapy During the Stable Phase		
5	In patients with confirmed disease, it is appropriate to initiate therapy with LABA and LAMA in combination, even considering the long waiting times for a follow-up specialist visit.	APPROVED	100%
6	The indication for triple therapy (LABA+LAMA+ICS) in combination, using a single inhaler, has the dual objective of improving or stabilizing symptoms and reducing the number of exacerbations and thus healthcare costs.	APPROVED	100%
7	In patients with frequent and severe exacerbations and in the presence of cardiovascular and metabolic comorbidities, early initiation of triple therapy is recommended.	APPROVED	100%
8	The use of a combination of LABA and an inhaled corticosteroid without LAMA is no longer recommended for COPD patients unless they also have concomitant asthma.	APPROVED	100%
9	The appropriate setting for determining the optimal device for a patient should involve the GP, who, together with their support staff, should explain in detail how to use the prescribed device and periodically verify correct usage, for example, during follow-up visits.	APPROVED	87.50%
10	In primary care settings, the following interventions are feasible: conducting clinical suspicion (risk factors and symptoms), performing simple spirometry, making an initial diagnosis, evaluating symptoms and exacerbations, initiating early therapy, managing comorbidities, and prescribing vaccinations.	APPROVED	75.00%
11	Improving adherence to inhalation therapy is essential throughout the healthcare chain, considering unsatisfactory real-life data (only 18% of COPD cases adhere regularly to therapy) and the critical role adherence plays in disease control.	APPROVED	100%
12	Promoting informational campaigns to increase patient awareness about disease management and the importance of therapeutic adherence is necessary.	APPROVED	100%
13	Long-term therapy with azithromycin is an effective addition to prevent COPD exacerbations in patients with repeated or severe exacerbations, particularly those who are currently non-smokers and have bronchiectasis as a comorbidity.	NOT APPROVED	50.00%
14	Antibiotics should only be used in patients with increased dyspnea, increased sputum volume, or purulent sputum, or in patients requiring mechanical ventilation (invasive or non-invasive).	APPROVED	75.00%

Table 3 (*Continues*)

#	SUGGESTIONS	APPROVED/NOT APPROVED	% APPROVAL
	Exacerbation/Hospitalization		
15	COPD is a disease that is currently being treated by many non-specialist physicians and, as a result, is not being correctly diagnosed.	APPROVED	100%
16	COPD or a complex respiratory problem causing respiratory failure must be evaluated by a pulmonologist immediately or at a later stage.	APPROVED	87.50%
17	If the patient is particularly severe and cannot be discharged from the ED, they must be placed in a respiratory intermediate care unit, clearly defining the roles of the intensivist, pulmonologist, and geriatrician.	APPROVED	75.00%
18	A pre-discharge pulmonology evaluation is mandatory, during which the specialist establishes a treatment plan (triple therapy) with a diagnostic suspicion of "COPD," providing the patient with exemptions, a therapeutic plan, and a spirometry appointment.	APPROVED	100%
19	It is mandatory to establish a virtuous fast-track system between general practitioners and specialists to enhance patient management.	APPROVED	100%
	Admission to Intensive Care with the Need for Tracheostomy		
20	When a patient arrives in intensive care already tracheostomized or requires tracheostomy during their stay, they must immediately be assigned to a medical team to manage and follow their care pathway.	APPROVED	87.50%
21	It is strongly recommended to establish a specialist Home Care Service (ADI) with hospital-level expertise to support tracheostomized patients at home.	APPROVED	100%
	Discharge		
22	The discharge team must always consider transferring the patient to or involving a specialized rehabilitation team.	APPROVED	100%
23	One or more educational sessions for nurses and patients are essential to ensure correct treatment adherence, with feedback provided to the physician afterward.	APPROVED	100%
24	Greater integration of services is necessary by creating multidisciplinary networks involving physicians, specialists, nurses, and physiotherapists for more coordinated management.	APPROVED	100%
25	A thorough field trial of digital tools (telemedicine and telemonitoring) is desirable to monitor patients remotely, evaluating the true cost-benefit ratio of timely interventions managed remotely.	APPROVED	100%
	The Candidate for Respiratory Rehabilitation		
26	To identify the ideal candidate for post-hospitalization rehabilitation, it is necessary to cluster patients into four domains (function, disability, social participation, personal expectations) to personalize care based on the degree of disability, symptoms, and needs.	APPROVED	100%
27	Priorities for patients and the appropriateness of proposed rehabilitation settings must be established.	APPROVED	100%
28	Measurable and essential conditions for prescribing a respiratory rehabilitation pathway include comorbidities, residual dyspnea, exacerbation history, disease impact, the presence of chronic respiratory failure (CRF), low FEV_1, hyperinflation, poor medication adherence, low disease knowledge, poor nutritional status, anxiety/depression, frailty, advanced age, and recent hospitalization.	APPROVED	100%
29	A culture of rehabilitation is lacking to first determine the type of rehabilitation needed for the patient, assessing whether it is general geriatric, respiratory specialist, cardiology, or palliative.	APPROVED	100%
30	A policy of equity in care is desirable to ensure uniform access to quality pathways nationwide, regardless of economic or geographic factors.	APPROVED	87.50%

limited resources. Studies confirm that nurse case managers reduce mortality and improve quality of life in COPD patients, making this practice generally recommended [24], but success depends on training, collaboration, and available resources.

Audit expressed differing opinions on the role of primary care. All components agreed that primary care physicians play a crucial role in the early diagnosis and long-term management of COPD [1], but workload, lack of training, poor organization, and limited use of technology hinder the effectiveness of community medicine, making it challenging to define common operational solutions. Whereas the group agreed that COPD is often misdiagnosed and poorly managed when treated by non-specialist physicians, the common feeling within the group was that community medicine is yet unprepared to offer adequate services such as spirometry or that it is sufficiently competent on the subject of the respiratory pathologies. The group reached a consensus on therapeutic choices, the use of drug classes, and the importance of treatment adherence. However, the group did not unanimously support the long-term use of azithromycin to prevent exacerbations in stable COPD, despite promising data are available in severe COPD patients with frequent exacerbations [19, 20]. The reason for rejecting this suggestion is that the published data on this topic are not strong enough to support the regular use of azithromycin together with the fear of possible complications. Another issue raised was the prescription of antibiotics when the patient has increased dyspnea, sputum volume or purulence, or requires mechanical ventilation [1]. The reason for the lack of unanimity is the fear of indiscriminate use of antibiotic therapy at home even in less dramatic and serious situations such as mild exacerbations. The use of antibiotics for home-treated exacerbations should be guided by clinical criteria to avoid resistance and reduce hospitalizations, although overuse remains a risk [1, 25].

Regarding acute respiratory failure (ARF) treatment in the ED, there was no agreement on the mandatory involvement of a pulmonologist or transfer to the respiratory semi-intensive care unit. The lack of complete agreement on this topic can be explained by the fact that this suggestion implies an organizational rigidity and a particularly intense and perhaps unsustainable pneumological presence, which also presupposes the presence and availability of semi-intensive pneumological beds. Although semi-intensive care reduces mortality and prevents complications [26, 27], logistical constraints, costs, and limited resources necessitate patient selection and a flexible approach for effective personalized care. Pulmonology consultation in the ED is particularly indicated for patients with complex, severe or unclear ARF causes and those with significant respiratory comorbidities [28, 29]. The audit encouraged an integrated approach between the ED personnel and respiratory specialists to improve care quality, reduce complications and mortality, and always considering local organization.

The group approved the need for integrated specialist home care, with hospital-level expertise to support tracheostomized patients at home, but not the immediate involvement of a medical team to follow these patients from the ICU to home. The reason for this is that this suggestion, although logical and potentially useful, is impractical given the limited resources available and the fragmented organization dedicated to these patients. Although the integrated approach is considered beneficial for home care [30], it is hindered by organizational complexity, lack of clear leadership, economic sustainability, and territorial disparities.

Regarding hospital discharge recommendations, the group unanimously supported the need to always consider rehabilitation, educational needs, and multidisciplinary care opportunities, possibly through telemedicine pathways. The possibility of creating a "checklist" of indications and suggestions at the time of discharge from the acute setting might promote standardization and efficiency of follow-up opportunities.

The group also agreed on the importance of identifying ideal candidates for respiratory rehabilitation, prioritizing on the basis of objective indicators and promoting greater awareness of its value. However, there was no consensus on adopting a policy of equity of care, although such a principle aims to ensure equitable and high-quality access for all [31]. The lack of consensus lies in the idea that a true equity of access to rehabilitation field, independent of organizational and economic factors, is very difficult and utopian. Challenges include organizational disparities, economic sustainability, differences in the effectiveness of care,

bureaucracy, and varying population needs. Proposed solutions include investments in disadvantaged areas, digitalization, and telemedicine pathways.

Limitations

Several limitations are included in the present report. This document only reflects the opinions of the invited experts; the audit consensus is not a set of suggestions or structured guidelines. Additionally, in the absence of specific guidelines on all the topics discussed, unresolved questions remain. However, this report can assist stakeholders in discussions about future choices and actions. The focus group was small, limited exclusively to the eight participants mentioned, with no additional members as a GP, nonmedical practitioner or patients. The homogeneous group of Italian experts from Northern Italy could introduce regional and selection biases and limit the generalizability of the findings. The process did not follow a true Delphi method with iterative rounds and controlled feedback, reducing the robustness of the consensus. The narrative review approach rather than a systematic review, may have led to selective inclusion of literature, potentially affecting the interpretation of evidence.

Practical implications

The present report represents a unique contribution to better clarity and practical advice in COPD management. The present audit has presented clinical recommendations (what), operational procedures (how), professional involvement (who), timing (when) and setting (where) for better support. Suggested improvements can be implemented in clinical practice which both patients and healthcare systems could benefit from, in an action-oriented plan of care for COPD patients.

Conclusions

The current approach to the management of patients with COPD —whether in the stable phase, during exacerbations requiring hospitalization, or in post-acute respiratory rehabilitation—remains fragmented, inconsistent, and poorly standardized.

This work provides a unique pulmonologists' perspective and suggestions, based on literature, best practices, and field experiences to improve collaboration among stakeholders and provide more effective care for COPD patients.

Future directions require next steps or broader consensus initiatives that could build on the findings to further improve care pathways.

References

1. Global strategy for prevention, diagnosis and management of COPD: 2024 Report. Available at: https://goldcopd.org/2024-gold-report/.
2. Ministero della Salute. Programma Nazionale Esiti. Edizione 2024. Available at https://pne.agenas.it/assets/documentation/report/agenas_pne_report_2024.pdf
3. Waeijen-Smit K, Crutsen M, Keene S, Miravitlles M, Crisafulli E, Torres A, et al. Global mortality and readmission rates following COPD exacerbation-related hospitalisation: a meta-analysis of 65 945 individual patients. ERJ Open Res 2024;10:00838-2023.
4. Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. J Adv Nurs 2000;32:1008-15.
5. Vitacca M. Telemonitoring in patients with chronic respiratory insufficiency: expectations deluded? Thorax 2016;71:299-301.
6. Althobiani MA, Russell AM, Jacob J, Ranjan Y, Ahmad R, Folarin AA, et al. The role of digital health in respiratory diseases management: a narrative review of recent literature. Front Med (Lausanne) 2025;12:1361667.
7. Lipson DA, Barnhart F, Brealey N, Brooks J, Criner GJ, Day NC, et al. Once-Daily Single-Inhaler Triple versus Dual Therapy in Patients with COPD. N Engl J Med 2018;378:1671-80.
8. van Geffen WH, Tan DJ, Walters JA, Walters EH. Inhaled corticosteroids with combination inhaled long-acting beta2-agonists and long-acting muscarinic antagonists for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2023;12:CD011600.
9. Turégano-Yedro M, Trillo-Calvo E, Navarro I Ros F, Maya-Viejo JD, González Villaescusa C, Echave Sustaeta JM, et al. Inhaler Adherence in COPD: A Crucial Step Towards the Correct Treatment. Int J Chron Obstruct Pulmon Dis 2023;18:2887-93.
10. Uzun S, Djamin RS, Kluytmans JA, Mulder PG, van't Veer NE, Ermens AA, et al. Azithromycin maintenance treatment in patients with frequent exacerbations of chronic obstructive pulmonary disease (COLUMBUS): a randomised, double-blind, placebo-controlled trial. Lancet Respir Med 2014;2:361-8.

11. Celli BR, Fabbri LM, Aaron SD, Agusti A, Brook R, Criner GJ, et al. An Updated Definition and Severity Classification of Chronic Obstructive Pulmonary Disease Exacerbations: The Rome Proposal. Am J Respir Crit Care Med 2021;204:1251-8.
12. Hurst JR, Wedzicha JA. Chronic obstructive pulmonary disease: the clinical management of an acute exacerbation. Postgrad Med J 2004;80:497-505.
13. Papi A, Bellettato CM, Braccioni F, Romagnoli M, Casolari P, Caramori G, et al. Infections and airway inflammation in chronic obstructive pulmonary disease severe exacerbations. Am J Respir Crit Care Med 2006;173:1114-21.
14. Donaldson GC, Seemungal TA, Bhowmik A, Wedzicha JA. Relationship between exacerbation frequency and lung function decline in chronic obstructive pulmonary disease. Thorax 2002;57:847-52.
15. Almagro P, Calbo E, Ochoa de Echagüen A, Barreiro B, Quintana S, Heredia JL, et al. Mortality after hospitalization for COPD. Chest 2002;121:1441-8.
16. Zoia MC, Corsico AG, Beccaria M, Guarnone R, Cervio G, Testi R, et al. Exacerbations as a starting point of pro-active chronic obstructive pulmonary disease management. Respir Med 2005;99:1568-75.
17. Villalba D, Gil Rossetti G, Scrigna M, Collins J, Rocco A, Matesa A, et al. Prevalence of and Risk Factors for Mechanical Ventilation Reinstitution in Patients Weaned From Prolonged Mechanical Ventilation. Respir Care 2020;65:210-6.
18. Barbano L, Bertella E, Vitacca M. Episodic medical home intervention in severe bedridden chronic repsiratory failure patients: a 4 years retrospective study. Monaldi Arch Chest Dis 2009;71:113-8.
19. Hopkinson NS, Englebretsen C, CooleyN, et al Designing and implementing a COPD discharge care bundle Thorax 2012;67:90-2.
20. Marques A, Souto-Miranda S, Machado A, Oliveira A, Jacome C, Cruz J, et al. COPD profiles and treatable traits using minimal resources: identification, decision tree and stability over time. Resp Res 2022;23:30.
21. Souto-Miranda S, Rocha V, Mendes MA, Simão P, Martins V, Spruit MA, et al. The presence of extra-pulmonary treatable traits increases the likelihood of responding to pulmonary rehabilitation. Respir Med 2023;206:107086.
22. Rochester CL, Alison JA, Carlin B, Jenkins AR, Cox NS, Bauldoff G, Bhatt SP, et al. Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline. Am J Respir Crit Care Med 2023; 208: e7-e26.
23. De Luca E, Cosentino C, Cedretto S, Maviglia AL, Bucci J, Dotto J, et al. Multidisciplinary team perceptions of the Case/Care Managers' role implementation: a qualitative study. Acta Biomed 2022;93:e2022259.
24. van Eeden AE, van de Poll I, van Vulpen G, Roldaan T, Wagenaar W, Boland MRS, et al. Effectiveness of case management in the prevention of COPD re-admissions: a pilot study. BMC Res Notes 2017;10:621.
25. Hunter MH, King DE. COPD: management of acute exacerbations and chronic stable disease. Am Fam Physician 2001;64:603-12.
26. Akbaş T, Güneş H. Characteristics and outcomes of patients with chronic obstructive pulmonary disease admitted to the intensive care unit due to acute hypercapnic respiratory failure. Acute Crit Care 2023;38:49-56.
27. Steriade AT, Johari S, Sargarovschi N, Necula D, Tudose CE, Ionita D, et al. Predictors of outcome of noninvasive ventilation in severe COPD exacerbation. BMC Pulm Med 2019;19:131.
28. Melloul A, Freund O, Tiran B, Perluk TM, Golan N, Kleinhendler E, et al. Respiratory Specialist Visits Before Admissions with COPD Exacerbation are Linked to Improved Management and Outcomes. Int J Chron Obstruct Pulmon Dis 2024;19:2387-96.
29. Leenders A, Sportel E, Poppink E, van Beurden W, van der Valk P, Brusse-Keizer M. Patient and Health Care Provider Perspectives on Potential Preventability of Hospital Admission for Acute Exacerbation of Chronic Obstructive Pulmonary Disease: A Qualitative Study.Patient Prefer Adherence 2022;16:3207-20.
30. de Mestral C, Iqbal S, Fong N, LeBlanc J, Fata P, Razek T, et al. Impact of a specialized multidisciplinary tracheostomy team on tracheostomy care in critically ill patients. Can J Surg 2011;54:167-72.
31. Gardiner L, Singh S. Inequality in Pulmonary Rehabilitation - The challenges magnified by the COVID-19 pandemic. Chron Respir Dis 2022;19:14799731221104098.

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