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The Italian Community-based Pulmonology Manifesto: a national survey exploring the current state, critical issues, and perspectives for a national reference model

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Informed consent: written informed consent was obtained from all participants before completion of the survey.

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Abstract

In Italy, demographic aging, increasing multimorbidity, and the growing burden of chronic respiratory conditions have highlighted the need for a reorganization of community-based respiratory services, as outlined by the Italian Ministerial Decree 77/2022, which promotes integrated, proximity-based models of care. Community-based pulmonology care represents a potentially pivotal component of healthcare systems for the management of chronic and complex respiratory diseases. A national, anonymous, web-based survey was conducted among Italian pulmonologists working in territorial and community healthcare settings. The questionnaire explored organizational structures, clinical and diagnostic activities, availability of technological resources, care pathways, continuity of care, and integration with hospital services. A total of 168 valid questionnaires were collected and analyzed using descriptive methods. The survey revealed substantial heterogeneity across regions and healthcare organizations in terms of structural models, availability of diagnostic and interventional procedures, multidisciplinary teams, and access to telemedicine solutions. While several community services provide advanced outpatient and home-based respiratory care, significant gaps persist in standardized care pathways, timely access to functional respiratory diagnostics, and structured follow-up of chronic patients. Limitations in direct access to hospitalization pathways further contribute to fragmentation of care and potentially optimizable use of emergency medical services. This survey provides an initial, comprehensive overview of the current state of community-based pulmonology in Italy. The collected data represent a foundational framework for further in-depth analyses aimed at defining shared minimum standards, strengthening hospital–community integration, and supporting the development of a more equitable, efficient, and patient-centered model of respiratory care.

Key words: community-based pulmonology, chronic obstructive pulmonary disease, integrated care, territorial healthcare, national survey.

Introduction

The Italian Ministry of Health Decree no. 77 of May 23, 2022 (DM 77/2022) outpatient healthcare introduces new models for outpatient healthcare nationwide. Adopted within Mission 6, Component 1, of the National Recovery and Resilience Plan (PNRR) — “Proximity networks, facilities, and telemedicine for community healthcare assistance” — it defines qualitative, structural, technological, and quantitative standards for community healthcare facilities and for prevention systems [1].

Within this regulatory framework, community-based pulmonology is called upon to redefine its role and organizational structure toward decentralized, patient-centered models of care with the aim of reducing the hospital burden, in a context where chronic respiratory diseases represent one of the leading causes of disability.

In a demographic and epidemiological context characterized by population ageing, increasing multimorbidity, and the growing burden of chronic respiratory and oncological diseases [2-4], community-based specialist respiratory care may represent a crucial component. Respiratory diseases are among the leading causes of morbidity, hospitalization, and mortality, with a substantial impact in terms of years of life lost, disability, and direct and indirect costs for the Italian National Health Service (SSN) and society [5]. In this scenario, the reorganization of community healthcare services and territorial care networks is strategic to ensure continuity of care, hospital–community integration, and multidimensional patient management.

In particular, the management of chronic respiratory diseases, including chronic obstructive pulmonary disease (COPD), severe asthma, interstitial lung diseases, bronchiectasis, neuromuscular diseases with respiratory involvement, and chronic respiratory failure of any etiology, requires patient-centered care models based on shared pathways between hospital and community services [6].

The DM 77/2022 also emphasizes the importance of ensuring equity of access and uniform standards throughout the national territory, while respecting the planning autonomy of the Regions [1]. However, to date, there is still a lack of a systematic and updated overview of the distribution, organizational characteristics, and structural and technological resources of community-based pulmonology services in Italy. In this context, a national survey targeting specialists working in community-based pulmonology assumes significant strategic relevance, allowing the description of the current organizational landscape and the identification of critical issues and areas for improvement.

Methods

Following three residential meetings focused on the topic of “Pulmonology and Territory”, held between 2024 and 2025 and attended by more than 150 pulmonologists directly involved in community-based respiratory care in Italy, a survey was developed by a selected board and distributed to meeting participants and regional representatives of community-based pulmonology.

The survey, available on a dedicated online platform from October 20, 2025, to November 21, 2025, was conducted anonymously using a web-based format, adopting a methodological approach aimed at ensuring maximum freedom of response while minimizing potential reporting bias. The survey platform was configured to prevent duplicate submissions from the same respondent. Data were analyzed in aggregated form. The questionnaire included closed-ended as well as multiple-choice, and open-ended questions, allowing both descriptive and comparative analyses of respondents’ perceptions and knowledge regarding organizational and structural aspects of community-based respiratory care. In particular, the survey consisted of three sections: (i) a “Demographic and Organizational Module”, aimed at exploring the respondent’s professional background and the healthcare organizational characteristics of the affiliated unit; (ii) an “Epidemiological and Clinical Care Module”, aimed at investigating the clinical and healthcare activities performed; and (iii) a module designed to assess the minimum requirements and equipment considered necessary for the provision of community-based respiratory care services.

Ethics approval was not required for this study as it was based on a voluntary, anonymous survey of healthcare professionals, without the collection of sensitive personal data or interventions affecting patient care, in accordance with applicable ethical guidelines and local regulations. The survey was conducted in accordance with the principles outlined in the Declaration of Helsinki, and informed consent was obtained from participants prior to their involvement

Definitions of Italian health care structures

Complex operative unit

A Complex Operative Unit (COU) is an organizational unit within the SSN, which operates in a specific clinical, diagnostic, therapeutic, preventive, or administrative area. It has organizational autonomy and is accountable for achieving its assigned objectives. It manages its own human, technological, and financial resources, including budget responsibility. A COU is headed by a director, a senior healthcare manager appointed in accordance with procedures established by

national legislation. COUs typically coordinate multidisciplinary professional activities and are responsible for the quality, safety, and performance of the services they provide. They usually operate within a department, which represents the standard organizational model for healthcare activities in Italian healthcare organizations [7].

Simple operative unit

A Simple Operative Unit (SOU) is an organizational unit that performs a specific clinical, technical, or administrative function and is generally subordinate to a Complex Operative Unit (COU). It has a clearly defined area of responsibility. A SOU operates under the authority of a COU. It is managed by a physician or another qualified professional with organizational responsibility, although with a lower degree of autonomy than that of a COU director. A SOU is assigned dedicated staff and resources to carry out its specific activities and contribute to the achievement of the objectives of the parent organizational structure [7].

Departmental Simple Operative Unit

A Departmental Simple Operative Unit (DSOU) is defined as a SOU which reports directly to a department. A DSOU is assigned specific objectives and is accountable for achieving them. It typically has budget responsibility, direct managerial authority over assigned personnel and resources, and responsibility for coordinating specific clinical, diagnostic, therapeutic, technical, or administrative activities [7].

Individual outpatient specialist

An Individual Outpatient Specialist is a physician who provides specialist outpatient services under a National Collective Agreement with one or more Local Health Authorities (LHAs), rather than being employed as a hospital staff member. These professionals contribute to the achievement of the institutional objectives of the SSN by delivering specialized healthcare services in community and outpatient settings. They are typically assigned to outpatient clinics, community healthcare facilities, and territorial services. Unlike hospital-employed physicians, they are generally not integrated into formal organizational structures such as COUs, SOUs, or DSOU [7].

Statistical analysis

Data were analyzed using aggregated descriptive statistics, with results presented as absolute frequencies and percentages for categorical variables.

Results

Professional profile

192 pulmonologists were invited to participate, and 168 complete questionnaires were collected, corresponding to a response rate of 87.5%. Although responses were collected nationwide, the geographical distribution of participants was not homogeneous across Italian Regions, with some areas being more represented than others (Figure 1A). The majority of participants reported more than 10 years of clinical experience (Figure 1B).

Organization of the Italian Community-based Pulmonology Network

Five Complex Operative Units (COU) in pulmonology are exclusively dedicated to territorial activities (1 in Trentino-Alto Adige, 2 in Friuli-Venezia Giulia, 1 in Emilia-Romagna, and 1 in Puglia); 7 hospital-based COUs also provide community services; 5 Departmental Simple Operative Units (DSOU) were identified (1 in Veneto, 2 in Toscana, and 2 in Puglia); and 3 Simple Operative Units (SOU) were reported (1 in Veneto, 1 in Friuli-Venezia Giulia, and 1 in Sardegna) (*Supplementary Table 1*). Most survey participants reported performing outpatient respiratory care activities as individual outpatient specialists (Figure 1C).

Approximately 10% reported having no nursing support. Forty-six percent collaborated with dedicated nursing staff specifically trained in specialist respiratory care activities, although with marked territorial variability, ranging from 100% in Piemonte (N=3) to 18% in Emilia-Romagna (N=34).

Clinical activities

The activities performed by community-based pulmonology range from outpatient clinics (45%) to the management of Diagnostic and Therapeutic Care Pathways (DTCP, 6% - i.e. structured, evidence-based multidisciplinary plans used by healthcare systems to diagnose, treat, and monitor a specific medical condition) dedicated to chronic respiratory diseases (mainly COPD) (Figure 2A). Only a small proportion of community-based specialists provide home-based care (4%), including, in a minority of facilities, invasive procedures in frail patients, such as tracheostomy cannula replacement and/or bronchial toilette procedures performed by bronchoscopy (Figure 2B). Seventy-eight percent perform spirometry, 78% arterial blood gas analysis, and 73% walking tests. A substantial proportion also provided consultations for inpatients within the healthcare facility where they practice (68%). Only a minority of facilities are equipped with advanced pulmonary function testing for static lung volume assessment. Oscillometry and FeNO measurements are still poorly available. Telemedicine and

telemonitoring activities (approximately 30%) are only partially implemented and rarely integrated into structured care pathways. Only 58% of respondents reported being able to estimate the annual number of services provided, ranging from 200 to approximately 17,000 visits per year.

Care pathways, accessibility, and continuity of care

The community-based pulmonology network participates in numerous diagnostic, therapeutic, and care pathways for patients with chronic diseases (mainly COPD, 78%), in line with the chronic care management approach (Figure 3). However, these pathways are neither uniformly available nor standardized nationwide. Eighty-six percent of respondents reported scheduling a follow-up appointment at the end of the outpatient visit, and 83% stated that they are able to provide a follow-up visit within one year. Waiting times for functional respiratory diagnostics, particularly spirometry for new suspected diagnoses, are sometimes longer than six months (6%). General Practitioners (GPs) represented the main source of patient referrals to community-based pulmonology outpatient clinics (38%) (Figure 4), followed by follow-up visits for patients already managed within the pulmonology network (32%), referrals from non-pulmonology specialists (13%), and referrals from pulmonologists working in other operative units (11%). If necessary, the possibility of direct hospitalization (Figure 5A and B) or access to referral wards through predefined agreements (Figure 5C) is available but highly variable, often unstructured and frequently not guaranteed. Emergency Rooms (ERs) still represent the main route to hospitalization (Figure 5D).

Minimum requirements, equipment, and ideal organizational models

Among the requirements considered essential were pulse oximeters, blood gas analyzers, equipment for both basic and advanced pulmonary function tests, ultrasound devices, telemonitoring tools, polysomnography, and the structured presence of trained nursing staff (Table 1). A substantial proportion of respondents identified the Complex Operative Unit (COU) or the Departmental Simple Operative Unit (DSOU) as the organizational models best suited to ensure clinical governance, continuity of care, and uniform standards across the territory.

Discussion and Conclusions

Population ageing, increasing multimorbidity, and the growing prevalence of chronic respiratory diseases have highlighted the need to reorganize community healthcare services [2-4]. Community-based respiratory care represents a potentially fundamental component of

healthcare systems for the management of chronic and complex respiratory diseases. In this context, the Italian Ministerial Decree 77/2022 plays a key role by promoting integrated healthcare models focused on proximity-based care [1].

To investigate the current organizational and clinical status of community-based respiratory care, a national anonymous web-based survey was conducted among pulmonologists working in community healthcare settings and territorial care facilities. The questionnaire explored several aspects, including service organization, clinical and diagnostic activities, technological availability, care pathways, continuity of care, and the level of integration with hospital services. Overall, the data document marked heterogeneity in the provision of community-based pulmonology services and a limited number of formally organized territorial structures (COU, DSOU or SOU) across the national territory.

A crucial element for the organization and delivery of clinical respiratory care activities is the presence and collaboration of dedicated nursing teams adequately trained in specialized respiratory procedures. The survey revealed that professionally trained nursing support is available only in a limited proportion of cases and is mostly confined to formally recognized COU, DSOU and SOU settings. In some contexts, systematic follow-up scheduling for chronic patients is not guaranteed, nor is the possibility of ensuring at least one annual follow-up visit (14%). Access time to respiratory functional diagnostics, particularly spirometry for new suspected diagnoses, are often prolonged, with a potential negative impact on early diagnosis and timely therapeutic management of respiratory diseases [8].

One of the most relevant aspects investigated by the survey concerns the organizational structure of the national community-based pulmonology network. Considerable heterogeneity emerges across regions and healthcare models, resulting in inequalities in healthcare delivery, in contrast with the objectives of the DM 77/2022, which aims to standardize essential levels of care and reduce territorial disparities. These critical issues are consistent with findings reported in a recent editorial published in *The Lancet Regional Health* [8], which identified organizational fragmentation, strong regional autonomy, and limited interoperability of healthcare systems among the main weaknesses of the Italian SSN, with repercussions on equity of access and continuity of care.

The DM 77/2022 outlines a healthcare system based on integrated and coordinated community facilities (Community Houses, Community Hospitals, and Territorial Operational Centers) [1]. However, the survey data show that pulmonology services are still frequently delivered in a fragmented manner, often entrusted to isolated outpatient specialists with limited organizational support.

The shortage of formally recognized community-based structures (COU, DSOU, SOU) represents another critical issue. This limits the development of structured clinical governance, which is essential for implementing shared care pathways, ensuring homogeneous quality standards, and promoting multidisciplinary integration. Community-based COU, DSOU and SOU structures could therefore represent complementary organizational models, consistent with the healthcare framework outlined by the DM 77/2022, allowing more structured and integrated patient management from both a clinical and organizational perspective, ultimately improving the quality and uniformity of patient care pathways.

The survey documents a good diffusion of basic respiratory services, but also significant gaps in the availability of advanced diagnostics and in the implementation of complex care pathways (e.g., oscillometry, FeNO, and full spirometry), potentially compromising early diagnosis and monitoring of chronic respiratory diseases.

Even more relevant are the findings regarding telemedicine and telemonitoring, which are available only in a minority of settings and rarely incorporated into structured organizational models. These data are consistent with findings from a recent national survey on telemedicine diffusion in Italy [9] which highlighted the still limited and non-uniform use of digital tools within the Italian SSN, despite the acceleration induced by the COVID-19 pandemic. The lack of systematic implementation of these tools risks significantly limiting the effectiveness of new models of care and undermining the functionality of the Electronic Health Record due to persistent structural weaknesses [10]. This delay appears even more relevant in light of the European Health Data Space (EHDS) initiative [11], which since 2025 has promoted interoperability and digitalization of healthcare systems at the European level. The limited diffusion of telemedicine and the persistent fragmentation of Italian information systems highlight a delay of the Italian SSN with respect to these European objectives.

The management of care pathways and continuity of care represents another key issue. Although most professionals reported providing scheduled follow-up visits, significant limitations persist regarding the standardization of DTCPs and timely access to diagnostics, with waiting times for spirometry in suspected cases sometimes exceeding six months. Early recognition and timely treatment of chronic respiratory diseases, particularly COPD, are crucial for slowing disease progression, reducing exacerbations, preserving lung function, improving quality of life, and ultimately reducing mortality [12-14]. Frequent reliance on ERs as the primary route for hospitalization represents both an indicator of system inefficiency and a potential source of clinical inappropriateness. Regarding access to hospitalization following community-based respiratory evaluations in unstable and/or critical patients, the survey showed

that ERs still represent the only hospitalization pathway, highlighting shortcomings in actual hospital–community integration. This finding is consistent with international literature [15], which reports that the Italian SSN continues to rely heavily on acute hospital care, resulting in ER overcrowding and inappropriate use of emergency services.

Another indicator of poor integration is the additional difficulty experienced by community services in accessing specialized hospital diagnostic services, which are often necessary to define patient management pathways and ensure adequate continuity of care. These findings underline the need to develop structured and facilitated access pathways to referral hospital wards and diagnostic services, in line with the integrated care models promoted by the DM 77/2022.

The convergence of respondents regarding essential equipment (spirometry, arterial blood gas analysis, ultrasound, telemonitoring) and the need for dedicated nursing personnel indicates the existence of a shared foundation upon which national standards could be built. Particularly noteworthy is the recognition of polysomnography equipment among the important tools for community-based pulmonology, reflecting the growing importance of obstructive sleep apnea syndrome as an emerging clinical issue among patients referred to for community-based respiratory evaluation.

The organizational criticalities emerging from this survey fit within a broader European context, historically characterized by marked variability in models of intensive/hub and community-based pulmonology care, as previously highlighted by the European Respiratory Society, which emphasized the need for integrated healthcare models dedicated to the management of chronic and complex patients [16]. In several European contexts, community-based pulmonology is integrated into structured healthcare networks with defined responsibilities, direct access to hospital pathways, and systematic use of digital technologies.

This study has several limitations, including the voluntary nature of participation and the possible presence of selection bias. Therefore, the survey was not intended to constitute a complete national census. Nevertheless, the size of the sample and its geographical representativeness strengthen the reliability of the findings. Despite these limitations, the collected data may provide the basis for defining national community standards, identifying quality and performance indicators, and designing future organizational models.

In conclusion, the survey confirms that Italian community-based pulmonology is currently in a transitional phase, positioned between clinical maturity — both in terms of volume and complexity of healthcare services delivered — and incomplete organizational definition. Italian community-based pulmonology today benefits from a solid professional foundation and a clear

strategic direction defined by the DM 77/2022, but still requires organizational and structural strengthening to ensure equity, continuity, and quality of care.

Abbreviation list

DM 77/2022	Italian Ministerial Decree no. 77 of May 23, 2022
PNRR	National Recovery and Resilience Plan
SSN	Italian National Health Service
COPD	Chronic Obstructive Pulmonary Disease
DTCP	Diagnostic and Therapeutic Care Pathway
COU	Complex Operative Unit
DSOU	Departmental Simple Operative Unit
SOU	Simple Operative Unit
FeNO	Fractional Exhaled Nitric Oxide
GP	General Practitioner
ER	Emergency Room
EHDS	European Health Data Space
WHO	World Health Organization
GOLD	Global Initiative for Chronic Obstructive Lung Disease

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Online supplementary material

Supplementary Table 1. Structures identified by the survey, categorized by region.

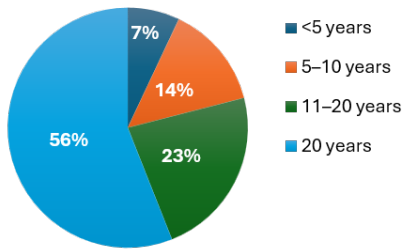
Table 1. Essential equipment for outpatient respiratory care activities (n=165).

Which equipment do you consider essential for carrying out your clinical activity?	
Pulse oximeter	92%
Blood gas analyser	90%
Spirometry	78%
Advanced spirometry	78%
Polysomnography	68%
FeNO measurement device	53%
Chest ultrasound device	52%
Telemonitoring tools	52%
Mailing list / dedicated institutional email account	45%
Electrocardiography	18%
Oscillometry	16%
Equipment for interventional procedures	15%
Thoracentesis/drainage kit	15%

A) Geographical distribution of participants



B) Clinical experience



C) Professional setting

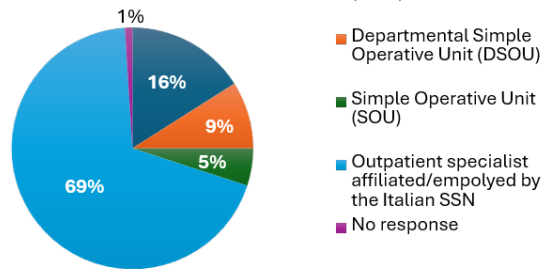
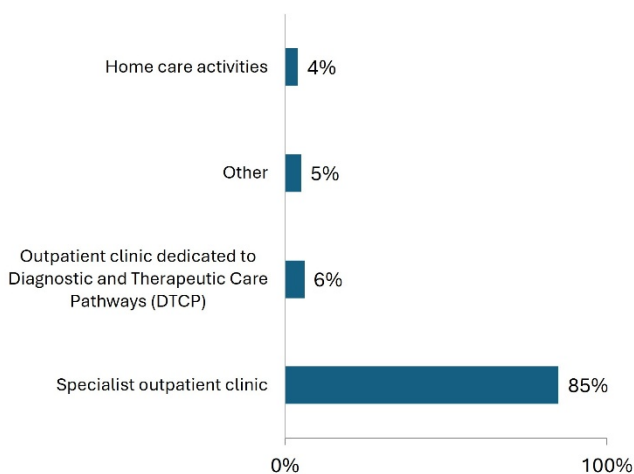


Figure 1. A) Geographical distribution of participants (n=168); B) years of clinical experience of responders and (C) their professional setting of care (n=168).

A) What is your main area of activity?



B) Outpatient interventional procedures performed (please specify):

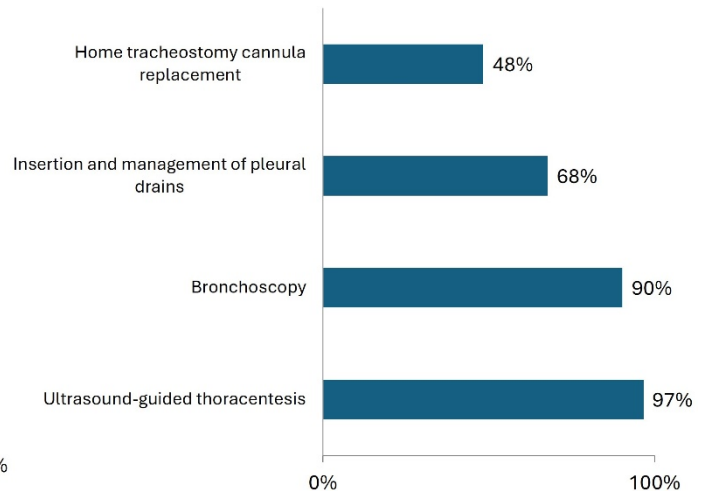


Figure 2. A) Areas of clinical activity (n=136); B) types of outpatient interventional procedures performed (n=31).

Are care pathways available in your facility for the following conditions:

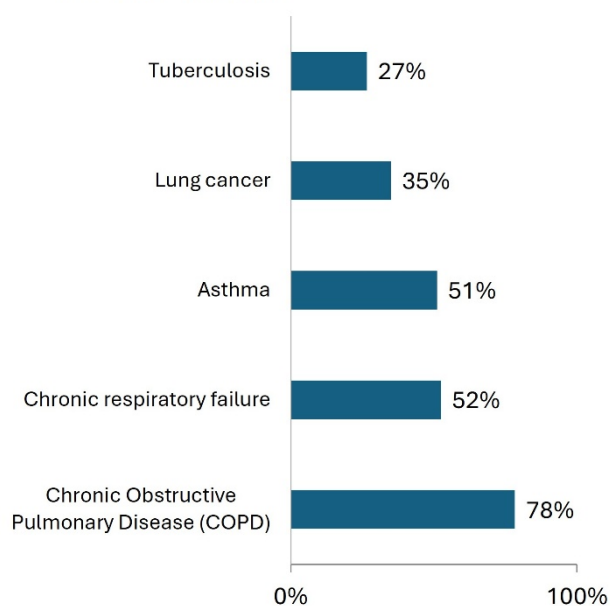


Figure 3. Specific care pathways provided by the reference outpatient facility/network (n=143).

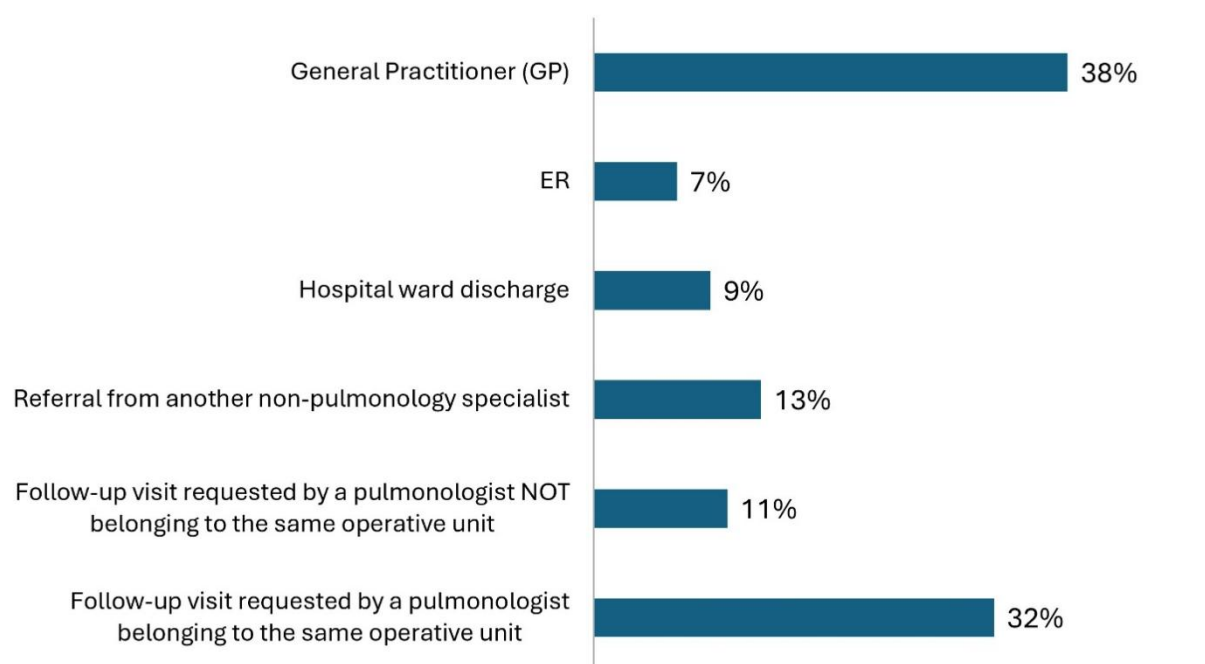
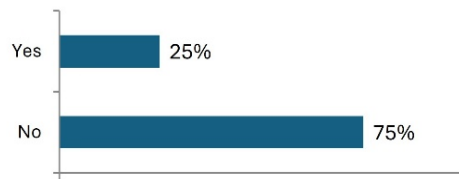
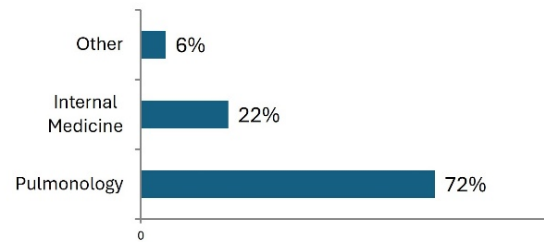


Figure 4. Sources of referral of patients attending community-based pulmonology outpatient clinics.

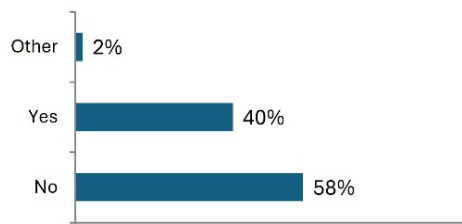
A) When necessary, is direct admission to the reference operative unit possible?



C) If yes, which ward?



B) When necessary, is hospitalization at the reference hospital hub possible?



D) When necessary, is referral to the ER the only available route for hospitalization?

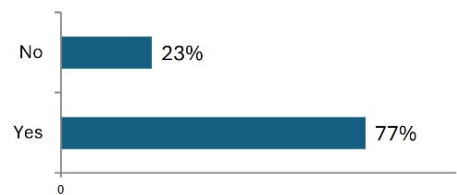


Figure 5. Possibility of hospitalization, when necessary, in: (A) the reference operative unit (n=161); (B) the reference hospital hub (n=162); (C) a ward within the reference hospital hub (n=65); (D) the ER (n=160).