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Home-based and telehealth cardio-respiratory physiotherapy in northern Italy: a cross-sectional survey

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Abstract

Cardiorespiratory physiotherapy (CRP) is an evidence-based process for individuals with both acute and chronic cardiorespiratory health conditions, yet access to center-based CRP in Italy is limited. Home-based and telehealth alternatives remain scarcely explored.

This study investigated the status of CRP in the Lombardy region through a cross-sectional online survey distributed to physiotherapists registered with the Interprovincial Professional Register of eight provinces.

A total of 388 responses were analyzed: 32 (8.2%) reported performing home-based CRP, and 9 (2.3%) reported telerehabilitation. Peripheral oxygen saturation was the most frequently assessed parameter (86%). Positive expiratory pressure devices were used for airway clearance (75%), and exercise reconditioning was consistently performed (79%). Variation was noted in lung re-expansion techniques, with some outdated methods still in use. Specific training in the use of telehealth facilities was often limited, and technological resources were essential for delivering telerehabilitation.

The findings indicate that CRP beyond the clinic is still underutilized in Lombardy. Strengthening training programs and implementing standardized protocols could enhance access to and the quality of care. However, results are preliminary and limited by low representativeness and potential selection bias; therefore, they should not be considered generalizable.

Key words: physical therapy modalities, home care services, community health services, delivery of healthcare, surveys and questionnaires.

Introduction

Over the past two decades, cardio-respiratory physiotherapy (CRP) has undergone a profound transformation in both its scope of practice and professional identity. The need for harmonized standards in postgraduate training across Europe led the European Respiratory Society (ERS) to launch the Harmonised Education in Respiratory Medicine for European Specialists (HERMES) project, with a structured syllabus identifying the key competencies and professional attitudes required for respiratory physiotherapists [1-4]. While this curriculum has been influential at the European level, the specific organization and delivery of services remain highly dependent on national and regional contexts.

Despite the growing body of evidence supporting the efficacy of CRP in chronic respiratory and cardiovascular diseases [5-10], access to such services remains inequitable and limited worldwide [11,12]. Even though rehabilitative interventions are proven to be both feasible and effective across various environments - including inpatient, outpatient, community, and home-based settings - a major global survey by Spruit et al. revealed marked heterogeneity in the structure, delivery models, and clinical content of CRP programs across continents [13]. While structured outpatient programs are common in Europe and North America, home-based rehabilitation and telerehabilitation remain marginal and underdeveloped, despite their potential to reach underserved populations [14,15]. This mismatch is particularly critical for people with chronic respiratory conditions, who frequently face physical, social, and logistical barriers to center-based care, including reduced mobility, transportation limitations, caregiver availability, and financial constraints [11,16].

The COVID-19 pandemic accelerated the adoption of telerehabilitation, forcing healthcare systems and rehabilitation providers to rapidly redesign service models [17]. Subsequent studies have since demonstrated that remotely delivered CRP can be safe, effective, and acceptable, particularly for people with stable chronic obstructive pulmonary disease (COPD) and chronic heart failure [18-20]. Nevertheless, significant variability persists in terms of modalities, duration, intensity, and technological platforms, underscoring the need for clearer clinical guidelines and standardized remote rehabilitation protocols.

Parallel to this, home-based CRP is increasingly recognized as a viable and cost-effective approach, particularly in the management of chronic disease, facilitating early discharge from hospital settings, and supporting post-acute recovery [21-25]. It offers the advantage of delivering care in a familiar environment, enhancing adherence, promoting family engagement, and fostering a person-centered approach [26].

In Italy, regulatory frameworks are also evolving: Ministerial Decree 77/2022, the National Recovery and Resilience Plan (PNRR), and the establishment of “Case della Comunità” (Community Houses) have highlighted the importance of territorial and community-based care. However, the absence of specific national regulations for home-

based physiotherapy has led to considerable heterogeneity in practice. Moreover, both home-based and telehealth models require specific competencies, organizational support, and technological infrastructure, elements that are still not universally available and that can significantly influence the effectiveness of care delivery [27].

Approximately 5.5 million people in Italy receive physiotherapy services [28]. Nevertheless, there is currently no structured specialization in respiratory physiotherapy, and training in this field largely depends on individual postgraduate opportunities. Given the significant epidemiological burden of cardiopulmonary health conditions [29], it is essential to investigate whether the physiotherapy workforce in the Lombardy region is adequately trained, equipped, and deployed to meet community needs.

This study aims to explore the current status of CRP delivered through home-based care and telehealth in Lombardy, focusing on the professional profiles, health conditions treated, interventions applied, and the training background of physiotherapists. By mapping these dimensions, the study aims to provide a preliminary understanding of the availability, practices, and gaps in alternative models of care that could complement or substitute for traditional center-based rehabilitation, especially for those who are most vulnerable or geographically isolated. The findings may serve as a foundation for policy development, workforce planning, and future research directions aimed at enhancing access to and equity in respiratory rehabilitation across the region.

Materials and Methods

Study design

We conducted a cross-sectional study analyzing the data from a structured online survey that was distributed by the "Interprovincial Order of Physiotherapists of Milan, Como, Cremona, Lecco, Lodi, Monza Brianza, Sondrio, Varese" (OFI; https://www.ofimilano.it/) (Figure 1A). In Italy, the Orders of Physiotherapists are the official institutional bodies (38 operating across the country at inter-regional, regional, inter-provincial or provincial levels) that legally recognize professional physiotherapists allowed to practice in Italy (https://www.fnofi.it/). No incentives were offered to participants. We followed the Guidelines for Reporting Survey-Based Research [30,31] and Observational Studies [32] as reported in *Supplement 1*. The protocol was registered on Open Science Framework (OSF) at the following link: https://osf.io/zrcq6/. No protocol amendments were made.

Selection criteria

To be included in the OFI data collection, the participants have to: i) be a physiotherapist registered at OFI; ii) read and provide consent to the use of anonymous data in an aggregated form for research purposes.

Survey management

We developed an original web-based questionnaire using Google Forms to collect data. The OFI launched the survey from December 13, 2024, until February 14, 2025, through its newsletter powered by MailUp platform (TeamSystem S.p.A., Pesaro, PU, Italy). This system enables monitoring of message delivery, identifying valid addresses reached, and tracking whether recipients opened the invitation and clicked on the survey link. A survey reminder email was sent on January 13, 2025. Data were collected anonymously, and participants gave their permission for the analysis and publication of anonymous and aggregated data. The Italian version of the survey was stored on OSF at the following link: https://osf.io/zrcq6/.

Survey questionnaire

We conducted a pilot test of our survey involving 20 experienced physiotherapists to assess its clarity and accuracy. The final questionnaire version consisted of 33 closed-ended items, organized into four sections. The first section, addressing demographic and professional characteristics, was administered to all respondents. The second section, focusing on CRP, was addressed only to physiotherapists who declared that they treat persons with cardiorespiratory conditions. The third and fourth sections explored home-based services and telerehabilitation, respectively, and were displayed exclusively to those who reported providing these activities. Thus, physiotherapists not involved in CRP contributed only demographic information and were unable to proceed to sections concerning CRP practice, home care, or telehealth. To ensure that the questionnaire was well-suited for collecting data from the target population, the questionnaire was developed in Italian (*Supplement 2A*). An English-translated version is also reported in *Supplement 2B* for display purposes.

Statistical analysis

Descriptive analyses were conducted to summarize respondents' demographic and professional characteristics. Categorical variables were expressed as absolute frequencies and percentages. Comparisons were made between physiotherapists who provided home-based CRP and those who did not to explore potential associations. The Chi-squared test was used for group comparisons. Yates' continuity correction was applied for 2×2 contingency tables. When expected cell counts were less than five, Fisher's exact test was applied instead. A p-value < 0.05 was considered statistically significant. All analyses were conducted using SPSS Statistics 26 (IBM, Armonk, NY, USA).

Results

Sample characteristics

The online survey was distributed to 7,727 contacts across eight provinces of Lombardy. Among these, 593 physiotherapists were recorded by the MailUp platform as having interacted with the invitation (i.e., they opened the email and clicked on the survey link; Figure 1B), which resulted in 388 completed surveys. This corresponds to a completion rate of 65.4% among those who interacted, and an overall response rate of 5.0% when calculated against the entire target population of physiotherapists contacted. Among the respondents, 252/388 (64.9%) were female. The majority were aged 31–45 years (156/388, 40.2%) or 46–60 years (149/388, 38.4%), while 42/388 (10.8%) were 21–30 years old and 41/388 (10.6%) were older than 60 years. Regarding professional experience, 142/388 (36.6%) reported more than 26 years of practice, 95/388 (24.5%) between 16–25 years, 115/388 (29.6%) between 6–15 years, and 36/388 (9.3%) less than 5 years. A total of 156 physiotherapists declared working in the cardiorespiratory field, of whom 32 provide home-based CRP services and 9 indicated engagement in telerehabilitation practices. The majority of respondents were employed in public institutions (61/156, 39.1%) or accredited private institutions (68/156, 43.6%), with a smaller proportion working as private practitioners (27/156, 17.3%) (Table 1 and *Supplement 2C*).

Regarding professional experience, 66/156 (42.3%) cardiorespiratory physiotherapists had less than three years of experience in cardiorespiratory rehabilitation. Only 25/156 (16.0%) possessed a postgraduate degree in this professional field, while 65/156 (41.7%) had undergone specific training related to cardio-respiratory care (Table 1 and *Supplement 2C*).

When comparing physiotherapists delivering home-based CRP services (n=32) with their counterparts who do not provide such services (n=124), several differences emerged (Table 1). Although age distribution and years of experience in the cardiorespiratory field were similar across groups, a significant difference was observed in total years of professional practice: physiotherapists engaged in home-based CRP were less likely to have more than 26 years of experience (15.6% *vs* 38.7%, p=0.03). Furthermore, workplace settings differed substantially between groups. Those providing home-based CRP were more frequently self-employed (50.0% *vs* 8.9%, p<0.001) and less commonly employed in public institutions (18.8% *vs* 44.4%, p = 0.02). No statistically significant differences were found in terms of sex distribution, specific training background, or experience working with people affected by cardiorespiratory health conditions.

People and health conditions managed

In the home-based setting, the most frequently managed conditions included COPD (22/32, 68.8%), cardiovascular diseases (21/32, 65.6%), neuromuscular disorders (21/32, 65.6%),

and post-surgical (18/32, 56.3%) (Table 2 and *Supplement 2C*). Conversely, in the telerehabilitation context, sleep-related breathing disorders were the most commonly addressed (4/9, 44.4%) (*Supplement 2C*). The majority of the respondents (94/156, 60.3%) dedicated less than 25% of their work time managing people with cardiorespiratory conditions (*Supplement 2C*).

Assessment practices

Peripheral oxygen saturation measurement emerged as the most widely utilized assessment tool across both home-based and telerehabilitation settings (*Supplement 2C*). At the same time, other instrumental evaluations, such as pulmonary function test and cough management, were poorly represented. In home-based care, assessments often include evaluations of mobility and postural aids (Table 2 and *Supplement 2C*). Telerehabilitation practitioners frequently employ dyspnea scales to monitor people's status (*Supplement 2C*).

Therapeutic interventions

A summary of delivered interventions in the home-based setting is reported in Table 2 and *Supplement 2C*.

Airway clearance techniques: among home-based physiotherapists, 18/32 (56.3%) reported using positive expiratory pressure (PEP) devices. Other commonly used techniques included manual (9/32, 28.1%), mechanical (8/32, 25.0%) cough assist, and postural drainage (9/32, 28.1%).

Lung re-expansion strategies: In home-based care, diaphragmatic breathing exercises and volumetric incentive spirometry were commonly employed.

Exercise reconditioning: Endurance and strength training exercises were both implemented by 22/32 participants (68.8%), while respiratory muscle training was reported by 19/32 (59.4%) and general mobilization by 21/32 (65.6%).

Educational interventions: most frequently, individuals with health conditions and caregiver education focused on promoting physical activity and lifestyle modifications (25/32; 81.3%), followed by training on the management of oxygen therapy (9/32;28.1%), airway clearance (9/32; 28.1%), and correct use of inhalation therapy (7/32; 21.9%).

Telerehabilitation

In the telerehabilitation subgroup, 5 of 9 participants (55.6%) reported using PEP devices remotely, with continuous positive airway pressure (CPAP)-based strategies applied by the same number of participants. The reported high use of CPAP therapy and ventilation strategies likely stems more from the prevalent treatment of sleep disorders, which are highly addressed in the remote setting, than from actual lung re-expansion strategies.

Strength training (6/9; 66.7%), endurance training (7/9; 77.8%), and education on physical activity and lifestyle (6/9; 66.7%) were among the most frequently delivered remote interventions. All telerehabilitation providers emphasized the importance of people having access to adequate technological resources, including reliable internet connections and compatible devices, to facilitate effective remote care delivery (see *Supplement 2C* for further details).

Discussion

This survey provides an initial perspective on the delivery of CRP outside conventional clinical settings in Lombardy. It represents the first attempt to map how CRP is delivered beyond hospital settings in Italy, offering valuable insights for service planning.

Although the response rate, around 5% of the targeted physiotherapy population, was modest, it mirrors trends observed in similar surveys [33-35]. It may reflect common issues such as survey fatigue or a general hesitancy among clinicians to engage in research initiatives. Despite this limitation, the data offer valuable exploratory insights and highlight areas for future development in terms of knowledge, training, and technological gaps in community-based respiratory care. However, the representativeness of respondents cannot be formally established, as comprehensive demographic data on the physiotherapy workforce in Lombardy are not yet available from the recently established Interprovincial Order. As a result, comparisons with the broader population of physiotherapists could not be performed, and the findings should be interpreted with caution. Additionally, it is plausible that physiotherapists with a primary interest in cardiorespiratory rehabilitation chose to participate in the survey. This potential self-selection bias may have led to an overestimation of the actual extent of CRP practices beyond the clinic in Lombardy. Finally, no information on the geographic distribution of respondents within the Lombardy region was available from the Interprovincial Order. This prevented us from analyzing whether participation varied across provinces. Future studies should address this aspect to better capture potential territorial heterogeneity in CRP service provision.

Only a minority of respondents reported practicing CRP in community settings, 32 in home-based care, and 9 via telerehabilitation. This gap contrasts with the high epidemiological burden of chronic respiratory and cardiovascular diseases in the region, underlining a misalignment between needs and service provision (*source*: regional registry https://www.dati.lombardia.it/stories/s/Paziente-cronico-nel-sistema-sanitario/cpxe-pdsg/). Some conditions (e.g., cystic fibrosis) appear underrepresented in community care, highlighting the need for stronger integration with specialized referral centers. These findings suggest that, despite growing normative support for decentralized models (Minister of Health Decree n. 77, 23 May 2022; https://www.gazzettaufficiale.it/eli/id/2022/06/22/22G00085/sg), their

actual integration into physiotherapy services in Lombardy is still limited and inconsistent [36,37]. It should also be noted that the Italian National Health Service is highly regionalized, and organizational models as well as their respective solutions may vary considerably across regions.

Beyond these general findings, the comparison between physiotherapists involved in home-based CRP and those working exclusively in facility-based settings offers further interpretive insights. Practitioners delivering care at home were significantly more likely to operate as freelancers and showed, on average, a lower cumulative number of years of professional experience compared with their non-home-based counterparts. However, no substantial differences emerged in terms of age distribution or formal postgraduate training, suggesting that the decision to provide home services may be driven more by organizational and occupational factors than by educational background. This profile might reflect a younger and more flexible workforce, or professionals seeking greater autonomy outside institutional settings, highlighting the need for structured pathways and incentives to support home-based practice within the public health system.

Although scientific literature advocates for a multiprofessional and multidisciplinary approach for chronic care [38,39], this survey suggests a poorly integrated network and limited collaboration among local healthcare professionals. Home-based cardiorespiratory physiotherapists primarily engage with caregivers and, to a lesser extent, with nurses. Contact with GPs and medical specialists appears considerably less frequent, reflecting that what may be a broader pattern in community practice. These observations, if confirmed on a larger scale, would support the need for targeted educational, outreach, and organizational initiatives to strengthen the integration of diverse professional expertise.

Assessment practices remain limited to basic tools, with scarce use of pulmonary function tests or standardized exercise capacity measures, indicating a need for better resource allocation and integration with hospital services [40,41]. To improve care and resource distribution for individuals with chronic conditions, it seems essential to rethink how hospitals and community services collaborate to facilitate more thorough and accessible assessments for people with chronic conditions in the home setting. Surprisingly, field tests to assess exercise capacity are rarely performed (7, 21.9%), suggesting that exercise training, one of the most widely implemented treatments, mainly relies on the results of the 6-minute walking test, which is not easily performed in a home setting [42].

The clinical content of CRP interventions reported in this survey presents a mixed picture. On one hand, practices such as exercise-based reconditioning and the use of CPAP for lung re-expansion are widely implemented and consistent with current international guidelines on pulmonary rehabilitation in chronic respiratory diseases [43]. The persistence of techniques with limited evidence (e.g., diaphragmatic breathing, incentive spirometry) suggests gaps in

training and dissemination of updated guidelines [44-46]. This phenomenon may reflect educational gaps in postgraduate and continuing professional development, clinical inertia linked to routine practices, and the absence of nationally standardized guidelines for community-based CRP. These factors, combined with limited access to updated resources outside hospital environments, may explain the persistence of outdated approaches in daily practice. Conversely, airway clearance appeared more standardized, with consistent use of PEP systems across both settings [47]. Devices for Airway Clearance Techniques are less employed, likely due to their limited availability and the challenges associated with their prescription in the home setting.

When it comes to advanced respiratory care in the home, physiotherapists are less likely to manage critical tasks, such as monitoring and optimizing invasive ventilation, performing airway clearance for individuals who are invasively ventilated, or handling tracheostomy care. This gap in home care might be due to a lack of extensive formal training in CRP that many practitioners receive. Delivering complex, evidence-based interventions like these requires a deeper level of knowledge and a higher degree of specialized expertise. Only 16% of respondents had completed postgraduate specialization, while most telerehabilitation providers had received only workplace-based training. An international Delphi study recently outlined a core capability framework for physiotherapists, underscoring the necessity for specialized skills when delivering high-quality care through telerehabilitation [48]. This highlights the pressing need for more structured academic programs and ongoing education in these areas.

Similar results were reported in another survey study investigating the role of physiotherapists during COVID pandemic, with a high number of obsolete techniques recorded and a very low number of trained and experienced physiotherapists involved in the wards [35]. Participants delivering telerehabilitation also identified people's access to adequate digital tools as a key barrier, an essential yet often overlooked factor. Additionally, the lack of standardized protocols, assessment tools, and reimbursement structures restricts the scalability and sustainability of remote care models [49].

Overall, these findings underscore the need for strategic action, including embedding cardiorespiratory competencies in curricula, supporting integrated and multidisciplinary models, and investing in technological and organizational infrastructure. Priorities should include embedding core cardiorespiratory competencies in training curricula, supporting integrated and interdisciplinary service models, and investing in technological and organizational infrastructure. Further research is essential to guide implementation and assess outcomes.

From a policy perspective, the Italian healthcare system is currently undergoing major reforms that directly concern the future of community rehabilitation. The PNRR and the

establishment of “Case della Comunità” aim to reinforce primary care and territorial health services through stronger integration with general practitioners and multidisciplinary teams. Our findings, which show the limited but existing role of CRP beyond hospital settings, suggest that physiotherapists could be better integrated into these initiatives. Although the PNRR is nearing its conclusion, strategically utilizing dedicated resources may still yield long-term benefits, including structural savings for the healthcare system, by reducing hospital admissions and enhancing the management of chronic health conditions at the community level.

Although the results are not generalizable, they offer a meaningful overview of current practice and service gaps in a significant region of northern Italy. The contrast between healthcare needs and available physiotherapy services underlines the urgency of targeted investment in professional development and system-wide reform.

Some methodological considerations should be acknowledged when interpreting these findings. The voluntary and self-administered nature of the survey may have introduced selection bias, potentially overrepresenting physiotherapists with a specific interest or experience in cardiorespiratory care. The absence of complete demographic and geographic data also limited the assessment of the representativeness of respondents within the regional physiotherapy workforce. Moreover, the cross-sectional design and reliance on self-reported data provide only a descriptive snapshot of current practices and do not allow for causal inference.

Conclusions

In conclusion, this survey provides an initial overview of CRP beyond the clinic in Lombardy, revealing limited but meaningful practices in home-based and telehealth settings. The findings underscore the need for enhanced training, clearer protocols, and improved system integration. Specific actions could include introducing new telerehabilitation modules into undergraduate and postgraduate training programs, adopting standardized protocols to ensure uniform practice, and creating incentive mechanisms to promote the use of validated devices and evidence-based techniques. Future research should further explore service models, outcomes, and strategies to expand equitable access to community-based respiratory care across the regional heterogeneity of the Italian National Health Service.

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Online supplementary material:
Supplement 1. STROBE statement—checklist of items that should be included in reports of observational studies.
Supplement 2A. Original Italian version of the survey.
Supplement 2B. Survey translated into English.
Supplement 2C. Survey responses.

Table 1. Characteristics of physiotherapists reporting cardiorespiratory practice in Lombardy, presented for the overall sample and stratified by those providing home-based services versus those not providing home-based services.

Characteristic	Total CRP (N=156)	Home-based CRP (n=32)	Non-home-based CRP (n=124)	p-value
Sex (Female/Total responders)	49 (31.4%)	15 (46.9%)	34 (27.4%)	0.06
Age (global p-value=0.45)				
21-30 years	14 (9.0%)	5 (15.6%)	9 (7.3%)	0.17*
31-45 years	66 (42.3%)	14 (43.8%)	52 (41.9%)	1.00
46-60 years	62 (39.7%)	11 (34.4%)	51 (41.1%)	0.62
>60 years	14 (9.0%)	2 (6.2%)	12 (9.7%)	0.74*
Years of experience as physiotherapist (global p-value=**0.04**)				
<1 year	1 (0.6%)	1 (3.1%)	0 (0%)	0.21*
1-5 years	11 (7.1%)	4 (12.5%)	7 (5.7%)	0.24*
6-15 years	45 (28.8%)	11 (34.4%)	34 (27.4%)	0.58
16-25 years	46 (29.5%)	11 (34.4%)	35 (28.2%)	0.64
26-40 years	53 (34.0%)	5 (15.6%)	48 (38.7%)	**0.03**
Years of experience with people affected by cardiorespiratory health conditions (global p-value=0.73)				
<1 year	16 (10.3%)	4 (12.5%)	12 (9.7%)	0.74*
1-5 years	42 (26.9%)	10 (31.3%)	32 (25.8%)	0.69
6-15 years	46 (29.5%)	8 (25.0%)	38 (30.6%)	0.45
16-25 years	27 (17.3%)	3 (9.3%)	24 (19.4%)	0.47*
26-40 years	25 (16.0%)	7 (21.9%)	18 (14.5%)	0.64
CRP training (global p-value=0.77)				
< 3 years of experience in CR field	66 (42.3%)	15 (46.9%)	51 (41.1%)	0.70
Courses or >3 years of experience in CR field	65 (41.7%)	13 (40.6%)	52 (41.9%)	1.00
Post-graduate course in CR physiotherapy	25 (16.0%)	4 (12.5%)	21 (16.9%)	0.79*
Workplace (global p-value<**0.001**)				
Public institution	61 (39.1%)	6 (18.8%)	55 (44.4%)	**0.02**
Private/accredited/contracted institution	68 (43.6%)	10 (31.2%)	58 (46.8%)	0.17
Freelance	27 (17.3%)	16 (50.0%)	11 (8.9%)	**<0.001**
Working time in CR physiotherapy (global p-value=0.40)				
25%	94 (60.2%)	23 (71.9%)	71 (57.3%)	0.19
50%	21 (13.5%)	4 (12.5%)	17 (13.7%)	1.00*
75%	10 (6.4%)	1 (3.1%)	9 (7.3%)	0.69*
100%	31 (19.9%)	4 (12.5%)	27 (21.8%)	0.32*

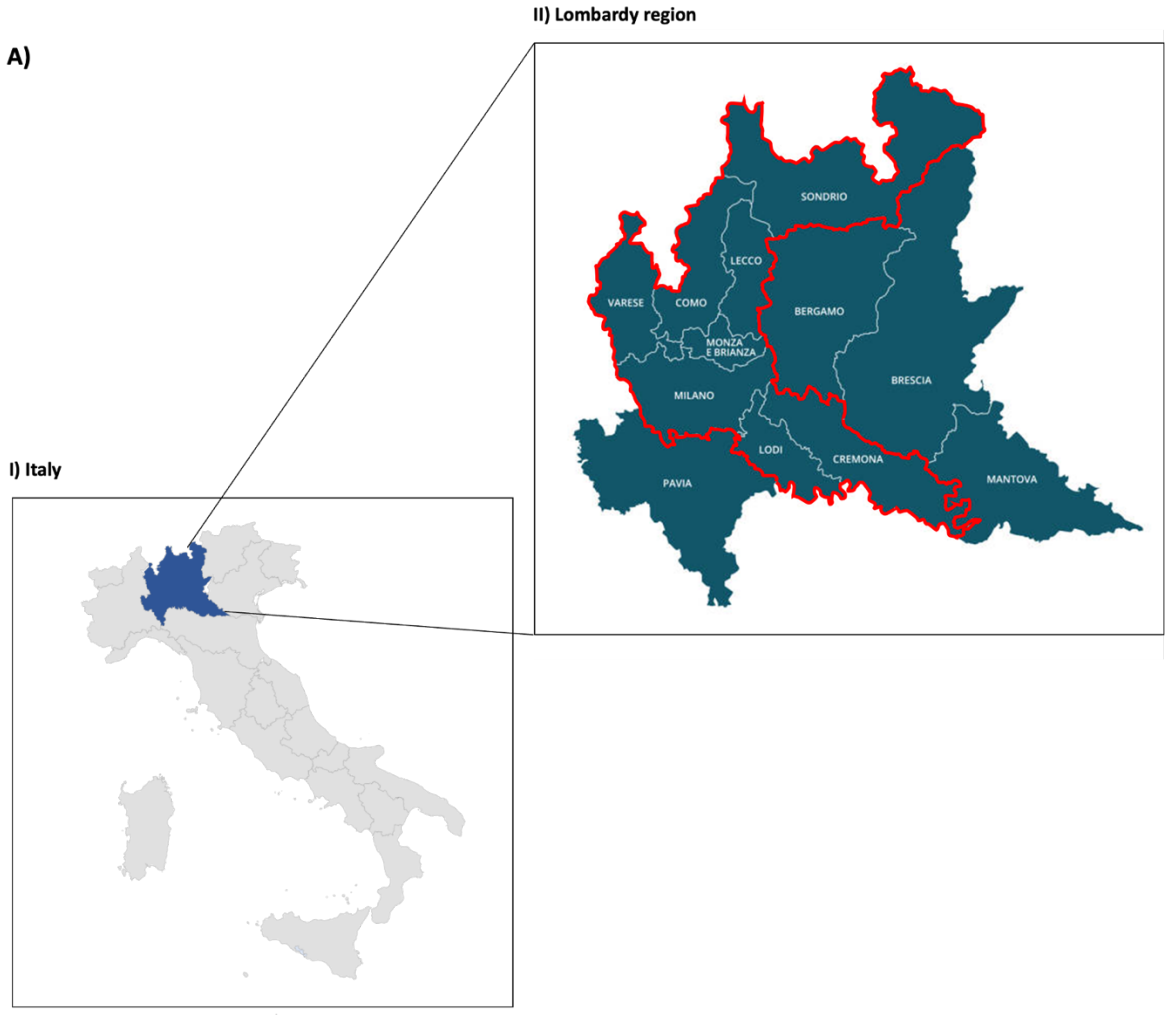
CRP, cardiorespiratory physiotherapist. Significant p values (p<0.05) are reported in **bold**. P values marked with an asterisk (*) were obtained using Fisher's exact test; all other p values were obtained using the Chi-squared test (home-based CRP *vs* non-home-based CRP).

Table 2. Reported health conditions, activities, barriers, and facilitators in home-based cardiorespiratory rehabilitation as identified by physiotherapists providing such services (n = 32).

Domain	Item	Respondents, n (%)
Conditions managed	COPD	22 (68.8)
	Cardiovascular diseases	21 (65.6)
	Neuromuscular diseases	21 (65.6)
	Post-surgical patients	18 (56.3)
	Other	83(N/A)
Professionals involved	Caregiver	25 (78.1)
	Nurse	22 (68.8)
	General practitioner	15 (46.9)
	Specialized physician	13 (40.6)
	Other	23 (N/A)
Functional assessment	Peripheral oxygen saturation	28 (87.5)
	Vital signs	23 (71.9)
	Muscle strength	20 (62.5)
	Functional capacity tests	19 (59.4)
	Other	201 (N/A)
Airway clearance	PEP systems	18 (56.3)
	Manual cough assist	9 (28.1)
	Postural draiage, percussion, vibration	9 (28.1)
	Mechanical cough assist	8 (25.0)
	Other	34 (N/A)
Lung re-expansion	Diaphragmatic breathing	17 (53.1)
	Volumetric incentives devices	17 (53.1)
	Ventilation/CPAP	14 (43.8)
	Other	31 (N/A)
Exercise training	Endurance	22 (68.8)
	Strength	22 (68.8)
	Respiratory muscle training	19 (59.4)
	Other	40 (N/A)
Ventilation	Airway clearance with NIV	8 (25.0)
	NIV adjustment/monitoring	7 (21.9)
	CPAP adjustment/monitoring	6 (18.8)
	Other	48 (N/A)
Oxygen therapy	Low-flow systems	19 (59.4)
	Other	22 (N/A)
Aerosol therapy	During sontaneous breathing	11 (34.4)
	Other	32 (N/A)

Tracheostomy	Tracheal suctioning	7 (21.9)
	Other	42 (N/A)
Education	Physical activity and lifestyle	26 (81.3)
	Smoking cessation	12 (37.5)
	Oxygen therapy education	11 (34.4)
	Airway clearance education	9 (28.1%)
	Other	36 (N/A)

COPD, chronic obstructive pulmonary disease; PEP, positive expiratory pressure; CPAP, continuous positive airway pressure; Ambu, artificial manual breathing unit; NIV, non-invasive ventilation; N/A, not applicable. Percentages refer to the proportion of physiotherapists (n = 32) who reported performing each activity or collaborating with the indicated professional. "Other" refers to heterogeneous responses and is reported as the cumulative number of respondents rather than a percentage.



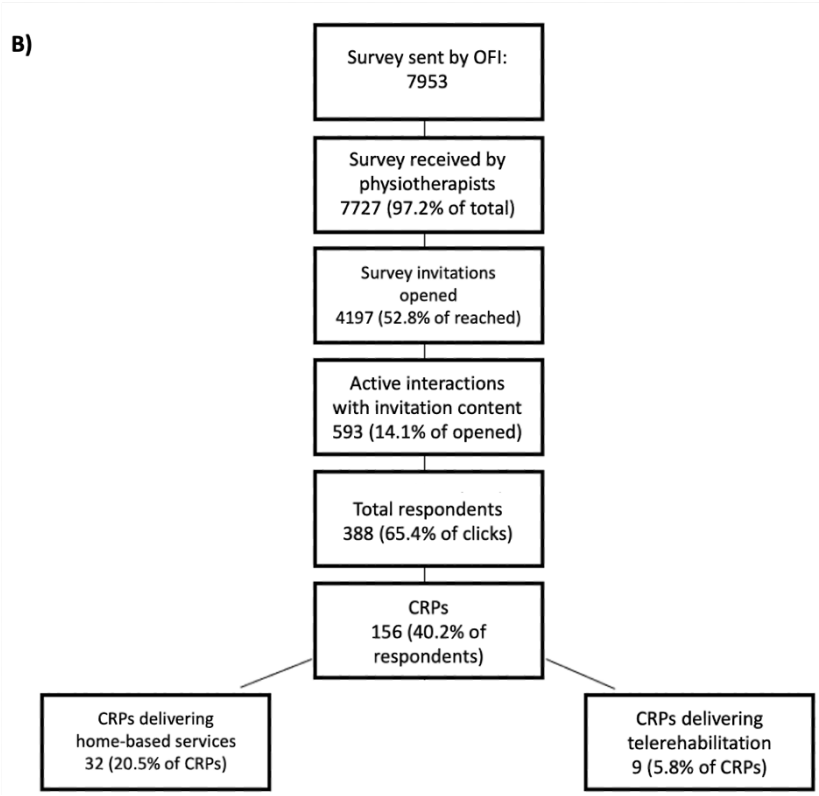


Figure 1. Survey setting and participation flow: (A) Lombardy region and provinces involved; (B) invitation and response flowchart. CRP, cardiorespiratory physiotherapist.