

Strategies to Improve Enrollment and Participation in Pulmonary Rehabilitation Following a Hospitalization for COPD

RESULTS OF A NATIONAL SURVEY

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Purpose: Pulmonary rehabilitation (PR) improves outcomes for patients with chronic obstructive pulmonary disease (COPD); however, very few patients attend. We sought to describe strategies used to promote participation in PR after a hospitalization for COPD.

Methods: A random sample of 323 United States based PR programs was surveyed. Using a positive deviance approach, a 39-item survey was developed based on interviews with clinicians at hospitals demonstrating high rates of participation in PR. Items focused on strategies used to promote participation as well as relevant contextual factors.

Results: Responses were received from 209 programs (65%), of which 88% (n = 184) were hospital-based outpatient facilities. Most (91%, n = 190) programs described enrolling patients continuously, and 80% (n = 167) reported a wait time from referral to the initial PR visit of <4 wk. Organization-level strategies to increase referral to PR included active surveillance (48%, n = 100) and COPD-focused staff (49%, n = 102). Provider-level strategies included clinician education (45%, n = 94), provider outreach (43%, n = 89), order sets (45%, n = 93), and automated referrals (23%, n = 48). Patient-level strategies included bedside education (53%, n = 111), flyers (49%, n = 103), motivational interviewing (33%, n = 69), financial counseling (64%, n = 134), and transportation assistance (35%, n = 73). Fewer than one-quarter (18%, n = 38) of PR programs reported using both bedside education and automatic referral, and 42% (n = 88) programs did not use either strategy.

Conclusions: This study describes current practices in the United States, and highlights opportunities for improvement at the organization, provider, and patient level. Future research needs

to demonstrate the effectiveness of these strategies, alone or in combination.

Key Words: COPD hospitalization • enrollment • implementation • pulmonary rehabilitation • referral • strategies

KEY PERSPECTIVE

- This is the first study at the national level to describe strategies used to promote participation in pulmonary rehabilitation after a hospitalization for chronic obstructive pulmonary disease.
- Opportunities to implement strategies to promote greater participation exist at the organization, provider, and patient level.
- Future research is needed to rigorously test these strategies, individually and in combination.

Chronic obstructive pulmonary disease (COPD) affects more than 16 million individuals in the United States, and exacerbations result in approximately 1.5 million emergency department visits and >700 000 hospitalizations annually.¹⁻³ Recovery from a COPD exacerbation is gradual and characterized by reduced functional status and quality of life, and elevated risk of rehospitalization and death.⁴⁻⁸ Among Medicare beneficiaries, the risk of readmission at 1 yr is >60%, and mortality approaches 26%.⁹

Pulmonary rehabilitation (PR) is a comprehensive program of exercise training and self-management support, typically offered over 8-12 wk. Pulmonary rehabilitation has been shown to improve exercise capacity, reduce dyspnea, and improve quality of life in both stable COPD and after an exacerbation.¹⁰⁻¹³ Rehabilitation is particularly beneficial when initiated following a hospitalization, an event that is associated with acute reduction in skeletal muscle function and a self-reinforcing cycle of dyspnea-related deconditioning—clinical features that are key targets of PR. Meta-analyses of randomized trials suggest that, when initiated after an exacerbation, PR lowers patient risk of readmission and may improve survival.¹⁴⁻¹⁶ On the basis of this evidence, the guidelines of the American Thoracic Society/European Respiratory Society, the American College of Chest Physicians, and the Global Initiative for Obstructive Lung Disease recommend that all patients begin PR after a COPD exacerbation.¹⁷⁻¹⁹

Although recommended by clinical guidelines, <2% of patients begin PR within 6 mo of hospitalization for COPD.^{20,21} Among the subset of patients who attend ≥1 session, less than half complete a full course of treatment. Barriers to higher rates of participation in PR have been

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reported at all levels of the health care system including the payor, program, provider, and patient.²²⁻²⁶ Common barriers to patients include lack of knowledge of PR, transportation and financial burden, and low levels of patient motivation.^{23,24,26} Given the poor uptake of PR in the United States, we sought to describe current practices related to promoting participation after a hospitalization for COPD. The goal was to identify practices at the organization, provider, and patient level that may offer the greatest opportunities to improve care.

METHODS

The study was approved by the Institutional Review Board at Baystate Medical Center.

A 39-item survey was developed based on findings from interviews conducted using a positive deviance framework between July 2019 and June 2020 intended to generate hypotheses regarding the contextual factors and strategies that might help PR programs achieve high rates of participation after a COPD hospitalization.²⁷ Seventeen high-performing hospitals were invited for qualitative key informant interviews of which nine participated, five declined, and three did not respond. Of the nine respondents, seven were “high-performing” PR programs, which were programs ranked in the top 5% of United States hospitals for PR enrollment after a hospitalization for COPD among Medicare beneficiaries in 2017. The two other respondents were “innovator” programs, which were selected by the authors based on review of their presentations at the American Association of Cardiovascular and Pulmonary Rehabilitation/American Thoracic Society in 2017-2019. Interviewees included medical directors of PR programs, pulmonologists, hospitalists, respiratory therapists, physical therapists, nurses, social workers, and navigators and represented programs, which varied in location (urban/rural), teaching status, and whether they were associated with a lung transplant program. Survey items (see Supplemental Digital Content 1, available at: <http://links.lww.com/JCRP/A415>) focused on organization, provider, and patient-level strategies used to enroll patients in PR prior to the pandemic, and potentially relevant contextual factors. Response options included nominal (yes/no), multiple-choice, and short answer.

Using Medicare claims data, 1647 hospitals were identified that delivered PR services in 2018 and that had >10 annual COPD admissions. From these 1647, we utilized “PROC SURVEYSELECT” in SAS (SAS Institute, Inc) with the option of SRS (simple random sampling without replacement) to select 350 PR programs to invite to take part in our survey. Hospitals were contacted by phone in 2021 to verify that the PR program was active and to obtain the name and contact information of program leadership. A total of 27 programs reported closing since 2018, leaving a sample of 323 active programs (see Supplemental Digital Content 2, available at: <http://links.lww.com/JCRP/A416>). Intended respondents included PR directors, managers, or other key PR staff. A pre-notification letter was mailed to each program contact announcing the study followed 10 d later by a paper copy of the survey, which was accompanied by a \$25 gift card. Ten days after the initially mailing, a reminder postcard was sent containing a QR access code, which facilitated completion of the survey online. A second paper survey was sent to nonrespondents 14 d later, and then made up to four attempts to contact the remaining nonrespondents by telephone.

STATISTICAL ANALYSES

A descriptive analysis was performed to delineate hospital and PR program characteristics. Responses with text for “other”

categories were coded and added to the main category when relevant. Free-text responses were coded qualitatively by two research staff, and consensus reached by the research team. Survey responses are reported with n (%) for the categorical variables, mean \pm SD for continuous variables. Missing data were infrequent with $\leq 2\%$ of certain responses being missing in the survey. Missing responses were included as their own category while computing the proportion of responses throughout the survey. All data were analyzed using SAS, version 9.4 (SAS Institute, Inc) and STATA 17 (StataCorp).

RESULTS

Of 323 programs surveyed, 209 (65%) responded. Approximately half (53%, n = 111) of the respondents described their current role as a manager/director of PR. With regard to professional background, approximately 43% (n = 90) of respondents were trained as respiratory therapists, 22% (n = 45) as nurses, and 19% (n = 40) as exercise physiologists. The median practice time was 8 yr (4, 20 yr). The median of observed PR rates among Medicare beneficiaries at the 209 programs was very low at 2.9% (1.5, 5.0%).

PROGRAM CHARACTERISTICS

Characteristics of PR programs that responded to the survey are presented in Table 1. All programs served patients in the outpatient setting; 88% (n = 184) were located in the hospital or on the hospital campus, while the remaining 12% (n = 25) were located off-site. Approximately half (48%, n = 101) of all programs were affiliated with hospitals operating 100-399 beds, 39% (n = 81) were at teaching hospitals, and 39% (n = 82) were located in the Midwest. The survey respondents spanned 43 states across the United States with ≥ 10 programs each from Florida, Iowa, Michigan, Minnesota, and Pennsylvania. Most programs reported sharing space with cardiac rehabilitation (CR; 13%, n = 27) or another hospital service (83%, n = 173). Approximately 7% (n = 15) reported having fully dedicated staff, while the majority reported sharing their administrative and clinical staff with CR (25%, n = 53) and other hospital programs (69%, n = 144). Approximately 10% (n = 20) of programs were affiliated with hospitals performing lung transplantation.

The vast majority (92%, n = 192) of PR programs enrolled individual patients on a rolling basis as space became available. A majority (80%, n = 167) of programs reported a typical wait time of up to 4 wk between referral and the first PR visit. Approximately 65% (n = 135) of programs had a “PR champion,” which was defined as someone who actively supports PR, promotes the program to hospital physicians, administrators, and hospital staff, and helps overcome barriers to program improvement. These PR champions commonly included medical directors (50%, n = 68), respiratory therapists (46%, n = 62), pulmonologists (21%, n = 28), and nurses (14%, n = 19). Others serving as a PR champion included exercise physiologists, physical therapists, and PR coordinators. Approximately 56% (n = 116) of PR programs reported enrolling current smokers provided that certain conditions were met (eg, committed to quitting, or dependent on health insurance), 8% (n = 16) programs allowed entry of smokers without preconditions, and 35% (n = 72) of PR programs excluded current smokers from PR.

ORGANIZATION-LEVEL STRATEGIES

Strategies to increase patient referral at the organization level included active surveillance to identify patients with COPD, as well as direct outreach to patients at the bedside. In many instances increasing participation in PR was tied

Table 1

Characteristics of the Hospitals/Outpatient Pulmonary Rehabilitation Programs (n = 209)

Pulmonary Rehabilitation Program Characteristics	n	%
Hospital size, beds		
Small (1-99)	59	28.2
Medium (100-399)	101	48.3
Large (≥400)	49	23.4
PR program location		
Urban	142	67.9
Rural	67	32.1
Hospital region		
Northeast	41	19.6
South	65	31.1
Midwest	82	39.2
West	21	10.1
PR program affiliated with a teaching hospital	81	38.8
AACVPR-certified PR program	69	33.8
Patient enrollment into PR		
Enrolled as a group (cohort)	19	9.1
Individual enrollment on a rolling basis	192	91.9
PR wait times from referral to first PR visit, wk		
<2	73	35.1
2-4	94	45.2
5-8	24	11.5
>8	7	3.4
Unsure	10	4.8
PR program allowed active smokers		
Yes, without conditions	16	7.7
Yes, with conditions (eg, committed to quitting, if allowed by insurance)	116	56.0
No, all PR participants must have quit smoking	72	34.8
Unsure	3	1.5
PR program had a champion	135	64.9
PR program affiliated with a specialized hospital for lung transplants	20	9.6

Abbreviations: AACVPR, American Association of Cardiovascular and Pulmonary Rehabilitation; PR, pulmonary rehabilitation.

to broader quality improvement and readmission reduction strategies (Table 2).

Nearly half (48%, n = 100) of programs reported having a systematic process to identify patients with COPD who might be eligible for PR, and 20% (n = 41) reported cohorting patients with COPD on a specialized respiratory unit. Approximately half (49%, n = 102) of programs had COPD-focused staff (eg, navigators, pulmonary nurses, or other nonphysician providers) meet with patients face-to-face while hospitalized to discuss PR, disease self-management, or transitional care planning.

More than half of programs (56%, n = 117) reported ongoing quality improvement projects to improve the outcomes for COPD patients, and of these 66% (n = 77)

Table 2

Organization-Level Strategies

Reported Use of Strategies at Organization Level	n	%
Engagement in quality improvement projects to improve outcomes for COPD patients	117	56.0
Quality improvement focused on increasing PR enrollment after discharge	77	66.0
Presence of systematic processes to identify COPD patients for quality improvement or readmission reduction efforts	100	47.8
COPD patients admitted to specialized units such as respiratory units	41	19.6
Type of reminders used to promote evidence-based therapies to treat COPD		
Computerized pop-ups/decision support/best practice alerts	35	16.8
Order sets/care sets	113	54.1
Chart review by quality assurance specialists during inpatient stay	63	30.1
Pharmacist reminders	12	5.7
Physician emails	6	2.9
Other ^a	16	7.7
Unsure	68	32.5
Presence of strategies aimed at reducing COPD readmissions	131	62.7

Abbreviations: COPD, chronic obstructive pulmonary disease; PR, pulmonary rehabilitation.
^aOther strategies reported as reminders to evidence-based therapies for COPD in the hospitals were respiratory therapy consult, staff education on PR, and having navigators.

incorporated PR as a component of the overall strategy. Open-ended responses commonly reported on quality improvement strategies (n = 75) included use of order sets/automated referral, patient education, inpatient consultation, physician education, navigators, and screening for COPD.

Nearly two-thirds of programs (63%, n = 131) reported working with hospital staff to reduce COPD readmissions. Among these 131 responses, strategies included post-discharge phone calls/text messages (66%, n = 87); referral to PR (65%, n = 85); transitional care support from a case manager/navigator (57%, n = 75); post-discharge clinic (26%, n = 34); and support from a community health worker (11%, n = 14).

Of the PR programs surveyed, 85% (n = 177) reported use of ≥1 of these organizational level strategies, and 50% (n = 104) reported ≥3. About 15% (n = 32) had none of these strategies in place.

PROVIDER-LEVEL STRATEGIES

Strategies to promote referral at the provider level focused on increasing provider awareness and knowledge, decision support, and automation (Figure 1).

Specific approaches included development and distribution of educational materials (45%, n = 94); conducting outreach visits to referring providers (43%, n = 89); recruiting PR champions (25%, n = 53); and audit/feedback of referral rates (14%, n = 30).

Strategies in this domain included the development of order sets for patients with COPD that included a referral to PR (45%, n = 93), electronic reminders (eg, best practice alerts) (18%, n = 38), and automated referrals (23%, n = 48).

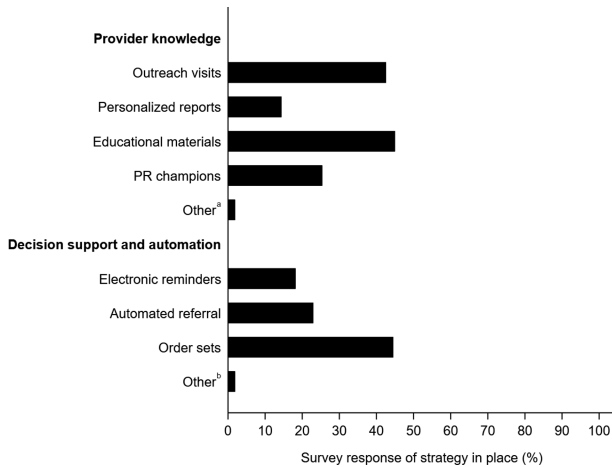


Figure 1. Percentage of respondents reporting use of provider-level strategies. (a) Includes responses such as staff “too busy” and sent therapy reports to primary care physician. (b) Includes responses such as autoreferral not supported; PR referral placed in work queue by a physician; and working on adding “opt out” for PR in electronic medical record. Abbreviation: PR, pulmonary rehabilitation.

Of the PR programs, 80% (n = 167) reported ≥ 1 provider-level strategy, and 37% (n = 77) reported ≥ 3 . Approximately 20% (n = 42) of programs had not implemented any of these provider-level strategies.

PATIENT-LEVEL STRATEGIES

Strategies to improve enrollment at the patient level fell into the following categories: increasing patient knowledge, increasing motivation, and overcoming transportation and financial barriers (Figure 2).

Specific strategies to improve patient knowledge included bedside education about PR (53%, n = 111); distribution of educational flyers (49%, n = 103); the use of other promo-

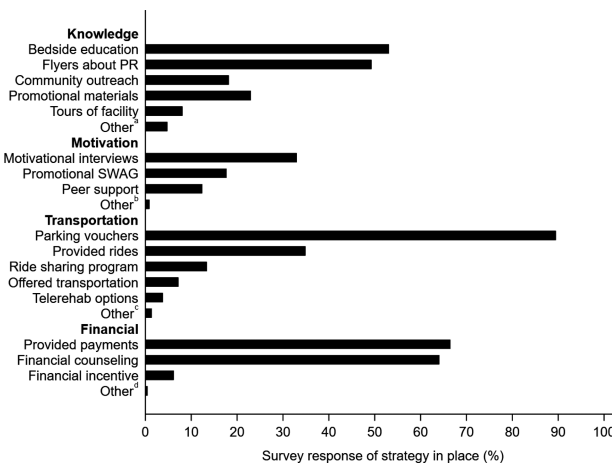


Figure 2. Percentage of respondents reporting use of patient-level strategies. (a) Includes responses such as lack of adequate staffing; PR ads on hospital Facebook page; radio spots; and navigator position removed prior to COVID. (b) Includes responses such as progressive incentives and staff encouragement, goal setting, follow-up calls, and T-shirts upon completion of program. (c) Includes responses such as gave patients numbers for transportation and patients use transportation companies services set up by their insurance. (d) Foundation funds available if the patient was willing for us to ask on their behalf; Catholic Health Charities; scholarship fund for a visit or two. Abbreviations: PR, pulmonary rehabilitation; SWAG, stuff we all get.

tional media, such as mailings to patients or videos in hospital rooms (23%, n = 48); community outreach efforts, such as PR staff visits to senior centers (18%, n = 38); and tours of the PR facility to hospitalized COPD patients (8%, n = 17).

Strategies used to increase patient motivation included motivational interviewing by a health coach or a provider (33%, n = 69); promotional gifts such as travel mugs and t-shirts (18%, n = 37); and peer support or navigator programs (12%, n = 26).

Strategies to mitigate transportation barriers included providing free parking or parking vouchers (90%, n = 187); facilitated rides with nonprofits (35%, n = 73); vouchers for ride-sharing programs (13%, n = 28); direct transportation assistance (7%, n = 15); and offering telerehabilitation programs (4%, n = 8).

Strategies to address financial barriers included offering payment plans (67%, n = 139); financial counseling (64%, n = 134); and financial incentives tied to participation or completion (6%, n = 13).

Roughly three-quarters (78%, n = 163) of programs had ≥ 1 patient-level strategy in place, and 39% (n = 82) reported ≥ 3 . Approximately one in five programs (22%, n = 46) had not implemented any of these patient-level strategies.

Based on the effectiveness of automatic referral and bedside recruitment (liaisons) in the setting of CR,^{28,29} we report on the combination of these strategies in PR. Thirty-eight (18%) of programs reported both automatic referral and bedside recruitment, while 42% (n = 88) had neither of these evidence-based strategies in place.

DISCUSSION

Despite strong evidence demonstrating the benefits of PR and guidelines recommending initiation of PR following a COPD exacerbation, few patients ever complete a single PR session.¹⁹⁻²⁶ This survey of 209 PR programs from across the United States identified current strategies used to promote participation following a hospitalization for COPD. Although most programs have implemented some of the approaches that we hypothesized to be effective, our findings highlight ongoing opportunities to address barriers to referral and enrollment at the organizational, provider, and patient level.

The process of ensuring that a patient begins PR after a hospitalization for COPD is complex. A referral to PR is a prerequisite, yet many hospital-based physicians remain unfamiliar with the evidence regarding the benefits of PR, are uncertain about eligibility requirements, do not see referral to PR as their responsibility, or are preoccupied by other concerns encountered in the acute care setting.³⁰ To overcome these barriers programs often distribute educational and promotional materials, conduct outreach to referring providers, and create order sets that include a referral to PR. Many programs also had a PR champion. To keep potentially eligible patients from slipping through the cracks, some programs reported conducting routine surveillance to identify COPD admissions, while others have developed automated systems for ensuring referral to PR. Use of order sets and automated referrals as a strategy to improve PR has been previously described by Milner et al,³¹ who recommended that these strategies be combined with provider education and training.

Even when a patient has been identified as potentially eligible for PR and a provider has placed an order for referral, there are numerous other barriers to enrollment and attendance.³⁰ These include lack of knowledge of the benefits of PR, low self-efficacy, fear, and low levels of motivation. The most common approaches for addressing these barriers included educational flyers, bedside education, and motivational interviewing by navigators, and trained staff/health

coaches. These methods are supported by Guo and Bruce,³² who found that adherence can be improved by strategies that increase confidence, promote tangible benefits of participation, and by recognizing and addressing issues such as readiness and fear. Studies in CR have shown that an automatic referral process combined with bedside recruitment can achieve enrollment rates of up to 70%.^{27,28,33} Given the high levels of participation achieved when those strategies have been combined in the CR context, it is especially notable that only 18% of PR programs reported having both of these strategies in place, and that 42% had neither. Rates of PR participation from our previous analysis with Medicare beneficiaries were much lower than has been reported in CR.^{20,34} It is possible that limited use of bedside liaison and automatic referrals in PR may explain some of these differences. However, dyspnea and the chronic progressive nature of COPD represent barriers to PR that are not routinely present among patients referred to CR after a myocardial infarction or coronary bypass surgery.

Among patients who accept referral and are initially motivated to attend, additional barriers to participation include the time involved, transportation, cost, the possibility of intercurrent illness, and the challenges of sustained behavior change. Strategies reported by programs to address these barriers included free parking and parking vouchers, financial counseling, and even financial incentives. A recent systematic review of strategies to increase referral and patient enrollment in PR found that patient education and use of financial incentives were associated with significant improvement.³⁵ An interesting finding of our study was that <10% of programs allow smokers to attend PR unconditionally, while one-third never allow active smokers into PR. This appears to be a missed opportunity, as prior research has shown that PR is similarly effective in smokers and non-smokers.^{36,37} Although it remains a source of controversy, some advocates have argued that smoking cessation counseling and treatment should be fully integrated into PR.^{38,39}

This study has several strengths. First, it is the first national survey that we are aware of describing strategies used by PR programs to foster enrollment after hospitalization for COPD. Second, the survey was developed after conducting site visits to a diverse group of hospitals that achieved high rates of PR participation, suggesting that the strategies asked about in our survey may indeed represent best practices. Despite these strengths our study has a few limitations. First, although a high (65%) response rate was achieved, it is possible that participating programs were not fully representative of all PR programs in the United States. Along these lines, lung transplant centers, which typically have robust PR programs, were overrepresented. Second, program characteristics and strategies were self-reported, as it was not practical to collect or verify this information independently. Third, we were unable to examine the association between specific strategies and hospital rates of participation because rates of participation in PR were extremely low across most hospitals, precluding the stability and/or reliability of any results that might come from this form of analysis. As a result, it is not possible to know with any confidence from our data alone what specific strategies were associated with higher or lower rates of PR participation.

CONCLUSIONS

This study describes current practices used to promote participation in PR after a hospitalization for COPD in the United States highlighting opportunities to implement strategies targeting organization, provider, and patient-level barriers to enrollment. To achieve the full public health

benefit of PR, policy makers should consider developing and funding initiatives to promote greater levels of participation after discharge.

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