APPENDICES

Appendix A. Additional Tables

Appendix A. Additional Tables

Table 1A. Utilized approaches for obtaining patient, family caregivers, and stakeholders input into BREATHE2 Study

Study Partners and Stakeholders (engaged from start to end of study as part of project team)		
	Method for Eliciting Input	**Role of Contributor**
Patient and Family Partners	Patient Family Partner Group Meetings (every 4-6 weeks)	1) Study partners (members of the study team); 2) One patient partner and one caregiver partner were also included as study co-investigators
Clinicians, Health Care Administrators, and other Stakeholders	Outreach and Joint Study Team Meetings (every 6 months)	1) Study advisors and collaborators; 2) One health care administrator was included as study co-investigator

Table 2A. Examples of Engagement Impact

Impact	Examples of Engagement Impact
Relevance of research question	The patient family partners (PFP) highlighted the importance of measuring quality of life and agreed to importance of capturing impact on acute care use.
Study design process and outcomes	During PFP meetings, the partners repeatedly voiced the need for information about COPD, its treatment, and ways to self-manage it. They proposed using groups 'like this one' to communicate about these issues and support each other. PFP members provided ongoing and timely feedback about the planned research; this ensured that interventions within the study addressed important issues, remained relevant to people with COPD and were feasible in practice. They provided critical input in setting the goals and aims of the study. They engaged in multiple discussions during regularly held meetings where intervention materials and content were reviewed and edited per group feedback. They also actively participated in the drafting and revising of study recruitment materials.
Study rigor and quality	The Peer mentors/ BREATHE Pals (the peer mentors in the BREATHE2 Study were called 'BREATHE Pals', a suggestion from the patient family partners) were very engaged in delivering the peer support activities and we have elicited their feedback on their experience with the program, its implementation, and their recommendation for future improvements. We have also elicited feedback on the same areas from patient and caregiver participants who were randomized to receive the peer support program. Close work with the patient and caregiver co-investigators and the patient and family partners have led to the intervention being tested in this study. For example, for the peer support program Get-Togethers activities, the research team including the patient and caregiver co-investigators developed an initial set of opening questions for each group event and proposed ice breaker activities. The initial plan was drafted as a table by the Intervention Development Workgroup, which includes patient and caregiver co-investigators and researchers. This draft was then reviewed in detail at the study's second joint team bi-annual meeting (which includes researchers, all patient and family partners, and stakeholders). We got further feedback from patient family partners on how to phrase the questions pertaining to patient-caregiver relationship and on specific icebreaker activities that the partners thought was 'worthy' of repeating at multiple sessions. Based on this feedback a final set of opening questions and icebreaker activities were developed
Recruitment	Positive impacts of stakeholder engagement included facilitation of intervention implementation (e.g. finding rooms for Get-Togethers, getting volunteer status for the peer mentors) and recruitment efforts (e.g. creating EPIC reports to aid screening and recruitment activities). All recruitment materials were co-developed with patient partners and stakeholders. Later in study, the patient and family partners proposed creating a video to help with participant recruitment and future engagement in study interventions. The video would bring in the 'patient voices' and will describe goals of the study and its interventions. The partners proposed ideas about the key message for that video which is that "there is hope after COPD diagnosis and one may have good quality of life while living with COPD". We worked with our Hopkins communications and marketing team and patient and family partners to develop this and used in study recruitment activities with good results.

Impact	Examples of Engagement Impact
Transparency of research process	We had an ongoing robust patient and family engagement process including having a patient and family partners group that meets independently throughout study period and jointly with research team. We also have patient and a caregiver co-investigator on the research study who are very engaged with all research activities The experiential knowledge of partners (including their judgment and values) has been utilized throughout the research process, in a plethora of different ways and at many different levels. Patient and stakeholder perspectives have shaped the informed consent document and how we presented the study to potential participants. Later in study, the patient and family partners proposed creating a video to help with participant recruitment and future engagement in study interventions. The video brought 'patient voices' into the recruitment process. The partners proposed ideas about the key message for that video which is that “there is hope after COPD diagnosis and one may have good quality of life while living with COPD". We worked with our Hopkins communications and marketing team and patient and family partners to develop this and used in study recruitment activities with good results. Furthermore, the BREATHE Pals (patients and caregivers providing peer support) provided their feedback on areas for future improvement for study intervention.
Adoption of evidence into practice	One unique benefit of patient and broad stakeholder engagement in this study is that it helped create a sense of ‘ownership’ of the program by the partners and stakeholders. This led to more ‘buy in’ and support for the study as it is nearing its end. Patients, caregivers, and stakeholders have been engaged in discussions about mechanisms for sustaining peer support delivery to study participants post end of research period. We have agreed based on discussions with study partners and stakeholders about mechanisms for future peer support to study participants post research period end, to inform participants about a variety of options to receiving peer support. Those include COPD Foundation support line, Better Breathers club groups (these are sponsored by the American Lung Association), and a local support group facilitated by one of the BREATHE Pals with support from one of the study sites (Howard County General Hospital).

Table 3A. Get-Together Themes and Discussion Topics by Session

Themes	Topics Description
Theme #1 **Ways to Breathe Easier**	• Ways to perform daily activities with less shortness of breath • Pursed-lip breathing • Discussion of general experiences with COPD and providing/receiving help and support
Theme #2 **Recognizing Signs of a Flare-up**	• COPD exacerbations (flare-ups) and how to manage them • Action plans and how to use
Theme #3 **Coping with COPD**	• COPD impact on life • Managing feeling short of breath • Managing feelings of anxiety and depression
Theme #4 **Getting the Most of Your COPD Medications**	• COPD treatments • Inhaler use • Rescue inhalers vs. maintenance inhalers vs. nebulizers • Managing medication costs
Theme #5 **Getting Acquainted with Oxygen Usage**	• Oxygen therapy: when is it needed and how to use safely • Traveling with oxygen • Getting comfortable using oxygen in public
Theme # 6 **Becoming More Active**	• Importance of staying active • Becoming more active • Pulmonary rehabilitation and its benefits
Theme #7 **Lifestyle Modification with COPD**	• Diet changes • Planning a daily routine and pacing yourself • Support for smoking cessation • Preventing and being proactive about COPD
Theme #8 **Preventing Breathlessness**	• Irritants you should avoid • Protecting yourself from infections

Table 4A. BREATHE2 Study Variables and Data Collection Schedule

Variable	Baseline	3 months	6 months	9 months
Outcomes – Patient				
Health-related quality of life as measured by St. George's Respiratory Questionnaire: total, symptom, activity, and impact scores[71]	I		T	T
Patient Activation Measure[74]	I	T	T	T
Self-efficacy and self-care behaviors (measured using UCOPD questionnaire),[76] patient report on physical activity*	I	T	T	T
Smoking status and readiness to quit	I	T	T	T
Patient perceptions of caregiving	I		T	T
Participation in pulmonary rehabilitation**	I	T	T	T
Post-enrollment ED visits and readmissions (COPD-related and all-cause)		T,M	T,M	T,M
mMRC Dyspnea Scale***	I	T	T	T
PROMIS support measures,[72,73] with 4 domains used: 1) Social isolation 2) Informational support 3) Emotional support 4) Instrumental support	I	T	T	T
Herth Hope Index with 3 subscales[75]	I	T	T	T
Mortality		T,M	T,M	T,M
Covariates – Patient				
Age, gender, marital status, race/ethnicity, living alone, education, income, occupation, insurance, health literacy[83]	I			
Lung function measures via spirometry (FEV1 and FEV1/FVC)	I			
Addiction to drugs or alcohol, mental health diagnosis	I			
Medical history (height, weight, previous PFTs, oral steroid use, class of inhaler treatment)	M			
No. of years since receiving COPD diagnosis, no. of hospitalizations in prior year, time since last hospitalization, depression treatment, cognitive status	I			
Home oxygen use	I		T	T
Self-reported health status	I	T	T	T
Functional status	I		T	T
Anxiety and depression	I		T	
Charlson Co-morbidity Index[82]	M		T	
Major life events during study period			T	
Patient participation in study intervention, other programs			D	
Outcomes – Family				
Family/caregiver preparedness for caregiving[78]	I	T	T	T
Caregiver stress and coping[80,81]	I	T	T	T
PROMIS support measures with 2 domains used: 1) Informational support 2) Emotional support	I	T	T	T
Covariates – Family				
Age, gender, relation to patient, employment, health, and smoking status	I			

I = Interviewer administered in-person; T = Interviewer administered via telephone; M = Medical record review; D= Study documentation

* Do you engage in any physical activity such as walking or bicycling, etc.? (No; Yes, occasionally; Yes, 1-2 times per week; Yes, 3 times a week or more); When you do physical activities, is it long enough to work up a sweat? (No; Yes, occasionally; Yes, 1-2 times per week; Yes, 3 times a week or more)

** Have you participated in a pulmonary rehabilitation program? (I currently am; I have participated in it in the past 2 years; I did participate in it more than 2 years ago)

*** 3 mMRC Breathlessness grades: Grade 0= "Dyspnea only with strenuous exercise; Grdae 1= Dyspnea when hurrying or walking up a slight hill; Grade 2= Walks slower than people of the same age because of dyspnea or has to stop for breath when walking at own pace; Grade 3 = "I stop for breath after walking about 100 yards or after few minutes on level ground"; Grade 4 = "I am too breathless to leave the house or I am breathless when dressing"

Table 5A. Demographic characteristics of eligible patients and those who enrolled or declined to participate

Patient Characteristics	Eligible Patients[1]	Enrolled Patients	Declined Patients
No. of Patients	1061	292	434
Age[2], *mean (sd)*	69.4 (10.51)	66.6 (9.39)	72.2 (10.64)
Median age	69	66	72
Race			
White, n(%)	827 (77.95%)	209 (71.58%)	356 (82.03%)
African-American, n(%)	210 (19.79%)	74 (25.34%)	69 (15.90%)
Asian, n(%)	6 (0.57%)	0 (0.00%)	5 (1.15%)
American Indian/ Alaskan Native, n(%)	1 (0.09%)	0 (0.00%)	1 (0.23%)
Native Hawaiian/ Pacific Islander, n(%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Multiple, n(%)	4 (0.38%)	3 (1.03%)	0 (0.00%)
Other, n(%)	12 (1.13%)	5 (1.71%)	3 (0.69%)
Patient refused, n(%)	1 (0.09%)	1 (0.34%)	0 (0.00%)
Ethnicity			
Hispanic, n(%)	9 (0.85%)	4 (1.37%)	2 (0.46%)
Non-Hispanic, n(%)	1050 (98.96%)	288 (98.63%)	431 (99.31%)
Patient refused, n(%)	2 (0.19%)	0 (0.00%)	1 (0.23%)
Gender			
Male, n(%)	413 (38.93%)	114 (39.04%)	179 (41.24%)
Female, n(%)	648 (61.07%)	178 (60.96%)	255 (58.76%)

[1] *Eligible patients are those who meet the study inclusion criteria.*

[2] *Age when the patient was approached by the team member.*

Table 6A. Reasons for eligible patients declining to participate

Reason*	Number of patients
Not interested	285
Other medical problems	68
Lack of time	60
Transportation issue	21
Family issue	7
Burden of attending in-person	6
Involved in other studies	3
Other	27

*Patient may have multiple reasons for declining the study

Table 7A. Patient Baseline Characteristics by Missingness of 6 Months Primary Outcome

Baseline Characteristics	Observed at 6 mos. (N=220)	Not Observed at 6 mos. (N=72)	p-value
No. of Patient Participants[1]			
Enrolled from HCGH Inpatient, n(%)	48 (21.8%)	19 (26.4%)	0.130
Enrolled from HCGH Outpatient, n(%)	46 (20.9%)	9 (12.5%)	
Enrolled from JHBMC Inpatient, n(%)	86 (39.1%)	36 (50.0%)	
Enrolled from JHBMC Outpatient, n(%)	40 (18.2%)	8 (11.1%)	
Age, *mean(sd)*	68.0 (9.5)	66.8 (8.7)	0.330
Race			
White, n(%)	155 (70.5%)	52 (72.2%)	0.740
African-American, n(%)	59 (26.8%)	17 (23.6%)	
Other, n(%)	6 (2.7%)	3 (4.2%)	
Gender			
Female, n(%)	128 (58.2%)	51 (70.8%)	0.056
Male, n(%)	92 (41.8%)	21 (29.2%)	
Education			
8th grade or less, n(%)	14 (6.4%)	2 (2.8%)	0.180
Some high school, n(%)	32 (14.5%)	9 (12.5%)	
High school grad or GED, n(%)	58 (26.4%)	28 (38.9%)	
Some college and above, n(%)	116 (52.7%)	33 (45.8%)	
Income (n=286)[2]			
$20,000 or less, n(%)	83 (37.7%)	33 (45.8%)	0.210
$20,001 - $40,000, n(%)	46 (20.9%)	17 (23.6%)	
> $40,001, n(%)	87 (39.5%)	20 (27.8%)	
Continuous oxygen treatment, *n(%*)	48 (21.8%)	29 (40.3%)	0.002
Currently smoking, *n(%)*	46 (20.9%)	26 (36.1%)	0.009
Living alone, n(%)	59 (26.8%)	26 (36.1%)	0.130
Breathlessness grade 3 and 4[3], *n(%)*	126 (57.3%)	47 (65.3%)	0.230
Patient Activation Measure[4], *mean(sd)*	62.5 (14.6)	59.5 (12.1)	0.120
PROMIS® Measures[5]			
Social Isolation, mean (sd)	45.9 (10.6)	44.9 (9.7)	0.480
Emotional Support, mean (sd)	54.7 (9.6)	53.7 (9.8)	0.440
Informational Support (n=289)[5], mean (sd)	56.5 (11.2)	56.7 (10.0)	0.890
Instrumental Support, mean (sd)	55.3 (10.4)	53.9 (10.5)	0.310
Moderate to Severe Anxiety[6], *n(%)*	66 (30.0%)	24 (33.3%)	0.590
Moderate to Severe Depression, *n(%)*	45 (20.5%)	9 (12.5%)	0.130
Herth Hope Index[7], *mean (sd)*	38.3 (5.2)	38.4 (4.5)	0.840
Charlson Comorbidity Index, *mean (sd)*	2.5 (1.9)	2.8 (1.7)	0.210
Congestive Heart Failure, *n(%)*	76 (34.5%)	26 (36.1%)	0.810
Self-reported health status[8], *mean (sd)*			
Physical, mean (sd)	3.6 (0.9)	3.8 (0.8)	0.099
Emotional, mean (sd)	2.8 (1.1)	3.0 (1.0)	0.230
Has participated in pulmonary rehabilitation, *n(%)*	55 (25.0%)	17 (23.6%)	0.810
Extremely confident filling out medical forms, *n(%)*	133 (60.5%)	42 (58.3%)	0.750

1 Randomization is stratified by enrollment site/setting. Participants are enrolled from HCGH inpatient, HCGH outpatient, JHBMC inpatient, and JHBMC outpatient.
2 Six patients declined to provide information on income, four from the observed group, two from missing group
3 mMRC Breathlessness grades: Grade 3=I stop for breath after walking about 100 yards or after few minutes on level ground; Grade 4=I am too breathless to leave the house or I am breathless when dressing.
4 Patient Activation Measure (PAM) is a 100 point score that reflects patients' engagement in healthcare. Higher scores represent higher levels of activation.
5 Higher PROMIS scores for emotional, informational, and instrumental and lower PROMIS scores for anxiety, depression, and social isolation represent better outcomes.
6 Three patients failed to answer all of the instrument's questions needed to compute a score. Two from observed group and one from the unobserved group.
7 Higher HERTH Hope Index scores represent more hope.
8 Self-reported health status: 1=Excellent; 2=Very good; 3= Good; 4= Fair; 5 =Poor.

Table 8A. Mean change in HRQoL as measured by SGRQ from baseline to 6 and 9 months post-enrollment

	Average difference from baseline (sd)		Adjusted for baseline score, site and setting [a]		Full set of adjustors [c]	
	HCP + Peer Support	HCP	Difference between arms [95% CI]	P*	Difference between arms [95% CI]	P*
Total Score						
At 6 months N=220; HCP + Peer Support n=107; HCP Only n=113	-0.52 (18.32)	-1.78 (19.66)	1.46 [-2.47, 5.38][b]	0.467	1.82 [-1.76, 5.40]	0.319[d]
At 9 months N=155; HCP + Peer Support n=79; HCP Only n=76	4.61 (20.83)	2.27 (23.29)	1.71 [-2.30, 5.72]	0.404	2.06 [-1.22, 5.35]	0.219
Symptom Score			**Overall p-value = 0.441** [e]		**Overall p-value = 0.687** [e]	
At 6 months N=223; HCP + Peer Support n=109; HCP Only n=114	-3.11 (23.03)	-3.16 (23.46)	-0.70 [-1.80, 0.39]	-	-0.41 [-3.77, 2.95]	-
At 9 months N=161; HCP + Peer Support n=81; HCP Only n=80	4.47 (26.08)	1.05 (24.50)	0.67 [-4.25, 5.59]	-	1.87 [-3.32, 7.06]	-
Activity Score			**Overall p-value < 0.001**		**Overall p-value < 0.001**	
At 6 months N=220; HCP + Peer Support n=107; HCP n=113	0.60 (16.87)	-2.31 (23.15)	4.37 [0.65, 8.08]	0.021	5.44 [2.29, 8.58]	0.001
At 9 months N=155; HCP + Peer Support n=79; HCP Only n=76	3.14 (16.29)	0.06 (23.59)	3.69 [1.50, 5.88]	0.001	5.27 [4.15, 6.39]	<0.001
Impact Score			**Overall p-value = 0.696**		**Overall p-value = 0.389**	
At 6 months N=221; HCP + Peer Support n=107; HCP n=114	-0.57 (24.00)	-0.82 (23.34)	1.07 [-1.72, 3.85]	-	2.36 [-1.88, 6.60]	-
At 9 months N=159; HCP + Peer Support n=79; HCP Only n=80	5.31 (26.65)	4.29 (27.73)	-0.42 [-3.39, 2.55]	-	1.35 [-2.65, 5.35]	-

Notes: Randomization is stratified by enrollment site/setting. Standard errors for all analyses clustered at the site/setting level. Normality of residuals is good.

a Mixed effects linear model adjusted for baseline score, and site and setting fixed effects.

b In addition to the set of adjustors described in [a] the model for total score is adjusted additionally for the three SGRQ domain scores at baseline, but not for total score at baseline

c Mixed effects linear model adjusted for age, gender, continuous oxygen use, ever hospitalized in the previous year, Charlson comorbidity index, CHF diagnosis, annual income, education, smoking status, self-reported general and emotional health, post-enrollment disposition, SGRQ's baseline total and domain scores, and site and setting fixed effects.

d In addition to the set of adjustors described in [d] the model for total score is adjusted additionally for all three SGRQ domain scores at baseline, but not for total score at baseline

e Overall p-values test the overall interaction between the three time points and study arm; when overall p-value is <0.05, differences between study arms at the individual time points were assessed with a Bonferroni-adjusted significance level of 0.05/3 = 0.0167 to account for multiple comparisons.

Notes on Table 8A:

We compared the SGRQ Symptoms, Activity, and Impact domain scores between the two study arms. At baseline, domain scores were similar between the study arms except for higher activity scores in HCP Plus Peer arm compared to HCP arm (mean activity scores 74.1[sd 20.9] and 71[sd 23.9], respectively). Table 8A shows the changes in these domain scores from baseline by study arm at the study time points (6 months, 9 months). There were no significant interactions between timepoint and study arm for the Symptoms and Impact domain scores. There was a significant interaction between timepoint and study arm for the Activity domain score after adjustment for baseline score, hospital site, and enrollment setting ($p<0.001$), and this interaction remained significant after additional adjustment for baseline patient characteristics ($p<0.001$). Looking at the individual timepoints (with Bonferroni-adjusted significance level of $0.05/3 = 0.0167$), there was a significant difference in the change from baseline for the activity domain score at 6 and 9 months between the treatment groups (adjusted difference 5.44 points with 95% CI: 2.29 to 8.58 at 6 months; and 5.27 points with 95% CI: 4.15 to 6.39). Of note is that this difference between study arms in change of Activity scores was not significant in the unadjusted model ($p=0.131$ and 0.415 at 6 and 9 months, respectively).

Table 9A. Patient Activation Scores

	Difference from baseline (sd)		Adjusted for baseline score, site and setting [a]		Full set of adjustors [b]	
PAM score	**HCP Plus Peer**	**HCP**	**Difference between arms [95% CI]**	**P**	**Difference between arms [95% CI]**	**P**
			Overall p-value = 0.034 [c]		**Overall p-value = 0.050 [c]**	
At 3 months N=187; HCP + Peer Support n=96; HCP Only n=91)	4.14 (16.11)	0.78 (18.58)	0.80 [-1.59,3.18]	0.513	1.29 [-2.03,4.61]	0.447
At 6 months N=193; HCP + Peer Support n=94; HCP Only n=99	4.26 (18.27)	3.78 (20.75)	-1.14 [-2.04,-0.23]	0.014	-0.97 [-2.36,0.41]	0.169
At 9 months N=129; HCP + Peer Support n=65; HCP Only n=64	4.41 (20.8)	5.36 (17.9)	-1.00 [-2.78,0.78]	0.271	-1.21 [-3.76,1.34]	0.352

Notes: Analyses completed using a mixed effect linear model. Randomization is stratified by enrollment site/setting. Standard errors for all analyses clustered at the site/setting level. Normality of residuals is good.

a Mixed effects linear model adjusted for baseline score, and site and setting fixed effects.

b Mixed effects linear model adjusted for age, gender, continuous oxygen use, ever hospitalized in the previous year, Charlson comorbidity index, CHF diagnosis, annual income, education, smoking status, self-reported general and emotional health, post-enrollment disposition, and site and setting fixed effects.

c Overall p-values test the overall interaction between the three time points and study arm; when overall p-value are significant, differences between study arms at the individual time points should be assessed with a Bonferroni-adjusted significance level of 0.05/3 = 0.0167 to account for multiple comparisons.

Table 10A. Themes from the follow up calls with the Respiratory Care Practitioner (RCP)

Themes discussed	Examples
Medication information	Explaining the differences between rescue and maintenance inhalers and when each is indicated; discussion of side effects
Breathing techniques	Pursed-lip breathing
COPD medical equipment usage and maintenance	Pulse oximeter, nebulizers, BiPAP and CPAP machines
Dietary concerns	Eating a properly balanced diet, consulting with senior dietician to provide dietary recommendations
Avoiding intrinsic and environmental triggers	Nasal irrigation for seasonal allergies, changing air filters
Smoking cessation	800-QUIT-NOW hotline, educational materials
Oxygen therapy	Obtaining portable oxygen concentrator, supplemental oxygen when exercising, traveling with oxygen
Energy conservation	Pacing, planning ahead and prioritizing activities
Infection control	Proper hand washing techniques, using a mask, avoiding sick contacts, annual flu vaccine
Pulmonary rehab	Description of pulmonary rehab activities, requirements to participation, testing and prior authorization
Educational materials	Providing supplemental COPD patient education materials.

Table 11A. Themes from the calls with the Peer Support Program Coordinator

Themes discussed	Examples
Administrative tasks	Contacting patient for Get-Together Meetings
Transportation challenges	Connecting patients with Mobility Paratransit services, providing taxi coupons to come to Get-Togethers
Housing concerns	Assisting evicted patients, helping patient obtain senior housing
Social support services	Obtaining information for medical assistance, providing information and resources to assist with medication costs
Assistance with obtaining oxygen tank/portable oxygen changes	Oxygen tanks, portable oxygen concentrator, contacting oxygen supply company on patient's behalf
Coping with other comorbidities	Mental health services, cardiac rehabilitation and dental clinic services
Connecting patients with a pulmonologist and/or pulmonary rehab	Assisting with authorization forms and applications, assisting with scheduling pulmonologist appointments

Table 12A. Patient Baseline Characteristics by Intervention Reception[1]

Baseline Characteristics	HCP	HCP Plus Peer Adhered to Intervention	HCP Plus Peer Low adherence to Intervention
No. of Patient Participants[2]	N=145	N=68	N=79
Enrolled from HCGH Inpatient, n(%)	34 (23.4%)	21 (30.9%)	12 (15.2%)
Enrolled from HCGH Outpatient, n(%)	26 (17.9%)	19 (27.9%)	10 (12.7%)
Enrolled from JHBMC Inpatient, n(%)	60 (41.4%)	15 (22.1%)	47 (59.5%)
Enrolled from JHBMC Outpatient, n(%)	25 (17.2%)	13 (19.1%)	10 (12.7%)
Age, *mean(sd)*	67.4 (9.5)	70.1 (9.3)	66.1 (8.9)
Race			
White, n(%)	101 (69.7%)	45 (66.2%)	61 (77.2%)
African-American, n(%)	42 (29.0%)	18 (26.5%)	16 (20.3%)
Other, n(%)	2 (1.4%)	5 (7.4%)	2 (2.5%)
Gender			
Female, n(%)	94 (64.8%)	41 (60.3%)	44 (55.7%)
Male, n(%)	51 (35.2%)	27 (39.7%)	35 (44.3%)
Education			
8th grade or less, n(%)	8 (5.5%)	4 (5.9%)	4 (5.1%)
Some high school, n(%)	18 (12.4%)	11 (16.2%)	12 (15.2%)
High school grad or GED, n(%)	34 (23.4%)	16 (23.5%)	36 (45.6%)
Some college and above, n(%)	85 (58.6%)	37 (54.4%)	27 (34.2%)
Income (n=286)[3]			
$20,000 or less, n(%)	60 (41.4%)	20 (29.4%)	36 (45.6%)
$20,001 - $40,000, n(%)	27 (18.6%)	13 (19.1%)	23 (29.1%)
> $40,001, n(%)	55 (37.9%)	33 (48.5%)	19 (24.1%)
Continuous oxygen treatment, *n(%)*	40 (27.6%)	17 (25.0%)	20 (25.3%)
Currently smoking, *n(%)*	31 (21.4%)	12 (17.6%)	29 (36.7%)
Living alone, n(%)	40 (27.6%)	20 (29.4%)	25 (31.6%)
Breathlessness grade 3 and 4[4], *n(%)*	86 (59.3%)	38 (55.9%)	49 (62.0%)
Patient Activation Measure[5], *mean(sd)*	62.8 (14.2)	60.8 (14.6)	60.7 (13.4)
PROMIS Measures[5]			
Social Isolation, mean (sd)	46.1 (10.8)	45.3 (8.3)	45.1 (11.2)
Emotional Support, mean (sd)	54.2 (10.1)	55.2 (8.9)	54.3 (9.6)
Informational Support (n=289)[6], mean (sd)	56.5 (11.2)	56.9 (10.2)	56.2 (11.0)
Instrumental Support, mean (sd)	54.2 (11.2)	57.1 (8.8)	54.6 (10.0)
Moderate to Severe Anxiety[7], *n(%)*	47 (32.4%)	20 (29.4%)	23 (29.1%)
Moderate to Severe Depression, *n(%)*	27 (18.6%)	12 (17.6%)	15 (19.0%)
Herth Hope Index[8], *mean (sd)*	38.6 (5.2)	38.6 (4.7)	37.6 (5.0)
Charlson Comorbidity Index, *mean (sd)*	2.6 (1.9)	2.4 (1.9)	2.9 (1.7)
Congestive Heart Failure, *n(%)*	39 (26.9%)	25 (36.8%)	38 (48.1%)
Self-reported health status[9], *mean (sd)*			
Physical, mean (sd)	3.7 (1.0)	3.5 (0.9)	3.8 (0.9)
Emotional, mean (sd)	2.8 (1.0)	2.6 (1.2)	3.1 (1.1)
Has participated in pulmonary rehabilitation, *n(%)*	34 (23.4%)	21 (30.9%)	17 (21.5%)
Extremely confident filling out medical forms, *n(%)*	87 (60.0%)	48 (70.6%)	40 (50.6%)

1 Intervention reception/adherence is defined as having had at least 4 interactions with the peer program by either attending a Get-Together or having a phone interaction with a BREATHE Pal.

2 Randomization is stratified by enrollment site/setting. Participants are enrolled from HCGH inpatient, HCGH outpatient, JHBMC inpatient, and JHBMC outpatient.

3 Six patients declined to provide information on income. Three from the HCP only group, two from the group that received treatment, one from the group that did not receive treatment.
4 mMRC Breathlessness grades: Grade 3=I stop for breath after walking about 100 yards or after few minutes on level ground; Grade 4=I am too breathless to leave the house or I am breathless when dressing.
5 Patient Activation Measure (PAM) is a 100-point score that reflects patients' engagement in healthcare. Higher scores represent higher levels of activation.
6 Higher PROMIS scores for emotional, informational, and instrumental and lower PROMIS scores for anxiety, depression, and social isolation represent better outcomes.
7 Three patients failed to answer all of the instrument's questions needed to compute a score. Two from the HCP only group and one who did not received treatment.
8 Higher HERTH Hope Index scores represent more hope.
9 Self-reported health status: 1=Excellent; 2=Very good; 3= Good; 4= Fair; 5 =Poor.

Table 13A. Intermediate Outcomes by Intervention Reception*

	HCP	HCP Plus Peer Adhered to Intervention	HCP Plus Peer Low adherence to Intervention
PROMIS Emotional Support			
Baseline, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	55.21 (9.75)	55.52 (8.29)	56.03 (8.47)
At 3 months, *mean (SD) (HCP N=90; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	54.10 (9.29)	55.48 (9.22)	53.71 (9.30)
At 6 months, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	54.49 (9.86)	56.70 (8.30)	54.96 (9.13)
Difference at 3mo, *mean (SD) (HCP N=90; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	-0.88 (9.51)	0.18 (9.92)	-1.06 (10.80)
Difference at 6mo, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	-0.72 (8.55)	1.18 (10.63)	-1.07 (11.69)
PROMIS Informational Support			
Baseline, *mean (SD) (HCP N=94; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	56.74 (11.46)	57.21 (9.68)	58.34 (9.99)
At 3 months, *mean (SD) (HCP N=90; HCP+Peer Ad N=52, HCP+Peer No Ad N=40)*	56.35 (10.20)	57.19 (9.91)	55.36 (10.03)
At 6 months, *mean (SD) (HCP N=94; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	56.83 (10.80)	58.88 (9.96)	56.37 (9.57)
Difference at 3mo, *mean (SD) (HCP N=90; HCP+Peer Ad N=52, HCP+Peer No Ad N=40)*	-0.73 (12.25)	0.55 (10.97)	-2.22 (12.63)
Difference at 6mo, *mean (SD) (HCP N=94; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	-0.00 (10.42)	1.67 (12.80)	-1.97 (10.32)
PROMIS Instrumental Support			
Baseline, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	55.62 (10.22)	56.78 (9.00)	56.35 (9.86)
At 3 months, *mean (SD) (HCP N=90; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	53.93 (9.42)	55.30 (9.59)	54.86 (11.34)
At 6 months, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	55.28 (9.95)	56.06 (9.54)	56.09 (8.80)
Difference at 3mo, *mean (SD) (HCP N=90; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	-0.86 (9.42)	-1.52 (8.83)	0.02 (8.04)
Difference at 6mo, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	-0.33 (9.21)	-0.72 (10.16)	-0.27 (10.54)
PROMIS Social Isolation			
Baseline, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	45.36 (10.98)	45.16 (7.94)	45.36 (11.39)
At 3 months, *mean (SD) (HCP N=90; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	46.05 (10.50)	44.97 (8.64)	47.61 (12.35)
At 6 months, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	45.58 (11.39)	44.16 (9.16)	45.49 (10.85)
Difference at 3mo, *mean (SD) (HCP N=90; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	0.13 (10.83)	-0.77 (8.13)	1.97 (10.16)
Difference at 6mo, *mean (SD) (HCP N=96; HCP+Peer Ad N=56, HCP+Peer No Ad N=37)*	0.22 (10.16)	-1.00 (9.45)	0.14 (10.89)
PAM Score			
Baseline, *mean (SD) (HCP N=99; HCP+Peer Ad N=56, HCP+Peer No Ad N=38)*	64.04 (14.38)	61.68 (14.03)	62.16 (13.32)

At 3 months, *mean (SD)* *(HCP N=91; HCP+Peer Ad N=55, HCP+Peer No Ad N=41)*	65.15 (14.79)	65.91 (13.57)	62.68 (13.71)
At 6 months, *mean (SD)* *(HCP N=99; HCP+Peer Ad N=56, HCP+Peer No Ad N=38)*	67.83 (16.03)	66.00 (15.81)	66.33 (15.95)
Difference at 3mo, *mean (SD)* *(HCP N=91; HCP+Peer Ad N=55, HCP+Peer No Ad N=41)*	0.78 (18.58)	4.92 (16.71)	3.08 (15.41)
Difference at 6mo, *mean (SD)* *(HCP N=99; HCP+Peer Ad N=56, HCP+Peer No Ad N=38)*	3.78 (20.75)	4.32 (19.72)	4.17 (16.14)
Herth Hope Index			
Baseline, *mean (SD)* *(HCP N=97; HCP+Peer Ad N=56, HCP+Peer No Ad N=38)*	39.25 (5.50)	38.96 (4.62)	37.21 (5.09)
At 3 months, *mean (SD)* *(HCP N=89; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	38.75 (5.13)	38.48 (5.15)	38.08 (4.98)
At 6 months, *mean (SD)* *(HCP N=97; HCP+Peer Ad N=56, HCP+Peer No Ad N=38)*	38.07 (6.08)	39.68 (5.01)	38.32 (5.72)
Difference at 3mo, *mean (SD)* *(HCP N=89; HCP+Peer Ad N=54, HCP+Peer No Ad N=40)*	-0.49 (5.37)	-0.54 (4.83)	0.73 (5.12)
Difference at 6mo, *mean (SD)* *(HCP N=97; HCP+Peer Ad N=56, HCP+Peer No Ad N=38)*	-1.18 (5.77)	0.71 (5.48)	1.11 (5.98)
Understanding COPD			
Baseline, *mean (SD)* *(HCP N=95; HCP+Peer Ad N=55, HCP+Peer No Ad N=37)*	75.93 (18.53)	71.47 (18.19)	71.50 (23.89)
At 3 months, *mean (SD)* *(HCP N=90; HCP+Peer Ad N=53, HCP+Peer No Ad N=41)*	77.89 (15.09)	78.09 (14.78)	75.72 (15.63)
At 6 months, *mean (SD)* *(HCP N=95; HCP+Peer Ad N=55, HCP+Peer No Ad N=37)*	78.04 (16.19)	80.85 (14.52)	80.06 (16.21)
Difference at 3mo, *mean (SD)* *(HCP N=90; HCP+Peer Ad N=53, HCP+Peer No Ad N=41)*	2.27 (19.40)	6.42 (20.47)	5.83 (21.30)
Difference at 6mo, *mean (SD)* *(HCP N=95; HCP+Peer Ad N=55, HCP+Peer No Ad N=37)*	2.00 (21.17)	9.37 (19.63)	8.56 (17.73)

* Intervention reception/adherence is defined as having had at least 4 interactions with the peer program by either attending a Get-Together or having a phone interaction with a BREATHE Pal.

Table 14A. Patient Baseline Characteristics by Site and Setting

Baseline Characteristics	Site and Setting			
	HCGH Inpatient N=67	HCGH Outpatient N=55	JHBMC Inpatient N=122	JHBMC Outpatient N=48
Age, *mean(sd)*	69.3 (11.0)	72.6 (6.5)	65.5 (8.5)	65.4 (9.3)
Race				
White, n(%)	42 (62.7%)	45 (81.8%)	88 (72.1%)	32 (66.7%)
African-American, n(%)	19 (28.4%)	8 (14.5%)	34 (27.9%)	15 (31.3%)
Other, n(%)	6 (9.0%)	2 (3.6%)	0 (0.0%)	1 (2.1%)
Gender				
Female, n(%)	39 (58.2%)	29 (52.7%)	81 (66.4%)	30 (62.5%)
Male, n(%)	28 (41.8%)	26 (47.3%)	41 (33.6%)	18 (37.5%)
Education				
8th grade or less, n(%)	1 (1.5%)	1 (1.8%)	10 (8.2%)	4 (8.3%)
Some high school, n(%)	5 (7.5%)	2 (3.6%)	30 (24.6%)	4 (8.3%)
High school grad or GED, n(%)	15 (22.4%)	10 (18.2%)	42 (34.4%)	19 (39.6%)
Some college and above, n(%)	46 (68.7%)	42 (76.4%)	40 (32.8%)	21 (43.8%)
Income (n=286)[2]				
$20,000 or less, n(%)	22 (32.8%)	6 (10.9%)	67 (54.9%)	21 (43.8%)
$20,001 - $40,000, n(%)	15 (22.4%)	6 (10.9%)	31 (25.4%)	11 (22.9%)
> $40,001, n(%)	27 (40.3%)	40 (72.7%)	24 (19.7%)	16 (33.3%)
Continuous oxygen treatment, *n(%)*	19 (28.4%)	6 (10.9%)	38 (31.1%)	14 (29.2%)
Currently smoking, *n(%)*	15 (22.4%)	4 (7.3%)	44 (36.1%)	9 (18.8%)
Living alone, n(%)	21 (31.3%)	21 (38.2%)	26 (21.3%)	17 (35.4%)
Breathlessness grade 3 and 4[3], *n(%)*	36 (53.7%)	10 (18.2%)	97 (79.5%)	30 (62.5%)
Patient Activation Measure[4], *mean(sd)*	62.6 (15.5)	63.7 (13.1)	59.2 (13.0)	64.8 (14.9)
PROMIS Measures[5]				
Social Isolation, mean (sd)	46.0 (9.4)	42.7 (9.4)	46.4 (10.5)	46.7 (11.9)
Emotional Support, mean (sd)	54.7 (8.1)	57.0 (8.2)	53.2 (10.8)	54.4 (9.8)
Informational Support (n=289)[5], mean (sd)	56.6 (8.8)	58.3 (9.6)	55.7 (12.3)	56.5 (11.2)
Instrumental Support, mean (sd)	55.7 (8.7)	57.7 (8.4)	53.7 (11.1)	53.9 (12.2)
Moderate to Severe Anxiety[6], *n(%)*	24 (35.8%)	6 (10.9%)	48 (39.3%)	12 (25.0%)
Moderate to Severe Depression, *n(%)*	17 (25.4%)	5 (9.1%)	23 (18.9%)	9 (18.8%)
Herth Hope Index[7], *mean (sd)*	39.4 (4.9)	39.2 (5.2)	37.7 (4.7)	37.5 (5.5)
Charlson Comorbidity Index, *mean (sd)*	2.4 (1.6)	1.7 (1.0)	3.1 (2.0)	2.8 (2.0)
Congestive Heart Failure, *n(%)*	23 (34.3%)	8 (14.5%)	54 (44.3%)	17 (35.4%)
Self-reported health status[8], *mean (sd)*				
Physical, mean (sd)	3.7 (1.0)	3.1 (0.8)	3.9 (0.8)	3.7 (0.9)
Emotional, mean (sd)	2.8 (1.1)	2.5 (1.2)	3.0 (1.0)	2.7 (1.1)
Has participated in pulmonary rehabilitation, *n(%)*	14 (20.9%)	23 (41.8%)	15 (12.3%)	20 (41.7%)
Extremely confident filling out medical forms, *n(%)*	42 (62.7%)	41 (74.5%)	62 (50.8%)	30 (62.5%)

1 Randomization is stratified by enrollment site/setting. Participants are enrolled from HCGH inpatient, HCGH outpatient, JHBMC inpatient, and JHBMC outpatient.

2 Six patients declined to provide information on income. Three from HCGH outpatient and three from HCGH inpatient.

3 mMRC Breathlessness grades: Grade 3=I stop for breath after walking about 100 yards or after few minutes on level ground; Grade 4=I am too breathless to leave the house or I am breathless when dressing.

4 Patient Activation Measure (PAM) is a 100 point score that reflects patients' engagement in healthcare. Higher scores represent higher levels of activation.

5 Higher PROMIS scores for emotional, informational, and instrumental and lower PROMIS scores for anxiety, depression, and social isolation represent better outcomes.

[6]Three patients failed to answer all of the instrument's questions needed to compute a score. One from HCGH inpatient, one HCGH outpatient, and one from JHBMC inpatient,

[7]Higher HERTH Hope Index scores represent more hope.

[8]Self-reported health status: 1=Excellent; 2=Very good; 3= Good; 4= Fair; 5 =Poor.

Table 15A. Patient Outcomes by Site and Setting at 6 months post-enrollment

	HCGH Inpatient	HCGH Outpatient	JHBMC Inpatient	JHBMC Outpatient
HCP Plus Peer arm				
SGRQ Total Score				
Baseline, *mean (SD)*	58.61 (17.95)	44.05 (16.68)	61.06 (16.07)	57.18 (15.82)
At 6 months, *mean (SD)*	61.22 (24.81)	38.02 (16.80)	62.89 (25.29)	55.39 (16.19)
Difference at 6 mos., *mean (SD)*	2.61 (19.63)	-6.02 (11.99)	1.83 (22.16)	-1.79 (13.89)
N=107	22	25	40	20
Acute Care Utilization at 6 mos.				
All-cause acute care events, *mean (SD)*	1.39 (1.58)	0.38 (0.68)	1.52 (1.87)	0.78 (1.31)
COPD-related acute care events, *mean (SD)*	0.76 (0.94)	0.24 (0.51)	0.89 (1.36)	0.39 (0.66)
N=147	33	29	62	23
HCP arm				
SGRQ Total Score				
Baseline, *mean (SD)*	50.18 (20.29)	35.03 (12.98)	65.40 (16.62)	59.30 (18.41)
At 6 months, *mean (SD)*	55.22 (23.92)	30.68 (18.07)	62.70 (25.10)	53.46 (23.86)
Difference at 6 mos., *mean (SD)*	5.04 (25.47)	-4.35 (13.10)	-2.70 (19.52)	-5.83 (15.85)
N=113	26	21	46	20
Acute Care Utilization at 6 mos.				
All-cause acute care events, *mean (SD)*	1.26 (1.91)	0.23 (0.65)	2.03 (4.55)	1.12 (1.39)
COPD-related acute care events, *mean (SD)*	0.76 (0.96)	0.12 (0.33)	1.27 (2.28)	0.68 (0.99)
N=145	34	26	60	25