How Well Does CAPTURE Translate?

An Exploratory Analysis of a COPD Case-Finding Method for Spanish-Speaking Patients

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BACKGROUND: This study tested the properties of a Spanish translation of CAPTURE (COPD Assessment in Primary Care To Identify Undiagnosed Respiratory Disease and Exacerbation Risk) with selective use of peak expiratory flow (PEF).

METHODS: This study comprised analyses of data from the Spanish-speaking cohort of the cross-sectional, case-control study used to develop CAPTURE. Translation procedures included forward and backward translation, reconciliation, and cognitive interviewing to assure linguistic and cultural equivalence, yielding CAPTURE-S. Spanish-speaking participants were recruited through one center and designated as case subjects (clinically significant COPD: $FEV_1 \leq 60\%$ predicted and/or at risk of COPD exacerbation) or control subjects (no or mild COPD). Subjects completed a questionnaire booklet that included 44 candidate items, the COPD Assessment Test (CAT), and the modified Medical Research Council (mMRC) dyspnea question. PEF and spirometry were also performed.

RESULTS: The study included 30 participants (17 case subjects and 13 control subjects). Their mean ($\pm$ SD) age was 62.6 (11.49) years, and 33% were male. CAPTURE-S scores were significantly correlated with PEF ($r = -0.78$), the FEV_1/FVC ratio ($r = -0.74$), FEV_1 ($r = -0.69$), FEV_1 % predicted ($r = -0.69$), the CAT score ($r = 0.70$), and the mMRC dyspnea question ($r = 0.59$) ($P < .0001$), with significantly higher scores in case subjects than in control subjects ($t = 6.16$; $P < .0001$). PEF significantly correlated with FEV_1 ($r = 0.89$), FEV_1 % predicted ($r = 0.79$), and the FEV_1/FVC ratio ($r = 0.75$) ($P < .0001$), with significantly lower PEF in case subjects than in control subjects ($t = 5.08$; $P < .0001$). CAPTURE-S score + PEF differentiated case subjects and control subjects with a sensitivity of 88.2% and a specificity of 92.3%.

CONCLUSIONS: CAPTURE-S with selective use of PEF seems to be useful for identifying Spanish-speaking patients in need of diagnostic evaluation for clinically significant COPD who may benefit from initiation of COPD treatment.

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KEY WORDS: case-finding; COPD; diagnosis; lung function

ABBREVIATIONS: CAPTURE = COPD Assessment in Primary Care to Identify Undiagnosed Respiratory Disease and Exacerbation Risk; CAT = COPD Assessment Test; IRB = institutional review board; mMRC = modified Medical Research Council; PEF = peak expiratory flow; ROC = receiver-operating characteristic

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COPD is a major public health problem in the United States. Despite increasing prevalence and morbidity, COPD is underdiagnosed in primary care settings.^{1,2} Many patients are first diagnosed when they present with an exacerbation,³ placing them at risk for future events,⁴ and/or after significant loss of lung function with unrecognized COPD symptoms. These individuals would benefit from therapies to improve lung function, reduce symptoms and exacerbations, and improve health status.^{5,6}

The Hispanic population is the fastest growing minority group in the United States,⁷ and COPD has been historically understudied in this population.^{8,9} The overall incidence of COPD among Hispanic subjects is estimated at 8.2% (95% CI: 7.1-9.5).¹⁰ Although the rate of COPD is less among Hispanic subjects compared to whites and other minority groups, COPD-related hospitalization rates are higher among Hispanic men of all ages and Hispanic women aged > 65 years compared with non-Hispanic whites.^{11,12} Inadequate access to health-care services, underdiagnosis, and poor health literacy (secondary to language and socioeconomic factors) may be contributing factors. Furthermore, the prevalence of undiagnosed COPD among Hispanic subjects is unknown, with language differences complicating recognition.

A simple method for identifying Hispanic patients who may have clinically significant disease would facilitate diagnosis and treatment. Although spirometry is

essential for diagnosis, it is not practical or recommended for routine screening in primary care.¹³ Questionnaires can be useful for initial evaluation; however, they can uncover mild cases rather than more severe cases who would benefit most from treatment.¹⁴⁻¹⁶ Only a limited number of questionnaires have been tested for use in the US Hispanic population.

The COPD Assessment in Primary Care to Identify Undiagnosed Respiratory Disease and Exacerbation Risk (CAPTURE) questionnaire was developed to identify patients with undiagnosed, clinically significant COPD ($FEV_1 \leq 60\%$ and/or at risk for exacerbation) who would benefit from diagnosis and treatment.¹⁷ This five-item self-administered questionnaire asks patients about symptoms, impact, and acute respiratory illness (e-Fig 1). Through simple summation, scores range from 0 to 6; higher scores are associated with a stronger likelihood of COPD. With selective use of peak expiratory flow (PEF), sensitivity and specificity of the English version for differentiating case subjects (ie, those with clinically significant COPD) and control subjects (ie, those with mild or no COPD) was 89.7% and 78.1%, respectively, with values of 89.7% and 93.1% for case subjects vs no COPD. The goal of the present article was to examine the properties of a Spanish translation of CAPTURE (CAPTURE-S) and PEF as a case-finding approach for Spanish-speaking patients.

Methods

Design

Data from Spanish-speaking patients were gathered during the prospective, cross-sectional, multicenter, case-control study used to

develop CAPTURE. Development procedures in English-speaking patients are described elsewhere.¹⁷ The protocol was approved by a central institutional review board (IRB) (Ethical and Independent Review Services IRB-14025-01) and IRBs at each participating site, including Columbia University (IRB-AAAK8511).

Participants

The Spanish cohort was recruited from primary care and pulmonary clinics at New York-Presbyterian Hospital, Columbia University Medical Center, where the surrounding neighborhood is 71% Hispanic¹⁸ (e-Appendix 1), using physician referrals and brochures placed in patient care areas.

Spanish-speaking subjects were enrolled concurrently with the larger cohort used for development and validation of the CAPTURE instrument. All subjects met the primary study criteria and considered Spanish their primary language, including reading, speaking, and writing. After obtaining informed consent, subjects completed a questionnaire including sociodemographic and health-related questions (including comorbidities), as well as 44 candidate items (described later). Subjects were not excluded on the basis of self-reported comorbidities. COPD was defined according to a medical diagnosis with prescribed pharmacologic therapy and an FEV_1/FVC ratio < 0.70. Case subjects (target population) included subjects with COPD and exacerbation risk (group 1: ≥ 1 exacerbation in the prior 12 months) or moderate to severe airway

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obstruction (group 2: $FEV_1 \leq 60\%$ predicted and exacerbation free ≥ 12 months). Control subjects had no known diagnosis of or treatment for COPD (group 3) or had mild COPD (group 4: $FEV_1 > 60\%$ predicted and exacerbation free ≥ 12 months). The mild group was included to optimize the identification of items most sensitive to the detection of individuals in the target population, as distinct from milder asymptomatic patients.

Procedures

To ascertain eligibility, a brief screening questionnaire was administered to potential participants in Spanish by clinical staff via telephone or in person. The questionnaire included questions about COPD and exacerbation history. Those subjects who were qualified and interested were consented in Spanish by a Spanish-speaking clinician. All procedures were performed in a single study-related visit scheduled outside of routine physician appointments.

Each participant completed a 44-item questionnaire in Spanish (described later). Time to complete the booklet was not measured. Participants were allowed to receive assistance from accompanying family members and ask clinical staff for clarification. Subjects also underwent PEF testing (Vitalograph AsmaPLAN mechanical PEF

meter), performing three maneuvers, with the highest value (L/min) used for analysis. For patients without a recent spirometry (past 5 years), pre-bronchodilator spirometry (FVC, FEV_1 , and FEV_1/FVC ratio) was obtained.

Measures

Candidate Item Pool: The pool of 44 candidate items for CAPTURE was developed by using a multi-method approach. This approach included a comprehensive literature review,¹⁹ qualitative interviews with English-speaking patients from the target population,²⁰ and analyses of existing datasets.²¹

All candidate items and instructions were translated into Spanish with the use of an established process designed to assure linguistic and cultural equivalence across translations.²² This process included independent translation by two native Spanish speakers originating from different countries, reconciled by a third native speaker, and translated back into English by two independent native English speakers fluent in Spanish. The back translations were reviewed for linguistic and conceptual equivalence with adjustments as needed. The translated questionnaire (instructions and candidate items) was completed by 12 Spanish-speaking adults > 40 years of age from Cuba, the Dominican Republic, Guatemala, Ecuador, Mexico, and

CAPTURE-S

Para cada pregunta, ponga una X en la casilla de la respuesta que mejor se adapte a usted.
No hay respuestas "correctas" ni "incorrectas", solo respuestas adecuadas para usted.

Responda a cada pregunta	Sí	No
1. ¿Ha vivido o trabajado alguna vez en un lugar con aire sucio o contaminado, humo, humo de tabaco que ha inhalado de otros o polvo?	☐	☐
2. ¿Su respiración cambia con las estaciones, el tiempo o la calidad del aire?	☐	☐
3. ¿La respiración le dificulta hacer cosas como cargar objetos pesados, retirar tierra o nieve con una pala, trotar, jugar al tenis o nadar?	☐	☐
4. Si se compara con otras personas de su edad, ¿se cansa con facilidad?	☐	☐
	0	1 vez
		2 o más veces
5. En los últimos 12 meses, ¿cuántas veces ha faltado a la escuela, al trabajo o a otras actividades debido a un resfriado, bronquitis o neumonía (pulmonía)?	☐	☐

*COPD Assessment in Primary Care to Identify Undiagnosed Respiratory Disease & Exacerbation Risk

Figure 1 – CAPTURE-S questionnaire. CAPTURE-S = Spanish translation of the COPD Assessment in Primary Care to Identify Undiagnosed Respiratory Disease and Exacerbation Risk.

Puerto Rico, each residing in the United States. Semi-structured cognitive interviews were conducted by trained interviewers to evaluate the extent to which respondents understood and interpreted items as intended. Comments generated during these interviews were used to adjust the translation to yield a final translation of the item pool that was conceptually equivalent to the English version and culturally and linguistically appropriate for use across different Spanish-speaking nationalities. A language coordinator conducted reviews and quality checks throughout the translation process.

CAPTURE-S: Random forest methods was used in the larger (English) analytical dataset ($N = 346$) to develop the final five-item CAPTURE instrument (e-Fig 1).¹⁷ This final five-item instrument was not available for testing in the Spanish cohort because both studies occurred concurrently. Because small sample size precluded use of random forest methods in the Spanish cohort, translations of each item comprising the English version of CAPTURE were used to derive the Spanish version (Fig 1). The English and Spanish versions are identical, with performance properties of CAPTURE-S tested in the present study.

Criterion Variables: The modified Medical Research Council dyspnea scale (mMRC), translated into Spanish using procedures outlined earlier, and the published Spanish translation of the COPD Assessment Test (CAT) (http://www.catestonline.org/english/index_SpainUS.htm) were used to assess respiratory symptoms and test the performance properties of CAPTURE-S.^{6,23-25}

Results

Sample

Thirty-one Spanish-speaking participants were enrolled, with spirometric data on all participants. One subject with a self-diagnosis of COPD did not meet spirometric criteria and was excluded from analysis. The final analytical sample included 17 case subjects and 13 control subjects (group 1: $n = 10$; group 2: $n = 7$; group 3: $n = 10$; and group 4: $n = 3$).

Sample demographic and clinical characteristics are shown in Table 1. Characteristics according to groups 1 through 4 are provided in e-Table 1. The sample was similar to the English-speaking sample, with the exception of educational status. A higher proportion of the Spanish-speaking subjects reported less than a high school education (e-Table 2).

CAPTURE and PEF Properties

Sensitivity, specificity, and overall error for differentiating case subjects and control subjects and case subjects vs no COPD using CAPTURE-S alone, PEF alone, and CAPTURE-S + PEF are shown in Table 2. ROC curves for differentiating case subjects and control subjects are shown in Figures 2A, 2B, and 2C. It is noteworthy that the PEF curve for male subjects shows a

Statistical Analyses

Sensitivity, specificity, misclassification error, area under the curve, and receiver-operating characteristic (ROC) curves for differentiating case subjects and control subjects were estimated and examined, with exploratory analyses of case subjects vs no COPD (group 3). Pearson product-moment correlations between CAPTURE-S scores and PEF, spirometry, CAT, and mMRC scores were examined and the mean score difference between case subjects and control subjects were tested by using Student's t test.

Assessments of PEF performance properties included sensitivity, specificity, overall error, area under the curve, and ROC curves using the sex-specific PEF thresholds derived previously (male subjects: < 350 L/min; female subjects: < 250 L/min).¹⁷ We also examined correlations between PEF and spirometry (Pearson product-moment), and mean score difference between case subjects and control subjects (Student's t test), with descriptive statistics used to assess values across Global Initiative for Chronic Obstructive Lung Disease (GOLD) and COPD Foundation (COPDF) airflow limitation categories. Because of the small sample size, the latter were not tested statistically.

Finally, sensitivity, specificity, error, area under the curve, and ROC were examined for CAPTURE-S + PEF in this sample, using the scoring system derived in the larger study¹⁷ (e-Appendix 1).

perfect correspondence between the PEF threshold and case/control designation.

CAPTURE-S scores were significantly correlated with PEF ($r = -0.78$), the FEV₁/FVC ratio ($r = -0.74$), FEV₁ ($r = -0.69$), FEV₁ % predicted ($r = -0.69$) ($P < .0001$), CAT score ($r = 0.70$), and the mMRC score ($r = 0.59$). The mean $\pm$ SD scores were significantly higher in case subjects (3.9 ± 0.97) than in control subjects (1.3 ± 1.38 ; $t = 6.16$; $P < .0001$).

PEF was significantly correlated with FEV₁ ($r = 0.89$), FEV₁ % predicted ($r = 0.79$), and the FEV₁/FVC ratio ($r = 0.75$) ($P < .0001$). The mean $\pm$ SD PEF for case subjects (190.6 ± 57.82 L/min) was significantly lower than for control subjects (421.2 ± 155.50 L/min) ($t = 5.08$; $P = .0001$). Table 3 presents mean PEF data stratified according to GOLD and COPD Foundation classifications; participants with more severe disease had lower PEF rates. Group 1 (COPD with recent exacerbation) had the lowest PEF values compared with groups 2 (moderate/severe COPD without exacerbation) and 4 (mild COPD) (Fig 3).

Although time to complete the questionnaire booklet was not recorded, study staff noted that Spanish-speaking participants more frequently asked for clarification and took longer to complete the booklet

TABLE 1] Sample Demographic and Clinical Characteristics

Characteristic	Analytic Sample (N = 30)	Case Subjects ^a (n = 17)	Control Subjects ^b (n = 13)
Age, mean $\pm$ SD, y	62.6 $\pm$ 11.49	68.2 $\pm$ 7.41	55.2 $\pm$ 11.86
Male sex	10 (33)	6 (35)	4 (31)
Employment			
Employed (full- or part-time)	11 (37)	1 (6)	10 (77)
Retired	10 (33)	9 (53)	1 (8)
Disabled	6 (20)	5 (29)	1 (8)
Homemaker	3 (10)	2 (12)	1 (8)
Education status			
Less than high school	10 (33)	9 (53)	1 (8)
High school	7 (23)	4 (24)	3 (23)
Associate, technical, or trade school	5 (17)	1 (6)	4 (31)
College degree or more	7 (23)	2 (12)	5 (39)
Smoking history			
Ever smoked ($\geq$ 100 cigarettes)	22 (73)	17 (100.0)	5 (39)
Current smoker	6 (20)	6 (35)	0
Spirometry, mean $\pm$ SD			
FEV ₁ , L	1.7 $\pm$ 0.95	1.1 $\pm$ 0.51	2.5 $\pm$ 0.86
FEV ₁ % predicted	68.2 $\pm$ 30.30	48.4 $\pm$ 19.98	94.2 $\pm$ 19.84
FEV ₁ /FVC ratio	0.6 $\pm$ 0.21	0.5 $\pm$ 0.15	0.8 $\pm$ 0.13
GOLD classification, airflow limitation			
No COPD	10 (33)	0	10 (77)
GOLD 1/2, mild/moderate	9 (30)	6 (35)	3 (23)
GOLD 3/4, severe/very severe	11 (37)	11 (65)	0
COPD Foundation classification			
SG0, normal	9 (30)	0	9 (69)
SG1, mild	6 (20)	3 (18)	3 (23)
SG2/3, moderate/severe	14 (47)	14 (82)	0
SGU, undefined	1 (3)	0	1 (8)
COPD Assessment Test, mean $\pm$ SD	16.6 $\pm$ 11.53	21.8 $\pm$ 10.1	8.5 $\pm$ 8.23
mMRC			
0	7 (23)	1 (6)	6 (46)
1	11 (37)	6 (35)	5 (39)
>2	11 (37)	10 (59)	1 (8)
Comorbid health conditions (any)	28 (93)	17 (100)	11 (85)

Data are presented as No. (%) unless otherwise indicated. GOLD = Global Initiative for Chronic Obstructive Lung Disease; mMRC = modified Medical Research Council; SG = spirometric grade.

^aClinically significant COPD (FEV₁ < 60% predicted or exacerbation risk).

^bCOPD with FEV₁ > 60% and exacerbation free > 12 months; or no known diagnosis or treatment for COPD and an FEV₁/FVC ratio > 0.70.

than English-speaking subjects. They also seemed to be unfamiliar with medical terms, such as COPD (EPOC- “Enfermedad Pulmonar Obstructiva Crónica”). Subjects were diligent, with little to no missing data.

Discussion

COPD is often underdiagnosed or misdiagnosed. Most screening methods to date have uncovered patients with mild disease who may not benefit from treatment; the US Preventive Services Task Force

TABLE 2] Predictive Performance of PEF Alone, CAPTURE Alone, and CAPTURE Plus Selective Use of PEF

Score Cutoff (Performance Indicator)	Case Subjects ^a Vs Control Subjects ^b (N = 30)	Case Subjects ^a Vs No COPD ^c (n = 27)
PEF alone; threshold (male subjects < 350; female subjects < 250)		
Sensitivity	88.2%	88.2%
Specificity	84.6%	100%
Overall error	13.3%	7.4%
CAPTURE alone; scores ≥ 2		
Sensitivity	100%	100%
Specificity	61.5%	70.0%
Overall error	16.7%	11.1%
CAPTURE + PEF 0–1 = control; score 5–6 = case Score 2, 3, 4 = PEF used for group assignment		
Sensitivity	88.2%	88.2%
Specificity	92.3%	100%
Overall error	10.0%	7.4%

CAPTURE = COPD Assessment in Primary Care to Identify Undiagnosed Respiratory Disease and Exacerbation Risk; PEF = peak expiratory flow.

^aClinically significant COPD (FEV₁ < 60% predicted or exacerbation risk).

^bCOPD with FEV₁ > 60% and exacerbation free > 12 months; or no known diagnosis or treatment for COPD and an EV₁/FVC ratio > 0.70.

^cNo known diagnosis or treatment for COPD and an FEV₁/FVC ratio > 0.70.

recommends against widespread screening.²⁶

CAPTURE and CAPTURE-S with PEF were designed to meet the need for a simple, clinically feasible method to identify patients with undiagnosed clinically significant disease who should be evaluated further.¹⁷ Having the same instrument in English and Spanish would facilitate its use in a wider range of primary care settings.

Our results show that a carefully developed Spanish translation of CAPTURE (CAPTURE-S) with selective use of PEF measurement may be useful for Spanish-speaking patients. To our knowledge, this study is the first to develop such a tool for use in the growing Hispanic population. The translation process assured us that CAPTURE-S is equivalent to the English version and is linguistically and culturally appropriate for Spanish-speaking patients from various countries of origin.

Sensitivity, specificity, and error were not unlike those observed in the English-speaking sample. In that study, values for CAPTURE alone (score ≥ 2 cutoff) were 95.7%, 44.4%, and 28.0%, respectively, for predicting case subjects vs control subjects and 95.7%, 67.8%, and 13.2% for case subjects vs no COPD. For PEF alone, values were 88.0%, 77.5%, and 16.9% for case subjects

vs control subjects, and 88.0%, 90.8%, and 11.1% for case subjects vs no COPD. For CAPTURE + PEF, values were 89.7, 78.1, and 15.7 for case subjects vs control subjects and 89.7, 93.1, and 9.2 for case subjects vs no COPD¹⁷ (e-Appendix 1). Our results suggest that CAPTURE-S is as precise as the English version for differentiating case subjects and control subjects and case subjects vs no COPD. It should be noted that CAPTURE (and CAPTURE-S) is a case-finding tool to identify patients who should undergo further evaluation (ie, spirometry, chest imaging) and not a diagnostic tool.

The validity estimates for the CAPTURE-S were consistent and in some cases better than those observed in the English-speaking sample, where correlations were as follows: FEV₁: $r = 0.47$; FEV₁ % predicted: $r = 0.53$; FEV₁/FVC ratio: $r = 0.50$ (all $P < 0.0001$; N = 344); CAT: $r = 0.74$; and mMRC rating: $r = 0.58$.¹⁷ Mean differences in CAPTURE score and PEF between case subjects and control subjects were also similar.

To effectively identify case subjects in routine clinical settings, the method should be of low cost, easy to administer, and take into consideration the characteristics of the patient population, including

Figure 2 – A-C, ROC for distinguishing case subjects and control subjects according to method. A, CAPTURE-S alone. B, Peak expiratory flow alone according to sex. C, CAPTURE-S with peak expiratory flow. ROC = receiver-operating characteristic. See Figure 1 legend for expansion of other abbreviation.

language and education. During the process of screening potential subjects and the administration of the questionnaire booklet, the site investigator and clinical coordinators observed a qualitative difference between Spanish- and English-speaking participants. As noted previously, Spanish-speaking participants took more time to complete the questionnaire booklet, required more clarification from staff, and seemed to have less

knowledge of COPD compared with the English-speaking participants at this site. These differences may be related to educational level, health literacy, and/or the lengthy questionnaire booklet used in the instrument development study. The Spanish-speaking subjects were mostly residents of the Washington Heights community, and we do not know if disparities observed in this study are generalizable to the broader US Hispanic population.

TABLE 3] PEF Rates According to COPD Classification

COPD Classification	PEF (L/min)
No COPD (n = 10)	475.5 ± 129.86
GOLD Classification	
GOLD 1 (n = 3)	240.0 ± 72.11
GOLD 2 (n = 6)	201.7 ± 74.68
GOLD 3 (n = 10)	189.0 ± 49.77
GOLD 4 (n = 1)	140.0
COPD Foundation Classification	
SG0 (n = 9)	500.6 ± 109.13
SG1 (n = 6)	211.7 ± 59.47
SG2 (n = 13)	196.2 ± 63.18
SG3 (n = 1)	140.0
SGU (n = 1)	250.0

Data are presented as mean ± SD or mean. See Table 1 and 2 legends for expansion of abbreviations.

The final five-item questionnaire is intended to be simple and easy to complete with an estimated sixth grade (US) reading level,¹⁷ suggesting it is suitable for use across a broad range of educational backgrounds.

The sensitivity and specificity of CAPTURE + PEF compared with those of PEF alone may suggest that PEF may suffice in identifying English-speaking patients or Spanish-speaking patients with airflow obstruction.¹⁷ PEF does not assess impact or exacerbation risk, however. Furthermore, performing PEF maneuvers in all primary care patients for case-finding purposes is likely to be impractical. In fact, data from the Burden of Lung Disease study shows that despite the availability of inexpensive and easy-to-use

spirometers, increased utilization of these instruments in routine primary care has not occurred.²⁷ CAPTURE is an attempt to balance efficiency and precision, with the questionnaire used as an initial screen and PEF administered to a subset of patients to assure fewer false-positive findings and lower overall screening costs (e-Appendix 1).

The present study was limited by small sample size, with all subjects recruited through one center in an underserved urban community comprised primarily of immigrants from the Dominican Republic. Although recent data suggest that there is no major difference in COPD prevalence among various Hispanic groups, adjusting for smoking and asthma history,⁹ further study in a larger sample and varied Hispanic groups is needed. The translation process purposefully included individuals from different Spanish-speaking countries so that CAPTURE-S could be used in various Spanish-speaking populations. Finally, we noted the limited knowledge of COPD in this study cohort. Health literacy among the different Hispanic groups is poorly understood, and the applicability of our results to the larger US Hispanic population is unknown.

Conclusions

CAPTURE-S + PEF may be useful as a case-finding method for Spanish-speaking patients with undiagnosed, clinically significant COPD in need of further testing (eg, spirometry, chest imaging). Future research in a larger, diverse cohort of Spanish-speaking individuals is warranted.

Figure 3 – Mean peak expiratory flow for case subjects (clinically significant COPD [$FEV_1 < 60\%$ predicted or exacerbation risk]) and control subjects (COPD with $FEV_1 > 60\%$ and exacerbation free > 12 months; or no known diagnosis or treatment for COPD and an FEV_1/FVC ratio > 0.70) and according to group.

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Additional information: The e-Appendix, e-Figure, and e-Tables can be found in the Supplemental Materials section of the online article.

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