Table 1 Implementation strategies integrated within the Academy program

Implementation Strategy	Academy Training Application
Implementation Blueprint	• Academy blueprint is organized into 4 phased training workbooks with associated learning objectives, tasks to complete, and resources to help teams adopt COPD CARE
Create a Learning Collaborative	• Attendees across multiple VAMCs attend sessions, share diverse insight and perspectives on new clinical guidance
Promote Implementation Facilitation	• Opportunities for external facilitation with the national program manager and attendees at Academy sessions as well as internal facilitation promote problem-solving and sharing successes
Identify and Prepare Champions	• Champions are defined as individuals dedicated to leading an implementation initiative. Hired pharmacists serve as clinical champions while a pharmacist leader is positioned as a service operations champion
Promote Adaptability	• Champions attend Academy sessions and share adaptations made in Academy content to meet local needs
Dynamic Training	• Clinical training was designed to be interactive with video modeling, clinical workbooks, and guided discussions led by the hired pharmacist to relate training content to clinical practice
Train-The-Trainer	• Hired pharmacist is trained to facilitate delivery of clinical content to pharmacists practicing in primary care at their VAMC
Develop and Organize Quality Monitoring Systems	• Informatics note templates with embedded data capture fields are used to track COPD CARE service delivery
Audit and Feedback	• Data captured from note templates are visualized within a COPD CARE implementation dashboard, which is automatically updated daily to reflect program performance
Build a Coalition	• Opportunities to strengthen relationships within and across academy cohorts are offered through peer-mentorship
Academic Partnerships	• Partnerships across VA program offices and through academic partnerships are formed to strengthen COPD CARE delivery and assessment

Implementation strategies as defined by the Expert Recommendations for Implementing Change (ERIC) project and application of each implementation strategy to Academy training.

Table 2 Description of data sources for RE-AIM domain measures

RE-AIM Domain	Domain Operationalization	Relation to COPD CARE Service Delivery
Reach	• Number of patient visits	• COPD CARE Wellness Visits or COPD CARE Follow-Up Visits completed
Effectiveness	• Comparison of time to primary care delivery following discharge	• Percentage of patients who received COPD primary care follow-up by a clinical pharmacist or primary care provider within 90-days following discharge o Time (in days) to care delivery for patients receiving 90-day primary care follow-up
Adoption	• Clinicians participating in the program	• Number of unique clinicians using the following COPD CARE informatics note templates o Referral template o Wellness Visit template o Follow-Up Visit template
Implementation	• COPD best practices delivered	• COPD Best Practices at service Wellness Visits, including: o (1) inhaler adherence evaluated, (2) inhaler technique reviewed, (3) COPD Assessment Test issued, (4) Smoking Status assessed, (5) COPD Written Action Plan provided, (6) Spirometry screening (7) COPD severity/GOLD staging completed (8) Prior exacerbation count in last year assessed (9) Prior hospitalizations in the past year assessed and (10) Oxygen need assessed
Maintenance	• Longitudinal outcomes of Reach, Adoption and Implementation	• COPD CARE service measures stratified by month and by early implementation (phase 1: months 1-6), late implementation (phase 2: months 7-12), and early sustainment (phase 3: months 13-18). Additionally, pre-implementation phase (months 6-1 before go-live) was assessed for Implementation measures,

RE-AIM domain and operationalization within the evaluation of COPD CARE service delivery.

Table 3 Longitudinal Reach and Adoption Outcomes

	Phase 1 (Early Implementation	Phase 2 (Late Implementation)	Phase 3 (Early Sustainment)
Reach			
Number of COPD CARE Encounters per month Overall[a] [Sum (95% CI)]	54.7 (28.6, 80.7)	112.8 (86.8, 138.9)	152.5 (126.4, 178.6)
Number of COPD CARE Encounters per month per VAMC[a] [Mean (95% CI]	3.9 (-0.7, 8.5)	8.1 (3.5, 12.7)***	10.9 (6.3, 15.5) ***
Adoption			
Number of Clinicians completing COPD CARE Encounters per month Overall[b] [Sum (95% CI)]	30.7 (18.1, 43.3)	77.5 (64.9, 90.1)	112.3 (99.7, 124.9)
Number of Clinicians completing COPD CARE Encounters per month per VAMC[b] [Mean (95% CI)]	2.2 (-1.4, 5.8)	5.5 (2.0, 9.1) ***	8.0 (4.5, 11.6) ***

Monthly averages per VAMC were compared to the early implementation phase using a mixed effects ANOVA regression model and p-values are Dunnett adjusted for two tests against Implementation stage. [a]Encounters included Wellness and follow-up visits. [a]Clinicans who completed an encounter with a referral note, Wellness, or follow-up electronic note template were included.

*P-value<0.05 vs. Early Implementation Phase

**P-value<0.01 vs. Early Implementation Phase

***P-value<0.001 vs. Early Implementation Phase

Table 4 Longitudinal Implementation of COPD Evidence-Based Practices

	Baseline (Pre-Implementation)	Phase 1 (Early Implementation)	Phase 2 (Late Implementation)	Phase 3 (Early Sustainment)
	[Mean (95% CI]			
Average Best COPD Evidence-Based Practices per Wellness Visit[a]	2.2 (1.8, 2.6)	8.5 (8.0, 8.9) ***	8.6 (8.2, 9.0) ***	8.6 (8.2, 9.0) ***
Reviewed Inhaler Adherence[b]	29.8 (25.0, 34.6)	97.5 (91.2, 100) ***	99.4 (94.2, 100) ***	100.0 (95.3, 100) ***
COPD Assessment Test (CAT) Score Provided[c]	0 (0, 15.4)	41.0 (23.9, 58.2) ***	43.4 (26.8, 60.0) ***	46.1 (29.8, 62.5) ***
COPD Action Plan Provided[d]	1.1 (0, 12.3)	70.9 (58.4, 83.3) ***	60.9 (49.3, 72.5) ***	53.9 (42.8, 65.1) ***
History of Prior Exacerbations within Past Year Assessed	44.8 (39.1, 50.5)	96.9 (89.6, 100) ***	98.8 (92.7, 100) ***	98.1 (92.4, 100) ***
Spirometry Assessed	4.8 (2.7, 7.0)	97.6 (94.9, 100) ***	99.6 (97.3, 100) ***	100.0 (97.9, 100) ***
COPD severity Assessed	1.1 (0, 2.7)	97.7 (95.7, 99.8) ***	99.9 (98.2, 100) ***	99.8 (98.3, 100) ***
History of prior Hospitalizations within Past Year Assessed	40.4 (34.1, 46.7)	95.2 (87.4, 100) ***	97.0 (90.3, 100) ***	96.3 (90.1, 100) ***
Oxygen Therapy use Assessed	32.3 (12.1, 52.5)	51.2 (30.1, 72.3) **	59.2 (38.7, 79.6) ***	60.3 (40.1, 80.4) ***
Current Smoking Status Assessed	60.6 (55.8, 65.4)	97.6 (91.3, 100) ***	99.7 (94.5, 100) ***	100.0 (95.3, 100) ***
Reviewed Inhaler Technique[e]	2.8 (1.0, 4.7)	97.7 (95.3, 100) ***	100.0 (98.0, 100) ***	100.0 (98.2, 100) ***

Best Practices were provided during primary care visits at baseline and during Wellness Visits post-implementation. Monthly average per VAMC were compared to the pre-implementation stage using a mixed effects ANOVA regression model with upper 95% CIs truncated at 0% and 100% and p-values are Dunnett adjusted for two tests against pre-implementation stage. [a]Up to ten COPD Best Practices were measured. [b]Adherence was subjectively assessed by the pharmacist. [b]CAT Scores measure 8 different COPD Symptoms and the patient is asked to rank each symptom. [d]COPD Action plans provides patient guidance to self-manage COPD Symptoms. [b]Adherence Inhaler technique was subjectively assessed by the pharmacist.
*P-value<0.05 vs. Pre-Implementation Phase
**P-value<0.01 vs. Pre-Implementation Phase
**P-value<0.001 vs. Pre-Implementation Phase