

Supplementary Table 1. COPD Guidelines and Diagnosis†

Question	Total Cohort	Provider Degree			Practice Location			
		MD/DO	APP	p-value	Colorado	Kansas	Other States	p-value
	N=71 (100%)	N=36 (51%)	N=35 (49%)		N=35 (49%)	N=17 (24%)	N=19 (27%)	
Which guidelines do you use to diagnose and manage COPD?				0.38				0.17
GOLD or ATS/ERS	43 (61)	20 (56)	23 (66)		22 (63)	12 (71)	9 (47)	
I use them, but can't remember the name; I don't use any; I did not know there were any; I use NAEP	28 (39)	16 (44)	12 (34)		13 (37)	5 (29)	10 (53)	
What barriers do you see in the diagnosis of COPD?								
Lack of specific COPD symptoms	10 (14)	3 (8)	7 (20)	0.19*	7 (20)	2 (12)	1 (5)	0.27*
Patient failure to recognize and report symptoms	37 (52)	21 (58)	16 (46)	0.29	19 (54)	9 (53)	9 (47)	0.63
COPD patients have multiple chronic conditions	47 (66)	29 (81)	18 (51)	0.01	22 (63)	13 (76)	12 (63)	0.74
Lack of knowledge/training in COPD diagnosis	9 (13)	2 (6)	7 (20)	0.08*	3 (9)	3 (18)	3 (16)	0.69*
Lack of easy access to spirometry	21 (30)	10 (28)	11 (31)	0.74	8 (23)	7 (41)	6 (32)	0.82
Lack of effective treatments	3 (4)	3 (8)	0 (0)	0.24*	2 (6)	1 (6)	0 (0)	0.56*
Other	7 (10)	1 (3)	6 (17)	0.06*	5 (14)	0 (0)	2 (11)	>.99*
What do you use to make a diagnosis of COPD?								
Smoking history	47 (66)	26 (72)	21 (60)	0.28	24 (69)	10 (59)	13 (68)	0.81
Smoker's cough	20 (28)	10 (28)	10 (29)	0.94	12 (34)	2 (12)	6 (32)	0.70
Dyspnea with activity	44 (62)	27 (75)	17 (49)	0.02	24 (69)	8 (47)	12 (63)	0.90
Dyspnea at rest	38 (54)	23 (64)	15 (43)	0.08	21 (60)	8 (47)	9 (47)	0.53
Spirometry	63 (89)	32 (89)	31 (89)	>.99*	34 (97)	15 (88)	14 (74)	0.03*
What diagnostic tests do you perform if you suspect COPD?								
Refer to a specialist	8 (11)	2 (6)	6 (17)	0.15*	2 (6)	4 (24)	2 (11)	>.99*
Chest X-ray	53 (75)	25 (69)	28 (80)	0.31	25 (71)	12 (71)	16 (84)	0.36*
Spirometry	62 (89)	34 (94)	29 (83)	0.15	33 (94)	15 (88)	15 (79)	0.20*
Trial of inhaled corticosteroids	15 (21)	6 (17)	9 (26)	0.35	5 (14)	5 (29)	5 (26)	0.52
Trial of inhaled bronchodilator	34 (48)	19 (53)	15 (43)	0.40	15 (43)	10 (59)	9 (47)	0.96

Arterial blood gas	4 (6)	3 (8)	1 (3)	0.61*	2 (6)	0 (0)	2 (11)	0.29*
Alpha-1 antitrypsin	4 (6)	2 (6)	2 (6)	>.99*	3 (9)	0 (0)	1 (5)	>.99*
Other	4 (6)	1 (3)	3 (9)	0.36*	3 (9)	0 (0)	1 (5)	>.99*
What is the best way for you to access information to guide treatment of COPD patients?								
EHR guideline-based prompts: smartphone applications: online medical resources	54 (76)	28 (78)	26 (74)	0.73	27 (77)	12 (71)	15 (79)	>.99*
Standing orders, printed guideline summaries or other	17 (24)	8 (22)	9 (26)		8 (23)	5 (29)	4 (21)	

† Data are presented as n (%). Percentages may not total 100% due to rounding.

Definition of abbreviations: MD = Doctor of Medicine, DO = Doctor of Osteopathic Medicine, APP = Advanced Practice Providers (NP/PA/Other), NP = Nurse Practitioner, PA = Physician Assistant, GOLD = Global Initiative for Chronic Obstructive Lung Disease, ATS = American Thoracic Society, ERS = European Respiratory Society.

P-values shown for comparison between MD/DO and APP groups or between Colorado and Kansas combined vs. Other States. Chi-square tests (or *Fisher's exact tests) were used to compare groups.

Supplementary Table 2. Assessment†

Question	Total Cohort	Provider Degree			Practice Location			
		MD/DO	APP	p-value	Colorado	Kansas	Other States	p-value
	N=71 (100%)	N=36 (51%)	N=35 (49%)		N=35 (49%)	N=17 (24%)	N=19 (27%)	
Are you satisfied with your practice's ability to:								
Assess symptoms in COPD patients?				>.99*				0.43*
Agree or strongly agree	62 (87)	31 (86)	31 (89)		29 (83)	15 (88)	18 (95)	
Neutral/undecided, disagree, strongly disagree	9 (13)	5 (14)	4 (11)		6 (17)	2 (12)	1 (5)	
Access spirometry for COPD patients?				0.41				0.67
Agree or strongly agree	44 (62)	24 (67)	20 (57)		23 (66)	10 (59)	11 (58)	
Neutral/undecided, disagree, strongly disagree	27 (38)	12 (33)	15 (43)		12 (34)	7 (41)	8 (42)	
Does your practice have a spirometer?								
Yes	47 (66)	24 (67)	23 (66)	0.93	29 (83)	9 (53)	9 (47)	0.04
No	24 (34)	12 (33)	12 (34)		6 (17)	8 (47)	10 (53)	
My practice routinely:								
Assesses symptoms in COPD patients using the CAT or mMRC dyspnea scale				>.99*				>.99*
Yes	8 (11)	4 (11)	4 (11)		3 (9)	3 (18)	2 (11)	
..No	63 (89)	32 (89)	31 (89)		32 (91)	14 (82)	17 (89)	
Tests COPD patients for alpha-1 antitrypsin				0.54				0.17
Always	1 (1)	0 (0)	1 (3)		0 (0)	0 (0)	1 (5)	
Occasionally	41 (58)	22 (61)	19 (54)		19(54)	13 (76)	9 (47)	
Never	29 (41)	14 (39)	15 (43)		16 (46)	4 (24)	9 (47)	

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Supplementary Table 3. Treatment and Prevention[†]

Question	Total Cohort	Provider Degree			Practice Location			
		MD/DO	APP	p-value	Colorado	Kansas	Other States	p-value
	N=71 (100%)	N=36 (51%)	N=35 (49%)		N=35 (49%)	N=17 (24%)	N=19 (27%)	
Are you satisfied with your practice's ability to:								
Deliver smoking cessation counseling to my COPD patients?				0.82				0.52
Agree or strongly agree	56 (79)	28 (78)	28 (80)		29 (83)	13 (76)	14 (74)	
Neutral/undecided, disagree, strongly disagree	15 (21)	8 (22)	7 (20)		6 (17)	4 (24)	5 (26)	
Deliver inhaler education to my COPD patients?				0.48				0.82
Agree or strongly agree	50 (70)	24 (67)	26 (74)		28 (80)	9 (53)	13 (68)	
Neutral/undecided, disagree, strongly disagree	21 (30)	12 (33)	9 (26)		7 (20)	8 (47)	6 (32)	
Treat symptoms in COPD patients?				0.74*				0.44*
Agree or strongly agree	61 (86)	30 (83)	31 (89)		32 (91)	14 (82)	15 (79)	
Neutral/undecided, disagree, strongly disagree	10 (14)	6 (17)	4 (11)		3 (9)	3 (18)	4 (21)	
Treat COPD exacerbations?				0.11*				0.17*
Agree or strongly agree	68 (96)	36 (100)	32 (91)		34 (97)	17 (100)	17 (89)	
Neutral/undecided, disagree, strongly disagree	3 (4)	0 (0)	3 (9)		1 (3)	0 (0)	2 (11)	
Prevent COPD exacerbations?				0.16				0.74
Agree or strongly agree	47 (66)	21 (58)	26 (74)		25 (71)	10 (59)	12 (63)	
Neutral/undecided, disagree, strongly disagree	24 (34)	15 (42)	9 (26)		10 (29)	7 (41)	7 (37)	

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Supplementary Table 4. Access to Supportive Services[†]

Question	Total Cohort	Provider Degree			Practice Location			
		MD/DO	APP	p-Value	Colorado	Kansas	Other States	p-value
	N=71 (100%)	N=36 (51%)	N=35 (49%)		N=35 (49%)	N=17 (24%)	N=19 (27%)	
My COPD patients have access to:								
Home oxygen if needed.				0.27				0.49
Agree or strongly agree	52 (74)	24 (69)	28 (80)		24 (69)	15 (88)	13 (68)	
Neutral/undecided, disagree, strongly disagree	18 (26)	11 (31)	7 (20)		11(31)	1 (6)	6 (32)	
Pulmonologist for consultation.				0.40				0.02
Agree or strongly agree	39 (55)	18 (50)	21 (60)		23 (66)	10 (59)	6 (32)	
Neutral/undecided, disagree, strongly disagree	32 (45)	18 (50)	14 (40)		12 (34)	7 (41)	13 (68)	
Pulmonary rehabilitation.				0.28				0.0007
Agree or strongly agree	26 (37)	11 (31)	15 (43)		18 (51)	7 (41)	1 (5)	*
Neutral/undecided, disagree, strongly disagree	45 (63)	25 (69)	20 (57)		17 (49)	10 (59)	18 (95)	

[†] Data are presented as n (%). Percentages may not total 100% due to rounding.

Definition of abbreviations: MD = Doctor of Medicine, DO = Doctor of Osteopathic Medicine, APP = Advanced Practice Providers (NP/PA/Other), NP = Nurse Practitioner, PA = Physician Assistant.

P-values shown for comparison between MD/DO and APP groups or between Colorado and Kansas combined vs. Other States. Chi-square tests (or *Fisher's exact tests) were used to compare groups.

Rural Medical Provider COPD Survey

You have been invited to participate in a 5 minute survey about COPD.

Please complete the survey below.

Thank you!

Our goal is to learn more about the challenges rural providers face when caring for COPD patients, so that they can be better understood and more easily addressed.

Are you a rural medical provider? Yes
 No

For questions 1-4 please check ALL answers that apply:

1) Which guidelines do you use in guiding COPD diagnosis and management?

- NAEP
- GOLD
- ATS/ERS
- I use them but can't remember the title
- I don't use any
- I did not know there were any

2) What barriers do you see in the diagnosis of COPD?

- Lack of specific symptoms associated with COPD
- Failure of patients to recognize and report dyspnea
- People with COPD usually have multiple chronic conditions
- Lack of knowledge and training in diagnosing COPD
- Lack of easy access to spirometry
- Lack of available treatment so diagnosis is not important
- Other

(Please provide other barriers you see in the diagnosis of COPD.)

3) What do you use to make a diagnosis of COPD?

- Smoking history (pack years)
- Smokers cough
- Dyspnea with activity
- Dyspnea at rest
- Spirometry testing

4) What diagnostic tests do you perform if you suspect COPD?

- Refer to a specialist for all assessments
- Chest X-ray
- Spirometry
- Trial of inhaled corticosteroids
- Trial of inhaled bronchodilators
- Arterial blood gases or pulse oximetry
- Alpha-1 antitrypsin deficiency screening
- Other



(Please provide other diagnostic tests you perform if you suspect COPD.)

5) What is the best way for you to access information to guide your treatment of COPD patients?

- Posted in clinics
- Standing orders
- EHR Guideline-based prompts
- Smartphone Apps
- Online medical resources
- Printed guideline summaries
- Other

(Please provide other ways you access information to guide your treatment of COPD patients)

Please indicate your level of agreement or disagreement with the statements below:

I am satisfied with my practice's ability to:

6a) Access spirometry for COPD patients.

- Strongly agree
- Agree
- Neutral/undecided
- Disagree
- Strongly disagree

6b) Assess symptoms in COPD patients.

- Strongly agree
- Agree
- Neutral/undecided
- Disagree
- Strongly disagree

6c) Treat symptoms in COPD patients.

- Strongly agree
- Agree
- Neutral/undecided
- Disagree
- Strongly disagree

6d) Deliver inhaler education to my COPD patients.

- Strongly agree
- Agree
- Neutral/undecided
- Disagree
- Strongly disagree

6e) Deliver smoking cessation counseling to my COPD patients.

- Strongly agree
- Agree
- Neutral/undecided
- Disagree
- Strongly disagree

6f) Prevent COPD exacerbations.

- Strongly agree
- Agree
- Neutral/undecided
- Disagree
- Strongly disagree

-
- 6g) Treat COPD exacerbations.
- Strongly agree
 - Agree
 - Neutral/undecided
 - Disagree
 - Strongly disagree
-

Please indicate your level of agreement or disagreement with the statements below:

My COPD patients have:

-
- 7a) Access to home oxygen therapy if needed.
- Strongly agree
 - Agree
 - Neutral/undecided
 - Disagree
 - Strongly disagree
-

- 7b) Access to a pulmonary rehabilitation program.
- Strongly agree
 - Agree
 - Neutral/undecided
 - Disagree
 - Strongly disagree
-

- 7c) Access to a pulmonologist for consultation.
- Strongly agree
 - Agree
 - Neutral/undecided
 - Disagree
 - Strongly disagree
-

- 8) My practice routinely tests COPD patients for alpha-1 antitrypsin deficiency.
- Never
 - Occasionally
 - Always
-

- 9) My practice routinely assesses symptoms in COPD patients using the COPD Assessment Test (CAT), or the modified Medical Research Council (mMRC) Dyspnea scale?
- Yes
 - No
-

About me:

-
- 10) Where is your practice located?
- Arizona
 - Colorado
 - Idaho
 - Kansas
 - Montana
 - Nebraska
 - Nevada
 - New Mexico
 - North Dakota
 - Oklahoma
 - South Dakota
 - Utah
 - Wyoming
 - Other
-

- Are you located in:
- Eastern Colorado
 - Southern Colorado
 - Western Colorado
-

(Please provide your practice location.)

11) What setting best describes your practice?

- Federally qualified health center
- Hospital or health system based
- Private
- Rural health clinic
- Other

(Please provide your practice setting.)

12) What is your highest degree?

- MD or DO
- NP
- PA
- Other

(Please provide your highest degree.)

13) My age is:

- < 30
- 30-39
- 40-49
- 50-59
- 60 or over

14) I have been in practice in a rural setting for:

- < 5 years
- 5 to 15 years
- 16 to 25 years
- > 25 years

15) How many total providers are in your practice (including MD, DO, NP or PA)?

- One
- Two
- Three
- Four
- Five
- More than Five

16) Does your practice have a spirometer?

- Yes
- No