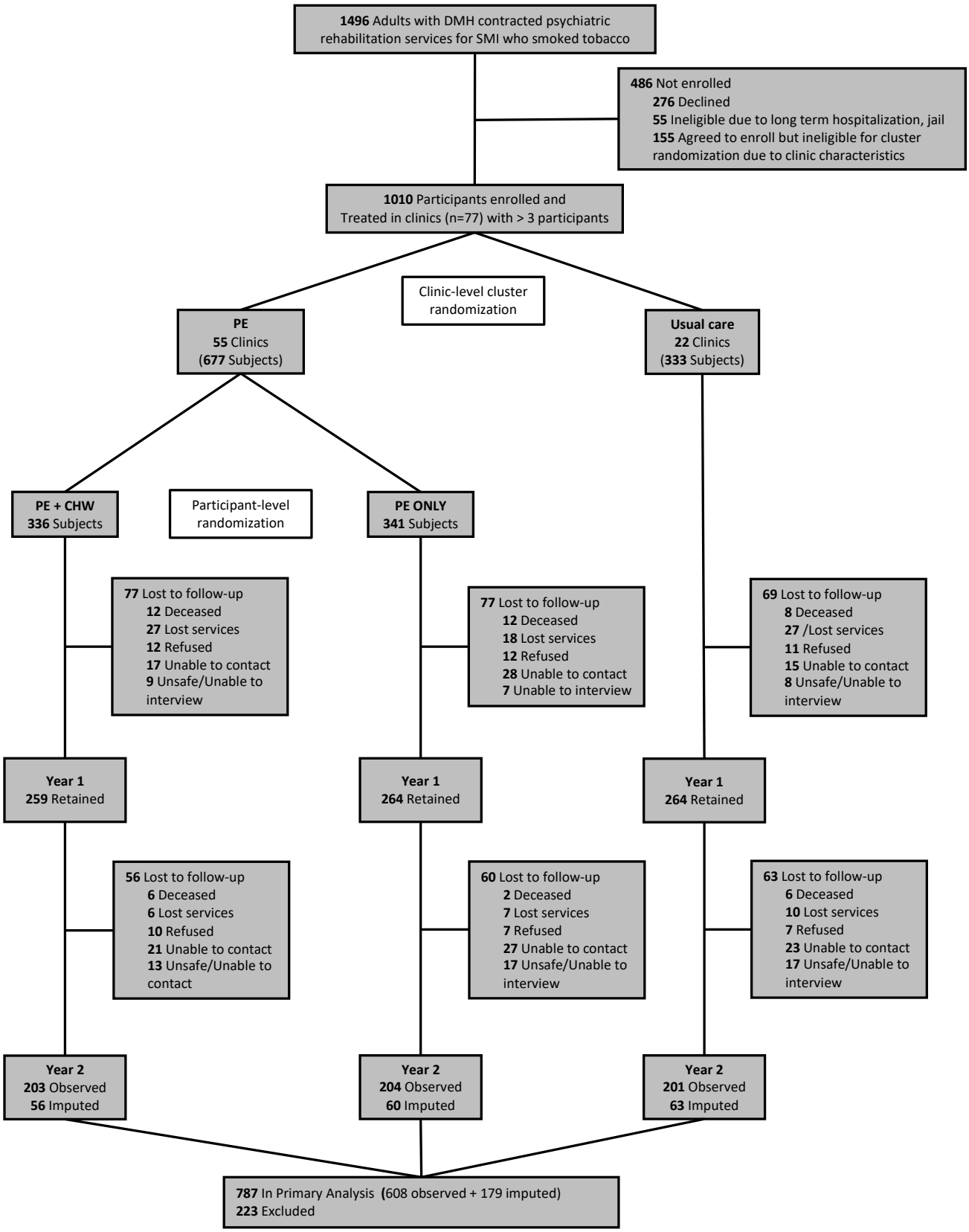
Online supplement for 10.1176/appi.ps.20220187

eFigure 1: Participant Flow Diagram


1496 Adults with DMH contracted psychiatric rehabilitation services for SMI who smoked tobacco
486 Not enrolled
276 Declined
55 Ineligible due to long term hospitalization, jail
155 Agreed to enroll but ineligible for cluster randomization due to clinic characteristics
1010 Participants enrolled and Treated in clinics (n=77) with > 3 participants
Clinic-level cluster randomization
PE
55 Clinics
(677 Subjects)
Usual care
22 Clinics
(333 Subjects)
PE + CHW
336 Subjects
Participant-level randomization
PE ONLY
341 Subjects
77 Lost to follow-up
12 Deceased
27 Lost services
12 Refused
17 Unable to contact
9 Unsafe/Unable to interview
77 Lost to follow-up
12 Deceased
18 Lost services
12 Refused
28 Unable to contact
7 Unable to interview
69 Lost to follow-up
8 Deceased
27 /Lost services
11 Refused
15 Unable to contact
8 Unsafe/Unable to interview
Year 1
259 Retained
Year 1
264 Retained
Year 1
264 Retained
56 Lost to follow-up
6 Deceased
6 Lost services
10 Refused
21 Unable to contact
13 Unsafe/Unable to contact
60 Lost to follow-up
2 Deceased
7 Lost services
7 Refused
27 Unable to contact
17 Unsafe/Unable to interview
63 Lost to follow-up
6 Deceased
10 Lost services
7 Refused
23 Unable to contact
17 Unsafe/Unable to interview
Year 2
203 Observed
56 Imputed
Year 2
204 Observed
60 Imputed
Year 2
201 Observed
63 Imputed
787 In Primary Analysis (608 observed + 179 imputed)
223 Excluded

eFigure 1 Legend. Study staff attempted to contact all 1496 people who received Department of Mental Health psychiatric rehabilitation services for serious mental illness through the two partnering agencies and were reported to smoke tobacco. 1441 were outpatients and were contacted.1165 agreed to participate and provided baseline data including primary care clinic site. Of these, 1010 received primary care at an eligible clinic and were randomized. Data for the 155 who were ineligible for cluster randomization for PE are included in this supplement. The label Discharged/Lost services refers to the fact that in year-1 of the intervention, eligibility for psychiatric rehabilitation services changed. While we attempted to retain all enrolled participants, some participants were lost to follow up due to disruption of services. Unable to interview refers to participants who were deemed by their psychiatric rehabilitation team to be too psychiatrically unstable to interview.

eFigure 2. Provider Education Outreach Materials

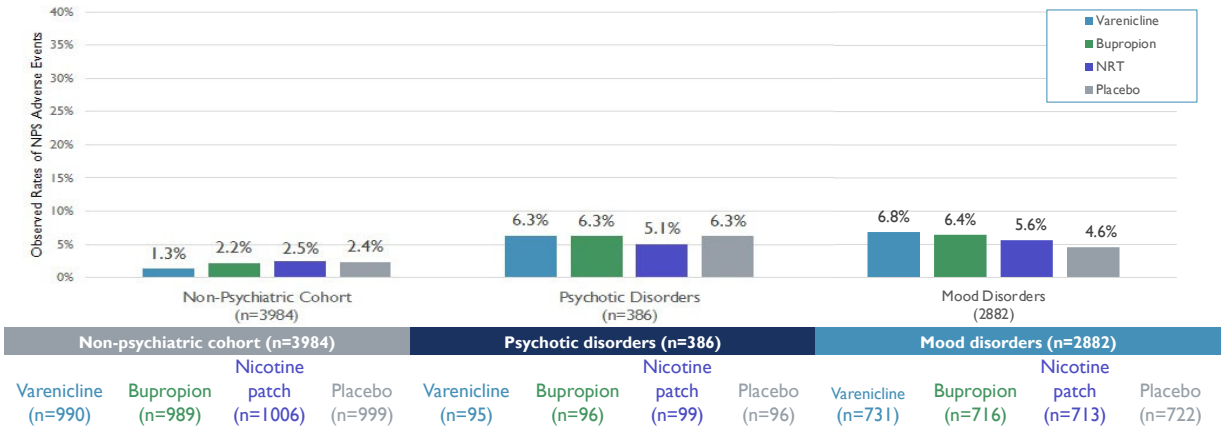
Good News for Patients Who Smoke

How prescribers can help patients with (and without) serious mental illness (SMI) stop smoking

SAFETY

Varenicline Does NOT Increase AEs

Continuous Abstinence During Weeks 9 Through 12 in Adult Smokers Without or With a History of Psychiatric Disorder



Neuropsychiatric (NPS) safety data based on EAGLES (Evaluating Adverse Events in a Global Smoking Cessation Study)[1,2], an FDA required trial to evaluate NPS safety in over 8000 smokers with and without a psychotic, anxiety or mood disorder†

SAFETY

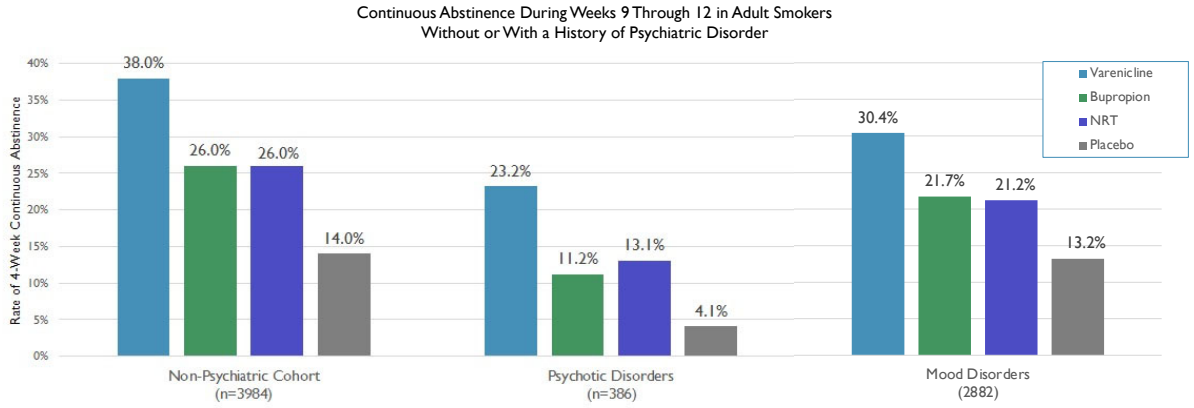
Neuropsychiatric (NPS) safety data based on EAGLES (Evaluating Adverse Events in a Global Smoking Cessation Study)[1,2], an FDA required trial to evaluate NPS safety in over 8000 smokers with and without a psychotic, anxiety or mood disorder†

EAGLES provides data that can be used to counsel smokers on the likelihood of experiencing a moderate to severe NPS adverse events during a smoking cessation attempt.

- Risk of NPS AEs is independent of treatment
  - ~2% NPS AE rate in smokers without mental illness
  - ~5-7% NPS AE rate in smokers with mental illness
- NPS AE rates during a cessation attempt are not different across active treatments or placebo
- No pattern of NPS AEs in the most worrisome NPS AEs
- No psychiatric subgroup appears to be at particularly increased risk

EFFICACY Comparative efficacy data based on EAGLES[2]

Varenicline was superior to bupropion, NRT and placebo, while bupropion and NRT were superior to placebo for biochemically-confirmed tobacco abstinence.‡



‡ "N" and analyses based on all-randomized populations in the EAGLES trial published in *The Lancet* (2016).[1]

EFFICACY Comparative efficacy data based on EAGLES[2]

Varenicline was superior to bupropion, NRT and placebo, while bupropion and NRT were superior to placebo for biochemically-confirmed tobacco abstinence.‡

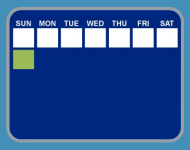
"FDA removes warnings on smoking cessation medication"
Pharmacy Times, December 16, 2016

FDA removed boxed warnings for varenicline and bupropion based on results of EAGLES, a required, randomized, double-blind, triple dummy, active-and placebo-controlled clinical trial conducted by Pfizer in collaboration with GlaxoSmithKline, designed in consultation with the FDA and the European Medicines Agency (EMA). It is the largest smoking cessation clinical trial ever conducted and the largest samples of smokers with psychotic, anxiety, and mood disorders ever conducted.

MYTH	People with SMI don't want to quit smoking	Quitting worsens psychiatric symptoms	Medications don't help people with SMI stop smoking	Medications should only be prescribed for smokers ready to quit completely
FACT	**60-70% of smokers with SMI want to quit**	**Stopping smoking improves depressive symptoms (like anti-depressant medication)**	**Smokers with SMI are 3-6x more likely to quit when prescribed medication** (Only 4% quit without a medication)	**"Flexible quit" and "gradual quit" after starting medications are validated ways to quit**

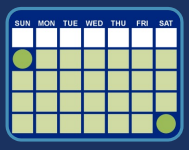
Three Ways to Quit Smoking:
All Start with Smoking Cessation Medication

Fixed Quit
For people who want to quit smoking in a week



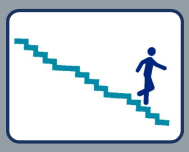
- Set a target quit date that is 1 week after starting smoking cessation medication
- Can keep smoking for the first week while they prepare to quit
- Take smoking cessation medication for 12-24 weeks

Flexible Quit
For smokers with serious mental illness (SMI)



- Start taking smoking cessation medication and pick a quit date 8 to 35 days after starting treatment
- *Can keep smoking for up to a month on smoking cessation medication while they prepare to quit*
- Take smoking cessation medication for 12-24 weeks

Gradual Quit
For patients who are not able/willing to quit abruptly



- Start taking smoking cessation medication and reduce smoking by 50% over 4 weeks, by an additional 50% in the next 4 weeks, and continue reducing with the goal of quitting by 12 weeks.
- Continue smoking cessation medication for an additional 12 weeks, for a total of 24 weeks

Steps to Address Smoking

Assess

At each clinic visit, ask patients if they currently smoke tobacco. (most with SMI smoke)

Engage

Remind patients that quitting is the single best thing they can do for their health. Recommend EVERY smoker start treatment to quit. Medication use may increase readiness to quit.

Prescribe

Start medication and educate patients about importance of adherence to treatment. Decide on fixed, flexible, or gradual approach to quitting.

Follow Through

Schedule 1-week to 1-month follow up to assess tolerability, plan quit day.

- Remind patients that most AEs are mild and transient.
- Problem solve around missed medication doses .

Reinforce progress and persistence. Most smokers require repeat quit attempts.

How To: Dosing

Varenicline

Available as 0.5 and 1.0 mg tabs
- 0.5 mg/d at hs x 3 d
- 0.5 mg bid x 4 d
- 1.0 mg bid x 11 weeks
- Additional 3-9 months Tx recommended in those who achieve abstinence
- 12-month safety data published: well tolerated

Renal excretion, used in chronic renal disease with dose reduction

No significant drug-drug interactions or effect on cytochrome enzymes

Nausea, headache, insomnia, and vivid dreams are common

How To: Dosing

Dual Nicotine Replacement Therapy

Nicotine patch

Dosing: 21 mg/d x 4-6 weeks then
- 14 mg/d x 4 weeks then
- 7 mg/d x 3-4 weeks

Apply one new patch every 24 hours (preferable am) to dry, clean skin

Move site with each new patch to avoid skin irritation

Remove patch at night if bothered by insomnia or vivid dreams

Nicotine gum or lozenge

Dosing: up to 20 mg/d x 4-5 weeks then
- Up to 14 mg/d x 4 weeks then
- Up to 10 mg/d x 3-4 weeks

Do not chew, break, crush, or swallow whole

Gum: Chew a few times then 'park it' between cheek and gum

Move around mouth until it melts (lozenge) or loses flavor (gum)

Do not eat or drink for 15 minutes before or during use

How To: Dosing

Bupropion SR or XL

Dosing:
150mg QD x 3 days, then 150mg BD

Insomnia common

Meta-analysis of 182 studies with 70,000 smokers:[9]
Varenicline **triples** chances of quitting vs. placebo
and increases odds of quitting by **50%** over NRT and bupropion

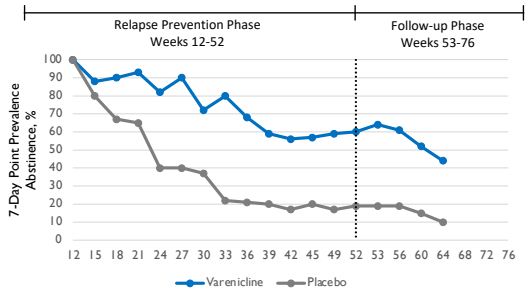
NRT and bupropion nearly **double** odds of quitting vs. placebo (80% increase)

How Long to Treat:
Six Months? One Year? Longer?

Sustaining smoking cessation

Relapse is common, but continuing medication may help patients stay off cigarettes. Maintenance treatment normalizes the relapse rate for smokers with SMI.[13]

Smokers with SMI who had stopped smoking with 12 weeks of treatment sustained cessation more successfully with 1 year of continued treatment[11]



Data also suggests that extended treatment with

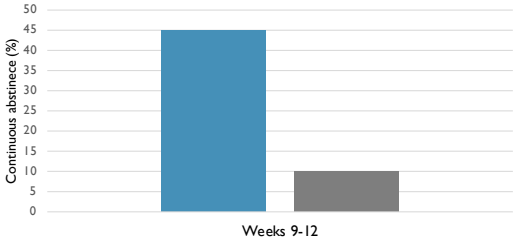
Bupropion and/or **NRT**

can sustain cessation

Repeat attempts for persistent smokers

Among those with prior unsuccessful quit attempts, active smoking cessation treatment was associated with significantly higher quit rates than placebo.[12]

Abstinence rates with varenicline and placebo in smokers who had failed a prior unsuccessful cessation attempt with varenicline



It takes an average of

5 quit attempts

Before long-term abstinence is achieved

A Public Health Crisis

64% of individuals with **Schizophrenia** smoke

44% of individuals with **Bipolar Disorder** smoke

15% of the **General Population** smoke

Mortality for patients with SMI is

3.7x higher

than for the general population[2]

Patients with SMI have a

25-year mortality gap

compared to the general population[3]

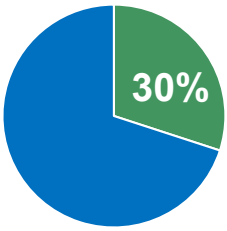
What is SMI?

Serious mental illness (SMI) describes patients with:

schizophrenia
schizoaffective disorder
bipolar disorder
major depressive disorder

Opportunities to save lives

Long-term smoking quit rates across strategies for smokers with SMI are roughly 30%, similar to the general population.[4]



Every quit attempt helps people move towards permanent abstinence.

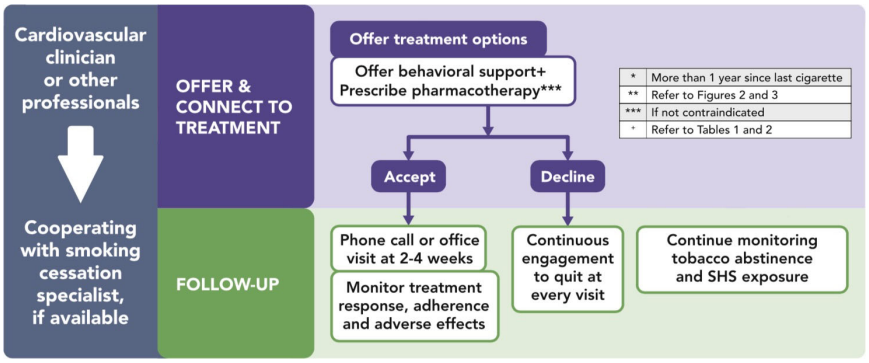
Treatment Guidelines…

- 2018 American College of Cardiologists ACC **Expert Consensus** Decision Pathway on Tobacco Cessation Treatment
- A Report of the American College of Cardiology Task Force on **Clinical Expert Consensus** Documents

Journal of the American College of Cardiology. Vol. 72, No. 25, 2018

ACC Recommends an "Opt Out" Approach

- The provider's offer of treatment is not contingent on readiness to quit ("**stage of change**") or a commitment to behavioral change, consistent with the approach to other chronic diseases
- The offer of treatment is **directive** with clear advice for both **pharmacotherapy and behavioral support** for all smokers with "rare exception"
- If they decline, engage on the topic at every subsequent visit



ACC Guidelines for Pharmacotherapy

TABLE 4 Recommended Pharmacotherapy for Smoking Cessation in Patients with CVD

	Outpatient With Stable CVD	Inpatient With ACS
1st line	Varenicline OR combination NRT*	*In-hospital to relieve nicotine withdrawal:* Nicotine patch OR combination NRT* *At discharge:* Combination NRT or varenicline†
2nd line	Bupropion OR single NRT product	*At discharge:* Single NRT product
3rd line	Nortriptyline‡	Bupropion§
If single agent is insufficient to achieve abstinence	Combine categories of FDA-approved drugs: Varenicline + NRT (single agent) Varenicline + bupropion Bupropion + NRT (single agent)	n/a

*Combination NRT comprises a nicotine patch plus the patient's choice of nicotine gum or lozenge or inhaler or spray.
†Some committee members planning to use varenicline would start it in-hospital; others would not start until discharge. Regardless, continue nicotine patch or short-acting form for 1 week to manage nicotine withdrawal symptoms during up-titration of varenicline dose.
‡Nortriptyline is not FDA-approved for smoking cessation indication and there are few data on use in patients with CVD.
§Bupropion is listed as 3rd line because of no evidence of efficacy when started during hospitalization for acute ACS or acute MI. However, there are no special safety concerns for bupropion in this setting.

ACS = acute coronary syndromes; CVD = cardiovascular disease; FDA = U.S. Food and Drug Administration; MI = myocardial infarction; NRT = nicotine replacement therapy.

References

1. Dickerson et al. Cigarette Smoking Among Persons with Schizophrenia or Bipolar Disorder in Routine Clinical Settings, 1999-2011. *Psychiatric Services*. 2013
2. Olfson, et al. Premature Mortality among Adults with Schizophrenia in the United States. *JAMA Psychiatry*. 2015.
3. Cook BL, et al. Trends in Smoking among Adults with Mental Illness and Association between Mental Health Treatment and Smoking Cessation. *JAMA*. 2014.
4. Williams, et al. Tobacco use and mental illness: a wake-up call for psychiatrists. *Psychiatr Serv*. 2014.
5. Schroeder, SA. Smoking cessation should be an integral part of serious mental illness treatment. *World Psychiatry*. 2016.
6. Taylor, et al. (2014). Change in mental health after smoking cessation: systematic review and meta-analysis. *British Medical Journal* 348, g1151.
7. Anthenelli, et al. Effects of varenicline and bupropion in smokers with and without psychiatric disorders. *Lancet*. 2016.
8. Lindson-Hawley, et al. Gradual Reduction vs Abrupt Cessation as a Smoking Cessation Strategy in Smokers Who Want to Quit. *JAMA*. 2013.
9. Cahill K, et al. Pharmacological Treatments for Smoking Cessation. *JAMA* 2014.
10. Hughes, JR. Effects of Abstinence from Tobacco: Valid Symptoms and Time Course. *Nicotine & Tobacco Research*. 2007.
11. Evins AE, Cather C, Pratt SA, et al. Maintenance treatment with varenicline for smoking cessation in patients with schizophrenia and bipolar disorder: a randomized clinical trial. *JAMA*. 2014.
12. Gonzales, et al. Retreatment with Varenicline for Smoking Cessation in Smokers Who Have Previously Taken Varenicline: A Randomized, Placebo-Controlled Trial. *Clin Pharmacol Ther*. 2014.
13. Evins AE, et al. Maintenance pharmacotherapy normalizes relapse curve in recently abstinent tobacco smokers with schizophrenia and bipolar disorder. *Schiz Res*, 2017 May;183:124-129.
14. Cather C, Hoeppner SS, Pachas GN, Pratt S, Achytes E, Cieslak KM, Schoenfeld D, Evins AE. Improved depressive symptoms in adults with schizophrenia during a smoking cessation attempt with varenicline and behavioral smoking cessation treatment. *J Dual Diag*. 2017 Jul-Sep;13(3):168-178.
15. Barua et al. 2018 ACC Expert Consensus Decision Pathway on Tobacco Cessation Treatment. Journal of the American Academy of Cardiology. 2018; 72, (25):3332-65.

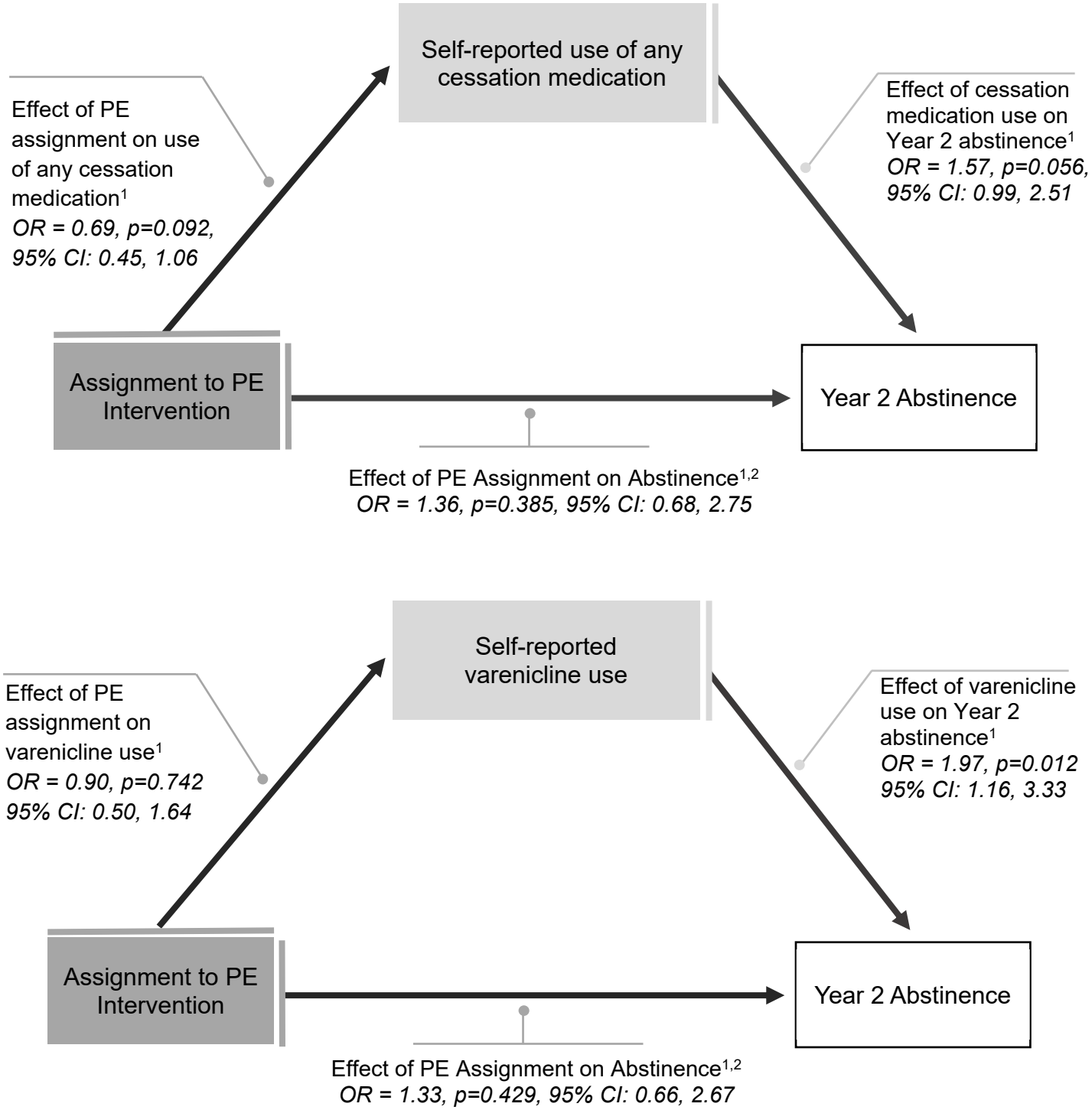
Notes & Disclaimers

There are general recommendations; specific clinical decisions should be made by the treating physician based on an individual patient's clinical condition. The production of this material was supported by a grant from the Patient-Centered Outcomes Research Institute (PCORI). These print materials developed in collaboration with NaRCAD.

ADDITIONAL REFERENCES

- Evins AE, Cather C, Laffer A. Treatment of nicotine dependence in people with psychiatric illness: Toward clinical best practices. *Harv Rev Psychiatry*. 2015 Mar-Apr;23(2):90-98. PMID: 25747922.
- Evins, AE, West R, Benowitz N, Russ C, Lawrence D, McRae T, Maravic MC, Heffner J, Anthenelli RM. Efficacy and tolerability of pharmacotherapeutic smoking cessation aids in those with schizophrenia spectrum disorders: A subgroup analysis of EAGLES. *Under review*.
- Heffner JL, Evins AE, Russ C, Lawrence D, Ayers CR, McRae T, St. Aubin L, Krishen A, Benowitz NL, West R, Anthenelli RM. Efficacy and Safety of First-Line Smoking Cessation Pharmacotherapies in Bipolar Disorder: Subgroup Analysis of EAGLES—a Randomized, Active- and Placebo-Controlled Trial. *Journal of Affective Disorders. In press.*
- Anthenelli RM, Gaffney M, Benowitz NL, West R, McRae T, Russ C, Lawrence D, St. Aubin L, Krishen A, Evins AE. Predictors of neuropsychiatric adverse events with smoking cessation medications in the randomized, controlled, EAGLES trial. *J Gen Int Med*. 2019. Mar 7. doi: 10.1007/s11606-019-04858-2. [Epub ahead of print] PMID: 30847828.
- Evins AE, Benowitz NL, West R, Russ C, McRae T, Lawrence D, Krishen A, St. Aubin L, Maravic MC, Anthenelli RM. Neuropsychiatric safety and efficacy of varenicline, bupropion, and nicotine patch in smokers with psychotic, anxiety and mood disorders in the EAGLES trial. *J Clin Psychopharm*. 2019. Mar/Apr;39(2):108-116. doi: 10.1097/JCP.0000000000001015. PMID: 30811371
- Evins AE, Korhonen T, Kinnunen T, Kaprio J. Prospective association between tobacco smoking and death by suicide: A competing risks hazard analysis in a large twin cohort with 35-year follow-up. *Psychological Medicine*. 2017. 47(12): 2143-2154. PMID: 28399944
- Cather C, Hoeppner SS, Pachas GN, Pratt S, Achytes E, Cieslak KM, Schoenfeld D, Evins AE. Improved depressive symptoms in adults with schizophrenia during a smoking cessation attempt with varenicline and behavioral smoking cessation treatment. *J Dual Diag*. 2017 Jul-Sep;13(3):168-178. PMID: 28414583.

eFigure 3: Mediation Analysis: Role of Cessation Medication Use in the Effect of PE on Abstinence



Path analysis diagram showing how any cessation medication use (Panel A) and any varenicline use (Panel B), both versus no medication use, mediate the association between PE intervention and year-2 abstinence status. Odds ratios and p-values are reported from the mediator (PE on medication use) and full models (PE and medication use on abstinence status), adjusting for cohort and CHW intervention. Here medication use is defined as patient report of receipt of prescription for smoking cessation medication (including NRT), filling the prescription and taking at least one dose in Panel A and any varenicline use in Panel B

eTable 1a. Year 2 Abstinence Rates by Intervention for Cohort 2[a]

Intervention	N		7-day PPA rates	
	Observed	Imputed	%	n
Usual care	39	18	14%	8
CHW	49	8	19%	11

Participants who enrolled in the trial but who received primary care at a clinic serving too few study participants to be eligible for the cluster randomization of clinics to PE or no PE were excluded from the main trial but were enrolled into a second cohort of 155 participants that is under-powered but intended to provide preliminary data on the impact of CHW support alone on tobacco abstinence at Year 2.

[a] Effect of CHW on biochemically-verified abstinence rates in the second year of the two-year intervention was estimated via a logistic regression model. Missing data for enrolled participants with baseline and year-1 but not year-2 data were handled using multiple imputation. Year-two abstinence for Cohort 2 were marginally higher in those assigned to CHW than usual care (11/57 [19%] vs 8/57 [14%]; adjusted odds ratio aOR= 1·40, 95% CI: 0·53, 3·73).

Due to systematic differences across the cohorts on factors likely to impact abstinence, particularly percent living independently which may be a proxy for severity of SMI, we do not include an exploratory factorial analysis in the supplemental materials.

eTable 1b: Sample characteristics at baseline: Cohort 2 vs Cohort 1

Measure	Cohort 2		Cohort 1	
	Overall		Overall	
	M/%	SD/n	M/%	SD/n
Sample, n		155		1010
Age	45.3	14.3	47.7	12.9
Sex; % female	39%	61	30%	307
Race[c]				
% Asian	2%	3	4%	38
% Black	18%	28	39%	394
% other	3%	4	4%	39
% White	72%	111	47%	472
% multi-race	6%	9	7%	67
Ethnicity; % Hispanic	18%	28	17%	171
Supervised Housing*; % yes	21%	32	44%	448
SF-1	3.1	1.1	3.1	1.1
Expired CO	22	17.2	23.4	20.7
HSI	2.9	1.6	2.8	1.6
Tobacco products per day	15.6	10.1	15.5	10.6
Cigarettes; % yes	86%	133	83%	842
Little cigars; % yes	24%	37	33%	333
Hand rolled cigarettes; % yes	7%	11	7%	74
E-cigarettes; % yes	4%	6	1%	15
Advised to quit smoking[a]; % yes	62%	96	65%	653
Prescribed cessation medicine[a]; % yes	30%	46	33%	332
Varenicline; % yes	3%	5	6%	61
Bupropion; % yes	2%	3	1%	12
NRT (any form); % yes	28%	43	31%	312
Cardiovascular/respiratory illness; %	56%	87	56%	561
Other smoking related illness[b]; %	17%	27	12%	120

[a] Indicates self-report of any physician recommendation to quit smoking and for prescription of these pharmacotherapeutic cessation aids in the year prior to enrollment
[b] Includes diabetes, cancer, pneumonia, tuberculosis, cataracts, glaucoma and retinal disease

[c] Univariate regression analysis (linear for continuous measures, logistic for categorical measures) found cohort 2 to be significantly different from cohort 1 ($p < 0.05$ following adjustment using the Benjamini-Hochberg method).

eTable 2. Examples of CHW Strategies and Activities with Study Participants

CHW Activities	Participants N	%	Illustrative Quotes from CHW Visit Notes
Relationship Building			
* Getting to know the person and their environment	237	99.6	➢ She was in the kitchen making coffee and told me I could talk to her if I stood in the kitchen with her while she "did her tasks". She told me about the stroke she had two weeks ago and how it was motivating her to quit smoking ➢ Client didn't want to talk about smoking so we listened to records and talked about music ➢ She was in her bedroom when I arrived and when I knocked on the door she answered and said, "Can you come in here and hang out while we meet?". I came in - and asked her about her morning. She showed me a purse she had bought at Goodwill and then showed me her jewelry and wig collections ➢ The group home staff told me when I arrived that the client was ornery and probably unwilling to meet. I did not have that experience. The client was willing to come out of his room and talk to me for twenty minutes. We chatted about his work, growing up in Memphis, his family and friends and his experience in this group home.
Engaging in activities in their environment to divert from smoking	122	51.3	➢ We played Connect Four and talked about the fears she has with her health; ➢ I met the client at his day program. He was doing crossword puzzle and we worked on it together for a few minutes; ➢ Client taught CHW how to play Jenga.
Coaching and Smoking Cessation Activities			
* Reinforcement of cessation techniques, addressing barriers	215	90.3	➢ Completed handouts with client to determine readiness to quit & identify barriers; ➢ Stopped by group home to remind him to work on his goal of using 4D's after meal to delay smoking; ➢ Talked about common myths about the patch and went over his triggers for smoking.

*	Carbon monoxide testing as motivational tool	203	85.3	➢ He said he felt he could breathe better and requested to do the CO test. He identified what CO is and that you want a lower number; ➢ Client did a CO test and blew a 33. He talked about the number and (correctly) noted that it was high; ➢ He reflected that his biggest takeaway was how the CO monitor test always held him accountable. He says knowing that every time he meets with me he will be getting the test done and he will have to explain if it is not a non-smoker CO he says "the low CO numbers were a reward all on their own".
*	Smoking cessation medication education	214	89.9	➢ Reviewed smoking cessation medications with client; ➢ Talked to client about his experience using patch and gum and the withdrawal symptoms he experienced. Told him about varenicline and he wants to try it.
*	Facilitating access to smoking cessation medication	147	61.8	➢ I went to see client at the hospital. His nurse mentioned that client has not been on any smoking medication. I mentioned that he is a smoker and it might be beneficial for him to use the patch and Chantix; ➢ CHW offered to take the client to the pharmacy directly after group and drive her home to make it easier for her to get the patches; ➢ CHW went to the clients PCP clinic multiple times with prior authorization (PA); ➢ Took client to PCP to ask for varenicline prescription paperwork to override the insurance limit multiple times; ➢ Talked to Pfizer Assistance Program for client; ➢ CHW made a call to client doctor with client present. Secretary said there were not any open appointments at this time. CHW talked to secretary about how urgent it is since the client was just in the hospital for pneumonia and getting him on a smoking medication as soon as possible would be extremely helpful for the client to try and cut down and quit.
*	Smoking cessation medication adherence	142	59.7	➢ Client reported having nausea from varenicline but is trying to drink lots of water; ➢ I gave client a small bag to put Chantix in to put in the bag he carries everywhere. We changed his first alarm (to remind him to take varenicline) to 11am. Client's CO reading was lower this week than last week; ➢ Client reports liking the patch and trying to use them daily; ➢ Started calling the client twice a day to remind him to take his varenicline. He states that this is very helpful.
*	Transportation to smoking cessation group	126	52.9	➢ Drove client to CBT smoking group, talked about upcoming mini-quit along the way; ➢ Reviewed techniques learned in group as CHW drove client home; ➢ Gave client a cab voucher for group next week (CHW doesn't have a car).

*	Providing support for quit attempt	111	46.6	➢ Went over a quit plan for next week, discussed potential withdrawal symptoms, how to navigate high risk situations; ➢ Reviewed quit plan, threw away all cigarettes, got rid of ashtrays; ➢ Client said she has removed all of the smoking paraphernalia from house but I spotted an ashtray and she said she hadn't even looked over there and had forgotten about it (I believe her because it was cleaned out and had dust on it).
	Providing support for mini quit	117	49.2	➢ Called client in morning to remind him of his mini-quit; ➢ Worked on client's mini quit plan; ➢ Reviewed coping techniques for cravings during mini-quit.
	Practicing relaxation techniques	125	52.5	➢ We paused our meeting to do some deep breathing because client was speaking very quickly due to anxiety around setting a quit date.; ➢ Practiced meditation, deep breathing, listened to relaxation tapes; ➢ He used the stress ball I left for him.
	Providing incentives or celebrated cessation attempt	102	42.9	➢ Took him to his favorite restaurant to celebrate his quit day then took him to group and then home; ➢ Gave client medal for successful mini-quit; ➢ CHW presented client with certificate for completing the first level of smoking cessation group. Client had a big smile on his face when he received certificate. He hung it on his wall and thanked CHW because he thought the certificate was "very nice"; ➢ CHW noticed that the client's bed sheets are covered with cigarette burns. Now that he is quit, he finds it very gross. The CHW and client made a plan to get the client new "non-smoking" sheets. Client reported he is excited for this- can't remember the last time he got new sheets; ➢ Client said she has wanted to get a recliner chair for a long time and asked if I would take her. We planned for Monday. I'm going to help her budget. This is her reward for not smoking; ➢ CHW noted next week she will bring her a 'chip' (medal for not smoking) and if she can continue to stay abstinent from smoking for a month they can go out for a reward.
Promotion of Health & Wellbeing				
	Assisting with general health care issues	76	32	➢ Brought client to urgent care; ➢ Talked to client about care plan after hospital discharge for thyroid/broken arm; ➢ Took client to nutritionist after being diagnosed with diabetes to learn proper eating habits; ➢ Helped client charge hearing aids; ➢ Talked to client about importance of hygiene and showering.

Assisting with nutrition goals	35	15	➢ Helped client prepare a healthy meal; ➢ Went shopping with client to choose healthy food; ➢ We practiced reading the nutrition facts on a bottle of jelly. I offered to take him to the store to practice reading the packages there.
Assisting with weight-related goals	27	11	➢ Downloaded app "Lose It" and explained to client how to track calories. We discussed her goals of losing weight and how she is very frustrated. This could potentially act as a threat to relapse (cigarettes smoking) because it is stressing her out and she has gained some weight since quitting. She said that she currently uses WW but is not closely abiding by their point system.
Facilitation/ modeling of walking and other modes of exercise	147	62	➢ Client noted he smokes more when bored so we went for a walk; ➢ We created an exercise plan for her to try this week based on different workouts I have brought to her to try out; ➢ We went to a dance class together; ➢ Took client to the gym at Lindemann and Planet Fitness to try out both; ➢ We walked over to a smoking cessation group at the Gill Wellness Center; ➢ Went for a walk; ➢ I encouraged to join me for a walk around the block and he agreed.
Medical Needs			
Communication of mental health needs with physician offices, group home staff, home health aides and visiting nurses, etc.	65	27	➢ Client expressed suicidal ideation, client was referred to program manager, it was determined that BEST team [Emergency psychiatric service provider] didn't need to be involved; ➢ Client reported wanting to hurt her neighbors, CHW offered client to speak to BEST team, client refused. CHW followed up with caseworker; ➢ Client complained that they were depressed, "I keep hearing voices", CHW emailed rehab specialist to fill him in on changes. Rehab specialist responded that it sounded like he had stopped taking meds and said he would schedule a psych appt for client; ➢ We reviewed client's common cycle of not smoking when depressed and smoking when manic. We talked about going on a cessation medication now, when he is quit, in case that mania makes him want to smoke again.
Making and confirming medical appointments	60	25	➢ Made a PCP appointment for him to get a physical; ➢ Made appointment for dentist (teeth taken out for dentures) and PCP appointment for annual physical; ➢ Called nutritionist and made an appointment for the client.

Communicating with others (physician offices, group home staff, home health aides and visiting nurses, etc.) about medical health needs	42	18	➢ After taking client to PCP (topics discussed include: hypertension, new BP medication, varenicline prescription, diabetic shoes, tests for kidney functioning and drug screen), CHW went back to group home staff and reviewed visit; ➢ Prior to this meeting I spoke with his nurse and we checked in on his diagnosis and care plan. In the meeting with the client we talked about this assessment and his upcoming biopsy; ➢ I met with the client and his psychiatric rehabilitation team nurse to check in on his incision (from lung surgery) and talk about his recovery; ➢ When the CHW arrived at the visit with the client she noticed a large cut on the client's left forearm that was bleeding heavily. The client reported he had fallen by the bathroom earlier that morning but had not told anyone. The CHW got a nurse who bandaged the cut.
Facilitating access to medication (not smoking cessation medication)	36	15	➢ Brought client to physician appointment and then to pharmacy; ➢ Took client to Walgreens to pick up his prescriptions and snacks; ➢ He received a letter from his insurance saying that one of his medications for diabetes would no longer be offered and he had 30 days to get a new one prescribed. I told him if he wanted to call now and set up an appointment, I would help him and could go with him. I spoke to the site manager of his group home who gave me the documents they received by mail about his insurance. I showed these to the client and we used my phone (on speakerphone) to call to determine his insurance status. We called his PCP and made an appointment with the intention of getting a referral for a new endocrinologist.
Assisting with administrative tasks for health	41	17	➢ Called his insurance company to have them send a list of PCPs that accept his insurance; ➢ Contacted outreach worker to help client get re-enrolled with MassHealth; ➢ CHW contacted ACO and determined that client could see two therapists if they chose to do so.
Transportation to medical appointments	39	16	➢ Accompanied client to orthopedic appt; ➢ Drove client to dermatology appointment for follow-up after skin cancer; ➢ Took participant to her diabetes doctor and sat in on the appointment; ➢ I brought client in for his lung surgery.
➢ **Basic Needs for Daily Living | Addressing Health Related Social Needs**			

Using smoking cessation techniques to address other substance use	15	6	➢ Client is quit and decided to now focus on getting him to quit smoking marijuana using same tools as for smoking cigarettes; ➢ Client is still quit, we talked about other things to do with his free time and ways to stay away from alcohol and other drugs; ➢ Client and CHW discussed how client had remained abstinent from alcohol since their last meeting and how this process could be compared to quitting smoking.
Assisting with securing basic needs (housing, food, electricity)	19	8	➢ Facilitated conversations about bedbugs in shelter and getting client an appointment with the Housing Specialist; ➢ Drove client to food bank; ➢ Contacted rehab specialist about electrical problem in apartment; ➢ Set up client with Elder Services.
General transportation	32	13	➢ Dropped client off at corner store; ➢ Picked client up from the Lowell Vinfen office and drove her home; ➢ Brought client on errands.
Assisting with employment activities	15	6	➢ Went with client to several businesses so they could fill out job applications; ➢ Discussed interviewing techniques and provided advice about job interviews.
Assisting with communication	19	8	➢ Client had a PCP appointment because they were not able to breathe well. CHW provided support at the appointment and helped communicate to Nurse Practitioner of the client's health and smoking.
Community activities	22	9	➢ Brought client to library to get library card; ➢ Accompanied client to his flag football game.
Assisting with financial tasks	11	5	➢ Tried to budget client's money and discussed only buying one carton of cigarettes instead of two; ➢ Helped client create a budget so they can buy reward with money saved from quitting smoking.
Promoting education or self-improvement	20	8	➢ CHW gave client a packet of resources about free courses and groups available in Boston that he could participate in. CHW also gave client new recipes to try as the client enjoys cooking. Client reported that this made him feel more positive and he thinks he will enjoy doing many of the things on the list; ➢ Bought client a calendar and wrote down all of her appointments and on it so she could keep track; ➢ Client told me about his Biology class that he just started taking which can be stressful but he enjoys it. He also told me about a new art tutor that he got and was excited about because he considers himself to be a visual artist. I also provided him with the number of a Vinfen Employment specialist because he has been interested in finding a job.

Data include counts from quantitative data collection form regarding focus of CHW visit. Examples provided in this table from CHW visit notes demonstrate the breadth of CHW activities as CHWs sought to improve participant health. CHWs worked to establish connections with all participants through befriending. For those not interested in discussing their smoking, CHWs looked for opportunities to identify and work on other health goals (i.e., healthy eating) and then sought to enhance motivation to discuss the potential of smoking reduction/cessation in the context of supporting other health goals (e.g., more money for healthy food). CHWs were tasked with developing an understanding of the individual and environmental factors maintaining each participant's smoking behavior. For those participants expressing interest in reducing/quiting smoking, CHWs encouraged participants to set small, achievable and measurable goals, such as a 24-hour quit, as a way of increasing self-efficacy to support cessation goals of increasing difficulty. CHWs provided education and health literacy training to participants with the goal of equipping participants with the knowledge and skills to advocate for prescriptions for evidence-based smoking cessation medication from their nurse/physician care providers and thereby increasing use of evidence-based TUD medication. CHWs provided encouragement/praise to support smoking reduction and abstinence goals and worked to increase the salience of realized benefits of smoking abstinence through discussions with participants. CHWs, provided transportation support to enable attendance at smoking cessation group counseling sessions as well as primary care appointments and often attended smoking cessation groups with participants. CHWs assisted participants and primary care and affiliated psychiatrists with communication, with prior authorization language or requests for free medication for those without insurance coverage, with transportation to the pharmacy, and coordination with residential staff where applicable to ensure consistent medication administration in residential settings. CHWs became familiar with participants' environment through meeting with them in their homes and this way helped participants to implement individually tailored ways to remember to take daily medication and identify existing routines to pair with medication-taking. When participants were hospitalized, CHWs communicated with hospital staff to provide information about the participant's smoking cessation goals and advocated for continued use of cessation medications in that setting. Additionally, CHWs provided behavioral smoking cessation support to optimize benefit from medication. This was done by becoming familiar with the participant's environment to help them identify ways to cope with craving and avoid smoking triggers, tailored to their environment and identifying alternative enjoyable behaviors to smoking.

eTable 3. Implementation of Provider Education Intervention

Type of Presentation	# Clinics receiving Round 1 PE	# Clinics receiving Round 2/3 PE	# Sessions of Round 1 PE Conducted	# Sessions of Round 2 or 3 PE Conducted
Small group session (≤ 3 PCPs attended)	5	34	5	72
Large group session (> 3 PCPs attended)	45	21	28 (often with staff attending from multiple clinics)	24
Total clinics receiving PE	50[a]	44[b]	---	---

[a] 3 clinics that declined in-person PE were provided with written materials are not included in this sum
[b] 2 clinics that declined in person PE were provided with written materials are not included in this sum; several clinics received a large presentation followed by multiple small presentations, thus the total number of clinics does not equal 55.

Fifty-three clinics randomized to PE were treating enrolled participants in Year 1; 50 of these clinics (94.3%) received at least one educational outreach visit to their clinical staff, comprised of 45 meetings with >3 PCPs and 5 meetings with ≤ 3 PCPs. Three clinics declined in person PE and were provided with written AD materials. Forty-four clinics (75.5%) received second or third educational outreach visits, including 24 meetings with >3 PCPs and 72 meetings with ≤3 PCPs. An average of 11 attempts to arrange or schedule educational outreach visits were needed per clinic to schedule the initial PE session and 18.6 attempts were made per clinic to schedule subsequent PE sessions.

eTable 4. Adverse Events by Study Arm

AE	PE + CHW (n=335)	PE only (n=342)	TAU (n=333)
Deceased	16 (4.8%)	18 (5.3%)	14 (4.2%)
Incarcerated	8 (2.4%)	7 (2%)	13 (3.9%)
Medical hospitalization	59 (17.6%)	47 (13.7%)	43 (12.9%)
Psychiatric hospitalization	82 (24.5%)	75 (21.9%)	66 (19.8%)

eTable 5. Observed Abstinence Rates at the Year 2 Assessment

Intervention		7-day PPA rates	
	N	%	n
Usual care	201	6%	12
PE	206	7%	14
PE + CHW	203	15%	30

eTable 6. Effect of interventions on Observed Year 2 Abstinence [a]

Comparison	Odds ratio	95% CI		Absolute effect size	P value
PE + CHW vs usual care	2.73	1.23	6.07	9%	0.014
PE + CHW vs PE	2.42	1.24	4.75	8%	0.010
PE vs usual care	1.13	0.46	2.73	1%	0.794

[a] Effect of PE + CHW and PE on biochemically-verified abstinence rates in the second year of the two-year intervention was estimated via a logistic regression model with a random intercept for clinic to account for clustering. Missing data for enrolled participants with baseline and year-1 but not year-2 data were excluded.

eTable 7. Year 2 Abstinence Rates by Intervention with Participants with Missing Data at Year 2 Considered Not Abstinent

Intervention	N		7-day PPA rates	
	Observed	Imputed	%	n
Usual care	201	132	4%	12
PE	206	135	4%	14
PE + CHW	203	133	9%	30

eTable 8. Effect of interventions on Year 2 Abstinence with Participants with Missing Data at Year 2 Considered Not Abstinent [a]

Comparison	Odds ratio	95% CI		Absolute effect size	P value
PE + CHW vs usual care	2.75	1.21	5.46	5%	0.014
PE + CHW vs PE	2.31	1.20	4.45	5%	0.012
PE vs usual care	1.11	0.48	2.60	0%	0.807

[a] Effect of PE + CHW and PE on biochemically-verified abstinence rates in the second year of the two-year intervention was estimated via a logistic regression model with a random intercept for clinic to account for clustering. Missing data for enrolled participants with only baseline or baseline and year-1 but not year-2 data were assumed to be non-abstinent.

Supplemental Materials: Approach for Path Analyses

In this section, we provide a more in-depth review of the path analysis approach we used, paraphrasing Tingley et al. (2014) and their implementation of mediation analysis in the *mediation* R package. Our sample consisted of 901 subjects with observed or imputed year 2 abstinence status data. There were three key variables of interest for the path analyses: 1) a subject's treatment status (whether he or she saw a CHW), 2) the potential mediator - whether a subject used cessation medication (yes or no), and 3) the study outcome - whether by year 2 of the intervention the subject had quit smoking (yes or no).

Let the variable T_i refer to whether the i^{th} subject received treatment; specifically, let $T_i = 1$ if the subject saw a community health worker (CHW) and let $T_i = 0$ otherwise. Let the variable $M_i(t)$ refer to the potential value of the mediator (use of cessation medication) under the treatment status $T_i = t$ for the i^{th} subject. Finally, let $Y_i(t, m)$ indicate the potential outcome that would result when treatment status $T_i = t$ and the mediator variable $M_i(t) = m$, respectively.

This notation allows us to represent both observed and counterfactual outcomes (the outcome that would result had subjects received a different treatment status than what they actually got). The *total unit treatment effect* can then be written as a difference between the observed and counterfactual outcomes:

$$\tau_i \equiv Y_i\big(1, M_i(1)\big) - Y_i\big(0, M_i(0)\big).$$

In other words, for the i^{th} subject, τ_i is the difference between the potential outcome if the subject had received treatment versus the potential outcome if the subject had not received treatment. The effect τ_i can be further decomposed into two components. First, the causal mediation effect is:

$$\delta_i(t) \equiv Y_i\big(t, M_i(1)\big) - Y_i\big(t, M_i(0)\big)$$

per each treatment status t.

Second, the direct effect of treatment is:

$$\zeta_i(t) \equiv Y_i\big(1, M_i(t)\big) - Y_i\big(0, M_i(t)\big)$$

per each treatment status t. These components sum up to the total effect:

$$\tau_i = \delta_i(t) + \zeta_i(1 - t).$$

The core quantity of interest is the *average causal mediation effect* (ACME), the population average of the causal mediation effect. As noted by Imai et al. (2010), for the i^{th} subject, when we observed $Y_i\big(T_i, M_i(T_i)\big)$, to compute the ACME we must then infer the counterfactual quantity $Y_i\big(T_i, M_i(1 - T_i)\big)$. Researchers can do do so by generating Monte Carlo draws simulated from the standard mixed effects models fitted to the observed data; this approach is implemented in the R package *mediation*.

Table 1: CONSORT 2010 checklist of information to include when reporting a cluster randomised trial

Section/Topic	Item No	Standard Checklist item	Extension for cluster designs	Page No *
Title and abstract				
	1a	Identification as a randomised trial in the title	Identification as a cluster randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)[i,ii]	See table 2	3
Introduction				
Background and objectives	2a	Scientific background and explanation of rationale	Rationale for using a cluster design	4-5
	2b	Specific objectives or hypotheses	Whether objectives pertain to the the cluster level, the individual participant level or both	5
Methods				
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	Definition of cluster and description of how the design features apply to the clusters	6-7
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons		N/a
Participants	4a	Eligibility criteria for participants	Eligibility criteria for clusters	6
	4b	Settings and locations where the data were collected		7
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	Whether interventions pertain to the cluster level, the individual participant level or both	7-8
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	Whether outcome measures pertain to the cluster level, the individual participant level or both	8-9
	6b	Any changes to trial outcomes after the trial commenced, with reasons		N/a
Sample size	7a	How sample size was determined	Method of calculation, number of clusters(s) (and whether equal or unequal cluster sizes are assumed), cluster size, a coefficient of intracluster correlation (ICC or *k*), and an indication of its uncertainty	Detailed protocol (supplemental materials)
	7b	When applicable, explanation of any interim analyses and stopping guidelines		N/A
Randomisation:				
Sequence generation	8a	Method used to generate the random allocation sequence		6

	8b	Type of randomisation; details of any restriction (such as blocking and block size)	Details of stratification or matching if used	6
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	Specification that allocation was based on clusters rather than individuals and whether allocation concealment (if any) was at the cluster level, the individual participant level or both	6
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	Replace by 10a, 10b and 10c	
	10a		Who generated the random allocation sequence, who enrolled clusters, and who assigned clusters to interventions	6
	10b		Mechanism by which individual participants were included in clusters for the purposes of the trial (such as complete enumeration, random sampling)	6
	10c		From whom consent was sought (representatives of the cluster, or individual cluster members, or both), and whether consent was sought before or after randomisation	6-7
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how		8
	11b	If relevant, description of the similarity of interventions		7-8
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	How clustering was taken into account	8-9
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses		9
Results				
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	For each group, the numbers of clusters that were randomly assigned, received intended treatment, and were analysed for the primary outcome	10-11, Figure 1
	13b	For each group, losses and exclusions after randomisation, together with reasons	For each group, losses and exclusions for both clusters and individual cluster members	10, Figure 1
Recruitment	14a	Dates defining the periods of recruitment and follow-up		7
	14b	Why the trial ended or was stopped		7
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	Baseline characteristics for the individual and cluster levels as applicable for each group	Table 1 (pg. 21)

Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	For each group, number of clusters included in each analysis	Table 2 (pg. 22)
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	Results at the individual or cluster level as applicable and a coefficient of intracluster correlation (ICC or k) for each primary outcome	10-11, Table 2 (pg. 22)
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended		10-11, Table 2 (pg. 22)
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory		11-12
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms[iii])		10, eTable 4
Discussion				
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses		14-15
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	Generalisability to clusters and/or individual participants (as relevant)	15
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence		13-15
Other information				
Registration	23	Registration number and name of trial registry		4
Protocol	24	Where the full trial protocol can be accessed, if available		4, Supplemental Materials
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders		4, 11

** Note: page numbers optional depending on journal requirements*

Table 2: Extension of CONSORT for abstracts[i,ii] to reports of cluster randomised trials

Item	Standard Checklist item	Extension for cluster trials
Title	Identification of study as randomised	**Identification of study as cluster randomised**
Trial design	Description of the trial design (e.g. parallel, cluster, non-inferiority)	
Methods		
Participants	Eligibility criteria for participants and the settings where the data were collected	**Eligibility criteria for clusters**
Interventions	Interventions intended for each group	
Objective	Specific objective or hypothesis	**Whether objective or hypothesis pertains to the cluster level, the individual participant level or both**
Outcome	Clearly defined primary outcome for this report	**Whether the primary outcome pertains to the cluster level, the individual participant level or both**
Randomization	How participants were allocated to interventions	**How clusters were allocated to interventions**
Blinding (masking)	Whether or not participants, care givers, and those assessing the outcomes were blinded to group assignment	
Results		
Numbers randomized	Number of participants randomized to each group	**Number of clusters randomized to each group**
Recruitment	Trial status[1]	
Numbers analysed	Number of participants analysed in each group	**Number of clusters analysed in each group**
Outcome	For the primary outcome, a result for each group and the estimated effect size and its precision	**Results at the cluster or individual participant level as applicable for each primary outcome**
Harms	Important adverse events or side effects	
Conclusions	General interpretation of the results	
Trial registration	Registration number and name of trial register	
Funding	Source of funding	

[1] Relevant to Conference Abstracts

REFERENCES

[i] Hopewell S, Clarke M, Moher D, Wager E, Middleton P, Altman DG, et al. CONSORT for reporting randomised trials in journal and conference abstracts. *Lancet* 2008, 371:281-283

[ii] Hopewell S, Clarke M, Moher D, Wager E, Middleton P, Altman DG at al (2008) CONSORT for reporting randomized controlled trials in journal and conference abstracts: explanation and elaboration. *PLoS Med* 5(1): e20

[iii] Ioannidis JP, Evans SJ, Gotzsche PC, O'Neill RT, Altman DG, Schulz K, Moher D. Better reporting of harms in randomized trials: an extension of the CONSORT statement. *Ann Intern Med* 2004; 141(10):781-788.