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## Is Implementation of the 5 A's of Smoking Cessation at Community Mental Health Centers Effective for Reduction of Smoking by Patients with Serious Mental Illness?

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### Abstract

We tested whether implementing the “5 A’s” (Ask, Advise, Assess, Assist, Arrange) at six mental health centers reduces smoking among persons with serious mental illness. One hundred and fifty six patients were evaluated just before initiating the 5 A’s and after six and 12 months. A delayed control condition evaluated 148 patients six months before 5 A’s implementation, just before and then after six months. Six months of the 5 A’s produced no effect. Modest cessation and reduction benefits were noted after 12 months. Implementing the 5 A’s at community mental health centers may have modest benefit after twelve months.

### INTRODUCTION

Smoking is the leading cause of preventable death in the United States and contributes to increased rates of diseases such as lung cancer and heart disease.<sup>1,2</sup> Over 70% of people with schizophrenia, bipolar disorder and other serious mental illnesses (SMI) smoke cigarettes, a rate that well exceeds the general population.<sup>3–5</sup> Studies of smoking cessation in SMI have largely tested the use of nicotine replacement, bupropion and psychosocial programs adapted from those developed for the general population.<sup>6–8</sup> These interventions produce some evidence of smoking reduction, but marginal rates of short-term abstinence and even lower rates of long-term abstinence.<sup>9</sup> Evidence suggests that mental health providers do not typically address smoking cessation for a variety of reasons related to beliefs, knowledge and lack of time and resources<sup>10–12</sup> though integrated treatment for dual disorders is needed.<sup>13,14</sup>

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In the mid-1990s the Agency for Health Care Policy and Research (AHCPR, now Agency for Healthcare Research & Quality, AHRQ) developed evidenced-based physician practice guidelines applicable to all smokers.<sup>15</sup> These have evolved into the current Public Health Service Clinical Practice Guideline, *Treating Tobacco Use and Dependence*.<sup>16</sup> The guideline recommends use of the 5 A's (Ask, Advise, Assess, Assist, and Arrange) in clinical practice and summarizes strong evidence that implementation of these practices increases rates of quit attempts and increased smoking cessation across multiple populations.<sup>15,16</sup> The updated current guideline also recommends that patients who are unwilling to quit at this time should be treated with the "5 R's" motivational intervention (Relevance, Risks, Rewards, Roadblocks, and Repetition). Most tests of the 5 A's have been done in primary care.

We conducted a study of the "5 A's" of smoking cessation at six community mental health centers in the Baltimore region. We tested whether we could institute these guidelines in a psychiatric setting and whether their implementation reduces smoking among persons with SMI.

## METHODS

### Settings and Design

The 5 A's were implemented at the clinic level. We first identified three pairs of outpatient mental health clinics that had at least 100 patients with schizophrenia in the greater Baltimore area, were willing to participate in the study, and were roughly matched on size, urbanicity, and percentage of patients that were African-American. Two clinics were in highly urban areas, with more than 75% of patients being African-American, and two were in the more rural region of Baltimore County and had about 25% African-American patients. The remaining two clinics were in suburban areas, where African Americans represented approximately half of the patient population. The Institutional Review Boards of the School of Medicine at the University of Maryland and of each participating facility approved the study. All research participants provided written informed consent after receiving a full description of the study. The study was conducted between March 2003 and February 2005.

Implementation involved a commitment to clinic-wide delivery of the 5 A's for all adult patients, though only a subset of patients received research evaluations of smoking status. Within each clinic pair, one clinic was randomly assigned to the "immediate" implementation condition and the other to the "delayed" implementation condition. The "immediate" sites implemented the 5 A's for 12 months whereas the "delayed" site of each pair implemented the 5 A's for six months after a six month delay control period.

### Intervention Description

**Overview**—The intervention goal was to ensure that each physician utilized the 5 A's *at each patient* visit as follows: 1. *Ask* patients if they smoke. 2. *Advise* those who smoke to quit immediately. 3. *Assess* willingness to quit by asking patients if they are willing to attempt cessation on a 10-point readiness ruler, particularly regarding setting a quit date within the next 30 days. 4. *Assist* patients who are willing to quit (greater than or equal to 5 on the ruler) to make optimal quitting plans and moving from willingness to action including

pharmacotherapy whenever appropriate. Those who reply negatively (below 5) receive assistance designed to nurture development of a motivation to quit. 5. *Arrange* for follow up: This ranges from making appointments for group treatment to indicating that the topic will be discussed at the next regular session.

We engaged in several activities to promote the 5 A's. Implementation components included pre-training clinic-wide publicity, psychiatrist training, provision of handouts and visual implementation aides, provision of smoking cessation aids for staff and trinkets to give to patients as part of the "Assist" step, access to ongoing help from an in-person physician clinic liaison, and web-based mid-term booster training. Each clinic also altered their psychiatrist chart notes form to include a standardized set of check boxes to document 5 A's implementation.

**Fidelity and Dose**—We reviewed 20 randomly selected charts from each clinic every two months, measuring intervention exposure for each patient according to the psychiatrists' visit encounter forms. Charts were drawn from *all* clinic patients (not only research participants), as all were intended to receive the 5 A's. Additionally, we reviewed the psychiatrist encounters in the charts of all research participants. Finally, participant assessments included items asking whether any health care professional had asked about smoking, advised them to quit, assessed their smoking status, or offered information about cessation interventions during their last visit.

**Participants**—Study inclusion criteria were: (1) chart DSM-IV diagnosis of 295 (schizophrenia spectrum disorder) or affective psychoses (296.1, 296.4–296.8) or other psychoses (297–297.3, 297.8–9, 298–298.4, 298.8–9); (2) age 18–64; (3) smoked at least one cigarette in the past month; (4) English-speaking; (5) had at least two appointments with his/her psychiatrist in the past six months, and; (6) able to provide informed consent. We recruited 156 and 148 participants in the immediate and delayed implementation conditions, respectively. We retained 84% of the original sample at the six-month follow up and 77% at 12 months (six months: 127 immediate and 128 delayed; 12 months: 119 immediate and 115 delayed).

In order to recruit our sample, psychiatrists and clinic staff reviewed patient rosters to identify participants who were thought to meet inclusion criteria. Research assistants then approached eligible participants for informed consent. Of note, study participation required only a willingness to discuss smoking. Of the 400 individuals who were approached for participation, 96 declined to participate, reflecting a refusal rate of 24%. Patients who refused to participate did not differ from those who agreed to participate on race or gender.

Participants from the immediate implementation sites were evaluated prior to the initiation of the 5 A's (baseline) and then after six and 12 months of potential exposure to the 5 A's. Participants from the delayed condition sites were evaluated six months prior to the implementation of the 5 A's (pre), just before the 5 A's implementation (baseline) and then after six months of the 5 A's.

## Assessments/Measures

Each participant completed an in-person 1.5-hour initial assessment. Hour-long follow-up assessments were done six months later and 12 months later. Measures used for this study are summarized below.<sup>17</sup>

The primary outcome measures included self-reported total number of cigarettes smoked per week, and self-reported smoking of any cigarettes in the past seven days using questions derived from the National Health and Nutrition Examination Survey III (NHANES)<sup>18</sup> and the Fagerstrom Test of Nicotine Dependence.<sup>19</sup> We also measured expired Carbon Monoxide (CO) using an EC50 Micro III Smokerlyzer Breath Carbon Monoxide Monitor.<sup>20,21</sup> Expired CO reflects smoking within the six to nine hours prior to the test. We categorized individuals as being recently abstinent if their CO ppm < 10.

Another study outcome measure included provision of smoking cessation treatments and services by the psychiatrist. Participants were asked at each assessment whether their psychiatrists delivered the 5 A's at their last visit, and what, if any, treatments were recommended.

Psychiatric diagnoses were obtained by chart review, with diagnoses dichotomized into categories of schizophrenia or schizoaffective disorder versus affective and other psychoses. Prescribed psychiatric medications during the study period were also obtained from medical chart review and verified by members of the study team. Each participant's drug regimen over the twelve months of the study was assessed for antipsychotic polypharmacy (yes/no) and antipsychotic drug switching (*yes/no*).

The four-item CAGE Questionnaire, a tool for identifying alcohol abuse, was used to assess both alcohol and substance use. The maximum total score of four reflects a greater problem with alcohol, and a parallel set of questions was adapted to assess drug use.<sup>22-24</sup>

Psychiatric symptoms were assessed using the Brief Psychiatric Rating Scale (BPRS), a well-established 18-item clinician-rated scale. BPRS items are rated on a seven-point scale of severity ranging from symptom *not present* to *extremely severe*. We used the total score to measure severity of psychopathology.<sup>25</sup>

We used Cohen's Perceived Stress Scale, which is a widely used psychological instrument for measuring the perception of stress. Items tap how unpredictable, uncontrollable, and overloaded respondents find their lives. Higher scores represent higher perceived stress and have been associated with failure to quit smoking. We used the four-item abbreviated version that has been shown to have adequate reliability and validity.<sup>26,27</sup>

## Statistical Analysis

Analyses were conducted in an intent-to-treat framework, with all data being included. In order to test for the interaction of time (baseline, six months) and study condition (immediate vs. delayed implementation) on the outcome variables (smoking and psychiatrist recommendations for smoking cessation), we used mixed effects models to fit three-level hierarchical linear models for continuous responses (SAS Proc Mixed) and three-level

hierarchical logistic models for dichotomous responses SAS Proc Glimmix).<sup>28</sup> These were used to account for correlation due to assessments over time nested within individuals and individuals nested within sites. However, site entered as a random effect was not significant in these models and standard errors for contrasts of interest did not significantly change when site was removed.<sup>29</sup> Hence, the site random effect was removed for simplification and for all subsequent longitudinal analyses only two-level hierarchical models were used. For dichotomous response we also switched to generalized estimating equations (GEE), which is a more commonly used two-level model for binary response.<sup>29</sup>

Race and race\*time were included as covariates in all analyses since African Americans smoked fewer cigarettes at baseline than Caucasians. Other covariates that were included in the analyses initially were age, sex, diagnosis, total BPRS, number of comorbidities, alcohol abuse screening, drug abuse screening, and antipsychotic medication status (clozapine or olanzapine vs. all other antipsychotics, polypharmacy, and switching). Variables not significantly related to any outcome were not included in final models.

Since our design did not allow for a 12 month control condition, in order to assess the main effect of time over 12 months, we combined the data from the immediate and delayed conditions such that at each time point, all individuals who had received the intervention were evaluated for the same amount of time. The same statistical models as above were used for these single group analyses, however, for these analyses there were four time points [pre–six months prior to the intervention, baseline–immediately prior to the intervention, six months post-intervention, 12 months post-intervention. A contrast statement was used to compare the combined pre/baseline condition to the six-month post-intervention time point and to the 12 month post-intervention time point. Race and race\* time were also included as covariates for all outcome variables in these analyses.

## RESULTS

### Description of Sample

Table 1 shows the demographic and clinical characteristics of the study sample. None of the variables including age, gender, total BPRS, number of comorbidities, alcohol abuse screening, drug abuse screening, or medication status were significantly related to any smoking variable or its change over time. Diagnosis and race were related to the overall number of cigarettes smoked per week; participants diagnosed with schizophrenia smoked significantly less than those with a diagnosis of affective or other psychosis and African American participants smoked less than White participants. African American participants were more likely to report all types of smoking cessation assistance at their last psychiatrist visit. A total of 29% (N = 88) of patients were prescribed a conventional antipsychotic medication at baseline. The most commonly prescribed second generation agents were olanzapine (N = 83 (27%)), oral risperidone (N = 77 (25%)), quetiapine (N = 56 (18%)), aripiprazole (N = 33 (11%)), clozapine (N = 19 (6%)), and ziprasidone (N = 14 (5%)). Thirty-three patients (N = 11%) were not prescribed an antipsychotic medication.

### Analysis of Delayed vs. Immediate Exposure to the Intervention at Six Months

We found no evidence of a significant effect of the intervention from baseline to six months in the immediate sites versus the delayed sites (Table 2).

### Analysis of Pre/Baseline versus Six and Twelve Months of Treatment

**Smoking Variables**—Table 3 shows the change in smoking behaviors over the four time periods (pre, baseline, six months of intervention, 12 months of intervention). The number of people who reported smoking in the past seven days significantly decreased at 12 months compared to the pre/baseline values. The number of cigarettes typically smoked in a week significantly decreased at six months and at 12 months. The rate of recent abstinence as measured by CO ppm < 10 was unchanged.

**Smoking Cessation Assistance**—Based on participant self-report, psychiatrists were significantly more likely to offer smoking cessation assistance after six and 12 months of exposure to the 5 A's (see Table 3) compared to the pre-baseline time point.

**5 A's Implementation Fidelity and Dose**—Because the number of intervention visits documented in the chart was positively skewed, fidelity is summarized as no visits with appropriate documentation during the study period, one visit during the study period, or two or more visits during the study period (Table 4). Notably, after six months of the intervention, almost 69% and 41% of participants received one or more sessions that included 3 A's and 5 A's, respectively. The overall percentage remained comparable after 12 months. None of the smoking variables were statistically associated with increased intervention fidelity.

## DISCUSSION

Our study finds no support for the effectiveness of *six months* of the 5A's intervention on smoking-related outcomes for individuals with SMI when delivered at community mental health centers. Six months may have been too short a time to observe an impact of this very low-intensity intervention.

However, there is modest support for the hypothesis that implementing the 5 A's at community mental health centers can promote abstinence and smoking reduction when delivered for at least 12 months. We did observe increased abstinence and reduced numbers of cigarettes smoked across time. Previous research has consistently demonstrated elevated rates of smoking among persons with SMI, phenomena that have been notoriously resistant to secular changes in smoking in the general population. Thus, there is no evidence that the passage of time caused the changes in smoking observed in our study. Change is most probably due to increased monitoring from exposure to the intervention and slow progress through the process of smoking cessation in cohorts of smokers with minimal assistance. Since study participants were not selected for motivation to reduce smoking, abstinence rates observed are *not* comparable to intensive smoking cessation programs which enroll individuals with some interest in quitting.

Examination of fidelity suggests that psychiatrists can successfully deliver a primary care smoking cessation intervention. As often happens in the implementation of these guidelines, 3 A's rather than the 5 A's were generally implemented. AHRQ presents meta-analyses that provide estimates of delivery of different components of the 5 A's in general medical care. These data suggest that the 5% abstinence rate observed in our study with the 3 A's is comparable to the results of screening procedures or delivery of 1 A or "ask" implemented in general health care.<sup>30</sup> The percentage of individuals who became abstinent when a screening system (1 A) was put in place was 6.4 (1.3–11.6). On the other hand, when physician advice was implemented in general health care, consistent with the 3 A's, the percentage of individuals achieving abstinence was 10.2 (8.5–12.0).<sup>31</sup> A way to understand this difference is that in the presence of severe mental illness and the considerable barriers to abstinence, interventions that are stronger and more intensive are needed, but incremental change is possible.

There is some inconsistent evidence that second-generation antipsychotics, including clozapine, are more likely to be associated with abstinence from smoking. In a study by McEvoy et al. patients who switched to clozapine treatment at therapeutically effective plasma levels were found to decrease smoking significantly.<sup>32</sup> A small study by George et al. found that second-generation antipsychotics, in combination with the nicotine transdermal patch, significantly enhanced rates of smoking cessation (55.6% in the second-generation group versus 22.2% in the first-generation group).<sup>33</sup> While we did not find this outcome, our study was not designed to test the medication-smoking hypothesis.

Several of the study's limitations have already been presented including the relatively short six-months time period for the 5 A's versus control comparison. In addition, it is possible that the immediate and delayed intervention sites varied in ways that were not detected in our analysis, introducing bias. These weaknesses are balanced by the study's overall size, implementation in standard community mental health centers, the importance of the clinical problem of smoking, and the relative simplicity and low cost of implementation of the 5 A's.

This study's modest impact is both the good news and the bad news. It is good news because implementing at least the first three of the 5 A's takes moments in a session and may in fact produce benefits with regard to abstinence. The bad news is that the challenges of eliminating smoking in this population remain formidable, and more effective, intensive strategies need to be developed and tested.

One of the positive results of this study is that we were able to demonstrate that community mental health clinic psychiatrists can dramatically increase attention to smoking cessation in the context of ongoing patient visits. Both chart and patient report indicated that these doctors were able to offer at least three of the A's to a majority of these patients. At a population level this is an important finding. The outcomes of the 1 A and the 3As' are modest in terms of cohorts but have implications for the dramatic decrease in population smoking over the years. If all psychiatric facilities were to address smoking even with the 3 A's over a long period of time, we may be able to see rates of utilization of more intensive treatments and of cessation increase among the SMI population of smokers.

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**TABLE 1**

Demographic and clinical characteristics of sample (N = 304)

<b>Demographics</b>	<b>n (%)</b>	<b>Mean (SD)</b>
Gender		
Female	145 (47.7)	
Male	159 (52.3)	
Race		
White	153 (50.3)	
African-American	137 (45.1)	
Other	14 (4.6)	
Marital status		
Ever married	128 (42.1)	
Never married	176 (57.9)	
Education		
<High school	97 (32.0)	
High school/GED	112 (37.0)	
Some college	94 (31.0)	
Age		44.28 (9.0)
Clinical Characteristics		
Diagnosis		
Schizophrenia	230 (75.7)	
Affective and other psychoses	74 (24.3)	
Brief psychiatric rating scale total score *		32.17 (8.1)
Cohen's perceived stress scale †		9.55 (3.4)
CAGE drug abuse screener ‡		2.02 (1.4)
CAGE alcohol abuse screener		1.22 (1.2)
Smoking		
Age started smoking		15.5 (5.7)

\* Range of possible scores 18–126

† Range of possible scores 0–16

‡ Range of possible scores 1–4

**TABLE 2**

Smoking behavior by immediate versus delayed condition from baseline to six months

		<b>Baseline</b>	<b>Six months</b>	<b>Time by condition interaction</b>
Have you smoked in past seven days (% Yes)	Immediate	98.7% (154/156)	96.1% (122/127)	$X^2_{(1)} = .11$ $p = .73$
	Delayed	99.3% (147/148)	98.4% (126/128)	
How many cigarettes smoked in a typical week? Mean (SD)	Immediate	131.6 (85.6) n = 155	129.7 (83.3) N = 127	$F_{(1,257)} = 0.82$ $p = .36$
	Delayed	137.7 (81.7) n = 148	129.3 (85.5) N = 128	
Recent abstinence from smoking: carbon monoxide (ppm < 10,% Yes)	Immediate	19.23% (30/156)	18.25% (23/126)	$X^2_{(1)} = 2.23$ $p = .14$
	Delayed	19.59% (29/148)	23.62% (30/127)	

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**TABLE 3**

Smoking behavior and psychiatrists' recommendation of smoking aids at each time point

	Six months before 5 A's	Baseline	After six months of 5 A's	Pre/baseline vs. six months statistic (df*) p value	After 12 months of 5 A's	Pre/baseline vs. 12 months statistic (df*) p value
Smoked in past seven day (% Yes)	99.32% (147/148)	98.59% (280/284)	95.87% (232/242)	X <sup>2</sup> (1) = 3.13 p = .076	94.07% (111/118)	X <sup>2</sup> (1) = 5.32 p = .021
How many cigarettes smoked in a typical week Mean (SD)	137.71 (81.70) (N = 148)	130.55 (85.37) (N = 283)	126.65 (84.66) (N = 242)	F (1,504) = 4.35 p = .04	125.02 (91.95) (N = 118)	F (1,543) = 3.98 p = .047
Recent abstinence from smoking: carbon monoxide (ppm < 10, % Yes)	19.59% (29/148)	21.20% (60/283)	18.67% (45/241)	X <sup>2</sup> (1) = 0.00 p = .97	23.73% (28/118)	X <sup>2</sup> (1) = 2.34 p = .13
At last visit, psychiatrist recommended oral prescription medication for smoking cessation: (% Yes)	2.07% (3/145)	3.99% (11/276)	9.78% (22/225)	X <sup>2</sup> (1) = 10.73 p = .001	12.96% (14/108)	X <sup>2</sup> (1) = 10.03 p = .002
At last visit, psychiatrist recommended nicotine replacement products (% Yes)	4.14% (6/145)	7.61% (21/276)	15.56% (35/225)	X <sup>2</sup> (1) = 15.41 p < .001	24.3% (26/107)	X <sup>2</sup> (1) = 15.75 p < .001
At last visit, psychiatrist recommended group therapy (% Yes)	5.52% (8/145)	5.8% (16/276)	11.56% (26/225)	X <sup>2</sup> (1) = 6.48 p = .01	16.67% (18/108)	X <sup>2</sup> (1) = 8.71 p = .003

Six months before 5 A's (pre): Delayed intervention first interview (n = 148).

Baseline: Delayed intervention second interview (n = 128) and Immediate intervention 1st interview (n = 156).

After six months of 5 A's: Delayed intervention third interview (n = 115) and Immediate intervention second interview (n = 127).

After 12 months of 5 A's: Immediate intervention third interview (n = 119).

\* Kenward/Rogers degree of freedom approximation used for continuous variables.

**TABLE 4**

Percentage of participants receiving the 5 A's after six and twelve months

Number of sessions with intervention documented	Ask	Advise	Assess	3 A's	Assist/Arrange	5 A's
After six months of 5 A's (N = 296)						
Intervention not delivered	28.4%	29.7%	32.4%	33.1%	56.7%	58.9%
One session	20.0%	22.6%	25.7%	25.0%	23.0%	25.0%
Two or more sessions	51.6%	47.7%	41.9%	41.9%	20.3%	16.2%
After 12 months of 5 A's (N = 146)						
Intervention not delivered	22.6%	25.3%	27.4%	27.4%	57.5%	59.6%
One session	13.0%	15.8%	16.4%	16.4%	15.1%	14.4%
Two or more sessions	64.4%	58.9%	56.2%	56.2%	27.4%	26.0%