



Effectiveness of a media campaign promoting health care provider tobacco dependence treatment

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ABSTRACT

The New York State Department of Health (NYSDOH) developed a provider-focused media campaign to encourage provision of evidence-based, clinical tobacco dependence treatment (TDT). The purpose of this study was to assess providers' awareness of the campaign and the relationship between campaign awareness and changes in campaign-related beliefs and clinical TDT intervention. We conducted a longitudinal, mailed survey of health care providers in New York State ($n = 851$; AAPOR3 RR: 24.6%). We estimated descriptive statistics and used multivariable regression analyses to assess whether changes in key outcomes (campaign-related beliefs and clinical TDT) from pre- to post-campaign vary by self-reported campaign awareness. Approximately 12% of providers were aware of the campaign. In multivariable analyses, changes from pre- to post-campaign in provider beliefs that the nicotine patch and gum are very effective at helping patients quit were greater for providers aware of the campaign compared with those not aware of the campaign (For patch: OR 2.17, CI 1.06–4.45, $p = 0.03$; for gum: OR 2.78, CI: 1.24–6.27, $p = 0.01$), but not for provider behavior. After seeing the NYSDOH campaign, providers' beliefs about the effectiveness of the patch and gum increased. Many state tobacco control programs and health care organizations are implementing tobacco-related policies and systems to facilitate the provision of clinical TDT; this study suggests that a digital and print provider-focused media campaign has the potential to complement health systems change interventions. Future studies should seek to identify ways to modify ad delivery to increase campaign awareness to maximize potential campaign impact.

1. Introduction

Evidence-based tobacco dependence treatments (TDTs) include seven FDA-approved medications, including two stop-smoking medications (bupropion and varenicline) and nicotine replacement therapy (NRT) (i.e., the patch, gum, inhaler, nasal spray, and lozenge); brief counseling by a health care provider (HCP); and telephone quitlines (Agency for Healthcare Research and Quality, 2008; Centers for Disease Control and Prevention, 2014). Although evidence-based interventions are available and most smokers want to quit, only approximately half of smokers attempt to quit each year (Babb et al., 2017). In addition, among smokers making a quit attempt, only one-third use evidence-based assistance (Babb et al., 2017).

The New York State Department of Health (NYSDOH) uses a comprehensive approach to promote cessation and use of evidence-based assistance. Efforts to encourage providers to adhere to evidence-

based clinical guidelines include systems-level changes within health care organizations, such as implementing audit and feedback systems or clinical decision support tools (Johnson and May, 2015).

In a systematic review of self-reported smoking cessation counseling, Bartsch et al. 2016 found that on average 44% of physicians reported assisting their patients with a quit attempt, which suggests room for improvement. Health behavior theories suggest that behavior change is achieved by influencing the knowledge and beliefs that are related to a behavior (Ajzen and Fishbein, 1980; Bandura, 1985; M. M. Fishbein, 1967; M.M. Fishbein and Ajzen, 1975). Prior literature has consistently shown that anti-smoking ads aimed at reaching smokers, especially those using graphic and emotional themes, are effective at promoting quitting (Davis et al., 2013; Durkin et al., 2012; Farrelly et al., 2012; McAfee et al., 2013; National Cancer Institute, 2008; Nonnemaker et al., 2014), but there are few published studies regarding whether media campaigns focusing on HCPs could be effective at increasing provision of

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TDT. One study of a media campaign encouraging HCPs to treat smoking as an addiction with medicine and brief counseling found that the campaign reached 43% of providers through print and digital media channels, and campaign awareness was associated with higher levels of evidence-based treatment delivery (Juster et al., 2019).

In 2018, NYSDOH implemented and evaluated an HCP-focused media campaign. From January to May 2018, NYSDOH ran print and digital ads encouraging providers to offer tobacco dependence treatment (TDT) to their tobacco-using patients. The current study assessed providers' campaign awareness and associations between campaign exposure and campaign-related beliefs (i.e., beliefs about effectiveness of cessation interventions) and behaviors (i.e., provider assistance and recommending combination NRT). Specifically, we measured pre-post changes in campaign-related beliefs and behaviors and tested whether self-reported campaign awareness was associated with changes in these outcomes.

2. Methods

2.1. Intervention

NYSDOH ran a paid, digital, and print provider-focused media campaign from January 18, 2018 – May 20, 2018. The ads encouraged providers to treat their patients' nicotine addiction by assisting their patients with a quit attempt including promoting the use of combination NRT, defined here as the combination of a long-acting therapy (e.g., the nicotine patch) with a short-acting therapy (e.g., nicotine gum). According to the United States Public Health Service *Treating Tobacco Use*

and Dependence Clinical Practice Guideline (Agency for Healthcare Research and Quality, 2008) this type of therapy can more than triple a patient's chances of quitting versus placebo. NYSDOH identified primary care providers, including physicians, physician assistants, and nurse practitioners as the priority audience for the campaigns. The ads also included a link to a website, TalkToYourPatients.health.ny.gov, that included additional information for providers about clinical TDT and cessation resources.

NYSDOH placed paid media digitally (e.g., display banners on provider-related websites), on social media (e.g., LinkedIn, Facebook), in print (e.g., trade journals such as the *Journal of the American Medical Association* or *New England Journal of Medicine*), and via email marketing (e.g., AdFire). The total cost of the campaign was \$230,724, with the largest share of this budget going to print (approximately \$176,000). The campaign was geographically focused on New York physicians, physician assistants, and nurse practitioners.

The campaign included two versions of the print ads: a two-page ad (Fig. 1) and a one-page ad (featuring the left side of Fig. 1). The ad content was modified as needed for the formats of each media channel used.

2.2. Participants and procedures

We conducted a longitudinal, mailed survey of HCPs in New York State (NYS). We collected pre-campaign data from October 2017-January 2018 and post-campaign data from July 2018-September 2018 (2 months post-campaign). We obtained a list of NYS licensed physicians, physician assistants, and nurse practitioners from the

Combine nicotine patch and gum
to triple your patients' chances of quitting.

Treat your patients' nicotine addiction.
For other effective combinations, go to TalkToYourPatients.health.ny.gov

The 5As Brief Interventions for Nicotine Addiction

Ask	Ask about tobacco use: "Do you currently smoke or use other forms of tobacco?"
Advise	Advise the patient to quit: "Quitting tobacco is one of the best things you can do for your health. I strongly encourage you to quit."
Assess	Assess readiness to quit: "Are you interested in quitting? Have you tried to quit before? What methods have you used in previous quit attempts?"
Assist	Assist the patient in quitting: Provide brief counseling about the risks of smoking, the rewards and roadblocks to quitting, and the importance of social support. When appropriate, provide a prescription for an FDA approved smoking cessation medication including varenicline, bupropion, or nicotine replacement therapies (NRT: patch, gum, lozenge, inhaler, nasal spray). See USPHS Clinical Guidelines for Treating Tobacco Dependence for more information on medication effectiveness.
Arrange	Arrange for follow up: Follow up regularly with patients who are trying to quit.

For additional help, call the New York State Smokers' Quitline (866) NY-QUITS, (866) 697-8487 or visit TalkToYourPatients.health.ny.gov

NEW YORK STATE Department of Health
U.S. Dept. of Health and Human Services Public Health Service Treating Tobacco Use and Dependence Clinical Practice Guideline 2008 Update

Fig. 1. Example Campaign Print Ad Encouraging TDT. NYSDOH ran a paid provider-focused media campaign digitally (e.g., display banners on provider-related websites), on social media (e.g., LinkedIn, Facebook), in print (e.g., trade journals such as the New England Journal of Medicine), and via email marketing (e.g., AdFire).

University at Albany, State University of New York's Center for Health Workforce Studies. We selected a stratified random sample of 6,000 HCPs (2,202 physicians, 1,999 physician assistants, and 1,799 nurse practitioners) to participate in a written, mailed survey. We selected primary care providers (PCPs) using an indicator in the sampling frame for primary care status, as available. Because the physician assistant list did not have a primary care indicator, we selected from the full licensure list.

We mailed eligible healthcare providers up to 3 mailings. Providers were eligible to participate if they were working in NYS, provided patient care to adults in the past 12 months, and reported that more than 20% of their patient population were adults. The first mailing included an invitation letter, a survey booklet, a business reply envelope to return the completed survey, and \$5 cash incentive. The second mailing (sent one week after the first mailing) was a reminder postcard. The third mailing (sent to non-responders two weeks after the reminder postcard) included a reminder letter, replacement survey, and a business reply envelope to return the completed survey. The RTI International and New York State Department of Health Institutional Review Boards determined that this activity was conducted for evaluation thus did not meet the definition of research with human subjects.

Forty-one participants refused to participate in the pre-campaign survey and 1,142 providers were ineligible (Fig. 2). Reasons for ineligibility included undeliverable addresses ($n = 498$), not living in NYS ($n = 381$), invalid provider type ($n = 64$), not providing patient care in the past 12 months ($n = 126$), and primarily serving minor patients ($n = 73$). A total of 1,534 eligible providers completed a pre-survey (AAPOR3 response rate: 44.2%). We repeated the mailed recruitment protocol 2 months post-campaign, sending surveys to all those eligible providers who completed a pre-campaign survey. We received completed surveys post-campaign from 851 providers; 3 providers were ineligible due to undeliverable address and 4 respondents refused (AAPOR3 response rate: 55.7%). The overall AAPOR3 response rate, which accounts for non-response at both waves, was 24.6%. We weighted the data to adjust for non-response.

2.3. Measures

Independent variables. To assess the overall rate of campaign exposure, we measured self-reported recall of the ads post-campaign by asking providers, "How often have you seen this ad in the past 6 months?" and showed providers images of the one-page ad and the two-page ad; providers could respond "never," "rarely," "sometimes," "often," or "very often." We defined campaign awareness as providers

responding "sometimes," "often," or "very often." We did not show providers images of the ads in the pre-campaign survey. A pre-post campaign indicator variable (equal to 1 indicating awareness of ads and 0 if unaware for the post-campaign period) was used to assess differences in key outcomes across the study periods. **Dependent variables.**

To assess beliefs about effectiveness of cessation interventions, we asked providers, "How effective do you think the following interventions are in helping patients stop using tobacco?": "nicotine patches," "nicotine gum," "stop-smoking medications (such as Zyban or Chantix)," and "health care provider counseling." Providers could respond "very effective," "somewhat effective," "somewhat ineffective" or "very ineffective." We constructed a combined measure of belief about effectiveness of any stop-smoking medication or NRT. Providers were coded as "very effective" if they reported "very effective" to items regarding "nicotine patches," "nicotine gum," or "stop-smoking medications (such as Zyban or Chantix)." We also constructed a combined measure of beliefs about effectiveness of counseling or any stop-smoking medication or NRT. Providers were coded as "very effective" if they responded "very effective" to any of the counseling or medication questions we asked.

To assess provider assistance with quitting, we asked providers 6 items, "For your patients who use tobacco, how often did you do the following in the past month?": "suggest that they set a specific date to stop using tobacco," "suggest they attend a tobacco cessation class, program or counseling," "suggest that they call a telephone Quitline," "provide them with booklets, videos, or other materials to help them quit on their own," "recommend over-the-counter nicotine replacement products," or "prescribe stop-smoking medications (such as Zyban or Chantix)." Providers could respond "always," "often," "sometimes," "rarely," or "never" to each. We coded providers as assisting their patients if they reported "always" or "often" to any of the 6 items. This measure of provider assistance is adapted from the CDC's Key Outcome Indicators for Tobacco Control Programs (CDC, 2005).

We assessed recommending combination NRT by asking providers, "How often do you recommend that patients who use tobacco use the nicotine patch at the same time as nicotine gum, lozenge, inhaler, or nasal spray?"; providers could respond "always," "often," "sometimes," "rarely," or "never." We coded providers as recommending combination NRT if they reported "always" or "often."

2.4. Other measures

We assessed provider demographics including age, gender, race/ethnicity (non-Hispanic White, non-Hispanic Black, Asian, Hispanic,

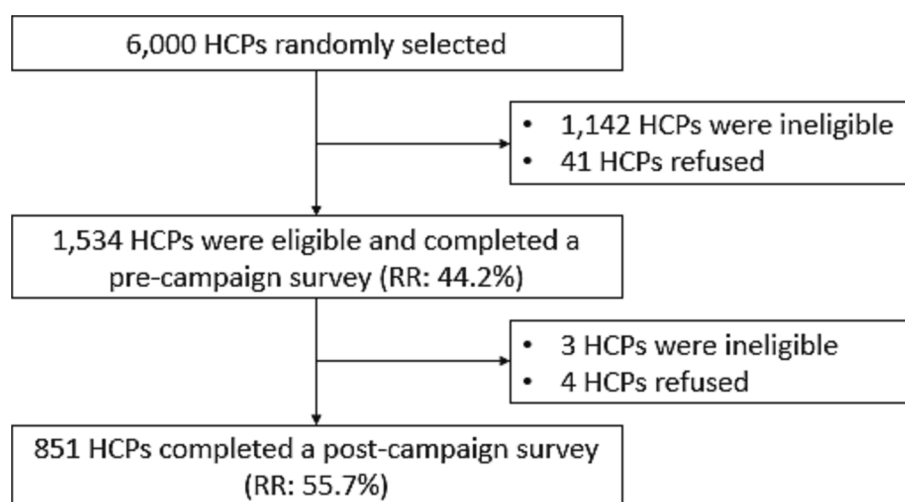


Fig. 2. Participant Recruitment and Response Rate, New York State Health Care Providers, Pre-campaign (October 2017-January 2018) and Post-campaign (July 2018-September 2018).

other), and provider type (physician, physician assistant, nurse practitioner). We also assessed specialty (family medicine, general practice, internal medicine, obstetrics/gynecology [OBGYN], other specialty, no specialty). We coded providers reporting “other specialty” as specialists and coded all other providers as PCPs. We defined smoking status using the National Health Interview Survey definition.

We assessed past 5-year training in TDT with two questions: “During the past 5 years, have you participated in formal training or education on tobacco cessation...” 1) “medications?” and 2) “counseling methods?” We coded providers as receiving past 5-year training if they responded “yes” to either question on the pre- or post-campaign survey. We assessed awareness of Medicaid coverage for TDT by asking if, to the best of their understanding, “does New York State Medicaid cover cessation aids, such as nicotine patches, nicotine gum, or prescription stop-smoking medications?” and “does New York State Medicaid reimburse providers for conducting individual brief cessation counseling with patients?” To describe provider-reported patient population characteristics, we asked providers to estimate the percentage of their patients that use tobacco and the percent with Medicaid insurance.

2.5. Analysis

We estimated descriptive statistics of provider characteristics and all key measures. We conducted bivariate analyses with campaign awareness and all key outcomes. To assess the effect of the campaign on outcomes, we used multivariable logistic regression to estimate two sets of models. Model set 1 estimated each outcome as a function of an indicator variable for the post campaign period (pre-campaign is the referent) and controls. Model set 1 assesses changes in an outcome from pre- to post-campaign (as measured by the coefficient on the post variable). Model set 2 estimated each outcome as a function of the indicator variable for the post period, a variable measuring self-reported awareness of the campaign, and an interaction between the post variable and awareness. Model set 2 assesses whether changes in key outcomes from pre- to post-campaign vary by self-reported campaign awareness (as measured by the coefficient on the interaction term).

In all models we controlled for provider characteristics (age, gender, race/ethnicity, provider type, specialty) and other factors that may be associated with key outcomes (e.g., smoking status, past 5-year training in TDT, awareness of Medicaid coverage for cessation medications and counseling, provider-estimated percent of tobacco-using patients, and provider-estimated percent of Medicaid patients). We assessed statistical significance at the $p < 0.05$ level. All analyses were weighted and conducted using Stata15.

3. Results

3.1. Participant characteristics

Providers in the sample were mostly female (67.8%) and white (68.2%) (Table 1). Approximately 60% were PCPs and 40% were specialists. We compared provider characteristics in Table 1 between providers who participated in both waves ($n = 851$) and those who participated pre-campaign only ($n = 683$) (data not shown). We found no significant differences by gender, specialty, smoking status, past 5-year training in TDT, provider-estimated percent of patients who use tobacco, or provider-estimated percent of patients with Medicaid insurance. Providers who participated in both pre- and post-campaign surveys were slightly older (47.5) than those who did not complete the post-campaign survey (46.0) ($p = 0.05$). Fewer Hispanic providers (3.8% vs. 7.4%) ($p = 0.01$) and more nurse practitioners (35.2% vs. 29.0%) ($p = 0.01$) completed a post-campaign survey.

3.2. Campaign awareness

Overall, 12.6% of providers (CI: 10.4% – 15.1%; $n = 105$) were

Table 1

Baseline Characteristics of New York State Health Care Providers Completing Pre-campaign (October 2017-January 2018) and Post-campaign (July 2018-September 2018) Surveys.

Characteristics	Total N = 851	Weighted % (95% CI)
Age (mean)	827	47.1 (46.2–48.1)
Gender		
Male	247	32.2 (28.9–35.6)
Female	593	67.8 (64.4–71.1)
Race		
White	610	68.2 (64.6–71.5)
Black or African American	47	7.0 (5.2–9.3)
Asian	103	13.7 (11.3–16.5)
Hispanic	29	5.3 (3.7–7.6)
Other	45	5.9 (4.3–7.8)
Provider type		
Physician	259	39.3 (35.8–43.0)
Physician Assistant	290	28.0 (25.1–31.0)
Nurse Practitioner	302	32.7 (29.5–36.0)
Specialty		
PCP	449	58.2 (54.7–61.6)
Specialist	374	41.8 (38.4–45.3)
Smoking status		
Current smoker	20	2.3 (1.4–3.5)
Former smoker	164	18.3 (15.8–21.1)
Never smoker	659	79.4 (76.5–82.1)
Past 5-year training	639	24.6 (21.6–27.7)
Awareness of Medicaid coverage for cessation medications	570	68.0 (64.7–71.2)
Awareness of Medicaid coverage for cessation counseling ^a	359	42.5 (39.1–46.0)
Estimated tobacco-using patients (mean)	817	28.5 (27.1–29.9)
Estimated Medicaid patients (mean)	807	39.3 (37.2–41.5)

PCP = primary care provider.

^a Medicaid will reimburse providers for conducting cessation counseling.

aware of the campaign. We assessed the extent to which providers aware of the campaign were different from those not aware of the campaign in the pre-campaign period. Compared with providers not aware of the campaign, more providers aware of the campaign were Asian (22.0% vs. 12.5%; $p = 0.04$), never smokers (87.1% vs. 78.1%; $p = 0.01$), or had past 5-year training in TDT (37.4% vs. 22.6%; $p = 0.004$). A lower percentage of providers aware of the campaign were White (53.5% vs. 70.2%; $p = 0.00$) or former smokers (11.0% vs. 19.7%; $p = 0.01$). Campaign awareness did not differ by age, gender, provider type, specialty, smoking status, provider-estimated percent of tobacco-using patients, or provider-estimated number of patients with Medicaid insurance.

3.3. Association between campaign awareness and key campaign-related outcomes

In bivariate analyses, we found significant increases from pre- to post-campaign for beliefs about effectiveness of nicotine patch, nicotine gum, stop-smoking medications, HCP counseling and beliefs about effectiveness of any NRT or stop-smoking medication (Table 2). We did not find differences from pre- to post-campaign in provider assistance by campaign awareness. Providers aware of the campaign reported higher rates of recommending combination NRT than providers not aware of the campaign on the pre-campaign survey (30.8% vs. 15.5%, $p = 0.002$) and post-campaign survey (47.8% vs. 21.0%, $p < 0.001$) (Fig. 3).

In the multivariable models, we found from model set 1, which assess pre-post changes for each outcome, that the percentage of providers who believe cessation interventions are very effective and report recommending combination NRT to their patients increased from pre- to post-campaign, but rates of provider assistance did not increase (Table 3, left side). We assessed how pre-post changes in outcomes differed by campaign awareness in model set 2 (Table 3, right side). We found that changes from pre- to post-campaign in provider beliefs that the nicotine

Table 2
Percentage of New York State Health Care Providers Reporting Key Outcomes by Campaign Awareness and Wave.

Key Outcomes	Aware of campaign (n = 105)				p-value	Not aware of campaign (n = 746)				p-value
	Pre-campaign		Post-campaign			Pre-campaign		Post-campaign		
	n	% (95% CI)	n	% (95% CI)		n	% (95% CI)	n	% (95% CI)	
Beliefs that cessation interventions are effective										
Nicotine patch	16	17.5 (10.9–26.9)	34	35.0 (26.0–45.3)	0.01	129	16.5 (13.9–19.4)	158	21.2 (18.3–24.5)	0.02
Nicotine gum	10	10.7 (5.8–18.9)	32	33.3 (24.4–43.5)	<0.001	84	10.9 (8.8–13.4)	127	17.0 (14.4–20.1)	0.001
Stop-smoking medications	38	36.8 (27.7–46.9)	54	54.2 (44.3–63.9)	0.01	224	29.9 (26.5–33.4)	299	41.3 (37.5–45.1)	<0.001
HCP counseling	21	21.0 (13.9–30.4)	40	40.9 (31.4–51.2)	0.003	123	16.6 (13.9–19.6)	169	24.1 (21.0–27.6)	<0.001
Any NRT or stop-smoking medications	44	42.7 (33.2–52.8)	60	60.2 (50.2–69.4)	0.01	260	34.2 (30.7–37.8)	328	44.8 (41.0–48.6)	<0.001
Any medications or counseling	50	47.8 (38.0–57.8)	68	67.6 (57.8–76.0)	0.01	308	40.8 (37.2–44.6)	380	52.3 (48.5–56.1)	<0.001
Provider TDT behaviors										
Provider assistance	82	79.7 (70.5–86.6)	87	86.2 (78.0–91.7)	0.23	543	74.1 (70.6–77.2)	549	76.9% (73.6%–79.9%)	0.23
Recommend combination NRT	31	30.8 (22.3–40.8)	47	47.8 (38.0–57.8)	0.02	112	15.5 (13.0–18.5)	152	21.0 (18.1–24.3)	0.01

CI: Confidence Interval; HCP: Health care provider; NRT: Nicotine replacement therapy.

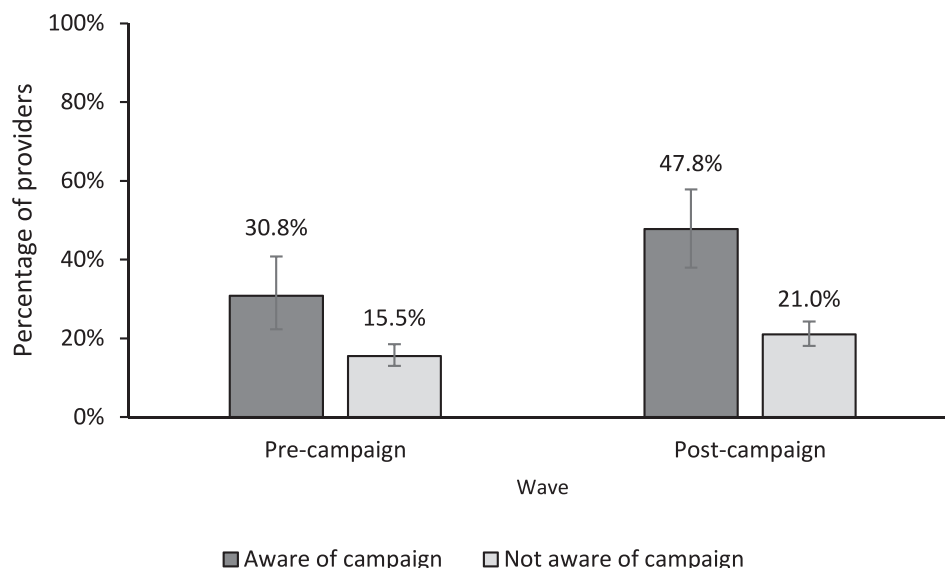


Fig. 3. Percentage of New York State Health Care Providers Reporting they “Always” or “Often” Recommend Combination NRT, by Awareness at the Post Period. Providers aware of the campaign reported higher rates of recommending combination NRT than providers not aware of the campaign on the pre-campaign survey (30.8% vs. 15.5%, $p = 0.002$) and post-campaign survey (47.8% vs. 21.0%, $p < 0.001$).

patch and gum are very effective were greater for those providers aware of the campaign compared with those not aware of the campaign. Providers aware of the campaign had a 2.17 to 2.78 higher odds of believing the nicotine patch or nicotine gum are very effective at helping patients quit post-campaign compared to pre-campaign.

4. Discussion

This study examined the effects of a media campaign to encourage HCPs to use evidence-based clinical interventions to assist patients with quitting. The effectiveness of tobacco dependence treatment (TDT) in helping smokers quit is well-established, but less is known about how provider-focused media campaigns could enhance provision of TDT. The current study is one of few studies examining effects of a provider-focused media campaign that encourages provision of evidence-based TDT.

Estimating the impact of a campaign requires understanding both the

reach and effectiveness of the campaign. Reach measures exposure and effectiveness measures how those exposed are affected. Both measures of campaign impact are important for campaign planners as a campaign with high effectiveness but low reach – or high reach but low effectiveness – will not have a large impact. In this study we measure both: awareness of the campaign being a measure of reach; effectiveness measured by changes in key outcomes from pre- to post-campaign and moderated by self-reported campaign awareness.

Our study found some evidence for campaign effectiveness. We found that after seeing NYSDOH’s ads which focused on the effectiveness of the patch and gum, providers’ beliefs about the effectiveness of these treatments increased. In contrast, the campaign messaging did not highlight as prominently stop-smoking medications, such as varenicline or bupropion, and providers’ beliefs about effectiveness of those medications did not change. However, we did not find a campaign effect for provider behavior in the multivariable models. In the bivariate analyses, we found that pre-campaign rates of recommending NRT, the behavioral

Table 3
Effect of Campaign Awareness on Key Campaign-related Outcomes, New York State Health Care Providers.

Outcome ^a	Pre-post			Pre-post by Awareness		
	aOR ^b	(95% CI)	p-value	aOR ^c	(95% CI)	p-value
Beliefs that cessation interventions are effective						
Nicotine patch	1.48	(1.17–1.86)	0.001	2.12	(1.04–4.34)	0.04
Nicotine gum	1.81	(1.38–2.38)	<0.001	2.78	(1.20–6.07)	0.02
Stop-smoking medications	1.65	(1.38–1.97)	<0.001	1.26	(0.69–2.27)	0.45
HCP counseling	1.80	(1.45–2.23)	<0.001	1.70	(0.92–3.12)	0.09
Any NRT or stop-smoking medications	1.59	(1.33–1.90)	<0.001	1.36	(0.77–2.40)	0.29
Any medications or counseling	1.65	(1.38–1.97)	<0.001	1.49	(0.84–2.64)	0.18
Provider assistance	1.12	(0.91–1.36)	0.283	1.24	(0.60–2.58)	0.56
Recommend combination NRT	1.44	(1.16–1.80)	0.001	1.65	(0.88–3.09)	0.12

aOR: Adjusted Odds Ratio; CI: Confidence Interval; HCP: Health care provider; NRT: Nicotine replacement therapy.

^a In all models we controlled for provider characteristics (age, gender, race/ethnicity, provider type, specialty) and other factors that may be associated with key outcomes (smoking status, past 5-year training in TDT, awareness of Medicaid coverage for cessation medications and counseling, provider-estimated percent of tobacco-using patients, and provider-estimated percent of Medicaid patients).

^b The aOR for the set of model 1 results are the OR for the post variable and represents the odds of each outcome in the post period relative to the odds of the outcome in the pre period.

^c The aOR for set of model 2 results are the OR of the interaction term (post*aware) and represents the ratio of the odds of the outcome in the post period relative to the odds of the outcome in the pre period for those aware of the campaign compared to the odds of the outcome in the post period relative to the odds of the outcome in the pre period for those not aware.

outcome most closely aligned with the campaign messaging, were 2 times higher among providers aware of the campaign (approximately 30%) than providers not aware of the campaign (approximately 15%), which indicates that providers already more likely to recommend combination NRT attended to the messaging. However, despite rates approximately 2 times higher pre-campaign, we found that rates of recommending combination NRT increased by 17 percentage points among providers aware of the campaign, compared with 5 percentage points among providers not aware of the campaign. These differences were not statistically significant in the multivariable models however, it is possible that small sample sizes limited statistical power to detect differences. These findings could suggest that the messaging used in this campaign is best suited for motivating providers already conducting TDT to increase those rates. This finding may highlight the need to identify alternative messaging that could motivate change among those providers not already recommending combination NRT to their tobacco-using patients.

Although study findings on the effectiveness of this campaign appear promising, campaign awareness was fairly low at approximately 12%, which limits the potential impact of the campaign and is lower than a prior study which found that 43% of providers were aware of a similar provider-focused cessation-related media campaign (Juster et al., 2019). As reaching sufficient portions of the primary audience is an important factor in assessing a campaign's overall potential impact, future research should confirm what awareness levels can be reached with print and digital media campaigns. Although not considered in this paper, an important question for future research is to study the cost-effectiveness of a cessation-related media campaign tailored for providers. More research is also needed to understand the comparative cost-effectiveness of different messaging approaches to reach providers (e.g., direct to provider mailings). In addition, as this study was conducted prior to the COVID pandemic which significantly impacted the health care landscape, additional campaigns and additional study are warranted.

One strength of the study design was the ability to assess the extent to which providers aware of the campaign differed from those not aware on key outcomes prior to potential exposure to the campaign (i.e., in the pre-campaign survey). We did not find evidence that providers aware of the campaign had different beliefs pre-campaign about the effectiveness of the patch and gum from those not aware of the campaign, which strengthens confidence in our findings. However, this study is also subject to several limitations. First, we measured awareness 2–3 months after the 5-month campaign ended, and most of the campaign dollars were spent in the first 3 months of the campaign. The extended period between the campaign and assessment of awareness may have limited

our ability to detect campaign effects. Second, the sample size of providers aware of the campaign was lower than anticipated and may have limited our ability to detect significant differences in key outcomes. Third, the simple pre-post model has the limitation of not allowing us to rule out some other factor changing from pre to post period that explains the change in outcome. The model which includes self-reported exposure has a potential selection bias arising from an unobserved factor being related to both the change in outcome and self-reported exposure. Fourth, we did not assess the type of organization or practice where a provider worked, which could be related to key outcomes. Fifth, the campaign included digital ads that were variations on the ads shown in the survey. It is possible that providers may have seen an alternative format (e.g., Facebook ad, LinkedIn, digital banner) but not recalled it with our visual prompt. Finally, these findings rely on self-reported data, which may be subject to social desirability bias, which is a tendency to answer survey questions in a manner that will be viewed favorably by others. In addition, when assessing campaign awareness, we did not include a comparison ad that providers could not have seen, which would have allowed assessment of reporting false awareness.

Many state tobacco control programs and health care organizations are working to increase provision of evidence-based clinical TDT by implementing tobacco-related policies and systems that support such intervention. This study examined effects of a cessation-related media campaign focusing on providers, and suggests this approach may be an effective complement to health systems change-related interventions. Overall, this study indicates that digital and print cessation-related messaging to promote TDT can influence providers' cessation-related beliefs. Future studies should seek to identify ways to modify ad delivery and increase campaign awareness to maximize potential campaign impact and should assess comparative cost-effectiveness of different approaches to reach providers with cessation-related messaging.

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6. Disclaimer

The findings and conclusions in this report are those of the authors and do not represent the official position of the New York State Department of Health.

CRedit authorship contribution statement

Kim A. Hayes: Conceptualization, Methodology, Writing – original draft. **Elizabeth M. Brown:** Conceptualization, Methodology, Writing – original draft. **James Nonnemaker:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Harlan Juster:** Conceptualization, Writing – review & editing, Funding acquisition. **Christina Ortega-Peluso:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Funding acquisition. **Matthew C. Farrelly:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Kevin Davis:** Methodology, Formal analysis, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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