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Increasing Influenza Vaccination in New York City Taxi Drivers: A Community Driven Approach

Francesca Gany, M.D., M.S.^{a,*}, Rohini Rau-Murthy^a, Imran Mujawar, M.S.^a, and Taxi Network^{a,1}

^aMemorial Sloan Kettering Cancer Center, Department of Psychiatry and Behavioral Sciences, 300 East 66th Street, 15th Floor, New York, NY 10065

INTRODUCTION

The Healthy People 2020 influenza vaccination season goal is 80% of all non-institutionalized adults 18–64 years old¹. However, influenza vaccination rates in the U.S. remain stubbornly low, at 41.5% of adults². These rates can potentially be improved through community tailored approaches^{3,4}.

Taxi drivers in New York City, who are 94% immigrant⁵ and who speak a variety of languages other than English, face occupational and other barriers to influenza vaccination. They are independent contractors, which is a barrier to obtaining health insurance⁶. Over half of NYC taxi drivers do not have a primary care physician⁷. NYC drivers typically work 9.5 hour shifts, 6 days a week^{5,8–10}, making it difficult to find time for healthcare. A lack of influenza vaccination messaging in their primary languages may prevent timely receipt of influenza public health messaging.

Because of their demographics, they are also at higher risk for influenza complications¹¹: 38% are over age 50⁵, and 40% are of South Asian origin⁹, putting them at a higher risk of cardiovascular or metabolic disorders⁸.

Because of the nature of their occupation, taxi drivers are likely at heightened risk for airborne infections such as influenza. An Australian study found the airborne influenza transmission risk in passenger cars to range from 59–99.9% for a 90-minute trip¹². NYC taxi drivers typically share close quarters with 150 passengers weekly⁵. Because taxi drivers come in contact with a large number of people, neglecting to protect them from influenza may put them at risk for contracting influenza, and its attendant complications, and then also for becoming potential “super-spreaders” of influenza infection, especially because of airflow dynamics within the vehicle, making a higher proportion of transmissions more likely^{13,14}. There are over 100,000 taxi drivers in New York City, and well over 200,000 across the United States. They carry millions of passengers. Targeting taxi drivers for

*Corresponding Author: Francesca Gany, M.D., M.S., Phone: 646-888-4240, ganyf@mskcc.org.

¹Lakshmi Prasad, MPH, Nicole Roberts, MPH

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interests to disclose.

influenza vaccination could be an effective strategy for enhancing herd immunity of the population at large¹⁵.

METHODS

An anonymous interviewer-administered cross-sectional street-intercept survey was conducted near NYC taxi occupational sites during November and December 2013 (Survey Wave I). The survey assessed taxi driver influenza vaccination status, knowledge, and attitudes. Survey questions were taken from the Behavioral Risk Factor Surveillance System (BRFSS); [<http://www.cdc.gov/brfss/>] additional questions were internally developed, informed by prior work.

Survey results guided a tailored vaccine intervention, which addressed the expressed vaccination barriers in Survey Wave I. We partnered with a national chain pharmacy in February 2014 to offer free influenza vaccinations at a large NYC yellow taxi garage during shift change, and we had a physician present to address knowledge gaps about the vaccine. Prior to the intervention, drivers at this garage were also surveyed (Survey Wave II), using the same survey tool as in Survey Wave I.

Data from the two surveys were pooled for analysis, after excluding 10 drivers potentially surveyed in both. Chi-square tests assessed whether there were significant differences between vaccinated and unvaccinated groups by age (50+ vs. less than 50 years), birth country/WHO FluNet influenza-like illness level (WHO levels collapsed to 'outbreak zones' vs. 'sporadic or no outbreak'), last primary care physician (PCP) visit (less vs. more than one year), and health insurance status (insured vs. uninsured) to examine the relative contributions to getting the vaccine. Furthermore, odds ratios were calculated for the probability of being 'vaccinated', using a logistic regression model, with age and last PCP visit as covariates. Data were analyzed using SAS 9.2 (SAS Institute Inc., USA). The study was approved by Memorial Sloan Kettering Cancer Center's Institutional Review Board.

RESULTS

The total sample size across both study waves was 87. All drivers were male. Their mean age was 48.6 years (12.1 SD), and their mean years driving was 11.3 (10.8 SD). There were no statistically significant differences between participants in the 2 phases with regard to age, mean years driving, and last PCP visit. However, drivers participating in the vaccine intervention at the garage had a higher insurance coverage rate (p -value = 0.04).

In the initial wave of the study (November through December 2013), 53 drivers were surveyed. Only 9 (17.7%) had received the vaccine. Among the 42 (82.3%) unvaccinated drivers, 23 were not interested in getting vaccinated. Of the 23 drivers who were not interested in getting vaccinated, 9 "didn't believe [in] it," 7 thought it "unnecessary" and five said it could make them 'sick'. Only 21 (40%) of all the drivers believed the vaccine could help prevent illness; the rest did not see the vaccine's benefit. Nineteen (36%) believed that the vaccine would do nothing or make them sicker, and 12 (23%) did not know what the vaccine would do. 12 were interested in getting vaccinated and those drivers felt that ideal vaccination locations would be a doctor's office, a store, or a taxi garage.

During the vaccine intervention, held in the taxi garage, of the 44 unvaccinated drivers (20 day/23 night shift), 19 (44%) got the vaccine. The remaining 24, those who did not choose to be vaccinated, cited the following as reasons for refusal: never had the flu before (6), thought it was “not necessary” (4), it could make them ‘sick’ (4), or did not “believe [in] it” (3).

Analysis of the data from Survey Waves I and II revealed that drivers 50 years and above were almost three times more likely to be vaccinated than drivers under 50 years (OR=2.86 [1.04, 7.92]). Drivers who had seen a PCP within the last year were more likely to be vaccinated (Chi-sq p-value=0.03), however, this association was not statistically significant when adjusted for age (OR=3.20 [0.82, 12.48]). Birth country WHO FluNet influenza-like illness levels, and insurance status were not significantly associated with vaccination status (Table 1).

DISCUSSION

To the best of our knowledge, this is the first study related to influenza vaccination among taxi drivers, potentially at high risk for both getting influenza and for being transmission vectors, especially in urban areas where there are many taxi riders. Survey Wave I found vaccination rates of only 17.7%, compared to the 39% of U.S. adults vaccinated by November 2013¹⁶. Only 40% of drivers surveyed believed the vaccine could benefit them. The decision to use a garage as the intervention location was informed by the initial survey, and supported by current literature, which shows that workplaces are important nonmedical sites for influenza vaccination interventions^{17,18}.

The most common barrier to immunization was that drivers thought vaccination was ‘not necessary’. This is a similar finding to that of a 2004 study, with a very different population, where 33% of 1,951 unvaccinated participants in a structured telephone survey of Tennessee residents thought it ‘unnecessary’¹⁹. Other reasons for not being vaccinated, such as the belief that the vaccine could cause illness or not believing in the vaccine, were also common across both studies. Younger taxi drivers in our study were less likely to be vaccinated, reflecting influenza vaccination coverage trends among the general U.S. adult population²⁰.

The worksite intervention showed much promise. 44% of drivers were vaccinated during the intervention. The worksite location offered several encouragements to vaccination. The vaccines were free for those who were uninsured, and obtaining the vaccine was quick and easy. For drivers, time is money, and no extra time needed to be expended for the drivers to be vaccinated. One additional observed benefit of the worksite vaccination location was that the social networks of the drivers were activated by the drivers, themselves, to encourage other drivers to become vaccinated. However, knowledge gaps persisted. These social networks could be the basis of a future formal vaccine intervention, in which driver social network hubs could be trained to educate their contemporaries on the need for the vaccine and the benefits.

Limitations of our study include the lack of a control group, to compare vaccination rates among a control group of drivers who did not receive the aforementioned tailored vaccine

intervention addressing immunization barriers. Additionally, a bigger sample size would have been desirable, to explore other determinants of vaccination status.

Nonetheless, the lessons from this study are applicable to the large (over 200,000) U.S. taxi driving population, and to other hard-to-reach populations. There should be larger free onsite worksite vaccination driver programs and research on the impact of those programs, including the documentation of uptake and remaining reasons for refusal.

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Table 1

Combined study sample with Chi sq values and Odds Ratios

	Unvaccinated N = 57 (68%)	Vaccinated N = 27 (32%)	Chi Sq <i>p</i> -value	Logistic Regression (effective n=80) Odds Ratio [£] (95% CI)
Age¹			0.02	
50+	23 (40.4%)	18 (66.7%)		2.86* (1.04, 7.92)
under 50	32 (56.1%)	8 (29.6%)		
Birth Country WHO influenza status²			0.37	
Outbreak zone	18 (31.6%)	6 (22.2%)		Not included
Sporadic or no report	25 (43.9%)	14 (51.9%)		
Last PCP visit³			0.03	
Less than 1 year	37 (64.9%)	24 (88.9%)		3.20 (0.82, 12.48)
More than 1 year	19 (33.3%)	3 (11.1%)		
Health Insurance Status				
Insured	30 (52.6%)	19 (70.4%)	0.12	Not included
Uninsured	27 (47.4%)	8 (29.6%)		

[£]The Odds ratio is modeling the probability that the participant is 'vaccinated'

* P<.05

¹Missing values for Age: 2 unvaccinated and one vaccinated.

²Missing values for Birth country WHO influenza status: 14 unvaccinated and 7 vaccinated.

³Missing values for Last PCP visit: 1 unvaccinated.