Evaluating the Findings of the IMPACT-C Randomized Clinical Trial to Improve COVID-19 Vaccine Coverage in Skilled Nursing Facilities

Sarah D. Berry, MD, MPH; Keith S. Goldfeld, DrPH; Kevin McConeghy, PharmD, MS; David Gifford, MD, MPH; H. Edward Davidson, PharmD, MPH; Lisa Han, MPH; Maggie Syme, PhD; Ashvin Gandhi, PhD; Susan L. Mitchell, MD, MPH; Jill Harrison, PhD; Amy Recker, BS; Kimberly S. Johnson, MD; Stefan Gravenstein, MD, MPH; Vincent Mor, PhD

**IMPORTANCE** Identifying successful strategies to increase COVID-19 vaccination among skilled nursing facility (SNF) residents and staff is integral to preventing future outbreaks in a continually overwhelmed system.

**OBJECTIVE** To determine whether a multicomponent vaccine campaign would increase vaccine rates among SNF residents and staff.

**DESIGN, SETTING, AND PARTICIPANTS** This was a cluster randomized trial with a rapid timeline (December 2020-March 2021) coinciding with the Pharmacy Partnership Program (PPP). It included 133 SNFs in 4 health care systems across 16 states: 63 and 70 facilities in the intervention and control arms, respectively, and participants included 7496 long-stay residents (>100 days) and 17,963 staff.

**INTERVENTIONS** Multicomponent interventions were introduced at the facility level that included: (1) educational material and electronic messaging for staff; (2) town hall meetings with frontline staff (nurses, nurse aides, dietary, housekeeping); (3) messaging from community leaders; (4) gifts (eg, T-shirts) with socially concerned messaging; (5) use of a specialist to facilitate consent with residents’ proxies; and (6) funds for additional COVID-19 testing of staff/residents.

**MAIN OUTCOMES AND MEASURES** The primary outcomes of this study were the proportion of residents (from electronic medical records) and staff (from facility logs) who received a COVID-19 vaccine (any), examined as 2 separate outcomes. Mixed-effects generalized linear models with a binomial distribution were used to compare outcomes between arms, using intent-to-treat approach. Race was examined as an effect modifier in the resident outcome model.

**RESULTS** Most facilities were for-profit (95; 71.4%), and 1973 (26.3%) of residents were Black. Among residents, 82.5% (95% CI, 81.2%-83.7%) were vaccinated in the intervention arm, compared with 79.8% (95% CI, 78.5%-81.0%) in the usual care arm (marginal difference 0.8%; 95% CI, −1.9% to 3.7%). Among staff, 49.5% (95% CI, 48.4%-50.6%) were vaccinated in the intervention arm, compared with 47.9% (95% CI, 46.9%-48.9%) in usual care arm (marginal difference: −0.4%; 95% CI, −4.2% to 3.1%). There was no association of race with the outcome among residents.

**CONCLUSIONS AND RELEVANCE** A multicomponent vaccine campaign did not have a significant effect on vaccination rates among SNF residents or staff. Among residents, vaccination rates were high. However, half the staff remained unvaccinated despite these efforts. Vaccination campaigns to target SNF staff will likely need to use additional approaches.

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The COVID-19 pandemic has been especially challenging for skilled nursing facility (SNF) residents and staff. As of June 2021, SNF residents and staff accounted for 4% of COVID-19 cases and 31% of deaths in the US, while representing just 1% of the population. Aside from this shocking mortality rate, the pandemic has caused immense emotional distress among residents owing to compulsory isolation. Staff at SNFs, who are often disadvantaged and low-income workers, have endured intense clinical demands and scrutiny throughout the pandemic. Fortunately, the COVID-19 vaccines have proved highly effective in preventing severe COVID-19 disease, even among patients in SNFs. Further, these vaccines are safe, with low rates of serious adverse events in community dwellers and SNF residents. It is critical that a sizeable proportion of SNF residents and staff are vaccinated against COVID-19 to prevent future outbreaks and deaths.

The Centers for Disease Control and Prevention (CDC) established the Pharmacy Partnership for Long-Term Care Program (PPP) to provide vaccination for long-stay residents and staff in more than 12,000 facilities nationwide between December 2020 and March 2021. Because most SNFs were unable to manage the cold-chain storage requirements of the available mRNA vaccines, facilities received 3 on-site visits from a pharmacy to fully vaccinate all residents and staff. Following the first visit, a median of 77.8% of residents were vaccinated, while the median staff vaccination rate was just 37.5%. Reasons for refusal to accept vaccination within SNFs are multifactorial and include concerns about the speed of the vaccines’ development, adverse effects, and distrust of government and pharmaceutical companies, with Black and Latino staff expressing more reluctance than White staff.

Anticipating the urgent need to encourage COVID-19 vaccination, we rapidly developed a campaign targeting SNF staff and patients/proxies to be implemented during the PPP. The intervention included adaptation of evidence-based strategies used to improve influenza vaccination among health care workers, and successful strategies for implementing complex interventions in the SNF setting. We then conducted a randomized clinical trial across 4 SNF health care systems (HCS) to determine the effect of the present study intervention vs usual care on vaccine rates among SNF residents and staff.

Methods

This study was approved by Advarra’s Institutional Review Board with a waiver of individual informed consent. The trial protocol is presented in Supplement 1.

Facilities and Randomization

This cluster randomized clinical trial was conducted between December 2021 and March 2021 in 4 SNF HCS participating in the PPP. Because facilities with large minority populations have historically achieved low rates of influenza vaccination, we ensured facilities with large Black patient populations were included by recruiting 3 health care systems with a majority of facilities that exceeded the national median composition of Black residents. In total, the HCS owned 397 facilities distributed as follows: HCS1, n = 283; HCS2, n = 48; HCS3, n = 38; HCS4, n = 28. For HCS1, we restricted eligibility to facilities located in the Northeast (n = 44), and in all HCS, we excluded facilities with institutional instability as determined by corporate leadership (n = 25; Figure) Among the remaining 133 facilities, the study statistician used R software to select a randomization scheme stratified first by HCS and then by the proportion of Black residents in each facility as defined by the Minimum Data Set and categorized in 3 groups: less than 25%, 25% to 40%, greater than 40%. The research implementation team was not masked to assignment. The statistician was provided a data set with treatment assignment masked during analysis of the primary end points.

Participants

Participants included all long-stay residents and staff in the randomized facilities. Long-stay was defined as residing in the facility for 100 days or longer at the time of the first vaccine clinic. Staff were individuals who provided care anywhere in the facility at the time of the first vaccine clinic. We estimated the number of staff retrospectively using the Staffing Data Submission Payroll Based Journal (PBJ): the total unique staff working in the facility during the 8 weeks before the first vaccine clinic, by discipline. Staff disciplines that typically provide care in multiple facilities (eg, dentist, physician) were excluded (n = 59; Figure).

Intervention

Based on our team’s experience with complex intervention studies in SNFs and prior literature on strategies to increase influenza vaccination in health care workers, we planned a multicomponent intervention to encourage COVID-19 vaccination. The components of the intervention were intended to address misinformation via education from trusted sources, and to garner positive emotions as motivators for vaccination. The intervention included the following components. (1) Electronic messaging and education were disseminated through a study website (NHCOVIDvaccine.com) and social media venues (eg, Facebook, Instagram). (2) Up to 4 opinion leaders per facility were identified; these were outspoken frontline staff chosen regardless of whether they favored vaccination. Opinion leaders were identified by facility leadership and invited...
to participate in a 1-hour virtual town-hall meeting led by a racially diverse group of moderators and geriatricians to answer questions, dispel misinformation, and encourage staff to discuss vaccination with their peers. A description of the first 26 of 30 town hall meetings with opinion leaders has been published. (3) Gifts (e.g., T-shirts, masks) were distributed to staff and residents upon vaccination with socially concerned messaging (“Vaccinated for You!”). (4) Short videos were distributed from community leaders about vaccination. (5) Proxies of unvaccinated patients (for any reason) were referred to a specialist team to facilitate remote informed consent. (6) Funds were allocated for enhanced testing of residents/staff with symptoms after vaccination.

Data Sources and Baseline Characteristics

Resident-level data were obtained from each resident’s electronic medical record (EMR) using the PointClickCare platform including census data, diagnostic codes from admission/status updates, Minimum Data set assessments, and vaccination status. These data were transferred to the data coordinating center at Brown University monthly. Resident characteristics included age, sex, race/ethnicity, influenza vaccination, and comorbidities. History of COVID-19 was considered positive if indicated anywhere in the EMR with the following diagnostic codes: U07.1, J12.82, B94.8, Z86.16.

We additionally collected information on facility characteristics, including bed number, for-profit status, share of residents with Medicaid, having a dementia unit, and 5-star rating from NHCompare. Political leaning of the SNF was estimated by the percentage point difference in proportion of Democratic vs Republican votes during the 2020 presidential election in the county in which the SNF was located.

Outcomes

For residents, the primary outcome was a binary measure indicating whether the resident received 1 or more COVID-19 vaccines through March 2021, ascertained using the facility’s EMR. For staff, the primary outcome was the proportion of staff who received any COVID-19 vaccines through March 2021 obtained from facility logs provided to Insight Therapeutics. For staff, the outcome was aggregated at the facility level: we estimated the proportion of staff vaccinated by dividing the count of eligible staff vaccinated (numerator) by the PBJ estimated number of eligible staff (denominator; see Participants section).

Implementation Fidelity

Implementation was measured via a modified version of the Framework for Implementation Fidelity (FiF), assessing content delivered, coverage, frequency, duration, and timeliness of the intervention. Each facility was scored on total adherence, from 0 to 16.

Statistical Analysis

We described baseline characteristics for the study overall and for each treatment arm using means and standard deviations.
for continuous variables, and proportions for categorical variables. Standardized mean differences were calculated to describe differences between treatment arms. Analyses used an intention-to-treat approach. Mixed-effects, generalized linear models with a binomial distribution that included random site-level effects were used to test the effect of the intervention on resident and staff vaccination rates. In the resident model, we a priori adjusted for age, sex, race/ethnicity, COVID-19 diagnosis, selected comorbidities (eg, dementia), HCS, and the strata of Black resident composition. In a separate model, we included an interaction term for intervention arm and resident race (Black vs other). In the staff model, we adjusted for HCS, strata of Black resident composition, and political leaning of the county, as we had no individual-level data. Using statistical simulation with a range of possible intervention effect sizes and intraclass correlations, we estimated that we would have 80% power to observe a difference of 8% in resident vaccination rates with 60 facilities in the intervention arm.

We conducted 2 post-hoc sensitivity analyses. First, we restricted staff models to nurses and nurse aides excluding other staff (eg, dietary, therapist). Second, because the PPP occurred during the holidays in the midst of COVID-19 outbreaks, we used a longer look-back period to generate an estimate of the number of eligible staff: the average count of unique staff that worked in each facility during the last 2 quarters of 2020.

Results

Facilities and Staff

Of the 133 randomized facilities, 63 were randomized to the intervention arm and 70 to usual care. Facilities were distributed across HCSs as follows: HCS1, n = 18 intervention, n = 20 control; HCS2, n = 15 intervention, n = 16 control; HCS3, n = 18 intervention, n = 19 control; HCS4, n = 12 intervention, n = 15 control. Table 1 shows facility characteristics overall, and stratified by intervention assignment. The mean number of beds was 112 (±55.4), and mean number of staff was 135 (±60). In 33 of the 133 facilities (24.8%), at least 40% of residents were Black. Among staff, 4479 (28%) were nurses and 6472 (40%) nurse aides. Facilities randomized to receive the multicomponent intervention vs usual care had similar 5-star ratings and bed size. A larger proportion of facilities in the intervention arm were located in a county with Republican voters as compared with facilities in the usual care arm.

Residents

The trial included 7496 residents: 5905 (79.4%) were aged 65 years or older, and 4637 (61.9%) were female. Nearly 70% (5015; 66.9%) of residents were White, whereas 26.3% were Black and 3.2% Latino (Table 1). More than half (3853; 51.4%) of residents had previously been diagnosed with COVID-19. Residents randomized to the multicomponent intervention vs usual care had similar length of stay and similar burden of respiratory illness. A smaller proportion of residents of SNFs randomized to the intervention were diagnosed with COVID-19 or dementia as compared with residents in facilities in the usual care arm.

Implementation Fidelity

Implementation fidelity varied within and across HCS (median score: 8, range: 3-15; eFigure 1 in Supplement 2). Most intervention facilities (84.1%) sent 1 or more staff (total n = 255) to a town hall meeting, but the extent of engagement varied. All 63 intervention facilities distributed gifts to vaccinated staff and residents; however, only 16 (25.4%) facilities were able to distribute gifts across all 3 clinics. A total of 38% of intervention facilities participated in social media posting/messages. Only 3 facilities used the consenting referral service.

Primary Outcomes

Overall, 81.1% (95% CI, 80.2%-81.9%) of residents were vaccinated. In the intervention arm, 82.5% (95% CI, 81.2%-83.7%) were vaccinated, whereas in the usual care arm, 79.8% (95% CI, 78.5%-81.0%) were vaccinated. eFigure 2 in Supplement 2 shows the percentage of residents vaccinated across HCS. In the adjusted model, there was no difference in the log-odds ratio for resident vaccination by intervention status (0.06; 95% CI, −0.24 to 0.36; Table 2). The average marginal effect of the intervention on resident vaccination was 0.8% (95% CI, −1.9% to 3.7%). There was no evidence of effect modification of Black race on the intervention (logOR 0.06; 95% CI, −0.24 to 0.36; Table 2).

Overall, 53.7% (95% CI, 53.0%-54.5%) of staff were vaccinated. In the intervention arm, 54.2% (95% CI, 53.1%-54.5%) were vaccinated, whereas in the usual care arm, 53.2% (95% CI, 52.2%-54.3%) were vaccinated. eFigure 3 in Supplement 2 shows the percentage of staff vaccinated across HCS. In the adjusted model, there was no difference in the log-odds ratio for staff vaccination by intervention status (−0.02; 95% CI, −0.25 to 0.20; Table 2). The average marginal effect of the intervention on staff vaccination was −1.5% (95% CI, −3.4% to 0.6%).

Sensitivity Analyses

Results were similar when restricting models to staff who were a nurse or nurse aide (logOR −0.06; 95% CI, −0.23 to 0.35), or when using a longer look-back period (logOR −0.02; 95% CI, −0.25 to 0.20; Table 2).

Discussion

We conducted a pragmatic randomized clinical trial to test the effect of a multicomponent vaccine campaign on COVID-19 vaccination in SNF residents and staff during the initial vaccine rollout with the PPP. Vaccination rates among residents were very high; however, half the staff remained unvaccinated. The multicomponent intervention did not improve vaccination rates in residents or staff with modest implementation of the intervention components. Given the low rates of staff vaccination, there is an urgent need to identify successful vaccination strategies in this setting.

To our knowledge, the present study is the first randomized clinical trial to examine the effect of multiple, common strategies to increase COVID-19 vaccination in SNFs. When designing the intervention, we selected strategies that have been demonstrated to increase influenza vaccination in health care
workers. Specifically, the combination of education, frontline champions, and offering gifts (eg, buttons, T-shirts) to vaccinated staff have been successful in increasing influenza vaccination in 2 trials of health care workers.22,23 Our own experience in SNFs reinforces the importance of identifying frontline staff to reinforce educational messages.24,25 Messaging socially concerned motivations (ie, protecting one’s community) has been demonstrated to be an effective strategy to increase influenza vaccination in health care workers.26 Our gifts to vaccinated staff included a goodwill message: “Vaccinated for You!”

We identified many barriers to staff vaccination as described in a prior qualitative report.18 Specifically, frontline staff frequently expressed reservations about the speed of vaccine development and misinformation regarding infertility and pregnancy. Although some concerns appear unique from concerns voiced by health care workers regarding influenza vaccination,27 the overall resident and staff rate of COVID-19 vaccination in our study closely mirrors historic rates of influenza vaccination in SNFs.28,29 A systematic review of trials to increase influenza vaccine uptake in health care workers confirms that multicomponent interventions are more often effective than single interventions. Similarly, a case-control study found facilities that used 9 or more activities (vs ≤5) were 3 times more likely to have high staff COVID-19 vaccination rates than low rates (OR 3.3; 95% CI, 1.2-8.9).30 Our intervention

### Table 1. Characteristics of Facilities and Residents in a Trial to Increase COVID-19 Vaccine Coverage Overall, and According to Intervention Arm

<table>
<thead>
<tr>
<th>Facility characteristics</th>
<th>No. (%)</th>
<th>Total</th>
<th>Intervention arm</th>
<th>Usual care arm</th>
<th>Standardized mean difference*</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>133</td>
<td>63</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bed No., mean (SD)</td>
<td>112 (55.4)</td>
<td>114 (56.6)</td>
<td>110 (54.7)</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>% Black residents</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25%</td>
<td>75 (56.4)</td>
<td>35 (55.6)</td>
<td>40 (57.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25%-40%</td>
<td>25 (18.8)</td>
<td>12 (19.0)</td>
<td>13 (18.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;40%</td>
<td>33 (24.4)</td>
<td>16 (25.4)</td>
<td>17 (24.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For-profit</td>
<td>95 (71.4)</td>
<td>47 (74.6)</td>
<td>48 (68.6)</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Star rating</td>
<td>0.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>19 (14.3)</td>
<td>8 (12.7)</td>
<td>11 (15.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>32 (24.1)</td>
<td>16 (25.4)</td>
<td>16 (22.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>20 (15.0)</td>
<td>10 (15.9)</td>
<td>10 (14.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>28 (21.1)</td>
<td>13 (20.6)</td>
<td>15 (21.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>33 (24.8)</td>
<td>16 (25.4)</td>
<td>17 (24.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of staff</td>
<td>122 (55)</td>
<td>60 (50)</td>
<td>62 (55)</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>No. of nurses/nursing aids</td>
<td>83 (44)</td>
<td>44 (36)</td>
<td>39 (31)</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Political leaning of countya</td>
<td>0.09 (0.38)</td>
<td>0.05 (0.38)</td>
<td>0.12 (0.38)</td>
<td>0.2</td>
<td></td>
</tr>
</tbody>
</table>

### Resident characteristics

| No. | 7496 | 3631 | 3865 |
| Age, y | 0.03 |
| <65 | 1547 (20.6) | 789 (20.4) | 758 (20.9) |
| 65-74 | 1802 (24.0) | 934 (24.2) | 868 (23.9) |
| 75-84 | 1862 (24.8) | 979 (25.30) | 883 (24.3) |
| ≥85 | 2241 (29.9) | 1131 (29.3) | 1110 (30.6) |
| Female | 4637 (61.9) | 2354 (60.5) | 2283 (60.9) | 0.04 |
| Race and ethnicitya | 0.03 |
| Black | 1973 (26.3) | 1020 (26.4) | 953 (26.2) |
| Latino | 240 (3.2) | 113 (2.9) | 127 (3.5) |
| White | 5015 (66.9) | 2588 (67.0) | 2427 (66.8) |
| COVID-19 diagnosis | 3853 (51.4) | 1906 (49.3) | 1947 (53.6) | 0.09 |
| Comorbidities | | | |
| Respiratory | 1975 (26.3) | 1057 (27.3) | 918 (25.3) | 0.05 |
| Dementia | 3499 (46.7) | 1715 (44.4) | 1784 (49.1) | 0.09 |
| Coronary artery disease | 1617 (21.6) | 894 (23.1) | 723 (19.9) | 0.08 |
| Congestive heart failure | 165 (21.5) | 859 (22.2) | 756 (20.8) | 0.04 |
| Stroke | 1727 (23.0) | 887 (22.9) | 840 (23.1) | 0.002 |
| Influenza vaccine | 6037 (80.5) | 3071 (79.5) | 2966 (81.7) | 0.05 |

* Standardized mean difference (SMD) is calculated as the difference between the mean characteristics in the intervention and usual care arms divided by the standard deviation of the mean characteristics in the total population. SMD > 0.15 indicates imbalance in the distribution of facility and resident characteristics between arms, whereas SMD < 0.15 suggests relative balance between arms.

b Political leaning of county: % difference of Democratic vs Republican votes during the 2016 Presidential election by county (scale −1 to 1: 1 indicates 100% of votes for the Republican candidate, 0 an identical number of votes for the Republican and Democratic candidates, and −1 indicates 100% of votes for the Democratic candidate).

c Missing <5% of data.

Evaluating the Findings of the IMPACT-C Trial to Improve COVID-19 Vaccine Coverage in Nursing Facilities

Original Investigation Research

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There are some limitations of the present study. First, most facilities achieved moderate or low implementation fidelity. This was not surprising given the aggressive timeline for vaccination directed by the PPP. Further, the intervention occurred in the midst of the second wave of COVID-19 outbreaks in US SNFs, with most facilities facing sizeable staff shortages and regulatory hurdles (eFigure 4 in Supplement 2). While it is possible that the present study intervention would have been more successful if implemented during a more stable time period, fidelity was consistent with other multicomponent intervention studies in SNFs, suggesting that bundled interventions alone may not improve vaccine uptake. Second, we did not collect information on the quality of implementation. Third, all facilities were engaged in their own strategies to increase vaccination. Most vaccine campaigns were initiated at the corporate level. Because we constrained randomization within HCS, differences in these practices are unlikely to influence our results. Fourth, we did not have individual data on staff, which limits our ability to examine the effect of race or ethnicity on the intervention in staff. Finally, this trial included facilities from 4 HCS with moderate geographic variation. Results may not generalize to all regions.

Although the Centers for Medicare & Medicaid Services recently announced regulations to mandate staff vaccination in SNFs, details of this plan, including whether it will allow test-out options for staff who remain unwilling to be vaccinated, are unavailable. Thus, efforts to increase staff vaccination remain highly relevant, and there are several lessons to be learned from this trial. First, it takes time to demonstrate trustworthiness and build relationships. Facilities should work to identify and train frontline staff ahead of when decisions are finalized regarding booster shots and mandates. Second, many organizations have developed guidelines to encourage vaccination that include the components of our intervention as bundled practices. The present study results suggest that these efforts may not be enough to change individual behavior. Based on our conversations with facility leadership and frontline staff, we suspect that it is critical to teach champions how to speak with empathy and confidence to other staff about the vaccine. Finally, social processes, including organizational and community culture, are central to successful vaccine campaigns. Minority staff, who have endured structural racism and inequities in the provision of personal protective equipment, may have reason to mistrust leadership. As employer mandates are being implemented, it is critical to create an organizational culture that addresses the concerns of all health care workers and staff. The Institute for Healthcare Improvement has created a framework for examining and improving organizational culture that could be beneficial for SNF leadership who are looking to improve trustworthiness and vaccine coverage. Changing organizational culture is likely to have lasting benefits on the quality of care in SNFs beyond the COVID-19 pandemic.

### Conclusions

Given the ongoing need to ensure adequate COVID-19 vaccine coverage in SNFs, it is critical to learn from successful and failed vaccine campaigns. The present study results suggest

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**Table 2. Results of a Multicomponent Intervention on COVID-19 Vaccination Coverage in Skilled Nursing Facility Residents and Staff**

<table>
<thead>
<tr>
<th></th>
<th>No. vaccinated Intervention arm</th>
<th>Usual care arm</th>
<th>No. eligible Intervention arm</th>
<th>Usual care arm</th>
<th>Marginal probability of vaccination (intervention vs usual care), % (95% CI)</th>
<th>Log odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary outcomes in skilled nursing facility residents and staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residents</td>
<td>2994</td>
<td>3083</td>
<td>3631</td>
<td>3865</td>
<td>0.8 (−1.9 to 3.7)</td>
<td>0.06 (−0.24 to 0.36)</td>
</tr>
<tr>
<td>Staff</td>
<td>4098</td>
<td>4643</td>
<td>7555</td>
<td>8716</td>
<td>−1.5 (−3.4 to 0.6)</td>
<td>−0.09 (−0.24 to 0.06)</td>
</tr>
</tbody>
</table>

Sensitivity analyses in skilled nursing facility staff

<table>
<thead>
<tr>
<th></th>
<th>No. vaccinated Intervention arm</th>
<th>Usual care arm</th>
<th>No. eligible Intervention arm</th>
<th>Usual care arm</th>
<th>Marginal probability of vaccination (intervention vs usual care), % (95% CI)</th>
<th>Log odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses/nurse aides</td>
<td>2260</td>
<td>2416</td>
<td>5159</td>
<td>5792</td>
<td>−0.1 (−2.1 to 2.0)</td>
<td>−0.01 (−0.23 to 0.21)</td>
</tr>
<tr>
<td>Longer look-back to identify eligible staff (July–December 2020)</td>
<td>4098</td>
<td>4643</td>
<td>8274</td>
<td>9689</td>
<td>−0.4 (−4.2 to 3.1)</td>
<td>0.05 (−0.16 to 0.26)</td>
</tr>
</tbody>
</table>
that bundled interventions that use best practices are not enough to increase vaccine rates in SNFs. Future vaccine campaigns must also strive to create an organizational culture that addresses the concerns of all stakeholders, and brings staff and residents/proxies together with the common goal of ending the pandemic.

**REFERENCES**


13. National Healthcare Commission. The National Institute on Aging had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

14. The content and views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the United States government.


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