



Published in final edited form as:

J Am Geriatr Soc. 2014 July ; 62(7): 1310–1316. doi:10.1111/jgs.12879.

Pandemic Influenza Plans in Residential Care Facilities

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Abstract

Objectives—Elderly in long-term facilities are vulnerable to a pandemic influenza. We aimed to identify characteristics of residential care facilities (RCFs) associated with having a pandemic influenza plan.

Design—Nationally representative, cross-sectional survey.

Setting—RCFs in the United States.

Participants—Participating facilities in the 2010 National Survey of RCFs (n=2,294), representing 31,030 assisted living facilities and personal care homes.

Measurements—Facility-level characteristics associated with a pandemic influenza plan, including general organization descriptors, staffing, resident services, and immunization practices.

Results—Overall, 45% (95%CI, 43–47) had a pandemic plan, 14% (95%CI, 13–16) had a plan in preparation, and 41% (95%CI, 38–43) had no plan. In the multivariable model, organization characteristics, staffing, and immunization practices were independently associated with the presence of a pandemic preparedness plan. The organization characteristics were larger size (extra-large, OR 3.27 [95%CI, 1.96–5.46], large, OR 2.60 [95%CI, 1.81–3.75], or medium, OR 1.66 [95%CI, 1.21–2.27], vs. small), not-for-profit status (OR 1.65 [95%CI, 1.31–2.09] vs. for-

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Meeting: Submitted to 2014 American Geriatrics Society Annual Scientific Meeting

Conflict of Interest: The authors report that there are no financial, personal or potential conflicts of interest.

Author Contributions: Drs. Lum and Ginde had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Lum, Mody, Levy, Ginde. Acquisition and statistical analysis of data: Ginde. Analysis and interpretation of data: Lum, Mody, Levy, Ginde. Preparation of the manuscript: Lum, Ginde. Critical revision of the manuscript for important intellectual content: Lum, Mody, Levy, Ginde.

Sponsor's Role: The sponsors had no role in the design, methods, analysis, or preparation of the manuscript. The views in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

profit), and chain-affiliation (OR 1.65 [95%CI, 1.31–2.09] vs. non-affiliated). Staffing characteristics included the amount of RN hours (Less than 15 minutes, OR 1.36 [95%CI, 1.07–1.74] vs. no hours), any LPN hours (OR 1.47 [95%CI, 1.08–1.99] vs. no hours), and at least 75 hours of required training for aides (OR 1.34 [95%CI, 1.05–1.71] vs. less than 75 hours). RCFs with high staff influenza vaccination rates (81–100%, OR 2.12 [95%CI, 1.27–3.53] vs. 0% vaccinated) were also more likely to have a pandemic plan.

Conclusion—A majority of RCFs lacked a pandemic influenza plan. These facilities were smaller, for-profit, non-chain-affiliated RCFs and had lower staff vaccination rates. These characteristics may help target facilities that need to develop plans to handle a pandemic, or other disasters.

Keywords

Residential facility; Assisted Living Facility; Geriatric; Pandemic; Influenza

INTRODUCTION

Four influenza pandemics in the 20th century caused millions of deaths, social disruption, and enormous economic consequences worldwide.¹ According to the Department of Health and Human Services (HHS), when a pandemic strain emerges, 25%–35% (approximately 75–105 million people) of the U.S. population could develop the disease, and a significant proportion, particularly frail elders, could die.² Given concerns regarding whether society and healthcare infrastructure can effectively handle the next influenza pandemic,³ pre-pandemic planning by healthcare facilities, especially long-term facilities that care for frail elderly, is a critical aspect to providing quality, uninterrupted care and limiting further spread of the influenza virus.⁴ Current pandemic preparedness efforts face numerous challenges including inadequate supply of antiviral medications, a healthcare system that has not been designed to accommodate even a modest pandemic, and most worrisome, fragmented regional pandemic planning.^{3,5}

Vulnerable older adults living in long-term facilities face unique challenges and will be at high risk from an influenza pandemic due to advanced age and multiple chronic conditions. In addition to an estimated 1.5 million nursing home residents,⁶ there are also approximately 733,000 vulnerable residents of residential care facilities (RCFs).⁷ RCFs refers to a heterogeneous group of state-regulated facilities, such as assisted living facilities, personal care homes, and other residences, that serve an adult population by offering a range of personal care (e.g., bathing or dressing) or health-related services (e.g., medication assistance), room and board with at least two meals a day, and on-site supervision.^{8,9} RCFs are highly susceptible to virus outbreaks and rapid propagation in a pandemic.¹⁰ Unlike nursing homes, RCFs are not federally regulated and infection prevention and control standards vary widely based on individual state regulations.¹¹ If community or state-level pandemic planning exists, RCFs are rarely included in these planning efforts.¹² Nationally, the extent of influenza pandemic preparedness in RCFs is unknown, and research in this area is absent.⁴

The 2010 National Survey of Residential Care Facilities (NSRCF) presents a unique opportunity to provide a contemporary description of the prevalence of pandemic preparedness in U.S. long-term facilities that are not nursing homes. The goal of this study is to identify facility-level characteristics of RCFs that are associated with having a pandemic influenza plan. We hypothesize that there are specific characteristics related to facility organization, staffing, resident services, and immunization practices that are independently associated with facility pandemic preparedness and may help target RCFs for improvement in disaster planning.

METHODS

Study Design and Participants

We performed a secondary analysis of the facility-level data from the NSRCF, a nationally representative, cross-sectional survey of U.S. RCFs. We received a waiver from the Colorado Multiple Institutional Review Board as an exempt study. Full details of survey methodology, including sampling, questionnaire, and interview processes, are described elsewhere.⁸ Briefly, in contrast to nursing homes, facilities included in this survey are RCFs, assisted living residences, board and care homes, congregate care, enriched housing programs, homes for the aged, personal care homes, and shared housing establishments that are licensed or otherwise regulated by a state and have four or more beds. Facilities licensed solely to serve mentally ill or developmentally disabled populations and nursing homes were excluded unless there was a specific unit meeting the eligibility requirements.

The NSRCF collected facility characteristics through in-person interviews with facility directors or designated staff. Facility-level data were collected on general organization, staffing, resident services and needs, and facility immunization practices. The primary sampling strata of facilities were defined according to number of beds and census regions, and within these sampling strata, 3,650 facilities were systematically and randomly sampled with probability proportional to size.⁸ Of the 2,302 RCFs that participated in the survey, the current analysis included 2,294 RCFs that responded to the primary outcome (i.e. pandemic influenza preparedness), which represent 31,030 RCFs nationally.

Definition of Study Variables

The primary outcome was pandemic influenza preparedness based on the question, "Has this facility developed a written plan for management of residents during an influenza pandemic?" Response options were yes, completed; yes, in progress; or no, not started. Independent variables were selected from the facility questionnaire based on potential association with pandemic preparedness factors including general organization characteristics, staffing, available resident services, indicators of resident needs, and facility immunization practices.^{13,14}

General organization characteristics included facility size, occupancy rate, ownership type, chain-affiliated (i.e. owned by chain or multi-facility system), percent of residents with services paid by Medicaid, duration of operation as RCF, and location in a metropolitan statistical area. Staffing characteristics included whether the administrator/director has a

certificate/license for managing facilities for older people, RN direct care hours per resident per day, LPN direct care hours per resident per day, personal care aide direct care hours per resident per day, and hours of required formal training for personal care aids. Resident services variables included a designated unit for residents with dementia/Alzheimer's disease and percent of single-occupancy living quarters. Resident needs variables included whether the RCF admission policy allows admission of a resident who: a) needs skilled nursing care on a regular basis, b) has moderate or severe cognitive impairment (i.e. the resident does not know who they are), or c) is unable to leave the facility in an emergency without help, and also the percentage of residents who are confined to a bed/chair because of health problems. Positive responses included "yes" and "no specific policy – decisions on a case-by-case basis" for each admission policy. Facility vaccination practices included the rate of staff influenza vaccination, resident vaccination programs, and staff vaccination policy.

Statistical Analysis

Statistical analyses were performed using Stata 12.1 (StataCorp, College Station, TX). Using survey commands, the recommended stratified weights for the facility data were applied to accurately represent national estimates for RCFs.⁸ All results are presented as weighted values. All P-values were two-tailed, with $P < 0.05$ considered statistically significant. For the primary analysis, weighted proportions with 95% confidence intervals (CIs) were calculated for the selected covariates, according to whether a pandemic influenza plan was existing, in preparation, or no plan. Independent variables were categorized based on clinically meaningful thresholds and to create relatively equal group sizes. Unadjusted, bivariate associations were determined between characteristics and pandemic preparedness outcomes using weighted chi-square test. To identify facility-level characteristics independently associated with RCF pandemic preparedness, we used multivariable logistic regression models. The pandemic preparedness outcome was analyzed two ways: a) existing plan and plan in preparation, or b) existing plan only. The analysis based on the presence of an existing plan only, which excluded 14% of RCFs that had a plan in progress but did not have a completed plan, was conducted as a more stringent sensitivity analysis. The multivariable models included general organization characteristics, staffing characteristics, resident services, resident needs, and staff vaccination rate.

RESULTS

Characteristics of the NSRCF facilities, stratified according to level of pandemic preparedness (i.e. existing plan, plan in preparation, or no plan), are summarized in Table 1. Overall, 45% of RCFs had an existing pandemic plan, 14% had a plan in preparation, and 41% did not have a plan. In unadjusted, bivariate analyses, being larger in size, non-profit/government owned, chain-affiliated, or operating as an RCF for more than 10 years were general organization characteristics associated with being more likely to have a pandemic plan. RCFs with fewer than 50% of residents with Medicaid as the payment source were more likely to have a plan. Several staffing characteristics were associated with pandemic preparedness including more direct patient care time for RNs, LPNs, and personal care aides and requiring more training for personal care aides. RCFs where staff had higher influenza

vaccination rates, compared to RCFs with lower staff vaccination rates, were also associated with pandemic preparedness.

In the multivariable model with the combined pandemic preparedness outcome of an existing plan or a plan in preparation (Table 2), several facility characteristics were independently associated with likelihood of having a pandemic plan: larger size, not-for-profit status, chain-affiliated, some RN direct care hours per patient, any LPN direct care hours per patient, requiring at least 75 hours of training for aides, and higher staff influenza vaccination rates. Of note, RCFs with at least 50% Medicaid residents or at least 10% of residents confined to bed/chair were less likely to have the combined pandemic plan outcome.

As a sensitivity analysis, we also tested which RCF characteristics were associated with only having an existing plan, excluding the 14% of RCFs that had a plan in progress. In this more stringent model of pandemic preparedness (Table 2), two additional characteristics were associated with being less likely to have a completed pandemic plan: having at least some single-occupancy rooms or the ability to admit residents with skilled nursing needs. While the unadjusted analysis of the presence of a designated dementia unit was associated with pandemic preparedness (Table 1, $P < 0.001$), this resident service characteristic was only associated with the more stringent “existing plan only” outcome multivariable model (Table 2). Overall, when comparing the multivariable models, the six facility characteristics that were independently associated with pandemic preparedness in both models were larger size, non-profit/government owned, chain-affiliated, having less than 15 minutes of RN direct care time (compared to less or more time), having any LPN direct care time, and higher staff vaccination rates.

In order to better understand current seasonal influenza vaccination practices, we analyzed facility staff and resident vaccination practices. The most common resident-level vaccination program among surveyed RCFs was “personal physician order for each resident” (54%), followed by “facility-wide standing orders” (19%). As shown in Table 3, the presence of a policy to promote resident influenza vaccination was associated with pandemic preparedness in bivariate analyses. Similarly, strategies to increase staff influenza vaccination rates were also associated with pandemic preparedness.

DISCUSSION

This study provides the first national estimate of pandemic preparedness among U.S. RCFs. Specifically in 2010, a majority of RCFs (54%) lacked a complete pandemic influenza plan. RCFs that did not have a plan were more likely to be smaller, for-profit, non-chain-affiliated RCFs or have lower staff vaccination rates. Of note, the multivariable analysis also found that RCFs with the highest proportions of Medicaid residents or residents confined to bed/chair, both indicators of highly vulnerable residents, were less likely to have conducted any pre-pandemic planning. Thus, despite increased resident vulnerability, some RCFs appeared to be unable to prioritize resources for pandemic preparedness. Given that pandemic influenza plans have been suggested to be important in reducing the risks of a potentially devastating influenza outbreak among frail elderly in residential care settings, the

identification of facility-level characteristics that are independently associated with pandemic preparedness in RCFs may help long-term care administrators and providers, consumer advocates, and policy makers target facilities that still need to develop plans to handle a pandemic, as well as other natural or manmade disasters.⁴

This national, cross-sectional analysis reports a contemporary prevalence of pandemic preparedness in long-term facilities other than nursing homes. Prior to this study, the only evaluation of RCF pandemic preparedness was in Nebraska assisted living facilities, where about one-third of assisted living facilities had a pandemic influenza plan.¹⁵ Since RCFs are regulated at the individual state-level, pandemic preparedness in RCFs may vary significantly. However, even though nursing homes are federally regulated, the extent of influenza pandemic preparedness among U.S. nursing homes remain sun known. To our knowledge, the only report of pandemic preparedness among nursing homes is a survey of Michigan and Nebraska nursing homes that found 23% of respondents had taken undertaken some pandemic influenza preparedness planning, whereas 52% of nursing homes did not yet have a plan.¹³ The relatively low rates of pandemic preparedness among nursing homes suggest that the presence of additional regulation may not be providing a clear impetus for pandemic preparedness.

The Centers for Disease Control and HHS have developed a checklist to help long-term facilities assess and improve their preparedness for responding to pandemic influenza.¹⁶ The checklist recommends a structure for planning and decision-making, development of a written pandemic influenza plan, and several elements of the plan. Given the wide variation among RCFs, each facility will need to adapt the checklist to meet its unique characteristics. Since RCFs are not federally regulated, facilities that are developing a comprehensive pandemic influenza plan need to incorporate information from state, regional, and local health departments, emergency management agencies, and other organizations.¹⁷ RCFs that have a pandemic influenza plan can conduct a self-assessment with a tool that evaluates the degree of preparedness and identifies issues related to preparedness in the long-term care setting.¹⁸

This analysis found that RCFs with higher staff vaccination rates were more likely to have a pandemic influenza plan. These data add to studies in long-term care settings regarding employee vaccination programs. The association between healthcare worker vaccination rates and patient “protection” from seasonal influenza infection has been reported.¹⁹ Not surprisingly, there was a strong association between employee vaccination rate and RCF pandemic preparedness, indicating that these facilities dedicate attention and resources for interventions intended to limit influenza morbidity. In addition to the protection of residents and staff, effective seasonal and pandemic preparedness may limit the spread of influenza infection to the broader local community who intersect with RCFs, such as family, visitors, indirect care workers, transporters and suppliers.

This study has several limitations. The responses were based on facility self-report and not verified—this may introduce bias or inaccuracy. The survey did not assess specific elements of pandemic preparedness plans, including whether the plans contain components of the HHS checklist. Additionally, the NSRCF includes a heterogeneous group of facilities that

serve populations with a broad range of needs.^{7,9} While the analysis included general organization, staffing, resident services, resident needs and immunization practices, we were unable to completely account for the heterogeneity of RCFs and other potential factors that may be relevant to pandemic preparedness in RCFs, such as hospital affiliation, collaborations with state, community, or referring hospital pandemic preparedness programs, facility-based infection control programs, presence of an overall emergency/disaster response team, and experience with prior disasters. In particular, there was limited detail on the type of medical care available at different RCFs, beyond direct healthcare worker staffing, the availability of admitting residents with skilled nursing needs, and immunization policies. Thus, while even some RN or LPN availability per patient was associated with pandemic preparedness, more specific detail on the type of care provided is not available. However, the NSRCF remains a large and nationally representative survey that provides contemporary estimates and characteristics of pandemic preparedness.

In conclusion, we found that over half of U.S. RCFs lacked a plan to address an influenza pandemic. This highlights the need to support pre-pandemic planning in this expanding sector of the U.S. healthcare system. We identified facility-level characteristics, including smaller size, for-profit ownership, and lack of chain-affiliation, which were associated with the absence of a pandemic plan and could be used to target regional-level pre-pandemic planning efforts. Future research is needed to assess the quality of existing pandemic response plans in RCFs. Timely, community, state, regional, and national pandemic preparedness that includes RCFs and nursing homes is critical to providing quality, uninterrupted care to frail elderly and preventing further spread of the influenza virus in this vulnerable population.

Acknowledgments

Financial Disclosure: Dr. Mody was supported by National Institute on Aging R01 AG032298, R01 AG41780, R18 HS019979 and University of Michigan Claude D. Pepper Older Americans Independence Center (P30 AG024824). Dr. Ginde was supported by National Institute on Aging K23 AG040708).

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Table 1

Characteristics of Residential Care Facilities According to Status of Pandemic Influenza Preparedness

RCF Characteristics	Weighted Percentage (95% CI) ^a			P-value
	Existing Plan n=1175	Plan in Preparation n=340	No plan n=779	
All facilities (n=2294)	45 (43–47)	14 (13–16)	41 (38–43)	
General Characteristics				
Facility Size (No. of licensed beds)				<0.001
Small (4–10)	29 (26–33)	14 (11–17)	57 (52–61)	
Medium (11–25)	47 (43–51)	17 (14–20)	36 (32–40)	
Large (26–100)	64 (61–67)	14 (12–16)	22 (19–25)	
Extra large (more than 100)	74 (67–79)	13 (9.2–19)	13 (9.1–18)	
Occupancy, %				0.24
1–65	43 (38–48)	15 (12–19)	42 (37–47)	
>65–80	46 (41–51)	13 (10–16)	41 (36–46)	
>80–95	48 (44–52)	16 (13–19)	45 (32–40)	
>95	41 (36–47)	14 (11–18)	45 (39–50)	
Ownership type				<0.001
Private, for-profit	42 (38–44)	14 (13–17)	44 (41–47)	
Non-profit/non-federal government	60 (55–65)	14 (11–18)	26 (21–30)	
Chain-affiliated	59 (55–63)	14 (12–17)	27 (24–31)	<0.001
Medicaid, %				<0.001
0	49 (45–52)	14 (11–17)	37 (34–41)	
20–49	49 (44–54)	14 (11–18)	37 (21–42)	
50+	33 (29–38)	15 (12–19)	51 (46–56)	
Operation as RCF for at least 10 years	50 (47–53)	12 (10–14)	37 (34–41)	<0.001
Metropolitan Statistical Area				<0.001
Yes	42 (40–45)	14 (12–16)	44 (41–47)	
No	45 (40–49)	17 (13–20)	39 (34–44)	
Unknown	74 (67–79)	13 (9.2–19)	13 (9.1–18)	
Staffing Characteristics				
Administrator certified	45 (42–47)	14 (12–16)	41 (39–44)	0.68
RN direct care hours per patient day				<0.001
None	38 (35–41)	14 (11–16)	48 (45–52)	
Less than 15 minutes	59 (55–63)	15 (12–17)	26 (23–30)	
More than 15 minutes	43 (36–51)	19 (13–26)	38 (30–47)	
LPN direct care hours per patient day				<0.001
None	36 (33–39)	14 (12–17)	50 (47–53)	
Less than 15 minutes	62 (58–67)	15 (12–18)	23 (19–28)	

RCF Characteristics	Weighted Percentage (95% CI) ^a			P-value
	Existing Plan n=1175	Plan in Preparation n=340	No plan n=779	
More than 15 minutes	64 (59–69)	14 (11–18)	22 (17–27)	
Personal care aide direct care hours per patient day ^b				<0.001
Less than 2 hours	52 (48–55)	15 (13–18)	33 (30–36)	
More than 2 hours	41 (42–47)	14 (13–16)	41 (39–43)	
Required training hours for aides				0.01
Less than 75 hours	43 (41–46)	16 (14–19)	40 (37–43)	
75 or more hours	52 (47–56)	12 (9.4–15)	36 (32–41)	
Staff vaccination rates, %				<0.001
0	5.4 (3.9–7.5)	5.3 (2.8–9.8)	18 (15–22)	
1–40	18 (16–21)	21 (16–26)	15 (12–18)	
41–80	29 (26–32)	29 (24–36)	20 (17–23)	
81–100	48 (45–49)	44 (38–51)	47 (43–51)	
Resident Services Characteristics				
Designated dementia care unit available	64 (59–69)	15 (12–20)	20 (16–25)	<0.001
Single-occupancy living quarters, %				<0.001
None	57 (54–61)	16 (14–19)	26 (23–30)	
1–49	38 (33–43)	15 (11–19)	47 (42–53)	
50–99	40 (36–45)	13 (10–17)	47 (42–52)	
100	37 (31–44)	13 (9.0–18)	50 (43–57)	
Resident Needs Characteristics				
Skilled nursing needs	37 (32–42)	11 (8.1–14)	52 (47–57)	<0.001
Moderate to severe cognitive impairment	43 (40–46)	15 (12–17)	42 (39–46)	0.07
Unable to leave in an emergency	44 (41–46)	14 (12–16)	42 (39–45)	0.11
Confined to bed or chair due to health problems	34 (29–38)	17 (13–21)	49 (44–55)	<0.001

RCF = residential care facility; RN = Registered nurse; LPN = licensed practical nurse

^a—Details for weighted analysis are available.⁸

^b - Among facilities that have personal care aides (n = 2197)

Table 2

Multivariable Models of Pandemic Preparedness Outcomes

Residential Care Facility Characteristics	Existing Plan + Plan in Preparation N=1515 (59%)	Existing Plan only N=1175 (45%)
General Characteristics	OR (95% CI)	OR (95% CI)
Facility Size (No. of licensed beds)		
Small (4–10)	Ref.	Ref.
Medium (11–25)	1.66 (1.21–2.27)	1.65 (1.20–2.27)
Large (26–100)	2.60 (1.81–3.75)	2.04 (1.39–2.98)
Extra large (more than 100)	3.27 (1.96–5.46)	2.88 (1.61–5.15)
Occupancy, %		
1–65	Ref.	Ref.
>65–80	1.16 (0.83–1.62)	0.96 (0.67–1.38)
>80–95	0.91 (0.66–1.26)	0.91 (0.64–1.30)
>95	1.24 (0.86–1.80)	1.12 (0.76–1.64)
Ownership type		
Private, for-profit	Ref.	Ref.
Non-profit/ non-federal government	1.49 (1.13–1.97)	1.52 (1.11–2.09)
Chain-affiliated	1.65 (1.31–2.09)	1.58 (1.22–2.06)
Medicaid, %		
0	Ref.	Ref.
20–49	0.96 (0.73–1.25)	0.99 (0.73–1.33)
50+	0.73 (0.54–0.98)	0.77 (0.56–1.04)
Operation as RCF for at least 10 years	1.18 (0.93–1.51)	0.92 (0.71–1.19)
Metropolitan Statistical Area		
Yes	Ref.	Ref.
No	0.78 (0.60–1.01)	0.86 (0.65–1.14)
Staffing Characteristics		
Administrator certified	1.01 (0.76–1.34)	1.05 (0.77–1.42)
RN direct care hours per patient day		
None	Ref.	Ref.
Less than 15 minutes	1.36 (1.07–1.74)	1.42 (1.09–1.87)
More than 15 minutes	1.16 (0.80–1.68)	1.41 (0.93–2.14)
LPN direct care hours per patient day		
None	Ref.	Ref.
Less than 15 minutes	1.33 (1.01–1.74)	1.43 (1.02–2.00)
More than 15 minutes	1.47 (1.08–1.99)	1.49 (1.05–2.12)
Personal care aide direct care hours per patient day		
None	0.81 (0.26–2.47)	0.72 (0.25–2.11)
Less than 2 hours	Ref.	Ref.

Residential Care Facility Characteristics	Existing Plan + Plan in Preparation N=1515 (59%)	Existing Plan only N=1175 (45%)
General Characteristics	OR (95% CI)	OR (95% CI)
More than 2 hours	1.29 (0.99–1.69)	1.07 (0.80–1.43)
Required training hours for aides		
Less than 75 hours	Ref.	Ref.
75 or more hours	1.34 (1.05–1.71)	1.09 (0.83–1.42)
Staff vaccination rates, %		
0	Ref.	Ref.
1–40	1.38 (0.81–2.38)	2.01 (1.18–3.42)
41–80	1.67 (0.99–2.82)	2.52 (1.51–4.21)
81–100	2.12 (1.27–3.53)	2.52 (1.54–4.11)
Resident Services Characteristics		
Designated dementia care unit available	1.25 (0.92–1.70)	1.49 (1.04–2.14)
Single-occupancy living quarters, %		
None	Ref.	Ref.
1–49	0.81 (0.59–1.12)	0.68 (0.48–0.95)
50–99	0.97 (0.72–1.32)	0.74 (0.53–1.01)
100	0.84 (0.57–1.25)	0.64 (0.43–0.96)
Resident Needs Characteristics		
Skilled nursing needs	1.02 (0.77–1.37)	0.70 (0.52–0.94)
Moderate to severe cognitive impairment	1.13 (0.86–1.47)	1.22 (0.92–1.61)
Unable to leave in an emergency	0.97 (0.75–1.24)	0.96 (0.73–1.26)
Confined to bed or chair due to health problems	0.71 (0.52–0.95)	0.96 (0.70–1.31)

RCF = residential care facility; RN = Registered nurse; LPN = licensed practical nurse; Ref. = Reference group

Bolded text denotes P-value <0.05

Table 3

Resident and Staff Vaccination Programs by Pandemic Preparedness

Facility Vaccination Characteristics	Weighted Percentage (95% CI)			P-value
	Existing Plan n=1175 (45%)	Plan in Preparation n=340 (14%)	No plan n=779 (41%)	
Resident vaccination program				<0.001
Facility-wide standing orders	51 (46–56)	19 (15–24)	30 (25–35)	
Pre-printed admission orders	66 (56–74)	10 (5.8–17)	24 (17–33)	
Advance MD/NP orders for all residents	49 (41–57)	10 (6.7–16)	41 (33–49)	
Personal MD order for each resident	44 (40–47)	14 (12–17)	42 (39–46)	
None of the above	31 (25–37)	12 (8.7–18)	57 (50–64)	
Staff vaccinations recommended	48 (45–51)	15 (13–17)	37 (34–40)	<0.001
Staff vaccinations offered on-site	58 (56–62)	14 (13–16)	27 (24–30)	<0.001
Staff vaccinations offered for free	60 (56–63)	12 (10–14)	29 (26–32)	<0.001
Staff vaccinations offered at reduced cost	52 (44–60)	17 (12–24)	31 (24–39)	0.04
Staff incentives for vaccinations	67 (56–76)	10 (5.5–19)	22 (14–33)	<0.001
Proof of vaccination required for work	51 (44–59)	17 (12–24)	32 (25–39)	0.04
Staff furlough or patient restriction policy	62 (57–68)	12 (8.8–16)	26 (21–32)	<0.001

MD = medical doctor; NP = nurse practitioner