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MariCris Nee, Edwin Simpser, Richard Grossberg, Linda Mosiello, Natalie Neu

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Title: COVID-19 and Vaccination for Residents and Staff in Pediatric Long-Term Care
Facilities

MariCris Nee^a, BSN, Med, Edwin Simpser^b, MD, Richard Grossberg^c, MD, Linda Mosiello^a,
RN, MS, C-NE, and Natalie Neu^d, MD, MPH

Affiliations: ^a Sunshine Children's Home and Rehab Center, Ossining, NY; ^b St Mary's Hospital for Children, Bayside, New York; ^c Case Western Reserve University School of Medicine, Cleveland, OH and Hattie Larlham Center for Children with Disabilities, Mantua, Ohio; ^d Columbia University Medical Center, New York, NY.

Address correspondence to: Natalie Neu, Pediatric Infectious Diseases, Columbia University Medical Center, 630 West 169th Street, PH4-468, NY, NY 10032

Short Title: COVID-19 Impact and Vaccinations in Pediatric Long-Term Care

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ABSTRACT

Objective: COVID-19 has had a significant impact on adult residents and staff in long term care facilities (LTCF). Little is known however, about the impact of COVID-19 and the uptake of COVID-19 vaccination in pediatric LTCF.

Patients & Methods: A survey was designed, piloted and emailed to facilities participating in the Pediatric Complex Care Association, an organization consisting of 43 pediatric LTCFs. Respondents were sent 1 reminder and given 1 month (4/2021) to report retrospective data from March 2020-March 2021. The survey asked pLTCFs to report data on COVID-19 infections and outcomes among residents and staff as well as COVID-19 vaccination status among residents and staff.

Results: 25 centers participated representing a 56% survey response rate. 7.0% of the residents (117 cases) were infected with COVID-19. The proportion of residents with COVID by site varied from 0-41%. Among staff members, 22% (1665 cases) were infected with COVID-19 with a range of 8-44% of staff by site. 1.3% of residents were transferred to acute care. There were 3 resident and 4 staff deaths respectively. Early uptake of COVID-19 vaccination was common for residents (76%) while for staff the rate was lower at 62%. At individual pLTCFs, vaccination ranged from 5-83 residents and for staff 46-499.

Conclusion: Pediatric residents and staff of LTCFs were impacted by COVID-19 but mortality was low. COVID-19 vaccination rates among the children and staff were similar and higher than reported from early national data in skilled nursing facilities.

INTRODUCTION

COVID-19 has devastated long term care adult facilities with rates of staff and resident illness and deaths accounting for more than 20% of total deaths attributed to COVID-19 in the United States (U.S.).^{1,2,3} Advanced age, complex, chronic medical conditions, and the ease of transmission of viral respiratory infections in congregate care settings are factors contributing to this impact. The prioritization of COVID-19 vaccination to residents and staff of long-term care facilities beginning in December of 2020 has dramatically decreased the rate of infection and deaths attributed to COVID-19.^{4,5} While the impact of COVID-19 in adult long term care settings has been widely published, little is known about the impact in pediatric long term facilities (pLTCF) where it is estimated that approximately 55,000 children live in the U.S.⁶ Although congregate care settings may pose a greater risk for the spread of infections, children, even those with complex, chronic medical conditions, have less morbidity and mortality from COVID-19 than

their adult counterparts.^{7,8} Neu, et al recently published a single center review of infection control and prevention strategies for COVID-19 management in pLTCF. This review detailed the successful implementation of infection prevention and control policies including: surveillance strategies (testing and symptom screens), quarantines, and outbreak management which resulted in very few resident cases of COVID-19.⁸ Since this paper's publication, COVID-19 vaccination became an additional strategy to prevent illness among staff and residents in pLTCFs.

Vaccination policies in pLTCF have been a strategy employed for influenza prevention. In the wake of COVID-19, epidemiologists have been concerned that influenza vaccination would decrease and that vaccine hesitancy driven by COVID-19, would negatively impact this tool of prevention.^{9,10} We hypothesized however, that in pLTCF, influenza vaccination programs would continue to be useful and that sites might be able to use this data to adapt similar policy mandates for COVID-19 containment. COVID-19 vaccinations have been shown to be effective in adult long-term care settings to decrease the impact of COVID-19.¹¹ Data, however, are lacking for pediatric facilities and thus we sought to describe the impact of COVID-19 on staff and residents in pLTCF and the early adoption of COVID vaccination among pediatric LTC staff and residents in the United States (U.S.).

METHODS

We established a study team from members of the Pediatric Complex Care Association (PCCA), an organization consisting of 43 facilities which was established 2012.¹² The team included an infectious disease expert, an infection control practitioner, two pLTCF medical directors, and members of the PCCA research committee. The team created an electronic survey which was

piloted among study team members. On April 6, 2021, the PCCA administration emailed all members asking for voluntarily participation in the survey. A reminder email was sent out two weeks later and the survey was closed after one month.

Survey respondents were asked to report data from the time period of March 2020 to March 2021. Respondents were asked to identify their facilities based on standardized criteria as follows: 1) Acute Care/Hospital/Specialty Hospital: active, short-term treatment; 2) Sub-Acute/Rehab: return to home/community, and a 3) Long-Term Care/Skilled Nursing/ICF: custodial/maintenance care. Other key demographic information that was collected included patient-level potential risk factors for severe COVID-19 infection such as tracheostomy and ventilator status, age specifically as it related to eligibility for COVID-19 vaccination, eg, ≥ 16 years of age. By definition and due to funding and regulatory qualifications, pediatric long-term care facilities primarily care for residents ≤ 21 years of age; although some institutions may care for older residents, this is very rare. The survey also asked respondents to report infection control practices related to COVID-19, the number of staff and residents with COVID-19 illnesses and associated hospitalizations as well as the percentage of residents and staff vaccinated for COVID-19 (before March 2021). Respondents also reported COVID-19 associated deaths among residents and staff. Data were also collected on influenza vaccine policies and rates of resident and staff vaccination from 2019-20 and 2020-21, as there was concern that the COVID pandemic might impact the influenza vaccination rates. These data were entered into the electronic survey by the respondents at each site. Data were reviewed by the study team and queries were sent to the respondent if errors were identified or if clarification was required.

Data were collected and analyzed with descriptive statistics using Qualtrics XM Directory software (Provo, Utah, USA). Percent vaccination for residents was established based on the number of residents ≥ 16 years of age in the facilities during the month that the survey was completed. The percent of staff vaccinated was determined based on the total staff in the facility during the survey response period. This study was approved as an exempted study by the Investigation Review Board of St Mary's Hospital for Children.

RESULTS

Twenty-four out of 43 (56%) members of the PCCA, representing 25 sites, participated in the survey. A dedicated full time Infection Control Practitioner was available at 88% of the participating facilities. The survey was completed by: Administrators (40%), Infection Control Practitioners (32%), Director of Nursing/Nurse Manager (12%), Quality Improvement managers (8%), Nurse Practitioners (4%) and Child Life Specialists (4%). Surveyed sites identified as LTC 21 (81%), 4 (15%) as Sub-Acute/Rehab, and 1 (4%) as Acute/Hospital/Specialty. Although the PCCA is a national organization, the survey participants were located in 15 states with 4 states having multiple sites- predominantly in the Northeast, where many of the member pLTCFs are located.

In the 25 facilities, there were 1,659 residents, 46% (765/1659) of whom were 16 or older. The average resident census per facility was 68.4 residents (range: 10-169) with the average bed count (maximum capacity) of 75 beds (range:14-169).

A total of 117 cases of COVID-19 occurred among facility residents from March 2020-March 2021 representing 7% of the resident population. Of the facilities, 84% had at least one resident diagnosed with COVID-19. The range of resident infections by site varied from 0-41%. For those sites with ≥ 10 resident who were ≤ 15 years of age, the proportion of residents infected with COVID ranged from 0-27% by site. Similarly, for sites with ≥ 10 residents who were ≥ 16 years of age, the proportion infected with COVID ranged from 0-45%. All sites in each age range had fewer than 6 cases by site except for one which had 39 cases in the older age range. Among staff members, 22% (1665 cases) were infected with COVID-19 with a range of staff infections from 8-44% or 10-305 staff infected at individual sites. Twenty-two (1.3%) of COVID-19 infected residents were transferred to acute care for management. There were three COVID-19 deaths among residents > 16 years of age with COVID-19 and four deaths among staff members with COVID-19. Table 1 shows the number of staff and residents diagnosed, hospitalized, or whose death was associated with COVID-19.

Figure 1 shows the percent of resident and staff who received COVID-19 vaccination by facility. Sixty-two percent of the staff at the 25 facilities had received at least one dose of the COVID-19 vaccine within 3 months of the vaccine release (December 2020). In 44% of the pLTCHs, 80% of staff had started or completed the COVID-19 vaccine series. Three sites had 100% of staff vaccinated. In addition, 76% of all eligible study residents (those 16 or older) received at least one dose of the vaccine. One site did not have access to staff vaccination status. One pediatric facility did not have residents who were eligible for vaccine as they were all < 16 years of age, and one site did not have resident vaccine data. In comparison, the average percent of staff and residents receiving influenza vaccination in the 2019-20 season was 89% and 97%. In 2020-21

season, the average percent of staff and residents receiving influenza vaccine was 85% and 87% respectively. Only one pLTCF did not have data on staff vaccination. These data represent the entire season for influenza which is a longer time than what was studied for COVID vaccination.

DISCUSSION

This is a unique report of the impact of COVID-19 infection and the early uptake of COVID-19 vaccination among staff and residents in pLTCFs. These facilities house high risk residents, 60% of whom had tracheostomies or were ventilator dependent. Yet, few were infected, hospitalized, or died with COVID-19 compared to data reported for adult LTCF staff and their residents. Those residents infected with COVID were more likely to be ≥ 16 years of age (9 vs 5.4%). The low prevalence of COVID-19 infection in this population and limited clinical impact is consistent with the comparatively low rate of COVID-19 infection and deaths among pediatric populations (3). Given the medical complexity and the rates of other viral infections among this population, we were surprised that these children and young adults were not more likely to be infected with COVID-19. What was also surprising was the variability in the proportion of residents infected by site (0-41%). The low incidence of COVID may have been due to the quick infection control response by the facilities and their experience with viral infections and outbreaks. However, variability in IP & C practices and staff infection rates may have also led to variability of infection among residents. In addition, state and federal mandates including masking, social distancing, and changes to visitor policies, may also have protected the pediatric populations in long term care. Finally, as few ill children infected and hospitalized with COVID-19 rarely required transfer to long-term care facilities, it is possible that these pediatric

institutions did not face the discharge impact of acute COVID as happened in some of the adult facilities.

Early receipt of COVID-19 vaccination among staff and residents in our study was high. This is in contrast to the data on early vaccine adoption presented by the Centers for Disease Control and Prevention where it was reported that among the skilled nursing facilities in the U.S. who participated in the Pharmacy Partnership for Long Term Care Program, (December 2020-January 2021), that an estimated median of 77.8% residents and 37.5% of payroll staff members received at least one dose of COVID-19 vaccine.⁴ While the time period is different, our study did show that twice as many staff participated in vaccination over an additional two month time period (December – March). There are many articles discussing COVID-19 vaccine hesitancy among long term care staff.^{11, 14} This however, seemed to have less impact among these 25 facilities.

Unfortunately, we did not ask the facilities if COVID-19 vaccine was mandated or what types of educational programs occurred in the facilities to encourage vaccination among staff members.

This trend in compliance with vaccination recommendations in pLTCF is also true for influenza with over 85% of staff both in 2019-20 and 2020-21 receiving the influenza vaccination. This too, is in contrast to national data on LTCF in which rates for influenza vaccination are lowest for health care personal in LTCF compared with hospital workers. (69.3% vs 80.6% of health care personnel in 2019-20 season).¹⁴ There are many factors which may influence compliance with vaccination and infection prevention and control policies that may be specific to pediatric facilities. Evaluating these factors is beyond the scope of this study but it would be important to understand such influences in order to increase COVID-19 vaccine acceptance in health care facilities in general.

Prepublication Release

There are several limitations of the study. Although over 50% of the PCCA sites participated in the study, the data may be biased as it primarily reflects practices of facilities in the Northeast who saw greater numbers of COVID-19 in spring of 2020. In addition, although survey responses were clarified by the study team, data were entered by self-selected site representatives and no documentation was requested to verify answers. Another limitation is that we did not ask facilities to report the upper age limit of their resident population. While this may limit the generalizability of our findings, we feel that our study population is more likely exclusively pediatrics as most facilities have either regulatory or funding limitations that impact the admission to the facility. This study reflects a small sample of the total pLTCF in the U.S. and most of the residents were from LTC sites with approximately half the resident population being over the age of 16. Thus, this data may not be generalizable to pLTCFs but no national data are available for these facilities to make that determination.

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Table 1: Resident Medical Complexity (Tracheostomy and Ventilator Status), Number of Staff and Residents by Age, Diagnosed, Hospitalized, Death associated with COVID-19 and Numbers Vaccinated against COVID-19 (March 2020 – March 2021) in 25 Pediatric Long-term Care Facilities

	Staff n=7687	Residents 0-15yo n=894	Residents ≥ 16 yo n=765
Facility demographics			
Tracheostomies non-ventilated		268 (30%)	178 (23%)
Tracheostomies, ventilated		356 (40%)	193 (25%)
COVID-19 data			
Diagnosed with COVID-19	1665 (22%)	48 (5.4%)	69 (9.0%)
Hospitalized due to COVID-19	29 (0.4%)	9 (1.0%)	13 (1.7%)
Death associated with COVID-19	4 (0.05%)	0	3 (0.39%)
COVID-19 vaccination			
Received COVID-19 vaccine	4706 (62%) *n=7561	n/a	584 (76%)

* 1 site was unable to provide staff vaccination information

Figure 1: March 2021: Percent of Residents and Staff Vaccinated for COVID-19 by Survey Site

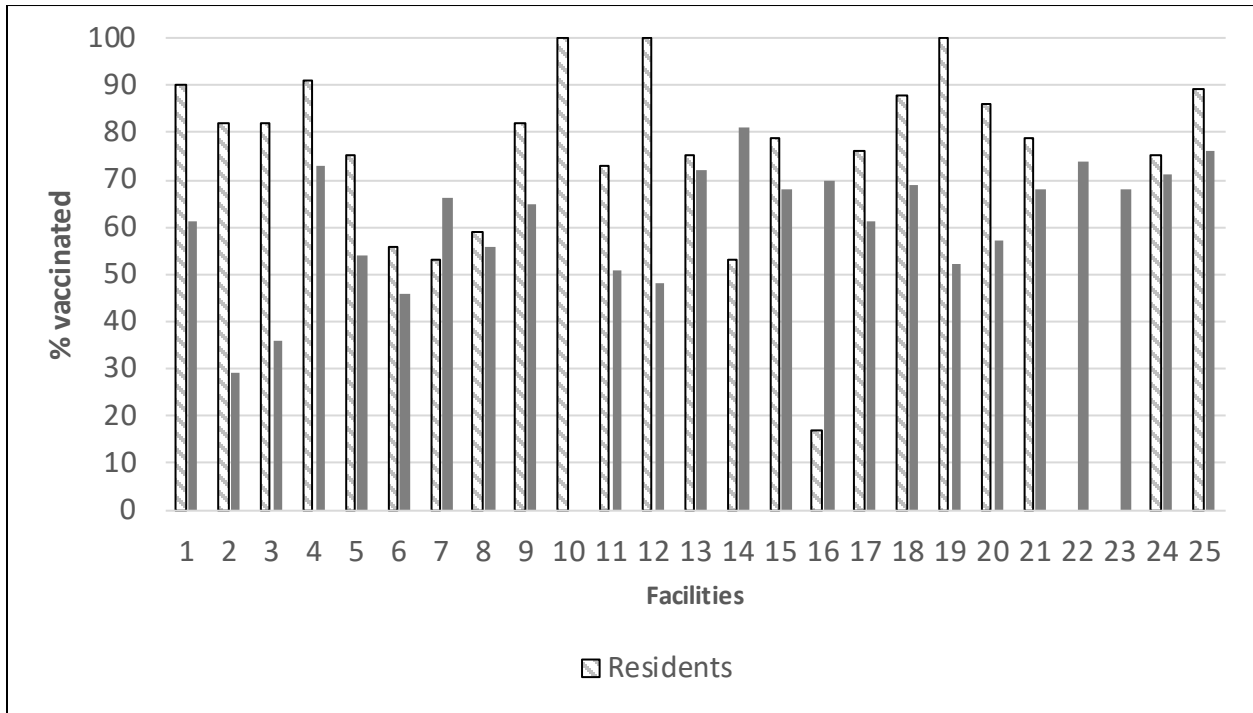


Figure 1 Legend: This figure represents the percent of residents and staff from the 25 pLTCFs who received at least 1 dose of COVID-19 vaccine by March 2021. Site 10 did not site have access to staff COVID vaccine information. Site 22 did not have access to resident vaccination data, and site 23 did not have residents who were eligible for vaccination at the time of the survey.

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