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Concise Communication

Impact of Alzheimer's disease and related dementias (ADRD) on the quality of room cleaning in nursing homes

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Abstract

Persons with Alzheimer's disease and related dementias (ADRD) are prone to receiving reduced quality of care. We compared the quality of room cleaning of rooms with ADRD residents and rooms with non-ADRD residents in nursing homes using an ultraviolet (UV) marker. ADRD status was associated with greater failure of UV marker removal (odds ratio, 1.68; 95% confidence interval, 1.04–2.71; *P* = .03).

Room cleaning is a standard healthcare practice to reduce environmental contaminants and prevent the spread of contagious pathogens. This process is especially pertinent in nursing homes that house residents at high risk for infection due to age, comorbidities, and compromised skin. Unfortunately, mechanisms to ensure high-quality care of patients with Alzheimer's disease and related dementias (ADRD) are still being established, and deficiencies are often identified,[1,2] even though ADRD is diagnosed in half of nursing home residents[3] and two-thirds of nursing home residents who are Medicare beneficiaries.[4]

The COVID-19 pandemic destabilized nursing-home care due to fear of caring for infected residents, extra workload due to COVID-19 protocols, personal protective equipment policies, and staffing shortages. This compromised care may have disproportionately affected those with limited self-advocacy. We sought to determine whether ADRD status was associated with adverse quality of environmental room cleaning during the pandemic.

Methods

We conducted a point-prevalence study of resident rooms in 11 nursing homes in Orange County, California, during the first pandemic winter wave from October 26, 2020, to December 16, 2020. A convenience sample of rooms was selected weekly, representing 2 rooms per unit and avoiding previously selected rooms. Rooms were selected without knowledge of ADRD status. For each room, study staff marked 5 high-touch objects with a ultraviolet (UV)-visible marker (DAZO, Ecolab, St. Paul, MN) as previously described: remote control, overbed table, nightstand, footboard, and bathroom handrail.[5] Staff often touch footboards when facing

residents, but cleaners may assume footboards are infrequently touched. Mark removal was assessed at 24 hours and again at 7 days.

The following data were collected: nursing home, date marked, room number, ADRD status, and object type. We also recorded whether the room was located in a COVID-19 cohort zone defined as green (no cases), yellow (possible cases), and red (confirmed cases).

Mark removal was described by the proportion of each object type with complete UV mark removal at 24 hours and 7 days, stratified by ADRD status of the resident. Multivariable analyses were conducted using generalized linear mixed models evaluating the outcome of UV marker removal by object, ADRD status, and COVID-19 cohort zone, clustering by nursing home and room. Analyses were performed using SAS version 9.4 software (SAS Institute, Cary, NC).

Results

In each of the 11 nursing homes, 300 objects and 60 rooms were assessed, for a total of 3,300 objects in 660 rooms. Of 3,300 objects, 1,415 (42.9%) were sampled in a green COVID-19 cohort zone, 1,390 (42.1%) in a yellow zone, and 495 (15.0%) in a red zone.

The proportion of removed UV markers by object is listed in Table 1. Overall, 216 objects (6.5%) had complete removal at 24 hours, and 905 objects (28.8%) had complete removal at 7 days. The overbed table had the highest frequency of removal (16.7% at 24 hours, 63.8% at 7 days), whereas the footboard had the least (1.7% at 24 hours, 10.6% at 7 days). Removal was similar across COVID-19 cohort zones.

Among the 3,300 objects, 2,380 (72.1%) were in 476 non-ADRD patient rooms and 920 (27.9%) were in 184 ADRD patient rooms. When comparing UV marker removal by ADRD room status, every object in ADRD rooms had a lower frequency of UV marker removal (Table 1). After 24 hours, the footboard had no evidence of UV marker removal in any ADRD rooms. The overbed table was 49.2% less likely to have UV markers removed in a room with an ADRD resident compared to a room with a non-ADRD resident;

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Table 1. Complete Removal of Ultraviolet (UV) Markers as Measure of Cleaning Quality of Objects

Object	Overall (N = 3,300, 660 per object), No. (%)	Rooms With No ADRD Resident (N = 2,380, 476 per object), No. (%)	Rooms With and ADRD Resident (N = 920, 184 per object), No. (%)
24-hour removal			
Overbed table	110 (16.7)	92 (19.3)	18 (9.8)
Remote control	38 (5.8)	30 (6.3)	8 (4.3)
Nightstand	32 (4.8)	26 (5.5)	6 (3.3)
Bathroom handrail	25 (3.8)	19 (4.0)	6 (3.3)
Footboard	11 (1.7)	11 (2.3)	0 (0)
Total (all objects)	216 (6.5)	178 (7.5)	38 (4.1)
7-day removal			
Overbed table	421 (63.8)	312 (65.5)	109 (59.2)
Remote control	185 (28.0)	154 (32.4)	31 (16.8)
Nightstand	179 (27.1)	140 (29.4)	39 (21.2)
Bathroom handrail	95 (14.4)	73 (15.3)	22 (12.0)
Footboard	70 (10.6)	59 (12.4)	11 (6.0)
Total (all objects)	950 (28.8)	738 (31.0)	212 (23.0%)

Note. ADRD, Alzheimer's disease and related dementias.

Table 2. Multivariable Analysis of Factors Associated with Lack of Complete UV Marker Removal on Environmental Objects in Nursing Home Resident Rooms

Factor	Odds Ratio (95% CI)	P Value
24-hour removal		
Object		<.001
Overbed table	1.0	
Remote control	4.16 (2.71–6.40)	
Nightstand	5.12 (3.25–8.06)	
Bathroom handrail	6.82 (4.16–11.18)	
Footboard	16.97 (8.66–33.27)	
ADRD resident room	1.68 (1.04–2.71)	.03
COVID-19 zone[a]		.25
Green	1.0	
Yellow	1.45 (0.93–2.27)	
Red	1.12 (0.61–2.06)	
7-day removal		
Object		<.001
Overbed table	1.0	
Remote control	7.65 (5.74–10.19)	
Nightstand	8.12 (6.08–10.84)	
Bathroom handrail	22.23 (15.86–31.17)	
Footboard	33.87 (23.47–48.88)	
ADRD resident room	1.36 (1.02–1.82)	.037
COVID-19 zone[a]		.76
Green	1.0	
Yellow	0.92 (0.69–1.23)	
Red	1.05 (0.69–1.58)	

Note. CI, 95% confidence interval; ADRD, Alzheimer's disease and related dementias.
[a]COVID-19 zone refers to defined area of cohorted rooms related to the presence of COVID-19 cases among nursing home residents: green (no cases), yellow (possible cases), and red (confirmed cases).

the nightstand, 40.0%; the remote control, 31.8%; and the bathroom handrail, 17.5%. At 7 days, the footboard was 51.6% less likely to have UV markers removed in an ADRD room compared to a non-ADRD room; the overbed table, 9.6%; the nightstand, 27.9%; the remote control, 48.1%; and the bathroom handrail, 21.6%. Overall, objects were 45.3% less likely to be cleaned in ADRD rooms at 24 hours and 25.8% less likely to be cleaned at 7 days.

In multivariable models controlling for object type and COVID-19 cohort zone (Table 2), ADRD resident status was significantly associated with failure to remove UV markers at 24 hours (odds ratio [OR], 1.68; 95% confidence interval [CI], 1.04–2.71; P = .03) and at 7 days (OR, 1.36; 95% CI, 1.02–1.82; P = .04).

Discussion

In this study, objects in rooms of residents with ADRD were significantly less likely to be adequately cleaned in nursing homes. Reasons for this may stem from the fact that individuals with ADRD may be less able to identify failures in room cleaning and less likely to advocate for themselves. This makes it easier for overworked staff to clean those rooms less adequately. In addition, individuals with ADRD may exhibit untoward behavior toward nursing-home staff,[6] resulting in intentional and unintentional preferences by cleaning staff to minimize time in rooms of residents with ADRD.

Importantly, tracking UV marker removal during the first winter wave of the COVID-19 pandemic identified extreme deficiencies in room cleaning, with only 7% of objects cleaned after daily cleaning, and only 29% after 7 daily cleaning attempts. This finding may be attributed to the impact of the COVID-19 pandemic, during which nursing-home employees were severely affected by the lack of resources and staffing, fear, and other psychological tolls of the pandemic.[7] Cleaning staff may be disproportionately affected by the pandemic due to their lower

educational level, common language barriers, and lack of dedicated training limiting their comfort and aptitude cleaning in COVID-19 designated areas. Cleaning staff are often disproportionately affected by short staffing due to socioeconomic situations such as high-density housing, which is predisposed to COVID-19 cases and outbreaks.[8] Nevertheless, even after controlling for COVID-19 designation, rooms were generally poorly cleaned, and the association of poorer cleaning and ADRD persisted. Furthermore, even prior to the COVID-19 pandemic, Murphy et al[9] reported that only 129 (22%) of 577 UV markers were removed by daily cleaning, compared to 7% in this study. Thus, broad efforts are needed to improve nursing-home cleaning.

An ADRD diagnosis is present in 47.8% of nursing home residents,[3] and many more have prediagnostic conditions. Ensuring that basic processes, such as room cleaning, are performed, regardless of the cognitive ability to assess or advocate for one's condition, is essential to nursing-home care. Active efforts are urgently needed to support not only general training for nursing-home environmental cleaning but also to understand barriers and solutions to cleaning rooms of residents with ADRD. These efforts will need to include oversight of workers because it is easier to perform less thorough cleaning in those rooms. They will also need to address the barriers to thorough cleaning, including insufficient

staffing, insufficient allotted time to complete the required job, insufficient wages (that produce pressure to work multiple jobs which leads to exhaustion), and fear of entering rooms that may be associated with unpleasant verbal or physical responses or abuse due to ADRD.[6,10]

This study had several limitations. Our capture of ADRD status did not include severity. Reasons cleaning deficiency were not determined. In addition, sampling was not randomized, although rooms were only sampled once. Nursing homes were also geographically limited to a large southern California county and may not be generalizable to other nursing homes.

In summary, rooms of individuals with ADRD are significantly less likely to be properly cleaned in nursing homes. Efforts are urgently needed to ensure the high quality of cleaning in nursing homes in general, and in rooms of residents with ADRD, in particular. UV markers may provide an effective feedback measure for cleaning process.

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