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Infection Control Assessment after an Influenza Outbreak in a Residential Care Facility for Children and Young Adults with Neurologic and Neurodevelopmental Conditions

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Abstract

objective—To assess the knowledge, attitudes, and practices of infection control among staff in a residential care facility for children and young adults with neurologic and neurodevelopmental conditions.

design—Self-administered survey.

setting—Residential care facility (facility A).

participants—Facility A staff (N = 200).

methods—We distributed a survey to staff at facility A. We classified staff with direct care responsibilities as clinical (ie, physicians, nurses, and therapists) or nonclinical (ie, habilitation assistants, volunteers, and teachers) and used χ^2 tests to measure differences between staff agreement to questions.

results—Of 248 surveys distributed, 200 (81%) were completed; median respondent age was 36 years; 85% were female; and 151 were direct care staff (50 clinical, 101 nonclinical). Among direct care staff respondents, 86% agreed they could identify residents with respiratory symptoms,

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70% stayed home from work when ill with respiratory infection, 64% agreed that facility administration encouraged them to stay home when ill with respiratory infection, and 72% reported that ill residents with respiratory infections were separated from well residents. Clinical and nonclinical staff differed in agreement about using waterless hand gel as a substitute for handwashing (96% vs 78%; $P = .005$) and whether handwashing was done after touching residents (92% vs 75%; $P = .04$).

conclusions—Respondents' knowledge, attitudes, and practices regarding infection control could be improved, especially among nonclinical staff. Facilities caring for children and young adults with neurologic and neurodevelopmental conditions should encourage adherence to infection control best practices among all staff having direct contact with residents.

Children with neurological and neurodevelopmental conditions are at increased risk for severe outcomes, including death, from influenza.[1–5] Some individuals with complex neurodevelopmental conditions, requiring 24-hour monitoring and care, live in long-term care facilities (LTCFs), such as residential care facilities or intermediate care facilities. While the staff and services in residential or intermediate care facilities might be different from other LTCFs—such as nursing homes—because of the unique needs of their residents (residents with neurological and neurodevelopmental conditions), they are similar in function. Thus, facilities that provide residential, educational, and recreational services have special infection control needs, since they provide medical care while also functioning as an individual's permanent home.

Influenza outbreaks can occur in LTCFs, especially during the influenza season.[6–8] Evidence-based guidelines have been published to emphasize appropriate infection control measures in healthcare facilities and LTCFs.[6,9] Staff infection control knowledge, attitudes, and practices have been studied in LTCFs such as nursing homes,[10–13] but less is known about infection control knowledge, attitudes, and practices among staff in residential care facilities providing services for children and young adults with neurologic and neurodevelopmental conditions.

In April 2011, the Ohio Department of Health and the Centers for Disease Control and Prevention investigated an influenza outbreak that began in February 2011 in facility A.[4] Facility A is a residential care facility that provides medical, recreational, and educational services to children and young adults with neurologic and neurodevelopmental conditions. During the outbreak, 13 residents with suspected or confirmed influenza were hospitalized (10/13) and/or died (7/13).[4] As part of the investigation, a self-administered survey was distributed to assess infection control knowledge, attitudes, and practices among facility A staff.

methods

Our survey contained 48 questions in 5 content areas: demographics (5 questions), occupational information (4 questions), infection control knowledge (13 questions), infection control attitudes (17 questions), and infection control practices (7 questions). Two additional questions were included to better understand staff's interest: "Would you like to

receive additional training on infection control at facility A" and "Describe any suggestions you would like to share regarding ways to improve infection control at facility A."

A 4-point Likert scale (strongly agree, agree, disagree, and strongly disagree) was used for the knowledge and attitude content area. A 2-point Likert scale (agree and disagree) was used for the practice content area. All 3 knowledge, attitude, and practice content areas contained the following 3 different subsections: general infection control and occupational health risks, hand hygiene concerns, and respiratory hygiene and isolation concerns.

Survey participation was voluntary and anonymous. All staff members that had close interaction with facility A residents were eligible to participate and were given 10 days during the investigation to complete the survey. Surveyed staff included physicians, nurses (nurse practitioners, registered nurses, and licensed practical nurses), therapists (respiratory, speech, physical, and occupational therapists), habilitation assistants (individuals providing daily care to residents and assisting medical staff), daily volunteers, school teachers, and housekeeping service staff. We focused our analysis on staff with direct resident care responsibilities and separated direct care staff into 2 groups according to profession. Clinical direct care staff had close medical interaction with residents and included physicians, nurses, and therapists. Nonclinical direct care staff had close nonmedical interaction with the residents and included habilitation assistants, daily volunteers, and school teachers. Non–direct care staff had no direct resident care responsibilities.

Data were entered into a Microsoft Access database. In order to increase statistical power, all frequencies of agreement (defined as those who answered "strongly agree" or "agree") were combined. We compared differences between groups providing direct care to residents using χ^2 tests in SAS (ver. 9.3; SAS Institute).

results

Two hundred of 248 (81%) distributed surveys were completed. One hundred seventy (85%) survey respondents were female staff members, and the median respondent age was 36 years (range, 18–64 years; Table 1). One hundred eightyfour (92%) respondents were non-Hispanic whites, and 45% had been working at facility A more than 5 years. There were 151 direct care staff and 49 non–direct care staff. Among the direct care staff, there were 50 clinical and 101 nonclinical staff. No statistically significant differences in responses were found between staff who had worked at facility A more than 5 years and those who had worked 5 years or fewer.

Knowledge Statements

In the knowledge content area, 93% or more of direct care respondents agreed with the general infection control and occupational health risks statements (Table 2). One hundred twenty-seven staff (84%) agreed that waterless hand gel is an acceptable substitute for handwashing, and there was a significant difference in the level of agreement ($P = .005$) between clinical (96%) and nonclinical (78%) staff. One hundred thirty (86%) staff agreed that they are able to identify a resident with symptoms of respiratory infection, and 139

(92%) staff agreed that they can easily identify a resident who is isolated for a respiratory infection.

Attitude Statements

In the attitudes content area, 96 (64%) respondents agreed that when they are ill with a respiratory infection, facility A administration encourages them to stay home (Table 3). All hand hygiene statements had 97% or greater agreement among staff, with the exception of only 75% (113) agreeing that their coworkers wash their hands before and after resident contact. One hundred twenty-eight (85%) staff agreed that separating residents with respiratory infections from residents without respiratory infections by a distance of 3 feet would be practical in the facility. One hundred forty-two (94%) staff agreed that when a resident is diagnosed with a respiratory infection, they are notified to take precautions to prevent the spread of infection.

Practice Statements

In the practice content area, 106 (70%) staff agreed that when they are ill with a respiratory infection, they stay home from work (Table 4). The majority of direct care staff stated that they wash their hands before and after touching residents, but there was a significant difference ($P = .04$) between clinical (92%) and nonclinical (75%) staff on handwashing after touching or caring for every resident. One hundred forty-three (95%) direct care staff agreed with the respiratory hygiene and isolation statements except in 1 instance, where only 72% (109) reported that the residential area or section in which they work separates residents with respiratory infections from well residents by a distance of at least 3 feet.

Suggestions from Respondents

Among all 200 direct and non–direct care respondents, 63% replied that they would not like to receive additional infection control training, 28% stated that they would, and 9% did not provide an answer. Forty-nine percent (36/73) of respondent suggestions were related to improvements in infection control practices at facility A (eg, improving isolation of ill residents, encouraging staff to practice better hand hygiene, and improving equipment cleaning practices after resident use). In addition, 32% (23/73) of respondents provided suggestions regarding a more comprehensive sick leave policy, 11% (8/73) had general comments on the facility performance (ie, the facility has provided them with infection control training), and 8% (6/73) provided general comments regarding the facility's current infection control practices (results not shown).

discussion

To our knowledge, this study is the first to provide information regarding infection control knowledge, attitudes, and practices among staff in a residential care facility caring for children and young adults with neurologic and neurodevelopmental conditions. The survey results demonstrate high levels of agreement to most of the knowledge and attitude statements and somewhat lower levels of agreement for the practice statements among direct care staff. Our findings are similar to those previously reported among nursing personnel in

LTCFs.[13] Our survey results also indicated lower levels in hand hygiene practices by occupational category, as previously reported among LTCFs and nursing homes.[10,12]

Not all clinical and nonclinical direct care staff indicated that they were able to identify residents with symptoms of respiratory infection, potentially leading to delays in implementation of transmission-based precautions and increasing the risk for influenza transmission. Although identification of ill residents ultimately remains the responsibility of clinical staff, nonclinical staff often maintain close and consistent interactions with residents at facilities for persons with neurologic and neurodevelopmental conditions. Therefore, training nonclinical staff to alert clinical staff when they notice residents behaving differently from their baseline may be beneficial. Because influenza may appear as a nonspecific respiratory infection, direct care staff in such facilities should be vigilant for any changes in baseline conditions that may indicate respiratory infection in residents who may not be able to communicate their symptoms effectively.

Nonclinical staff showed significantly less agreement than clinical staff regarding handwashing after touching residents. This finding might be due to the manner in which clinical and nonclinical staff perceived their interactions with residents. Although nonclinical staff often had direct and prolonged contact with residents in facility A, they may not have viewed their interactions as medical activities and therefore may not have felt that handwashing was required. In contrast, clinical staff may have been more likely to view direct contact with residents as patient care activity, for which hand hygiene is expected. Given the multiple roles of staff and level of services provided to residents in this type of facility, reinforcement of hand hygiene practices among all direct care staff is important,[14] especially during the influenza season.

Sick leave policies and the use of leave among ill staff highlighted some important issues. Only 70% of direct care staff indicated that when ill with a respiratory infection they stayed home from work, and only 64% agreed that the facility's administration encouraged them to stay home. Direct care staff should be educated about the risk of transmitting respiratory infections to residents and coworkers if they work when ill. Facility administrators should develop sick leave policies that encourage staff with respiratory illness to stay home until symptoms resolve. Finally, facility administrators should consider implementing an occupational health plan addressing staff absences and other related occupational issues (eg, self-assessing influenza-like illness before reporting to work),[15] especially during the influenza season.

Several staff members reported that cohorting of residents may not be practical in facility A. Respiratory cohorting is an important infection control measure during influenza outbreaks in LTCFs.[6,16] Although most direct care staff believed that separating ill residents from well residents would be beneficial, fewer believed that this would be practical in facility A, and only 72% believed this was routinely done in the area in which they worked. Implementing transmission-based precautions and respiratory cohorting in facilities such as facility A can be challenging for staff and stressful for residents. However, in order to reduce possible disease transmission, modifying resident placement and movement during outbreaks should be considered.

Our study has several limitations. First, this was a self-administered survey and did not include an objective assessment/review of infection control practices within facility A. Second, we classified direct care clinical staff into a single group, but there are likely substantial differences in education, experience, and medical responsibilities among physicians, nurses, and other health professionals, which may have affected survey responses. Third, conducting the survey after a recent outbreak of respiratory illness during which members of staff were reported to be ill and residents were either hospitalized and/or died[4] might have biased responses. Respondents might have felt that they and the facility were being evaluated by an external investigation team in relation to the outbreak, potentially affecting survey responses.

Our findings suggest that adherence to certain infection control practices among staff with direct resident contact was reported to be high but could be improved in certain areas, especially among nonclinical staff. Many direct care staff have non-healthcare-related interactions with residents, and there may be substantial variation in their infection control training and experience. Thus, it would be beneficial to assess infection control knowledge, attitudes, and practices at other facilities with similar characteristics. Furthermore, since it may be challenging for staff at these facilities to incorporate elements of evidence-based infection control guidelines[6,9,14,15,17,18] while allowing for the breadth of nonmedical activities they perform, it may be appropriate to develop a set of infection control best practices tailored to facilities caring for children and young adults with neurologic and neurodevelopmental conditions. Finally, it remains important to identify any barriers to infection control best practices at such facilities, implement appropriate training for staff, and encourage adherence to infection control recommendations among all staff having direct contact with residents.

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table 1

Demographic Characteristics of Survey Participants (N = 200)

Characteristic	No.	%
Facility care worker		
Medical staff[a]	24	12
Therapists	26	13
Habilitation assistant	78	39
Other	72	36
Care provider		
Direct care	151	…
Clinical	50	25
Nonclinical	101	50
Non–direct care	49	25
Age, median (range), years		
All participants	36 (18–64)	…
Gender		
Female	170	85
Male	26	14
Race		
Non-Hispanic white	184	92
Non-Hispanic black	12	6
Other	4	2
Time worked at facility, years		
<1	21	11
1–5	88	44
6–10	34	17
>10	55	28
Employment status		
Full time	172	86
Part time	12	6
Temporary as needed	15	8

note. Missing values are not included. Clinical direct care staff includes physicians, nurses, and therapists. Nonclinical direct care staff includes habilitation assistants (provide daily care to residents and assist medical staff), volunteers, and school teachers.

[A]Includes physician, nurse practitioner, or other type nurses.

table 2

Frequencies of Agreement to Knowledge Statements by Clinical and Nonclinical Direct Care (N = 151)

Survey question	Direct care (N = 151)	Direct care staff		P
		Clinical (N = 50)	Nonclinical (N = 101)	
General infection control and occupational health risks				
1. A common way infections are spread at long-term care facilities is from unclean hands of healthcare workers, such as doctors, nurses, and habilitation assistants.	146 (97)	49 (98)	97 (96)	NS
2. Crowded conditions in long-term care facilities increase the chance of spreading infections from one person to another.	141 (93)	47 (94)	94 (93)	NS
3. During my educational training, I received instruction on infection control and the prevention of infections in long-term care facilities.	149 (99)	49 (98)	100 (99)	NS
4. During my time working at this facility, I have received instruction on infection control and prevention in this facility.	150 (99)	49 (98)	101 (100)	NS
5. When I have an infection control question I cannot answer, I know whom to ask at this facility for help.	145 (96)	50 (100)	95 (94)	NS
Hand hygiene concerns				
1. Handwashing before and after every resident contact will reduce the spread of infectious diseases among residents.	148 (98)	50 (100)	98 (97)	NS
2. Waterless hand gel is an acceptable substitute for handwashing with soap and wa- ter, as long as hands are not visibly soiled.	127 (84)	48 (96)	79 (78)	.005
3. Healthcare workers should always wear gloves when conducting resident care activities.	136 (90)	44 (88)	92 (91)	NS
4. Gloves may be reused between residents without increasing the risk of disease transmission as long as they are not visibly soiled.	5 (3)	2 (4)	3 (3)	NS
Respiratory hygiene and isolation concerns				
1. Residents who have respiratory infections should be physically separated from others by at least 3 feet to prevent the spread of infections.	141 (93)	47 (94)	94 (93)	NS
2. Healthcare workers can reduce the spread of infections by covering their mouths and noses when coughing or sneezing	150 (99)	50 (100)	100 (99)	NS
3. I am able to identify residents with symptoms of respiratory infection.	130 (86)	46 (92)	84 (83)	NS
4. I can easily identify a resident that is isolated for a respiratory infection.	139 (92)	48 (96)	91 (90)	NS

note. Data are no. (%), unless otherwise indicated. P values compare answers of agreement only for clinical and nonclinical direct care staff, using χ^2 tests. Missing values not listed. NS, not significant.

table 3

Frequencies of Agreement to Attitude Statements by Clinical and Nonclinical Direct Care (N = 151)

Survey question	Direct care (N = 151)	Direct care staff		P
		Clinical (N = 50)	Nonclinical (N = 101)	
General infection control and occupational health risks				
1. I feel a personal responsibility to prevent infections among the residents I care for.	150 (99)	49 (98)	101 (100)	NS
2. Preventing the spread of infections in this facility is important to the facility administrators.	140 (93)	49 (98)	91 (90)	NS
3. My facility has adequate resources to prevent the spread of infections among residents.	145 (96)	48 (96)	97 (96)	NS
4. When I am ill, I should remain at home until I feel better.	131 (87)	47 (94)	84 (83)	NS
Hand hygiene concerns				
1. One of the main reasons I wash my hands is to protect myself from infections.	149 (99)	50 (100)	99 (98)	NS
2. One of the main reasons I wash my hands is to protect the residents from infections.	150 (99)	49 (98)	101 (100)	NS
3. Washing my hands before and after direct resident contact is an important part of my job.	149 (99)	50 (100)	99 (98)	NS
4. My supervisors expect me to wash my hands before and after direct resident contact.	146 (97)	50 (100)	96 (95)	NS
5. My coworkers wash their hands before and after resident contact.	113 (75)	39 (78)	74 (73)	NS
6. I intend to wash my hands before and after resident contact when the resident I'm caring for has an infection.	147 (98)	48 (96)	99 (98)	NS
7. I intend to wash my hands before and after resident contact regardless of my job duties.	146 (97)	48 (96)	98 (97)	NS
Respiratory hygiene and isolation concerns				
1. Separating residents with respiratory infections from residents without respiratory infections would be beneficial in this facility.	145 (96)	49 (98)	96 (95)	NS
2. It is important to cover my mouth and nose when I cough or sneeze to protect residents from infections.	150 (99)	50 (100)	100 (99)	NS
3. It is important to cover my mouth and nose when I cough or sneeze to protect my coworkers from infections.	150 (99)	50 (100)	100 (99)	NS
4. Separating residents with respiratory infections from residents without respiratory infections by a distance of 3 feet would be practical to the facility.	128 (85)	44 (88)	84 (83)	NS
5. When I am ill with a respiratory infection, the facility administration encourages me to stay home.	96 (64)	32 (64)	64 (63)	NS
6. When a resident is diagnosed with a respiratory infection, staff are notified to take precautions to prevent the spread of infection.	142 (94)	49 (98)	93 (92)	NS

note. Data are no. (%), unless otherwise indicated. P values compare answers of agreement only for clinical and nonclinical direct care staff, using $\chi 2$ tests. Missing values not listed. NS, not significant.

table 4

Frequencies of Agreement to Practice Statements by Clinical and Nonclinical Direct Care (*N*p151)

Survey question	Direct care (*N* = 151)	Direct care staff		*P*
		Clinical (*N* = 50)	Nonclinical (*N* = 101)	
General infection control and occupational health risks				
1. When I am ill with a respiratory infection, I stay home from work. Hand hygiene concerns	106 (70)	36 (72)	70 (69)	NS
1. I wash my hands after removing gloves.	144 (95)	49 (98)	95 (94)	NS
2. I wash my hands before touching every resident.	100 (66)	39 (78)	61 (60)	NS
3. I wash my hands after touching every resident.	122 (81)	46 (92)	76 (75)	.04
Respiratory hygiene and isolation concerns				
1. I wash my hands after I cough or sneeze.	143 (95)	49 (98)	94 (93)	NS
2. After a resident coughs or sneezes, I clean them appropriately.	144 (95)	47 (94)	97 (96)	NS
3. The residential area/section in which I currently work separates residents with re- spiratory infections from residents without respiratory infections by a distance of at least 3 feet.	109 (72)	37 (74)	72 (71)	NS

note. Data are no. (%), unless otherwise indicated. *P* values compare answers of agreement only for clinical and nonclinical direct care staff, using $\chi 2$ tests. Missing values not listed. NS, not significant.