Investigation of a Suspect SARS-CoV-2 and Influenza A Mixed Outbreak: Lessons Learned for Long-Term Care Facilities Nationwide

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Abstract

A suspected outbreak of influenza A and SARS-CoV-2 at a long-term care facility in Los Angeles County was months later, determined to not involve influenza. To prevent inadvertent transmission of infections, facilities should use highly specific influenza diagnostics and follow CDC guidelines that specifically address infection control challenges.

Introduction

The congregate nature of long-term care facilities (LTCFs) and the resident population, comprising older persons with underlying medical conditions, is associated with rapid transmission and poor outcomes when cases of influenza or COVID-19, have been detected [1, 2]. Concordant outbreaks of both have not previously been reported but can very easily occur.

In March 2020, authorities in Los Angeles County (LAC) were preparing for SARS-CoV-2 cases among LTCF residents. Low activity for influenza virus [3], along with a county-wide shortage of respiratory swabs, prompted public health officials to recommend swabs be reserved for evaluation of SARS-CoV-2 only. Facility staff, unaware of this guidance, continued to evaluate respiratory symptoms with two swabs; those for SARS-CoV-2 were tested at LAC Public Health Laboratory (PHL) and those for influenza were tested at a commercial laboratory. On April 16, local health authorities were notified of concurrent outbreaks of SARS-CoV-2 and influenza A among Facility A residents. An investigation was launched to determine the extent of the outbreak and an Infection Control and Assessment Response tool was used to understand how infections spread [4].

Initial Investigation

A case of COVID-19 was defined as a positive test result for SARS-CoV-2 using the CDC 2019-Novel Coronavirus (2019-nCoV) Real-Time RT-PCR Diagnostic Panel on specimens collected during March 26–May 2, 2020. An influenza case was defined as a positive test result for influenza by the OSOM Ultra Plus Flu A&B Test* (Sekisui Diagnostics, LLC) [5], a rapid antigen detection assay used by the commercial laboratory where Facility A sent respiratory specimens and the CDC Human Influenza Virus Real-Time RT-PCR Diagnostic Panel kits for Influenza A/B typing (VER 2) used by both LAC PHL and CDC. A case of mixed infection was defined as a positive test result for both SARS-CoV-2 and influenza from swabs collected within 10 days of each other. Upon review of medical and laboratory records, we identified 31

infections among residents, including 21 SARS-CoV-2 only, two influenza A only, one influenza B only, and seven mixed SARS-CoV-2/influenza A infections; 18 (58%) residents were hospitalized and 17 (55%) died, all of whom were positive for SARS-CoV-2 (Table 1).

To understand what factors may have contributed to infection transmission at Facility A, we reviewed intervals between specimen collection and reported result; median intervals were 1 day (range = 0–4 days) and 3 days (range = 0–7 days), respectively, indicating influenza test results for a patient were followed several days later by SARS-CoV-2 test results for the same patient. Residents were moved into designated zones for the following reasons: 1) after symptom onset but before return of test results, 2) after receiving a positive influenza test result, 3) after receiving a positive SARS-CoV-2 test result, or 4) after exposure to a resident who tested positive. Overall, 85 room changes occurred March 26–May 2. We found that asymptomatic persons who had not been tested, or were found to be without infections, were at times cohorted with symptomatic persons, persons with one positive test result, or persons with two positive test results. As a result, 17 (65%) of 26 asymptomatic residents who were roomed with a symptomatic resident later tested positive for influenza A (n=1), SARS-CoV-2 (n=11), or both (n=5) suggesting exposure and inadvertent SARS-CoV-2 transmission due to cohorting practices. The number of room changes for residents with positive tests results ranged from 0 to 4, underscoring the inconsistent cohorting strategies used as the outbreak unfolded.

We evaluated use of personal protective equipment (PPE) at Facility A; because of a PPE shortages, extended use/reuse of PPE (including gowns, coveralls, face shields, face masks, and respirators,) was practiced by staff when attending to cohorted residents. Because of staffing shortages, limited rooms were in use; some rooms were filled to maximum capacity while others remained unused. But because patients with similar symptoms or with discordant test results were cohorted together, the same PPE was used when care was provided for all patients in a specific cohort.

To identify unrecognized cases at Facility A and determine if there was ongoing transmission, a point prevalence survey was conducted using RT-PCR for both influenza and SARS-CoV-2 on April 30. This survey identified two residents and four staff with positive SARS-CoV-2 test results and one resident with a positive influenza B result. We concluded that the reason for the outbreak had been discerned and referred staff to CDC infection prevention and control guidance to correct actions believed to have facilitated transmission, and closed the investigation.

Later investigation

About one month later, we were notified of eight asymptomatic Facility A residents who tested positive for influenza A; they were tested after exposure to a resident with respiratory symptoms, but that resident tested negative for influenza. Seemingly persistent influenza transmission during continued low influenza activity, particularly among asymptomatic persons, raised alarms for investigators. A total of 34 swabs collected since April from Facility A residents who tested positive for influenza A at least once had been stored properly and not yet discarded. They were gathered and re-tested using by RT-PCR; all 34 swabs tested negative for influenza. To further understand the false positive test results, we compared the rate of positive influenza tests at the commercial laboratory to that performed by the PHL. During the influenza surveillance weeks corresponding with Facility A's outbreak, 50/270 (18.5%) influenza tests performed by the commercial laboratory were positive (47/50, 94% influenza A), compared to 10/4,090 (0.24%) positive influenza tests at LAC PHL (6/10, 60% influenza A). This investigation could not identify or distinguish between causes of false positive test results related to quality control such as faulty assays or to improper calibration procedures.

Discussion

We describe an investigation of a suspected mixed outbreak involving influenza and SARS-CoV-2 where inconsistent cohorting and infection control practices along with a non-specific laboratory test are believed to have contributed to SARS-CoV-2 transmission. Although influenza was deemed not to be the offending respiratory pathogen, the events that unfolded when a mixed outbreak was suspected provide multiple lessons applicable to other LTCFs.

First, Facility A residents were tested for influenza when influenza activity in the community was low and using an assay with low specificity. While LTCFs should consider testing for influenza (or other respiratory pathogens) outside of typical influenza seasons, clinicians should be familiar with the local influenza epidemiology and understand how that changes the optimal test choice and interpretation of results [6, 7]. If there is little local influenza circulation in the community and results of an antigen detection assay (rapid influenza diagnostic test or immunofluorescence assay) are positive, confirmatory testing with a nucleic acid amplification test (e.g., RT-PCR) should be performed before making cohorting decisions both to confirm the diagnosis and for influenza-typing during the low season [7, 8].

Second, at Facility A, cohorting residents on the same unit based on symptoms alone likely resulted in inadvertent mixing of infected and uninfected residents. According to CDC recommendations for preventing transmission of SARS-CoV-2 in LTCFs, residents with suspected COVID-19 should be cohorted only after laboratory confirmation of infection [1, 9, 10]. Residents in other LTCFs faced with the dilemma of whether or not to cohort patients before laboratory confirmation, should choose not to move patients during the interval between specimen collection and laboratory report unless a private room is available [1, 9, 10]. In previous years, LTCFs might have performed laboratory confirmation on a subset of residents within a respiratory illness cluster; however currently all residents with symptoms consistent with COVID-19 should be tested for SARS-CoV-2 [8, 11]. If influenza and SARS-CoV-2 viruses are

co-circulating in the community or facility, residents with consistent symptoms should be tested for both pathogens [10]. If negative for both pathogens, testing should be considered for other viral or bacterial causes of acute respiratory illness [10].

Third, Facility A experienced PPE shortages, a common problem during the ongoing SARS-CoV-2 pandemic. CDC guidance recommends that decisions about wearing the same PPE for multiple residents should be made only after laboratory testing confirms common respiratory infection [9]. Although not evaluated as part of this investigation, PPE preservation practices could result in exposure to discordant pathogens other than SARS-CoV-2 and influenza; multidrug-resistant bacterial and fungal pathogens and *Clostridium difficile* are among the pathogens that could be transmitted by direct or indirect contact when the same PPE is used to care for multiple patients. If a LTCF is faced with a high proportion of residents with COVID-19 and safe cohorting strategies are therefore impossible (e.g., the majority of residents are already infected), facilities should consult with public health authorities for guidance [10]. Management options include transferring residents or keeping residents in their rooms with use of transmission-based precautions for their care or physical barriers between beds in shared rooms to minimize pathogen spread related to frequent or complicated room movements [10].

CDC guidance on testing and best infection prevention and control practices exist for the situations faced by Facility A [9]. Following these recommendations may prevent inadvertent morbidity and mortality, including those described in this report.

Notes

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Potential Conflicts of Interest:

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*OSOM Ultra Flu A&B Test *reported* influenza A sensitivity = 89.2%, specificity = 99.4%

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TABLE 1. Characteristics among residents and staff with positive influenza and/or SARS-CoV-2 laboratory results — Los Angeles California, March 26–May 2, 2020

Resident Characteristics	No. (%)				
	Total Residents with Positive Test Results n =31/102 (30.4%)	**SARS-COV-2* & Influenza-A†** n=7/102 (6.9%)	**SARS-CoV-2*** n=21/102 (20.6%)	**Influenza-A†** n=2/102 (2.0%)	**Influenza-B§** n=1/102 (1%)
Median age, years (range)	89 (68-97)	89 (70-97)	88 (73-97)	80 (68-92)	92
Sex					
Male	6 (19.4%)	1 (14.3%)	5 (23.8%)	0	0
Female	25 (80.6%)	6 (85.7%)	16 (76.2%)	2 (100%)	1 (100%)
Wing					
East	23 (74.2%)	6 (85.7%)	16 (76.2%)	1 (50%)	0
West	8 (25.8%)	1 (14.3%)	5 (23.8%)	1 (50%)	1 (100%)
Outcome					
Hospitalized [died in hospital]	18 (58.1%) [13 died]	5 (71.4%) [4 died]	13 (61.9%) [9 died]	0	0
Died in hospital or LTCF	17 (54.8%)	5 (71.4%)	12 (57.1%)	0	0

Staff Characteristics	No. (%)				
	Total Staff with Positive Test Results n =24/123 (19.5%)	**SARS-COV-2* & Influenza-A†** n=1/123 (0.8%)	**SARS-CoV-2*** n=23/123 (18.7%)	**Influenza-A** n=0/123	**Influenza-B** n=0/123
Median age, years (range)	43 (23-59) (n=23)	53	43 (23-59) (n=22)	NA¶	NA¶
Sex					
Male	5 (20.8%)	0	5 (21.7%)	NA	NA
Female	19 (79.2%)	1	18 (78.3%)	NA	NA
Unknown	0	0	0	NA	NA
Wing					
East	15 (62.5%)	1	14 (60.9%)	NA	NA
West	5 (20.8%)	0	5 (21.7%)	NA	NA
Unknown	4 (16.7%)	0	4 (17.4%)	NA	NA
Outcome					
Hospitalized	1 (4.2%)	0	1 (4.3%)	NA	NA
Died	0	0	0	NA	NA

*Positive results using CDC 2019-Novel Coronavirus (2019-nCoV) Real-Time RT-PCR Diagnostic Panel

†Positive results using OSOM Ultra Plus Flu A&B Test Rapid Antigen Assay

§ Positive results using CDC Human Influenza Virus Real-Time RT-PCR Diagnostic Panel kits for Influenza A/B typing (VER 2). This influenza B case was identified in the point prevalence survey and was the only influenza case identified with a nucleic acid test during the study period.

¶ Not applicable (no positive patients)