



Research Article

Impact of a COVID-19 outbreak in a long-term care facility in Barcelona, Spain: The role of a COVID-19 prevention and control program

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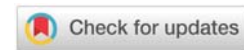
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Abstract

Background: COVID-19 outbreaks in long-term care facilities are a significant impact on infection rates and mortality rates of the residents. The study aimed to describe the effectiveness of a COVID-19 prevention and control (CPC) program in a long-term care facility.

Methods: A CPC program, including social isolation, active symptoms screening for all residents and staff, SARS-CoV-2 testing for symptomatic individuals, droplet and contact isolation measures for asymptomatic residents, confinement of the unit and clinical care in a separate unit for patients, was implemented in a long-term care facility with two geriatrics and two psychiatric units, with a total of 300 beds. The attack rate was calculated as the number of COVID-19 confirmed cases divided by the total number of exposed individuals and case fatality rate as the deceased COVID-19 cases divided by the total number of COVID-19 cases.

Results: Two geriatric (unit-1 and 2) and one psychiatric (unit-4) units were affected by the outbreak. Attack rates were 26/47(55.3%) for unit-1, 15/29(51.7%) for unit-1 and 11/46(23.9%) for unit-4. Case fatality rates were 3/25(12.0%) for unit-1 and 2/16 (12.5%) for unit-2 and no patient from the unit-4 died. Among healthcare professionals, total attack rate was 30/124(24.2%) with no differences between units. Viral pneumonia was present in 13(25%) residents and all healthcare professionals had mild COVID-19.

Conclusions: Timely institution of a CPC program with close monitoring of all exposed individuals are essential to decrease the negative outcomes of COVID-19 outbreaks in long-term care facilities. Droplet and contact isolation for all residents is a useful alternative to wide-facility SARS-CoV-2 testing.

Introduction

The COVID-19 pandemic (coronavirus disease 2019) is a devastating disease that has affected more than a hundred countries causing a serious impact on the health, economy and society [1]. COVID-19 mortality is higher in people aged 60 years or over and with underlying medical conditions, such

as cardiovascular disease, chronic respiratory disease, diabetes and cancer [2-5]. During the ongoing COVID-19 pandemic, long-term care facilities and other congregate living settings have been identified as high-risk settings for severe outbreaks and poor outcomes [6-11]. These facilities are particularly susceptible as many of their residents are older, frail, with disabilities and multiple and severe chronic comorbidities or

immunocompromised status [12]. Moreover, clinical and social characteristics of long-term care facilities provide an ideal environment for acquisition and spread of COVID-19, resulting in large outbreaks [6-11]. Gathering of a large number of residents who share multiple resident rooms, group activities and clinical care, together with a high number of health care professionals and visitors, are factors that promote the coronavirus spreading in the facility [13,14]. Moreover, control measures are difficult to enforce for residents with dementia and behavior disturbances [13,14]. In addition, most facilities are poorly prepared to implement infection control policies owing to shortage of protective equipment and relatively low level of staff training [13-15].

Anyway, the rapid evolution and mortality of COVID-19 outbreaks in long-term care facilities highlight the critical need of implementing a strong COVID-19 prevention and control (CPC) program to protect both residents and Healthcare Professionals (HCP) [16-18]. However, characteristics and functioning of CPC programs vary depending on the resources of each facility [6-11], so studies are necessary to evaluate the effectiveness of CPC programs to reduce the morbidity and mortality of outbreaks in long-term care facilities.

Therefore, the objective of this study was to describe the effectiveness of a COVID-19 prevention and control action program, including social isolation, active symptoms screening for all residents and staff, SARS-CoV-2 testing for symptomatic individuals, droplet and contact isolation measures for asymptomatic residents, confinement of the unit and clinical care in a separate unit for patients in a long-term care facility during the first wave of COVID-19 epidemic in Spain [19].

Material and methods

Setting

The study was conducted at the Emili Mira Healthcare Center, a public acute and long-term care center for medical and psychosocial rehabilitation in Barcelona, (Spain) dependent on a large tertiary teaching hospital. The center had 2 main buildings for clinical care: The Central Building and the Levante Building. The Central Building offered acute psychiatric care in 4 units with a total of 100 beds. The Levante Building was the long-term care facility and had 4 units with 50 bed each one. Units 3 and 4 were for psychiatric care, and units 1 and 2 for geriatric care. The psychiatric units offered long-term mental health care for people with severe mental disorders and geriatric units offered care for patients >65 years who were recovering from an illness or surgery and needed the assistance of a caregiver for activities of daily living, such as eating, bathing, and taking oral medications at the correct time, in addition to ongoing medical care.

Nurses, physicians, physiotherapist and social workers were the HCP involved in the clinical care of patients. Each unit had its own medical staff but some nurses and physicians were shared between units and buildings depending on clinical programs. There were resting areas for each specific unit and a shared locker room located in the Central Building for all HCP.

Interventions

From the beginning of the national state of alarm (declared on the 14th March, 2020), a structured CPC program was implemented in the facility to prevent and control COVID-19 among residents. The CPC program was designed by the clinical staff and was approved by the medical direction of the facility. The CPC program was coordinated by a physician specialized in infectious diseases and included preventive measures for residents, HCP and facility according to the international guidelines [16-18].

Residents

All residents were screened for symptoms every day and axillary temperature every 8 hours. A determination of coronavirus SARS-Cov-2 real time reverse-transcription-polymerase chain reaction (cobas® SARS-CoV-2 Test Roche laboratories) in nasopharyngeal samples was done for any suspected case of COVID-19. Residents who tested positive for SARS-CoV-2 were transferred to a specific acute care unit inside the facility. Before the outbreak New resident admissions were admitted and were placed in quarantine during the first 14 days. New resident's admissions were cancelled during the outbreak.

HCP

HCP were checked themselves for fever and symptoms of COVID-19 at the beginning and during the work shift. Symptomatic HCP were tested for coronavirus SARS-CoV-2 and positive cases were isolated at home until recovering and having a negative test, HCP were educated on correctly performing hand hygiene and the use of personal protective equipment according to local guidelines.

Facility

All groups' activities, including communal dining were cancelled and older people were locked in their room with droplet and contact isolation measures. Family and caregiver visits were restricted but residents could establish video call once a day through an electronic device supervised by assistant nurses. Resident clothes and linens were changed every day for all residents, as well as medical clothes for HCP. The number of cleaning times of the rooms and staff office was doubled and droplet and contact isolation measures were established for all individuals. A specific acute care unit for residents with confirmed COVID-19 was created in the facility, which was placed on a different floor and worked with own medical staff. All measures were finished in each unit 14 days after the last COVID-19 diagnoses in residents or HCP.

Definitions

The COVID-19 primary case was defined as the first case diagnosed among residents or HCP. COVID-19 confirmed cases were defined as symptomatic resident or HCP who had tested positive in the SARS-CoV-2 RT-PCR. Total number of residents exposed included all the patients who were residing in each unit at the time of the primary case diagnosed and those who

were discharged in the previous two days to the primary case diagnosed. Total number of staff exposed included all HCP who were working in each unit at the at the time of the primary case diagnosed and those who were working in the previous two days to the primary case diagnosed. The duration of the outbreak included the period between the diagnosis of the primary case and the last case diagnosed,

The main variables of the study were the attack and case fatality rates of the residents and the HCP. The secondary variables of the study were the description of the clinical characteristics of patients and HCP with COVID-19.

The attack rate was calculated as the number of confirmed cases divided by the total number of exposed individuals, and case fatality rate as the deceased confirmed cases divided by the total number of confirmed.

Statistics

Descriptive statistics was expressed as mean and standard deviation, whereas quantitative variables with nonparametric distribution were expressed as median and interquartile range. Absolute frequencies and percentages were expressed for the qualitative variables. One-way ANOVA and Kruskal-Wallis test were used to compare quantitative variables. Analyses were made using SPSS software, version 17.0.0 (Chicago, Illinois).

Ethics

The study followed the ORION statement guidelines for transparent reporting of outbreak reports and intervention studies of nosocomial infection [20] and complied with the ethical statements in the Declaration of Helsinki (64th General Assembly, Fortaleza, Brazil, October 2013).

Results

The outbreak affected the two geriatric (unit-1 and 2) and one the psychiatric (unit-4) units of the long-term care facility (Levante Building). There were 122 residents (47 unit-1, 29 unit-2, 46 unit-3), and 124 HCP (61 unit-1, 23 unit-2, 14 shared between unit-1 and unit-2 and 26 in unit-4) exposed during the outbreak. The primary case was diagnosed on March 12 in a regular HCP of the unit-4 and the last confirmed case on April 24 in a resident of the unit-1. In total there were 82 confirmed COVID-19 cases: 52 in residents and 30 in HCP. Duration of the outbreak was 20 days for the unit-4 (March 12 to March 31), 23 for the unit-2 (March 17 to April 7) and 30 for the unit-1 (March 23 to April 22). The epidemiological curve for each unit is shown in the Figure 1.

Clinical characteristics and attack and case fatality rates of residents with COVID-19 are showed in Table 1. Residents from the geriatric units were older, had lower functional index and higher comorbidity, COVID-19 pneumonia, attack and case fatality rates compared to the residents from the psychiatric unit.

Among HCP, the median age was 38 (IQR: 26-51) years and 24/30 (77.4%) were women. All cases were mild COVID-19 and

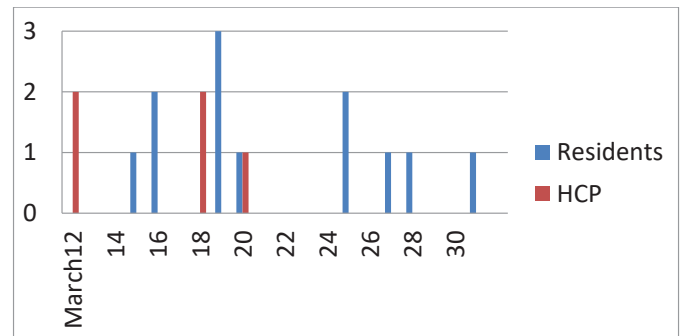


Figure 1: Epidemic curve for unit-4 of the long-term care facility.

Table 1: Clinical characteristics of residents with COVID-19 from the long-term care facility.

Variable	Unit-1 (geriatrics)	Unit-2 (geriatrics)	Unit-4 (psychiatry)	P
n	26	15	11	
Age ¹	80.4±9.1	77.3±4.1	55.4±6.3	0.04
gender	14(53.8%)	7(46.6%)	7(63.6%)	0.38
Charlson index ²	6.5(5-8)	6(4-7)	1.5(1-3)	0.06
Barthel index	40(10-50)	40(30-50)	100(100-100)	0.01
Pneumonia	8(30.7%)	4(26.6%)	1(9.1%)	0.37
Attack rate	26/47 (55.3%)	15/29 (51.7%)	11/46(23.9%)	<0.01
CF rate	3/26(11.5%)	2/15 (13.3%)	0	0.96*

Data are presented as No. (%) unless otherwise indicated. 1: Data presented as mean ± standard deviation. 2: Data presented as median and interquartile range. CF: Case Fatality; * Comparison between geriatrics units.

none HCP died. The total attack rate was 30/124(24.2%) with no differences between units: 14/75 (18.6%) for unit-1, 12/37 (32.4%) for unit-2 and 5/26(19.2%) for unit-4 (p 0.23).

Discussion

The results of this study describing the effectiveness of a CPC program focused on symptom-based screening, showed similar results than programs based on facility-wide SARS-CoV-2 testing in terms of incidence [10]. Facility-wide testing is essential to detect asymptomatic patients who can keep active the outbreak in the facility [21,22]. However, the virus spread has already occurred at the time the first case is identified in the facilities and some patients can test negative because the disease is under the incubation period [9] and thus, implementing isolation measures by contact and drops for all residents at this time is a suitable preventive measure to control the outbreak. The results of this study supports this option for CPC programs of facilities which have limited access to laboratory for asymptomatic patients.

Moreover, this study showed nearly twice of infections among residents of geriatric units compared to the psychiatric unit. This fact is important, as residents from the geriatric units had high needs of nursing care secondary to their functional disability, according to the Barthel index, that predisposed them to an intense contact with HCP during the daily routine care [23], which is a risk factor for infection [24,25]. Thus, HCP should be aware of the risk of nursing care and adhere strictly to CPC practices to prevent the spread of infection.

Another point of interest of this study was that the primary case of each unit was diagnosed in one HCP, and later in residents and others HCP, as it was seen in the epidemic curve. This fact highlights the importance of checking symptoms of HCP and policies to avoid that symptomatic HCP continued working in the facility [26-28]. By contrast, staff rotation between care units could not be avoided in this study, which could spread COVID-19 to others units, particularly if they were asymptomatic [29-30]. Otherwise, the high attack rate among HCP observed in this study, in spite of availability of the personal protective equipment, suggests some deficiencies in the compliance and adherence to preventive measures. During outbreaks, there are considerable disruptions in the clinical care routine, such as leave staff absenteeism, fear to the infection, low experience using personal protective equipment, increased workload and relaxing preventive measures over time and at work breaks, which can affect the compliance and adherence to preventive measures [31,32]. Anyway, regular auditing and feedback from observation of staff workflow could be a useful option to maintain optimal HCP adherence to preventive measures during outbreaks [33].

It is also necessary to note the low mortality among patients with COVID-19 in this study, who had several factors for high risk mortality [2-4] as older age, comorbidities and functional dependency. Probably early diagnosis and treatment in a specific unit with a comprehensive clinical care [34], could contribute to this result.

This study has some limitations and advantages. Lack of a facility-wide SARS-CoV-2 testing initiated before identification of a COVID-19 case is essential to prevent outbreaks and to detect asymptomatic patients who can spread the virus during outbreak [10]. However, the CPC program, including droplet and contact isolation to prevent that hypothetical asymptomatic patients spread the virus, proved to be effectiveness for controlling the outbreak in a more difficult and complex center, with two facilities, high number of residents and HCP and common spaces for HCP [11].

Given that antiviral drugs have failed to prevent COVID-19 after exposure, specially hydroxychloroquine [35,36], future line of research should be focused on health policies that generalize the incorporation of CPC programs, including facility-wide SARS-CoV-2 testing. Additionally, incorporation of SARS-CoV-2 antigen tests for the screening of asymptomatic residents and HCP should be evaluated [37].

Conclusions

In conclusion, COVID-19 outbreaks in long-term care facilities cause serious adverse outcomes among residents and affect a high number of HCP. The extent to which COVID-19 outbreaks in these facilities can be prevented and reduced their clinical impact depend on the application of

Community-facility contact restrictions, increased testing of residents and staff, and heightened infection control including more access to personal protective equipment for staff. In facilities where wide testing SARS-CoV-2 is restricted

for asymptomatic residents, droplet and contact isolation measures for all residents is a useful alternative.

As the COVID-19 crisis continues, long-term care facilities are in critical need of these resources to protect their vulnerable populations.

1. Highlights A COVID-19 prevention and control program is necessary to reduce the negative clinical impact of COVID-19 outbreak, especially in older adults with comorbidities and disabilities.
2. Including a droplet and contact isolation for all residents in the program is a useful alternative to wide-facility SARS-CoV-2 testing.

Authors' declaration

Conflicts of interest to declare by author due to financial and personal relationships that could potentially bias this work: none.

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