

COLLABORATIVE EXPERIENCE BETWEEN HOSPITAL AND LONG-TERM FACILITIES FOR THE CARE OF PATIENTS WITH COVID-19

Pilar Sáez-López (1,2), Ana Belén Arredondo-Provecho (3) and the multidisciplinary working team group on care in nursing homes

(1) Geriatrics Unit, Hospital Universitario Fundación Alcorcón. Madrid. Spain.

(2) Research Institute of the Hospital Universitario La Paz, "IdiPaz". Madrid. Spain.

(3) Preventive Medicine and Public Health, Hospital Universitario Fundación Alcorcón. Associate Professor Universidad Rey Juan Carlos. Madrid. Spain.

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ABSTRACT

Background: The disease produced by SARS-CoV-2 has led to severe situations and mortality in elderly people. The objective of this study was to describe the collaboration between hospital professionals and nursing homes when applying preventive measures for the transmission of COVID-19 and in the assistance of institutionalized patients.

Methods: A descriptive study was carried out in 4 centers with information collected by researchers in two moments of the COVID-19 pandemic. The information collected was related to the resources and knowledge of infection prevention, details about face-to-face and telematic assistance from the hospital team, as well as material, drugs provided, and clinical results. Statistical chi-square tests and McNemar's test were used.

Results: The study was conducted in 4 centers with a total of 640 residents and an initial occupancy between 62% and 85%. Differences were found regarding the ratio of staff and knowledge of preventive measures of the transmission of SARS-CoV-2 infection, which was improved in the second period of the study. The number of face-to-face visits (from 5 to 22) and telematic visits (between 42 and 109 patients) were different in the 4 nursing homes, as well as the material provided, adapted to the needs of each center. The percentage of infected patients ranged from 6.1% to 90.2%, and the accumulated mortality in the second period ranged from 15.38% to 38.35% of the residents at the beginning of the pandemic.

Conclusions: The collaboration between the professionals of healthcare centers and the hospital, adapted to the needs of each center, has allowed to improve the assistance to the residents and the coordination between the professionals, optimizing the available resources.

Key words: Long-term care facilities, Nursing homes, Coordination, Health professionals, Elderly care, COVID-19.

RESUMEN

Experiencia de colaboración entre hospital y centros sociosanitarios para la atención de pacientes con COVID-19

Fundamentos: La enfermedad producida por SARS-CoV-2 ha provocado situaciones de mayor gravedad y mortalidad en las personas mayores. El objetivo de este estudio fue describir la colaboración entre profesionales del hospital y de las residencias en la aplicación de medidas de prevención de la transmisión de COVID-19 y en la asistencia de pacientes institucionalizados.

Métodos: Se realizó un estudio descriptivo en 4 centros sociosanitarios con información recogida por los investigadores en dos momentos de la pandemia por COVID-19. Se recogió información relacionada con los recursos y conocimiento de la prevención de infecciones, detalles sobre la asistencia presencial y telemática del equipo del hospital, así como material, fármacos suministrados y resultados clínicos. Las variables estudiadas se describieron mediante porcentajes, frecuencias absolutas y ratios y se utilizaron las pruebas estadísticas de chi cuadrado y el test de Mc-Nemar.

Resultados: Se realizó el estudio en 4 centros con un total de 640 residentes y una ocupación inicial entre el 62% y 85%. Se encontraron diferencias respecto al ratio de personal, conocimiento de medidas de prevención de transmisión de la infección por SARS-Cov 2, mejorando este último en el segundo periodo de estudio. El número de consultas presenciales (de 5 a 22) y telemáticas (entre 42 y 109 pacientes) fueron diferentes en las 4 residencias, así como el material aportado, adaptándonos a las necesidades de cada centro. El porcentaje de pacientes contagiados varió entre el 6,1% y el 90,2% y la mortalidad acumulada en el segundo periodo osciló entre el 15,38% y el 38,35% de los residentes que había al principio de la pandemia.

Conclusiones: La colaboración entre los profesionales de los centros sociosanitarios y del hospital adaptada a las necesidades de cada centro ha permitido mejorar la asistencia a los residentes y la coordinación entre los profesionales, optimizando los recursos disponibles.

Palabras clave: Centros sociosanitarios, Residencias, Coordinación, Profesionales sanitarios, Cuidados a personas mayores, COVID-19.

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Correspondence:

Pilar Sáez López

Hospital Universitario Fundación Alcorcón

C/ Budapest, nº 1

28922 Alcorcón, Madrid, España

mpsaez@fhalcon.es

INTRODUCTION

In January 2020 the SARS-CoV-2 virus disease known as COVID-19 was detected in Wuhan, China. The outbreak transmission was so quick that on 11th March the World Health Organization (WHO) classified it as a pandemic⁽¹⁾. Currently, it is affecting the entire world, with 36,754,395 cases and 1,064,834 deaths as of 9th October⁽²⁾. Italy was the first European country to report local transmission⁽³⁾. Other countries such as Spain are heavily affected, with a total of 861,112 cases, of which 261,762 in the Community of Madrid and 32,929 deaths, of which 9,739 have been in the same community as of 9th October 2020⁽⁴⁾.

The risk of severe SARS-CoV-2 infection and death is much higher in older patients and/or those with comorbidity^(5,6,7).

While in the general population, the most common symptoms were fever, cough, dyspnea, myalgia, anosmia and respiratory distress⁽⁸⁾, in the elderly, it manifested atypically with delirium, instability, diarrhea, falls and asymptomatic, who were up to 50% of infected patients^(9,10).

The greater degree of frailty, functional dependence and cognitive impairment of people living in nursing homes means that they require more assistance, which increases contact with workers and with each other because they share rooms and common rooms. These facts, together with the contagion of the workers themselves and their poor training in infection prevention, contributed to the transmission of SARS-CoV-2 disease in these centers^(11,12).

All these circumstances determine the data available on the incidence and mortality of elderly people in nursing homes during the pandemic, with figures varying between 30% and 60% of those infected, depending on the series,

and a mortality of 33% in only 3 weeks after the first diagnosed case⁽¹³⁾.

There are known modifiable factors, endorsed by the recommendations of the WHO and the British Geriatric Society Center for Disease Control, which can reduce the impact of the pandemic, such as providing protective material and training in its use together with education in hand hygiene and surface cleaning, such as providing protective material and training in its use together with education in hand hygiene and surface cleaning. Further impact could be achieved by providing tests to identify those infected and isolate them, sectorization to prevent new infections and trying to ensure that there are workers to meet the demands for each group of patients in specified areas or spaces to avoid the transmission. The implementation of these measures is not easy because of the great heterogeneity of nursing homes, the changing situation, the variability in the architecture of the buildings, the presence of a leader or manager who knows the rules and ensures compliance, and the availability of human resources and protective equipment^(11,12,14,15,16).

On March 24th, the Spanish Ministry of Health also published the Guide to prevention and control of COVID-19 disease in nursing homes and other social services center, which includes adapted contingency plans and measures to protect residents and workers' health⁽¹⁷⁾.

Considering the paramount importance of COVID-19 disease in institutionalized elderly people and the difficulty of preventing contagion in this environment, it is essential to carry out a multidisciplinary plan, individualized for each center, and to implement measures to prevent transmission and provide the highest quality care.

At the Hospital Universitario Fundación Alcorcón (HUFA), there was already collaboration between the Geriatrics, Internal Medicine,

Care's Continuity and Preventive Medicine services and the four nursing homes to facilitate access to hospital resources for residents, by means of clinical advice, procedures for tests or treatments, video calls and regular face-to-face consultations by the Internal Medicine Service since 2017 and with the Geriatrics Unit since 2019. Besides, regular sessions on basic hygiene and disinfection measures to prevent the transmission of microorganisms, proper waste management and handling of residents with infectious pathologies and multi-resistant pathogens were given to all workers. When the pandemic was declared, the Community of Madrid appointed a liaison geriatrician in all public hospitals to intensify clinical support and implement preventive measures to avoid dissemination and thus improve the care of residents with suspected SARS-CoV-2 infection. The hospital delegates this task to a team of a geriatrician, two nurses of preventive medicine, a physiotherapist and an internal medicine resident.

The aim of this article was to present the experience of collaboration between the hospital and residential healthcare team in the care of patients and in the application of transmission prevention measures of COVID-19 disease in four nursing homes and to describe the implementation and clinical outcomes in each of them.

SUBJECTS AND METHODS

This article is a descriptive study carried out in two time periods during the pandemic in 2020, in the four nursing homes of Alcorcón, a municipality in the Community of Madrid. The first period was from 20th March to 20th April and the second from 21st April to 15th May.

The intervention of the hospital care team (liaison geriatrician and nurses of preventive medicine) was adapted to all needs detected in each nursing home, taking into account the

resources available to them, although the same general prevention guidelines and treatment protocols were used in all of them, following the recommendations of the guidelines of the Ministry of Health and the Community of Madrid.

The geriatrician's main task was to coordinate care, advising the doctors and assessing the individual clinical needs of each resident in terms of tests, medication and hospital referral if necessary. While the nurses focused their work on training workers, advising residents of the measures that were put in place together with the nurses, doctors and directors of each center, implementing and monitoring hygiene and dissemination control measures, such as sectorization, isolation, establishing food, clothing and waste circuits. Also, they participated in defining hot, warm and clean areas to avoid contagion, putting up information signs and instructing in the use of personal protective equipment (PPE), as well as advising the nurses of the center on what they needed. Furthermore, the material needed was provided for residents' care and protective equipment for the professionals when they were not available, although the hospital also lacked of material. We also collaborated with the geriatrician in the procedures required and diagnostic tests were carried out and completed, with the limitations based on the availability of the laboratory to carry out microbiological tests (polymerase chain reaction: PCR).

To collect the information, the authors of this article designed a specific form, but it is not validated. It was completed with the data provided by the responsible for each center and the hospital team's own register with information related to the human and material resources of the residences and clinical support of the hospital, as well as patients suspected of suffering from COVID-19 disease. The data were evaluated at two points in time during the pandemic.

Some variables referred to two specific days, one day of each period, and other data referred to both time periods of several days.

There were three types of variables collected:

i) Concerning the characteristics of the nursing home, human and material resources and knowledge of infection prevention: number of residents, ratio of medical, nursing and assistant workers, availability of hydroalcoholic solutions and disinfectants, differentiated circuits according to the location of infected patients or not, respect for defined areas and specific workers for each area, waste management, cleaning, application of precautions to prevent transmission, knowledge of the indication and correct use of personal protective equipment (PPE), availability of PPE and masks.

ii) Assistance from the hospital team and material provided from the hospital to the nursing home: number of visits weekly made by geriatrician, nurses and physiotherapist, number of residents with telephone and face-to-face follow-up by Geriatrics, material provided and tests carried out (drugs, protective material and diagnostic tests for SARS-CoV-2 and blood tests).

iii) Clinical outcomes in patients including any person living in the nursing homes in the area with suspected COVID-19 disease: date of the first suspected or confirmed case with SARS-CoV-2 infection, number of infected, number of admissions to hospital, number of people cured and number of deceased ones. Patients for whom the hospital team is not consulted or without clinical symptoms suggestive of COVID-19 disease were excluded from the analysis.

The variables studied were described using percentages, absolute frequencies and ratios. The chi-square test and the McNemar test were

used to compare the variables. Data analysis was carried out using the statistical program SPSS for Windows version 21.

The study was approved by the Clinical Research Ethics Committee on Medicinal Products of the Hospital Universitario Fundación Alcorcón.

RESULTS

Characteristics of care homes: human and material resources and knowledge about infections. The characteristics of the four social and healthcare centers were heterogeneous in terms of size, number of residents, workers ratio, public and/or private ownership and resources, as shown in [table 1](#) (nursing homes were codified with the following: nursing home 1-NH1, nursing home 2-NH2, nursing home 3-NH3, nursing home 4-NH4).

In the first study period, the percentage of occupation with respect to authorized places varied between 81-85% for NH2, NH3 and NH4 and 62% for NH1. In all of them, occupation decreased in the second study period, between 8.2% and 21.3%.

Regarding human resources ([table 1](#)), differences were found in terms of workers ratios between the 4 nursing homes in the different categories, with nursing home 1 standing out with lower ratios. This situation improved in the second period in centers 1 and 4 following the incorporation of workers on sick leave, new agreements and a reduction in the number of residents.

With reference to knowledge about infection transmission prevention and availability of protective material ([table 2](#)), a shortage of material resources and difficulty in their proper use was observed in the first period in the NH1. The evolution of the variables measuring the

Table 1
Characteristics of nursing homes and human resources.

| Characteristics | First period from 20 th March to 20 th April 7 th of April | | | | Second period from 21 st April to 15 th May 4 th of May | | | |
|---|--|----------------------|------------------------------|---------------------|---|----------------------|-------------------------------|---------------------|
| | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 |
| Number of residents | 120 | 120 | 147 | 150 | 71 | 102 | 114 | 111 |
| Authorized places | 146 | 148 | 180 | 177 | 146 | 148 | 180 | 143 |
| Occupation | 82% | 81% | 82% | 85% | 49% | 69% | 63% | 78% |
| Medical care (hours/weeks) | 40 | 70 | 168 | 75-80 | 40 | 70 | 168 | 145 |
| Nursing care (24 hours/day) | 2m ^(*) -2a ^(*) -2n ^(*) | 2m-2a-1n | 3m-3a-1n | 3m-3a-2n | 2m-2a-2n | 2m-2a-1n | 3m-2a-1n | 6m-3a-2n |
| Ratio of nurses/residents | 1:60; 1:60; 1:60 | 1:55; 1:55; 1:111 | 1:47; 1:47; 1:70 | 1:50; 1:50; 1:75 | 1:41; 1:41; 1:41 | 1:55; 1:55; 1:111 | 1:45; 1:68; 1:136 | 1:24; 1:49; 1:74 |
| Assistant nursing technician care (24h/day) | 9m-8a-3n | 14m-13a-3n | 21m-0a 6 shifts of 12h | 3m-21a-8n | 9m-8a-3n | 14m-13a-3n | 15m-0a-5m shifts of 12h | 24m-21a-6n |
| Ratio of assistant nursing technician/residents | 1:13; 1:15; 1:40 | 1:8; 1:8; 1:4 | 1:8; 1:23 | 1:8; 1:7; 1:19 | 1:9; 1:10; 1:27 | 1:9; 1:27 | 1:9; 1:27 | 1:6; 1:7; 1:24 |
| Cleaning/resident ratio | 1m-1a-0n | 9m-7a-0n | 6m-1a-0n | 17m-12a-0n | 4m-2a-0n | 9m-7a-0n | 5m-1a-0n | 25m-11a-0n |
| (*) m=morning; a=afternoon; n=night. | | | | | | | | |

availability of protective material and learning about infection prevention improved in all centers one month after the start of the pandemic (table 2), although one of them showed a good implementation of the measures from the beginning of the pandemic (NH2).

All centers operated under the protocols of the Regional Social Politics, Family, Equality and Natality and the Health Department, which were regularly updated.

Hospital team assistance and material provided by the hospital (tables 3 to 5). Attendance by the nurses of preventive medicine at nursing homes was adapted to each one needs, varying

between 16 and 7 visits in a month, as shown in table 3.

The liaison geriatrician's counselling work was mostly by telephone, following the instructions of the Regional Ministry, in order to be able to attend all nursing homes on a daily basis and maintain the hospital care work assigned to them. There was a significant difference in the number of residents attended by geriatricians both in person (higher in nursing homes 1, 2 and 3) and by telephone (with higher figures in nursing homes 3 and 4).

Regarding protective material (table 4), the same material was delivered as was used in the

Table 2
Material resources and knowledge of infection transmission prevention measures related to the care of residents.

| Resources | First period from 20 th March to 20 th April 7 th of April | | | | Second period from 21 st April to 15 th May 4 th of May | | | |
|--|--|-----------|---|--|---|-----------|-----------------------------------|-----------|
| | N. home 1 | N. home 2 | Nursing home 3 | Nursing home 4 | Nursing home 1 | N. home 2 | N. home 3 | N. home 4 |
| | NO HUFJA ^(*) PROVIDES | YES | YES HUFJA ^(*) PROVIDES TO MEET A GROWING NEED | YES | YES | YES | YES | YES |
| Availability of hydroalcoholic solutions | NO HUFJA ^(*) PROVIDES | YES | YES HUFJA ^(*) PROVIDES TO MEET A GROWING NEED | YES | YES | YES | YES | YES |
| Availability of surface disinfectant | YES | YES | YES | YES | YES | YES | YES | YES |
| Know the use and dilution of disinfectant | NO | YES | YES | YES | YES | YES | YES | YES |
| Defined COVID-19 circuits (+ and -) | NO | YES | YES | YES | YES | YES | YES | YES |
| Circuits are respected | NO | YES | YES | NO | YES | YES | YES | YES |
| Signposting of the area | NO | YES | NO | NO | NO BUT THEY KNOW COVID-19 RESIDENTS LOCATION | YES | YES | YES |
| Waste manager | NO | YES | NO | YES | NO | YES | NO | YES |
| Adequate cleaning | NO | YES | YES | YES | NO | YES | YES | NO |
| Workers are aware of the measures to be applied in each case | NO | YES | YES | NO | YES | YES | YES | YES |
| Know the precautions to prevent the transmission of microorganisms | PRE-PANDEMIC FORMATION. DIFFICULTIES IN APPLYING IT | YES | YES | NO | YES | YES | YES | YES |
| Know the indications of PPE. Correct use according to the task to be carried out | NO | YES | YES | SESSIONS ARE PROVIDED TO ALL STAFF ON ALL SHIFTS | YES | YES | YES | YES |
| Availability of PPE | NO | YES | YES | YES | SHORTAGE | YES | YES HUFJA ^(*) PROVIDES | YES |
| Availability of masks | NO, JUST FFP2 WITH INAPPROPRIATE USE | YES | YES, FOR THE STAFF. HUFJA ^(*) PROVIDES FOR RESIDENTS | YES | YES | YES | YES | YES |
| Specific workers for the COVID-19 defined area | NO | YES | YES | YES | NO BUT START THE ACTIVITY BY CLEAN ZONE AND DECONTAMINATE THEMSELVES | YES | YES | YES |

(*) HUFJA: Hospital Universitario Fundación Alcorcón. The equipment provided corresponded to donations and wasn't certified.

Table 3
Hospital team assistance.

| Assistance | First period from 20 th March to 20 th April | | | | Second period from 21 st April to 15 th May | | | |
|--|--|----------------|----------------|----------------|---|----------------|----------------|----------------|
| | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 |
| N° visits/week nurses of preventive medicine | 16 | 7 | 10 | 15 | 4 | 4 | 4 | 6 |
| N° visits/week geriatrician/doctor | 8 | 10 | 2 | 1 | 1 | 1 | 2 | 2 |
| N° residents assisted in person | 20 | 21 | 22 | 5 | 18 | 7 | 21 | 15 |
| N° residents assisted by phone | 42 | 60 | 109 | 88 | 22 | 48 | 90 | 85 |

hospital itself, and again differences were observed, with a greater contribution to nursing homes 1 and 3, although NH3 also had weekly donations that covered their needs. Nursing homes 2 and 4 had sufficient material from the beginning because they were supplied or through private purchase.

In relation to the hospital drugs provided by the hospital Pharmacy, most were intravenous antibiotics and hydroxychloroquine (with a greater contribution to nursing homes 3 and 4). The drugs were provided with a prescription from geriatrics to the patient who needed them, applying a protocol drawn up and agreed in the hospital and known by the nursing home doctors, so that all the centers had the same access to this resource for their patients (table 4).

The possibility of performing PCR for COVID-19 diagnosis in the hospital itself was limited by the capacity of the laboratory and the tests were distributed according to the clinical indication at any moment. During the study periods, two centers were able to perform PCR either privately or through a university laboratory (table 5).

Clinical patients' outcomes (table 6). At the beginning of the pandemic, the total number of residents among the 4 nursing homes was 640. The prevalence of residents with suspected or confirmed COVID-19 disease was compared on two specific dates of the two periods (7th April and 4th May). In the second period the number was higher (223 vs. 138) and the difference between periods was statistically significant in all nursing homes, but the NH2 was lower in the second study period, as shown in table 6.

Cases of residents with suspected or confirmed COVID-19 disease among all those in the nursing home on 7th April ranged from 6.1% to 90.2%. Considering both periods, nursing homes 1 and 4 had the highest number of cases, with a significant difference ($p=0.0001$). The number of residents requiring hospital admission was higher in the first period. NH3 and NH4 admitted more residents in all the study.

The number of deaths was much higher in the first period in all nursing homes. The cumulative morbidity of NH1 and NH4 on 4th May among residents at the beginning of the pandemic was higher than in the other two

Table 4
Protective and pharmacological material provided by the hospital.

| Material | First period from 20 th March to 20 th April | | | | Second period from 21 st April to 15 th May | | | |
|------------------------------|--|----------------|--|----------------|---|-------------------------|---|----------------|
| | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 |
| Masks | 10 hygienic mask bags. 2 surgical masks boxes. | - | Material to make masks and 5 surgical masks boxes. | - | 10 hygienic mask bags | Mask restraint devices | 20 hygienic mask bags. | - |
| PPEs | 30 plastic aprons and 20 waterproof gowns | - | 4 PPEs. 40 waterproof gowns | - | 54 DGM | 1 box of plastic sleeve | 20 waterproof gowns and 20 plastic aprons | - |
| Face shields | 67 | - | 34 | 20 | 20 | - | 50 | 150 |
| Disposable gown | 4 boxes of 100 | - | 2 boxes | - | 2 boxes | - | - | - |
| Gloves | 2 boxes | - | 4 boxes | - | - | - | 5 boxes | - |
| Headcovers | 2 bags | - | 2 bags | - | 2 bags | - | - | - |
| Shrouds | 10 | - | 13 | - | - | - | - | - |
| Hydroalcoholic solutions | 10 HUFA 17 DGM ^(*) | - | 5 | - | 10 | - | 5 | - |
| Antibiotic doses (vial form) | 10 | 36 | 20 | 87 | 28 | 20 | 77 | 48 |
| Hydroxychloroquine | 120 | 48 | 144 | 104 | 38 | 0 | 44 | 64 |
| Corticosteroids | - | - | - | 21 | - | - | - | - |

* DGM = Directorate General of elderly people. It is where elderly can have specific attention to their needs.

Table 5
Diagnostic tests performed.

| Tests | First period from 20 th March to 20 th April | | | | Second period from 21 st April to 15 th May | | | |
|---|--|---|-----------|--|---|-----------------------|--|--------------------------------------|
| | Nursing home 1 | Nursing home 2 | N. home 3 | N. home 4 | N.home 1 | N. home 2 | N. home 3 | N. home 4 |
| Blood tests | 4 | - | 0 | 0 | - | 2 | 3 | 4 |
| PCR | 17 | TOTAL 98. 5 HUFA and 93 private company | 19 | TOTAL 140. 20 in HUFA and 120 in Universidad Complutense | 9 | 28 private company | TOTAL 99. 19 in HUFA and 80 in Universidad Complutense | 200 in Universidad Complutense |
| Rapid tests | 100 rapid tests were received as donation. HUFA gives 24 | 25 HUFA | 100 HUFA | Rapid tests > 100 | DGM50 | 0 | 0 | 0 |
| Disinfection by Military Emergency Unit | YES. Police protection equipment and civil protection intervention requested | Exterior front only. 2 private disinfections were hired for the front in the back side of the building. | YES | YES | YES | Outdoor disinfection | YES | YES |

Table 6
Clinical patients' outcomes.

| Variables | First period from 20 th March to 20 th April | | | | Second period from 2 ^{1st} April to 15 th May | | | |
|---|--|----------------|----------------|----------------|---|----------------|----------------|----------------|
| | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 | Nursing home 1 | Nursing home 2 | Nursing home 3 | Nursing home 4 |
| Date of the first suspected case | 08/03/2020 | 17/03/2020 | 02/04/2020 | 15/03/2020 | - | - | - | - |
| Total number of residents at the beginning of the pandemic | 133 | 130 | 174 | 170 | - | - | - | - |
| Total number of residents on 7 th April of the first period and 4 th May of the second period | 91 | 120 | 147 | 150 | 82 | 110 | 136 | 147 |
| Number of healthy or recovered COVID-19 residents on 7 th April of first period and 4 th May of second period | 18 | 103 | 138 | 111 | 8 | 110 | 81 | 53 |
| Number of COVID-19 residents on 7 th April of the first period and 4 th May of the second period | 73 | 17 | 9 | 39 | 74 | 0 | 55 | 94 |
| Prevalence of infected people on 7 th April and 4 th May | 80.22% | 14.17% | 6.12% | 26% | 90.24% | 0.001% | 40.44% | 63.95% |
| Cumulative mortality since the beginning of the pandemic in each period (20 th March to 20 th April and 21 st April to 15 th May) | 49 | 18 | 33 | 39 | 3 | 2 | 1 | 3 |
| Number of residents admitted in the first and second periods | 13 | 4 | 25 | 18 | 2 | 3 | 7 | 15 |
| Cumulative mortality since the beginning of the pandemic measured as of 7 th April and 4 th May | 42 | 10 | 27 | 20 | 51 | 20 | 38 | 59 |
| Cumulative mortality prevalence over residents at the beginning of the pandemic as of 7 th April and 4 th May | 31.58% | 7.69% | 15.52% | 11.76% | 38.35% | 15.38% | 21.84% | 34.71% |
| Comparison of the prevalence of COVID-19 patients by period. | <0.0001 | <0.0001 | <0.0001 | 0.2637 | - | - | - | - |
| MC - NEMAR TEST. P VALUE | | | | | | | | |

nursing homes, with figures ranging from 29.1% to 38.35%.

DISCUSSION

The intention of this article was to describe the collaborative activity between a team of Geriatrics and Preventive Medicine workers of the hospital and the care team of all nursing homes in the area, which were supported by clinical care and infection prevention guidelines.

The mode of clinical support has been similar in all centers, although adapted to individual needs. However, large differences have been observed between the four nursing homes, both in terms of human and material resources, information and adaptation of prevention measures, as well as clinical outcomes.

The activities carried out by the nurses on counselling on the use of protective measures, application of the sectorization guidelines to

each site, training sessions and review of compliance with the recommendations⁽¹⁷⁾ justified numerous visits in the first days of the intervention and were subsequently reduced in the second period due to learning and better adherence to the recommendations and improved infection control, which supports the usefulness of these measures.

The support provided by geriatrics was mostly telematics, enabling the numerous procedures and guidelines to be streamlined through hundreds of calls and e-mails. However, the geriatrician's face-to-face assistance to the centers was necessary in certain particularly critical circumstances and varied according to the number of acute patients, the availability of doctors in the hospital and the presence of health workers from the nursing home itself.

In nursing home 1, the first case was detected earlier than the rest, on 8th March, at a time when not enough was known about how to prevent the transmission. In addition, there was a lower workers' ratio in all groups, with the absence of medical workers during the first few weeks and many sick leaves that could not be covered in the first study period. In addition, there was a lack of personal protective equipment (PPE), no hydroalcoholic solutions, difficult access to tests and great difficulties in sectorization. All these circumstances must have contributed to the high number of infected patients and, as a consequence, more deaths.

In contrast, NH4 had better workers ratios, which increased considerably during the peak of the pandemic, and sufficient personal protective equipment, although the distribution and application of infection prevention measures (use of equipment, sectorization, established circuits for COVID-19 patients, adequate cleaning) was irregular at first until they learned how to act and adapt it to the center itself. For this purpose, on 11th March 2020, they received the protocol

called *Procedure of action for centers of the Regional Ministry of Social Policies, Families, Equality and Natality, against Coronavirus infection*. At this center, in collaboration with the Universidad Complutense, a complementary circuit for microbiological analysis (PCR) was implemented in March due to the fact that the laboratory at the reference hospital was not available to perform all the tests requested at the center.

Nursing home number 2 had an intermediate workers ratio and also had adequate protective measures, with correct use of these measures, assigned workers to COVID-19 zone, a significant increase in cleaning staff, as well as the possibility of early screening tests⁽¹⁸⁾ for SARS-CoV-2 privately.

These circumstances have been the key to reach fewer patients with the infection and also the lowest percentage of deaths out of the total number of residents. The performance of this center can provide guidance on best practices for dealing with this disease and future outbreaks⁽¹⁷⁾.

All centers learned to apply the method of preventing transmission of the disease as can be seen in the comparison of the 1st and 2nd period. However, recommendations such as sectorization and isolation of patients have meant that a complex individualized plan adapted to the architecture of each nursing home had to be drawn up, with the consequent unavoidable delay in the implementation of the measures. It should be borne in mind that the rooms in nursing homes, unlike those in hospitals, have a large amount of furniture, small appliances and belongings, which made it difficult to make the many changes that were indicated. This may have influenced the spread of the disease, as suggested by the results of nursing home 1, where the first case appeared early and spread before the recommendations were applied and before sectorization.

Regarding the provision of hospital drugs, prior to the beginning of the pandemic there was a limited connection between the hospital pharmacy and nursing homes 2 and 4. Collaboration was quickly extended to the rest of nursing homes, with the hospital pharmacy participating, not only in the management of requests and medicine logistics, but also in the provision of advice and pharmaceutical care, as was done by other hospital pharmacy services in our area⁽¹⁹⁾, or in those social and healthcare centers where the integration of the pharmacist is already a reality⁽²⁰⁾.

Regarding the number of infected patients in relation to the total number of residents, NH2 with 20.83% is lower than the 30.3% described by Kimball⁽¹⁰⁾ in his series, although the other three centers double the incidence, with some exceeding 50% of infected patients, taking into account the two periods. It should be noted that in this study suspected cases are counted by clinic because most of them could not be confirmed by PCR, which may overestimate the diagnosis. The calculation of infection by counting suspects has been standard practice in countries such as Canada, Ireland and Belgium, which, even at the risk of misdiagnosis, may provide a more accurate figure for COVID-19 disease mortality⁽²¹⁾.

The number of patients admitted to hospital from these centers varies between 16% and 46% of those infected, with a much higher percentage of suspected cases in one of the centers. These figures are somewhat lower than those reported by McMichael⁽²²⁾ of 56.8%. The short observation period for this data (one day of each period) and the support of the care team in facilitating treatment in nursing homes themselves may have influenced the fewer hospital referrals.

The cumulative mortality in relation to the total number of residents in each center on 4th May varied between 15.3% and 38.35%. Although

mortality among those infected was not collected, these figures suggest higher mortality in our series than in McMichael's publication⁽²²⁾ where 27.2% were counted. In this variable, again the lack of confirmation of infection must have influenced the figure and also, in the context of the pandemic, there may have been several fragile patients who died due to decompensation of their previous pathologies. The review by Comas-Herrera⁽²¹⁾ shows large differences in mortality of institutionalized patients among the total number of infected patients, ranging from 58% in Norway, 51% in Belgium, 38% in France, 30% in Spain and, curiously, 0% in South Korea and Hong Kong.

In view of the data, it is possible that the results are related to the availability of human resources, but also to the haste in initiating infection prevention measures, compliance with them and the availability of early diagnostic tests, contact detection, isolation and sectorization. It is very likely that asymptomatic patients and caregivers⁽¹⁰⁾ have played an important role in transmission due to the absence of diagnosis, so in the absence of repeated screening by testing, implementing universal transmission prevention strategies was the only measure that could contribute to reducing the serious consequences of the disease.

One of the limitations of the study is the fact that it did not collect the cases that appeared every day, and only had information for one day of each period for some variables. Additionally, the diagnosis may be underestimated, as diagnostic tests were not available for all suspects and at the peak of the pandemic asymptomatic people were not tested, with the consequent risk of spreading the infection to the rest of the population.

Conclusion. The care of institutionalized patients during the pandemic by a geriatric and preventive care team has provided advice to the residential care team on how to improve the

prevention of transmission and clinical care of the elderly. This team has observed better results in centers with adequate human and material resources, but especially in those that have carried out sufficient early diagnostic tests, which has helped them to better implement recommendations on isolation and sectorization to avoid dissemination among residents and between residents and care workers.

Continuous collaboration between a multidisciplinary hospital team and the health care team in nursing homes can improve the quality of care for institutionalized elderly people.

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REFERENCES

1. WHO covid-19. Timeline. <https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19>. [Cited 2020 Oct 19].
2. WHO COVID-19 Dashboard. <https://covid19.who.int/>. [Cited 2020 Oct 19].
3. Epicentre. COVID-19 Epi Dashboard. <https://reports.msf.net/public/covid19/>. [Cited 2020 Oct 19].
4. Actualization nº 133. Enfermedad por el coronavirus (COVID-19). 11.06.2020 (datos consolidados a las 14:00 horas del 11.06.2020). SITUACIÓN EN ESPAÑA. Ministerio de Sanidad, Consumo y Bienestar social. Madrid; 2020. Disponible en: https://www.msbs.gob.es/en/profesionales/saludPublica/ccayes/alertasActual/nCov-China/documentos/Actualizacion_133_COVID-19.pdf. [Cited 2020 Jun 12].
5. Liu W, Tao ZW, Wang L, Yuan ML, Liu K, Zhou L, Wei S, Deng Y, Liu J, Liu HG, Ming Y, Hu Y. Analysis of factors associated with disease outcomes in hospitalized patients with 2019 novel coronavirus disease. *Chin Med J* 2020;133 (9):1032–1038.
6. Cheng Y, Luo R, Wang K, Zhang M, Wang Z, Dong L *et al*. Kidney disease is associated with in-hospital death of patients with COVID-19. *Kidney International* 2020; 97: 829-838.
7. Centers for Disease Control and Prevention. Older Adults. Coronavirus Disease 2019 (COVID-19). Accessed April 4, 2020. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html>. [Cited 2020 May 6].
8. Lithander FE, Neumann S, Tenison E, Lloyd K, Welsh TJ, Rodrigues JCL, Higgins JPT, Scourfield L, Christensen H, Haunton VJ, Henderson EJ. COVID-19 in older people: a rapid clinical review. *Age Ageing*. 2020 Jul 1;49(4):501-515.
9. Diarrhée, perte d'équilibre, modification du comportement, troubles sanguins sont potentiellement des signes avant-coureurs de l'infection respiratoire du Covid-19 chez la personne âgée fragile 2020 [Available from: <https://sfgg.org/espace-presse/revue-de-presse/diarrhee-perde-dequilibre-modification-du-comportement-troubles-sanguins-sont-potentiellement-des-signes-avant-coureurs-de-linfection-respiratoire-du-covid-19-chez-la-person/>]. [Cited 2020 Aug 20].
10. Kimball A, Hatfield KM, Arons M, James A, Taylor J, Spicer K *et al*. Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled

- Nursing Facility - King County, Washington, March 2020. *MMWR Morb Mortal Wkly Rep.* 2020 Apr 3;69(13):377-381.
11. Huhtinen E, Quinn E, Hess I, Najjar Z, Gupta L. Understanding barriers to effective management of influenza outbreaks by residential aged care facilities. *Australas J Ageing.* 2019;38(1):60–63.
 12. Stanyon MR, Goldberg SE, Astle A, Griffiths A, Gordon AL. The competencies of Registered Nurses working in care homes: a modified Delphi study. *Age Ageing.* 2017;46(4):582–588.
 13. Roxby AC, Greninger AL, Hatfield KM, Lynch JB, Dellit TH, James A *et al.* Detection of SARS-CoV-2 Among Residents and Staff Members of an Independent and Assisted Living Community for Older Adults - Seattle, Washington, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:416–418.
 14. Secretaria General de Sanidad y Consumo. Dirección General de Salud Pública, Calidad e Innovación. Centro de coordinación de alertas y emergencias Sanitarias. Información científico-técnica. Enfermedad por coronavirus, COVID-19. Actualizado el 2 de junio de 2020. Disponible en: <https://www.mscbs.gob.es/profesionales/saludPublica/ccayes/alertasActual/nCov-China/documentos/ITCoronavirus.pdf>. [Cited 2020 Aug 20].
 15. World Health Organization. Infection Prevention and Control guidance for Long-Term Care Facilities in the context of COVID-19. Geneva, World Health Organisation, 2020. https://apps.who.int/iris/bitstream/handle/10665/331508/WHO-2019-nCoV-IPC_long_term_care-2020.1-eng.pdf (accessed 28 March 2020). <https://mc.manuscriptcentral.com/qjm6>
 16. British Geriatrics Society. Managing the COVID-19 pandemic in care homes. London, British Geriatrics Society, 2020. <https://www.bgs.org.uk/resources/covid-19-managing-the-covid-19-pandemic-in-care-homes> (accessed 28 March 2020).
 17. Ministerio de Sanidad. Guía de prevención y control frente al COVID19 en residencias de mayores y otros centros de servicios sociales de carácter residencial . Versión de 24 de marzo de 2020. Disponible en: https://www.mscbs.gob.es/en/profesionales/saludPublica/ccayes/alertasActual/nCov-China/documentos/Residencias_y centros_sociosanitarios_COVID-19.pdf. Consultado el 30 de marzo del 2020.
 18. https://read.oecd-ilibrary.org/view/?ref=129_129658-l62d7lr66u&title=Testing-for-COVID19Away-to-lift-confinement-restrictions. [Cited 2020 May 10].
 19. Corregidor-Luna L, Hidalgo-Correas FJ, García-Díaz B. Gestión farmacéutica de la pandemia COVID-19 en un hospital mediano. *Farm Hosp.* 2020;44 (Supl 1):S11-6.
 20. Cantudo-Cuenca MR, Cantudo-Cuenca MD, Muñoz-Cejudo BM, Cañizares Huarte-Mendicoa J. Variabilidad de la prestación farmacéutica a centros sociosanitarios residenciales desde los servicios de farmacia de hospital. *Farm Hosp.* 2019;43(3):82-6.
 21. Comas-Herrera A, Zalakaín J, Litwin C, Hsu AT, Lane N, Fernández JL (2020) Mortality associated with COVID-19 outbreaks in care homes: early international evidence. Article in *LTCcovid.org*, International Long-Term Care Policy Network, CPEC-LSE, 21 May 2020.
 22. McMichael TM, Currie DW, Clark S, Pogosjans S, Kay M, Schwartz NG *et al.* Epidemiology of Covid-19 in a Long-Term Care Facility in King County, Washington. *N Engl J Med* 2020; 382:2005-2011.

Annex I

Collaborating authors “Nursing home multidisciplinary care team”.

Sanitas Nursing Home

Eduardo Aulló Chaves
Diana Rosa Fernández Rodríguez
Aranzazu Díaz Navarro
Pilar Alcalá Manchado
Gema Plaza Muñoz

Campodón Nursing Home

Javier Ramos Lizana
Natalia Mayoral Carrizosa
Hermes Pérez Mora
Cristina Hernández Monreal

Alcorcón Nursing Home

José Antonio López Gil
Margarita Gregorio Gil
Eliás Martín Moreno
Martín Gutierrez Jiménez
Carmen Copado Alba
Cristina Eugenia Rusu Rusu
Eva María Solís Gómez
Ana María Muro Molina

Amavir Nursing Home

Lourdes Dominguez López
Paula Antonia Virgili López
Laureano Antonio Ferrero Yero
Lidia Sánchez Rodríguez

Hospital Universitario Fundación Alcorcón

Margarita Díaz Martín
Olga Romo Bartolomé
Montserrat Pérez Encinas
Sira Sáenz Márquez
María José Goyanes Galán
María Velasco Arribas
Pilar Martínez Velasco
Leandro Valdez Disla
Beatriz Perdomo Ramirez
Sara Aya Rodríguez
Mally Veras Basora
Pilar Delgado Sanchez
Victoria Sebastián Pérez
Pablo de Guinea Luengo
José Luis Patiño Contreras
Irene Blanca Moreno Fenoll
Diego Gayoso Cantero
Miguel Galán de Juana
Gonzalo Sierra Torres
Antonio de Pablo Esteban

Development and review (IT & documentation)

Eulalia Grifol Clar
María Angeles Pizarro Jaraiz
Fatima Ngole Bebea Zamorano