RESEARCH

EVALUATION OF THE MEASURES TAKEN IN NURSING HOMES OF THE ISTANBUL METROPOLITAN MUNICIPALITY DURING THE COVID-19 PANDEMIC

Turkish Journal of Geriatrics
DOI: 10.31086/tjgeri.2021.195
2021; 24(1): 13-22

■ Nilüfer AYKAÇ[1]
■ Önder YÜKSEL ERYİĞİT[2]
■ Osman ELBEK[3]

Abstract

Introduction: This research investigates the effectiveness of measures taken against the COVID-19 pandemic in nursing homes under the responsibility of the Istanbul Metropolitan Municipality.

Materials and Method: Documents, decisions, and statistical data from the Istanbul Hospice gathered between March 1 and May 31.

Results: The average age of the nursing home residents was 70.2. Among them, 29.0% were capable of self-care, while 31.4% were fully dependent on others for care. Visitor restrictions, social function cancellations, fever and complaint follow-up, institutional disinfection, the use of personal protective equipment, placarding, new employee shifts, short stays and isolation areas, personnel services, employees and resident screening tests, cargo limitations, and psychologist-sociologist support were implemented in the home to help deal with the pandemic. In all, 14 of 930 employees tested positive for the virus when given a COVID-19 PCR test. A total of 104 bed-dependent residents received PCR screening tests, and none were positive for the virus. There were 23 deaths in total (3.3%). There were no definite COVID-19-related deaths. The probable case-related mortality rate was 0.5%.

Conclusion: Our research shows that the measures taken to address the COVID-19 pandemic in the nursing homes run by the Istanbul Hospice were timely and effective. Our data indicates that, if the finance and service structures of the nursing homes are met, and local authorities have control over the administrative organization, there will be no fatal outbreaks associated with COVID-19.

Keywords: Aged; Health; Infections

CORRESPONDANCE

[1] Nilüfer AYKAÇ

Gayrettepe Florence Nightingale Hospital, Pulmonary Diseases, Istanbul, Turkey

Phone: +905332554668
e-mail: niluferkongar@gmail.com

Received: Sep 08, 2020
Accepted: Feb 14, 2021

[1] Gayrettepe Florence Nightingale Hospital, Pulmonary Diseases, Istanbul, Turkey

[2] Istanbul Metropolitan Municipality, Health Department, Istanbul, Turkey

[3] Kadıköy Florence Nightingale Hospital, Pulmonary Diseases, Istanbul, Turkey

INTRODUCTION

SARS-CoV-2 is a single-chain and enveloped RNA virus located in the beta coronavirus 2b strain. As of August 2020, 80% of the deaths in the United States has occurred in people aged 65 and over due to decrease in immune defense (1). In some countries, death rates in nursing homes have reached very high rates, such as 4964% (2). As a result, adults who live in places such as nursing homes are the group at the greatest risk for both disease and mortality, in terms of COVID-19, due to their age, concomitant diseases, and the social conditions of their environment (1). One of the most important lessons learned from the COVID-19 pandemic is that fragile groups living in nursing homes have been negatively affected by their interactions with healthcare professionals and visitors (3). Preventive measures, in terms of contamination, are key for planning the operation of these units, in terms of pandemics. A proactive perspective is needed when dealing with an epidemic process, and there must be follow-up on all complaints by or about the employees serving the nursing home's residents, such as protocols for fever control and mask use, strict visitor restrictions, and the reduction of group activities (3).

As of 2017, Turkey was home to 10,266,623 people aged 60 years and over. Today, the number of people aged 65 or over accounts for 8.5% of the population (4), and there are still 7.5 million geriatric patients (5). As a fragile group facing other pandemics that may occur in the coming years, the situation of nursing home residents is and will remain critical. As of 2015, there were 28,433 (0.3%) people receiving public and private institutional care services and 12,299 (0.1%) people living in Ministry of Family and Social Policies (ASPB) nursing homes within the total population. According to 2016 data, Istanbul is considered an "adult province" as its population of those 65 and older is 6.35%. The city is home to 107 elderly care institutions (6). This article examines the measures taken against the COVID-19 pandemic in nursing homes under the responsibility of the Istanbul Metropolitan Municipality and discusses their efficacy.

METHOD

This research is based on documents found on the official web pages of the Istanbul Hospice Directorate (7) concerning the decisions and practices implemented in response to the COVID-19 pandemic between the dates of March 2 and May 19, 2020. The study also includes an analysis of statistical data from the Directorate.

Table 1. Directorate of Istanbul Hospice Housing Units

Name of Unit	Gender of Residents	Residents' Characteristics	Capacity
Güven	Female	Capable of self-care, but in need of partial care	124
Zümrüt	Male	Capable of self-care, and not in need of partial care	70
Sevgi	Male	In need of partial care	134
Şefkat	Female	Incapable of self-care and bedridden	144
Huzur	Male	Incapable of self-care and bedridden	180
Papatya	Female	Mental disability	64
Dolunay	Male	Mental disability	64
Çınar	Female	Diagnosed with dementia or Alzheimer's disease	55
Umut	Male	Diagnosed with dementia or Alzheimer's disease	40

Findings

Established in 1988 by the Istanbul Metropolitan Municipality, the Directorate of Istanbul Hospice facilities encompass 151,000 square meters, including 46,000 indoor square meters. It is Turkey's largest care and nursing home. It includes nine housing units (Table 1) (7).

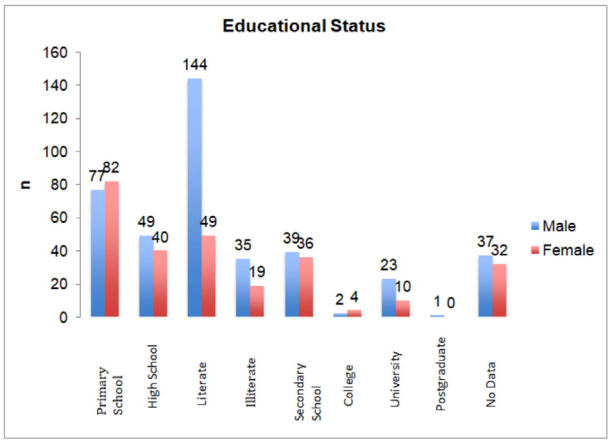
All clothing and health needs of the hospice residents are met by the Metropolitan Municipality. The institution has physicians and health personnel available 24 hours a day, 7 days a week (7).

During the COVID-19 pandemic period, a total of 679 people were living in the nursing care housing units, which have a total bed capacity of 1,066. At that time, 387 (36.3%) beds were unused.

The average age of residents was 70.2, and the male to female ratio was 1.50. The average age among female residents was higher than among men (74.8 and 70.4, respectively).

The marital statuses of the 272 female residents were: 39.7% single, 32.7% widowed, 21%, divorced, and 6.6% married. The marital statuses of the 407 male residents were: 62.6% single, 24.0% divorced, 6.7% widowed, and 6.7% married. Residents' education levels are shown in Figure 1.

Figure 1. Residents' Education Status



Only 197 (29%) of the 679 residents were in a position to perform self-care. Many people (N=269, 39.6%) were partially dependent, and 213 people (31.4%) were fully dependent on others for care. About one-third of residents, 232 people (34.1%), used assistive devices. The most commonly used assistive device was a wheelchair (50%). About half of the residents, 328 people (48.3%), have special dietary needs; 87 people (12.8%) were given food supplements, 47 people (6.9%) were fed via a Percutaneous Endoscopic Gastrostomy or nasogastric catheter. The staff fed food to 69 residents (10.1%).

Among the 679 residents, 586 people residing in the nine housing units had one or more of the following conditions: 302 had cardiovascular disease, 167 had Alzheimer's disease or dementia, 150 had chronic respiratory disease, 82 had a mental disability, 54 were diabetic, 30 had cancer, 12 had rheumatoid arthritis, and 11 had scoliosis (Table 2).

Table 2. Distribution of Concomitant Disease

Concomitant Disease	Detection Rate (%)
Cardiovascular disease	51.5
Alzheimer's disease or Dementia	28.4
Chronic respiratory disease	25.5
Mental disability	13.9
Diabetes	9.2
Cancer	5.1
Rheumatoid arthritis	2.0
Scoliosis	1.8

Roughly one quarter (N=154, 26.2%) of the residents were fully bedridden. Another 18 (3.0%) receive ongoing oxygen supportive therapy, 18 (3.0%) receive immunosuppressive therapy, and 2 (0.3%) needed dialysis treatments. Four people (0.6%) had undergone an amputation due to diabetes. One

fourth (N=161, 27.4%) were smokers, and 59 (10.0%) were obese.

There are 926 employees among the different branches of the Istanbul Hospice Directorate; 459 of them are caregivers, 153 are healthcare workers, 95 are office employees, 93 are transportation and logistics workers, 71 provide technical support, 54 are dining hall workers, and 1 is a lawyer. Employees in the care and health services departments account for 49.5% and 16.5% of all employees, respectively.

COVID-19 Pandemic Precautions

Since March 2, 2020, visiting hours, from 10:00–11:30 A.M. and 1:30–4:00 P.M. on weekdays, have been cancelled, and no visitors have been allowed into the facility. Similarly, all social events planned for residents both inside and outside the nursing home were cancelled. A complaint and fever tracking program was launched for the residents. Procedures related to the transfer of persons with problems requiring hospitalization during the pandemic were defined. The nursing home and all directorate facilities were periodically disinfected.

Beginning March 9, 2020, all personnel were required to wear gloves, masks, and disposable gowns, and they were required to serve residents while wearing this protective equipment. Hand sanitizers were placed at the buildings' entrances and on all floors of all buildings, for use by staff and residents. With the guidance of dietitians, foods that strengthen the immune system of the elderly patients, such as those with plenty of vitamin C, were increased, as was their fluid intake. The institution's employees were trained on pandemics, and posters featuring 14 rules for fighting the coronavirus were hung in the common areas (Figure 2).

As of March 11, 2020, residents were no longer allowed access to the service buildings of the directorate, and the directorate was completely closed to visitors. Restrictions were imposed on residents' movements in and out of the institution, with all travel banned unless deemed absolutely necessary.

Authorities were notified of the "Measures Against the New Coronavirus" mandate, which was published by the Istanbul Metropolitan Municipality on March 16, 2020. Aside from those related to urgent health issues, the transfer of patients to external health institutions was banned. Some apartment blocks located in the directorate were identified as short-term observation areas.

Personal protective equipment shortages were resolved on March 18, 2020. WhatsApp groups were created among staff to ensure timely and speedy information flow regarding the new coronavirus. In accordance with the relevant regulations, new policies, were implemented, such as allowing elderly and sick patients' transport among facilities, suspending annual administrative leave for healthcare professionals, and ensuring all staff were provided with private transport by way of institutional service vehicles, instead of public transport.

On March 19, 2020, services to non-resident patients were discontinued for the outpatient clinic of the Health and Hygiene Department and the Physical Therapy Center.

COVID-19 PCR scans were conducted on 380 staff working in the nine housing units on April 8, 2020, and PCR-negative staff began working overnight in the institution for 18 subsequent days. Administrative and site personnel cafeterias were separated, to enable physical distancing. A special area where staff or residents awaiting transfer to a hospital could quarantine for 14 days upon their return to the institution, and an area for conducting COVID-19 PCR examinations, was designated. The practice of not purchasing food and drink from outside the institution was employed. A work program was created by the institution's psychologists and sociologists to support the morale and motivation of the staff and residents remaining at the institution.

Figure 2. A "14 Rules" Poster

On 25 April 2020, a second group of 250 staff working in nine housing units was screened for COVID-19 PCR, and PCR-negative staff began a 30-day shift at the institution. A diet revision was carried out for the month of Ramadan, to strengthen the immune systems of residents and staff.

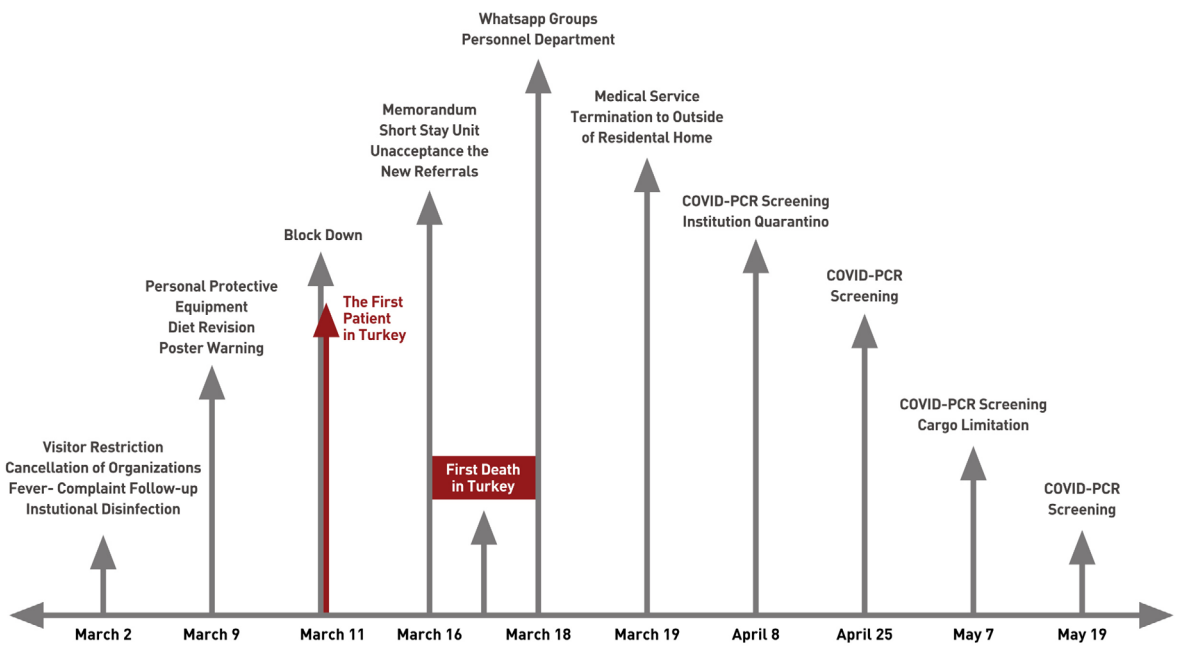
On May 7, 2020, COVID-19 PCR screenings of 305 personnel working in the administrative building and in the field were conducted. Nursing home residents were forbidden entry to the administrative building, and vice versa. Collective fast-breaking feasts organized in past years to celebrate Ramadan were not held. Dining hall staff were also scheduled to serve overnight within the institution. Restrictions on cargo from outside the institution were imposed. Apart from the maintenance staff, all staff members began working with gloves, masks, and special overalls at all times.

COVID-19 PCR screenings of a third group of 250 staff working in the nine housing units were carried out on May 19, 2020, and PCR-negative staff began a 20-day shift (Figure 3).

Regarding employee safety during the COVID-19 pandemic, the following measures were implemented:

- Transfer of personnel using corporate vehicles during shift changes
- Identification and arranging of areas to serve the resting and other needs of the staff
- Personnel suspected of having COVID-19 were admitted to a hospital and placed on administrative leave
- Documentation of all institutional personnel, including fever tracking at the beginning and ends of shifts and three times during the work day
- Continuous use of masks in the institution

Figure 3. Timeline of Measures Taken



- Use of visors and gloves, in addition to masks, during contact with nursing home residents
- Use of double surgical masks, in addition to other protective clothing, for those personnel serving residents who are unable to handle self-care and/or who are bedridden
- Ending transitions between administrative and nursing homes
- Providing psychological and social workers' support to all staff
- Assurance of no contact with any suspected COVID-19 cases, even from outside the institution

During this period, 293 people among the institution's staff were tested for COVID-19 antibodies. Additionally, COVID-19 PCR tests were performed on 380 employees on April 8, 250 on April 25, 305 on May 7–8, 250 on May 19, and 331 on May 22, 2020. No positive cases were found as a result of the tests of these employees. However, during the shift changes when COVID-19 PCR tests conducted before employees began 18-, 20-, or 30-dayshifts, uncovered 14 positive cases. These individuals were not allowed to work. No symptoms suggesting COVID-19 were detected during the symptom monitoring and fever screening of residents. Despite the absence of symptoms and fever, 104 COVID-19 PCR tests were performed; all of them were found to be negative. Similarly, the test was negative in 43 residents who had to leave the institution during the pandemic due to their concomitant diseases. All of them were quarantined for 14 days after returning to the institution, and a COVID-19 PCR test was performed at the end of the quarantine.

In all, 23 (3.3%) of the nursing home residents died between March 1 and May 31, 2020. The loss of 16 (69.5%) of these 23 patients occurred in a private or public hospital. All COVID-19 PCR examinations performed at the institution and in the hospital were negative for all patients who died. However, although the PCR results for of four patients were negative, clinical and radiological examinations were compatible with viral infection. According to the COVID-19 guide published by the Ministry of Health (8), although there was no death related to a "definitive case" in the nursing homes affiliated with the Istanbul Hospice Directorate, there were four deaths related to "possible cases" (0.5%).

DISCUSSION

This research indicates that the measures taken to deal with the COVID-19 pandemic in the nursing homes run by the Istanbul Hospice were timely and effective. Our data emphasize that widespread deaths in nursing homes due to the pandemic can be prevented by appropriate interventions.

The global level of the COVID-19 experience has highlighted facts the that the insufficient nature of personal protective equipment and the low number of tests for workers who care for the elderly in nursing homes are major problems (9). For this reason, ensuring the continuity of protective equipment consisting of a mask, face shield, apron, and gloves is recommended as the most important step for reducing the risk among nursing home residents (9). In addition, it is recommended that each institution create emergency patient transfer protocols for patients with suspected COVID-19, and that they establish observation and isolation units for these cases. For employees, specific training for COVID-19 and paid leave must be defined for use. Finally, it should be emphasized that special arrangements, such as the transfer of financial resources and tax reductions, should be provided to nursing homes (9). All of these suggestions were implemented in the nine housing units within the scope of the Istanbul Hospice. As of March 9, 2020, all personnel were provided with personal protective equipment; as of March 18, protective equipment shortages were taken care of; and beginning May 7, non-maintenance personnel were provided with protective equipment. Employee leave regulations were is-

sued on March 18. All of the needs of the nine housing units within the Istanbul Hospice were fully met by the Istanbul Metropolitan Municipality, which ensured that there would be no spending problems or limitations during this period. A lack of personnel, a challenge frequently identified in the literature, can lead to life-threatening risks, high employee turnover, supply shortages, and inadequate infection prevention and control measures; each of these was prevented at the facility in question (10). During this period, 459 employees provided care services to 679 nursing home residents. There was a ratio of one care worker per 1.47 nursing home residents.

A study evaluating the data from 56 nursing homes located in Istanbul reported that 54% had a specific plan for dealing with COVID-19; all of them had COVID-19 plans for staff and had imposed restrictions on visitors (11). We determined that 96% of the nursing homes participating in the research have implemented screening policies for visitors, and COVID-19 outbreak simulations have been performed in 29% of the facilities. One quarter (25%) of nursing homes have provided an alternative care area for hospitalized COVID-19 patients (11). Nursing homes under the direction of the Istanbul Hospice also had an independent COVID-19 plan. Plans were made for the employees, and visitor restrictions were in place before the first COVID-19 patient was identified in Turkey. On March 16, 2020, short-term care and observation areas were created within the institution as sites for providing for alternative care. However, no COVID-19 outbreak simulation was conducted within the institution.

In a study investigating nursing homes' equipment, 66% of institutions reported that they had access to the COVID-19 PCR test (11). However, 72% had experienced an equipment shortage, and 83% reported serious staffing shortages. Therefore, employees had to work long hours and assume responsibilities different from their typical duties (11). In Turkey, the COVID-19 PCR test is administered free of charge by the Ministry of Health or an authorized laboratory. During the pandemic, 104 bedridden nursing home residents and staff were tested by the Provincial Health Directorate.

Since there was no shortage of personnel within the institution, employees were not allowed to work for long hours; this helped to prevent an increased risk of transmission to the residents by caregivers assuming a variety of responsibilities. However, considering that personnel outside the institution may unknowingly come into contact with a COVID-19 patient, employees of the institution were made to work overnight at the institution for 18-, 20-, or 30-day shifts. COVID-19 PCR tests were performed on employees before they entered the institution on shift change days. During this examination, 14 employees were found positive, and their entrance was prevented. A nursing home in Spain used the same protocol as that of the Istanbul Hospice Directorate. They continued providing their services while completely closed to the outside, and no COVID-19 cases were encountered within the institution (12).

The first nursing home COVID-19 outbreak in the United States was in a nursing home in Kirkland, Washington. During the outbreak, two-thirds of the nursing home residents and 47 employees became infected (13). High mortality rates have been reported in nursing homes in New York and Massachusetts. As of April 23, 2020, there were more than 10,700 coronavirus deaths in nursing homes in 35 states. This constitutes 23% of the deaths in the US, as of late April 2020 (13). Undoubtedly, elderly people living in nursing homes should be considered high-risk individuals, as they often share rooms and engage in communal living arrangements; these are the main factors that facilitate deadly outbreaks in nursing homes. At the same time, a significant portion of the people living in their own homes need help with activities of daily living. Research has reported that 64% of nursing home residents need help bathing, 57% require help with walking, 48% need dressing assistance, and 40% need help with toilet needs. These requests for help make

physical distancing impossible (13). In addition, dementia counteracts hand washing and physical distancing measures. Only 29% of the 679 residents in the institutions within the Istanbul Hospice were capable of handling all self-care needs. Nearly one third (N=213, 31.4%) of those residing in the institution were fully dependent on caregivers. Another third (N=232, 34.1%) used assistive devices, most often wheelchairs, and47 (6.9%) were fed through a PEG or nasogastric catheter. Staff fed 69 residents (10.1%).

Other physical conditions make it difficult, if not impossible, to reduce physical contact. More than one-fourth of residents (28.4%) in the nursing home have Alzheimer's disease or dementia, 13.9% have a mental disability, and their educational levels are low.

Apart from the problems outlined above, the average age of nursing home residents was 70.2; 51.5% of them have a cardiovascular disease, 25.5% have a chronic respiratory disease, and 9.2% are diabetic; these conditions mean that many patients are in high-risk groups. However, our research shows that, despite these problems and risks, mass deaths were avoidable in the nursing home, thanks to appropriate pandemic plans.

In their research, Abrams and colleagues reported that COVID-19 outbreaks experienced in nursing homes in the US were neither dependent on low or high Medicaid payments nor related to quality criteria, such as star ratings (14). In this study, it has been shown that there is a significant correlation associated with facility size, urban location, non-chain institution, and outbreaks. On the other hand, in this study is also noteworthy in that we have shown the probability of detecting COVID-19 in non-profit nursing homes is significantly lower than that in for-profit homes (14). In this context, the basis of nursing home outbreaks, which are evident in the US, was not medical-related, but rather due to the weakness of the Medicaid insurance system that finances long-term care services yet only provides low payments, as opposed to a social security program that has a relatively higher payment capacity while providing short-term care services such as Medicare (15, 16). In other words, the root cause of the problem is financial, not medical. Medicaid-dependent care homes, which are mainly low reimbursement, have been unable to provide qualified services, cannot employ competent and sufficient personnel, and are located in poor neighborhoods. They are also at risk of closure at any time (15).

A similar situation has brought nursing homes in Spain to negative conclusions in terms of COVID-19. Although public health services are free in Spain, unlike the US, the public health system is designed as if there are no vulnerable groups living in units such as nursing homes. The political and social disregard for these groups has made it difficult for people living in nursing homes to be healthy and to gain access to health services. It has also subjected them to age-related discrimination (11). The main causes of the deadly COVID-19 epidemic in the nursing homes of Spain are that 71% of the 5,417 nursing homes are run by large business groups, the control mechanisms for public administration are insufficient due to privatization, and the staff working in those institutions that have been privatized due to acquisitions have insufficient training and are paid low wages (11). Because of these problems, private nursing homes were taken under public authority as a part of the state of emergency announced in Spain on March 14, 2020. It remains to be seen whether this change will reflect positively in the short term. The fact that the bodies of two nursing home residents in a public nursing home in the Usera district of Madrid remained unnoticed in their rooms for almost a day indicates that the transfer to public authority did not solve the problems in the short term (11). However, as in the Istanbul Hospice Directorate nursing homes, it is obvious that there will be no destructive lethal outbreaks associated with COVID-19 in nursing homes if the financial and service structures of these institutions are met in a

public manner, and if the managerial organization is capable of solving local problems and developing local collaborations, rather than waiting for a central public authority to act.

Acknowledgements: We would like to thank the Istanbul Metropolitan Municipality Health Department's Istanbul Hospice Directorate, which shared its data on the Istanbul Metropolitan Municipality with us.

REFERENCES

1. Ge H, Wang X, Yuan X, et al. The epidemiology and clinical information about COVID-19. Eur J Clin Microbiol Infect Dis 2020; 39 (6): 1011-9. (PMID: 32291542)
2. Lim WS, Liang CK, Assantachai P, et al. COVID-19 and older people in Asia: Asian Working Group for Sarcopenia calls to actions. Geriatr Gerontol Int 2020; 20 (6): 547-58. (PMID: 32365259)
3. Mills JP, Kaye KS, Mody L. COVID-19 in older adults: clinical, psychosocial, and public health considerations. JCI Insight 2020; 5 (10): e139292. (PMID: 32302293)
4. Republic of Turkey Ministry of Health. Health Statistic Yearbook 2018 [e-book]. Ministry of Health Publication; 2019. [Internet]. Available from: https://dosyasb.saglik.gov.tr/Eklenti/36164,siy2018en2pdf.pdf?0 Accessed: 01.10.2020.
5. Işık AT. COVID-19 in Older Adults: Topics to Keep in Mind. Journal of Geriatric Science 2020; 3 (1): 1–2. (in Turkish)
6. Nikolich-Zugich J, Knox KS, Rios CT, et al. SARS-CoV-2 and COVID-19 in older adults: what we may expect regarding pathogenesis, immune responses, and outcomes. Geroscience 2020; 42 (2): 505-14. (PMID: 32274617).
7. Istanbul Metropolitan Municipality Department of Health Directorate of Almshouse (Darülaceze); [Internet]. Available from: https://saglik.ibb.istanbul/istanbul-darulaceze-mudurlugu/ . Accessed: 06.20.2020. (in Turkish)
8. TR Ministry of Health. Covid-19 Pandemic Guide [e-book] Ministry of Health Publication; 2020. [Internet]. Available from: https://covid19bilgi.saglik.gov.tr/depo/rehberler/covid-19-rehberi/COVID-19_REHBERI_GENEL_BILGILER_EPIDEMIYOLOJI_VE_TANI.pdf Accessed: 06.18.2020. (in Turkish)
9. American Geriatrics Society. American Geriatrics Society policy brief: COVID-19 and nursing homes. J Am Geriatr Soc 2020; 68 (5): 908–11. (PMID: 32267538)
10. Davidson PM, Szanton SL. Nursing homes and COVID-19: We can and should do better. J Clin Nurs 2020; 29 (15-16): 2758-9. (PMID: 32281165)
11. Quigley DD, Dick A, Agarwal M, Jones KM, Mody L, Stone PW. COVID-19 preparedness in nursing homes in the midst of the pandemic. J Am Geriatr Soc 2020; 68 (6): 1164-6. (PMID: 32343362).
12. Rada AG. Covid-19: the precarious position of Spain's nursing homes. BMJ 2020; 369: m1554. (PMID: 32312710)
13. Coe NB, Van Houtven CH. Living arrangements of older adults and COVID-19 risk: It is not just nursing homes. J Am Geriatr Soc 2020; 68 (7): 1398-9. (PMID: 32359073)
14. Abrams HR, Loomer L, Gandhi A, Grabowski DC. Characteristics of U.S. nursing homes with COVID-19 cases. J Am Geriatr Soc 2020; 68 (8): 1653-6. (PMID: 32484912)
15. Fontanarosa PB, Bauchner H. COVID-19-looking beyond tomorrow for health care and society. JAMA 2020 Apr 17. (PMID: 32301955)
16. Werner RM, Hoffman AK, Coe NB. Long-term care policy after Covid-19 - solving the nursing home crisis. N Engl J Med 2020; 383 (10): 903-5. (PMID: 32459918)