Original Article

Direct costs of treating COVID-19 Cases Admitted to a Tertiary Hospital in Ankara, Türkiye

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Abstract

Objective: The aim of the study is to estimate the direct treatment cost of COVID-19 cases in ICU and Ward, and the average length of stay during the pandemic period.

Material and methods: The cost study was carried out from the provider's perspective in a tertiary hospital in Ankara. Only direct costs during hospitalization were analyzed excluding medication costs. The Average Length of Stay (LOS) was determined. The cost was estimated for COVID-19 patients that were admitted to the ward and intensive care unit (ICU) by gender and age group. Patient medical records were reviewed retrospectively in a period of 1 month (April 1, 2020 - April 30, 2020) for clinical data and patient hospital bills were used for costing data.

Result: A total of 525 COVID-19 patients were admitted to the hospital. Slightly more than half of the COVID-19 patients were male (52.1% overall) and the mean age was 47.5±18.6 years for males and 51.0±19.4 for females. Overall, 4.4% of COVID-19 cases were among children and adolescents (≥18 years), 72.8% were among adults (19–64 years), and 22.9% were among elderly adults (≥ 65 years). The direct cost estimated for COVID-19 ranged from 3,781.77 Turkish liras (TL) to 32,494.98 TL. The average LOS for ICU TL patients and ward patients were 4, 5, and 6 days, respectively.

Conclusion: The cost of treating COVID-19 in ICU is high compared to the treatment costs in the ward. The average length of stay for COVID-19 cases in ICU was longer among elderly patients. [*Ethiop. J. Health Dev*. 2022; 36(4):000-000]

Keywords: Covid-19, Direct cost, Pandemic, Treatment cost, Türkiye

Introduction

In January 2020 the World Health Organization (WHO) declared the outbreak of a novel coronavirus disease, COVID-19, to be a Public Health Emergency of International Concern (1) WHO stated that there is a high risk of COVID-19 spreading to other countries around the world. In March 2020, WHO made the assessment that COVID-19 can be characterized as a pandemic(2). Up to 24 February 2021, a total of 112,754,519 confirmed cases and 2,498,675 deaths were reported worldwide(3). Many influences have occurred in the psychological, sociological, environmental, political, and economic fields along with health problems and deaths during the novel coronavirus outbreak, which may cause a new world order. The cessation of production and the slowdown of trade due to the quarantines and restrictions applied have caused destruction in the national economies and the economic burden of the virus in the health sector has also contributed to this destruction(4), (5). Since the health system of each country is different, the management of this process also varies between countries.

General health insurance has been gathered under one roof with health care reform that was established 18 years ago in Türkiye. It is based on paying a premium and it offers free health services to all individuals. A total of 165,555 confirmed cases and 4585 confirmed deaths were reported in Türkiye by June 2, 2020(6). Regardless of the economic potential and desire of individuals, general health insurance ensures that all members of the society benefit from health services equally, accessibly, and effectively. With the General Health Insurance,99.2% of Türkiye's population is covered with health insurance(7).

The Ministry of Health defined a 'pandemic hospital' as that which consists of at least two physicians of infectious diseases and clinical microbiology, chest diseases, and internal medicine specialists, with a level-3 intensive care unit during the COVID-19 pandemic. In addition, the University Hospitals and all private health institutions were made to compulsory perform patient admissions and treatment processes as well as the Ministry of Health Hospitals. In hospitals, all healthcare professionals actively participated in the process and only emergency services started to be provided with an exception for COVID-19. All patients that were diagnosed or found suspicious started to be treated free of charge within the scope of the general health insurance. Standard diagnosis and treatment protocols were applied to all patients and standard service was provided all over the country according to the guidelines created by the Ministry of Health.

The control of the pandemic, diagnosis, and treatment of infected patients has become a great financial burden on the health system. The COVID-19 outbreak can clog the health system due to the uncontrolled growth rate of the virus, and may also cause major troubles making it difficult for the healthcare system to cope with health problems other than COVID-19(8).Non-COVID-19 healthcare was substantially disrupted during the pandemic process(9). As the patients postponed their admissions to the hospital except for emergencies because they were afraid of becoming infected, hospitals greatly reduced their

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services except for emergency medical interventions. For these reasons, there will be an accumulated health service demand after the pandemic process. It is not known whether the economic damage caused by COVID-19 will prevent this demand. To plan the process after the pandemic, the cost of COVID-19 must be revealed. The aim of the study is to estimate the treatment cost of COVID-19 in the ICU and wards during the pandemic period.

Methods

This costing study was carried out at Ankara Keçiören Training and Research Hospital. Medical records of COVID-19 patients were reviewed retrospectively for all patients in a period of 1 month (April 1, 2020 - April 30, 2020). Cost data obtained from the hospital system were recorded in the same time frame. The study population was patients diagnosed with COVID-19 (ICD-10: U07.3, Z03.8). Patients who were outpatient referred to another hospital and were not diagnosed with COVID-19 were excluded from the study. A checklist including demographic data of the patient (such as gender, age), hospitalization unit (ICU or ward), hospitalization and discharge dates, medication, supplies, bed, and other resource fees were prepared. We will review the patient medical record and hospital bill in order to estimate the cost of COVID-19 cases admitted to the hospital. The date of admission to the ward and discharge from the ward and admission to ICU and discharge from ICU will be tracked, and estimated the average length of stay in normal ward and ICU. The cost study was carried out from the provider perspective. The direct costs during hospitalization were analyzed. The costs related to the consumption of healthcare resources, such as diagnostic and laboratory tests, treatment, and LOS but this costing estimation did not include medication costs. The indirect costs associated with workdays missed or transport to the hospital were not considered.

Ankara Keçiören Training and Research Hospital is a tertiary hospital affiliated with Health Sciences University Türkiye and belongs to the Republic of Türkiye Ministry of Health. It provides free services to all patients under general health insurance and has a health tourism certificate. The hospital has 308 hospital beds, 116 wards, and 20 ICU beds. The hospital serves mostly the district of Keçiören with 939,161 inhabitants. The study was approved by the ethical committee of Ankara Keçiören Training and Research Hospital.

IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp. Armonk, NY) was used for the data analysis. The demographic characteristics of the study group were reported using descriptive statistics (frequencies, proportions, medians) and dispersion measures (standard deviation, min-max, interquartile range). The median scores of the groups were compared by Kruskal-Wallis (and Bonferroni ad hoc test) and Mann-Whitney U tests. A value of $P<0.05$ was considered statistically significant.

The COVID-19 cases are admitted to ICU if they are in critical condition if not, they are admitted into the ward. If the patient overcomes the critical condition, they are transferred to the normal ward from ICU at the same time patients that are admitted to the ward when facing critical condition will be transferred to ICU. Patients admitted to ICU or ward may recover and may be discharged from the hospital or die (Figure 1).

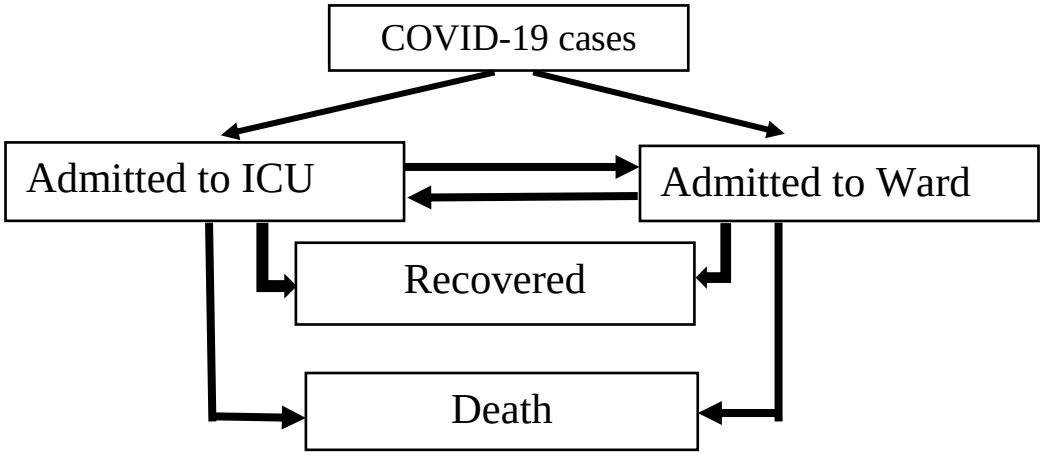

Figure 1. COVID-19 cases treatment and outcome model structure

Results

From April 1–30, 2020, a total of 525 COVID-19 patients were admitted to the Keçiören training and research hospital. Slightly more than half of the COVID-19 patients were male (53.1% overall) and the mean age was 47.5±18.6 years for males and 51.0±19.4 for females (Table 1). Overall, 4.4% of COVID-19 cases were among children and adolescents (≥18 years), 72.8% were among adults (19–64 years), and 22.9% were among elderly adults (≥ 65 years). Around 10 % (55 cases) of the patients were admitted to ICU while the majority (470 cases) of COVID-19 cases were admitted to the ward.

Table 1. Demographic characteristics of COVID-19 patients (n=525)

	Total Frequency (%)	Ward Frequency (%)	ICU Frequency (%)
Gender			
Male	279 (53.1%)	246 (52.3%)	33 (60.0%)
Female	246 (46.9%)	224 (47.7%)	22 (40.0%)
Age group			
0-18	23 (4.4%)	23 (4.9%)	-
19-64	382 (72.8%)	361 (76.8)	21 (38.2%)
65 yrs and above	120 (22.9%)	86 (18.3%)	34 (61.8%)

A Total of 55 (10.5%) cases were treated in ICU while almost 90% of the cases were treated in the ward. Median length of stay (LOS) of each gender was 6 days in the ward. No children and adolescent patients were admitted to ICU.

The median ICU length of stay was 6 (between 4 -8 days) days for intensive care unit patients, the median LOS was 8 (between 3-14 days) days for patients treated in the ward, there is a statistical difference between LOS in ICU and ward patients (p=0.003). No difference was found between hospitalization in the intensive care unit and the total length of stay-in-hospital for female patients (p=0.120) while it was found that among the male patients treated in the ICU had stayed longer in the hospital (p=0.014). In addition, among the aged group, those aged between 19-64 treated in ICU had longer stay-in-hospital (p=0.017) while no difference was found in the 65-year-old and older group (p=0.190) in this study (Table 2).

Table 2 Average length of stay of COVID-19 patients in ward and ICU (n=525)

	Length of stay in Hospital (day) Median (IQR 25-75) Ward	ICU	p
Gender			
Male	6 (4 -8)	8 (3 -15	0,014
Female	6 (4 -8)	7,5 (3 -9))	0,120
Age group			
0-18	5 (2 -7)		-
19-64	6 (5 -8)	8 (3 -16)	0,017
65 yrs and above	6,5 (3 -8)	7,5 (3 -12)	0,190
Total	6 (4 -8)	8 (3-14)	0,003

The cost of the COVID-19 patient admitted to the ward and discharged from the ward was 3620.64 TL ranging from 523.50 TL to 5093.84 TL for males; the median cost is 4282.56TL and ranged from 527.05 TL to 5372.37 TL for female. The median cost for the patients admitted to ICU and discharged from ICU is 7281.60 TL, ranging from 4576.31 TL to 25294.87 TL for males, while the median cost is 5949.69 TL, ranged from 5246.17 TL to 7207.36 TL for female (Table 4).

Table 4 Average cost per patient by gender (Cost in Turkish Lira/TL)

	Male **Cost Median (IQR 25-75)**	Female **Cost Median (IQR 25-75)**	Total **Cost Median (IQR 25-75)**
Discharge from ward	3620,64 (523,50-5093,84)	4282,56 (527,05-5372,37)	3781,77 (525,96-5141,59)
Referred to ICU from Ward then discharged	10327,03 (3619,25-2304,17)	6917,90 (6460,96-7603,35)	7976,70 (4880,57-12204,31)
Referred to ICU from ward then die	6365,84 (2554,32-42375,92)	6370,08 (3685,25-9054,90)	6365,84 (3685,25-9054,90)
Discharged from ICU	7281,60 (4576,31-25294,87)	5949,69 (5246,17-7207,36)	5949,69 (5134,44-9428,76)
Die in ICU	6741,56 (5470,20-32494,98)	13039,82 (12259,59-37936,91)	12649,71 (6741,56-32494,98)
Total	3781,92 (558,18-5470,20)	4411,66 (574,98-5777,03)	4284,33 (569,86-5713,10)

The median cost of COVID-19 patients admitted into the ward and discharged from the ward was 4919.54 TL for children and adolescents, 3705.22 TL for adults and 3781.92 TL for the elderly. (Table 5).

Table 5 Average cost for patient by age group (Cost in Turkish Lira)

	0-18 yrs old Cost **Median** **(IQR 25-75)**	19-64 yrs old Cost **Median** **(IQR 25-75)**	65 yrs and above Cost **Median** **(IQR 25-75)**
Discharged from ward	4,919.54 (3,541.35-4,927.92)	3,705.22 (524,15-5105,75)	3,781.92 (503,06-5761,52)
Referred to ICU from Ward then discharged		10913,70 (6245,49-15240,94)	6689,43 (4569,98-9853,90)
Referred to ICU from ward then die		2554,32 (2554,32-2554,32)	7710,37 (5025,55-25715,41)
Discharged from ICU		41160,98 (41160,98-41160,98)	5694,28 (5134,44-7207,36)
Die in ICU		6741,56 (5470,20-12259,59)	32494,98 (13039,82-37936,91)

Discussion

The costing study was carried out from the provider's perspective. All the direct costs during hospitalization were analyzed, i.e., those related to the consumption of healthcare resources, such as diagnostic and laboratory tests, treatment, and LOS. The most direct impact that the coronavirus pandemic will have on healthcare spending is through testing, treatment, and prevention of COVID-19, but the extent of upward pressure on health costs is still unknown (10). figures are available from some countries regarding the treatment cost of COVID-19. The current study reported that around 10 % of the patients were admitted to ICU while the majority (470 cases) of COVID-19 cases were admitted to the ward, which is much lower than the Brazilian's study report 51.7% of total patients which involved intensive care unit stays (11). Independent nonprofit FAIR Health projected cost based on Diagnosis Related Groups (DRGs), per patient average cost for COVID-19 patients requiring inpatient stays, using DRG values. The costs vary depending on whether the DRG code is 193, 194, or 195. The total average charges per patient range from $74,310 for DRG 193 to $42,486 for DRG 195 in the United States of America (12). In the current study, the LOS was determined for COVID-19 cases that were treated in the ICU and ward by gender and different age group. Our study found that more men admitted in the ICU due to COVID-19 than women, the similar findings were reported by other researchers (13).The study found that compared to younger patients, older patients hospitalized with COVID-19 were more likely to have longer LOS. Many studies demonstrated that elderly patients with COVID-19 are more likely to progress to severe disease compared to young(14) patients due to the severity of the condition they may stay longer in the hospital compared to young patients. Similar findings were demonstrated in other studies on hospitalized Community-Acquired Pneumonia Patients, the elderly patients stayed in the hospital longer than the younger age group(15). Researchers from China reported that LOS was longer for those aged 45 years and above COVID-19 patients compared to the younger aged group (16). Current study also found that the LOS in ward was same for both genders, similar to the reports in other studies (16). In our study, LOS for female COVID-19 patients was longer than male patients in ICU. Most caregivers, at home and in our communities, are women so they could be exposed to higher doses of the coronavirus over time. The cost for inpatients of COVID-19 that were treated in the ward and the ICU by gender and different age group case was calculated. The highest cost was due to ICU treatment and elderly patients. Its demonstrated in many studies, treatment cost in ICU is high due to longer ICU length of stay, disease severity, and complications(17), the severity of illness and the occurrence of severe sepsis are directly related to the level of ICU cost(18), another study found that ICU care is approximately 3.8 times more expensive than routine hospital care(19). Care provided in the ICU is expensive, the average daily cost of an ICU bed is threefold higher than a bed in a general ward (20). The high-cost group had a longer median ICU length of stay (21). More male COVID-19 patients were admitted in ICU in our study, and similar findings were reported by other researchers. The main determinant of ICU admission was been male in Italy (22). Our study estimated the cost for COVID-19 patients admitted to ICU and ward by age and gender. The highest cost related to ICU stay is followed by ward stay. The median cost for patients admitted to ICU and discharged from the ICU was 5694.28 TL while 32,494.98TL for those that were treated in ICU and ended up dead at ICU. The median cost for patients admitted to the ward was 3,781.92.TL The similar finding reported by a Brazilian researcher that ICU stays had the highest costs (US$ 26,849,860.07; 64.7%), followed by ward (US$ 13,417,202.20; 32.3%), the treatment was much higher than that of our study due to study cost components but the ICU cost was higher than ward treatment cost (11), another study reported the median total hospital cost was $11,267, this is also much higher than our study (23). Saudi study reported similar findings, the mean cost per patient (in SAR) for those admitted to the general Medical Ward (GMW) and ICU was 42,704.49 ±

29,811.25 and 79,418.30 ± 55,647.69, respectively(24). A study conducted in China (25) reported that the overall mean cost was USD 6827 per treated episode of COVID-19. The highest mean cost was observed in drug acquisition (USD 3077), the finding also was higher than our study, and one of the main reasons for the drug fee was not included in the current study. The cost for COVID-19 patients is very different from country to country due to components of costing calculation. The cost may not address the real cost of COVID-19 in Türkiye due to the single study center and components of cost calculation. Further study may be conducted at the national level and include all the necessary components.

Conclusion

The highest cost was borne by ICU services and elderly patients. The younger patients aged less than 18 years old did not admit to ICU for treatment, all of them were treated in the normal ward. Differed by gender, more male patients admitted to ICU. The average length of stay for COVID-19 cases in the ICU was longer among elderly patients aged 65 years old and above, and female patients.

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