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Abstract

Background: A retrospective review of the early stages of the COVID-19 pandemic in 2020 and the challenges faced by hospitals is essential in the post-pandemic era of 2022.

Aim: To identify the reasons for prolonged hospitalization after recovery for COVID-19 patients in the United Arab Emirates.

Methods: This was a retrospective observational study of 150 (18.75%) patients with prolonged hospitalization in a tertiary hospital in Dubai from 1 April to 1 July 2020. Data was obtained from the electronic medical records of the hospital. Continuous variables are reported as mean and standard deviation, and categorical variables are reported as numbers and percentages.

Results: The mean duration of hospitalization was 48.5 (9–272) days, with an interquartile range (IQR) of 22 days. The mean duration of extended stay was 27.5 (2–231) days, with an IQR of 17 days. The common reasons for prolonged hospitalization were mandatory isolation 28% (n = 62), hospital-acquired infections 17% (n = 37), acute respiratory distress syndrome 15% (n = 32), myopathy/neuropathy 14% (n = 31), pulmonary fibrosis requiring oxygen supplementation 14% (n = 31), and completion of COVID-19 treatment 12% (n = 25).

Conclusion: To make optimal use of available hospital resources, reasons that directly or indirectly contributed to the prolonged hospitalization of patients should be considered and addressed during future pandemics or disease outbreaks.

Keywords: prolonged hospitalization, COVID-19, long COVID, length of stay, Dubai

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Introduction

Since the first case of COVID-19 was reported at the end of 2019 in Wuhan, China, > 661 million cases and > 6 million deaths have been documented (1). The pandemic has presented the global economy with several major difficulties. The number of people needing hospitalization overstretched healthcare systems and the resources available, particularly in the early months of 2020. The necessary restrictions and lockdowns imposed a second burden on the global economy.

Although the novel SARS-CoV-2 primarily affects the respiratory system, there is much evidence that infection can involve multiple organ systems with various manifestations. Following apparent recovery, post-COVID complications may occur, such as acute and chronic long-COVID-19 syndrome (2,3). These post-COVID-19 symptoms delay complete recovery and a return to full functionality (3,4). Pulmonary fibrosis is a well-known consequence of acute respiratory distress syndrome and affects the life of survivors (5). Cardiovascular complications after recovery from COVID-19 have been reported, including hyperlipidaemia, heart failure, and glucose metabolism disorders (6–8). There is a high rate of complications in patients who require intensive care and intubation. The reported rate of cognitive impairments, including delirium, is between 30% and 80% (9). All these complications can contribute to delayed

discharge. While hospitalization can be necessary and lifesaving, it comes with associated morbidity and costs that occur more commonly in the older population (9,10).

Long-COVID-19 is gaining increasing attention; however, much of the research focus remains on the active stage of the infection. Only a few studies have explored the reasons for hospitalization after apparent recovery from COVID-19. Although many patients were released early, particularly later during the pandemic when the number of recommended days of isolation was reduced, a sizable percentage of patients needed to stay in hospital for an extended period (2). Guo et al. reported increased odds of prolonged hospital stay among women, and among patients with fever and chronic kidney or liver disease, increased creatinine levels, or bilateral pulmonary infiltration (11).

In this study, we aimed to identify the reasons for the extended hospitalization after recovery from COVID-19 of some of the patients admitted to our institution. We hope that these data can be used to model bed demand for contingency planning as new variants of SARS-CoV-2 continue to emerge, and be a lesson for future pandemics.

Methods

Study design and participants

This was a retrospective observational study conducted in a government hospital in Dubai, United Arab Emirates (UAE). Rashid Hospital is a specialized tertiary care teaching hospital with a capacity of 786 beds. In the early stages of the pandemic, it was the largest centre among the few authorized for the treatment of COVID-19. Eight hundred patients with confirmed COVID-19 were admitted to the hospital from 1 April to 1 July 2020. Hospital policy at that time was that nasopharyngeal polymerase chain reaction (PCR) tests were repeated every 3 days for PCR-positive patients and every 24 hours for PCR-negative patients, until 2 consecutive negative readings were obtained. Patients were then considered fit for discharge (12,13). Patients were also required to maintain 10–14 days of isolation after negative test results, as per interim guidance at the time (13,14). Among the 800 patients admitted to hospital, 150 (18.75%) fulfilled the discharge criteria but remained in hospital and were studied in detail. Inclusion criteria were: patients who were diagnosed with COVID-19 on presentation, received treatment in accordance with the hospital protocol, and stayed in hospital for > 1 day after 2 consecutive negative PCR tests. Exclusion criteria were: patients who did not test positive on presentation and all patients who were discharged from the hospital within 1 day after 2 negative PCR tests.

The study was conducted after approval by the Ethics Committee of the hospital.

Data collection

Electronic medical records were used to collect data regarding patient demographic information, duration of hospitalization, treatment received, and details of hospital stay including medical complications. The data were gathered in an Excel sheet. The reasons for prolonged hospital stay were categorized into 4: (1) those related to complications of COVID-19 infection and/or medication; (2) complications related to hospitalization; (3) pre-existing condition or a condition unrelated to COVID-19: and (4) other reasons including isolation and repatriation.

Statistical analysis

Continuous measurements were reported as mean and standard deviation, and categorical variables were reported as numbers and percentages.

Results

Patient characteristics

The mean age of the 150 patients was 47.7 (19–76) years (Table 1). There were 136 (90.6%) male and 14 (9.4%) female patients. Seventy (46.6%) patients had no comorbidities, 46 (30.6%) had only 1, 22 (14.6%) had 2, and 12 (8%) had 3. Fifty-four (36.6%) patients had diabetes mellitus, 43 (28.6%) had hypertension, and 29 (26.8%) had other comorbidities.

Hospitalization

The mean total hospital stay for the 150 patients was 28.5 (9–272) days, with an interquartile range (IQR) of 22 days (Table 1). The mean extended hospital stay after 2 consecutive negative PCR results until discharge was 11.5 (2–231) days, with an IQR of 17 days. Sixty-four (42.6%) patients were admitted to the intensive care unit; most of whom were COVID-19 positive at that time and tested negative later. Twenty-six (17.3%) patients who stayed in hospital after testing negative for COVID-19 died.

We grouped the reasons for prolonged hospitalization into 4 categories (Table 1). (1) Complications/treatment of COVID-19 (n = 89, 59.3%). Most of these patients had severe COVID pneumonia with multiorgan dysfunction. They required a longer time to recover from the illness and its complications. Common reasons noted were acute respiratory distress syndrome requiring intubation and subsequent tracheostomy (n = 32). Other reasons were: difficulty in decannulation of the tracheostomy tube, and pneumothorax (n = 3); post-COVID lung fibrosis requiring supplemental oxygen support (n = 31); venous thromboembolism with hemodynamically compromising pulmonary embolism (n = 2); bleeding from mucosal surfaces

as well as external and internal hematomas (n = 4); and drug-induced acute kidney injury (n = 14) and liver dysfunction (n = 2). (2) Complications related to hospitalization (n = 52, 34.6%). Hospital-acquired infections such as secondary bacterial pneumonia, urine infection, catheter and tracheostomy site infections, and bed sores contributed to prolonged stay in many patients. Many patients were affected by neuropathy and myopathy that required prolonged physiotherapy. (3) Pre-existing conditions or conditions unrelated to COVID-19 (n = 18, 12%). The common causes in this category were uncontrolled diabetes, heart failure, acute kidney injury, seizures, ischaemic and haemorrhagic stroke, and upper gastrointestinal bleeding. Four patients had pulmonary tuberculosis, 2 were treated for intracerebral haemorrhage, and 1 for cervical fracture. (4) Other reasons, including isolation issues related to discharge, repatriation, and logistics

(n = 70, 46.6%). This category included patients who were unable to arrange isolation at home or needed to be repatriated to their home country. One patient extended her stay because her newborn baby needed hospital care.

Discussion

A single symptomatic case of COVID-19 is predicted to have a median direct medical cost of $3045 in the United States of America for the course of the infection (15). Back in 2005, it was estimated that each hospital stay in the UAE cost $223.26 per day. Since then, the cost has grown dramatically (10). Our study focused on identifying the reasons for prolonged hospital stay after recovering from COVID-19. Understanding these reasons could help reduce the length of time spent in hospital and the associated costs.

Patients in our hospital were treated for COVID-19 in accordance with the UAE national guidelines in force at that time. Several of the drugs used to treat COVID-19 patients in this study are known to cause adverse effects. For example, lopinavir/ritonavir and favipiravir may cause liver enzyme abnormalities (17,18), low-molecular-weight heparin may cause anaemia and haemorrhage (19), and tocilizumab increases the risk of secondary infections (20). All of these adverse effects can

contribute to prolonged hospital stay and postponed discharge. In our study, 4 patients experienced bleeding complications, including 1 large subcutaneous

hematoma, which caused a significant drop in haemoglobin that required blood transfusion. The bleeding events were related to anticoagulation therapy. Two patients developed liver injury that

was likely related to COVID-19 infection or medication. Hepatotoxic drugs such as lopinavir/ritonavir were withdrawn from these patients, and their liver functions improved during recovery.

COVID-19 is known to induce acute kidney injury with complex pathophysiology (21). Fourteen patients in our study developed acute kidney injury, but almost all of them recovered during the course of the infection, and none required dialysis. A few simple steps may help reduce these complications; for example, identifying patients at high risk for bleeding before beginning anticoagulation, such as those with a high HAS-BLED score, and those receiving concurrent antiplatelet agents. A careful review of medication to reduce multiple hepatotoxic or nephrotoxic drugs and decrease drug interactions would also reduce adverse effects. It should be emphasized that the most recent WHO guidelines state that anticoagulation is not necessary for these patients, thus lowering the risk of bleeding and, consequently, hospitalization (22).

Comorbidities are known to complicate and lengthen hospital stays in many conditions. They were particularly important for patients with COVID-19 because they had an impact on the standard of care, especially in the early phases of the pandemic, when health services were not well equipped to handle such a large number of hospitalizations. To minimize the exposure of staff to infection, most patients only received minimum essential care. For example, a patient with a stroke and COVID-19 did not receive the same physiotherapy and support as with a stroke patient without COVID-19.

Some comorbidities increase COVID-19 complications. Most of our patients with prolonged stay had comorbidities, including diabetes mellitus and hypertension. Diabetes and metabolic syndrome are proinflammatory and prothrombotic states that play an important role in the complications of COVID-19 (23). Diabetes alters the immune response and inhibits both the innate and adaptive immune responses (24). There is a positive association between blood glucose levels and length of stay in hospital (7). Diabetes is an independent risk factor for hospital-acquired pneumonia, thus complicating COVID-19 cases (25). Closer and more vigilant monitoring of patients could reduce some of these complications.

The average length of stay in our study was 48 days, which was longer than that reported in other studies. Rees et al. reported that length of stay for COVID-19 patients ranged from

Older patients are more likely to develop complications such as immobilization, dehydration, malnutrition, nosocomial infections, and bed sores (27). Early physiotherapy with nutritional support could reduce these complications. Thirty-seven (17%) of our patients developed hospital-acquired infection and required treatment with intravenous antibiotics. This could have

been prevented with regular monitoring and removal of unnecessary lines and urinary catheters that were missed due to increased patient load and fear of infection. Probably, shorter mandatory isolation periods could improve care because it would enable patients to be shifted to appropriate wards and facilities.

Expatriates account for the majority of residents and a large percentage of patients in the UAE (28). Most of the expatriate patients lived in the country without their families and had no support after hospital discharge; therefore, they had to be repatriated to their home countries instead of regular discharge from the hospital. Nine (6%) of our patients had to be repatriated. The repatriation process was prolonged by lockdown and suspension of international flights as part of measures to control the pandemic. At the beginning of the pandemic lack of rehabilitation and isolation facilities also contributed to prolonged hospitalization.

Conclusion

We confirmed that COVID-19 alone may not have been the main cause of protracted hospitalization, some of the patients had a variety of other contributory factors. The most common reasons for prolonged hospitalization were: completion of isolation period for patients who could not isolate at home; hospital-acquired infections requiring prolonged treatment; severe infection causing acute respiratory distress syndrome requiring intensive care; myopathy/neuropathy requiring rehabilitation; and pulmonary fibrosis requiring oxygen supplementation. Optimal management of resources has been a major challenge during the COVID-19 pandemic, thus understanding the causes and effects of prolonged hospitalization is essential. If these complications and issues can be identified, anticipated, and addressed early, then patients could be discharged earlier, thus reducing the burden on healthcare systems. Improved infection control practices could be implemented to help prevent catastrophic hospital-acquired infections, and a reduction in the patient isolation period could allow important investigations to be arranged sooner. The findings from this study could help hospital management in planning bed and personnel allocation as well as logistic assistance ahead of any unanticipated pandemics in the future.

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Competing interests: None declared.

Durée et étiologie de l'hospitalisation prolongée des patients atteints de COVID-19 aux Émirats arabes unis

Résumé

WHO EMRO | Duration and aetiology of extended hospitalization among COVID-19 patients in United Ara

Contexte : Il est essentiel de procéder à un examen rétrospectif des premiers stades de la pandémie de COVID-19 en 2020 et des difficultés rencontrées par les hôpitaux dans l'ère post-pandémique de 2022.

Objectif : Identifier les causes d'une hospitalisation prolongée suite à une guérison des patients atteints de COVID-19 aux Émirats arabes unis.

Méthodes : La présente étude observationnelle rétrospective a été réalisée auprès de 150 patients (18,75 %) hospitalisés de manière prolongée entre le 1er avril et le 1er juillet 2020 dans un hôpital tertiaire de Dubai. Les données ont été obtenues à partir des dossiers médicaux électroniques de l'hôpital. Les variables continues sont présentées sous forme de moyennes et d'écarts-types, et les variables catégorielles sont présentées en tant que nombres et pourcentages.

Résultats : La durée moyenne d'hospitalisation était de 48,5 jours (9-272), avec un intervalle interquartile (IQR) de 22 jours. La durée moyenne de séjour prolongé était de 27,5 jours (2-231), avec un IQR de 17 jours. Les causes les plus courantes d'hospitalisation prolongée étaient l'isolement obligatoire pour 28 % (n = 62), les infections nosocomiales pour 17 % (n = 37), le syndrome de détresse respiratoire aiguë pour 15 % (n = 32), la myopathie ou la neuropathie pour 14 % (n = 31), la fibrose pulmonaire nécessitant une supplémentation en oxygène pour 14 % (n = 31) et l'achèvement du traitement contre la COVID-19 pour 12 % (n = 25).

Conclusion : Afin de tirer le meilleur parti des ressources hospitalières disponibles, les causes ayant contribué de manière directe ou indirecte à l'hospitalisation prolongée des patients doivent être prises en compte et traitées pour les prochaines pandémies ou flambées de maladies.

مدة وأسباب الاحتجاز المطوَّل لمرضى كوفيد - 19 في المستشفيات في الإمارات العربية المتحدة

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8 / 11

WHO EMRO | Duration and aetiology of extended hospitalization among COVID-19 patients in United Ara

أفضل مبشر، رانجانا براديب

الخلاصة

: كان من الضروري في حقبة ما بعد جائحة كوفيد -19 في عام 2022 إجراء استعراضالخلفية
استرجاعي للمراحل المبكرة للجائحة في عام 2020 والتحديات التي واجهتها المستشفيات .

: هدفت هذه الدراسة الى تحديد أسباب الاحتجاز المطوَّل لمرضى كوفيد -19 فيالأهداف
المستشفيات بعد التعافي في الإمارات العربية المتحدة .

: أُجريت هذه الدراسة الرصدية الاسترجاعية على 150 مريضًا (18.75%) احتُجزواطرق البحث
لمدد طويلة في مستشفى تخصصي في دبي في الفترة من 1 أبريل / نيسان إلى 1 يوليو / تموز 2020.
وقد جُمعت البيانات من السجلات الطبية الإلكترونية للمستشفى . ويُبلَّغ عن المتغيرات
المستمرة في صورة متوسط وانحراف معياري، ويُبلَّغ عن المتغيرات الفئوية في صورة أعداد
ونسب مئوية .

: كان متوسط مدة الاحتجاز في المستشفى 48.5 (9-272) يومًا، وبلغ المدى بين النتائ [ج
الرُبعي 22 يومًا . أما متوسط مدة الإقامة الممتدة
فكان 27.5 (2-231) يومًا، وبلغ المدى بين الرُبعي 17 يومًا . والأسباب الشائعة للاحتجاز
المطوَّل في المستشفى هي العزل الإلزامي : 28 %

(العدد = 62) ، وحالات العدوى المكتسبة في المستشفى : 17% (العدد = 37) ، ومتلازمة الضائقة
التنفسية الحادة : 15% (العدد = 32) ، والاعتلال العضلي / العصبي : 14% (العدد = 31) ،
والتليف الرئوي الذي يتطلب المعالجة بالأكسجين : 14% (العدد = 31) ، واستكمال علاج
كوفيد -19: 12% (العدد = 25).

: للاستفادة المثلى من الموارد المتاحة في المستشفيات، ينبغي النظر فيالاستنتاجات
الأسباب التي تسهم بشكل مباشر أو غير مباشر في استطالة مدد احتجاز المرضى في
المستشفيات، ومعالجة هذه الأسباب أثناء الجوائح أو فاشيات الأمراض في المستقبل .

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9 / 11

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