Acta Scientific MEDICAL SCIENCES (ISSN: 2582-0931)

Volume 6 Issue 12 December 2022

Research Article

Follow-up of Critically Ill COVID-19 Patients After ICU Discharge

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DOI: 10.31080/ASMS.2022.06.1403

Received: November 03, 2022

Published: November 21, 2022

Abstract

Introduction: Severe COVID-19 survivors may experience decreased health-related quality of life, as well as physical and psychological disability after discharge. This study aimed to characterize the impact on the quality of life of severe COVID-19 patients admitted to a single Portuguese Intensive Care Unit (ICU).

Methods: Retrospective case series of 119 consecutive patients with laboratory-confirmed COVID-19 admitted to ICU from January to December 2020, in whom a EuroQol five-dimension five level (EQ-5D-5L) was used to access self-perceived quality of life. Demographic and clinical data were collected.

Results: Average ICU mortality was 40%. 51 patients undertook a EQ-5D-5L telephone survey, approximately 12 months after ICU discharge. A moderate impairment was identified in 43% of the patients and extreme impairment in 25% of the patients. Problems related to anxiety/depression were more frequently reported.

Discussion: Assessment of health-related quality of life has increasingly been recognised as crucial in severe COVID-19 survivors. Our study results are in line with available evidence in these patients, showing impairment in different aspects of quality of life, particularly those concerning pain/discomfort and anxiety disorders. The later were the most frequently reported in our analysis.

Conclusion: Health-related quality of life is negatively affected in severe COVID-19 survivors. An organized approach to manage the post-acute phase is needed to improve long-term outcomes.

Keywords: COVID-19; Intensive Care Units; Morbidity; Follow-Up Studies

Introduction

The global coronavirus disease 2019 (COVID-19) was declared pandemic by World Health Organization (WHO) in March 2020 and continues to impact international healthcare. To date, the World Health Organization (WHO) has recorded more than 460 million cases and more than 6 million confirmed deaths worldwide. In Portugal there have been over 3 million confirmed infections and over 21,000 deaths, at the time of writing [1].

COVID-19 has led to an extraordinary number of critically ill patients requiring ICU (Intensive Care Unit) admission for treatment of acute and severe respiratory failure [2,3]. Prolonged and aggressive invasive mechanical ventilation, deep sedation and neuromuscular blockage leading to prolonged ICU stay are common denominators in severe forms of COVID-19 and are well known risk factors for reduction in health-related quality of life, impaired physical function, and psychological disability [4]. Emerging evidence concerning medium and long-term problems experienced by COVID-19 survivors emphasizes post-acute COVID-19 related-symptoms and health-related quality of life [2,5-10].

The EuroQol five-dimension five level (EQ-5D-5L) is a simple but widely used instrument developed to measure health-related

quality of life. This tool characterizes health status in five domains (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression), and results in an index representing the individual health status [11]. It is validated to the Portuguese population [12].

This study aimed to characterize the impact on the quality of life of severe COVID-19 patients admitted in a single Portuguese ICU in 2020.

Methods

In the pandemic setting, Braga´s hospital was designated as COVID-19 reference center for Minho, and, as such, critically ill COVID-19 patients within that area were transferred there. Admission into the ICU occurred at the discretion of the attending critical care physician, but general criteria included patients requiring rapid increase oxygen supplementation, noninvasive positive pressure ventilation, invasive mechanical ventilation, or vasopressors.

We conducted a retrospective case series of all consecutive adult patients with severe forms of COVID-19 admitted to the ICU of Hospital de Braga during 2020, and follow-up outcomes until approximately one year after ICU discharge. The study was approved by the Ethics Committee of Hospital de Braga and all patients gave informed verbal consent at the time of the contact. Sociodemographic and clinical data (genre, age, length of stay, severity scores, ventilatory support, tracheostomy, ICU mortality and hospital mortality) were collected retrospectively from informatic clinical records.

The EQ-5D-5L survey was undertaken by telephone interview, either with the patient or with family/caregiver. Missed calls were retried up to three times at a different timing (different day and hour).

Results

This case series included 119 critically ill patients with SARS-CoV-2 infection and severe respiratory involvement. Baseline demographic, clinical characteristics and outcomes are shown in table 1.

The median age was 68 years old. Overall, 91 (76,4%) patients were male and male gender was more represented across all age groups. ICU admissions peaked in November/December (n = 76, 63,9%) and March/April (n = 27, 22,7%), which is consistent with COVID-19 pandemic waves in Portugal. ICU mortality was 39%, two patients died in-hospital after ICU discharge and only one patient died after hospital discharge.

Population characterization	N = 119
Median age, n (P_{25}-P_{75})	68 (60-74)
Gender Male, n (%) Female, n (%)	 91 (76,5) 28 (23,5)
Median APACHE II HMR APACHE II (%)	17 21,0%
Median SAPS II HMR SAPS II (%)	38 28,6%
Median ICU length of stay, days (P_{25}-P_{75})	16 (7-23)
Median hospital length of stay, days (P_{25}-P_{75})	23 (12-38)
Mortality ICU, n (%) Hospital, n (%)	 46 (38,7) 48 (40,3)

Table 1: Population characterization.

APACHE: Acute Physiology and Chronic Health Evaluation; ICU: Intensive Care Unit; HMR: Hospital Mortality Risk; SAPS: Simplified Acute Physiology Score

About 97% (n = 116) of the patients needed ventilatory support: 79,8% (n = 95) were intubated for invasive mechanical ventilation (IMV), and 70,6% (n = 84) and 79,8% (n = 95) were managed noninvasively either with High Flow Nasal Oxygen (HFNO) or Non-Invasive Ventilation (NIV), respectively. Table 2 summarizes ventilatory support strategies in COVID-19 patients in ICU. Tracheostomy was performed in 13 patients, corresponding to 10,9%.

Ventilatory support	N = 116
HFNO, n (%)	10 (8,62)
NIMV, n (%)	8 (6,90)
IMV, n (%)	12 (10,3)
HFNO + NIMV, n (%)	41 (35,3)
HFNO + IMV, n (%)	45 (38,8)
NIMV + IMV, n (%)	73 (62,9)
HFNO + NIMV + IMV, n (%)	35 (30,2)

Table 2: Ventilatory support.

HFNO: High Flow Nasal Oxygen; IMV: Invasive Mechanical Ventilation; NIMV: Non-Invasive Mechanical Ventilation

Telephone interviews were attempted in 70 patients, and more than 70% of those (n = 51) were able to complete EQ-5D-5L survey. Around 30% (n = 19) of the telephone interviews were missed (interviewers were not able to reach the patient/family/caregiver). The median time for follow-up was 12 months after ICU discharge (IQR 11-18 months). Table 3 summarizes the results from EQ-5D-5L surveys. Nil problems were reported in every domain of EQ-5D-5L in 13,7% (n = 7). A "moderate problem" was reported in some domain of EQ-5D-5L in 43,1% (n = 22) of the patients. "Severe problem" or "unable to do" was reported in some domain in 25,5% (n = 13).

EQ-5D-5L	No problem	Slight problem	Moderate problem	Severe problem	Unable to do
Mobility, n (%)	21 (41,2)	16 (31,4)	10 (19,6)	4 (7,84)	0 (0)
Self-care, n (%)	33 (64,7)	9 (17,6)	2 (3,92)	3 (5,88)	4 (7,84)
Usual activities, n (%)	25 (49,0)	10 (19,6)	9 (17,6)	2 (3,92)	5 (9,80)
Pain/discomfort, n (%)	28 (54,9)	13 (25,5)	4 (7,84)	6 (11,8)	0 (0)
Anxiety/depression, n (%)	18 (35,3)	20 (39,2)	7 (13,7)	5 (9,80)	1 (1,96)

Table 3: EQ-5D-5L survey results.

EQ-5D-5L: EuroQol Five-Dimension Five Level

Overall, most of the reported problems were related to anxiety/depression (64,7%, n = 33), followed by those associated with mobility (58,8%, n = 30). Difficulties in usual activities were described in 51,0% (n = 26), and pain/discomfort was acknowledged by 45,1% (n = 23) of the patients. Self-care was reported in a small group of patients (35,3%, n = 18). The combined proportion of "no problem" and "slight problem" was greater than 65% in all five domains of EQ-5D-5; as opposed to the combined proportion of "severe problem" and "unable to do", which was considerably lesser and similarly reported in all domains of EQ-5D-5L (8-14%).

Discussion

In this case-series study, health-related quality of life, assessed with EQ-5D-5L, was moderately impaired in 43% and extremely impaired in 25% of the patients. Problems related to anxiety/depression were more frequently reported, though extreme problems were equally acknowledged in all 5 domains of the survey.

The available literature addressing health-related quality of life in severe COVID-19 survivors, reports moderate to severe impairment in up to 60% of the patients [6-10]. Importantly, available studies show marked heterogeneity, particularly related to different disease severity, timing of follow-up and tools used to assess quality of life, making the comparison of its results very challenging.

Our analysis revealed a higher proportion of problems related to anxiety/depression, which is not in line with results from several other studies in which pain/discomfort was more prevalent [7,9]. In another Portuguese study, problems related to usual activities were more frequently described [10]. Differences in baseline characteristics of patients, COVID-19 severity and follow-up strategies are possible explanations for these variations. Of note, anxiety/depression is described in COVID-19 survivors [9,13,14], both as part of post-acute COVID-19 syndrome [5], as well as in ICU survivors (post-intensive care syndrome) [4,15,16].

There were several limitations to our study. Firstly, this is a single center case series with a relatively limited sample size, which bounds the generalizability of the results, particularly demographic ones. Secondly, data was collected retrospectively from electronic records, and there was no standard protocol for clinical registration or patient workup during ICU admission. Also, follow-up timing was heterogenous.

Finally, EQ-5D-5L is based on the patient perception of disability, which also has its limitations and can lead to inaccuracy.

Conclusion

In this case series of critically ill patients with laboratory-confirmed SARS-CoV-2 infection, health-related quality of life was negatively affected. An organized approach to identify and manage the post-acute phase is crucial to improve long-term outcome of these patients.

Funding Sources

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethical Considerations

- **Protection of humans and animals**: The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.
- **Data confidentiality:** The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Competing Interests

The authors have declared that no competing interests exist.

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