



Educational Nursing Interventions in Post-COVID-19 Heart Transplantation: An Experience Report

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Abstract: **Introduction:** COVID-19 infection can lead to fulminant myocarditis, making the pretransplant process shorter and more rapidly progressing. **Objective:** To report the case of a patient who after COVID-19 infection evolved to heart transplantation, as well as the educational nursing interventions performed in this process. **Methods:** This is a case report approved by the Research Ethics Committee, under protocol no. 52318721.7.0000. 5462, described according to the CARE guidelines, and a systematization of nursing care for an adult who, upon contracting COVID-19 in June 2020, evolved within six months to myocarditis, heart failure, and transplantation, in a cardiology hospital in the city of São Paulo (SP). **Results:** A young male adult presented with mild symptoms of COVID-19 and progressed with worsening systemic symptoms, failure to withdraw vasoactive drugs, and implantation of an intra-aortic balloon device with outcome to heart transplantation. The reported case showed the evolution of this young patient, with no history of cardiovascular disease, evolving to heart transplantation, differently from what is reported in the literature about transplant patients who acquired COVID-19. The evolution of the disease required systematized nursing care and educational interventions, the focus of this study to obtain health education outcomes. **Conclusion:** The patient, with a nursing diagnosis of improved knowledge disposition, through the intervention of improved health education, obtained knowledge of heart failure control and had heart transplantation as the outcome, with in-hospital adherence to therapy, and should be monitored after discharge.

Descriptors: Coronavirus; Heart Failure; Case Reports; Nursing; Health Education; Transplantation.

INTRODUCTION

In December 2019, the world became aware of a string of viral pneumonia cases in China, and in March 2020, the World Health Organization (WHO) declared the beginning of the COVID-19 pandemic, a disease of viral origin, of the same family as the severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS), with high virulence, which induces widespread inflammation, mainly in lung tissue, and can have clinical presentation from asymptomatic pictures to multiple organ dysfunction and death.^{1,2}

According to WHO data, as of January 27, 2021, 360,578,392 cases have been confirmed, of which 5,620,865 have died, with the highest number of confirmed

cases in Europe (136,835,965 cases), followed by America, with 131,342,970 cases. The Brazilian data from the Ministry of Health, on the same date, are quite expressive: 24,764,838 confirmed cases and 625,085 deaths from COVID-19, showing a lethality of 2.5%.^{3,4}

According to the literature, patients with previous diseases such as hypertension, diabetes mellitus and other heart diseases had clinical worsening, increased hospitalizations and death as the outcome. There have also been increasing reports of cases in which previously healthy patients, i.e., without previous diseases, have developed cardiovascular disease, such as myocarditis.^{5,6}

Acute fulminant myocarditis leads to advanced heart failure refractory to optimal therapy, and the outcome in some cases is heart transplantation.^{7,8}

In the literature, most of the descriptions of COVID-19 are associated with previously transplanted patients who contracted the disease and developed complications due to their greater vulnerability, and there are few studies describing cases of previously healthy patients who contracted COVID-19 and developed the need for heart transplantation, which justifies this case report.

Nurses must be able to perform diagnoses and interventions in search of results of this nursing care in the face of infection by COVID-19 and act in interdisciplinary and educational work aimed at better therapeutic adherence after cardiac transplantation.⁹

Taking into account the data pointed out, it is essential to share information to support nurses in planning care and implementing the systematization of nursing care to this population, which, upon acquiring COVID-19, requires adapting in a short period of time to the heart diseases developed and to the new condition of life, unlike those who previously had heart diseases.

OBJECTIVE

To report the case of a patient who, after COVID-19 infection, evolved from myocarditis to heart failure and transplantation, as well as the educational nursing interventions performed in this process.

METHODS

The case report was developed following the CARE guidelines and was submitted to the Research Ethics Committee and approved by it under protocol No. 52318721.7.0000.5462.

The subject is an adult male patient who was diagnosed with COVID-19 in June 2020. Hospitalized in a public cardiology reference hospital in the city of São Paulo (SP), he evolved with myocarditis, fulminant heart failure and indication for transplantation, in a period of six months, and experienced the educational interventions during hospitalization.

In this experience report, the taxonomy of the North American Nursing Diagnosis Association International (Nanda), Nursing Intervention Classification (NIC) and Nursing Outcomes Classification (NOC) was adopted to enable systematized nursing care.

RESULTS

A young adult male, 26 years old, with obesity (body mass index = 33.77 kg/m²) as his only comorbidity, manifested rhinorrhea for two days in May 2020. Figure 1 shows that, in June, the patient presented with dyspnea on moderate exertion, and on serology examination, IgG antibodies against COVID-19 were detected. The condition was treated as a possible remaining symptom of COVID-19, and the individual was counseled for home follow-up. In July, the symptoms intensified to epigastric pain, nausea, vomiting, lower limb edema, and worsening dyspnea. In August, the patient was referred to a cardiologist, who showed evidence of liver, kidney, and heart injury from laboratory tests and X-rays. At that point the patient was referred to a specialized tertiary public cardiology referral service.

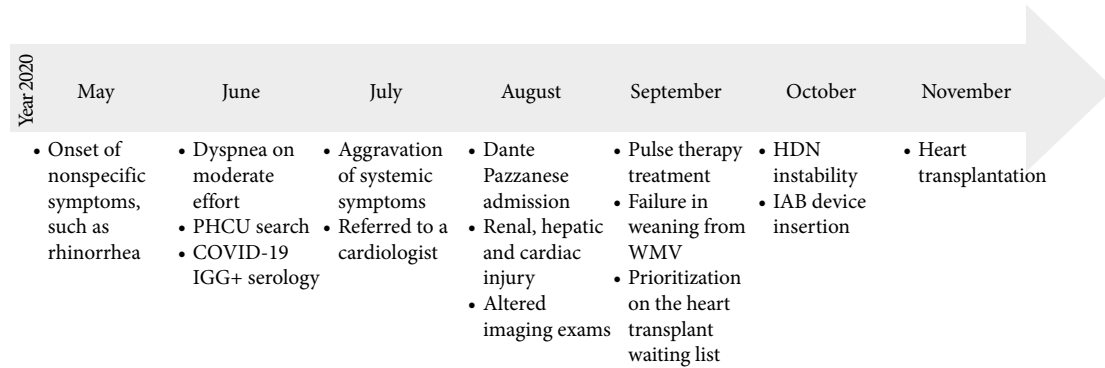


Figure 1. Evolution of the case in 2020. São Paulo, 2021.

PHCU: primary health care unit; WMV: withdrawal of mechanical ventilation; HDN: hemodynamic; IAB: intra-aortic balloon.

Despite the history of a young and healthy individual, the symptoms on admission were compatible with the diagnosis of profile C heart failure and target organ damage, as indicated by the admission laboratory tests (Table 1). A transthoracic echocardiogram, still in the emergency room, showed a left ventricular ejection fraction value of 11% and images suggestive of intracavitary thrombi. Cardiac compensation with vasoactive drugs started immediately. The diagnosis of inflammatory myocarditis was confirmed by magnetic resonance imaging.⁴

Table 1. Admission laboratory exams altered. São Paulo, 2021.

Exam	Result	Reference
Hemoglobin	14.9	13 – 17 g/dL
Platelets	55	150,000 – 400,000 mm ³
Prothrombin time	1.82	1 to 1.2 se
D-dimer	17,000	less than 500 ng
Creatinine	1.7	0.6 – 1.2 mg/dL
Urea	126	19 – 43 mg/dL
Oxaloacetic transaminase	223	17 – 59 U/L
Pyruvic transaminase	485	< 35 U/L
C-reactive protein	3.9	< 1 mg/dL
Troponin	420	< 0.034 mg/dL
Natriuretic peptide	9,203	< 125 pb/mL

Pulse therapy with methylprednisolone and human immunoglobulin was performed In September, however with no response of functional recovery of the heart. In October, given the dependence on dobutamine throughout the process, the patient started to present criteria for inclusion in the heart transplant queue as a priority. Still maintaining instability, the condition required ventricular assist device implantation (intra-aortic balloon), until, after approximately 30 days, in November, he received his new heart.

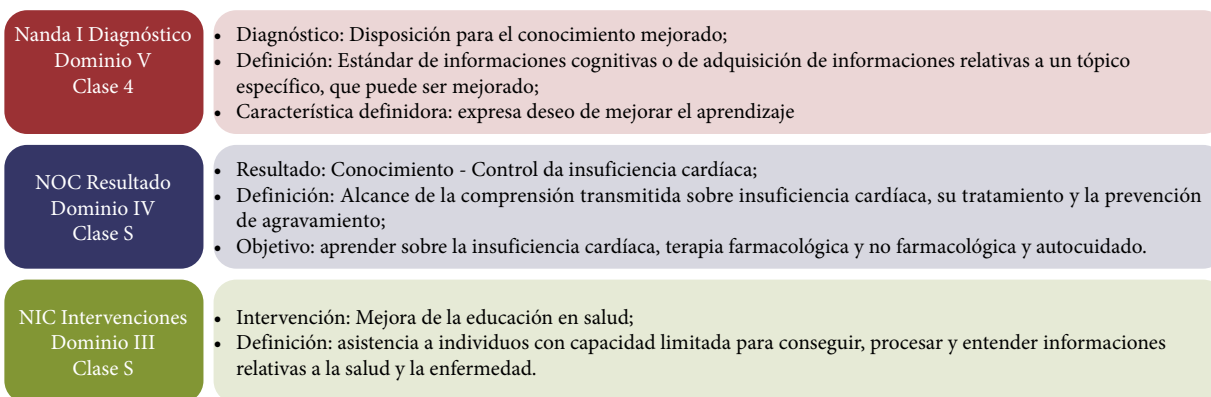
Diagnosis, interventions and nursing outcomes

The rapid evolution of the disease has required the clinical competence of the nurse and the patient's knowledge of the process and adherence to treatment.

Upon admission, the diagnosis was profile C heart failure, and the expected outcome was hospital discharge, which did not occur, due to disease progression, and the indication was transplantation. In the nursing scope, the diagnosis was listed: willingness to improve knowledge, characterized by the patient's expressed desire to improve learning to cope with changes in lifestyle habits, resulting from his diagnosis of heart failure and subsequent indication for transplantation.

Thus, through the knowledge questionnaire for patients with heart failure, an initial score of 49 points was identified, i.e., good knowledge of the disease.⁵ The planning and interventions initially proposed for the diagnosis of heart failure were maintained, even after the evolution of the disease and the indication for transplantation.

The expected outcome regarding knowledge related to heart failure management was based on the NANDA-I, NOC and NIC instruments, as illustrated in Fig. 2.



Nanda: North American Nursing Diagnosis Association International; NIC: Nursing Intervention Classification; NOC: Nursing Outcomes Classification.

Figure 2. Planning the systematization of nursing care. São Paulo, 2021.

The interventions were carried out in two stages, as described:

1. Health Education: performed based on the patient's previous knowledge and providing him with information about heart failure (pathophysiology, medications, diet, fluid restriction, signs and symptoms of worsening, daily weight, blood pressure and heart rate monitoring, and exercise). The strategy used was a dialogical exposition with the availability of easy-to-understand written educational materials;
2. Transition from heart failure interventions to heart transplantation (self-care in maintenance and post-transplant management, in-depth on medications, and clarification of doubts): dialogical presentation about the care after heart transplantation (self-care for hygiene, nutrition, medication adherence, cardiac rehabilitation, vaccinations, immunosuppression, risk of infection, home care, and family support).

The result of the interventions showed improved knowledge from 14 to 27 points, relative to the indicators measured in the control of heart failure (Table 2).

Table 2. Outcome of nursing interventions. Knowledge: heart failure management. São Paulo, 2021.

Indicators	None (1)	Limited (2)	Moderate (3)	Substantial (4)	Comprehensive (5)
a) Basic heart actions		A		B	
b) Signs and symptoms of progressive heart failure			A	B	
c) Treatments to improve cardiac performance			A	B	
d) Benefits of regular exercise	A		B		
e) Recommended fluid intake			A		B
f) Therapeutic effects of the drug	A		B		
g) When to get professional help	A			B	
Preintervention: 14 points			Postintervention: 27 points		

A: before the intervention; B: after the intervention.

DISCUSSION

In Brazil, as of September 16, 2021, according to data from the Ministry of Health, 21,069,017 cases of COVID-19 had been confirmed, with 589,240 deaths (2.8%). Among these cases, 572,913 were males and 39,556 were in the 20-29 age group, showing that young adults have been affected by the disease and can present more complex clinical problems, such as fulminant myocarditis.⁶

The reported case showed the evolution of a young patient with no history of cardiovascular disease evolving to heart transplantation, unlike in the literature describing transplant patients who acquired COVID-19.⁷ Considering COVID-19 a new disease, there are few reports of patients without prior comorbidities who developed heart disease requiring transplantation.⁷

As evidenced in Table 1, the changes in test results are consistent with the study findings that showed clinical presentations with outcomes associated with COVID-19 postinfection and successful heart transplantation.⁸

Regarding knowledge: heart failure control after the educational intervention, Table 2 shows that there was an evolution of knowledge acquired by the patient's own interest in self-care.

Regarding heart failure and its signs and symptoms (items a and b), limited and moderate knowledge evolved to substantial. As far as therapy and the therapeutic effects of the drug are concerned, it has evolved from moderate and none to substantial and moderate. As far as care related to the benefits of regular exercise, recommended fluid intake, and when getting help from a professional evolved from none and moderate to moderate, comprehensive, and substantial.

The result of good knowledge expressed by the patient was possibly due to his search for information and updates in the media, however, the evaluation of the application of knowledge by the patient at home was not possible due to the severity of the case and the clinical evolution, which prevented his discharge from the hospital, unlike the literature that showed complete recovery of ventricular function after three weeks of pulse therapy.²

Health education becomes essential through the nurse's role in the pre-, trans-, and postcardiac transplantation phases. It provides a combination of opportunities (identification of risks and vulnerabilities, conditions for self-care, drug adherence, and following the guidelines of the interdisciplinary team) that allow for health maintenance and incorporation of these practices into the routine, promoting better health regulation, autonomy, and patient engagement in treatment.^{3,4,9}

Besides these educational actions, the nurse acts in the planning of clinical care, which includes the plan of nursing interventions, their execution, and the reevaluation of the results acquired, as well as the search for the support network for the follow-up of their therapy and social reintegration.¹⁰

CONCLUSION

In this study, the educational intervention carried out after a diagnosis of fulminant myocarditis that progressed to heart failure allowed the patient to develop good knowledge about his health condition. This condition was evidenced by the improved results of the NOC indicators (knowledge: heart failure control), which progressed from one to two evaluative criteria, achieving minimally moderate knowledge.

This acquired knowledge contributed to facing the indication for heart transplantation because of his clinical worsening refractory to the therapies provided.

The outcome was successful orthotopic bicaval heart transplantation six months after the first symptoms of COVID-19 diagnosis.

AUTHORS' CONTRIBUTION

Substantive scientific and intellectual contributions: Soares VL, Poltroniéri NVG and Kobayashi RM; **Conceptualization and design:** Soares VL, Poltroniéri NVG and Kobayashi RM; **Technical procedures:** Soares VL, Kobayashi RM, Simonetti SH and Gaspar AR; **Data analysis and interpretation:** Soares VL, Poltroniéri NVG, Kobayashi RM, Simonetti SH and Gaspar AR; **Manuscript writing:** Soares VL, Poltroniéri NVG, Kobayashi RM, Simonetti SH and Gaspar AR; **Critical review:** Poltroniéri NVG, Kobayashi RM and Simonetti SH; **Final approval:** Poltroniéri NVG, Kobayashi RM and Simonetti SH.

AVAILABILITY OF RESEARCH DATA

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