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Out of hospital management of LVAD patients during COVID-19 outbreak

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[Correction added on 21 August 2020, after first online publication: Silvia Mariani was designated as corresponding author]

Abstract

Coronavirus disease 2019 (COVID-19) is a pandemic touching thousands of people all around the world. Patients supported with left ventricular assist devices (LVADs) are affected by long-standing cardiovascular diseases and subjected to variations of the normal cardiovascular physiology, thus requiring an even closer monitoring during the COVID-19 outbreak. Nevertheless, the COVID-19 pandemic led to a drastic reduction in routine clinical activities and a consequent risk of looser connections between LVAD patients and their referring center. Potential deleterious effects of such a situation can be a delayed recognition of LVAD-related complications, misdiagnosis of COVID-19, and impaired social and psychological well-being for patients and families. As one of the largest LVAD programs worldwide, we designed a sustainable and enforceable telemonitoring algorithm which can be easily adapted to every LVAD center so as to maintain optimal quality of care for LVAD patients during the COVID-19 pandemic.

KEYWORDS

coronavirus, COVID-19, heart failure, left ventricular assist device, mechanical circulatory support

1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19) has been declared a pandemic affecting thousands of patients all around the world. Patients suffering from cardiovascular comorbidities have been identified as one of the groups exposed to higher morbidity and mortality.[1] A meta-analysis including 1576 Chinese COVID-19 patients demonstrated that the most prevalent comorbidities were hypertension (21.1%, 95% CI: 13.0%–27.2%), diabetes (9.7%, 95% CI: 7.2%–12.2%), and cardiovascular diseases (8.4%, 95% CI: 3.8%–13.8%).[2]

A special population at risk for COVID-19 includes end-stage heart failure (HF) patients and, more specifically, patients supported with left ventricular assist devices (LVADs). These patients are chronically affected by long-standing cardiovascular diseases and are subjected to variations of the normal cardiovascular physiology due to a non-pulsatile blood flow, exposure of the blood to artificial surfaces, and risk of hemorrhagic and thrombotic events. As a consequence, these patients deserve a constant connection to specialized multidisciplinary HF teams, regular visits to outpatient clinic, constant presence of highly trained VAD coordinators, and a 24/7 dedicated hotline.

2 | CHALLENGES DURING THE COVID-19 OUTBREAK

The COVID-19 outbreak led to a drastic reduction in routine clinical activities to create new COVID-19 isolated wards and prioritize COVID-19 patients. Accordingly, also elective LVAD surgeries have been suspended with a potential morbidity and mortality increase in LVAD candidates waiting for implantation. Furthermore, there is a risk that the tight connection between LVAD patients and their referring center becomes looser with potential deleterious effects such as delayed recognition of LVAD-related complications, misdiagnosis of COVID-19, and impaired social and psychological well-being for patients and families. In order to avoid such a situation, specific LVAD management algorithms became necessary.

On the global scene, Germany represents a positive example with high COVID-19 test rates on the general population and relative low mortality. At the same time, Germany hosts large LVAD programs such as the one at Hannover Medical School which can look back to more than 750 implantations in the past 9 years, and serves constantly about 250 LVAD patients in the follow-up program. Based on this peculiar situation in the global COVID-19 and LVAD scenario, our center developed a specific algorithm for out of hospital management of LVAD recipients during the COVID-19 outbreak.

3 | GENERAL RESPONSE TO THE COVID-19 CHALLENGES

Due to the general reorganization of healthcare resources in our hospital, elective LVAD implantations have been reduced to allow for a higher availability of intensive care beds. Consequently, only patients classified as INTERMACS profile 1 and 2 have been considered for LVAD implantation. In parallel, non-urgent visits to the outpatient clinic and elective hospital admissions have been suspended to reduce infection risks in HF patients.

Healthcare professionals involved in the management of LVAD recipients have been divided in two in-hospital working groups which alternated themselves every 7 days. This strategy ensured all basic services for in-hospital patients such as a constant presence of specialized surgeons and cardiologists as well as VAD coordinators. In turn, this guaranteed a lower infection risk for healthcare professionals due to a 50% reduction in their in-hospital working time and provided a constant back-up of healthy personnel in case of infection of a team member.[3] At the same time, the team members working from home were able to provide a 24/7 dedicated LVAD hotline which is crucial in the telemonitoring organization.

4 | TELEMONITORING OF LVAD PATIENTS

Each LVAD recipient routinely followed up in the outpatient clinic entered the telemonitoring algorithm (Figure 1) after an initial check of his/her status through an intake phone call. This check aimed to verify the home-care situation, recent or current hospital admissions, and open clinical problems requiring regular access to the referring clinic such as in case of severe driveline infections undergoing specific treatments. Moreover, in order to enter this monitoring program, the patient should have been judged as adequately educated through extensive talks and training sessions focused on driveline dressing techniques, battery and controller exchange, blood pressure, fluids, and anticoagulation self-management.

If the patient was deemed suitable for the telemonitoring program, a VAD coordinator established a COVID-19-specific phone contact. The patient was invited to strictly follow national guidelines in terms of social behaviors and was provided with surgical masks and driveline dressing kits through home delivery. This phone contact had several goals: identify a possible COVID-19 case, rule out LVAD complications, educate the patient on a correct behavior to prevent COVID-19, answer his/her questions, and provide psychological support. A specific questionnaire was designed to investigate COVID-19 symptoms such as fever, chills, increased fatigue, muscle pain, sore throat, anosmia, cough, cold-like symptoms, diarrhea, and worsening dyspnea. The questionnaire investigated also possible contacts with COVID-19 cases or flu-like episodes in the last 6 months. At the same time, the VAD coordinator recorded all LVAD-specific data like flow, speed, power consumption, INR values, weight, and status of the driveline site. If deemed necessary, the patient was asked to send a picture of the driveline site through email or smartphone. In case of no evident problems, the VAD coordinator re-contacted the patient weekly to repeat the full monitoring. If a suspicion of COVID-19 was raised, the LVAD patient was referred to a COVID-19 dedicated team while if an LVAD complication was suspected, the patient was transferred to the LVAD clinic.

5 | CONCLUSIONS

LVAD patients should be considered with special attention during the COVID-19 outbreak due to their high cardiovascular risk and their specific needs. While it is important to prevent COVID-19, the routine care should not be discontinued to avoid severe complications both on clinical and psychological sides. Therefore, specific management algorithms should be implemented by every implanting and referring LVAD center to aim for early diagnosis and treatment of COVID-19 or LVAD complications. A continuous telemonitoring system based on a fully digitalized structure is surely desirable,[4-7] yet

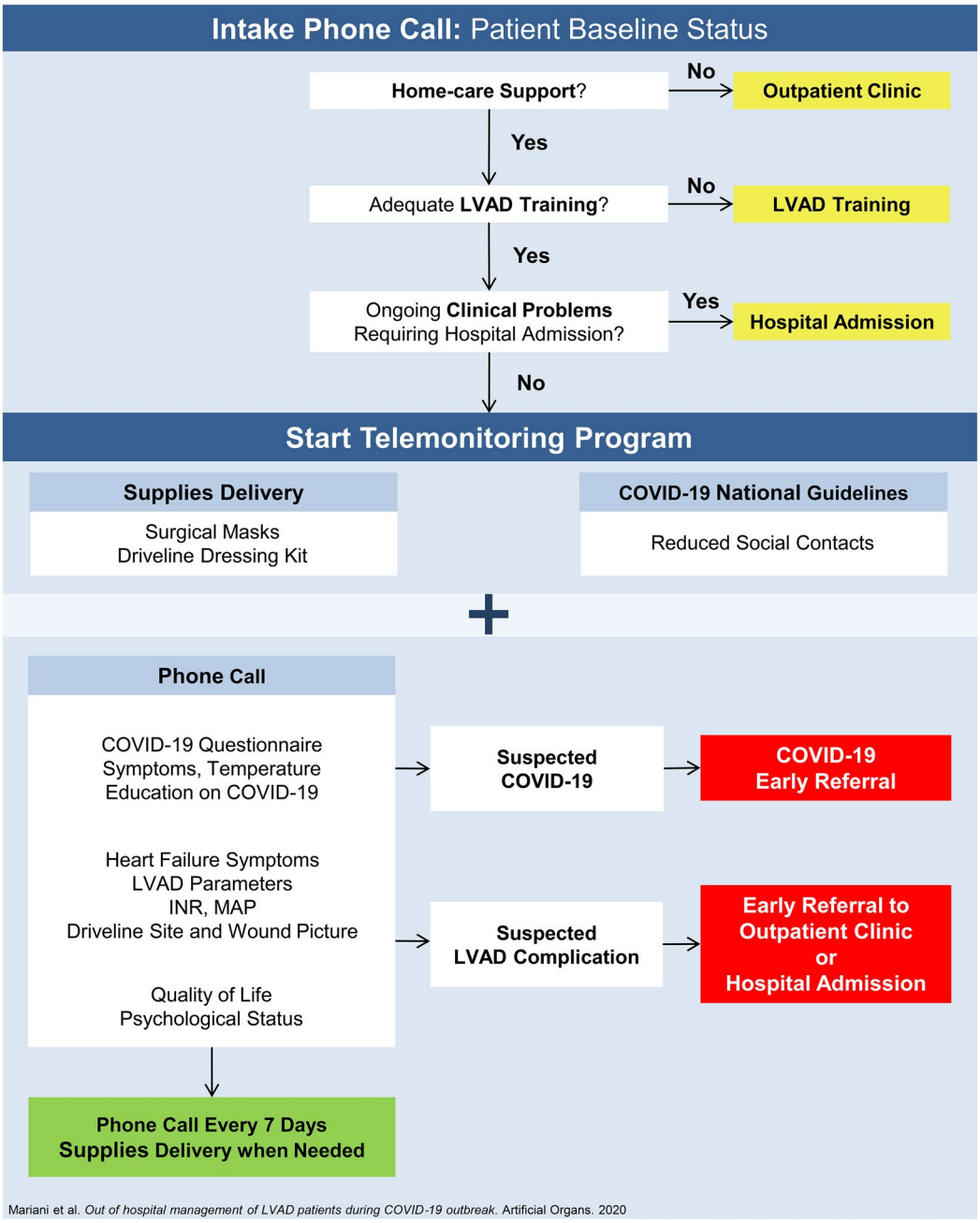

FIGURE 1 Algorithm for out-of-hospital left ventricular assist device (LVAD) management during COVID-19 outbreak. INR, international normalized ratio; MAP, mean arterial pressure [Color figure can be viewed at wileyonlinelibrary.com]

not available in every LVAD center. On the other side, our telemonitoring algorithm has been designed to be sustainable, enforceable, and adaptable to every LVAD center, regardless of number of LVAD patients or previous experiences.

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DISCLOSURES

Jasmin S. Hanke is consultant for Abbott. Jan D. Schmitto and Günes Dogan are consultants for Medtronic and Abbott.

AUTHOR CONTRIBUTIONS

Concept/design: Mariani, Schmitto
Drafting article: Mariani
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