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Nursing assistance in COVID-19 cardiovascular complications: Integrative Literature Review

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***Abstract*—** *This study aims to describe the aspects related to nursing care in cardiovascular complications of COVID-19. This is an integrative literature review, carried out in March 2021, through the search for articles in the scientific databases, published between January 2020 and February 2021. For the treatment of the data, the analysis technique was used of content 04 complete original articles were selected that answer the central question of the research and that were organized in three categories according to the evidences found. The analysis of the literature shows that the articles address nursing care through teleconsultation, nursing care in the cardiac complications of COVID-19 and nursing management in a cardiological unit in the context of the COVID-19 pandemic. It is concluded that nursing has a wide field of action in the front line and great challenges are faced when dealing with a new disease. The losses of COVID-19 to the cardiovascular system are present in the short and long term and nurses play an important role in the prevention, diagnosis, monitoring, treatment and rehabilitation of heart diseases.*

I. INTRODUCTION

The emergence of a New Coronavirus, officially known as Severe Acute Respiratory Syndrome (SARS-CoV-2), the cause of COVID-19, presented an unprecedented challenge for the whole world.[1]

In addition to the classic symptoms, the virus can affect the cardiovascular system and cause several clinical manifestations such as myocardial injury, Heart Failure (HF), Takotsubo Syndrome (ST), arrhythmias, myocarditis, Acute Myocardial Infarction (AMI) and shock [2]. Furthermore, the association between COVID-19 and previous cardiovascular disease is related to worse outcomes and increased risk of death.[3]

The damage caused by COVID-19 to the cardiovascular system is probably multifactorial and can result from an imbalance between high metabolic demand and low cardiac reserve, systemic inflammation and thrombogenesis.[4] Initial data suggest that those with COVID-19 and hypertension or cardiovascular disease have a mortality rate of 2 to 3 times higher than the population that is affected by the virus in general, suggesting that they are highly susceptible to the most serious effects of the disease. [2]

The virus has also been linked to long-term cardiac damage as it has also stopped treatment of people with existing cardiovascular disease. Some of the drugs that have been examined to treat the SARS-CoV-2 virus may be associated with long QT and arrhythmias. At the beginning of the COVID-19 pandemic, Hydroxychloroquine and Azithromycin assays to treat the New Coronavirus were established.[5]

However, these drugs can cause heart problems, specifically QT prolongation, especially in patients with liver disease or kidney deficiencies. In May 2020, the Australian Therapeutic Administration (TGA) updated its advice stating: "Based on the most recent international data, the use of Hydroxychloroquine to treat COVID-19 is strongly discouraged. The two main injuries to the cardiovascular system are: myocarditis and heart failure caused by the virus.[6]

Heart failure (HF) is a physiological state in which the heart is unable to pump enough blood to meet the body's metabolic needs after any structural or functional impairment of ventricular filling or blood ejection, refers to a clinical syndrome characterized by manifestations of volume overload and inadequate tissue perfusion.[7]

In the context of COVID-19, heart failure can present a set of unique challenges that can complicate presentation, management and prognosis. As a consequence of heart failure, myocarditis is a medical condition described as inflammation of the muscular middle layer of the heart wall, called myocardium.[8] It involves necrosis of cardiac myocytes or cardiac muscle cells, can cause a cascade of signs and symptoms that can include fatigue, dyspnoea, palpitations and can lead to death.[6]

Myocarditis is usually idiopathic, however, it can also occur because of other diseases. The signs and symptoms are usually nonspecific and can mimic any other heart disease.[9] However, signs characteristic of heart failure may appear, such as fatigue, dyspnoea, edema, signs of fluid overload, crackles, elevated jugular venous pulses, as well as the presence of 3rd and 4th heart sounds, systolic murmurs and chest pain.[10]

A multicenter cohort study involving 191 patients hospitalized with COVID-19 in Wuhan, 48% of patients had some comorbidity (67% of those who died), 30% had hypertension (48% of those who died), 19% had diabetes (31% of those who died) and 8% had coronary heart disease (24% of those who died).[11]

Although the virus enters the body through the upper respiratory tract, its affinity and selective binding to the angiotensin-converting enzyme 2 (ECA2) receptor, which is abundant in the endothelium of arteries and veins as well as in the epithelium of the respiratory tract, creates an ideal scenario in which COVID-19 develops with the potential for serious vascular complications. This may explain why hypertension is one of the cardiovascular conditions associated with adverse events.[9]

COVID-19 is a new disease, still in the process of discovering the extent to which it can cause health problems, whether in the short or long term. Nursing, as a category so present in patient care, needs to be prepared to know how to better manage the clinical situation of cardiac patients.[12]

In view of this situation, nurses working in cardiology have faced several challenges, since cardiac patients require stability and safety in care, in diagnoses, treatment, education and adequate follow-up.[5]

From the knowledge of the problems caused by COVID-19 in cardiovascular condition, some care must be adopted by the nursing team, who must be attentive during their visits, whether in primary or hospital care, about the clinical history, physical examination, troponin levels and electrocardiogram (ECG).[13]

The nurse has a fundamental role in the health team in the daily monitoring of patients, because through clinical evaluation, they will be able to survey and evaluate data for decision-making with the multidisciplinary team. Although attention is focused on addressing the acute situation created by the disease COVID-19, it is important

to continue efforts to prevent cardiovascular morbidity and mortality.[12]

The main functions of the nurse in the management of heart failure have focused mainly on the follow-up and monitoring of patients. The goals of the nursing care plan include support to improve the function of cardiac pumping through various nursing interventions, prevention and identification of complications.[14]

HF usually begins with increasing shortness of breath, sometimes accompanied by unspecific signs and symptoms of edema, fatigue, loss of appetite and changes in weight. HF may not be detected until the patient actually presents the signs and symptoms of pulmonary and peripheral edema. In view of this, nursing assessment focuses on observing the effectiveness of therapy and in developing care strategies.[15]

Some important nursing care are cardiac auscultation, as well as heart rate and rhythm to detect possible arrhythmias, palpation of peripheral pulses, blood pressure monitoring, skin tone checking for signs of pallor or cyanosis and production monitoring of urine, carefully observing the decrease in production and also the concentration.[15]

It is also important to assess the mental state and the level of consciousness, as well as to observe changes in the pattern of behavior such as lethargy, confusion, disorientation and anxiety. Assessing the patient's respiratory condition is of great importance, as well as paying attention to signs such as dyspnea, shortness of breath, fatigue and edema by monitoring oxygen saturation and a complete physical examination.[15]

Nursing care in heart failure consists of assessing vital signs at least every hour, increasing the intervals between taking vital signs as they stabilize, starting to be checked every four hours; administration of supplemental oxygen, as prescribed, and interrupting the oxygen saturation level (SpO2) if it is above the target range or as requested by the physician [15].

This study aims to describe aspects related to nursing care in cardiovascular complications of COVID-19.

II. METHOD

The research is of the type of integrative literature review, which aims to gather and synthesize research results on a delimited theme, in a systematic and orderly manner, being an instrument for the deepening of knowledge about the investigated theme, allowing the synthesis multiple published studies and general conclusions about it.[16]

In carrying out this review, six steps were used: 1) selection of hypotheses or guiding questions for the review; 2) selection of studies that will compose the sample; 3) definition of the characteristics of the studies; 4) categorization of studies; 5) analysis and interpretation of results; and, 6) report of the review.[17]

The guiding question for the elaboration of this integrative review consisted of: What are the scientific productions available on the aspects related to nursing care in the cardiovascular complications of COVID-19?

The survey of bibliographic studies took place during the month of March 2021 and four databases were chosen: Virtual Health Library (VHL), PubMed, Medical Literature and Retrivial System on Line (MEDLINE) and Google Scholar.

Following, the validated DECS descriptors were used: “COVID-19”; “Cardiology” and “Nursing”, the Boolean AND operator was used, in Portuguese, Spanish and English, published between January 2020 and February 2021.

For data collection, it was decided to use the instrument validated by Ursi [17]. The analysis of the selected studies took place in a descriptive manner, in order to enable observance and description of the data, thus, it was possible to gather the synthesized knowledge on the subject in question. Based on this, two empirical categories were elaborated, which will be presented and discussed below, in which the content analysis method of Bardin [17] was used to explore the content.

To guarantee the success of this study, it was decided to describe and distribute the results in tables, highlighting the main findings of each research. As for the discussion, it was carried out in a descriptive manner, in order to achieve the objectives of building an integrative review.

III. RESULTS AND DISCUSSION

In the present integrative literature review, 04 original scientific articles were selected that strictly met the selection of the sample previously established and showed approximations with the object of this study. These were organized in alphanumeric codes, from CV01 to CV04, for a better presentation and understanding of the results.

After analyzing the articles, three categories emerged, namely: 1) Nursing care through teleconsultation; 2) Nursing assistance in the cardiac complications of COVID-19; 3) Nursing management in a cardiology unit in the context of the COVI-19 pandemic.

Tables 1 and 2 show the characteristics of these studies, in which articles in English (80%), clinical trials

(60%), published in international journals (80%) and indexed in the Pubmed database predominate (80%).

Table 1: Distribution of studies.

Nº	Base	Language	Author. Title. Periodic. Year	Objective	Methodology
CV01	Google Scholar	Portuguese	SILVA, Vanessa Machado da. et al. Previous cardiovascular diseases and the risk of developing the severe form of COVID-19 in patients treated by a teletriage service. Brazilian Journal of Development. 2021.	Research and contextualize the experiences established during nursing practices in the Screening Service, entitled TELECOVID.	Experience report of nursing students in the development of the curricular internship, which took place from April to July 2020.
CV02	PubMed	English	VENDRIK, J. et al. Ongoing Transcatheter Aortic Valve Implantation (TAVI) practice amidst a global COVID-19 crisis: nurse-led analgesia for transfemoral TAVI. Neth Heart J. 2020.	Aim to show the safety and feasibility of TF-TAVI with nurseled local analgesia, possibly eliminating the need for an anaesthesiologist to be present in the cath lab.	The study population comprised 90 patients treated with TF-TAVI, with local analgesia performed by our dedicated cath lab nurses. The patients had a mean age of 80± 5 years and 59% were male, with a predicted surgical risk of 2.2± 0.9/3.1± 2.4% (Society of Thoracic Surgeons Predicted Risk of Mortality [STSPROM] score/EuroSCORE II), depicting a contemporary, lower-risk population.
CV03	PubMed	English	RUSSO, Vincenzo. et al., Nursing Teleconsultation for the Outpatient Management of Patients with Cardiovascular Disease during COVID-19 Pandemic.	The aim of our study was to describe the medical interventions following nursing teleconsultation for the outpatient management of patients with cardiovascular diseases during the COVID-19 pandemic.	All patients who did not attend the follow-up visit were rescheduled due to the COVID-19 block. These were selected to be included in the study. Each patient was accompanied by a semi-structured telephone interview conducted by a nurse. The results of the study show good adherence of patients to the nursing teleconsultation and the usefulness of this tool to detect clinical conditions that require medical intervention.
CV04	PubMed	English	VALDEZ-LOWE, Claudia; PARIKH, Sachin; KENEL, Kristina L. Running a cardiology consult service during a pandemic: Experiences from the front lines. Journal of the American Association of Nurse Practitioners. 2021.	Running a cardiology consultation service during a pandemic: Frontline experiences.	Brief Report

Source: Research protocol, 2021.

Table 2: Evidence from the studies.

Nº	Evidence
CV01	During the call centers, the role of the nursing team in the prevention and control of comorbidities of vascular origin was observed, which were associated with more expressive cases of COVID-19. Still, in view of the implications of the virus, studies show that it acts causing inferences in systemic blood pressure homeostasis; in the pathophysiology of cardiorespiratory failure and also favoring intracellular inflammatory reactions. Thus, it can cause myocardial lesions, predispose the development of venous and arterial thromboembolism and activate the coagulation cascade, thus emerging cardiac disorders as one of the most serious implications given its poor prognosis. Finally, it was concluded that nursing practices added knowledge beyond assistance, given the constant exercise of clinical thinking, with which it was possible to relate to cardiac comorbidities the imminent risk of developing the most serious manifestations of SARS-CoV- two.
CV02	The composite endpoint of device success (Valve Academic Research Consortium [VARC]-2) was reached in all patients. No patients showed more than mild paravalvular leakage (3/90, 3.3%). Overall, intravenous medication was sparsely used during the procedure, with 48 of the 90 (53%) patients receiving no unplanned intravenous medication. There was neither procedural nor inhospital mortality. The performance of TF-TAVI using local analgesia only, managed by a dedicated nurse instead of an anaesthesiologist, was shown to be feasible and safe in a selected group of patients. This strategy may (temporarily) eliminate the need for na anaesthesiologist to be present in the cath lab and enables ongoing TAVI treatment amidst the global COVID-19 crisis.
CV03	In total, 203 patients (81%) underwent nursing teleconsultation in a mean time of 7 3 days from the outpatient visit lost due to the COVID-19 lockdown. Furthermore, 53 patients (26%) showed poor adherence to nursing teleconsultation. Among the 150 patients (mean age 67 10 years; 68% male) who completed the telephonic interview, the nursing teleconsultation revealed the need of medical intervention in 69 patients (46%), who were more likely at very high cardiovascular risk (77% vs. 48%; $p < 0.0003$) and who showed a higher prevalence of dyslipidemia (97% vs. 64%; $p < 0.0001$) and coronary artery disease (75% vs. 48%, $p < 0.0008$) compared to those not in need of any intervention. The up-titration of the lipid-lowering drugs (n: 32, 74%) was the most frequent medical intervention following the nursing teleconsultation. The mean time between the nursing teleconsultation and the date of the rescheduled in-person follow-up visit was 164 -36 days. Conclusions: Nursing teleconsultation is a simple and well-tolerated strategy that ensures the continuity of care and outpatient management for patients with cardiovascular diseases during the COVID-19 pandemic.
CV04	It approaches that the assisting nurses had a fundamental role in the management of the cardiology health services at the peak of the pandemic due to COVID-19, since they contributed to the change in the profile of the health services attendance, making adaptations to receive the patients, as for For example, the suspension of elective surgeries and surgical centers became exclusive units to assist COVID-19.

Source: Research protocol, 2021.

Category 1: Nursing care through teleconsultation to cardiac patients in the context of the COVID-19 pandemic

The literature analysis showed that in this current pandemic context, it was necessary to implement strategies to assist the population, such as the Telehealth Centers, which aim to provide remote assistance to those with signs and symptoms suggestive of COVID-19, in order to prevent the spread of the virus, the advancement of expressive clinical conditions, as well as the overcrowding of health units. [18]

During the consultations, it was observed that many patients had several associated comorbidities, among which stand out Systemic Arterial Hypertension, Acute Myocardial Infarction, peripheral vascular impairment, ischemic stroke, Diabetes Mellitus and obesity. In general, a great relationship between pre-existing vascular disorders and more pronounced COVID-19 conditions was identified, going according to several scientific publications that refer to an unfavorable prognosis in the face of this association. [18]

Some authors suggest that the mechanism of entry of the new coronavirus occurs from its connection with the transmembrane angiotensin-converting enzyme (ECA2), which functions as a receptor. After its entry and subsequent replication in the human cell, the virus favors a decrease in the expression of ACE2, causing inferences in systemic arterial pressure homeostasis and in the

pathophysiology of cardiorespiratory failure. This loss of function causes less conversion of angiotensin II into angiotensin and, consequently, its greater availability in the body, which when bound to the AT1 receptor has pro-inflammatory and vasoconstrictor effects. Furthermore, the inactivation of ECA2 prevents its anti-inflammatory, vasodilatory, anti-fibrogenic and anti-proliferative protective effects from being manifested. Furthermore, it is estimated that in addition to these changes, there is an increase in the production of reactive oxygen species through the activation of NADPH oxidase 2, an enzyme complex linked to the membrane, which favors intracellular inflammatory reactions. [18]

The new coronavirus can also cause myocardial lesions and myocarditis, intensifying the clinical picture of those with previous heart diseases. Thus, the indiscriminate attack of the immune system, generates a storm of cytokines, a mechanism that is currently being discussed, where this exaggerated reaction in many organs, including the heart, has the consequence of elevating its enzymes (troponin I and NT-pro BNP). [18]

The prolonged inflammatory response, associated with decreased physical activity, the reduction in the amount of circulating oxygen, the presence of antiphospholipid antibodies and the lupus anticoagulant has been related to a predisposition to venous and arterial thromboembolism, as well as to the hypothesis of thrombo inflammation. In addition, it is further emphasized that the virus itself could activate the coagulation cascade, thus emerging venous and arterial thromboembolism and other cardiac complications as one of the most serious and prognostic implications with the worst results. [18]

In this way, the practices at the Triage Center allow nursing students to add knowledge beyond the care practice, when applying remotely, the exercise of clinical thinking. In this way, it was possible to correlate the scientific aspects studied with the observations evidenced during the call centers, which affirm to those with cardiac comorbidities the imminent risk of developing serious clinical manifestations of SARS-CoV-2. [18]

Finally, nursing practices at the Triage Center add knowledge beyond assistance, given the constant exercise of clinical thinking, with which it is possible to relate to cardiac comorbidities the imminent risk of developing the most serious manifestations of SARS-CoV-2. [18]

In Italy, teleconsultation is a method of providing health services through the use of innovative technologies in situations where the health professional and the patient are not in the same place. It involves the safe transmission of information and data in the form of texts, sounds, images or other forms necessary for the prevention, diagnosis, treatment and subsequent monitoring of patients. Teleconsultation services must be equated with any diagnostic and / or therapeutic health service. However, telemedicine does not replace traditional health care, but integrates it to virtually improve efficacy, efficiency and adequacy. [19]

There are three different ways to provide these services: synchronous, asynchronous and remote. Synchronous refers to the delivery of health information in real time, through the use of digital devices, allowing a live discussion with the patient or provider to provide medical expertise. Asynchronous refers to the "store and forward" technique, while a patient or professional collects history, images and reports, then sends it to a specialist doctor for diagnosis and specialization in treatment. While the remote patient monitoring mode is obtained by means of an electronic device that records a continuous flow of information in real time about any patient that transmits data to a centralized website, which can be safely accessed by the healthcare team. [19]

During the COVID-19 pandemic, teleconsultation helped professionals to avoid direct physical contact and minimize the risk of transmission by SARS-CoV-2, decreasing morbidity and mortality for Covid-19 and, finally, providing ongoing care to the community. [19]

The strategy of replacing hospital visits with telecardiology has been effective in the short-term management of patients with cardiovascular diseases and patients prefer to continue with remote monitoring compared to the usual treatment. [19]

The nurse's involvement in telemedicine consisted of establishing an approach to collect anamnesis data or educating the patient in the detection of vital parameters, collecting laboratory and instrumental examinations performed. The findings of this study show that nursing in teleconsultation conducts semi-structured telephone interviews and electronic transmission of documents, having been a well-tolerated tool and accepted by 74% of the study population. [19]

In the future, to expand the use of the model of nursing care through teleconsultation and to increase its credibility with patients, it would be necessary to officially recognize the telemedicine service and address the evolving concerns related to reimbursement policies and health laws licensing. It is necessary to carry out support training for nursing interviewers, oriented to ensure clear and effective communication and standardized telephone follow-up. [19]

A national program for the digital literacy of the elderly should be created to increase adherence to nursing teleconsultation. All of these actions are mandatory to increase the use of telemedicine and mitigate interruptions

in care and improve the health of patients during the COVID-19 pandemic. [19]

The nursing teleconsultation revealed the need to optimize the monitoring of pharmacological therapy in about half of the study population. In particular, the lipid reduction titration and the adjustment of the oral anticoagulant dose were the most performed actions. [19]

This evidence supported the need for continuity of care and outpatient management for patients at high risk for cardiovascular disease during the COVID-19 pandemic. It was found that 62% of the study population did not reach the therapeutic goal of LDL cholesterol in relation to their cardiovascular risk profile. In particular, in 74% of cases, it was necessary to increase the titration dose of the lipid-lowering drug, confirming the suboptimal control of LDL among European patients at high risk of cardiovascular disease. [19]

The global approach to cardiovascular risk should be focused on lifestyle optimization (stop smoking, diet, exercise and weight loss), LDL reduction therapy and treatment of atherogenic dyslipidemia. Considering the worrying reduction in hospitalizations for acute myocardial infarction and the parallel increase in mortality rates and complications observed in Italy, careful management of residual cardiovascular risk is of fundamental importance for the general population during the COVID-19 pandemic. [19]

Cardiovascular prevention requires modern preventive cardiology programs delivered by interdisciplinary teams of health professionals that address all aspects of lifestyle and risk factor management to reduce the risk of recurrent cardiovascular events. [19]

The nursing teleconsultation revealed the need to adjust the dose of oral anticoagulant; in most cases (65%), an inadequately low dose level of New Oral Anticoagulants (NOAC) was found. The association between Direct Oral Anticoagulants (DOACs) and inadequate low dosage was explained by doctors' fear of hemorrhagic events or by therapeutic inertia at follow-up. [19]

NOAC underdosing was associated with an increased risk of thromboembolic events; consequently, it is of fundamental importance to prescribe an appropriate dosage, based on the Summary of Product Characteristics (SPC), in order to obtain a real world environment the same benefits demonstrated in randomized clinical studies. [19]

In the remaining cases (35%), the nursing teleconsultation revealed the need for a reduction in the standard dose due to a worsening of renal function. Although the impact on renal function is less for NOACs than for Vitamin K Antagonists (AVKs), the assessment of creatinine glomerular filtration rate according to Cockcroft-Gault should be performed for the early detection of a common cause of reduction dose. [19]

These data confirm that the pre-specified follow-up schedule for patients using anticoagulant therapy should not be missed during the COVID-19 pandemic, particularly for elderly people with high cardiovascular risk and prevalent comorbidities, such as dyslipidemia and ischemic heart disease. [19]

Although NOACs are safer than AVKs in some different clinical settings, an inadequate dose can predispose to both thrombotic events. Furthermore, the use of any anticoagulant is associated with some drug interactions, which may increase the risk of severe bleeding or decrease protection against stroke. Teleconsultation should be oriented to evaluate blood collection (including hemoglobin, renal and hepatic function), check adherence and reassess whether the chosen NOAC or its dose is the best for the patient, according to age, weight or renal functionfunction. [19]

However, the nursing teleconsultation significantly anticipated the optimization of pharmacological treatment for about 4 months in comparison with the rescheduling of the face-to-face visit. Considering that the benefit of reducing LDL cholesterol depends on the timing and magnitude of LDL reduction, the strategy for implementing a successful early intervention can improve the health of the population and undoubtedly provide socioeconomic benefits, avoiding complications Expensive Atherosclerotic Cardiovascular Disease ASCVD. [19]

Category 2: Nursing care in the cardiac complications of COVID-19

Transcatheter Aortic Valve Implantation (TAVI) is a well-established treatment for aortic valve stenosis that has been widely adopted and has evolved into a minimalist and relatively low-risk procedure for most patients. Using only local analgesia, instead of conscious sedation or general anesthesia, it minimizes the invasive nature of the procedure and shows a decrease in the incidence of postoperative delirium and decreases the duration of hospitalization. If left untreated, the symptomatic of severe aortic stenosis has a poor prognosis. [20]

The current COVID-19 crisis has led to an unavailability of anesthetic support for non-acute cardiac care. In current practice, transfemoral (TF) TAVI is predominantly performed as an elective procedure in the catheterization laboratory. Thus, TAVI is an indispensable procedure that cannot be interrupted in the midst of the COVID-19 crisis. Through this study, the safety and viability of TF-TAVI performed by nurses through local

analgesia was demonstrated, possibly eliminating the need for an anesthesiologist present in the catheterization laboratory. [20]

However, the nursing program should preferably be started with a good risk for evaluation, training, planning and evaluation. The procedures were performed in a tertiary cardiac center with extensive experience and with all the necessary equipment (such as echocardiography machine and peripheral devices for left ventricular support), experienced staff and an operating room available on demand. [20]

TF-TAVI with analgesia conducted by nurses will evidently facilitate the planning of procedures in a more agile way, thus shortening the potentially dangerous waiting list for the procedure in regular clinical care. During the global crisis of COVID-19, this strategy can allow continuous treatment of TAVI and therefore can prevent deaths unrelated to COVID-19. On the other hand, hospitalization of frail elderly patients with TAVI may present an increased risk of COVID-19 infection. Thus, careful patient selection is necessary, considering the change in the risk-benefit ratio in the current pandemic. Mentias et al., (2020) [21] proposed an algorithm for the TAVI time based on the patients' health status and following the urgency of the procedure, which could be used as a guideline in these unusual times. [20]

Category 3: Nursing management in a cardiology unit in the context of the COVID-19 pandemic

The assisting nurses had a fundamental role in the management of cardiology health services at the height of the pandemic due to COVID-19, since they contributed to the change in the profile of health services attendance, making adaptations to receive patients, such as the suspension of elective surgeries and surgical centers have become exclusive units to assist COVID-19. [22]

It reports the experience of nurses in a Cardiology hospital in Detroit, Michigan-USA, in which they were protagonists in the control of mechanical ventilators, which were increasingly in demand, infusion pumps that were connected to long extension cables and if in the corridors outside the patients' rooms, the protocols were updated daily, changes in the structure of the hospitals in order to reorder the flow of entries and exits, mandatory screening was initiated, among other changes.[22]

In addition, they work on guiding the requirement to maintain a safe environment for staff and patients; they manage the teleconsultation service, in which most of the contact for patient admission was made by telephone; collect patient history by reviewing graphics and reviewing imaging studies, laboratory tests, telemetry, electrocardiograms and external records, when available; manage the electronic medical record that documents how and why information about the history and physical examination was obtained. [22]

The medical and nursing staff became providers of social support for family members. They operate in a variety of environments and one of the most frequently identified attributes was the presence in clinical environments where there was a regular turnover of personnel. [22]

The continuity of nursing care provides the cardiology team with subsidies for decision making in search of the best conducts. Furthermore, the nurses' practices in the hospital allow independence from the management of routine cardiac problems. The nurse is also the readily available resource person who can quickly provide clinical guidance to other health care providers and assist patients with follow-up care. [22]

Numerous studies have shown that nurses who work in cardiology centers provide quality care, including specialized care services. The knowledge and experience that nurses have, often places them at the forefront of rapid changes as a result of the pandemic. Therefore, adaptability was identified as one of the primary characteristics for carrying out tasks during this pandemic. [22]

Furthermore, all providers of advanced practice within the cardiology division took turns being redistributed to care for COVID-19 patients in the cardiac units. [22]

As suggestions, he points out that health institutions should foster an organizational culture of resilience using three strategic principles. First, leadership, which must be focused on creating an environment of resilience, providing an optimistic and realistic action plan, in addition to providing frequent and open communication with staff. They recommend that the workload and any incentives be distributed equally to include all suppliers and support staff to avoid creating an environment of resentment and anger rather than building one of resilience. [22]

Second, the communication on COVID-19 must be updated and structured in a format that makes the employee feel empowered and not exalted with anxiety. The news is crucial to day-to-day operations in a pandemic, but the new changes should not make the employee feel like they are being bombarded with a lot of information. A specific institutional page where information is regularly updated with news and information resources would reduce the feeling of being overwhelmed. [22]

Third, providing continuous mental health support to nurses is necessary to preserve their well-being and consequently their productivity at work. [22]

IV. CONCLUSION

From this study, it was possible to understand about the main nursing care that should be provided in cardiovascular complications associated with COVID-19, with regard to its activities in monitoring patients in teleconsultation, nursing care in COVID-19 cardiological complications, such as the TAVI procedure and the management of the nursing service in a cardiology unit in the context of the pandemic COVID-19.

It is concluded that nurses have been facing great challenges in relation to the care of patients with cardiovascular diseases, as they are a high-risk group and have a greater susceptibility when presenting the severe forms of COVID-19. The pandemic highlighted the essential role of these health professionals who provide care to protect people's health and save lives.

Finally, nurses have a wide field of action in the front line when dealing with a new disease that has been showing successive mutations with constant changes in its epidemiological pattern. The losses of COVID-19 to the cardiovascular system are present in the short and long term and it is up to nurses to play an important role in the prevention, diagnosis, monitoring, treatment and rehabilitation of heart diseases.

From the results of this study, it is suggested to carry out fieldwork in order to identify the role of nurses in cardiology in the context of the pandemic in different health care scenarios.

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