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Chest Pain Protocols for Hospital Discharge of Adults with Acute Coronary Syndrome Symptomatology

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ABSTRACT

Background: *Acute Coronary Syndrome is defined as a group of clinical symptoms compatible with acute myocardial ischemia with high clinical and financial impact. The article synthesizes scientific evidence on the applicability and efficacy of chest pain protocols for hospital discharge of adults with symptoms suggestive of Acute Coronary Syndrome in the Emergency Room.*

Materials & Methods: *Integrative review of the literature under a qualitative approach.*

Results: *Some diagnosis protocols are already implemented, achieving success in the evaluation of chest pain in hospital discharge of adults.*

Conclusion: *The diagnostic strategy of chest pain units allowed individuals with chest pain of non-cardiovascular etiology to be investigated in less complex and less costly locations, allowing their release from the hospital quickly and safely.*

Keywords: *Health Management. Clinical protocols. Chest pain. Emergency. Acute Coronary Syndrome.*

INTRODUCTION

As cardiovascular diseases are defined as alterations that affect organic functions responsible for supplying oxygen and nourishing cellular tissues so that they can effectively perform their physiological functions. According to Costa et al.[1], Acute Coronary Syndrome (ACS) is defined as a "group of clinical symptoms compatible with acute myocardial ischemia". Thus, it is a manifestation resulting from Coronary Artery Disease (CAD), which includes Acute Myocardial Infarction (AMI) and Unstable Angina (UA). It is known that CAD results from a complex process known as atherosclerosis[2;3;4], which results in AMI.

According to the Brazilian Unified Health System (SUS) and worldwide epidemiological data, AMI is avowedly important, since it results in high rates of functional disability and mortality. In that respect, epidemiological data show that mortality due to myocardial ischemia is around 52.6%, surpassing the rates presented in other Latin American countries, resulting in a relevant increase in costs related to health. AMI is one of the diseases that result in greater clinical impacts regarding functionality, besides substantial financial impact[5].

In recent decades, there has been an important change in the population's mortality profile, characterized by the increase in deaths caused by Non communicable chronic diseases (NCDs). Under this perspective, NCDs correspond to apercentage around 69% of SUS's hospital expenses, being responsible for a high frequency of hospital admissions of this national health system. Only in 2007, there were about 1,155, 489 hospital admissions caused by cardiovascular diseases, resulting in an overall cost of R$ 1,466,421,385.12 and, consequently,a total of 91,182 deaths[6].

According to Smith et al.[3] and Boden et al.[2], the diagnosis of ACS begins with a complete clinical evaluation of the patient's symptoms, through exams such as electrocardiogram and cardiac troponin levels, as well as considering a review of the patient's previous history. However, for Ahmadi et al.[7], symptoms in the elderly may be atypical and electrocardiography results may be more difficult to interpret due to

the higher incidence of left bundle branch block or other rhythms. Cardiac troponins are frequently higher in the elderly, even in the absence of ACS, which could increase even more the uncertainty about a possible AMI due to physiological changes specific to the aging process. Thus, defining and delimiting the symptoms of patients with ACS can help the health system adopt specific measures to combat this condition, as well as help make strategic decisions related to this group of patients. In that respect, a team of trained professionals can facilitate the arrival of individuals affected by ACS to emergency care, leading to an effective treatment with in the determinate time frame, which will probably result in an important reduction in the mortality rate of this population group[7].

ACS is responsible for about 1/5 of chestpa in visits in emergency units worldwide. According to North American data, more than 12 million people have CAD and, among these, about 1 million end up evolving to AMI, raising mortality rates for around 466,000 deaths annually. In this context, it is known that cardiovascular diseases in isolation are responsible for approximately 32% of deaths in the general population, being classified as the leading cause of mortality, according to Brazil' s population data[8].

The direct and indirect costs related to the treatment of ACS, under the perspectives of SUS and the Supplementary Health System, according to a study conducted by Teich et al.[4], considered the historical series of hospital admissions in SUS, between 1999 and 2010, and the expected number of admissions for 2011. Projected by a linear extrapolation of the historical series, the study concluded that the estimate of the direct cost associated with ACS in this period was approximately 0.77% of the total budget of SUS, in prospect for reaching an expense of around R$ 515,138,6179[4].

The need for hospital admissions, diagnostic and therapeutic procedures, medical follow-up, and continued pharmacological treatment for this group of patients determine a significant economic impact. Estimates of the costs of these events are essential for studies of economic evaluation and cost-effectiveness of technologies directed to the management of ischemic heart disease[6]. As a result, about half to two-thirds of patients with chest pain who are hospitalized do not end up confirming a cardiac cause for their symptoms. Thus, emergency doctors find themselves facingthe difficulttask of quickly identifying those individuals with ACS for treatingthem appropriately and releasing the others for an outpatient investigation. Establishing the correct etiological diagnosis for patients with chest pain has been one of the major problems faced in public health,not only bydoctors and hospitals, but also by those responsible for paying expenses, including the government, insurance companies, and health care providers[6].

This research aimed to summarize scientific evidence on the applicability and efficacy of chest pain protocols during hospital discharge of adults with suggestive symptoms of ACS when compared to the usual treatment or any other chest pain protocols. Despite the daily use of chest pain protocols in patients with ST-segment elevation and/ or elevation of biomarkers of myocardial injury[9], patients with atypical chestpa in and normal electrocardiogram continue to be undergone unnecessary examinations and admissions[10;11], generating highcosts and overcrowding in emergency rooms. Diagnostic protocols or algorithms are important tools to achieve this efficiency. As they also promotean improvement in the quality of medical care in chest painunits, they result in an optimization of the cost-benefit.

One of the greatest challenges for the clinical physician who works in emergency services is the evaluation of patients with chest pain or other suggestive symptoms of myocardial ischemia. Several diseases from cardiac origin or not can cause chest pain, a classic symptom of coronary heart disease, which makes the differential diagnosis complex.

Hence the importance of the use of protocols in emergency services for guiding and facilitating the rapid diagnosis and for proper conduct with patients complaining of chest pain. These patient evaluation protocols are based on the analysis of pain characteristics and initial electrocardiogram. These data allow establishing the probability of the patient having an ACS.

It is estimated that the application of the chest pain protocol in the emergency room streamlines the assistance for the patient, facilitating the identification of chest pain caused by cardiac reasons. The use of protocols optimizes the evaluation and treatment of patients to reduce the mortality rate, mainly in the first 12 hours of assistance. Thus, the present study aims to evaluate the adequacy

identification of AMI in the emergency room by usingthe chest pain protocol, as well as aims to verify the applicability and efficacy of these protocols.

Materials and Methods

This study, classified as an integrative review of the literature, aims to verify publications related to the researched theme, mainly to evidence knowledge in this scientific field[12]. Using a qualitative approach, the tables show this knowledge from the reviewed studies.

All selected articles were read, and the following descriptors were identified to support the composition of definitive searching strategies: chest pain; precordial pain; ACS; angina pectoris; clinical protocols; chest pain protocol; accelerated diagnostic protocol; mortality; hospital mortality; major adverse cardiac events; early diagnosis; patient discharge; quick discharge; early discharge.

The criteria of exclusion were the unavailability of access, double publications, works available only in the form of abstracts, texts in the form of projects, publications in languages other than English and Portuguese, works published before 2015 and after 2020, as well as all articles that were not related to the topic of the research.

Results

Using the descriptor “Acute Coronary Syndrome”, 191 studies were found. After applying the criteria of exclusion, only 1 study was selected. When the descriptor was crossed with the term "clinical protocols", 380 studies were found and only one was not considered by the criteria of exclusion. For the descriptor "chest pain protocol", 380 studies were also identified and only one was selected. Using the descriptor "diagnostic protocol", 33 papers were found and only one was chosen. For the descriptor "hospital mortality", 301 studies were identified and only one was used. Finally, using the descriptor "hospital discharge", 627 publications were identified, but all were discarded.

Thus, the study highlighted a total of 2,218 works. Among them, 36 met the criteria for inclusion, then only 5 remained after applying the criteria of exclusion. In the third stage, a data collection instrument was used to extract key information from each selected article, which was compiled in Table1.

Table 1: *Instrument for collecting data from articles.*

Title	Periodic	Year	Local	Type of document
Ventilatory dysfunction in patients referred for coronary tomography: association between spirometric alterations and atherosclerosis[13]	University of Sao Paulo (USP)	2015	SP	Doctoral thesis
Effectiveness of a diuretic algorithmic and non-pharmacological management in cardiac patients: randomized clinical trial[14]	Federal University of Rio Grande do Sul	2016	RS	Doctoral thesis
Respiratory filter reduces cardiovascular effects associated with pollution: randomized, double-blind, controlled, and cross-sectional study in patients with heart failure (FILTER-HF trial)[15]	USP	2016	SP	Doctoral thesis
Reduction of long-term mortality related to higher doses of atorvastatin in patients with ACS[16]	International Journal of Cardiovascular Sciences (IJCS)	2016	SP	Scientific article
12-month follow-up of patients submitted to the early interfering strategy through radial or femoral access with vascular occlusion device[17]	IJCS	2017	SP	Scientific article

Source: *Data collected by the authors.*

Regarding the distribution of the studies, according to the type of research, the following classifications were identified: a cross-sectional cohort study; Prospective Randomized Open Blinded End Point Study; Double-blind, controlled, and crossed clinical study; Retrospective and unicentric cohort study; and the design and rationale of the pilot study ARISE already published[1],as summarized in Table 2.

Table 2: *Level of study evidence*

Title	Objective	Kind of Research	Evidenced Data
Ventilatory dysfunction in patients referred to coronary tomography: association between spirometric alterations and atherosclerosis	To establish the prevalence of spirometric alterations in the population being investigated heart disease by tomography and the impact of functional alteration on the use of health resources.	Phase 1: Transversal study. Phase 2: Cohort followed during a year from the coronary tomography.	There is a high prevalence of spirometric alterations in patients referred to coronary tomography. Both DPOC and pulmonary restrictive diseases are undiagnosed in this population. And the presence of spirometric alteration is associated with higher cardiovascular morbidity and has prognostic implications. These findings suggest that during the investigation of AD, the concomitant evaluation of pulmonary function is of great relevance.
Effectiveness of a diuretic algorithmic and non-pharmacological management in cardiac patients: randomized clinical trial	To compare the effectiveness of an algorithm for diuretic adjustment clinical outcomes (reduction of hospital admissions and maintenance of clinical stability) in 90 days.	Study type: Prospective Randomized Open Blind End Point.	The use of the algorithm for diuretic adjustment with the non-pharmacological orientations did not reduce admissions for HF and all causes. Evaluating the combined outcome (admissions, change of the coronary calcium score in two points, and change of functional class), the result was favorable and significant for the use of the algorithm, reducing admissions and avoiding the worsening of HF for outpatients.
Respiratory filter reduces cardiovascular effects associated with pollution: randomized, double-blind, controlled, and cross-sectional study in patients with heart failure (FILTER-HF trial)	To assess the impact of a polypropylene filter on cardiovascular outcomes in HF patients and healthy volunteers during controlled exposure to pollution.	Double-blind, controlled, and cross-blind clinical trial.	Air pollution adversely affected the cardiovascular performance of patients with HF. This is the first clinical trial demonstrating that a simple respiratory filter can prevent endothelial dysfunction, intolerance to exercise, and increase of BNP associated with pollution in patients with HF. The use of filter masks has the potential to reduce morbidity associated with HF.
Reduction of long-term mortality related to higher doses of atorvastatin in patients with ACS	To compare short- and long-term outcomes among patients with ACS who received higher doses of atorvastatin versus low doses of atorvastatin initiated within the first 24 hours of hospital admission.	Retrospective and unicentric cohort study.	Favorable and significant differences were observed for long-term mortality in patients with ACS who received high doses of atorvastatin from the acute phase on.

12-month follow-up of patients submitted to the early interfering strategy through radial or femoral access with a vascular occlusion device	To compare the incidence of severe adverse cardiovascular events in clinical follow-up of 12 months, according to the adopted access route.	The design and rationale of the ARISE pilot study have already been previously published.	There was no distinction between the techniques for survival free of severe adverse cardiovascular events in 12 months of follow-up. Clinical trials with greater statistical power are necessary for the validation of these findings.

Source: *Data collected by the authors.*

DISCUSSION

Considering the characterization of the participants and the configuration of each study, the papers were divided as follow:

In Study 1[13], there is an association between respiratory diseases and CAD. In addition to similar risk factors, such as smoking and a sedentary lifestyle, both are associated with advanced age and systemic inflammation.

The use of Coronary Computerized Tomography (CCT) with multiple detectors is a method for diagnosing coronary disease, describing the anatomy and the severity of the obstruction. The author affirms that one way of estimating the risk of cardiovascular events is the Coronary Calcium Score (CCS) obtained from this examination. Many patients are conducted to undergo a CCT to investigate CAD or to classify the risk of future cardiac events. Due to the association between respiratory disease risk factors and CAD, many of these patients have likely the associated lung function reduced.

Therefore, the author developed a study to establish the prevalence of spirometric alterations in the population under investigation of heart disease by CCT, as well as the impact of the functional alteration in the use of health resources. For this, selected patients were referred to tomography for coronary angiotomography in In Cor (The Heart Institute), or identification of coronary calcium score, aged over 40 years old. This study was divided into two phases: 1. Cross-sectional study; and 2. Cohort, followed up for a year as from the procedure of the tomography[13].

In the first phase, patients met the inclusion criteria by answering a questionnaire that evaluated anthropometric data, symptoms, smoking history, co morbidities, and continuous use medications. All patients who were already diagnosed with coronary disease due to a history of AMI or self-referred angina pectoris, or the antecedent of previous surgical or percutaneous myocardial revascularization, were excluded[13].

After the CT scan, spirometry was scheduled. The patients were referred to the Pulmonary Function Laboratory forpre-and post-bronchodilator examination, with the forced vital capacity maneuver. After the examination, the cross-sectional phase of the study was initiated, where patients were contacted by telephone quarterly, during one year, by a single trained member of the research team. During this period, a question was asked about the presence of symptoms (dyspnea measured by them MRC score, cough, and chest pain), visits to the emergency room, hospital admissions, and death[13].

Finally, from 558 patients, 381 were screened to participate in the study. Eighty-six patients had myocardial revascularization surgery or underwent angioplasty withstent, 66 refused to participate in thestudy,11 were unableto performspirometryand13 were excluded due to a history of AMI, angina, or recent or decompensated CHF. Thus, 205 patients completed the protocol and then were divided into a group with a Normal Pulmonary Function (NPF) and a group with an Altered Pulmonary Function (APF), with 147 and 58 individuals, respectively.[13]CCS was obtained by tomography in all 205 patients and most of them (168) underwent the test for chest pain, palpitation, and/or dyspnea. Thirty-seven patients underwent the test to classify the risk of future events[13].

With these data, the population under investigation for CAD is at high risk for respiratory functional alterations. When the investigation of CAD is positive, there is a greater chance there will be a spirometric alteration, which demands greater use of health resources, being also a marker of higher mortality[13].

In Study 2[14], heart failure (HF) is the main cause of hospitalization whose most common form of presentation and cause of decompensation is congestion. Approaches such as self-monitoring with patient education, home visits, assistance by phone, and the use of telemonitoring technologies are strategies that have been

efficient in reducing clinical outcomes by identifying early signs and symptoms of decompensation. The use of validated protocols for the adjustment of diuretics is little explored in this context. Therefore, to fill in this gap, the author proposed to test a protocol of diuretic adjustment to compare the effectiveness of a diuretic adjustment algorithm (DAA) in clinical outcomes (reduction of hospital admissions and maintenance of clinical stability) in90 days.

A study such as PROBE (Prospect Randomized Open Blinded End Point), parallel to 2 groups, was conducted with patients from the outpatient clinic of the IC of the Hospital de Clínicas de Porto Alegre - RS (HCPA), from May 2013 to February 2016. Out of a total of 2,459 eligible patients, 2,290 were excluded because they did not adequately meet the criteria for inclusion or other causes mentioned next. Seventy-eight patients were randomized for GI and 88 for CG and after one month of follow-up, they were analyzed, respectively. The most prevalent etiology of HF was hypertensive (n = 42, 26%), followed by ischemic (n = 34, 21%). Something around 70% of patients (n = 110, 68.5%) had already been hospitalized at least once for HF. At basal metabolic rate measurement, patients are predominantly in functional class III (76.47%), followed by class II (47, 29%). During a 30-day follow-up, information about blood biochemistry was collected at the time of admission, over the period.The laboratories' variables were similar among the groups, except for potassium, which was higher in GI[14].

The results indicated that the population studied is predominantly elderly, male, and approximately 70% had previous hospitalization because of HF. Clinical characteristics were similar among the groups, except for the serum potassium value evaluated for 30 days, which was higher in GI, but without clinical relevance. In the evaluation of patients' stability, represented by functional capacity, CCS, and body weight changes, slightly more than half (58%) reduced or remained in the same functional class in both groups.

Based on the findings of this study, the importance of achieving clinical stability of patients with HF is reinforced, as a way of minimizing harm often represented by unplanned admissions, which corroborates worse prognoses.

In Study 3[15], air pollution is a risk factor associated with decompensation and mortality in patients with HF. In the study conducted by the author, the objective was to evaluate the impact of a polypropylene filter on cardiovascular outcomes, in patients with HF and healthy volunteers during controlled exposure to pollution.

Adouble-blind controlled and cross clinical trial was done, including 26 patients with HF and 15 healthy volunteers, exposed to three different inhalation protocols, randomized in order: Clean Air; Exposure to Diesel Exhaust Particles (ED); and filtered ED. The outcomes studied were endothelial function by reactive hyperemia index (RHI) and augmentation index (Aix), serum biomarkers, variables of the sub maximal cardiopulmonary test (a six-minute walk [tc6m]; oxygen consumption [VO_2]; carbon dioxide ventilatory equivalent [VE/VCO_2 slope]; consumption of O_2 per beat [O_2 Pulse]) and heart rate variability (HRV).

The author concluded that air pollution adversely affected the cardiovascular performance of patients with HF. It is noteworthy that this was the first clinical trial demonstrating that a simple respiratory filter can prevent endothelial dysfunction, exercise intolerance, and the increase of BNP associated with pollution inpatients with HF. Thus, the use of masks with filters has the potential to reduce morbidity associated with HF[15].

Study 4[16] presents that several experimental studies have demonstrated a reduction in inflammatory markers associated with higher doses of statins in patients with ACS. However, the clinical implication of statin dose in the acute phase of ACSwasstill uncertain. For this reason, the authors conducted a study to compare short and long-term outcomes among patients with ACS who received higher doses of atorvastatin *versus* lower doses of atorvastatin in the first 24 hours of hospital admission.

For this purpose, they conducted a retrospective and unicentric cohort, which included all patients with ACS (n = 929) admitted between May 2010 and May 2015 in the emergency room. The patients were divided into two groups: GroupI: atorvastatin < 40 mg/day (n = 464) and Group II: atorvastatin $\geq$ 40 mg/day (n = 465). The statin dose was defined at the discretion of the physician in charge of the case. Patients who did not start using atorvastatin in the first 24 hours were excluded from the study, as well as those who modified the initial doses throughout the follow-up[16].All patients who met the criteria established by the last American Heart Association guideline were considered as ACS.[16]

The clinical and interventional treatment performed in the patients also followed the recommendations established in the latest current guidelines. Major bleeding was defined by BARC Score 6types 3 and 5, and minor bleeding by types 1 and 2. Reinfarction was considered when there was a recurrence of chest pain associated with new troponin elevation. Ischemic stroke was considered when the patient presented a new focal motor neurological deficit confirmed by computed tomography of the skull. Rhabdomyolysis was considered when there was an increase in the CPK above 10 times the upper limit of the method. Medicaments hepatitis related to statin was considered if there was an increase in transaminases that exceeded three times the upper limit of normality[16].

The average age of patients was 63years old, and about 61% were male. The most prevalent risk factor was systemic arterial hypertension in 81% of the cases. Regarding treatment, the percutaneous coronary intervention was observed in 31.7% in group I, and 31.2% in group II. Myocardial revascularization surgery was performed in 9.5% of group I against 12.5% of group II. ACS without ST elevation was the diagnosis in 79.3% of patients in groupI, and 79.4% in group II. In group II, a higher prevalence of dyslipidemia (56.3% vs. 49.1%) was observed, higher use of B-blockers (75.2% vs. 63.1%), angiotensin-converter enzyme inhibitors (55.9% vs. 45.5%), clopidogrel (72.3% vs. 65.1%) and higher prevalence of previous use of statin (48.6% vs. 39.7%) concerning group I, respectively[16].

The research concluded that favorable and significant differences were observed concerning long-term mortality of patients with ACS who received high doses of atorvastatin since the acute phase[16].

Andrade et al.[17]stated in Study 5 that the radial technique would be able to reduce the prevalence of vascular complications, severe bleeding, and mortality when compared to the femoral technique. However, this one was still preferred as an access route for the implementation of invasive coronary procedures, requiring the adoption of strategies capable of minimizing complications. Therefore, the authors did a pre-specified analysis of the ARISE study to compare the incidence of severe adverse cardiovascular events in clinical follow-up of 12 months, according to the access route adopted.

The design and rationale of the ARISE pilot study have already been previously published. The research was conducted from July 2012 to March 2015 with 240 patients diagnosed with SIMISSST that have undergone invasive stratification and were randomized for the procedure by radial or femoral access using *DOV Angio-Seal (St. Jude Medical, St. Paul, Minnesota, USA)*. The choice of*Angio-Seal*is due to ease of handling, lower cost, and higher casuistry. Patients should present at least two of three markers of greater clinical severity: ischemic alteration in the 12-lead electrocar diogram, the positivity of myocardial necrosis biomarkers, or age > 60 years old[17].

In the randomization process, markers of myocardial necrosis, hemoglobin, and hematocrit were measured before the procedure, and between 12 and 24 hours after its completion. Electrocardiogram was performed right after the procedure or in the case of the suspicion of a new ischemic event. Vascular complications related to arterial access were evaluated during hospitalization and in a face-to-face, visit 30 days after the procedure. The late measurement of the occurrence of cardiovascular events was obtained by a telephone call at 6 and 12 months, as well as by reviewing electronic medical records[17].

The mean age of the participants of the research was 63 years old, 30.8% were diabetic, positive troponin was detected in 84.2% of the sample and, except for the higher prevalence of women in the radial group, no differences were observed between the groups. Of the sample, 65% were classified as low or very low risk for bleeding by the CRUSADE score. IPC was performed in 86.7% of the cases. Stents were implanted in 97.6% of the cases, with a predominance of non-pharmacological ones, due to the reimbursement policies of the public health system. Succeeding angiographies and procedure rates were high (97.6% and 95.2%, respectively), hemostasis with TR BAND was obtained in 100% of the procedures by radial access, with a demonstration of anterograde flow evident by the oximetric curve in 102 patients (85%). In 6 patients in the femoral group (5%), the Angio-Seal device was not sufficient to obtain hemostasis, requiring additional manual compression for more than 10 minutes. The rate of vascular complications at the site of arterial puncture at 30 days was 12.5% in the Angio-Seal group, atthe expense of hematomas > 5 cm, and 13.3%in the radial group, at the expense of hematomas > 5 cm

(6.7%), and asymptomatic occlusion of the radial artery (5.8%), with no significant difference. There were no cases of arteriovenous fistula, retroperitoneal hematoma, compartment syndrome, limb ischemia, nerve injury, or need for repairing vascular surgery. The rate of severe bleeding or blood transfusion was 2.5% in the Angio-Seal group and 1.7% in the radial group, without statistical significance[17].

Thus, in patients submitted to early interventional strategy in the ARISE pilot study, randomized to the radial or femoral technique with vascular occlusion device, there was no distinction in survival free of severe adverse cardiovascular events at 12 months of follow-up. Finally, clinical trials with greater statistical power were still necessary for the validation of these findings[17].

CONCLUSION

Some diagnostic protocols are already implemented and are successful in the evaluation of chest pain at hospital discharge of adults with symptoms that suggest ACS. However, it is necessary to search for safer protocols continuously and make them available inscientific studies, revealing the results achieved with their use. Similarly, the diagnostic strategies of chest pain units, observed in the reviewed studies, allowed individuals with angina of non-cardiovascular etiology to start being investigated in a less complex and expensive place, so they could go home faster and safer.

The studies included in this research affirm that the use of protocols decreases the length of patient's stay during hospitalization, and the consequence is a significant reduction in diagnostic errors and unnecessary hospital admissions, with the consequent occupation of beds of coronary units by high-risk patients, thus, allowing outpatient follow-up, and saving hospital resources. They also demonstrated that the use of protocols promotes more effective care assistance by all professionals because it provides guidance that allows a faster and more appropriate evaluation, andamore suitable care plan. Such studies suggest that the use of protocols increases the safety of professionals during the triage of patients with chest pain, reducing stress and anxiety of the patient and his/her family members.

Multicentric clinical studies, with a larger sample, and better controlled, would be able to further evaluate the safety protocols at early discharge. Thus, this review can be considered an important step to prove that the use of the evaluated protocols can facilitate early and safe discharge of patients in the ER, besides the fact that all the necessary components for the implementation of the protocols are widely available for consultation. Consequently, this facilitates the triage process, which can be integrated into the current chest pain assessment processes in other hospitals and, thus, creates significant benefits without financial investment.

Finally, diagnostic protocols arise as health technologies, besides being an instrument to optimize risk classification, offering safe and quality care, basing professional practice, organizing assistance, and early identifying patients at low risk for ACS.

Few studies were included in this integrative review, and with small samples, which was considered a limiting factor in the evaluation of the effects of different protocols for early and safe discharge of patientsin the emergency room. Although it has been concluded that the protocols are effective for early discharge of adult patients with chest pain suggestive of ACS in the emergency room, there is still insufficient evidence to state that this early discharge is safe.

Further studies with adequate power and sample sizes, such as multicentric studies tested in different populations and larger samples of patients, are required to answer the matter of this research and support its results. Thus, it would be possible to reducegeneralizations and to improve the safety of these protocols.

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