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TELECARDIOLOGY FOR THE ISSUANCE OF AN ELECTROCARDIOGRAM REPORT: THE IMPLEMENTATION OF THIS TOOL IN THE EMERGENCY ROOM OF A HOSPITAL IN VALE DO ITAJAÍ

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Abstract: In the context of urgency and emergency, cardiovascular diseases have a high morbidity and mortality. Thus, the electrocardiogram (ECG) is a test widely used in emergency care due to its versatility, wide use to guide therapeutic approaches and to assess the patient's general condition. Therefore, the ECG if interpreted and reported by a cardiologist, in the shortest possible time, is able to offer more chances of a good clinical outcome to the patient, by increasing the diagnostic accuracy. Given this scenario, telecardiology is a promising technology that can improve patient access to the assessment and treatment of cardiovascular problems, reducing the number of hospitalizations, improving patients' quality of life and centralizing these exams on one platform, contributing to the reduction errors in reports made by non-specialist physicians. With this, this experience report analyzed the impact of the implementation of the Electrocardiogram Reporting System by telecardiology in the emergency room of a Hospital in Vale do Itajaí, where the electrocardiograms performed are sent to a platform of the implanted system, where they are classified and evaluated by a cardiologist, obtaining an accurate diagnosis in up to 10 minutes. In this work, the records of electrocardiograms performed within the period from March 2, 2021 to September 13, 2022 were extracted, totaling 5,577 electrocardiograms reported and an average of 2 minutes 47 seconds to be reported and released on the technological platform. Therefore, the implementation of the telecardiology project brought more reliable reports to the Emergency Room of the Hospital do Vale do Itajaí, more dynamic assistance, more assertive conduct, digital centralization of exams and reports and assistance in complying with the Guidelines for the care of patients with cardiological complaints.

INTRODUCTION

The electrocardiogram (ECG) is a widely used test due to its versatility and importance in the diagnosis of diseases and in the assessment of the general health status of the patient. it is important to invest in innovations and create solutions that allow a safe and increasingly faster diagnosis.

In the urgent and emergency scenario, the ECG, if interpreted and reported by a cardiologist, in the shortest possible time, is able to offer more chances of a good clinical outcome for the patient, by increasing the diagnostic accuracy. Thus, telecardiology came to contribute to this agility and to support emergency procedures in the cardiovascular field.

This report seeks to show the success in implementing the tool for issuing an electrocardiogram report in the emergency department of a Hospital in Vale do Itajaí, in which the EGCs are evaluated remotely, through a digital platform with specialist cardiologists who deliver the ECG report in an average of 2 and a half minutes. In addition, the tool also offers a chat to answer questions about the doctor's conduct based on the guidelines and guidelines of the Brazilian Society of Cardiology.

THE EXPERIENCE REPORT
CHEST PAIN

According to Bassan (2002), the emergency physician needs to define about the permanence, about the beginning of the treatment or release of the patient, who presents chest pain. Acute coronary syndrome (acute myocardial infarction and unstable angina) has a morbidity and mortality rate of approximately 20% among chest pain complaints in emergency rooms, with the aim of ruling out or confirming this diagnosis.

Classic chest pain in acute coronary syndrome presents as a squeezing or burning pain, typically chest pain, which may be retrosternal, and may radiate to the shoulder, left arm, right arm, neck or mandible. In most cases it is associated with diaphoresis, palpitations, nausea, vomiting or dyspnea. The duration is between 10-20 minutes, being continuous, in unstable angina it ends up passing, it presents relief with rest or use of nitrate (BASSAN, 2002).

Thus, the Brazilian Society of Cardiology (2021) presented in its guidelines that every patient screened and identified with chest pain must be immediately submitted to an ECG, it is the first choice exam for evaluating the patient who has suspected ACS. Ideally, it must be carried out and interpreted within 10 minutes of the patient's admission to the hospital environment, this can be performed serially throughout the service (as shown in Figure 1). If the diagnosis is not confirmed, cardiac biomarkers are useful to confirm the diagnosis of infarction, among them troponins are the preferred biomarkers for diagnostic evaluation in case of suspected acute myocardial infarction. The physician may also order creatinine, chest X-ray, D-dimer, and may also use risk stratification scores such as EDACS, ADAPT, and HEART.
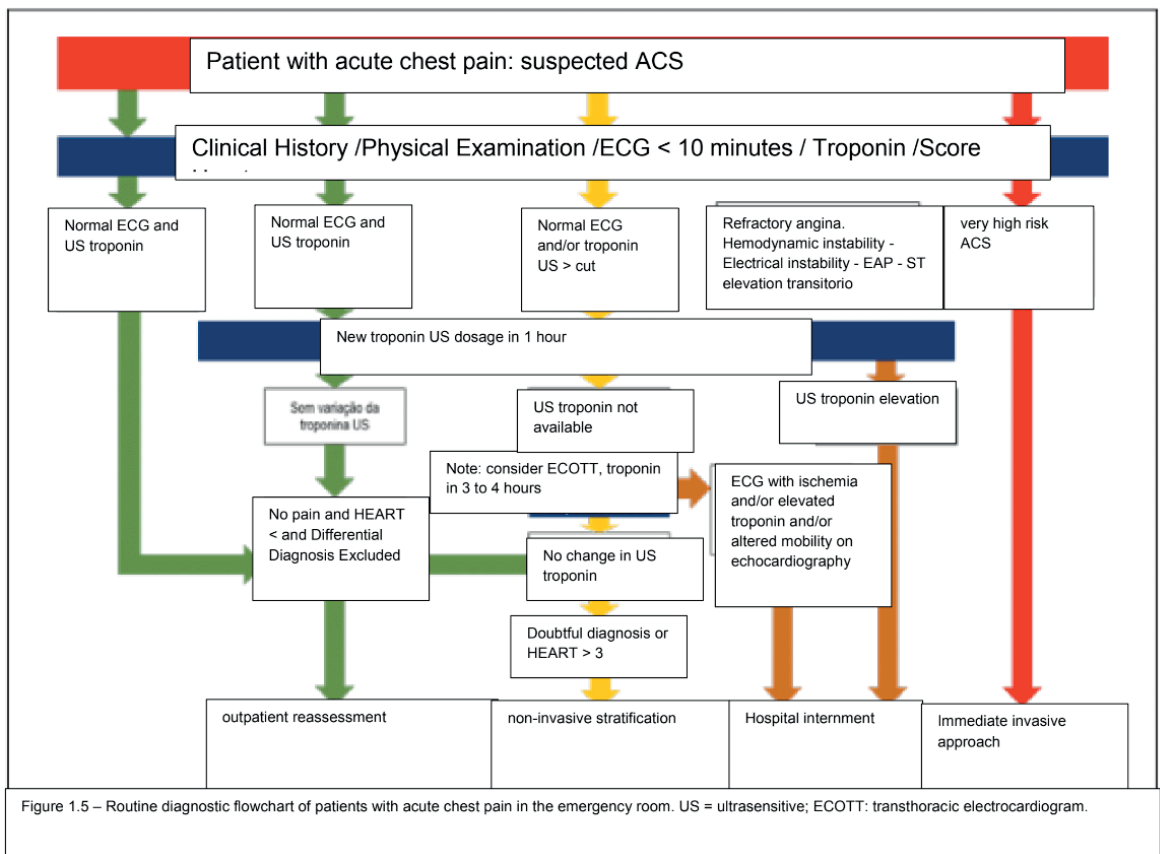

Figure 1.5 – Routine diagnostic flowchart of patients with acute chest pain in the emergency room. US = ultrasensitive; ECOTT: transthoracic electrocardiogram.

Figure 1 - Chest pain flowchart of patient with acute chest pain. Source: Brazilian Society of Cardiology, p. 211, 2021.

ACUTE CORONARY SYNDROME MANAGEMENT ALGORITHM

Acute Coronary Syndrome (ACS) is subdivided into the following clinical forms of management: Acute Coronary Syndrome with ST-segment Elevation (STEACS) or Acute Myocardial Infarction with Supra ST (STEMI), and Acute Coronary Syndrome without ST-elevation (ACS) (NSTEACS), the latter being further subdivided into Unstable Angina (UA) and Acute Myocardial Infarction without Elevation (NSSTEAMI). Thus, knowing how to classify the patient within these clinical forms facilitates management and is important to define the therapy to be followed in view of the existing protocols for ACS (BRASIL, 2022).

Regarding conduct, everyone who has suspected ACS with or without ST elevation must be seen in the emergency room or coronary care unit to perform the MOVE mnemonic: the first step being continuous non-invasive monitoring (measuring blood pressure, heart rate and cardioscopy). Moving on to the second step, where supplemental oxygen must be given if peripheral oxygen saturation < 90% or if respiratory distress is present. The third step is to ensure guaranteed peripheral venous access for collection of exams and infusion of medications. The last step of the mnemonic is to perform a 12-lead ECG within 10 minutes of patient admission (VELASCO, 2020).

Thus, having a reliable and quick ECG report increases the chances of the patient being properly managed at the hospital that received it or ensures that it can be transferred as quickly as possible to a closer reference service, thus increasing the chance of patient survival. patient in these cases of coronary syndromes.

CARDIOVASCULAR MORTALITY

Chronic diseases are part of the main causes of death in the world, with cardiovascular diseases (CVD) being the main cause of this group. In many low-income countries, 80% of premature deaths occur from CVD and in middle-income countries, it is 88%. Mortality from these diseases has different associated risk factors, from behavioral and social to genetic factors and, therefore, it is possible to infer that their distribution may be different, since the context in which different population groups are inserted is different. variable. When analyzing the findings on the Mortality Rate from cardiovascular diseases divided by age group, together with the analysis of the mortality coefficients found in the literature, a predominance of mortality in people aged greater than or equal to 70 years is evidenced (PELLENSE, 2021).

The influence of the risk of death from cardiovascular diseases, which is greater in less favored areas, results from a combination of socio-environmental and behavioral factors and conditions that impact on higher mortality rates, prevalence and incidence of these diseases. The social deprivation of the region can be a socioeconomic factor for such diseases, better described than the occupational or social class of the people. The low socioeconomic status of the population in these areas has an impact on precarious health and risk behaviors, such as smoking. Differences in access to the health care network, mediated by social conditions, could explain, in part, the increased risk of standardized mortality in areas of social exclusion, where the poorest population lives and with less access to these services. In addition, individuals with lower socioeconomic status have less access to the diagnosis and treatment of chronic diseases, affecting mortality. The discrepancy in living conditions between regions and social deprivation in areas of lower socioeconomic status can have a negative impact on the living conditions and health of populations

(FARIAS, 2014).

The management and containment of risk factors is fundamental for the prevention of cardiovascular diseases. However, changing habits is the most difficult intervention to implement, and population strategies are extremely important. In Brazil, a successful example was the strategy used to control smoking, resulting in more efficient blood pressure control, but still persistent in the population. On the other hand, the increase in cases of obesity in the population may lead to an increase in risk factors such as hypertension and diabetes in the coming years, and this effect may lead to an increase in heart disease. Studies consistently demonstrate that the importance of cardiovascular diseases as a cause of death has been growing in the country every year, and these estimates are of great importance to continue implementing actions of preventive policies and health promotion, and mainly for the formulation, planning and adequacy of new strategies to be implemented in the country. (BIRTH, 2018).

TELECARDIOLOGY

Every urgency and emergency care network in Brazil encounters territorial barriers and lags in the distribution of specialists throughout the country. Therefore, in order to improve the treatment of patients with ACS, it is essential to support telecardiology as a cardiovascular approach strategy. There are several technologies available for telecardiology, including remote electrocardiogram (ECG) analysis, mobile phone-based telehealth, telemonitoring of implantable cardiac devices (such as pacemakers and defibrillators), and video-based telemedicine.

The telecardiology coupling solution for reporting ECG exams optimizes the diagnosis of an Acute Coronary Syndrome, reducing the time to start management, ruling out differential diagnoses and reducing mortality. This technology offers benefits, facilitates access to diagnoses and assists in a better approach adopted by the physician responsible for emergency care, since in urgent and emergency services, the ECG report and patient management are often not performed by a cardiologist. In addition, there is a reduction in hospital costs and there is also a centralization of these tests on a platform, contributing to the reduction of errors in reports made by non-specialist physicians.

In this context, telecardiology is a promising technology that can improve patients' access to the assessment and treatment of cardiovascular problems, reducing the number of hospitalizations and improving patients' quality of life (OLIVEIRA, 2015).

METHODOLOGY

After the implementation of the Telemedicine Electrocardiogram Reporting System in the emergency department of this Hospital in Vale do Itajaí, the electrocardiograms performed are sent to a platform of the implanted system and this exam is classified by an artificial intelligence into "normal" and "altered", then, the "altered" electrocardiograms are evaluated by a cardiologist registered on the platform that issues the report, suggesting a possible diagnosis within a period of 5 to 10 minutes.

In this work, aggregated data forwarded from the database provided by the electrocardiogram reporting tool implemented in the hospital were used, collecting only the time that the tool itself took to issue the electrocardiogram report and the diagnosis of this report issued, maintaining anonymity and confidentiality. confidentiality of participants. The participants were not submitted to any intervention and the Institution in which the tool was implemented is not identified either.

CONCLUSION

The emergency service at the Hospital do Vale do Itajaí has an average of 400 consultations per day and an average of 90 patients hospitalized per month with a diagnosis of AMI (Acute Myocardial Infarction). According to Brasil (2022), it is necessary to perform a 12-lead Electrocardiogram (ECG) as the first diagnostic tool in the management of patients with suspected Acute Coronary Syndrome (ACS), such as infarctions. Thus, the number of electrocardiograms performed in the emergency room becomes high, meaning that, during the period from March 2, 2021 to September 13, 2022, 5,577 electrocardiograms were reported by the implemented technological tool, as shown in Figure 5.
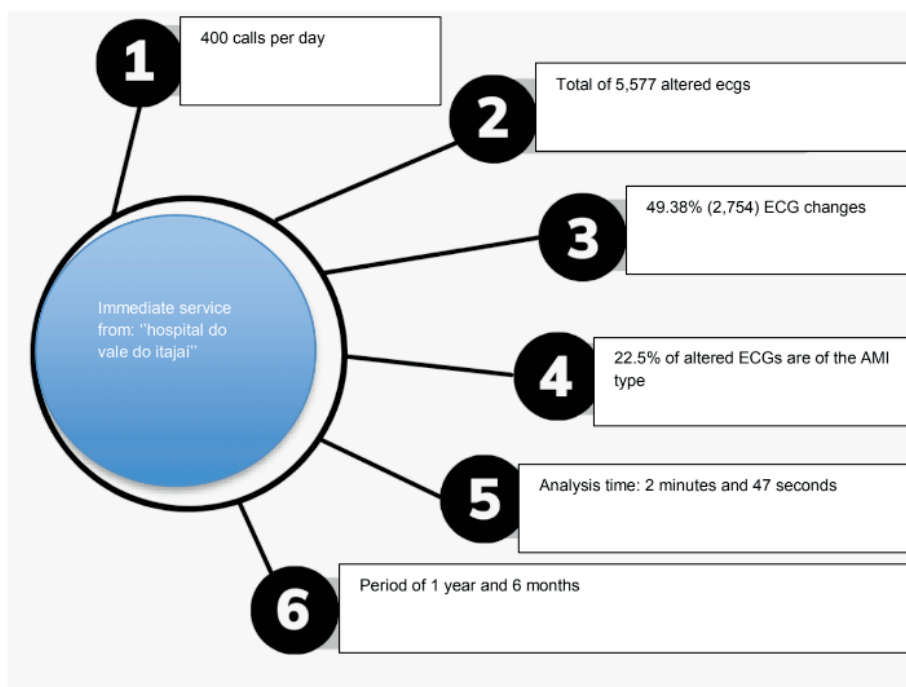

Figure 5 - Outcomes of the Hospital do Vale do Itajaí. Caption: AMI (Acute Myocardial Infarction), ECG (Electrocardiogram), Min (minutes), Sec (seconds). Source: Authors.

In Table 1, the electrocardiogram reports performed during the defined period are presented in detail. There were 146 Acute Myocardial Infarctions with ST Supra, 464 reports of Cardiac Arrhythmias, 55 reports of Atrial Fibrillation among other pathologies that helped in a more specific diagnosis for the treatment of the emergency care user. In addition, 2,330 normal electrocardiograms were reported that could complement and/or rule out diagnoses more precisely, thus contributing to the dynamics of care and the resolution of medical procedures in a more objective way. Another positive point of the tool is the speed with which the report is released, taking around 2 minutes 47 seconds to be reviewed and released on the technological platform. In addition, before the implementation of the digital system, the electrocardiograms were printed in the emergency room and physically stored in the patients' records, which made it difficult to access and epidemiology these results, which were left without a centralized management of reports and exams.

ECG Normal	2.330
AV conduction	68
QRS complex	699
Ventricular Repolarization	672
Overloads	240
DAC (coronary artery disease)	120
Ventricular Pre-Excitation	5
arrhythmias	464
Pacemaker	14
Entities	5
Miscellaneous	174
STEMI - Acute ST elevation myocardial infarction	146
Subendocardial Ischemia	47
Subendocardial injury current	41
Asystole	5
FA - Atrial fibrillation	54
Mistakes	493
Total	5.577

Table 1 - reports performed by the Kardia system. Source: Authors.

A study published in the European Journal of the Heart in 2022 analyzed data obtained from 10 hospitals in the public health network in Brazil that implemented the technology center in the last 7 months (May to October 2021). A total of 5,506 ECGs were entered on the platform, of which 53.77% (2,961) were considered abnormal; of these, 9.92% (294) had alterations compatible with ischemic events (current injury or myocardial ischemia). According to this study, the median time for the ECG report made by the specialist was 2 minutes and 51 seconds, as shown in Figure 6. Mota (2022) demonstrated that the implementation of a technological hub in the setting of chest pain in the emergency room help proved to be viable and with great potential to reduce the distance between symptoms and treatment of patients with ACS.
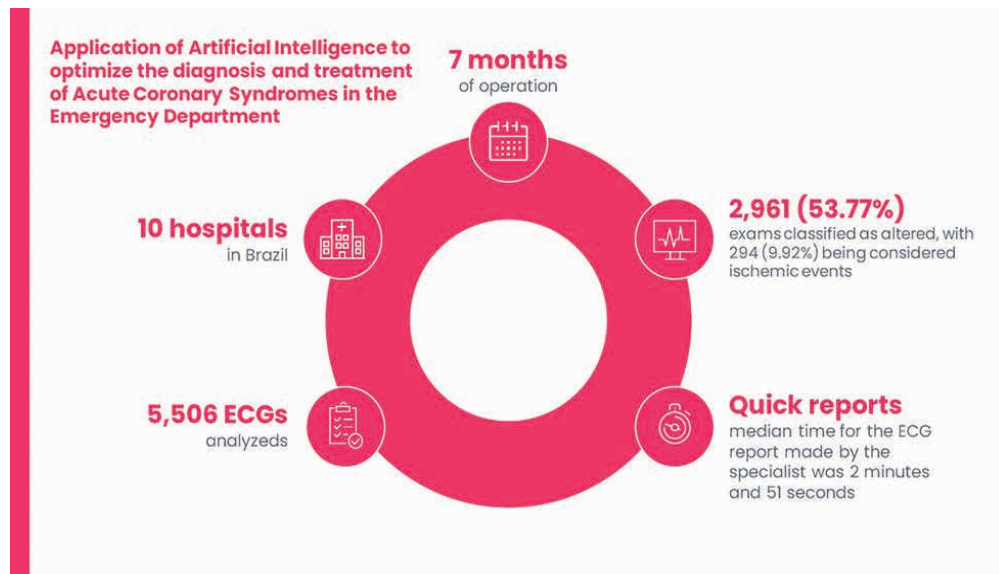

Figure 6 – Study results of MOTA, 2022

Therefore, the implementation of the telecardiology project brought more reliable reports to the emergency department of the Hospital do Vale do itajaí, faster service, adequate patient management, digital centralization of exams and reports, and assistance in complying with the Guidelines for the care of patients with cardiac complaints.

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