Algorithm Elaboration For Quick Interpretation Of The Main Heart Arrythmias In The Electrocardiogram

RESUMO | Objetivo: relatar a elaboração de um algoritmo para facilitar a interpretação rápida das principais arritmias cardíacas no eletrocardiograma. Método: estudo descritivo, exploratório, com abordagem qualitativa, do tipo relato de experiência, realizado mediante um projeto de intervenção em educação em saúde durante o ano de 2021. Resultados: a elaboração do algoritmo denominado Scaritmo contribuiu para sistematizar as etapas de identificação de arritmias cardíacas, favorecendo o processo didático e aprendizado dos estudantes e otimizando a interpretação rápida do eletrocardiograma. Conclusão: o uso do algoritmo Scaritmo permite a sistematização teórico-prática das etapas necessárias para a interpretação do eletrocardiograma tornando sua avaliação mais didática e assertiva pelo examinador em treinamento.
Descritores: Educação em saúde; Eletrocardiograma; Arritmias cardíacas.

ABSTRACT | Objective: to report the development of an algorithm to facilitate the rapid interpretation of the main cardiac arrhythmias in electrocardiogram. Method: a descriptive, exploratory study with qualitative approach, of experience report type, conducted through an intervention project in health education during the year 2021. Results: The development of the algorithm called Scaritmo contributed to systematize the steps of cardiac arrhythmia identification, favoring the didactic process and student learning, and optimizing the rapid interpretation of the electrocardiogram. Conclusion: The use of the Scaritm algorithm allows the theoretical and practical systematization of the steps necessary for the interpretation of electrocardiograms, making its evaluation more didactic and assertive by the examiner in training.
Keywords: Health Education; Electrocardiogram; Cardiac Arrhythmias.

RESUMEN | Objetivo: relatar el desarrollo de un algoritmo para facilitar la interpretación rápida de las principales arritmias cardíacas en electrocardiograma. Método: estudio descriptivo, exploratorio, con abordaje cualitativo, de tipo relato de experiencia, realizado a través de un proyecto de intervención en educación para la salud durante el año 2021. Resultados: el desarrollo del algoritmo denominado Scaritmo contribuyó para sistematizar los pasos de identificación de arritmias cardíacas, favoreciendo el proceso didáctico y el aprendizaje de los alumnos y optimizando la rápida interpretación del electrocardiograma. Conclusión: El uso del algoritmo Scaritmo permite la sistematización teórica y práctica de los pasos necesarios para la interpretación del electrocardiograma, tornando su evaluación más didáctica y asertiva por el examinador en formación.
Palabras claves: Educación para la Salud; Electrocardiograma; Arritmias Cardíacas.

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INTRODUCTION

Cardiovascular diseases are among the most prevalent chronic diseases in the world, accounting for about 17.9 million deaths each year. It comprises a group of heart disorders, among them: coronary heart disease, cerebrovascular disease, and rheumatic heart disease. It can affect different age groups, from newborns to the elderly. [1]

In addition to the genetic factors that are strongly associated, behavioral factors are commonly responsible for its development, among them: harmful eating habits, tobacco use, harmful use of alcohol and sedentary lifestyle. Excessive alcohol use is related to the weakening of the heart muscle, promoting a serious disease called alcoholic cardiomyopathy, intensifying the risks of cardiovascular diseases. [2]

Among the signs of cardiovascular disease, cardiac arrhythmia is an important marker. It comprises an abnormal change in the heartbeat. The heartbeat can be fast, slow or irregular. There are several factors related to its development, such as pathological processes of a cardiac nature, hydroelectrolytic disorders, infectious processes or even due to external factors, such as alcoholic beverages, caffeine, energy drinks, cigarettes, drugs and stress. [3] They can be benign or malignant and can cause respiratory distress, chest pain, fainting and even sudden death. [4] According to a report by the American Heart Association, 2023 [5] As for the statistics of heart disease and stroke, it was shown that the risk of developing sudden death after an acute myocardial infarction comprising a short period of 3 months is 0.29% or 116 per 100,000 person-years. Currently, cardiovascular diseases lead to more individual deaths compared to cancer and chronic respiratory diseases combined.

One of the exams frequently used in clinical practice for diagnosing cardiovascular diseases is the electrocardiogram. It provides a graphic representation of the electrical activity of the heart, thus evidencing the functionality and/or abnormality of cardiac functioning. [6]

Professionals who provide assistance to patients in different health segments require training to identify the need for evaluation as well as the correct interpretation of the tracings present on the electrocardiogram. However, recurrently, the difficulty of professionals to carry out its correct interpretation is referenced. Therefore, making it difficult to access effective treatments in a timely manner and promote the rehabilitation of patients. [4]

A study developed by Nascimento and Rosenstock, 2020 7 showed that among 11 students interviewed who attended the electrocardiogram discipline of the undergraduate nursing course at Centro Universitário UNIESP enrolled between the 6th and 9th period,

understood the concept and objectives of the exam well, however they found it difficult to identify irregular tracings, only 2 (18.8%) adequately answered specific aspects of tracing reading, as the equivalence of ECG voltage and time, which is equivalent to 0.1 mv and 0.04 s, respectively, and only 6 (54.55%) answered satisfactorily regarding the mechanical activity of the heart. As for the identification of sinus rhythm, 63.64% answered inadequately and 36.36% did not know how to answer. Another study with nurses identified that only 37.5% of the professionals answered that they "rarely" received any type of instruction in the institutions to which they were linked, and only 25% knew how to correctly interpret the QRS complex [8]; evidencing, therefore, the deficit in the understanding between anatomy and electrophysiology for its correct interpretation.

With the advent of the internet, the development of technologies that facilitated the interpretation of tracings was possible. [9] ECG-related software for educational purposes or just related to diagnostic aids is already a reality, such as the "ECG Fácil" application. [10]

The implementation of educational mechanisms beyond the classroom, show improvement in the knowledge of the Electrocardiogram. [9] However, some limitations are still evident, such as the description of the validation of these teaching tools. [11]

Through these problematizations, an algorithm was developed, entitled SCA-RITMO, which guides, in a simplified and functional way, the interpretation of the electrocardiogram in a more independent way. This innovation product for teaching-learning was developed by Nurse Cardiologist Maria Fernanda Silveira Scarcella and collaborators, based on their experience after 10 years of studying and teaching electrocardiography.

In this sense, this study aims to report the experience of developing this algorithm to facilitate the interpretation of the tracings of the main normal and arrhythmic cardiac rhythms, through a systematized scheme of steps, which aims at

better understanding and interpretation of the ECG at the bedside, which can impact the quality, safety and speed of care for patients with heart disease.

METHOD

The present work is a descriptive, exploratory study, with a qualitative approach, of the experience report type, carried out in the context of an intervention project as a facilitator in the teaching-learning of the academic community, developed in March 2023.
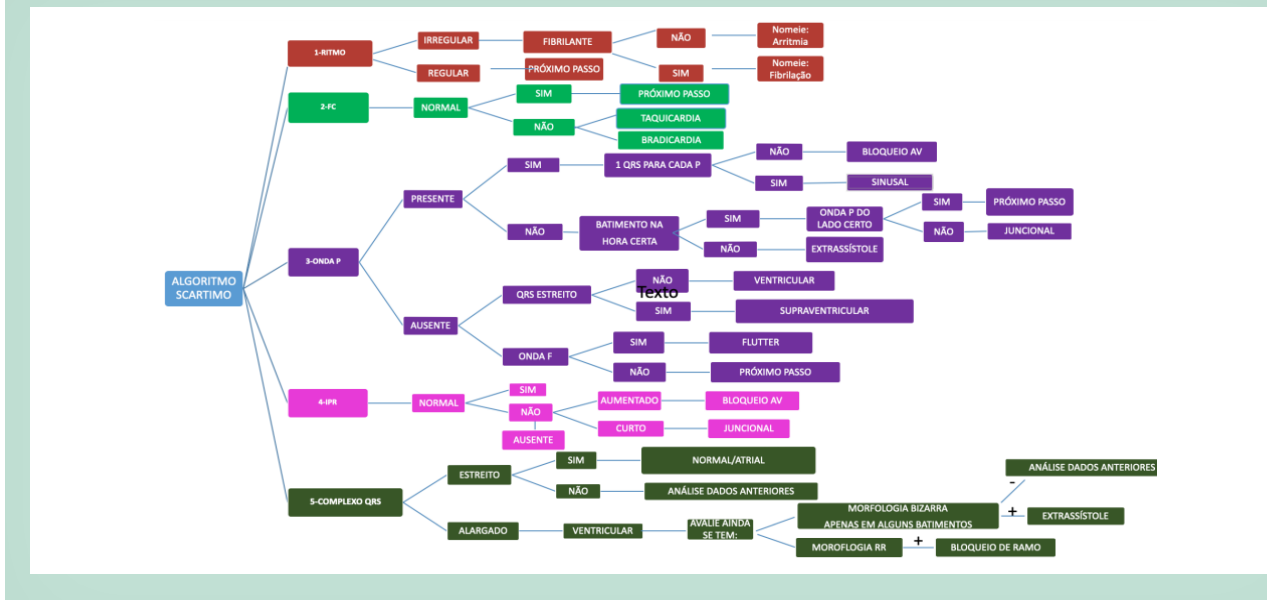
An in-depth research was carried out in national and international databases, for a theoretical basis in the literature in order to favor the understanding and foundation of the topic addressed.

The research was carried out in March 2023 in the Virtual Health Library (VHL) in the databases: Medical Literature Analysis and Retrieval System Online (MEDLINE), Latin American and Caribbean Literature in Health Sciences (LILACS), Database in Nursing (BDENF) and Pubmed, with the inclusion criteria: complete articles, published in the last 5 years, available in Portuguese, English or Spanish. For this purpose, the indexed descriptors were used: Health education; Electrocardiogram; Cardiac arrhythmias.

Data were extracted from the selected articles and gathered in a data collection instrument developed by the researchers themselves, containing data such as: article title, indexed database, author, country of origin, language, year of publication, place where the research was carried out, methods, answer to the guiding question and main conclusions.

The research carried out is an experience report, so there was no need to apply a free and informed consent term (FICF). The reported experience was based on the researchers' direct observations during activities in their work environment.

Primary Study

Maria F. S. Scarcella, Talita F. Ribeiro, Artemísia X. Barbosa, Simone A. S. Freitas, Flávia M. M. Diniz, Micaela S. Pereira
Algorithm elaboration for quick interpretation of the main heart arrythmias in the electrocardiogram

Figure 1. Scaritmo Algorithm

RESULTS

As identified by everyday experience and corroborated by research in the literature, there is significant difficulty in reading, understanding and interpreting the electrocardiogram. The impasse identified by the researchers was understood as hindering the provision of safe and comprehensive nursing care, especially in highly complex patients, that is, with an inherent risk of hemodynamic instability and critical illness.

The SCARITMO algorithm (Figure 1) was developed with the aim of facilitating the acquisition of knowledge by the academic community, systematizing the learning process. In this sense, improving the binomial theory and practice, favors the training of professionals with a highly qualified profile, marked by reflective, critical, humanitarian and ethical, with responsibility and competence to work in a multidisciplinary team at any level of care and/or complexity.

The developed algorithm systematizes the reading of the electrocardiogram in 5 steps, directing the ECG reader to the paths to be followed according to what

was evidenced in the reading of the patient's tracing in the previous step. The analysis must be performed in the peripheral bipolar derivation known as DII, enabling the professional or student to quickly recognize, for example, the main cardiac arrhythmias.

The first step is to analyze the heart rhythm, classifying it into regular and irregular; in the second step, the analysis of the heart rate should be performed, assessing whether there is bradycardia or tachycardia; the third step comprises the analysis of the P wave, where it must be verified whether it is present or absent/undetectable. In the fourth, the size of the PR segment is evaluated, where the reader can quickly find the presence of atrioventricular blocks, and finally, the fifth and last step, where there is the analysis of the QRS complex, where we seek to show whether it is narrow or wide, thus, the rhythm can be classified as supraventricular or ventricular.

DISCUSSION

The intervention project contributes to bringing about changes in training pro-

cesses, understanding that educational proposals are individual and unique processes in which individuals must use methodologies that meet the needs of each one. [12]

Going against the literature, the pedagogical systematization is based on the needs required in the educational guidelines of nursing professionals, who deliberate on the construction of quality, innovative political-pedagogical projects that articulate teaching, research and assistance. Therefore, the elaboration of didactic methods that develop clinical reasoning and reflective criticism promote resoluteness in the nursing care practice, starting from the problematization of everyday situations. [13]

The systematization of learning allows enriching, in addition to the knowledge of health students, also that of professionals already working in the area, and who have not yet had the opportunity to develop this ability to understand anomalies in electrocardiograms.

According to the authors Junqueira and Oliver (2020), there is a need to adapt the training of health professionals so that the labor market can count on

individuals who meet the interests of the whole society. They point out that educators are unprepared to conduct the education process in practice, thus weakening the educational process, the authors also bring that, so that learning can be shared, possible actions, such as: permanent education; ongoing training and planning of teaching strategies, must be carried out. [14]

In this sense, aiming at the model of health care and care practices, active methodologies in the teaching and learning process provide support for the professional development of academics. The developed algorithm allows the student to strengthen the links between theory and practice in critical areas of action such as intensive care units, emergency rooms and hospitalization units.

The need already perceived in previous studies, associated with what was recognized in professional experience, led to the creation of the Scaritmo algorithm, which is a necessary tool to intensify the link between theory and practice, acting as a facilitator in the learning of the ECG, thus contributing to the formation of a capable, autonomous and efficient professional, moving in this way a positive change in the professional attitude, with scientific basis and improved practice.

Thus, it is understood that the pedagogical tool developed can provide an improvement in the training process of students in the health area and in their performance in hospitals or outpatient units, thus stimulating permanent education and knowledge updating.

CONCLUSION

The algorithm developed emerges as a tool of technological innovation of the light-hard type, to provide an essential skill for the health professional, a skill that may have been neglected due to the difficulty of achieving it. This work has an indirect impact on the quality, promptness and safety of care provided to cardiac patients, as it offers the possibility of improving the acquisition of knowledge and technical skills for ECG interpretation, thus contributing to qualified professional training.

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