Nurse attributions in the handling of transcutaneous pacemaker in elderly patients: Integrative review

RESUMO | Objetivo: investigar a produção científica nacional e internacional sobre as ações e cuidados do enfermeiro no manejo do marca-passo transcutâneo em idosos. Método: revisão integrativa, realizada nas bases de dados "Scopus", "Web of Science", "EMBASE", "PUBMED", "MEDLINE", no período de 2012 a 2022. Resultados: foram selecionados oito artigos, todos internacionais, somente um conduzido por enfermeiros. Categorizados por: (1) Possibilidades e limitações no uso do marca-passo trânscutâneo na prática clínica; (2) Cuidados de enfermagem na utilização do marca-passo transcutâneo em idosos e (3) Sistematização da Assistência de Enfermagem e a abordagem ao paciente em uso de marca-passo transcutâneo. Conclusão: os principais cuidados de enfermagem ao idoso que utiliza o marca-passo transcutâneo são: prevenção de queimaduras cutâneas; administração de medicamentos; manejo da dor; monitoramento dos dados vitais; avaliação da captura mecânica; investigação do histórico familiar; medicações em uso; realização do exame físico e acesso venoso periférico.
Descritores: Bradicardia; Marca-passo artificial; Cuidados de Enfermagem; Idoso. Serviços médicos de emergência.

ABSTRACT | Objective: : to investigate the national and international scientific production regarding the actions and handling of the transcutaneous pacemaker in elderly. Method: integrative review, made in the databases Scopus", "Web of Science", "EMBASE", "PUBMED", and "MEDLINE", for the period 2012 to 2022. Findings: there were selected eight articles, all international, and only one conducted by nurses. Categorized into: (1) Possibilities and limitations of the use from the transcutaneous pacemaker in clinical practice; (2) Nursing care when utilizing transcutaneous pacemaker in elderly and (3) Systematization of Nursing Care and approach to patients using transcutaneous pacemaker. Conclusion: the main Nursing Care approaches to elderly who use transcutaneous pacemaker are prevent skin burn; drug administration; pain management; monitoring vital signs; evaluation of heart activity; investigating family history and drugs in use; performing physical examination and peripheral venous access.
Keywords: Bradycadia; Artificial pacemaker, Nursing care, Elderly, Emergency medical care.

RESUMEN | Objetivo: investigar cual és lá produccion científica nacional e internacional sobre Las acciones y cuidados del enfermero en el manejo del marca-pado intracutaneo en ancianos. Método: Revision Integrativa realizada en Las bases de datos "Scopus" web of Science", EMBASE", "PUBMED", "MEDLINE", durante el período 2012 a 2022. Resultados: fueron Seleccionados ocho articulos todos internacionales, solanemente uno fue llevado a cabo por enfermeros. Categorizado por (1) posibilidades y limitaciones en El uso del marca-paso intracutaneo en lá práctica clínica; (2) cuidados de enfermeria en lá utilização del marca-paso intracutaneo y (3) sistematizacion de la assistencia de enfermeria y el abordaje del paciente que usa marca-paso intracutaneo. Conclusion: Los principales cuidados de enfermeria Al anciano que utiliza marca-paso intracutaneo son: prevencion de quemaduras cutaneas; administracion de medicamentos, manejo del dolor, monitorizacion de datos vitales, evaluacion de lá captura mecanica, investigação del histórico famíliar, medicaciones en uso, realizacion de examen fisico y acceso venoso periférico.
Palabras claves: Bradicardia; Marca-paso artificial; Cuidados de Enfermeria; Anciano, Servicios médicos de Emergencia

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INTRODUCTION

As the population ages, the number of cardiovascular diseases also grows, resulting in an increase in the number of visits to emergency servi-

ces. Cardiac arrhythmias or dysrhythmias are one of the most common causes observed in the care of elderly patients, aged 65 years or older, treated in emergency units in the United States of America (USA). [1] In Brazil, research carried out with data from the Mortality Information System (MIS) shows that, although mortality from cardiovascular diseases has decreased over the years, it is still the leading cause of death in the country. [2]

Among cardiac arrhythmias, bradycardias stand out, characterized by a heart rate (HR) of less than 60 beats per minute (bpm) and identified on the electrocardiographic monitor as a regular rhythm, characterized by the "P" waves that precede the "QRS" complexes and the "PR" and "QRS" intervals are normal (Figure 1). [3,1] In addition, there are atrioventricular blocks (AVB), defined as problems in the conduction of electrical impulses in the heart, which are divided according to their severity. First-degree AVB have a prevalence of (6%) to (8%) in individuals aged 70 years or older and, like second-degree Mobitz type I AV block, they are not predictive of cardiovascular events. However, second-degree AV block type Mobitz II or third-degree AV block have a worse prognosis and require emergency treatment. [4]

Regarding signs and symptoms, bradyarrhythmias are commonly related to syncope in elderly patients, and syncope of cardiogenic origin, responsible for up to 20% of cases in this population, has the worst prognosis. Thus, patients with altered levels of consciousness, hypotension, pulmonary congestion, and chest pain caused by bradyarrhythmia should seek care in emergency departments. In contrast, asymptomatic patients should be monitored and observed regularly. [1,4]

The treatment of bradycardia is initially done through the use of drugs such as atropine, dopamine and epinephrine. In cases of drug-refractory, unstable, or high-grade block patients, artificial pacing with a transcutaneous pacemaker (TCP) should be considered immediately. This device can be a differential in mobile and fixed Pre-Hospital Care (PHC), in places that are difficult to access such as rural areas and that do not have the possibility of inserting a temporary transvenous pacemaker device (TVP). [1,5] Its main advantage is the stabilization of the patient's clinical condition, but there are disadvantages such as the pain it can generate.

Figure 1 – Sinus bradycardia. Curitiba/PR (BRAZIL), 2022

Source: ACLS (2018)

The TCP delivers stimulatory impulses to the heart when in contact with the skin of the chest, through transcutaneous leads. This stimulation is non-invasive and can be performed by Advanced Life Support (ALS) professionals. [1,2]. Portanto, é relevante que os enfermeiros que atuam nos serviços de urgência e emergência possuam competência para prestar cuidados de enfermagem aos pacientes que necessitam do TCP.

The American Heart Association (AHA) recommends an initial HR of 60bpm for TCP installation, and HR adjustment (up or down) should be performed based on the patient's clinical response. [6] Among the nursing care are the verification of vital data, assessment of the level of consciousness, observation of improvement in skin color and temperature, continuous monitoring of the electrocardiogram (ECG), to analyze the electrical and mechanical capture, which indicate the contraction of the heart, which is confirmed by palpating the pulse of the radial artery, as well as the application of the steps of the nursing process and Systematization of Nursing Care (SAE). [1,7] In order to contribute to the improvement of care for the elderly with arrhythmias, it is essential to expand studies on the subject. Thus, the objective was to investigate the national and international scientific production on the actions and care of nurses in the management of transcutaneous pacemakers in the elderly.

METHODS

It is an integrative literature review, which establishes a synthesis of knowledge on a topic, seeking research and general conclusions about an area of study. [10] Conducted through a preliminary assessment of its magnitude and available content on a chosen topic. It aims to compile the available literature and seeks to clarify conceptual limits and definitions of the subject studied, as well as any gaps in the literature. (8)

The study and structuring of this text sought to adhere to the Preferred Reporting Items for Systematic Reviews and Meta analyses (PRISMA) standard, a flowchart that helps improve the quality of literature reviews (Figure 2) in the results. [9] This type of review is composed of five phases, namely: (1) identification of the research question; (2) identification of relevant studies; (3) selection of studies; (4) data analysis; (5) synthesis and presentation of data. [10]

In the first phase, the research question, objective and descriptors for the

bibliographic search were defined. At that moment, the PICo mnemonic combination was used (P - Population: Elderly; I - Interest: Nursing Actions and Care; Co - Context: TCP Management).

In view of the above, the following research question was structured: What are the necessary nursing actions and care for the management of TCP in elderly patients in the emergency department?

The second phase was divided into two. The first corresponded to the selection of descriptors selected from the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) database and keywords: bradycardia AND transcutaneous pacemaker AND Nursing care AND elderly AND emergency medical service, in Portuguese, English and Spanish and with their different variations, as shown in Table 1.

After selecting the descriptors, the second was carried out in February 2022. Using the Portal of the Coordination for the Improvement of Higher Education Personnel (CAPES), the electronic capture of the studies was carried out in the "Scopus" databases, "Web of Science", "EMBASE", "US National Library of Medicine (PUBMED)", "MEDLINE".

Here, the articles identified were selected according to pre-established eligibility criteria. The inclusion criteria were: articles available in full and related to the theme, original articles, written in Portuguese, English or Spanish and published in the last 10 years. As exclusion criteria were established: duplicate articles in the selected databases, keeping only the first version found, experience reports, theoretical reflections, dissertations, theses, monographs and publications that did not cover the research topic.

The management of the bibliography found for the selection of articles included in the corpus of the integrative review was mediated through the computer program EndNote®.

Table 1 – Search strategies applied in the databases chosen for the integrative review. Curitiba, Paraná, 2022

Databases	Search strategy
PUBMED- B/ WEB OF SCIENCE	(("Transcutaneous cardiac pacemaker" OR "Marca-passo cardíaco transcutâneo" OR "Marca passo cardíaco transcutaneo" OR "Transcutaneous cardiac pacing" OR "External transcutaneous pacemakers" OR "Cardiac pacing, artificial"[MeSH Subheading] OR "Estimulacao cardíaca artificial" OR "Estimulación cardíaca artificial" OR "Transcutaneous pacemaker" OR "Transcutaneous pacing")) AND (("Bradyarrhythmia"[MeSH Subheading] OR "Bradiarritmia" OR "Bradycardia"[MeSHSubheading] OR "Bradicardia"))
BVS MEDLINE	("Transcutaneous cardiac pacemaker" OR "Marca-passo cardíaco transcutâneo" OR "Marca passo cardíaco transcutaneo" OR "Transcutaneous cardiac pacing" OR "External transcutaneous pacemakers" OR "Cardiac pacing, artificial" OR "Estimulacao cardíaca artificial" OR "Estimulación cardíaca artificial" OR "Transcutaneous pacemaker" OR "Transcutaneous pacing") AND ("Bradyarrhythmia" OR "Bradiarritmia" OR "Bradycardia" OR "Bradicardia") OR ("Aged" OR "Idoso" OR "Anciano") OR ("Emergency medical services" OR "Serviços Médicos de Emergência" OR "Servicios Médicos de Urgencia" OR" Prehospital care" OR "Assistência Pré-Hospitalar" OR "Atención Prehospitalaria" OR "Emergency health services")
EMBASE	("Transcutaneous cardiac pacemaker" OR "Marca-passo cardíaco transcutâneo" OR "Marca passo cardíaco transcutaneo" OR "Transcutaneous cardiac pacing" OR "External transcutaneous pacemakers" OR "Cardiac pacing, artificial" OR "Estimulacao cardíaca artificial" OR "Estimulación cardíaca artificial" OR "Transcutaneous pacemaker" OR "Transcutaneous pacing") AND ("Nursing Care" OR "Cuidados de enfermagem" OR "Atención de Enfermería" OR "Assistência de Enfermagem" OR "Atendimento de Enfermagem" OR "Emergency Nursing" OR "Nursing" Or "Enfermagem" OR "Enfermería")
SCOPUS	(("Transcutaneous cardiac pacemaker" OR "Marca-passo cardíaco transcutâneo" OR "Marca passo cardíaco transcutaneo" OR "Transcutaneous cardiac pacing" OR "External transcutaneous pacemakers" OR "Cardiac pacing, artificial" OR "Estimulacao cardíaca artificial" OR "Estimulación cardíaca artificial" OR "Transcutaneous pacemaker" OR "Transcutaneous pacing") AND TITLE-ABS-KEY (("Bradyarrhythmia" OR "Bradiarritmia" OR "Bradycardia" OR "Bradicardia")) AND (("Aged" OR "Idoso" OR "Anciano")))

Source: The authors (2022).

In the third stage, the pre-selected articles were refined from the reading of titles and abstracts and corpus I was determined based on reading the articles in full, according to the flowchart shown in Figure 2.

Then, for the analysis of phase 4, in the selected articles, a complete new reading was carried out, now aiming to obtain details of their content in order to identify the themes dealt with there. The level of evidence of the articles included in the study was assigned based on the classification proposed by the Oxford Center for Evidence-Based Medicine (2009) [11], composed of five hierarchical levels of evidence by type of study.

These were later organized into empirical categories. Finally, the categories that emerged from this analysis were described by the critical analysis of the data in the fifth phase. This phase was interpreted and presented in a narrative way. The results were entered into electronic spreadsheets available in the Microsoft Excel 2016® program. In this context, it is worth mentioning that the research was carried out with data in the public domain, thus, ethical assessment was not necessary.

RESULTS

The initial search in the databases resulted in 289 articles, of which 132 were excluded after reading the title, 145 after reading the abstract for not

meeting the objective proposed by this study, there were two duplicate articles also promptly excluded. Ten articles were read in full, of which two were excluded for not answering the research question, totaling eight articles included in the review.

To illustrate the selection of articles and the composition of the corpus of the integrative review, the PRISMA model was used. [9] Figure 2 shows the flowchart for the selection of articles, from identification to inclusion in the corpus of analysis of the integrative review.

It is worth mentioning that only one of the articles has a professional nurse as its author, making it difficult to visualize nursing care in relation to the management of patients using TCP. In addition to not obtaining any study of national scope.

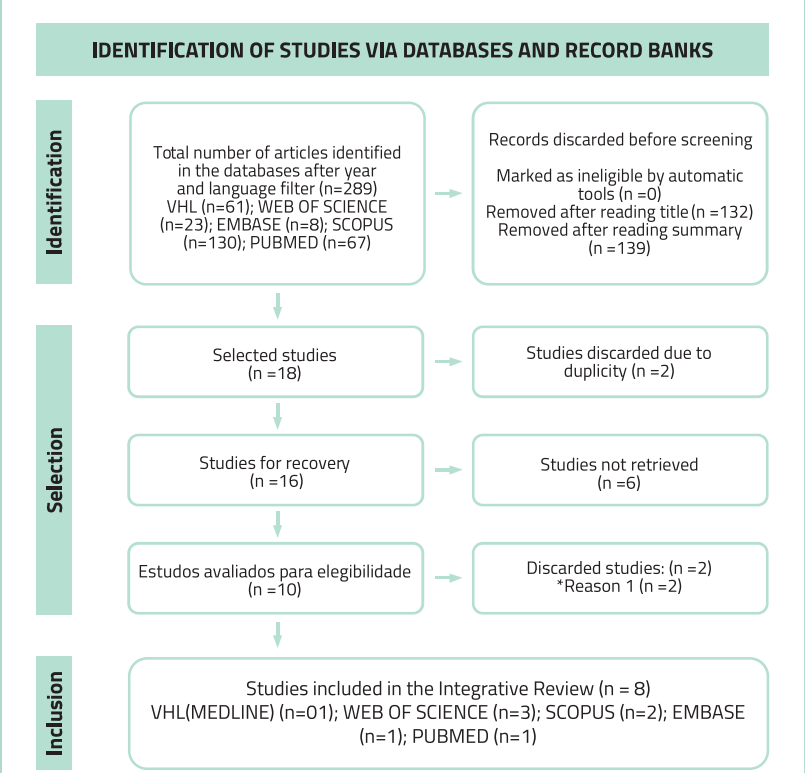
In order to assist the reader in viewing the critical analysis performed, Table 2 was prepared, which has the authors, title, journal, country, level of evidence and study design.

From the readings of the selected articles, for a better visualization of the concepts relevant to the research, three empirical categories were listed, namely: (1) Possibilities and limitations in the use of transcutaneous pacemakers in clinical practice; (2) Nursing care in the use of a transcutaneous pacemaker in the elderly and (3) Systematization of Nursing Care and the approach to the patient using a transcutaneous pacemaker. Its construction took place from the joint reading of the selected articles. It is worth mentioning that the categories are not mutually exclusive, since the same article could contain topics belonging to more than one category.

DISCUSSION

POSSIBILITIES AND LIMITATIONS IN THE USE OF TCP IN CLINICAL PRACTICE

Figura 1 – Bradicardia Sinusal. Curitiba/PR (BRASIL), 2022



Source: The authors (2022).

Caption: *Reason 1 (does not answer the research question)

Table 2 – Description of author(s), title, year, journal, level of evidence, country and study design of the studies selected for the integrative review. Curitiba, Paraná, 2022

Author (s) / Year	Title	Journal	Country	LE	Desenho do Estudo
HULLEMAN et al.; 201611	Conduction disturbances in out-of-hospital bradyasystolic cardiac arrest	Resuscitation	Netherlands	2c	Retrospectivoe
BEKTAS et al.; 20164	The effectiveness of transcutaneous cardiac pacing in ED	Am J Emerg Med	USA	2c	Prospective and unicentric observational
CARRIZALES--SEPULVEDA et al.; 20186	Thermal burn resulting from prolonged transcutaneous stimulation in a patient with complete heart block	Americ J Emerg Med	Mexico	4c	Case report
PAYNE et al.; 201818	Third degree burns associated with transcutaneous stimulation	BMJ Case Rep	USA	44c	Case report

ZAGKLI et al.; 2020a 25	Effects of transcutaneous cardiac pacing on ventricular repolarization and comparison with transvenous pacing	J Electrocard	Greece	2c	Prospective Observational
ZAGKLI et al.; 2020b26	Ventricular capture electrocardiogram during transcutaneous cardiac pacing	J Electrocard	Greece	52c	Cohort study
SIDHU e MARINE, 202021	Bradycardia assessment and management	TrendsCardiovasc Med	USA	55d	Not classified
ADAMS e ADAMS, 20211	Transcutaneous stimulation: a guide for emergency nurses	J EmergNurs	USA	5d	Not classified

Source: The authors (2022).

Caption: DE- Emergency Department; LE - Level of Evidence.

As previously described, the TCP is a device that can assist in the care of patients with medication-refractory bradyarrhythmias. It is up to the multi-professional team to list the cost-benefit for its installation and use. [12]

TCP is time-saving, non-invasive, and well tolerated by conscious patients diagnosed with second- or third-degree AVB, despite being a painful intervention. [12] Patient pain has been a topic of discussion in the emergency department due to its clinical impact on the patient's general condition. [13]

Thus, analgesia and sedation should be considered, in addition to performing non-pharmacological measures for control and comfort. Still, nursing plays a fundamental role in the monitoring of pain as the fifth vital sign and in the prescribed pharmacological therapeutic programming, in its constant presence at the bedside. [14]

Pain due to electrical discharge is a common complication and a limiting factor in its installation, therefore, the patient must be frequently reassessed to verify the cost-effectiveness of using TCP. [14]

If there is difficulty in the adhesion of the adhesive pads to the patient's chest due to excess hair, this should not be a limiting factor, promptly indicating the trichotomy by the nursing team. In the presence of sweating, it is necessary to dry the skin before applying the pads and if there is no adhesion, it should be changed immediately. [12]

Pain measurement is a fundamental parameter for therapeutic guidance. Its intensity should be a guiding criterion for clinical practice, its evaluation takes place from the global interpretation of the sensitive aspects, emotional and cognitive about the painful experience, in this sense, the biggest limitation of the use of the device may be the patient's intolerance to it. [15]

Regarding the possibilities for using the device, authors report that of the 2,333 patients with bradysystolic rhythm, 371 (16%) had 3rd degree AVB and 33 (1.4%) had 2nd degree. The emergency department may be faced with the occurrence of this bradyarrhythmia, characterized by one of the cardiological emergencies, which if not stabilized, the patient's condition may lead to Cardiopulmonary Arrest (CPA). [16]

A study showed the severity of 3rd degree AVB where, despite stimulation, there was no greater survival, indicating that in out-of-hospital cardiac arrest, with severe bradysystolic rhythm, survival remains poor, but stimulation using TCP remains a management option for this patient. [16]

The TCP is a useful device in mobile and fixed APH, or locations at a considerable distance from a large hospital that has a hemodynamics room and evaluation by specialized professionals. The results of this study demonstrated the feasibility, safety and efficacy of TCP. In this sense, TCP is associated with hemodynamic and ECG responses similar to TVP. [17]

NURSING CARE IN THE USE OF TCP IN THE ELDERLY:

Fact that nursing is always present in patient care within any health service. In the emergency, this professional has a fundamental role for the constant monitoring, provision of targeted care and assistance to the various situations that the patient may present. [18]

Care directed to the elderly should be the subject of constant discussion in the emergency department, highlighting all its particularities. Since the constant change in the population pyramid is taking place and the prevalence of services to this public increases frequently. [19]

The elderly can suffer from chronic conditions that can worsen and lead to the need for emergency care. Among these occurrences, bradyarrhythmias are frequent and some received the indication for the use of TCP, therefore, it is essential to understand the nursing care for these patients.

A cohort study evaluated the influence of TCP on ventricular repolarization, a form of treatment for bradyarrhythmias, showing that the device produces greater elongation of ventricular repolarization than TVP, but less increase in ECG markers of ventricular dispersion of repolarization. However, even so, it supports the accumulated experience of safe use of TCP for bradycardia in the emergency department in

patients with or without structural heart disease. [20].

Among the selected studies, the importance of the nurse's role in the care of patients with bradycardia and the relevant aspects that must be evaluated and addressed in the management of CPM are evident. [14]

Starting with the performance in the installation of the device, where the manufacturer's guidelines must be followed, positioning it in the anteroposterior region. From this perspective, continuous monitoring and verification of the degree of response can be attributed to the nurse. If patients still remain unstable after TCP therapy, further treatment is required, such as administration of dopamine or epinephrine. In short, the use of TCP had a positive effect on the vital signs of the patients seen. [12]

The configuration of the device can be understood as an attribution and way of acting by the nurse in this context. A study carried out by nurses in 2021 highlights the importance of this professional when using the TCP, sharing the responsibility for configuring the stimulation device. In this sense, the parameters must be adjusted according to the protocol, paying attention to the stimulation mode on demand or fixed mode. [1] Thus, an initial current of 20mA and the prescribed frequency are indicated, and it is recommended to start with 60bpm to maintain adequate blood pressure and cerebral perfusion. [6]

The nurse is also responsible for continuous cardiac monitoring, applying the electrodes so as not to interfere with the placement of the TCP paddles. In addition, to analyze whether there is a failure to capture data on the monitor, as well as to evaluate the electrical capture observed in the form of the wide QRS and wide T wave on the electrocardiogram (ECG) and mechanics, which can be measured by the femoral pulse, brachial pulse and right radial pulse. [1]

In addition, it is necessary to check the level of consciousness, the improvement of skin color and temperature, to maintain the effectiveness of the treatment. Another aspect that should be noted is the presence of noise in the ECG signal or excessive artifact. This can be a result of interference caused by nearby equipment, including cell phones or radios, and can be resolved by ensuring adequate distance between patients and these sources. [1]

During the use of TCP, all patients experienced body spasms, and a total of 65% complained of tolerable chest discomfort, reiterating items already addressed such as analgesia and non-pharmacological care in pain management. [17]

The bedside care provided to the patient must be based on the application of the Nursing Process (NP) through the Nursing Care Systematization (NSC), constituted by a methodology that aims to organize the practice of nursing to provide the best care to the patient.

NURSING CARE SYSTEMATIZATION (NSC) AND THE APPROACH TO PATIENTS USING TCP:

To guide the necessary care for patients using TCP in the emergency department, SAE and NP should be used. In the context of bradyarrhythmias, we can detail diagnoses and prescriptions necessary to increase the quality and safety of the patient.

Faced with the prolonged use of TCP, based on studies published in the United States and Mexico [21,14] the importance of assessing possible damages is highlighted. Among them, the third degree burns in the anterior chest area and in the back, where the stimulation adhesive pads were placed.

In this sense, in one of the studies, it was reported that the blades were kept in one patient for 12 hours and in another for 36 hours, which generated skin lesions, until the placement of the temporary TVP. Furthermore, the authors [21] point out that the manufacturers suggest that the pads should be replaced daily. Therefore, it is evident that TCP can be associated with severe burns and should be used with a shorter duration, and it is up to the Nurse to assess the physical integrity of the patient's skin. In the implementation of the NP, the diagnosis of risk of impaired skin integrity must be present and guide the prescription of preventive care described above.

In relation to priority diagnoses, the Decreased Cardiac Output [22], must be present and guide the nursing prescription. Prevalent signs of a Decreased Cardiac Output include edema, jugular vein distention, and dyspnea. [23] If it is decreased, physiologically there is no supply of metabolic needs and the patient's clinical evolution progressively worsens. [24]

Bradyarrhythmias and conduction disorders are frequent reasons for emergency department consultations. Patients can be asymptomatic, being diagnosed casually when performing the ECG or producing a wide range of symptoms, such as: dizziness, syncope, fatigue, angina, dyspnea, heart failure, among others. When an elderly person who has suffered syncope is admitted, the presence of bradyarrhythmias should be investigated. Physiologically, they occur due to an electrical conduction disorder [25]

In this context, temporary stimulation may be necessary in patients who are hemodynamically unstable or at risk of asystole. In this way, it is up to nursing to look for reversible causes, investigating family history, medications in use, checking vital signs, performing physical examinations, establishing peripheral venous access, among other important actions for the management of TCP. [26]

The diagnosis of Acute Pain is also present in a large percentage of pa-

tients using TCP. Thus, another similar study showed that the planning of nursing care involves the assessment of patients' health conditions, the delegation of activities to the nursing team, the organization of the different procedures to which the patient is submitted and the forecast/provision of the necessary materials and resources, seeking measures for pain relief and comfort. Therefore, it is recommended that nurses use indicators, epidemiological and managerial information to support their actions and decisions, having the NP and NCS as a central tool. [27]

As a limitation of this integrative review, the scarcity of national and international publications on the topic of TCP was highlighted, especially in the area of nursing and aimed at the specific population of the elderly. Most of the works found describe the use of other types of pacemakers. Furthermore, the low level of evidence of the selected articles that composed the integrative review was observed. As potentialities of the study, the clarity and methodological rigor are highlighted, as well as the relevant theme that contributes to the practice of evidence-based care.

CONCLUSION

Nurses work in the management of TCP in elderly patients, with its prevalence in emergency departments. In this context, it is necessary to identify the possibilities and limitations of using the device in each clinical case, in addition to carrying out the NCS to define nursing diagnoses and prepare a prescription that will guide essential care for this patient.

The literature describes the main nursing care for the elderly who uses TCP as: the prevention of skin burns caused by the prolonged use of TCP blades; drug administration; the management of pain from electrical discharge; monitoring vital data; assessment of mechanical pulse and electrical capture through continuous ECG monitoring; investigation of family history; the medications in use; physical examination and peripheral venous access.

As a limitation of this study, there is no study developed at the national level on the subject, as well as the little international production that focuses on the professional nurse in the face of the use of TCP in the elderly, promoting the possibility of further studies on this topic.

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