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TIME-CRITICAL DECISIONS: HEART SCORE'S IMPACT ON CARDIAC EMERGENCY OUTCOMES: INTEGRATED LITERATURE REVIEW

Keputusan Waktu Kritis: Dampak HEART Score pada Luaran Kegawatdaruratan Jantung: Tinjauan Literatur Terpadu

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ABSTRAK

Ketidakpastian dan keterlambatan penanganan kegawatdaruratan jantung menjadi penyebab tingginya angka kematian pasien di Indonesia hingga saat ini sebesar 13 juta. Penelitian ini bertujuan untuk mengumpulkan bukti kredibilitas skor HEART untuk mendeteksi kegawatdaruratan jantung guna mencegah ketidakpastian dan keterlambatan penanganan. Tinjauan sistematis dilakukan dengan menelusuri basis data Taylor & Francis, Springer Link, dan Science Direct yang diterbitkan antara tahun 2019 dan 2024. Data dianalisis menggunakan analisis isi deduktif mengenai kredibilitas skor HEART dalam mendeteksi kegawatdaruratan jantung. Hasil analisis menunjukan hanya sepuluh artikel yang mengekstraksi data dari skor HEART, yang memberikan kepastian serta mendukung penanganan yang cepat. Alat yang digunakan untuk komponen skor HEART harus dikalibrasi. Para peneliti menemukan bahwa skor HEART akurat mendeteksi kegawatdaruratan jantung (80%), cukup efektif dalam mendeteksi kejadian darurat jantung (60%), dan dapat digunakan untuk mengevaluasi pasien selama dan setelah kegawatdaruratan (50%). Kesimpulannya, skor HEART merupakan alat deteksi kegawatdaruratan yang efisien. Keberhasilan skor HEART dalam mengatasi ketidakpastian dan keterlambatan kegawatdaruratan jantung membutuhkan hubungan interpersonal dengan kolaborasi.

***Kata kunci**: kegawatdaruratan jantung, keterlambatan, ketidakpastian, kredibilitas, skor HEART*

ABSTRACT

Uncertainty and delays in handling cardiac emergencies contribute to Indonesia's high patient mortality, reaching 13 million cases. This study aimed to evaluate the credibility of the HEART score in detecting cardiac emergencies to reduce such delays. A systematic review was conducted by searching Taylor & Francis, Springer Link, and Science Direct databases for articles published between 2019 and 2024. Data were analyzed using deductive content analysis focusing on the HEART score's credibility. Ten relevant articles were identified, highlighting the HEART score's ability to provide certainty and rapid assessment, though its components require calibrated tools. Findings show that the HEART score is accurate in detecting cardiac emergencies (80%), fairly effective in identifying events (60%), and applicable for patient evaluation during and after emergencies (50%). In conclusion, the HEART score is an efficient tool for early detection and management of cardiac emergencies. Its successful implementation requires not only clinical accuracy but also strong interprofessional collaboration to ensure timely and effective patient care.

Keywords: cardiac emergencies, credibility, delay, HEART score, uncertainty

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INTRODUCTION

Cardiac emergency cases represent the highest incidence of emergency conditions and are the leading cause of death globally [1], [2] with 55.4 million death recorded in 2020. This trend is also evident in Indonesia, which ranks second in Southeast Asia with approximately 13 million cases. Moreover, the incidence of cardiac emergencies has shifted toward younger age groups, occurring even before the age of 45 [2] Delays in treatment continue to be a major contributor to mortality in cardiac emergency cases [1].

Delays in treatment can result from uncertainty in establishing a diagnosis [2], often due to the presence of unfamiliar signs and symptoms, which may lead to complications. To address this issue, a reliable detection tool is needed [3] One such tool is the HEART score, a mnemonic that stands for History, Electrocardiogram, Age, Risk factors, and Troponin. Each component of the HEART score is assigned a value from 0 to 2. The total HEART score ranges from 0 to 10, allowing patient stratification into three risk categories: low risk (score ≤3), moderate risk (score 4–6), and high risk (score 7–10). Higher scores are associated with an increased likelihood of major adverse cardiac events (MACE), thus requiring more immediate intervention or comprehensive clinical evaluation [4].

The HEART score is a validated clinical decision-making tool used in cardiac emergencies. It has only been adopted in the past few years and is now being implemented in several developed countries, particularly for detecting cardiac emergencies in patients both before and after old age [4]. Several studies have compared the accuracy and practicality of the HEART score with other decision instruments used in cardiac emergencies. Findings suggest that the HEART score performs better in diagnosing and predicting MACE in patients with cardiac emergencies compared to the Global Registry of Acute Coronary Events (GRACE) and the Thrombolysis in Myocardial Infarction (TIMI) risk scores [5]. When compared specifically with the TIMI score, the HEART score demonstrates superior predictive capacity for acute coronary syndrome (ACS) (PMID: 30215999). In addition, compared to the Emergency Department Assessment of Chest Pain Score (EDACS), the HEART score also shows better sensitivity in predicting MACE in patients with suspected ACS [5].

However, the research team has yet to find any previous research articles in the International that explain the performance of HEART score in cardiac emergencies to overcome uncertainty and prevent delays in treatment. Therefore, this study aims to determine the credibility of the HEART score in detecting cardiac emergencies to avoid uncertainty and delays in treatment. The specific objectives of this study are to determine the accuracy of the HEART score in detecting cardiac emergencies, determine the ability of the HEART score to detect cardiovascular emergencies and evaluate the HEART score after post-cardiovascular emergencies in minimizing complications.

METHODS

Research design

Using the systematic review method [6]. The question outlined in this review is: "What is the credibility of the HEART score for cardiac emergency detection by interprofessional relations?". Based on this question, we use the acronym PICO by defining Population (P): Interprofessional relations; Intervention (I): HEART score; Control (C): Standard cardiac examination; Outcome (O): Credibility [7]

Search methods

Researchers used the Taylor & Francis, Springer Link, and Science Direct databases. In the manuscript search strategy, the researcher used alternative terms as keywords: Population (P) used “Interprofessional Relations” OR “Medical Team” OR “Doctors in the Emergency Department” OR “Nurses in the Emergency Department” OR “Phlebotomist”; Intervention (I) uses "HEART score"; Comparison (C) using “Standard heart

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examination" OR "Electrocardiogram examination" OR "Troponin examination" OR other detection tools"; Outcome (O) uses "Credibility" OR "Ability" OR "Excellence" OR "Success". Articles retrieved from the database were cataloged in bibliographic management software, reviewed, and classified.

Inclusion and exclusion criteria

The inclusion criteria in this study were (1) interprofessional relations, (2) HEART score, (3) accredited international journal, (4) journal publication year 2019 to 2024, (5) observational cohort study article, and (6) manuscript language English. Meanwhile, the exclusion criteria are (1) articles written in the form of reviews, conference proceedings, protocols, case reports, surveys, and theses/dissertations, (2) articles that cannot be downloaded, (3) pharmaceutical care intervention in heart disease, (4) anesthesia for heart surgery, and (5) tele-palliative care for heart disease.

Screening of articles

All researchers (Permaida/P, Komang Noviantari/KN, Ina Yuhana/IN) carried out article screening. Screening was carried out through several stages, including identifying keywords (Interprofessional Relations, Medical Team, Doctors in the Emergency Department, Nurses in the Emergency Department, Phlebotomist, HEART score, Standard heart examination, Electrocardiogram examination, Troponin examination, other detection tools, Credibility, Ability, Excellence, Success) in the three available databases, selecting appropriate titles and abstracts, and identifying full-text availability and suitability based on inclusion criteria. Suppose there is a dispute between P and KN. In that case, IY will carry out an evaluation and invite discussion between P and KN to resolve the problem by discussing the location of the differences of opinion so that the three reviewers can carry out the screening process we [8].

Data extraction

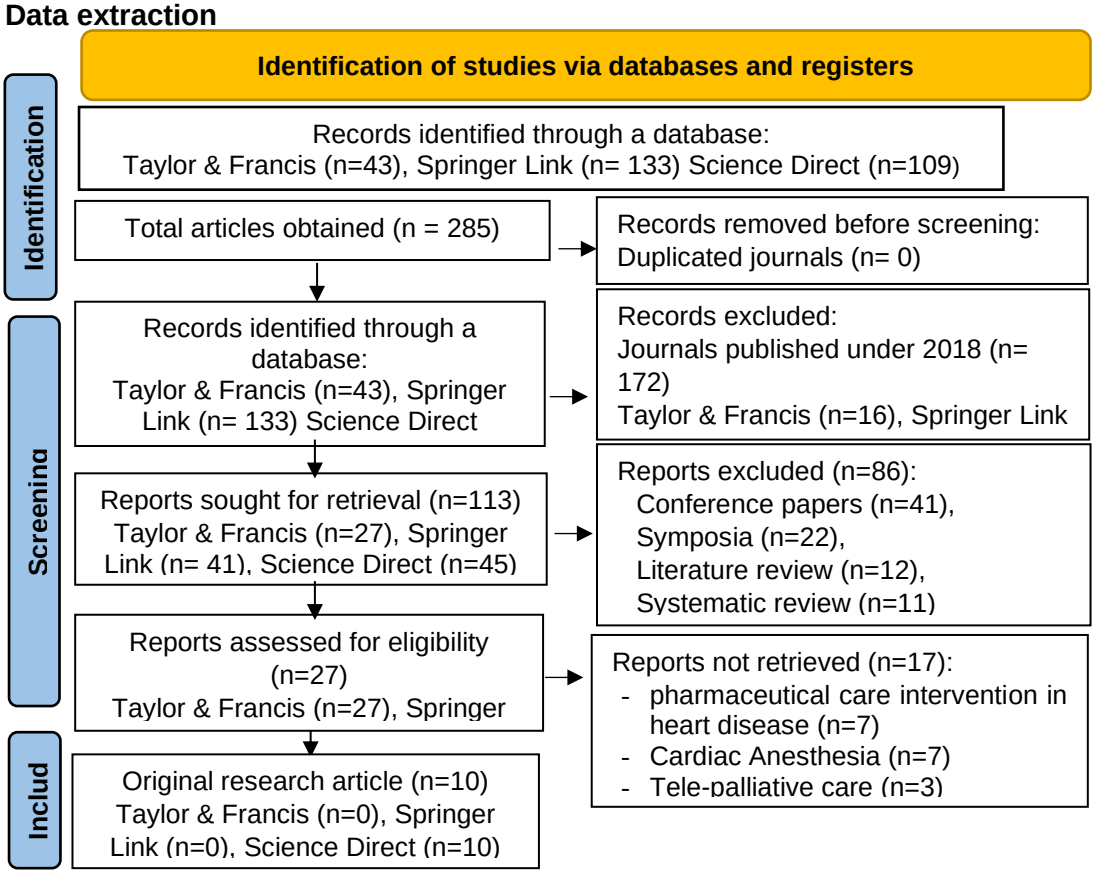

Figure 1. PRISMA 2020 flowchart steps in selecting the articles

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Using the predefined keywords mentioned in the search method, the researchers retrieved a total of 285 articles during the screening process from the selected databases (Taylor & Francis, Springer Link, and Science Direct). Following an eligibility screening conducted by the researchers—which involved the removal of duplicate records (no article excluded), exclusion of articles published before 2018 (172 excluded), non-cohort observational studies (86 excluded), and studies with irrelevant interventions such as anesthesia for cardiac surgery and tele-palliative care for heart disease (17 excluded)—a total of 10 articles were deemed eligible for data extraction, all of which were sourced from the ScienceDirect database (figure 1).

Quality assessment of the selected article

The research quality assessment in this study used the Joanna Briggs Institute (JBI), a critical appraisal tool designed to critique and determine the extent to which research has addressed potential biases in its design, implementation, and analysis. Table 1 presents the results of the quality assessment. User feedback is always appreciated. The assessment tool can be accessed via https://jbi.global/sites/default/files/2019-05/JBI_Critical_Appraisal Checklist_for_Cohort_Studies2017_0.pdf.

Risk of bias

Selected manuscripts are evaluated for quality. The research team used scores to assess the criteria for each relevant article assessment component that was met to be answered with “yes” (Y), “no” (N), “unclear” (UC), or “not applicable” (N/A). researchers team evaluated and compared the quality of the articles using the JBI Quality Assessment Checklist. If there are differences of opinion, researchers will evaluate them jointly to reach a consensus [9]. The JBI assessment tool is a score obtained by dividing the number of items on the critical assessment tool that answered "yes" by the number of items on the tool x 100. The category results include strong (score > 80%), good (70–79%), fair (50–69%) and poor (<50%). The research team will exclude articles that receive a score below 60% [10] so that 10 articles fall within the criteria (Table 1).

Data analysis

Researchers illustrated the article selection process in Figure 1 using the PRISMA Flow Chart and followed the SWiM guidelines for data synthesis[6] Data from 10 selected articles were analyzed with deductive content analysis, summarized in Appendix Table 2. Further analysis focused on three aspects: (1) accuracy of the HEART score, assessed with Cohen’s Kappa, PABAK, and AUC; (2) efficacy in detecting cardiac emergencies, evaluated through sensitivity, specificity, PPV, and NPV; and (3) reassessment as a post-cardiac emergency tool, analyzed by duration (minutes) and prediction of MACE. The results are presented in Appendix Table 3.

Ethical considerations

This research has no ethical issues.

RESULTS

Most HEART score studies came from developed countries, predominantly the United States (60%). Calibration of supporting tools was reported in 90% of studies, and 70% applied the HEART score to adults (≥18 years). The review highlights three aspects: accuracy, efficacy, and reassessment of the HEART score (Tables 2–3).

Accuracy of HEART Score as Detection of Cardiac Emergencies

It is known that 80% of articles explain the accuracy of the HEART score in detecting cardiac emergencies in patients. The accuracy of the HEART score was tested, including the Cohen's K test on 30% of articles showing results ranging from 0.77 to 1.00, meaning the strong to very strong category; the PABAK test on 20% of articles showed results ranging from 0.47 to 0.93; , meaning the moderate to very good category; the AUC test on 30% of articles showed results in the range. The research quality assessment in this

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Table 1. JBI Critical Appraisal of Included Studies by Research Design.

Design/ Citation	Critical appraisal											Total score	Quality score
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11		
Cohort Studies													
Reyes, J et al., 2023 [3]	Y	Y	Y	Y	N	Y	Y	Y	UC	Y	N	72.7%	good
Barron, R et al., 2023 [11]	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	72.7%	good
Akman,G et al., 2023 [12]	Y	Y	UC	Y	Y	Y	Y	Y	Y	UC	N	72.7%	good
Khand et al., 2023 [13]	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	81.8%	strong
Check et al., 2022 [14]	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	72.7%	good
Aarts et al., 2021 [15]	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	81.8%	strong
Faramand et al., 2021 [16]	N	N	Y	Y	N	Y	Y	Y	Y	UC	Y	63.6%	fair
Soares et al., 2021 [17]	Y	Y	Y	Y	N	Y	Y	Y	Y	UC	Y	81.8%	strong
Mark et al.,2020 [18]	Y	Y	N	Y	N	Y	Y	Y	N	N	Y	63.6%	fair
van Dongen et al., 2020 [19]	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	81.8%	strong

Note. N = No; N/A = Not Applicable; UC = Unclear; Y = Yes.

Table 2. Summary of HEART score as an assessment of cardiac emergencies

No	Author (s)	Method	Age	Country	Program contents	Result
1	Reyes et al., (2023) [3]	Research design: Cohort Studies Sample: 944 patients, accidental sampling	≥ 18 years old	United States of America	HEART score value in three-hour troponin I examination of patients with potential acute coronary syndrome.	The HEART score can detect cardiac emergencies such as acute coronary syndrome (ACS). It can detect major adverse cardiac events (MACE) after re-detection after 3 hours of the event from a positive troponin I (ΔTnI) test result.
2	Barron, R et al., 2023 [11]	Research design: Cohort studies Sample: 336 clinician-patient pairs Convenience sampling	≥ 18 years old	United States of America	patient and clinician gender's influence on HEART scores in Emergency Department.	The influence of patient and doctor gender on HEART score detection is significant. Male doctors give higher HEART scores to male patients than female patients, while female doctors do not.
3	Akman,G et al., 2023 [12]	Research design: Cohort studies Sample: 514 patients, Purposive sampling	≥ 18 years old	Turkey	Evaluation between HEART and T-MACS scores to predict major cardiac events (MACE) in patients who come to the emergency department with chest pain.	The detection ability between the HEART and the T-MACS scores is good, but the T-MACS score is better. On the other hand, the HEART score has the advantage of being able to detect cardiac emergencies in patients who are younger than the average respondent.

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No	Author (s)	Method	Age	Country	Program contents	Result
4	Khand et al., 2023 [13]	Research design: Cohort studies Sample: 3,752 patients, Retrospective sampling	≥ 18 years old	United Kingdom	By recalibrating the troponin examination tool, look at the ability of History, Electrocardiogram, Age, Risk factors, and Troponin (HEART) score in patients with possible acute cardiac syndrome (ACS).	Recalibration is highly recommended and feasible for patients with a score of 3 so that there is no rush in deciding to discharge the patient early by looking at the results of a single troponin re-examination (hs-cTnT) and minimizing the incidence of major adverse cardiac events (MACE).
5	Check et al., 2022 [14]	Research design: Cohort Studies Sample: 38,277 patients, Retrospective sampling	≥ 18 years old	United States of America	To determine whether gender or race independently predicts HEART and European Society of Cardiology (ESC) scores in patients presenting with chest pain.	HEART score can detect cardiac emergencies in patients younger than the average respondent (51 years), and chest pain is not a benchmark for someone experiencing a cardiac emergency.
6	Aarts et al., 2021 [15]	Research design: Cohort Studies Sample: 668 patients, Consecutive sampling	-	Netherlands	To know the European Society of Cardiology (ESC) Algorithm 0 h/1h and HEART score in detecting cardiac emergencies in the Emergency department.	The HEART score provides essential diagnostic information for patients, and combining the ESC 0 hour/1 hour algorithm with the HEART score shortens the length of stay in the Emergency Department.
7	Faramand et al., 2021 [16]	Research design: Cohort Studies Sample: 156 patients, Consecutive sampling	-	United States of America	Look at the performance of the HEART score in detecting patient groups with cocaine-associated chest pain (CACP) and non-cocaine-associated chest pain (Non-CACP) groups.	Patients with CACP have lower HEART scores compared to non-CACP patients. HEART score can identify major adverse cardiac events (MACE) in non-CACP patients.
8	Soares et al., 2021 [17]	Research design: Cohort Studies Sample: 336 patients, Snowball sampling	≥ 18 years old	United States of America	Identify the HEART score in predicting 30-day major adverse cardiac events (MACE).	The existence of the HEART score component makes doctors more careful and recommends disposition in the Emergency Department.
9	Mark et al.,2020 [18]	Research design: Cohort Studies Sample: 149,441 patients Consecutive sampling	-	United States of America	Identified the risk of major adverse cardiac events (MACE) at 60 days in patients with a history of high HEART scores.	HEART score can detect the risk of major adverse cardiac events (MACE) by looking at the results of repeat examination of high troponin and electrocardiogram with ischemia.
10	van Dongen et al., 2020 [19]	Research design: Cohort Studies, Sample: 689 patients,Stratified sampling	≥ 18 years	Netherlands	Comparison of classification of pre-hospital troponin test values vs in-hospital troponin values.	Pre-hospital HEART score assessment with point-of-care troponin can be used to assess cardiac emergencies.

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Table 3. Accuracy, efficacy and reassessment of the HEART Score

Inspection	Reyes, J et al., 2023 [3]	Barron, R et al., 2023 [11]		Akman,G et al., 2023 [12]	Khand et al., 2023 [13]	Check et al., 2022 [14]	Aarts et al., 2021 [15]	Faramand et al., 2021 [16]	Soares et al., 2021 [17]	Mark et al.,2020 [18]	van Dongen et al., 2020 [19]
Accuracy											
K Cohen	0,855 to 1,000	-		-	-	-	-	-	-	0.77 to 0.96	0.956
PABAK	-	Woman 0.72	Man 0.47	-	-	-	-	-	0,93	-	-
AUC	-	-		0.831	-	-	-	0.84	-	-	0.756
p-value	-	-		-	-	0.001	-	0.022	-	-	-
Efficacy											
Sensitivity	98.5%	-		86.59%	96.1%	-	100%	86.6%	100%	-	-
Specificity	47.9%	-		71.3%	53.1%	-	89.5%	71.3%	27.8%	-	-
PPV	14.1%	-		36.4%	16.6%	-	27.3%	-	11.5%	-	-
NPV	99.7%	-		96.6%	99.3%	-	100%	-	96.4%	-	-
Reassessment											
Duration (minute)	180	-		-	-	-	226	-	-	-	-
p-value	< 0.001	-		< 0.001	-	<0.001	-	0.016	-	-	-
prediction of MACE	√	-		√	√	√	-	√	√	√	-

study used the Joanna Briggs Institute (JBI), a critical appraisal tool designed to critique and determine the extent to which research has addressed potential biases in its design, implementation, and analysis.ge of 0.756 to 0.84, meaning the good to very good category; and a p-value < 0.05 in 20% of articles shows that the HEART score is proven to be accurate.

HEART Score Efficacy to Detect Cardiac Emergencies

The efficacy of the HEART score in detecting cardiac emergencies was reported in 60% of the reviewed articles using sensitivity, specificity, PPV, and NPV measures. Half of the studies showed sensitivity values ranging from 86.6% to 100%, indicating a high ability to identify patients with cardiac emergencies correctly. Specificity values in 60% of articles ranged from 27.8% to 89.7%, where higher values reflect better identification of patients without emergencies.

Reassessment HEART score as a Post-Cardiac Emergency

PPV values reported in 50% of articles ranged from 11.5% to 36.4%, suggesting limited ability to confirm cardiac emergencies without the HEART score. Conversely, NPV values ranged from 96.6% to 100%, indicating a strong capacity to distinguish patients who do and do not experience cardiac emergencies.

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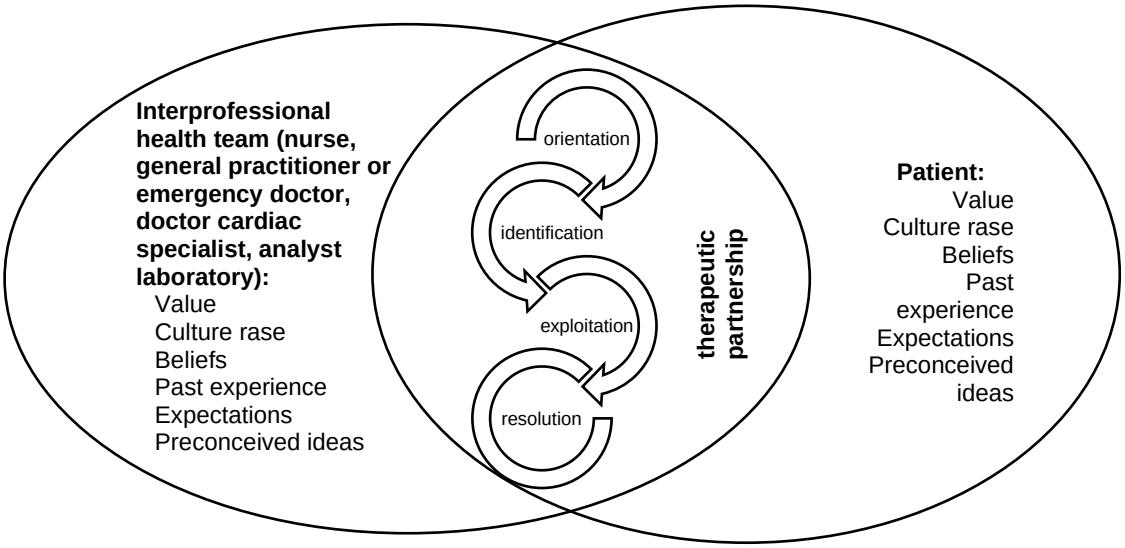

Figure 2: The concept of interpersonal relation towards HEART scores between health professionals and cardiac emergency patients

Table 4. Advantages and disadvantages of HEART score

Advantages	Disadvantages
Can be used in younger patients; There are troponin and electrocardiogram examinations to strengthen the data that the patient is experiencing a cardiac emergency; The total score can categorize a patient's condition into low risk, medium risk and high risk categories; Repetition of the HEART score is an evaluation after a cardiac emergency; HEART score re-checking is carried out 3 hours after the patient receives treatment; HEART score is able to detect complications from major adverse cardiac events (MACE); It can not only be used in hospitals but in health care facilities that already have troponin and electrocardiogram examination equipment	The HEART score still cannot match the T-MACS and ESC cardiac emergency examinations; The HEART score examination is unable to detect cocaine-associated chest pain (CACP) with ischemic complications and aortic dissection.

The HEART score requires re-examination to reassess patients after cardiac emergencies, as shown by $p < 0.05$ in 40% of studies. About 70% of articles reported that patients remained at high risk of post-emergency complications, particularly MACE, with re-examination times ranging from 180 to 226 minutes after the initial assessment. The effectiveness of the HEART score from initial evaluation to post-emergency care depends on strong teamwork among healthcare professionals and patients (Figure 2). Its strengths and limitations are further summarized in Table 4.

DISCUSSION

Cardiac emergency mortality is still high and must be addressed quickly, precisely, and accurately [2]. The HEART score is a tool that is considered capable of solving related problems [16]. The Mnenominc HEART score was developed in 2018 to calculate the total score to determine categories, including low risk or a score of 0-3; moderate risk or 4-6; and high risk or 7-10, based on the abbreviation (1) history of current disease, (2) electrocardiogram, (3) age, (4) risk factors (diabetes, smoking, hypercholesterolemia, family history of disease with coronary arteries, obesity, history of revascularization coronary heart disease, myocardial infarction, stroke or peripheral arterial disease), and (5) troponin test [3], [16]. Each component of the risk score is given a score of 0 to 2. The resulting component scores include "0" or "non-specific" meaning the absence of heart problems; “1” or “possible” means there is a history of cardiovascular disorders but

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not typical of acute coronary syndrome (ACS); and “2” or “very suspicious” means it has a history [12], [15]. Overcoming this emergency problem certainly requires interprofessional cooperation, developed by Hilde Peplau, which is known as the theory of interprofessional relations.

This theory explains that today's world of health care has advanced technology and complex medical interventions taking center stage; without realizing it, it is very easy to ignore the basic elements that have an impact on patients namely the interprofessional-patient relationship [20]. This assessment can be assessed by doctors and nurses in the emergency unit. The development of science and technology in using the HEART score not only highlights the importance of doctors providing treatment; there is a role for nurses in assessing conditions and protecting patients by collaborating with doctors to discuss the best treatment for patients, educators, and providers of nursing care 24 hours non-stop; and the role of the phlebotomist in reporting troponin examination results increased more than the [19]. The ongoing relationship between interprofessional relations and patients creates interaction through stages including (1) orientation, (2) identification, (3) exploitation, and (4) resolution [21]. The orientation stage is the initial stage where interprofessional relations - patients do not know each other or are strangers and ask about the health problems faced by the patient [20]. The identification, selective, and focused stage looks at the problems faced. In the exploitation stage, patients benefit from appropriate and fast treatment. The resolution stage is the termination of the interprofessional relationship - the patient's health problem is resolved, and the patient is satisfied with the treatment provided. All of these stages constitute a therapeutic relationship, outcome from theory, and she reminds us of the importance of adapting treatment based on the needs and preferences of each patient [20], [21].

Accuracy of HEART Score as Detection of Cardiac Emergencies

Determining the accuracy of a screening tool certainly requires interprofessional collaboration between nurses and doctors, which is built due to similarities based on values, cultural feelings, beliefs, past experiences, expectations, and prejudices that the patient will face [20] by carrying out enumerator testing which, among others, Cohen's K, Prevalence-Adjusted Bias-Adjusted Kappa (PABAK), and Area Under Curve (AUC) [3], [11], [12], [13], [14], [15], [16], [17], [18], [19]. Testing accuracy using Cohen's Kappa test is a classic statistical method often used to test reliability or agreement between raters [22]. Categories of test results using Cohen's Kappa are categorized based on the suitability level [22]. The K value includes <0.2, meaning there is no suitability; 0.21-0.40 is the minimum suitability level category; 0.41-0.60 is the weak suitability level category; 0.61-0.79 is the moderate level of agreement category; 0.80-0.90 is the strong level of agreement category; and > 0.90 is the almost perfect level of agreement category[22].

Assesses the accuracy of screening tools on the HEART score using Prevalence-Adjusted Bias-Adjusted Kappa (PABAK). This test is used when an event occurs that has prevalence, bias, and is a clinical situation [22] and is a reflection of an ideal situation that occurs in the "real" world with inter-rater reliability in reporting agreement [22]. The assessment categories for using Prevalence-Adjusted Bias-Adjusted Kappa (PABAK) include < 0.2, meaning the strength of agreement is low; 0.21-0.40 indicates a fair strength of agreement; 0.41-0.60, indicating moderate strength of agreement; 0.61-0.80 indicates good strength of agreement, and 0.81-1.00 indicates excellent strength of agreement [22].

Accuracy testing by interpersonal relations with Area under the curve (AUC) is a short metric to summarize the accuracy of diagnostic studies [23]. This scoring function can measure disease differentiation [23] and minimize errors when interpreting diagnostics. The area under the curve (AUC) considers the 95% confidence interval and width in understanding diagnostic performance with interpretations including 0.5 ≤ AUC ≤ 0.6 means failure, 0.6 ≤ AUC ≤ 0.7 means poor, 0.7 ≤ AUC ≤ 0.8 means fair, 0.8 ≤ AUC ≤

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0.9 means good, and 0.9 ≤ AUC means very good. An AUC value above 0.80 is considered clinically useful, meaning that the accuracy of the HEART score is good [23].

The HEART score is suitable for use in emergency units in Indonesia. The probability value (p-value) used by interpersonal relations to test hypotheses aims to help determine whether the null hypothesis should be rejected [22]. Many researchers consider the p-value an essential summary of statistical analysis of research data, but it must be regarded that the p-value is often misused and misunderstood [14]. The p-value used depends on the research design and sample size. The larger the sample, the smaller the p-value (< 0.05), the higher the significance, and a p-value > 0.05 is considered an "unimportant" or "not significant" result [16]. This means that the HEART score is suitable for use.

HEART Score Efficacy to Detect Cardiac Emergencies

The efficacy of the HEART score to detect cardiac emergencies provides a sense of calm to patients, considering the feelings of anxiety and fear when they are in an emergency in health services. This is, of course, influenced by values, culture, beliefs, past experiences, hopes, and prejudices [20]. In this phase, effective communication between interpersonal relations and patients. The ability to detect the HEART score provides relief by assessing sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). Sensitivity is the result of an assessment and the ability of a screening tool to provide certainty in correctly identifying all people suffering from the disease and all people with conditions that fall into the categories in the test. The higher percentage of sensitivity means it is adequate and cannot be denied[12] .

Specificity results from an assessment to sort patients who are sick and who are not ill. A high specificity percentage means those who used the HEART score were not superior to other emergency detection tools, namely the European Society of Cardiology (ESC) [15]. On the other hand, a low percentage of specificity [24] means the ability of the detection tool can identify patients experiencing cardiac emergencies [13].

Positive predictive value (PPV) is the ability to assess the performance of a screening tool to determine whether a person has a disease [13]. The positive predictive value (PPV) percentage is high, indicating that the patient is experiencing a cardiac emergency and does not require further examination because the screening component has directed the patient to a more specific course. The HEART score has directed patients to undergo an electrocardiogram and troponin examination [24].

Negative predictive value (NPV) is the ability of a screening tool to determine whether a person is truly not sick and not experiencing a cardiac emergency. A high percentage of negative predictive value (NPV) indicates that the detection tool is in good condition [24], and the HEART score proves this.

Reassessment of the HEART score

Repeated examinations after the patient experiences a cardiac emergency are very necessary and can be used as a comparison. At this stage, the patient's trust in interpersonal relationships increases after going through the orientation, identification, and exploitation stages [21]. Repeated HEART score assessment becomes the resolution stage, namely troponin examination with the hope that after treatment, the concentration test will be less than 0.02 ng/mL [19] and electrocardiogram examination with expected results [13]. Next, the total points are calculated again. The re-check was carried out 3 hours after treatment and under intensive observation, not at the beginning of the HEART score [21]. Re-examination aims to minimize the risk of increased heart muscle damage and prevent major adverse cardiac events (MACE) [16]. This series forms a therapeutic partnership [21].

The limitation of this study lies in its design as an integrated literature review with only a few articles meeting the inclusion criteria. However, it provides valuable insights into the credibility of the HEART score in assessing cardiac emergency patients. Future

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research should explore interprofessional collaboration strategies in applying the HEART score within healthcare services.

CONCLUSIONS

The HEART score has been proven accurate for detecting cardiac emergencies (*p-value* < 0.05), effective in differentiating between patients who do and do not experience such emergencies, and useful as a tool to reassess patients' conditions after a cardiac event. This detection tool has demonstrated credibility among inter-professional teams and patients in managing cardiac emergencies. It also serves as a reference in the development of interpersonal relationship theories aimed at building therapeutic partnerships to reduce the incidence of major adverse cardiac events (MACE) and mortality. Therefore, the use of the HEART score is recommended in healthcare settings where cardiac emergencies are suspected. HEART score is not determined directly. So, training, direction, and agreement with the inter-professional team are needed for implementation

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