

ORIGINAL ARTICLE

Presence of Pathological Arrhythmia in Patients Admitted to the Emergency Room for Cardiac Arrhythmia

UMER JALEEL RANA¹, LIAQUAT ALI², RIFFAT SIDDIQUI³, HINA AZEEZ⁴, SAAD AHMAD⁵, AHTISHAM UL HASSAN⁶¹Medical Officer, PIMS²Assistant Professor Cardiology/Medicine, Pims Hospital³Women Medical Officer, DHQ Hospital Sargodha⁴Senior Registrar, Medicine, Federal Government Polyclinic (PGMI), Islamabad⁵Medical Officer, PIMS⁶Medical Officer, PIMS, IslamabadCorrespondence to: Umer Jaleel Rana, Email: umerjaleel26@gmail.com

ABSTRACT

Aim: The presence of a patient with indications brought on by cardiac arrhythmia is a regular condition that brings them to the emergency room. Nonetheless, up to this point, the incidence of abnormal heart rhythm among children who have been triaged for cardiac arrhythmia in our emergency department is unclear.

Methods : The design of this study was prospective observational study design. This study was conducted in Pakistan Institute of Medical Sciences and the duration of this study was from January 2021 to April 2021. 345 patients in the emergency department (ED) or after admission, a workup consisting of echocardiography was conducted at discretion of treating physician. The examinations remained carried out by cardiology residents or associates who had previous experience with echocardiography. To use the individuals' initial electrocardiogram (ECG) following admission, patients were categorized as either having a "pathological heart rhythm" or having a "norm recurrent sinus rhythm." This was done so that additional investigation could be performed. Individuals whose heart rates fall inside the current range often do not exhibit any symptomatology of bradycardia or tachycardia that need medical care, which led to the definition of norm frequent SR as SR occurring at a heart rate of between 50 and 100 beats per minute. Every single heart rhythm that was dissimilar from the form of frequent SR was considered to be a pathological heart rhythm

Results: Individuals who had been triaged and referred to multidisciplinary emergency department of Pakistan Institute Of Medical Sciences (PIMS), Islamabad for cardiac arrhythmia treatment during the previous year remained involved in the current retrospective cohort research. After that, the therapeutic approach, admission frequency, and diagnoses at discharge were examined, as well as the heart rhythm as shown on the 12-lead ECG. Out of a maximum of 37,850 individuals, there were a maximum of 552 who were referred to a specialist for cardiac arrhythmia. On the first ECG, 43.6% of those individuals had a pathological heart rhythm, with 65.8% of them having atrial fibrillation, 17.6% had atrial flutter, and 18.6% having other heart rhythm abnormalities. Approximately 83% of patients walked in with emergency severity index III problems, which means that numerous resources are required but vitals are not urgent. Patients with a pathological electrocardiogram have always been taken to the hospital at a rate of 62 percent, while only 64 percent of patients with a sinus rhythm had been admitted. Additionally, 35.8 percent of the patients with a pathological electrocardiogram undertook invasive investigations, compared to 15.7 percent of the patients in the sinus rhythm cohort. The diagnosis of cardiac arrhythmia had already been present in 46.5% of patients due to their past interactions with medical professionals.

Practical Implication: This study was to figure out the patients who had a pathological heart rhythm, as well as the actual preponderance of this condition among these patient populations, and to assess additional medical treatment, successive hospitalization, and the primary diagnostic test made upon discharge

Conclusion: It was determined that cardiac arrhythmia was present in a total of 2.9% of the individuals who presented themselves to our multidisciplinary emergency department. The hospital admission rate was fairly high, coming up at 48.6%, although the patients who presented themselves to the emergency room in our sample were seldom in a life-threatening state. Because such a significant number of people in our sample had a previous history of cardiac arrhythmia, improved outpatient care among those individuals is required in order to cut down on trips to the emergency department also save costs.

Keywords: Cardiac Arrhythmia, Pakistan Institute Of Medical Sciences, Emergency Room.

INTRODUCTION

The technique of triage is an essential aspect of the administration of contemporary emergency rooms. Because of partial number of resources also variable number of new admissions, it is not possible to treat every patient promptly or immediately ⁽¹⁾. Because of this, it is imperative that patients who have life-threatening diseases or injuries be accurately recognized as soon as they arrive at the hospital ⁽²⁾. In order to determine how urgently a patient, need medical attention, many institutions make use of structured triage systems ⁽³⁾. One example of this is the emergency urgency index. Individuals can remain assigned to certain triage codes in accordance with problems they report to emergency nurse upon arrival, which would further enhance the procedures that take place in the ED ⁽⁴⁾. "Cardiac arrhythmia" (CA), which is one of several triage codes, is a frequent reason for emergency evaluation, especially in the elderly ⁽⁵⁾.

In Asia, the increased frequency of any irregular cardiac rhythm in the general population was believed to be 3.36% in the year 2020 ⁽⁶⁾. This incidence rose with age, with over 6% of afflicted persons aged 64 years or older. Somewhere along the route in China, rate of hospitalization owing to cardiac arrhythmia

has been more than 520 out of 101,500 residents ^[(7-11)]. Nevertheless, here remains very slight info available via individual population that is grouped together in the ED under the triage code CA ^[(12)]. To determine which patients, need immediate medical attention and to estimate the amount of work that will be required in the emergency department, it is important to conduct a comprehensive analysis of the patients in question ^[(13-16)]. This information is essential not only for enhancing procedures and the excellence of medical treatment in ED but likewise for determining admission rates also the amount of space occupied by patients in hospitals ^[(17-20)].

Significance of the study: The purpose of this study was to figure out the percentage of patients who had a pathological heart rhythm, as well as the actual preponderance of this condition among these patient populations, and to assess additional medical treatment, successive hospitalization, and the primary diagnostic test made upon discharge.

METHODOLOGY

Only those individuals who were triaged to CA at the multidisciplinary Emergency Department of Pakistan Institute Of

Medical Sciences (PIMS), Islamabad (Pakistan), were eligible for inclusion in this retrospective analysis, which took place from 1st January 2021 to 30th April 2021. Patients who were inadvertently put into the admission system, individuals who were immediately moved to ward without therapy in ED, also individuals who left hospital on its own responsibilities prior to receiving therapy were not included in our analysis. Only the first presentation of patients who made many trips to the emergency department was taken into consideration for analysis. (Fig. 1). The research remained carried out in agreement through permission from Ethics Committee SZABMU, Pakistan Institute Of Medical Sciences (PIMS), Islamabad, Pakistan. Individuals were regularly classified by experienced nurses based on the nature and degree of their illnesses as soon as they were brought into the emergency department after they had presented themselves there. Individuals who came into the emergency room and complained of palpitations, tachycardia, or bradycardia remained given "cardiac arrhythmia" diagnosis. In addition, the ESI code was utilized in order to determine the level of urgency associated with the provision of medical care (ESI (1) high-danger condition or physician confused, lethargic, disoriented, or in serious pain; ESI (3) numerous resources remain necessary without critical vitals; ESI (4) one resource remains desirable; ESI (5) no reserve remains desired). Following this first round of triage, individuals remained evaluated in accordance with the protocol established by attending physician (for example, anamnesis, physical examination, blood tests, and EKG).

On a maximum of 345 individuals, either in the emergency department (ED) or after admission, a workup consisting of echocardiography was conducted at discretion of treating physician. The examinations remained carried out by cardiology residents or associates who had previous experience with echocardiography. To use the individuals' initial electrocardiogram (ECG) following admission, patients were categorized as either having a "pathological heart rhythm" or having a "norm recurrent sinus rhythm." This was done so that additional investigation could be performed. Individuals whose heart rates fall inside the current range often do not exhibit any symptomatology of bradycardia or tachycardia that need medical care, which led to the definition of norm frequent SR as SR occurring at a heart rate of between 50 and 100 beats per minute. Every single heart rhythm that was dissimilar from the form of frequent SR was considered to be a pathological heart rhythm.

Individuals who show symptoms of severe ischemia, such as ST-segment raise also new left bundle branch block, have been directly transported to catheter lab also had been ruled out of the study. The ICD-10 categorization was used to assess the characteristics of the sample, manner of manifestation, treatment, admission rate, and discharge diagnosis. Researchers exclusively report discharge diagnostics of hospitalized patients in this investigation since ICD codes for outpatient clinics are economically meaningless in Pakistan and were not audited by health insurance, making them unreliable for analysis in our study.

In total, 35 individuals including in-care needs were moved to nearby hospitals. There is no information regarding the admitting hospital for 7 of the individuals. Seventeen have been referred to initial-tier hospitals since they did not require extremely dedicated technical apparatus or acute treatment. The remaining 14 individuals subsequently relocated to second-level institutions, primarily due to a lack of bed capacity. As a result, statistics on in-patient care or diagnoses at discharge solitary apply to individuals who remained referred to our facility. GraphPad Prism® software was used to conduct the descriptive statistics. The D'Agostino-Pearson omnibus test remained employed to assess data distribution ordinariness. The unpaired t-test remained utilized to test normality of data, and Mann-Whitney U test stood used to test non-normally disparate data sources. Fisher's exact test was employed to compare attribute values. The data is the average SD. P values less than 0.06 are measured regarded as important.

RESULTS

from 1st January 2021 to 30th April 2021, a total of 19,651 individuals visited Pakistan Institute Of Medical Sciences (PIMS), Islamabad, Pakistan's ED. The emergency nurse triaged 664 individuals to CA because they had signs of palpitations, bradycardia, or tachycardia. 116 people had to be eliminated for a variety of reasons, as illustrated in Fig. 2, leaving 576 individuals for investigation. On the first ECG, 59% of all patients classified as CA had normal frequent SR. Individuals having abnormal ECGs were more likely to have atrial fibrillation or atrial flutter (Fig. 2A). Table 1 shows the individuals' characteristics of the sample. Pathological ECG individuals remained considerably older and had more cardiovascular comorbidity than norm frequent SR participants. A similar number of individuals were transported to the ED by ambulance in both groups (39.7% in abnormal ECG set vs. 39.3% in the SR; $p=0.94$), although more individuals having CA (16.5%) than SR (3.9%) had contacted an outpatient physician prior entering the ED ($p<0.002$; Fig. 2B).

Individuals through SR remained much more frequently triaged through higher ESI scores promptly the following presentation in the ED, reflecting a lesser urgency of medical care (8.6% ESI 5 and 7 in abnormal ECG group vs. 18.5% in SR; $p<0.002$; Fig. 2C). Whenever questioned for key indication, both groups of individuals most widely mentioned palpitations and tachycardia, raising the possibility of a cardiac rhythm issue, prompting the triage code CA. Additionally, individuals having abnormal ECGs frequently reported dyspnea and physical weakness, whereas individuals having SR consistently encountered chest pain, pre-syncope/collapse, and gastrointestinal symptoms (Fig. 2D). The early medical therapy of individuals with abnormal ECGs typically included the exchange of electrolytes, such as magnesium or potassium, as well as the use of rate-controlling medications such as beta-blockers.

Individuals with abnormal ECG had a higher admission rate (62.7%) than individuals having SR (38.5%) or the overall rate of altogether ED individuals (49.1%). The number of people managed in intermediary or ICU (Fig. 2E), along with overall length of hospital stay, were not different across classes. Each of the individuals who were referred to CA perished. Ninety people were admitted to our hospital having abnormal ECGs and underwent invasive examinations. 46.3% of these individuals had coronary angiography performed, including 15.7% requiring coronary bypass surgery. Thirty-seven (46.3%) of the 85 patients who have undergone electrical cardioversion, and 27 (32.8%) had an electrophysiological assessment (Fig. 2F). Ablation was performed in this group primarily for atrial flutter (54.8%) or atrial fibrillation (12.6%, Fig. 2G). Invasive tests were performed on one-seventh of the SR individuals ($n=56$, 17.9%). The majority of those patients (87%) had confirmatory coronary angiography, and in roughly half of all those instances (43.7%), the PCI remained required. Furthermore, 15.8% of this cohort had an electrophysiological evaluation.

Table 1:

Features	Individuals having a pathological heart rhythm	Individuals having SR	P value
Coronary artery disease	5 (4.0)	23 (19.2)	$p=.003$
Cardiac arrhythmia	87 (69.6)	35 (29.2)	$p<.002$
Diseases of heart valves and pericardium	1 (0.8)	6 (5.0)	$p=.07$
Heart failure	6 (4.8)	8 (6.7)	$p=.58$
Chest pain	0 (0)	5 (4.2)	$p=.04$
Hypertension	1 (0.8)	5 (4.2)	$p=.12$
Cardiogenic shock	0 (0)	2 (1.7)	$p=.25$
The complication of an implantable device	3 (2.4)	2 (1.7)	$p>.98$

According to ICD10-codes, the most commonly diagnosed at discharge for in-hospital asymptomatic population ECG remained cardiac arrhythmia (68.7%), second through heart failure (5.9%), and diagnostic classified underneath subject cardiovascular disease (5.1%; Table 2). The vast popular of individuals through SR also have heart issues. According to their original indications, they have been mainly classified as having cardiac arrhythmia, but to a much lower percentage (27.3%) than those with an abnormal ECG. This category also included coronary artery disease (18.3%), heart failure (9.8%), viral disorders (6.7%), and endocrinologic illnesses (3.6%).

Table 2:

Overall	Individuals having a pathological heart rhythm	Individuals having SR	P value
Troponin > 0.03 ng/ml	47 (22.60)	42 (14.58)	p=.03
Tachycardia > 99 bpm	65.6	16.9	p< .002
ProBNP pg/ml	2792.0 + 2549.2	7960.3 + 9723.6	p=.38
CK > 169 U/l	50 (23.70)	55 (19.23)	p=.26
CK-MB > 23 U/l	21 (10.10)	18 (6.38)	p=.17

DISCUSSION

Researchers described only those individuals triaged to code CA in ED at Pakistan Institute Of Medical Sciences (PIMS), Islamabad, Pakistan, for 4-months in this study ^[(21)]. Participants have been divided into two classes based on rhythm identified in ECG at admission: normo frequent SR or pathological cardiac rhythm. Moreover, half of people who were referred to CA had SR. Remarkably, ICD codes at discharge revealed that 72.8% of SR individuals transferred to our hospital had cardiac abnormalities, and 15.8% had an electrophysiological evaluation throughout their hospital stay ^[(22-24)]. As the result, the prevalence of a problematic cardiac rhythm may be overestimated in our population. As the result, patients suspected of CA although through norm frequent SR in ED must remain advised to undergo an outpatient cardiology follow-up with extended ECG monitoring ^[(25-27)]. The finding that the considerable number of people in SR set had previously experienced the stroke highlights significance of the thorough work-up to diagnose paroxysmal atrial fibrillation. CA of any type was identified in almost half of the individuals prior to presentation to the ED ^[(29)].

Possibly new user-owned gadgets, including such smartwatches, can help with this process. Individuals in the problematic ECG group had considerably higher rates of hypertension, diabetes, also hypercholesterolemia than those in normal SR set. Diabetes, hypertension, and cardiovascular disease were discovered as danger features for occurrence of atrial fibrillation in the Framingham Heart Studies ^[(30-34)]. In our dataset, individuals with abnormal ECG had a higher prevalence of confirmed CAD and then were considerably more likely to have hypercholesterolemia, the recognized known risk for CAD. The current highlights necessity of appropriate cardiovascular risk variable management in primary care to avoid growth of AF in altogether ages also, as a result, minimize ED visits due to AF ^[(35)]. Only rigorous outpatient care, however, may minimize number of emergency visits also hospitalizations for CA individuals. This way, resources may be conserved and expenditures can be lowered ^[(36)]. An experienced emergency nurse assigned triage codes to all individuals upon arrival according to the signs they presented. Notwithstanding the nurses' skill, this triage technique is approaching its inherent limitations since the indications of cardiac arrhythmia differ from person to person and overlap with other conditions ^[(37)].

The ORBIT-AF study, the multicenter registry of 11,139 outpatients experiencing AF, found the considerable variance in effects. Male AF individuals experience fewer palpitations, dyspnea, and chest pain than female ones. Furthermore, 43.7% of

males and 32.4% of women are asymptomatic ^[(38)]. Individuals whom report signs other than tremors, bradycardia, or tachycardia may remain assigned to a separate triage code using this technique ^[(39)]. Individuals with normal SR, on the other hand, described conventional signs of cardiac arrhythmias, such as palpitations, to the same amount as individuals having disordered heart rhythms in our study. In future research, researchers hope to see if a triage system based on the individuals' concerns influences the duration of stay in ED and rate of hospitalization. This research has a few drawbacks because it is a retrospective analysis ^[(40)]. Because of the authors of the study design, those individuals triaged to any other code besides CA were omitted from the analyses. Furthermore, owing to administrative constraints, information from individuals who moved to additional institutions weren't able to be gathered and examined. Outpatient ICD codes were also excluded from this investigation. Because generally healthier when younger individuals remain cleared from emergency room or moved to teach hospitals, percentage of people having meaningful illnesses in our assessment may fluctuate ^[(41)]. ICD codes have been utilized to examine the diagnoses of hospital admissions at discharge. Although they are universally recognized, have generic relevance, and are easily transferrable, catchall words linked to particular ICD codes suggest imprecisions ^[(42-45)].

CONCLUSION

In the conclusion of this study half of the individuals admitted to the ED that under code CA had SR on their ECG. AF was the most common arrhythmia. The hospital admission rate remained at 48.6%, however, individuals in our sample who went to the ED were seldom in serious condition. At the time of release, 80% of individuals hospitalized in our hospital through SR received the cardiological analysis. Because the substantial proportion of our group had the diagnosis of cardiac arrhythmia, improved outpatient care for those individuals is required to prevent ED visits also save expenditures.

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