ANXIETY LEVEL IN PATIENTS WITH VITAL SIGNS MONITOR AT CARDIOVASCULAR CENTER, HANOI MEDICAL UNIVERSITY

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The Cardiovascular Center at Hanoi Medical University Hospital (HMUH) routinely employs vital signs monitoring systems for patient in severe conditions, post-intervention, and post-cardiothoracic surgery. However, confining patients to their beds often causes significant inconvenience. Additionally, alarm signals from these systems, while crucial for safety, can often be clinically insignificant, leading to patient anxiety. This study aimed to assess the anxiety levels and experiences of patients connected to continuous monitoring systems. Conducted between February and May 2024 at the Cardiovascular Center (HMUH), the cross-sectional study involved 108 patients who had been continuously monitored for at least 24 hours. Data were collected on demographics, reasons for monitoring, alarm frequency, clinical significance of alarms, and anxiety levels using the Hospital Anxiety Depression Scale (HADS). Results indicated some notable results, continuous monitoring was primarily due to post-cardiovascular interventions (51.9%), a significant majority (96.8%) experienced more than 12 alarms per day, but only 38.7% of these alarms had clinical significance. Anxiety levels were notably high, with 33.4% having anxiety. Major factors contributing to patient discomfort included sound and limitations in personal care. Continuous monitoring significantly impacts patient anxiety and comfort, primarily due to excessive non-significant alarms and restricted mobility.

Keywords: Continuous monitoring system, anxiety, sound.

I. INTRODUCTION

At the Cardiovascular Center of Hanoi Medical University Hospital, continuous vital signs monitoring is crucial for patient care, especially for those in critical condition, post-intervention, or post-surgery. The system tracks electrocardiograms, oxygen saturation, blood pressure, invasive pressures, and respiratory rates, alerting staff to any abnormality. However, the need for patients to remain in bed due to sensor cables can cause discomfort. While alarms help ensure patient safety, many are non-critical and may result from interference or mismatched thresholds, causing unnecessary stress and disrupting rest.

Several studies worldwide have been conducted to evaluate anxiety in patients with cardiovascular conditions. Saikun Wang and colleagues published a study titled “Prevalence and Risk Factors of Depression and Anxiety Symptoms in Intensive Care Unit Patients with Cardiovascular Diseases: A Cross-Sectional Study,” which indicated that among ICU patients with cardiovascular diseases, 38.1% exhibited symptoms of anxiety, 28.7% showed symptoms of depression, and 19.3% experienced both anxiety and depression symptoms.[1] Minglan Wu and colleagues conducted a study titled “Prevalence and Risk Factors of Anxiety and

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Depression in Post-COVID-19 Cardiovascular Patients in China", revealing that the prevalence of anxiety and depression in cardiovascular patients was 11.72% and 9.20%, respectively.[2] In Vietnam, a study by Trinh Thi Thanh Tuyen at the Cardiovascular Center of Hanoi Medical University Hospital on the anxiety levels of patients' post-coronary artery intervention within 24 hours found that 37% of the patients experienced anxiety disorders.[3] While studies have investigated the impact of hospital environments, such as noise and lighting, on patient anxiety levels, no research has yet focused on the anxiety levels of patients connected to continuous vital signs monitoring systems, either globally or in Vietnam.[4,5] Therefore, we conducted a study to assess the anxiety rate in patients with continuous vital signs monitoring systems at the Cardiovascular Center of Hanoi Medical University Hospital and the factors related to the anxiety. This research aims to fill the existing gap by providing valuable insights into the psychological impact of continuous monitoring on cardiovascular patients.

II. MATERIALS AND METHODS

1. Subjects

Research was conducted in Cardiovascular Center, Hanoi Medical University Hospital from Febuary/2024 to May/2024.

Inclusion Criteria: Patients who had continuous vital sign monitoring for at least 24 hours.

Exclusion Criteria: Patients who had vital sign monitoring but experienced interruptions or discontinuations for any reason.

2. Methods

Research Design: a cross-sectional study.

Sampling: A convenience sample of 108 patients who met all inclusion criteria was interviewed and assessed.

Research variables: Patients were collected information on full name, age, gender, treatment room, reason for continuous monitoring, average number of alarms per day, significant meaning monitor signs, hospital anxiety levels assessed by Hospital Anxiety Depression Scale, and reasons patients complain about with monitor. The Hospital Anxiety and Depression Scale (HADS) classifies anxiety and depression into different levels based on the score a patient achieves on each subscale. For both the anxiety (HADS-A) and depression (HADS-D) subscales, a score between 0 - 7 is considered normal, indicating no significant presence of anxiety or depression. Scores from 8 - 10 fall into the borderline range, suggesting that the patient may be experiencing mild symptoms that warrant further observation or intervention. Finally, scores from 11 - 21 indicate clinically significant levels of anxiety or depression, where professional evaluation and treatment may be necessary. This classification allows healthcare providers to assess the emotional state of patients and guide appropriate psychological support or intervention, depending on the severity of the symptoms.

Monitoring procedure with Drager monitoring system (audible alarm signals is from 45 dB to 85dB informed by the manufacture instruction).

Prepare Equipment

- Ensure the monitoring system is powered on and operational.
- Gather necessary sensors: ECG electrodes, SpO_2 sensor, blood pressure cuff (NIBP), and temperature probe.

Patient Setup

- Explain the monitoring process to the patient.
- Position the patient comfortably for easy access to sensor attachment points.

Attach Sensors

- Apply the ECG electrodes on the patient's

chest (RA, LA, LL, for 3-lead configuration).

- SpO_2 Sensor: Attach the pulse oximeter sensor to the patient's finger, toe, or earlobe.

- Blood Pressure Cuff: Wrap the blood pressure cuff securely around the upper arm.

- Temperature Probe: Insert the temperature probe orally, rectally, or in the axillary area as needed.

Verify Connections

- Check that all cables are securely connected to the Dräger system.

- Ensure each sensor is providing accurate and stable readings on the monitor.

Set Alarm Limits

- Adjust alarm thresholds for heart rate, SpO_2, blood pressure, and other vital signs based on the patient's condition.

Start Monitoring

- Confirm real-time monitoring on the Dräger display.

- Ensure that the alarms are functioning and active and troubleshooting.

When the monitoring system issues alarm signals through sound and light warnings, doctors and nurses respond by assessing the patient's condition and performing emergency procedures, if necessary.

Data processing: Data from interview questionnaires and vital sign monitor alarm history were entered and processed using SPSS 22 software, presented as mean, standard deviation, frequency, and percentage. Comparisons between related factors were performed using the t-test for mean comparisons. Statistical significance was considered at $p < 0.05$.

3. Research Ethics

The research complies with ethical guidelines for medical research, and the collected data is ensured to be safe, secure, and confidential.

III. RESULTS

1. General characteristics

There are 108 patients observed in the research. The study encompassed a diverse group of patients with an average age of 63.6 years, accompanied by a standard deviation of 15.86 years. Gender distribution within the patient cohort revealed a slight predominance of male patients, accounting for 54% of the total, while female patients comprised 46%. The necessity for continuous monitoring was driven by several clinical reasons, segmented into three primary categories: post-cardiovascular intervention with 51.9% of patients, post-thoracic cardiac surgery representing 16.7%, and internal medicine follow-up comprising 31.4% of the patient cohort. Patients were accommodated in different types of treatment rooms based on their clinical needs. The distribution was as follow: Emergency and ICU with a portion as 38.9%, and most of the patients, 61.1%, was treated in regular rooms.

Table 1. General characteristics

General characteristics		%
Age (Mean ± SD)		63.6 ± 15.86
Gender	Men	54%
	Women	46%
Reasons of monitoring apply	Post-cardiovascular intervention	51.9%
	Post-thoracic cardiac surgery	16.7%
	Internal medicine follow-up	31.4%

General characteristics		%
Treament room	Emergency and ICU room	38.9%
	Regular room:	61.1%

2. Average monitor alarm times and its meaning

The analysis of monitoring frequency over a 24-hour period reveals the following insights: less than 12 times in 24 hours with a small fraction of patients, accounting for only 3.2%, were monitored less than 12 times within a 24-hour period, and with more than 12 times in 24 hours with a significant majority, 96.8% of the patients, were monitored more than 12 times within a 24-hour period. The findings revealed that 38.7% of monitored signs had significant clinical meaning, indicating the portion of readable alarm signs which provide useful information for the medical staff. Conversely, 61.3% of the monitored signs were deemed non-significant in clinical terms, which most of the signal did not bring beneficial data to the medical staff.

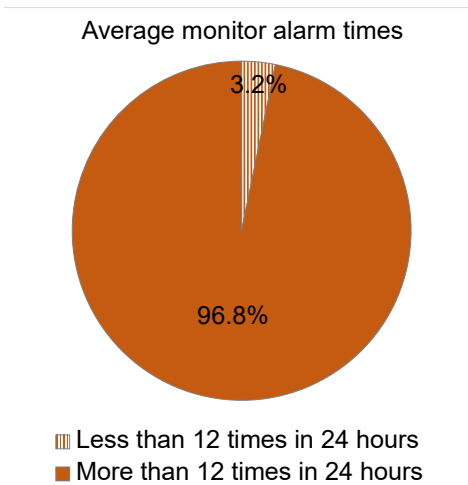

Chart 1. Average monitor alarm times

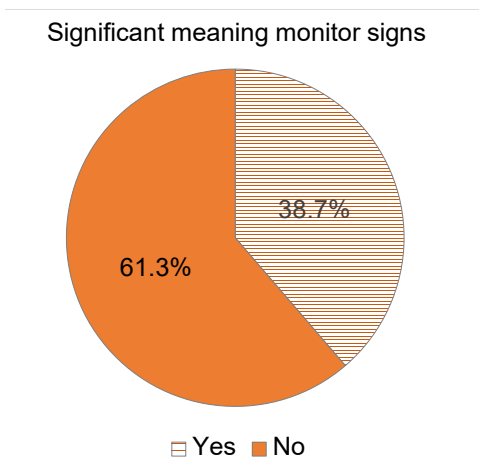

Chart 2. Significant meaning monitor signs

3. Hospital Anxiety Levels

The findings revealed that 29.6% of the patients exhibited normal anxiety levels, indicating no significant anxiety-related issues. A larger proportion, 37.0%, displayed borderline abnormal anxiety levels. Additionally, 33.4% of the patients experienced abnormal anxiety levels. Among the patients surveyed, 37 reported that limitations in personal care adversely impacted their experience. Additionally, environmental factors such as light and sound were significant, with 18 patients indicating that light disturbances affected their comfort and a notable 72 patients reporting sound as a major disruptive factor. Interactions with medical staff, specifically during routine checks, were identified by 2 patients as a source of disturbance. Lastly, 6 patients cited various other factors that contributed to their discomfort.

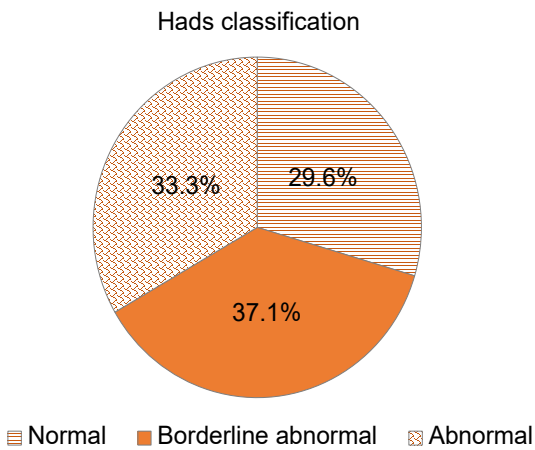

Chart 3. HADS Classification

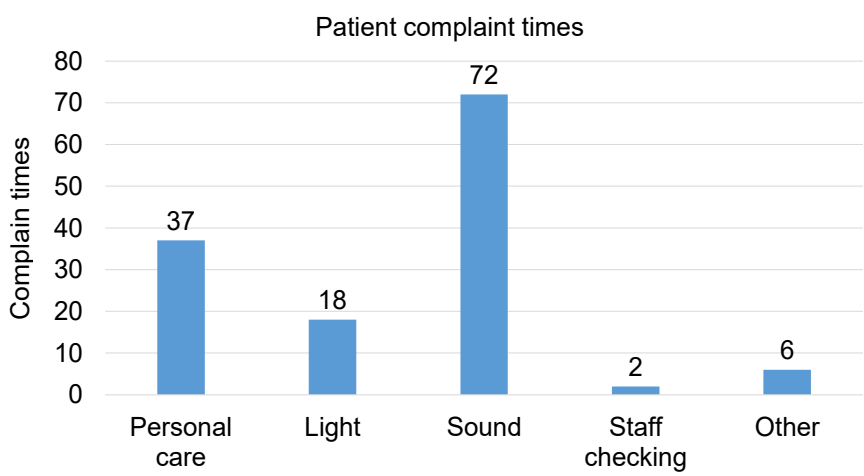

Chart 4. Patient Complaint Reasons

IV. DISCUSSION

In this study conducted at the Cardiovascular Center of Hanoi Medical University Hospital, the findings offer insights into patient characteristics and the clinical requirements necessitating continuous monitoring. The relatively high mean age of 63.6 years aligns with the increasing

prevalence of cardiovascular diseases in older populations. The standard deviation of 15.86 years in patient age underscores the diverse age profile within the study population. This heterogeneity is attributable to the comprehensive range of cardiovascular conditions treated at the Hanoi Medical University Cardiovascular Center, including congenital heart defects, heart rhythm disorders, and coronary artery disease. Consequently, the patient cohort encompassed individuals spanning from pediatric to geriatric age groups. In the gender distribution with the male predominance, cardiovascular diseases are more prevalent in men, which could explain the higher percentage of male patients.

The primary indication for continuous monitoring was post-cardiovascular intervention, constituting 51.9% of cases. This prevalence can be attributed to the center's established expertise in cardiac interventions and the corresponding high volume of such procedures. In contrast, post-thoracic cardiac surgery accounted for 16.7% of cases, a relatively lower proportion potentially linked to the procedure's recent introduction at the center (within the past five years) and the limited number of specialized surgeons available. The patient cohort was distributed across two primary care settings: emergency and intensive care units (38.9%) and regular wards (61.1%). Despite comprising only approximately 15% of the total bed capacity, the emergency and intensive care units accommodated a disproportionately high percentage (38.9%) of patients requiring continuous monitoring. This disparity is attributable to the critical nature of conditions necessitating intensive care, which invariably necessitates continuous patient monitoring. When the monitoring system issues warning signals, doctors and nurses respond by assessing the patient's condition and performing emergency procedures if necessary. In most cases, the signals are artifacts caused by loose electrodes or a loss of sensor detection. In these instances, the patient needs to be reattached to the electrodes or sensors. In some circumstances, when the alarm limits are not suitable for the patient's condition, the thresholds will be adjusted accordingly.

In analyzing monitoring alarm frequency, a standardized threshold was absent. Consequently, an arbitrary cut-point of 12 alarms per day was established based on our data distribution. This analysis revealed a marked disparity, with 96.8% of patients exceeding this threshold. A more granular examination of alarm data indicated that 61.3% of alarms were non-clinically significant, primarily attributed to artifact-induced signals and inappropriately set alarm parameters.

In the Hospital Anxiety Depression Scale categorization, the anxiety levels observed in our study were higher than those reported by Bayani et al. (28.5%) and Wu et al. (11.72%).[2,6] This discrepancy may be attributed to two main factors. Firstly, the number of monitoring alarms in our study was significantly high, producing an annoying sound and flashing light from the monitors, which substantially reduced the patients' resting time, thereby contributing to their anxiety. Secondly, the patients' medical conditions played a role; patients under monitoring generally had poor medical statuses, and their concerns about their health likely exacerbated their anxiety. The findings presented here are in alignment with the research of Güngör Serap and colleagues, who identified noise from monitoring systems as a primary contributor to patient anxiety.[7] Furthermore, the study by Akan Z and colleagues supports these findings by demonstrating a

positive correlation between noise pollution in hospitals and elevated anxiety levels.[8]

Patient complaints were predominantly related to lighting conditions and restricted personal care. Excessive illumination, potentially exacerbated by frequent alarm activations as previously discussed, emerged as a primary source of patient dissatisfaction. Additionally, the confinement to bed during monitoring periods resulted in limitations on personal hygiene and comfort, contributing to a decline in patient satisfaction. These findings align with a study conducted by Carlos Areia and colleagues, which identified noise pollution, comfort, and limitations on mobility and independence as the primary concerns expressed by patients.[9]

V. CONCLUSION

There is a high rate of anxiety among patients using monitoring systems. The primary factor contributing to anxiety in these patients is the overload of alarms triggered by artifact signals, most of which have little to no medical significance. A potential solution involves confirming the proper placement of electrodes, conducting regular patient check from the nurses, and educating patients on the importance of keeping the sensors attached to their bodies.

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