

Cardiac Patients' Involvement in Safety Perceptions During COVID-19 Pandemic in Northern Iran: A Cross-Sectional Study

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Abstract

Background: Pandemics and epidemics place significant strain on healthcare systems, underscoring patient safety as a fundamental component of quality care. While much research focuses on healthcare practitioners' perspectives to measure patient safety, involving patients themselves can help reduce medical errors and improve safety-especially during the COVID-19 pandemic-by increasing awareness and sharing information about safe care practices.

Aim: This study investigated the impact of cardiac patients' involvement on patient safety perceptions during the COVID-19 outbreak in northern Iran.

Method: This cross-sectional study included 209 patients admitted to Heshmat Teaching and Treatment Hospital in Rasht during 2022. Data were collected using the Patient Measure of Safety (PMOS) questionnaire. A convenience sampling method was used.

Results: Of the 209 participants, 139 (66.5%) were male and 70 (33.5%) were female, with a mean age of 61.18 ± 10.10 years. Two PMOS domains, Ward type and layout (35.08 ± 11.73) and Staff training (5.75 ± 1.89), demonstrated the highest frequency of scores in the Low category. Access to resources, communication and teamwork, organization, and care planning had the highest effect on the total score, respectively ($p < 0.001$).

Implications for Practice: Patients rated the safety of the studied hospital wards as moderate, indicating a need for improvement. The least favorable domains were ward type and layout, along with staff training. Targeted interventions are recommended to enhance the overall patient safety culture, with particular emphasis on improving ward design and staff training programs.

Keywords: COVID-19 Pandemic, Hospital, Patient Safety

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Introduction

At the end of 2019, a novel coronavirus triggered an outbreak of coronavirus disease 2019 (COVID-19) originating in Wuhan, China. In March 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic (1). Pandemics and disease outbreaks, such as COVID-19, exert multifaceted impacts on healthcare systems (2). Medical errors and care-related mistakes represent persistent challenges confronting health systems worldwide in the realm of patient care. According to WHO estimates, non-compliance with hospital safety protocols contributes to over 2.6 million deaths annually across the globe (3).

At the end of 2019, a novel coronavirus triggered an outbreak of coronavirus disease 2019 (COVID-19) originating in Wuhan, China. In March 2020, the World Health Organization (WHO) declared Covid-19 a global pandemic (1). Pandemics and disease outbreaks, such as Covid-19, exert multifaceted impacts on healthcare systems (2). Medical errors and care-related mistakes represent global challenges confronting health systems in the domain of patient care. According to WHO, estimates, non-compliance with hospital safety protocols contributes to over 2.6 million deaths annually across the globe (3). Covid-19 pandemic has placed extraordinary strain on frontline healthcare workers, and hospital infrastructure. Frontline personnel experience chronic emotional stress, burnout, moral distress, and interpersonal conflicts with colleagues or supervisors during pandemics—all of which may compromise patient safety standards (4). Over the past decade, the importance of considering the patient's perspective when measuring the quality and safety has gained widespread recognition. Patient participation in safety initiatives is increasingly regarded as a critical strategy for enhancing the quality of safe care delivery (5).

Patients can provide a unique perspective on the safety of care in hospitals (2). Understanding the degree to which hospitals are organized for quality and safety is related to patient's perceptions of care is becoming increasingly valuable and necessary for targeted interventions across healthcare systems (6). It is necessary to identify, and reduce the weakness of hospital systems to increase patient care. Patient feedback regarding the safety of their own care represents one of the most accurate and cost-effective methods for identifying systemic weaknesses in hospital environments (6). To identify safety issues and provide feedback about patient safety in hospital environments, patients themselves can be an important source of information, and PMOS is an important scale that allows patients to determine potential risks to safety in hospital settings (7). Cardiac patients often require specialized, continuous care and are particularly vulnerable to safety events due to the complexity of their conditions and treatments. Understanding safety perceptions in cardiac settings during a pandemic is therefore of heightened importance. However, there is limited research on how patients, particularly those with cardiovascular conditions, perceive safety during pandemics such as COVID-19. Understanding patient perspectives on safety is crucial as they provide unique insights into systemic weaknesses and potential areas for improvement in healthcare delivery. The current study aims to investigate the effect of the participation of cardiac patients during the outbreak of the COVID-19 virus in assessing patient safety in northern Iran.

Methods

This cross-sectional study was conducted on 209 patients admitted to Heshmat Teaching and Treatment Hospital in Rasht, northern Iran, during 2022–2023. The sample size was calculated using G*Power software, assuming an effect size of 0.3, $\alpha = 0.05$, and power = 0.95, yielding a minimum required sample of 200 participants.

Inclusion criteria were age ≥ 18 years and hospitalized for a minimum of 24 hours. Exclusion criteria included cognitive impairment, severe psychiatric illness, and end-stage disease. Participants were asked to sign an informed consent form. The study population comprised adult cardiac patients admitted to the cardiac wards of Heshmat Hospital. A convenience sampling method was utilized.

The questionnaire was self-administered, and the patients were informed that participation was voluntary. The medical researcher responsible for questionnaire distribution, a resident in Public Health, Epidemiology, and Hospital Organization, was independent of hospital staff and available to address participants' queries regarding the questionnaire. Completion time was approximately 15–20 minutes. Completed questionnaires were immediately placed in a secure, private folder by the researcher to ensure patient confidentiality. Participants were assured that all data would be analyzed in aggregate and that their responses would remain strictly confidential. Healthcare professionals in

the cardiac wards were not informed about the questionnaire content.

The Patient Measure of Safety (PMOS) questionnaire has 44 items and 9 domains (8). All items are in the 5-point Likert scale, with 1 implying strongly disagree and 5 strongly agree. It also has the 'not applicable' option that patients can select. The questionnaire has 9 domains: 1-communication and teamwork (9 questions, with scores ranging from 9 to 45), 2-organization and care planning (5 questions, with scores ranging from 5 to 25), 3-access to resources (4 questions, with scores ranging from 4 to 20), 4-ward type and layout (12 questions, with scores ranging from 12 to 60), 5-information flow (3 questions, with scores ranging from 3 to 15), 6-staff roles and responsibilities (4 questions, with scores ranging from 4 to 20), 7-staff training (2 questions, with scores ranging from 2 to 10), 8-equipment design and functioning (with 2 questions, with scores ranging from 2 to 10), 9-and delays (2 questions, with scores ranging from 2 to 10). This questionnaire was originally developed in the United Kingdom by McEachan et al., demonstrating robust internal consistency with a Cronbach's alpha coefficient of 0.87 (9). Subsequent Persian adaptation and validation performed by Sarvi et al. (2019) yielded a content validity index (CVI) of 0.85 and a content validity ratio (CVR) of 0.65, indicating favorable content validity within the Iranian healthcare context (7). In the present study, the PMOS again demonstrated acceptable reliability, with a Cronbach's alpha of 0.78.

Descriptive data were summarized using frequencies and percentages for categorical variables, and means with standard deviations for continuous variables. The normality of data distribution was assessed using the Kolmogorov–Smirnov test. Data were analyzed using independent t-tests to compare scores by gender, Pearson correlation coefficients to assess associations with age, and confirmatory factor analysis (CFA) to evaluate the contribution of each PMOS domain to the total score. All statistical analyses were performed using SPSS for Windows (version 25.0; SPSS Inc., Chicago, IL, USA), and statistical significance was set at $p < 0.05$.

Ethical Consideration

This cross-sectional study was approved by the was approved by the Committee for Ethics in Cardiovascular Diseases Research Center, Guilan University of Medical Sciences, Rasht, Iran (Ethical approval code: IR.GUMS.REC.1402.035).

Results

Based on obtained results, 139 people (66.5%) were men and 70 people (33.5%) were women. The average age of the subjects was 61.18 ± 10.10 years. Following the demographic characteristics, the descriptive results of the Patient Measure of Safety (PMOS) are presented. The PMOS questionnaire includes nine factors (Communication and teamwork, Organization and care planning, Access to resources, Ward type and layout, Information flow, Staff roles and responsibilities, Staff training, Equipment, and Delays) and provides both factor-level scores and a total score. Each item is scored on a Likert scale, and higher scores indicate better perceived patient safety. The mean and distribution of scores for each PMOS factor and the total score are summarized in Table 1. To facilitate interpretation of the PMOS scores, the percentile-based distribution was categorized into three groups. Scores below the 25th percentile were classified as "Low", scores between the 25th and 75th percentiles as "Moderate", and scores above the 75th percentile as "High". These categories were used to summarize the distribution of each PMOS factor in Table 1.

All statistical results were reported based on the independent t-test for gender comparisons, Pearson correlation for the association with age, and confirmatory factor analysis (CFA) to determine the effects of each PMOS component on the total score. Table 1 displays the mean of each factor and the total score of the PMOS questionnaire, as well as the classification of the scores of each factor and the total score according to the 25th, 50th, and 75th percentiles. Based on the results of Table 1, the mean of total PMOS was 139.29 ± 19.93 . Because the PMOS components include different numbers of items, their raw mean scores cannot be directly compared. Therefore, interpretation was based on percentile-based categories. As shown in Table 1, two components—Ward type and layout and Staff training—had the highest proportion of participants in the Low category. This indicates that, relative to other PMOS domains, patients perceived these two areas as less favorable in terms of safety.

Table 1. Mean of the factors of the PMOS questionnaire and the total score along with the ranking of the points of the factors and the total score

PMOS Domain	Low n (%)	Moderate n (%)	High n (%)	Mean $\pm$ SD
Communication and teamwork (F1)	0(0)	98 (46.9)	111 (53.1)	30.78 $\pm$ 4.20
Organization and care planning (F2)	0(0)	71 (34)	138 (66)	17.64 $\pm$ 2.46
Access to resources (F3)	10 (4.8)	149 (71.3)	50 (23.9)	12.59 $\pm$ 2.90
Ward type and layout (F4)	41 (19.6)	89 (42.6)	79 (37.8)	35.08 $\pm$ 11.73
Information flow (F5)	1 (0.5)	100 (47.8)	108 (51.7)	10.35 $\pm$ 1.78
Staff roles and responsibilities (F6)	2 (1)	110 (52.6)	97 (46.4)	14.47 $\pm$ 3.15
Staff training (F7)	24 (11.5)	149 (71.3)	36 (17.2)	5.75 $\pm$ 1.89
Equipment (F8)	7 (3.3)	159 (76.1)	43 (20.6)	6.21 $\pm$ 1.67
Delays (F9)	3 (1.4)	159 (76.1)	47 (22.5)	6.42 $\pm$ 1.46
Total score	0 (0)	139 (66.5)	70 (33.5)	139.29 $\pm$ 19.93

As presented in Table 2, Pearson correlation analysis revealed no significant associations between age and any of the PMOS domain scores or the total PMOS score ($p > 0.05$). Similarly, independent t-tests indicated no significant gender-based differences across any PMOS component or the total score ($p > 0.05$), despite the sample comprising 66.5% male and 33.5% female participants.

Table 2. Correlation between each factor of the PMOS questionnaire and the total score of the questionnaire with age

Variable	Communication and teamwork	Organization and care planning	Access to resources	Ward type and layout	Information flow
Age	$r = 0.005$ $p = 0.943$	$r = 0.045$ $p = 0.515$	$r = -0.09$ $p = 0.194$	$r = 0.020$ $p = 0.778$	$r = -0.12$ $p = 0.860$
	Staff roles and responsibilities	Staff training	Equipment	Delays	Total score
	$r = -0.01$ $p = 0.887$	$r = 0.008$ $p = 0.904$	$r = 0.107$ $p = 0.122$	$r = -0.027$ $p = 0.702$	$r = 0.01$ $p = 0.883$

PMOS: Patient measure of safety; Pearson correlation test and p -value < 0.05 significance level

To evaluate the contribution of each domain to the overall safety perception, confirmatory factor analysis (CFA) was employed. The goodness-of-fit indices for the conceptual model are summarized in Table 3, all of which fell within acceptable thresholds, confirming a satisfactory model fit.

Table 3. Satisfied indexes of the conceptual model

Index	Acceptable value	Estimated value of the model	
CMIN/DF	< 3	1.989	✓
GFI	> 0.8	0.977	✓
AGFI	> 0.8	0.914	✓
NFI	> 0.9	0.965	✓
CFI	> 0.9	0.982	✓
TLI	> 0.9	0.945	✓
IFI	> 0.9	0.982	✓
RMSEA	< 0.08	0.069	✓

The unstandardized and standardized regression coefficients are detailed in Table 4. All nine PMOS domains demonstrated a significant positive impact on the total score. In terms of effect magnitude, access to resources exerted the greatest influence, followed by communication and teamwork,

organization, and care planning ($p < 0.001$ for all). Corresponding path diagrams with unstandardized and standardized coefficients are provided in Figures 1 and 2, respectively.

Table 4. The results of fitting the conceptual model and determining the non-standard and standard effects of each factor on the total score

	B	S.E.	C.R.	<i>p</i> -value	Beta
Communication and teamwork (F1)	1.000				0.757
Organization and care planning (F2)	0.551	0.071	7.801	<0.001	0.713
Access to resources (F3)	0.722	0.082	8.810	<0.001	0.789
Ward type and layout (F4)	1.494	0.289	5.162	<0.001	0.405
Information flow (F5)	0.271	.038	7.053	<0.001	0.484
Staff roles and responsibilities (F6)	0.291	0.081	3.579	<0.001	0.293
Staff training (F7)	0.284	0.048	5.974	<0.001	0.479
Equipment (F8)	0.291	0.041	7.023	<0.001	0.552
Delays (F9)	0.213	0.034	6.321	<0.001	0.466

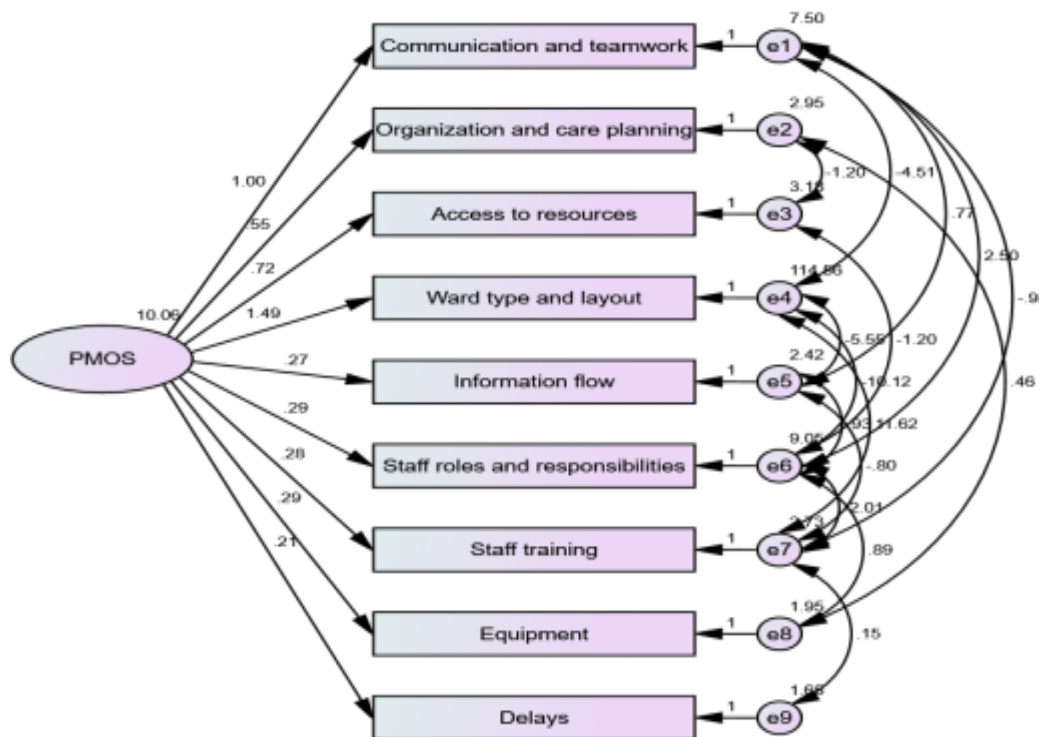


Figure 1. Conceptual model with non-standard coefficients

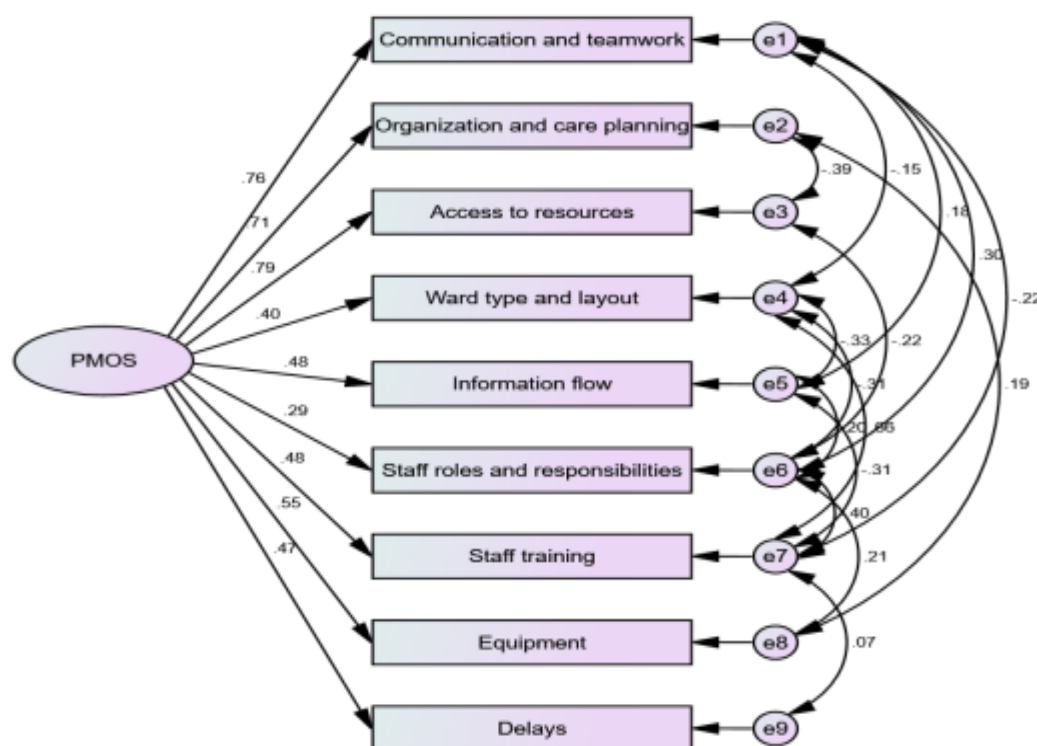


Figure 2. Conceptual model with standard coefficients

Discussion

The main result of the study is that the mean of total PMOS was 139.29 ± 19.93 . In other words, patients' perception of the safety situation prevailing in the studied wards was moderate. Our findings were significantly lower than the other study in the UK by Baxter et al. (10). The inconsistency in the results of different studies, even studies conducted in one country, indicates the dependence of the patient's safety culture on the context. Based on the findings, the two PMOS components, Ward type and layout and Staff training, had the highest frequency of scores in the Low category among patient safety ratings. This outcome was in conflict with that of the research conducted by New et al. in 2021 (11). Based on the researcher's opinion, this difference in the result can be related to the different types of disease and the number of samples.

In examining the relationship between each of the factors of the PMOS questionnaire and the total score, no significant relationship was observed between age and gender. Moreover, the findings of the study by Vaezi et al. showed that the average patient safety culture had no significant relationship with the gender variable. Although the average dimension of the ward type and layout was different for gender, the average value of this dimension was higher in women (3).

In our study, access to resources, communication and teamwork, organization, and care planning had the highest effect on the total score, respectively. Planning is an integral element of the continuum of patient care delivery procedures that involves assessment, goal-setting, decision-making, and resource-access provision, and health care depends on effective communication (12). These two domains can play an essential role in the quality of providing safe care to patients (3). This result is consistent with the Taylor et al study in Australia (12) and the McEachan et al study in the United Kingdom (9). It should be noted that in the past there was a significant relationship between communication, and team working with the organization and planning of care and overall understanding of safety in the New et al. study in Canada (11).

Data were collected while participants were hospitalized, reducing the risk of recall bias. The researcher was careful to avoid the use of leading interview questions to prevent biasing participants' responses. This study was conducted in a single institution, which is the only provincial reference for heart disease. Responses to the questionnaire may be influenced by fatigue since completion was done

following the interview, which lasted 45 min or longer for some participants. The positive and negative experiences shared by participants illustrate the value of including patients in safety improvement.

This study has several methodological limitations that should be acknowledged. The collection of demographic variables was restricted to age and sex, primarily due to inconsistent documentation of other patient characteristics in hospital records, as well as the need to minimize patient burden during the COVID-19 pandemic. Future research should incorporate a broader range of demographic and clinical variables to enable more comprehensive subgroup analyses and enhance the generalizability of findings.

Implications for practice

Patients' perceptions of safety in the studied hospital wards were moderate, highlighting the need for systematic quality improvement initiatives. Among the various safety domains assessed, ward type and layout, along with staff training, received the lowest ratings. Accordingly, healthcare administrators and policymakers are advised to implement targeted interventions aimed at strengthening the overall patient safety culture, with particular emphasis on optimizing ward design and enhancing staff training programs.

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Conflicts of interest

The authors declare no conflict of interest.

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Authors' Contributions

A.S designed and supervised the study protocol. M.E.G, S.M conducted data interpretation and statistical analysis. Z.A, M.E.G prepared the manuscript and M.E.G, S.M collected the data. All authors have read and agreed to the published version of the manuscript.

Artificial Intelligence statement

The authors have not used any AI tools or technologies to prepare this manuscript.

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