Health Sciences Investigations Journal

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ISSN Online 2704-4890 | ISSN Print 2720-7609

Online first publication

Original Research Article

HSI Journal (2023) Volume 4 (Issue 2):494-501. https://doi.org/10.46829/hsijournal.2023.12.4.2.494-501

Open Access

Patients' satisfaction with the quality of care upon implementation of electronic health records system at the 37 Military Hospital, Ghana

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Received April 2023; Revised August 2023; Accepted October 2023

Abstract

Background: To resolve delays faced by patients when accessing health services, the electronic health records system (EHRs) was introduced as part of the health management information system (HMIS) to enhance the quality of care.

Objective: This study assessed patients' satisfaction with the quality of care upon the implementation of the electronic health records system at the 37 Military Hospital in Ghana.

Methods: The study adopted a cross-sectional study design using a quantitative method. A simple random sampling method was applied to recruit 228 outpatients who were seeking healthcare at the time of data collection to respond to a structured questionnaire. A Chi-square test and logistic regression analysis were used to assess the association between the dependent variable and independent variables. A p-value of 0.05 at a 95% confidence interval was used as the threshold for statistical significance.

Results: The results showed a high quality of care with respect to attention to patients' needs (M = 3.68, SD = 0.525), the responsiveness of health providers to emergencies (M = 3.81, SD = 0.651), the efficiency of services rendered (M = 3.78, SD = 0.576), timeliness of healthcare (M = 3.78, SD = 0.576), patient-provider communication (M = 3.42, SD = 0.683) and general patients' care (M = 3.86, SD = 0.528). Similarly, the results showed high patient satisfaction in relation to waiting time for services (M = 4.32, SD = 0.93), adequacy of attention from health providers (M = 3.29, SD = 0.98), health provider-patient relationship (M = 3.63, SD = 1.05) and level of service provision after the implementation of EHRs (M = 3.89, SD = 0.95). Efficiency of services rendered (OR = 0.36, 95% CI; 0.276, 0.653, $p < 0.05$), timeliness of healthcare (OR = 0.42, 95% CI; 0.153, 0.693, $p < 0.05$), and general patients' care (OR = 0.43, 95% CI; 0.023, 0.678, $p < 0.05$) were strong predictors of patients' satisfaction.

Conclusion: The study demonstrated patients' overall satisfaction with the operation of electronic health records systems. The study recommends that the management of the 37 Military Hospital should continuously improve the quality of care of the health services to ensure sustained patient satisfaction.

Keywords: Electronic health records system, health institution, patient satisfaction, quality of care

Cite the publication as Adomah-Afari A, Anakwa-Awuku A, Gadeka DD (2023) Patients' satisfaction with the quality of care upon implementation of electronic health records system at the 37 Military Hospital, Ghana. HSI Journal 4 (2):494-501. https://doi.org/10.46829/hsijournal.2023.12.4.2.494-501

INTRODUCTION

To resolve delays faced by patients when accessing health care services at the 37 Military Hospital, the electronic health records system (EHRs) was introduced as part of the health management information system (HMIS). Considering its potential to enhance the quality of care. However, many patients have been dissatisfied with healthcare provision with complaints about the apparent lack of quality healthcare delivery [1]. However, the presence of the computer coupled with the necessity to document a patient's medical information was reducing patients' overall satisfaction with the implementation of the

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electronic health records system at the hospital [2]. Generally, record-keeping forms an integral part of society. Governments keep records of their citizens to ensure effective planning and implementation of developmental projects. Record-keeping plays an important role in the health sector by promoting accurate and quality healthcare by serving as a principal structure for storing and documenting patients' medical data, thereby improving communication, follow-up investigation and diagnosis [5,6]. The electronic health record system was described as an electronic database encrypted with an individual's health history or information, which was created, managed and utilised by an authorised health staff during healthcare delivery [7]. Thus, an electronic health record system has facilitated a revolutionary transition in healthcare delivery from paper-based health records to its electronic version [8]. Obviously, the electronic health records system has a tremendous possibility of improving the synchronisation of healthcare by making information electronically available and readily accessible at the point of healthcare delivery, especially when implemented throughout the institution [9]. The speed of adoption was observed to be more rapid in developed countries than in low-middle-income countries [10]. This deduction confirmed an observation that there was a 46% increase in the implementation of EHRs in the past five years globally, with upper-middle and high-income countries spearheading the revolutionary transition while lower-middle and low-income countries recorded a lower implementation rate [11]. Additionally, the World Health Organization [11] revealed that the implementation of electronic records systems recorded the highest integration with laboratory (77%), followed by pharmacy information systems (72%) and communications systems (56%) among the majority of member states.

Ghana, as a low-middle-income country, has made considerable progress in accelerating the use of EHRs in health institutions since the commencement of its national policy on electronic health in 2010 [12]. The 37 Military Hospital has been acknowledged as one of the quasi-government hospitals leading the implementation of EHRs in Ghana with the objective of providing quality healthcare services since 2018 [13]. One of the major problems confronting the 37 Military Hospital is how to deal with the increasing number of patients accessing services and the attendant delays in patients' waiting time [14,15]. Moreover, there is still a challenge with patients' waiting time due to the lack of extension of the EHRs to all departments of the 37 Military Hospital. Many studies have explored patients' satisfaction with the electronic health records system compared to the previously used paper-based health records system [1,2,16]. However, these studies focused mainly on the improvement of services as a way of determining patients' satisfaction in other jurisdictions [17]. Nonetheless, there appeared to be no evidence of how the implementation of the EHRs had enhanced patients' satisfaction with the quality of healthcare at the hospital. The objective of the study was to assess patient satisfaction with the quality of care upon implementation of the electronic health records system (EHRs) at the 37 Military Hospital in Ghana. Patient satisfaction was measured based on Donabedian's [18] model of healthcare quality: structure, process and outcome. The findings are expected to inform the management of the 37 Military Hospital of the progress made in enhancing patient satisfaction after the implementation of the EHRs since 2018 and consequentially form a solid foundation for further studies on the EHRs in Ghana.

MATERIALS AND METHODS

Study design and sites

The study adopted a cross-sectional research design using a quantitative approach. The study location is the 37 Military Hospital. It is located in the Ayawaso East Municipality, with a population of about 130,256 by 2021 in the Greater Accra Region [19]. The 37 Military Hospital, built in the British colony of West Africa, is the largest military hospital in Ghana. Initially, the hospital provided treatment to only military staff but eventually extended its healthcare delivery service to the public [12]. The study population included all outpatients receiving healthcare at the hospital. The study considered only patients aged 18 years and above who could consent to participate in the study.

Sample size and sampling technique

The sample size was estimated using Cochran (1963) formula [20] for the cross-sectional study below.

$$n = \frac{(Z_{\frac{\partial}{2}})^2 p(1-p)}{d^2}$$

Where:

n: sample size

p: represents the proportion of patients receiving quality healthcare at the 37 Military Hospital; p = 50%, where electronic health records systems are used. There is a paucity of evidence on the proportion of patients who received quality care in similar settings in the literature. A proportion of 50% was, therefore, used as it provided an appropriate sample size needed to ensure the representativeness of the study population [21].

d: margin of error, 5%. The precision (margin of error) provided a sufficient sample size needed to answer the study objective.

$Z_{\alpha/2}$ = 1.96 since α = 5% at a 95% confidence level

The minimum sample size required for the study was 384. A non-response rate was not considered in the sample size estimation since the questionnaire was self-administered or interviewer-administered, which did not subject study participants to non-response.

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Data Collection

Data for the study was acquired between August and December 2021 using a structured questionnaire [22]. The structured questionnaire was designed based on Donabedian's [18] model of healthcare quality: structure, process and outcome to assess the level of quality of care and satisfaction of patients with the use of the electronic health records systems at the 37 Military Hospital. The questionnaire had two sections: section one consisted of demographic characteristics (age, sex, educational level, occupation and how long the study participant has been a patient at the hospital) and section two encompassed variables describing the quality of care: attention to the responsiveness of providers to emergencies, patient-provider communication, perceived efficiency in services that are rendered, timeliness of healthcare services, the general patients' care at the hospital and the aspect on patients' satisfaction with waiting time, attention from providers, turn-around time for diagnostic and lab tests, patient-provider relationship, overall satisfaction with the implementation of the EHRs at the hospital and whether the patient would continue to seek treatment at the hospital as a result of the EHRs. The questionnaire consisted of 13 questions that had ordinal response categories. Each question on quality of care was rated with a five-point Likert scale ranging from "1 = very poor", "2 = poor", "3 = average", "4 = good", and "5 = very good", and the aspect on patient satisfaction with the use of the electronic health records systems ranged from "1 = strongly disagree" to "5 = strongly agree". Content validity was assessed through a literature review and field tests, including cognitive interviews. The internal consistency of the overall quality of care and patient satisfaction scale, as measured with Cronbach's alpha, was 0.870.

A simple random sampling approach was applied where 'Yes' and 'No' were written on pieces of paper for selection. This strategy was applied to recruit patients who had completed their processes at the facility and voluntarily chose to be involved in the study. A hospital exit interview approach was applied where research assistants positioned themselves at vantage points at the hospital. Patients who picked a 'Yes' were involved in the study until a sufficient sample was reached. Information gathered was based on the patient's previous and immediate experiences. Each of the questionnaires was answered by the participants using both a self-administered strategy for patients who had the ability to read and write in the English language and an interviewer-administered strategy for patients who could not read or write in any language. Only well-trained research assistants were engaged to carry out this process. They were further supervised by the researchers. Each questionnaire took 5 - 10 minutes to complete.

Quality assurance

A two-day training workshop was provided to train the two research assistants on the objectives and how to respond to questions from participants. The questionnaires were pretested among 50 respondents who were randomly selected at the University of Ghana Hospital to detect and correct ambiguously worded questions before the main data collection process began, as it had also implemented the electronic health records system to deliver quality care. The researchers applied both validity and reliability to appraise the quality of the research instrument [23].

Data analysis

Data from the questionnaire were entered into Microsoft Excel and then transferred to Stata version 14.0 for cleaning and analysis. Descriptive analysis was carried out, followed by inferential statistical analysis. The answers from the Likert Scale were analysed numerically. The items of the Likert Scale were represented with 1 score indicating the lowest performance of the assessed quality of care or patient satisfaction feature and 5 for the highest level of the performance of the feature. In total, a minimum score was computed as 6 out of the maximum score of 30 for quality of care and patient satisfaction. All the scores were converted to percentages. The scores were divided by the maximum possible scores multiplied by 100%. The total possible scores for quality of care and patient's level of satisfaction were converted to percentages after dividing by the maximum score for that domain multiplied by 100%. The results were presented in frequencies and percentages. Accordingly, composite means were calculated. A dichotomous outcome variable with a mean of less than 3.00 (average or unsure) representing low quality or patient satisfaction with care and a mean above 3.00 for high quality or satisfaction was then derived. Binary relationships between quality of care and patient satisfaction with using electronic health records systems and sociodemographic characteristics were determined using the Chi-square test. This was followed by multiple logistic regression analysis. A confidence interval of 95% was used to show significant relations between the dependent and the independent variables. This analytical strategy was applied since this study had one nominal and two or more measurement variables.

RESULTS

Association between patients' (sociodemographic characteristics) factors and quality of care

A total of 228 participated in this study, representing a 59% response rate. The results revealed that 55.3% (n = 126) of the patients involved in the study were females, and 44.7% (n = 102) were males. Additionally, 57.9% (n = 132) were within the 18 to 40 age category, and 28.9% (n = 66) were within the 41 to 60 years age category. It was also observed that 31.5% (n = 72) had completed senior high school, and 21.1% (n = 48) had a degree as their highest educational level. A total of 28.9% (n = 66) were self-employed, 18.4% (n = 42) were civil servants, and 13.2% (n = 30) were unemployed. Additionally, 42.1% (n = 96) had visited the 37 Military Hospital for more than ten years, while 34.2% (n = 78) visited the health facility within 5 to 9 years. The results revealed that gender (x2 = 0.9183, p = 0.632), age

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Table 1. Association between quality of care and patients' (socio-demographic characteristics) factors

Characteristics	Frequency	Percentage (%)	X^2	P-value
Gender			0.9183	0.632
Male	102	44.7		
Female	126	55.3		
Age Category			4.6088	0.595
18-40 years	132	57.9		
41-60	66	28.9		
Above 60 years	30	13.2		
Highest Educational Level			8.6398	0.577
Primary School	12	57.9		
Junior High School	30	28.9		
Senior High School	72	13.2		
Diploma	42	57.9		
First Degree	48	28.9		
Masters	24	13.2		
Occupation			24.1939	0.451
Civil Engineer	6	2.6		
Student	24	10.5		
Sound Engineer	6	2.6		
Accountant	6	2.6		
Civil Servant	42	18.4		
Self Employed	66	28.9		
Unemployed	30	13.2		
Lecturer	6	2.6		
Journalist	6	2.6		
Retired Worker	12	5.3		
Nurse	6	2.6		
Teacher	12	5.3		
Architect	6	2.6		
Frequency of visit to 37 Military Hospital			12.6290	0.049
Less than a year	12	5.3		
1-4 years	42	18.4		
5-9 years	78	34.2		
Above 10 years	96	42.1		

Table 2. Level of quality of care among patients

Dimension of Level of Quality-of-Care	Mean	Std. D
Attention to patients' health needs	3.68	0.525
Responsiveness of health providers to emergencies	3.81	0.651
Patient–Provider Communication	3.42	0.683
Efficiency of services rendered	3.78	0.576
Timeliness of healthcare	3.78	0.576
General patients' care at the hospital	3.86	0.528
Overall level of quality of care	4.02	0.636

(x2 = 4.6088, p = 0.595), educational level (x2 = 8.6398, p = 0.577) and occupation (x2 = 24.1939, p = 0.451) were not significantly linked with the level of quality of care. However, the frequency of patient visits to the health facility (x2 = 12.6290, p = 0.049) was significantly connected with the quality of care.

Level of quality of care among patients

The results showed that the quality of care at the 37 Military Hospital was high with respect to attention to patients' needs (M = 3.68, SD = 0.525), the responsiveness of healthcare providers to emergencies (M = 3.81, SD = 0.651), the efficiency of services rendered (M = 3.78, SD = 0.576), timeliness of healthcare (M = 3.78, SD = 0.576) and general

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Table 3. Patients' perspective of level of satisfaction with the implementation of EHRs

Statement	Strongly disagree/ disagree n (%)	Unsure n (%)	Strongly agree/agree n (%)	Mean	SD
Reduced waiting time for services	0 (0.0)	18 (7.9)	210 (92.1)	4.32	0.93
Received adequate attention from health providers	42 (18.4)	66 (29.0)	120 (52.6)	3.29	0.98
Diagnosis and laboratory test results are processed quickly and communicated to other departments	0 (0.0)	30 (13.0)	198 (87.0)	4.0	0.87
Improvement of health provider-patient relationship	18 (7.9)	72 (31.6)	138 (60.5)	3.63	1.05
Frequent treatment at the hospital due to improvement of service after the implementation of EHRs	12 (5.3)	24 (10.5)	192 (84.2)	3.89	0.95
Overall level of satisfaction with the implementation of EHRs	0 (0.0)	66 (29.0)	162 (71.0)	3.73	0.86

Table 4. Association between patients' satisfaction and quality of care domains

Patients' satisfaction	OR	95% CI	P value
Attention to patients' health needs	0.15	(-0.118, 0.424)	0.259
Responsiveness of health providers to emergencies	0.01	(-0.265, 0.291)	0.922
Patient – Provider Communication	0.013	(-0.238, 0.264)	0.917
Efficiency of services rendered	0.36	(0.276, 0.653)	0.015*
Timeliness of healthcare	0.42	(0.153, 0.693)	0.003*
General patients' care	0.43	(0.273, 0.678)	0.020*

Prob > F = 0.000, R-squared = 0.6525.

patients' care (M = 3.86, SD = 0.528). Additionally, the quality of care at the hospital was found to be high in terms of patient-provider communication (M = 3.42, SD = 0.683). Overall, the quality of care was assessed to be high (M = 4.02, SD = 0.683) (the results are detailed in Table 2).

Patient's perspective on the level of satisfaction with the implementation of the EHRs

From the results, 92.1% (n = 210) of patients at the 37 Military Hospital confirmed that the implementation of EHRs reduced waiting time for services (M = 4.32, SD = 0.93), and 52.6% (n = 120) agreed that they received adequate attention from health providers at the hospital after the implementation of the EHRs (M = 3.29, SD = 0.98). Furthermore, 87% (n = 198) of the patients indicated that their diagnosis and laboratory results were quickly processed and communicated to other departments (M = 4.0, SD = 0.87), and 60.5% (n = 138) confirmed an improvement in health provider-patient relationship (M = 3.63, SD = 1.05). In addition, 84.2% (n = 192) of the patients indicated that they would frequently seek treatment at the hospital due to improvements in health services (M = 3.89, SD = 0.95). Furthermore, 71% (n =162) of the patients confirmed their overall level of satisfaction with the implementation of EHRs at the 37 Military Hospital (M = 3.73, SD = 0.86) (the results are displayed in Table 3).

Association between quality of healthcare and patient satisfaction

Table 4 presents the multiple logistic regression of the association between patients' satisfaction and quality of care domains. After adjusting for the confounding effects of quality of care, the remaining domains that were strong predictors of patients' satisfaction include efficiency of services rendered ($p < 0.05$), timeliness of healthcare ($p < 0.05$) and general patients' care ($p < 0.05$).

DISCUSSION

Level of quality of care

The study showed a high quality of care at the 37 Military Hospital with respect to attention to patients' needs, the responsiveness of health providers to emergencies, the efficiency of services rendered and the overall quality of care. These are critical factors that could be considered as the hospital strives to enhance the quality of its service delivery to patients. These results have similarly been demonstrated in a study which observed that factors such as the attitude of health professionals towards patients, speedy healthcare service delivery, effective communication, the presence of modern apparatus, the hospital's capacity to render 24-hour health services and the hygiene of the hospital would influence patients' satisfaction with a health facility [24]. However, these results were dissimilar to a study carried out at the Greater Accra Regional Hospital, which inferred that the availability of nurses, doctor's time spent with patients, communication and behaviour of health workers, as well as the excellence of healthcare support delivered by paramedical staff were some of the indicators of healthcare that patients valued [25]. Critical analysis of these results through the lens of the Donabedian model [18]

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implies that the process and outcome, as assessed by the patients at the hospital, were recommendable. However, management may have to focus extensively on its structures in terms of facilities, staff and equipment to ensure continuous improvement in the level of quality of care at the 37 Military Hospital.

Patient's perspective on the level of satisfaction with the implementation of EHRs

The results of the study revealed that 92.1% of patients at the 37 Military Hospital confirmed that the implementation of EHRs reduced waiting time for services, 52.6% concurred that they received more attention from health providers at the hospital after the implementation of the EHRs, 87% of the patients indicated that their diagnosis and laboratory results were quickly processed and communicated to other departments after the implementation of EHRs, and 60.5% confirmed an improvement of health provider-patient relationship. In addition, 84.2% of the patients indicated that they would frequently seek treatment at the hospital due to improvement in health services after the implementation of EHRs, and 71% confirmed their overall level of satisfaction with the implementation of EHRs at the 37 Military Hospital. The findings showed that 92.1% of patients confirmed that the implementation of the EHRs had reduced waiting time for services, 84.2% confirmed that they would frequent the hospital to seek health care, and 71% showed overall satisfaction, which means that the EHRs had improved service delivery at the hospital. This was significant as 42.1% of patients had visited the hospital for more than ten years. Thus, they experienced the transition from the pre-EHR era to the current EHR system. Interestingly, studies on patients' level of satisfaction with the electronic health records system vary significantly [26,27]. Mysen et al. [27] observed the neutrality of patients on the use of EHRs in healthcare delivery. Rose et al. [26] discovered that the use of EHRs increased patients' overall satisfaction due to their involvement with health providers. Wali et al. [6] deduced that patients' satisfaction with EHRs was statistically significant with overall satisfaction - patients' overall satisfaction with the EHR system was statistically significant with its implementation, including reduced waiting time, efficient prescription dispensing, improved physician-patient relationship and an increase in physicians' attention during the consultation.

Relationship between Quality of Care and Patients' Satisfaction

The results showed that the efficiency of services rendered, timeliness of healthcare and general patient care are strong predictors of patients' satisfaction. The management of the hospital should consider these factors as important to patients since they want to experience services delivered by a competent team of health providers within a reasonable waiting time period. Incidentally, other investigators have shown a strong positive association between patients' level of satisfaction and healthcare provision indicators [28]. Umoke et al. [29] inferred that patients were satisfied with tangibility, reliability, responsiveness, assurance and empathy. However, these findings were unrelated to a study which deduced that hospital size, surgical volume, availability of hospital beds and low mortality were significantly associated with patient's overall level of satisfaction [30]. Other studies indicate that quality of care in health institutions could be linked with patients' satisfaction, as patients' satisfaction depended largely on favourable health outcomes [31]. Kabatoore et al. [32] noted that patient satisfaction was largely affected by interpersonal factors, thus highlighting the need for training clinicians on the importance of good communication skills and technical competencies demonstrated by thorough examination of patients and relieving worries about illness during the consultation. This will also require healthcare professionals to be involved in the implementation of public eHealth services such as EHRs [33]. However, a study in Ghana also observed that the eHealth workforce at all the surveyed sites was insufficient [34]. Thus, it is important to consider the suggestion that an efficient electronic health record system geared towards efficient quality healthcare provision would flourish when parity, effectiveness, efficiency and responsiveness of resource utilisation for quality healthcare are considered the building blocks [35].

Conclusion

The study concludes that the strong predictors of patients' satisfaction were the efficiency of services rendered, timeliness of healthcare, and general patient care. The study indicated that the quality of care at the 37 Military Hospital was assessed by patients to be high in respect of attention to patients' needs, responsiveness of health providers to emergencies and efficiency of services rendered. Thus, this study demonstrates that the 37 Military Hospital had employees who showed a high level of expertise and courtesy and had the capacity to inspire trust, confidence, and security. Further, the hospital provides accurate, dependable and consistent service to patients. These are key areas that the management of the hospital and related institutions in the health sector could emphasise as attempts are being made to continue improving patient experience with the implementation of the EHRs. Moreover, the study revealed that the frequency of patient's visits to the health facility was significantly associated with quality of care. Furthermore, the study demonstrated that patients confirmed that the implementation of EHRs reduced waiting time for services, improved health provider-patient relationships and enabled their diagnosis and laboratory results to be processed quickly and communicated to other departments. In addition, 84.2% of the patients indicated that they would frequently seek treatment at the hospital due to the improvement in health services, and 71% of the patients confirmed their overall level of satisfaction with the operationalisation of the EHRs at the 37 Military Hospital. The findings provide a benchmark for policymakers in the health sector and management of health institutions currently implementing the EHRs or potentially implementing them in the future in Ghana and elsewhere.

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Limitations to the Study/Future Research

Arguably, quantitative research methods do not provide room for participants' interactions [36,37]. Moreover, the generalisation of the results to the entire health sector may be restricted due to the limited overall sample size and the use of one quasi-hospital and one municipality out of 261 local Metropolitan Municipal and District Assemblies (MMDAs) in Ghana [19]. This study used only patients at the 37 Military Hospital. Hence, future researchers could focus on increasing the sample size to cover a large range of participants. Moreover, future researchers could focus on adding other MMDAs and public and private hospitals that have implemented the EHRs to examine the impact on quality of care. Future researchers could also focus on using qualitative research methods to find explanations for the quantitative findings.

DECLARATIONS

Ethical considerations

Ethical clearance for the study was obtained from the Institutional Review Board of the 37 Military Hospital with reference number: 37MH-IRB/MAS/IPN/513/2021. Permission was granted by the management of the 37 Military Hospital before the commencement of the study. Consent was acquired from the participants before their participation in the study. Ethical principles such as anonymity, confidentiality and neutrality were strictly adhered to in the conduct of this study. Additionally, participants were enlightened on the objectives of the study and voluntarily chose to participate in the research. Consent was acquired from the participants before their participation in the study.

Consent to publish

All authors agreed to the content of the final paper.

Funding

None

Competing Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Author contributions

The study was conceptualised and designed by the authors. Data analysis was conducted by the third author with support of the other authors. The draft manuscript was prepared by the first author and reviewed by the other authors after data collection and analysis.

Acknowledgements

The authors wish to express profound thanks to the management of the 37 Military Hospital and the patients who willingly offered to participate in this study.

Availability of data

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

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