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

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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


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
The objective of the study was to assess patient satisfaction with 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.

\[
    n = \frac{(Z_0)^2 p (1-p)}{d^2}
\]

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.
- \( Z_{0.02} = 1.96 \) since \( \alpha = 5\% \) 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.
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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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 patients’ care at the hospital (M = 3.86, SD = 0.528) were not significantly associated 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.

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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percentage (%)</th>
<th>X²</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>102</td>
<td>44.7</td>
<td>0.9183</td>
<td>0.632</td>
</tr>
<tr>
<td>Female</td>
<td>126</td>
<td>55.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Category</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18-40 years</td>
<td>132</td>
<td>57.9</td>
<td>4.6088</td>
<td>0.595</td>
</tr>
<tr>
<td>41-60</td>
<td>66</td>
<td>28.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 60 years</td>
<td>30</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Educational Level</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Primary School</td>
<td>12</td>
<td>57.9</td>
<td>8.6398</td>
<td>0.577</td>
</tr>
<tr>
<td>Junior High School</td>
<td>30</td>
<td>28.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior High School</td>
<td>72</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>42</td>
<td>57.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Degree</td>
<td>48</td>
<td>28.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>24</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Engineer</td>
<td>6</td>
<td>2.6</td>
<td>24.1939</td>
<td>0.451</td>
</tr>
<tr>
<td>Student</td>
<td>24</td>
<td>10.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sound Engineer</td>
<td>6</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountant</td>
<td>6</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Servant</td>
<td>42</td>
<td>18.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Employed</td>
<td>66</td>
<td>28.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>30</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecturer</td>
<td>6</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journalist</td>
<td>6</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired Worker</td>
<td>12</td>
<td>5.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>6</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>12</td>
<td>5.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Architect</td>
<td>6</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of visit to 37 Military Hospital</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than a year</td>
<td>12</td>
<td>5.3</td>
<td>12.6290</td>
<td>0.049</td>
</tr>
<tr>
<td>1-4 years</td>
<td>42</td>
<td>18.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-9 years</td>
<td>78</td>
<td>34.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 10 years</td>
<td>96</td>
<td>42.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Level of quality of care among patients

<table>
<thead>
<tr>
<th>Dimension of Level of Quality-of-Care</th>
<th>Mean</th>
<th>Std. D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention to patients’ health needs</td>
<td>3.68</td>
<td>0.525</td>
</tr>
<tr>
<td>Responsiveness of health providers to emergencies</td>
<td>3.81</td>
<td>0.651</td>
</tr>
<tr>
<td>Patient–Provider Communication</td>
<td>3.42</td>
<td>0.683</td>
</tr>
<tr>
<td>Efficiency of services rendered</td>
<td>3.78</td>
<td>0.576</td>
</tr>
<tr>
<td>Timeliness of healthcare</td>
<td>3.78</td>
<td>0.576</td>
</tr>
<tr>
<td>General patients’ care at the hospital</td>
<td>3.86</td>
<td>0.528</td>
</tr>
<tr>
<td>Overall level of quality of care</td>
<td>4.02</td>
<td>0.636</td>
</tr>
</tbody>
</table>
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 test results were processed quickly and communicated to other departments (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].
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.

Conclusion

This 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.
**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.

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**Availability of data**

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

**REFERENCES**

4. Atinga RA, Abekah-Nkrumah G, Domfeh KA (2017) Understanding factors regarding the publication of this article. The authors declare that there is no conflict of interest influencing the adoption of mHealth by the elderly: An extension of the UTAUT model. Int J Med Inform 101:75–89.