Effect of Electronic Health Records on Patient Satisfaction and Waiting Time at Selected Hospitals, in Addis Ababa

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Abstract

**Background:** Electronic health records provide a great potential for improving the delivery of health services and decision-making abilities for all hospital stakeholders and for prudent management of health care resources. The main objective was to assess the effect of EHR on patient satisfaction and waiting time at Selected Hospitals, Addis Ababa.

**Methods:** An institutional-based comparative cross-sectional study was conducted. The sample size was calculated using a double population-proportion formula, which comprised 184. Statement to confirm that all methods were carried out in accordance with relevant guidelines and regulations. After receiving ethical clearance from the Institutional Ethics Review Board and the Addis Ababa Health Bureau IRB, formal letters were written to Yekatit12 Hospital and Menelik II Referral Hospital. Written consent was taken for participants. Epidata V3.1 and SPSS software V25 were used for data entry and analysis respectively. Both bivariate and multivariate logistic regression analyses were performed to assess the presence and degree of association between dependent and independent variables. Statistically significant variables were declared using an adjusted odds ratio with a 95% confidence interval.

**Result:** The mean waiting time at Yekatit 12 HMC was 60.2 ± 48.2 minutes and 82 ± 56.8 minutes at Menelik. Similarly, 74 (83.1%) at Yekatit 12 HMC and 31.8% at Menelik II Referral Hospital were satisfied with the service. Eye contact, clear communication, accessibility of the service, explanations of the medical procedures, involving patients in clinical decisions regarding their health care, and active listening to their opinions and questions had statistical significance.

**Conclusion:** Though patient satisfaction is not limited to those variables, overall client satisfaction and waiting time at Yekatit 12 Hospital Medical College were higher than those at Menelik II Referral Hospital, that could be attributable to the installation of EHR. As a result, the federal MOH and the respective RHBs should implement EHR in all health-care facilities.

Plain English Summary

Evidence in Ethiopia from the Health Transformation agenda focused on information technology to improve data management for better data use in the service area as well as for decision-making by stakeholders. In this study, the researchers thought that assessment of the effects of electronic health records on patient satisfaction and waiting time is important to act accordingly. The study was conducted in Addis Ababa, the Capital city of Ethiopia, where the infrastructures are expected to be more accessible than other parts of the country. One health facility implementing EHR was selected to compare with one non-implementing with a similar service. Until the planned sample size was achieved based on the proportional sized allocation between medical facilities, participants were recruited consecutively. Epidata V3.1 and SPSS software V25 were used for data entry and analysis respectively. Bivariate and multivariate logistic regression analysis was computed to control con founders and to show satisfaction levels. Overall client satisfaction and waiting time at Yekatit 12 Hospital Medical College were higher than those at Menelik II Hospital, which could be attributable to the installation of EHR. The finding of this study shows that there huge difference in satisfaction level and waiting time at two sites even with comparable infrastructures, in the city.

Introduction

In recent years, there has been a greater focus on concerns associated with a healthcare evaluation. As a result, it has been proposed that healthcare evaluations should include not only clinical effectiveness and economics but also
social acceptability to healthcare customers. A well-thought-out, well-implemented electronic health records (EHR) strategy can improve healthcare service delivery while also boosting employee and patient interactions. A formal EHR evaluation rarely examines patients' perceptions of care quality after the system is implemented.\textsuperscript{1,2}

Measurement of hospital performance provides a significant potential for healthcare system improvement and accountability additionally as it allows you to specify what hospitals do and compare it to original aims to ascertain where you'll improve. A comprehensive factor for the patients within the health care organizations is that the criteria considered for the acceptable and desirable treatment, which is rapid and suitable. Prompt treatment during a hospital means minimizing the time for getting a health service with a stress on favorable treatment. Waiting time is a metric used to evaluate patient satisfaction, managerial effectiveness, and equity within the provision of health care to healthcare consumers. It's also considered a measurable parameter for assessing the effectiveness of the hospital department and its professionals in providing better service.\textsuperscript{3,4}

Nowadays, the appliance of electronic information and communication technology within the health care system (EHR) has increased worldwide and allowed patients to supplement and update their information, cultivates shared knowledge between clinicians and patients. Timeliness and patient-centered are among the important attributes of quality service. Patient waiting time is the period between a patient's arrival at the outpatient department and his or her entry into the consulting room.\textsuperscript{5,6,7,8}

The structured EHR data provide the potential to access point-of-care data which will be used to inform practice and conduct research and for physicians with essential practice-level information when meaningful usage is implemented, which incorporates standard and consistent data entry in certain fields.\textsuperscript{9}

Fully functional EHR was attributed with 22.4 percent reduced ED duration of stay and 13.1 percent lower diagnosis/treatment time as compared to ED with minimal or no EHR. The relationship, however, varied depending on the patient's level of acuity also as the diagnostic services provided. Surprisingly, ED with basic EHR wasn't more efficient on average, and their efficiency wasn't linearly associated with the amount of EHR features used.\textsuperscript{10}

In Ethiopia, the five-year perspective strategic plan stated as the health sector transformation plan, which had been implemented from 2015 to 2020, envisioned modernizing data handling and utilization through electronic health management information systems and strengthening the EHR system within the health care industry but still challenges continued with the data management.

Before the implementation of EHR at Yekatit 12 Hospital medical college most complaint area of the client was lost chart that they await an extended time even not seen on the same day with a retrieval rate of but 60% from regular Hospital report system. The introduction of the EHR initiated an enormous transition in health care compared to paper-based medical records (PMR). Saving time, avoiding lost paperwork, and increasing patient participation in their care are just a few of the benefits and overall delivery of health care, but recent data on their effect on the physician-patient relationship is limited. It is critical to understand that computers used for care do not reduce patient satisfaction because this is frequently an accurate proxy for the physician-patient relationship.\textsuperscript{11}

This study assessed satisfaction at institutions where EMR is implemented compared to where EMR isn't implemented. Since there is no such developed EHR system in Ethiopia, we'd like to assess the effect of EHR on patient satisfaction and waiting time. The results of this study also will provide baseline information related to the effect of EHR within the area and help stakeholders like policymakers, the Ministry of Health, Ministry of Education,
and other Organizations to need appropriate measures to reinforce this data management system to possess the improved quality of taking care of the clients in terms of patient satisfaction, patient waiting time.[Fig. 1]

**Methods**

**Study area and design**

A comparative cross-sectional study was carried out at Yekatit 12 HMC and Menelik II Referral Hospital OPDs (both regular and an emergency), from March to April 2021 in selected Hospitals of Addis Ababa. Yekatit12 Hospital Medical College, formerly Bethesaida Hospital (1915), is located in Addis Ababa, Arada Sub-city, a woreda 6, near the Addis Ababa "sidist kilo “campus. It provides emergency and outpatient services to approximately 230,000 individuals each year. The hospital began implementing EHR in 2012, with four phases, for better data administration and utilization, and is now in the fourth phase, with a success rate of 95%.

Menelik II referral hospital, meanwhile, is a historical public hospital in Ethiopia's capital city, Addis Ababa, in the Yeka sub-city, and is one of the government hospitals under Addis Ababa city administration. It was found in 1909 and is one of the government hospitals under the Addis Ababa city administration.

**Populations and Sampling**

All patients attending outpatient (OPD) and Emergency department (ED) for clinical care from March to April 2021 were the source population and those who fulfill the inclusion criteria were the study population during the study period. All patients who had a hearing deficit, psychiatric disorders, were seriously ill, and who are intoxicated at emergency were from the study.

A total sample of 177 patients were included in the study (89 from EMR implementing hospitals and 88 from hospitals with no EMR). The sample size was calculated using double proportion formula, for both satisfaction) and waiting time with the assumption of a 95%CI, 5% margin of error, and estimated level of satisfaction and waiting time in Kuwait,2006.\(^\text{15}\) The maximum sample was taken for comparing proportions was used to make a valid statistical computation. To compensate for non-response, a 10% contingency, and proportion allocation was done depending on the patient load to the specific department (additional file 1)

**Data collection tools and procedures**

Participants were recruited through systematic sampling in which patients were first registered by nurses on OPD/Emergency register then according to the proportion allocation study participants were selected then informed to the data collector. Informal consent was obtained from each respondent before the interview and confidentiality of responses were assured. By using a structured questionnaire, which was adapted from different literature, information about the social-demographic characteristic of the respondents, service satisfaction, waiting time, triage time, and other related data were collected.

**Operational definitions:**

**Waiting time** is “the length of time from when the patients registered at reception by EHR or manually to the time the patient sees Doctor for evaluation at Emergency and OPD, 1hr is cut off point for OPD”

**Overall satisfaction level**
75% and above response rate of the five satisfaction measuring items were categorized as “satisfied” and those who scored less than 75% of the five satisfaction measuring items were categorized as “unsatisfied” [21].

## Quality control measures and data management

The questionnaire was pretested (5%) on clients of selected Hospitals one week before the actual data collection period. The training was given to data collectors with close supervision. To ensure consistency, the questionnaire was written in English, translated into Amharic, and then back into English. The data gathering tool was only slightly altered as a result of the input received during the pretest. Cronbach's Alpha test, which was 0.89, was used to determine the tool's reliability and validity. All collected data were checked for completeness, accuracy, and consistency by the principal investigator then communicated to the data collectors on the next day.

Collected data were coded, checked for completeness, entered into Epidata V3.1, and exported to SPSS version 25 for analysis. Incomplete information or missed data were excluded from the study. During analysis, the responses of “very satisfied” and ‘satisfied’ were classified as satisfied and responses of ‘very dissatisfied’, ‘dissatisfied’, and ‘neutral’ as dissatisfied.

The study variables were described using descriptive statistics such as mean, median, and frequency. The association between the independent variable and the outcome variable was investigated using binary logistic regression analysis. The variables with significant relationships at a P-value of 0.25 were then incorporated in multiple logistic regressions to exclude co-founders and select the most important predictors. Comparisons of proportions were performed using the $\chi^2$-test and mean using the student t-test. Statistical significance was declared at 95% CI and p-values of 0.05 to discover the amount of difference between the EHR implemented group and the control group.

## Ethical Consideration

Here is statement to confirm that all methods were carried out in accordance with relevant guidelines and regulations. After receiving ethical clearance from the Institutional Ethics Review Board and the Addis Ababa Health Bureau IRB, formal letters were written to Yekatit12 Hospital and Menelik II Referral Hospital, as well as written permission to conduct the study from both the hospitals’ administration and the relevant body. Respondents were advised of their right to refuse or terminate the interview at any moment. They were also told that their data and information would be kept private and would not be shared with anybody outside of the relevant organizations.

## Results

### Socio-demographic characteristics of the participants

Among the 177 participants, 89 (50.3 %) were from Yekatit 12 Hospital Medical College, and the rest were from Menelik II Referral Hospital, yielding a response rate of 96.7 % and 95.7 %, respectively.

Eighty-nine (50.3 %) of those polled were under the age of 35. The average age of the respondents at Yekatit HMC was 40±14.2 years and 33.4±9.2 years at Menelik II Referral Hospital. The median monthly household income of the participants was 3000 ETB (66.7USD), (Table 1).
Table 1 shows the socio-demographic characteristics of study participants from Yekatit 12 Hospital Medical College and Menelik II Referral Hospital in Addis Ababa, Ethiopia, in 2021.

| Variables               | Category          | Yekatit 12 HCM N(%) | Menelik II RH N(%) | Total N(%) |
|-------------------------|-------------------|----------------------|--------------------|------------|
| Site                    |                   |                      |                    |            |
|                         | Site              | 8                    | 89 (50.3%)         | 88 (49.7%) | 177 (100%) |
| Sex                     | Male              | 31 (34.8%)           | 40 (45.5%)         | 71 (40.1%) |
|                         | Female            | 58 (65.2%)           | 48 (54.5%)         | 106 (59.9%)|
| Age                     | <34 years         | 34 (38.2%)           | 55 (62.5%)         | 89 (50.3%) |
|                         | 35-54 years       | 37 (41.6%)           | 32 (36.4%)         | 69 (39%)   |
|                         | >55 years         | 18 (20.2%)           | 1 (1.1%)           | 19 (10.7%) |
| Marital status          | Single            | 16 (18%)             | 28 (31.8%)         | 44 (24.9%) |
|                         | Married           | 65 (73%)             | 56 (63.6%)         | 121 (68.4%)|
|                         | Others            | 8 (9%)               | 4 (4.5%)           | 12 (6.8%)  |
| Educational status      | No formal education| 20 (22.47%)         | 6 (6.8%)           | 26 (14.7%) |
|                         | Primary school    | 10 (11.2%)           | 13 (14.8%)         | 23 (13%)   |
|                         | Secondary school  | 28 (31.5%)           | 29 (33%)           | 57 (32.2%) |
|                         | Diploma           | 21 (23.6%)           | 17 (19.3%)         | 38 (21.5%) |
|                         | Degree and more   | 10 (11.2%)           | 23 (26.1%)         | 33 (18.6%) |
| Occupation              | Gov.Employee      | 16 (18%)             | 29 (33%)           | 45 (25.4%) |
|                         | private employed  | 35 (39.3%)           | 26 (29.5%)         | 61 (34.5%) |
|                         | student           | 2 (2.2%)             | 10 (11.4%)         | 12 (6.8%)  |
|                         | Merchant          | 5 (5.6%)             | 5 (5.7%)           | 10 (5.6%)  |
|                         | Daily labourer    | 4 (4.5%)             | 2 (2.3%)           | 6 (3.4%)   |
|                         | Unemployed        | 27 (30.3%)           | 16 (18.2%)         | 43 (24.3%) |
| Monthly Income          | < 1500 EB         | 30 (33.7%)           | 27 (30.7%)         | 57 (32.2%) |
|                         | ≥1500 EB          | 50 (66.3%)           | 61 (69.3%)         | 120 (67.8%)|
| Educational Status      | No formal education| 20 (22.5%)         | 6 (6.8%)           | 26 (14.7%) |
|                         | Primary school    | 10 (11.2%)           | 13 (14.8%)         | 23 (13%)   |
|                         | Secondary school  | 28 (31.5%)           | 29 (33%)           | 57 (32.2%) |
|                         | College diploma   | 21 (23.6%)           | 17 (19.3%)         | 38 (21.5%) |
|                         | Degree and above  | 10 (11.2%)           | 23 (26.1%)         | 33 (18.6%) |

Service-Related characteristics of the participants
Participants were assessed for their OPD waiting time at both Hospitals that 52(58.4%) and 38(43.1%) were waiting for less than one hour at Yekatit 12 Hospital Medical College and Menelik II Referral Hospital respectively. The mean emergency waiting time at Yekatit 12 HMC was 32.8 minutes, while at Menelik II Referral Hospital it was 71 minutes[Fig. 3].

Sixty seven percent of respondents agreed that registration of general information at triage was faster at Yekatit 12 HMC compared to 24 % at Menelik II Referral Hospital. Sixty-two (69.7%) of respondents at Yekatit 12 HMC were satisfied and comfortable with the overall waiting area of the service, compared to only 22.7% at Menelik Referral Hospital.

During their stay, treating health workers called the names of 82 (92.3%) and 59 (67%) of respondents at Yekatit 12 HMC and Menelik Hospital, respectively. Similarly, 96.6 % of Yekatit 12 HMC agreed that they listened to their wishes, while 81.8 % of Menelik agreed. Y12HMC and Menelik II Referral Hospital treating clinicians assisted 79 (88.8%) and 63 (71.6%) patients respectively in making a decision about their medical problems[Table 3].
Table 3
Service-related Level of satisfaction with Likert-scale of study participants at Y12 HMC and Menelik II Referral Hospital, Addis Ababa, 2021.

| Variables                                                  | Study Sites     | Level of satisfaction |
|------------------------------------------------------------|-----------------|-----------------------|
|                                                            | Strongly agree  | Agree                 | Neutral    | Disagree  | Strongly disagree |
| Accessed to medical care whenever you need                 | Yekatit12 HMC  | 59(66.3%)              | 16(18%)    | 4(4.5%)   | 6(6.7%)           |
|                                                            | Menelik II RH   | 10(11.4%)              | 31(35.2%)  | 16(18.2%) | 20(22.7%)          | 11(12.5%)         |
| Registration of general information at triage is shorter   | Yekatit12 HMC  | 48(53.9%)              | 22(24.7%)  | 4(4.5%)   | 11(12.4%)          | 4(4.5%)           |
|                                                            | Menelik II RH   | 9(10.2%)               | 23(26.1%)  | 7(8%)     | 31(35.2%)          | 18(20.5%)         |
| Comfortable with Overall waiting area of services          | Yekatit12 HMC  | 53(59.6%)              | 15(16.9%)  | 2(2.2%)   | 11(12.4%)          | 8(9%)             |
|                                                            | Menelik II RH   | 7(8.0%)                | 23(26.1%)  | 7(8.0%)   | 33(37.5%)          | 18(20.5%)         |
| Had eye contact while examination                          | Yekatit 12 HMC | 63(70.8%)              | 19(21.3%)  | 2(2.2%)   | 4(4.5%)            | 1(1.1%)           |
|                                                            | Menelik II RH   | 12(13.6%)              | 44(50%)    | 12(13.6%) | 8(9.1%)            | 12(13.6%)         |
| Health care workers communicated with me by calling my name| Yekatit 12 HMC | 71(79.8%)              | 11(12.4%)  | 2(2.2%)   | 4(4.5%)            | 1(1.1%)           |
|                                                            | Menelik II RH   | 11(12.5%)              | 48(54.5%)  | 6(6.8%)   | 13(14.8%)          | 10(11.4%)         |
| Listened to my wishes concerning my care.                  | Yekatit 12 HMC | 74(83.1%)              | 12(13.5%)  | 1(1.1%)   | 1(1.1%)            | 1(1.1%)           |
|                                                            | Menelik II RH   | 19(21.6%)              | 53(60.2%)  | 5(5.7%)   | 8(9.1%)            | 3(3.4%)           |
| Respect is shown by Health care workers                    | Yekatit 12 HMC | 75(84.3%)              | 12(13.5%)  | 1(1.1%)   | 0                  | 1(1.1%)           |
|                                                            | Menelik II RH   | 19(21.6%)              | 44(50%)    | 6(6.8%)   | 5(5.7%)            | 14(15.9%)         |
| My privacy was maintained                                  | Yekatit12 HMC  | 67(75.3%)              | 13(14.6%)  | 1(1.1%)   | 6(6.7%)            | 2(2.2%)           |
|                                                            | Menelik II RH   | 21(23.9%)              | 46(52.3%)  | 3(3.4%)   | 7(8%)              | 11(12.5%)         |
| Explanation of medical procedures is good                  | Yekatit 12 HMC | 53(59.6%)              | 17(19.1%)  | 7(7.9%)   | 4(4.5%)            | 8(9%)             |
|                                                            | Menelik II RH   | 9(10.2%)               | 26(29.5%)  | 7(8%)     | 28(31.8%)          | 18(20.5%)         |
| Explanation of Laboratory tests is good                    | Yekatit 12 HMC | 43(48.3%)              | 16(18%)    | 13(14.6%) | 7(7.9%)            | 10(11.2%)         |
|                                                            | Menelik II RH   | 12(13.6%)              | 23(26.1%)  | 8(9.1%)   | 23(26.1%)          | 22(25%)           |
| Health care workers helped me take part in decisions       | Yekatit 12 HMC | 64(71.9%)              | 15(16.9%)  | 5(5.6%)   | 1(1.1%)            | 4(4.5%)           |
| concerning my care.                                        | Menelik II RH   | 32(36.4%)              | 32(36.4%)  | 6(6.8%)   | 9(10.2%)           | 9(10.2%)          |

Searching for patient medical records was the most common reason for them waiting longer than expected, accounting for 55 (72.4 %), followed by patient load, with each scoring 50 %. At Y12 HMC and Menelik II Referral Hospital.
Hospital, the results of searching for patient medical records (34.8 %, 88.7 %), jumping the queue system (56.5 %, 47.2 %), and late arrival of treating physicians (13 %, 37.7%) respectively. [Table 2]

Table 2
Common reasons why they were waiting longer than their expectation at Y12HMC and Menelik II Referral Hospital, Addis Ababa, 2021.

| variables                                      | category          | Yeakatit 12 HMC | Menelik II RH | Total N(%) |
|------------------------------------------------|-------------------|-----------------|---------------|------------|
| Did Doctor arrive late?                        | Yes               | 3(13%)          | 20(37.7%)     | 23(30.2%)  |
|                                                | No                | 15(65.2%)       | 22(41.5%)     | 37(48.7%)  |
|                                                | Don't know        | 5(21.7%)        | 11(20.8%)     | 16(21.1%)  |
| Searching Patient’s medical record takes longer?| Yes               | 8(34.8%)        | 47(88.7%)     | 55(72.4%)  |
|                                                | No                | 14(60.9%)       | 5(9.4%)       | 19(25.0%)  |
|                                                | Don't know        | 1(4.3%)         | 1(1.9%)       | 2(2.6%)    |
| Large numbers of patients with few doctors     | Yes               | 13(56.5%)       | 25(47.2%)     | 38(50.0%)  |
|                                                | No                | 8(34.8%)        | 19(35.8%)     | 27(35.5%)  |
|                                                | Don't know        | 2(8.7%)         | 9(17%)        | 11(14.5%)  |
| Patients jumping queue                        | Yes               | 13(56.5%)       | 25(47.2%)     | 38(50.0%)  |
|                                                | No                | 9(39.1%)        | 23(43.4%)     | 32(42.1%)  |
|                                                | Don't know        | 1(4.3%)         | 5(9.4%)       | 6(7.9%)    |
| Sign and direction indicators were available to ease ways | Yes               | 9(39.1%)        | 22(41.5%)     | 31(40.8%)  |
|                                                | No                | 12(52.2%)       | 23(43.4%)     | 35(46.1%)  |
|                                                | Don’t know        | 2(8.7%)         | 8(15.1%)      | 10(13.2%)  |

In terms of satisfaction level, variables that remained significant with multivariable logistic regression were found to be waiting longer than expected [AOR=0.168; 95% CI (0.044, 0.642)], accessibility to medical care whenever needed [AOR=5.911; 95% CI (1.516, 23.043)], comfort with the overall waiting area of the service [AOR=9.514; 95% CI (2.591, 34.931)], explanation of the medical procedure to the patient by health care workers [AOR=7.466; 95% CI (1.693, 32.919)], health care workers’ involvement in deciding on their medical care [AOR=19.1]

Regarding the level of satisfaction, variables that remained significant with multivariable logistic regression are waiting longer than their expectation [AOR=5.78; 95% CI (1.44, 23.21)], accessibility to medical care whenever needed [AOR=5.67; 95% CI (1.36, 23.62)], comfortable with the overall waiting area of the service [AOR=8.07; 95% CI (2.09, 31.19)], explanation of the medical procedure to the patient by health care workers [AOR=5.5; 95% CI (1.34, 26.65)], Health care workers’ help that involved the clients to decide on their medical care [AOR=23.79; 95% CI (3.99, 140.58)].
Good explanation of the medical procedures 5 times more likely satisfied than those who were not explained about the procedure and laboratory tests is highly associated with patient satisfaction which increased satisfaction 4 times more than those with no explanation. However, no statistically significant associations were observed between study site, registration at the reception, waiting for the area, eye contact with their treating physician, communication, laboratory test explanation, respect, and maintenance of privacy, frequency of visiting the center, or time spent with the physician during the examination.[Table 4].
| Variables                                      | Category                              | Level of satisfaction | Y12 HMC N(%) | Menelik II RH N(%) | COR(95%CI)          | AOR(95%CI)          | P-value |
|-----------------------------------------------|---------------------------------------|-----------------------|--------------|-------------------|---------------------|---------------------|---------|
| Do you wait longer than your expected?        | Yes                                   |                       | 23(25.8)     | 53(60.2)          | 1                   | 1                   | 0.009   |
|                                               | No                                    |                       | 66(74.2)     | 35(39.8)          | 8.28(4.191,16.337)* | 0.168(0.044,0.642)** |         |
| Accessed to medical care whenever you need    | Agree                                 |                       | 75(84.3)     | 41(46.6)          | 16.54(7.51,36.41)*  | 5.911(1.516,23.043)** | 0.010   |
|                                               | Disagree                              |                       | 14(15.7)     | 47(53.4)          | 1                   | 1                   |         |
| Registration of general information at triage is shorter. | Agree                                 |                       | 70(78.7)     | 32(36.4)          | 9.92(4.95,19.89)*   | 2.839(0.797,10.111)  | 0.107   |
|                                               | Disagree                              |                       | 19(21.3)     | 56(63.6)          | 1                   | 1                   |         |
| Comfortable with Overall waiting area of services | Agree                                 |                       | 68(76.4)     | 30(34.1)          | 15.12(7.23,31.61)*  | 9.514(2.591,34.931)** | 0.001   |
|                                               | Disagree                              |                       | 21(23.6)     | 58(65.9)          | 1                   | 1                   |         |
| Explanation of medical procedures is good     | Agree                                 |                       | 70(78.7)     | 35(39.8)          | 18.367(8.570,39.362)* | 7.466(1.693,32.919)** | 0.008   |
|                                               | Disagree                              |                       | 19(21.3)     | 53(60.2)          | 1                   | 1                   |         |
| Explanation of Laboratory tests is good       | Agree                                 |                       | 59(66.3)     | 35(39.8)          | 13.739(6.608,2858.988)* | 3.176(0.795,12.684)   | 0.102   |
|                                               | Disagree                              |                       | 30(33.7)     | 53(60.2)          | 1                   | 1                   |         |
| Health care workers helped me take part in decisions concerning my care. | Agree                                 |                       | 79(88.8)     | 64(72.7)          | 16.333(5.430,49.134)* | 19.146(3.594,102.00) ** | 0.001   |
|                                               | Disagree                              |                       | 10(12.2)     | 24(27.3)          | 1                   | 1                   |         |
| Respect was shown by Health care workers      | Agree                                 |                       | 87(97.8)     | 63(71.6)          | 15.529(4.463,54.033)* | 5.909(0.636,54.871)   | 0.118   |
|                                               | Disagree                              |                       | 2(2.2)       | 25(28.4)          | 1                   | 1                   |         |
| Listened to my wishes concerning my care.     | Agree                                 |                       | 86(96.6)     | 72(81.8)          | 14.655(3.269,65.709)* | 1.369(0.115,16.297)   | 0.804   |
|                                               | Disagree                              |                       | 3(3.4)       | 16(18.2)          | 1                   | 1                   |         |
In general, this research found that 74 (83.1%) of Yekatit 12 HMC respondents were satisfied with overall outpatient services (OPD and Emergency), whereas those at Menelik II Referral Hospital it was 31.8% [Fig. 2, additional file 2]

**Discussion**

This paper estimates the level of patient satisfaction with outpatient department (OPD) services (both regular and emergency) at Yekatit 12 Hospital and Menelik II Referral Hospital. At Yekatit 12 Hospital Medical College and Menelik Hospital, the overall proportion of clients who were satisfied with the service was 83.4% and 31.8%, respectively. This difference could be attributed to Y12HMC's implementation of EHR, particularly during clinical consultations, with the physician being more available to discuss health topics, having more time to listen to the patient's complaints, and discussing test results and medication. This finding is comparable for Yekatit HMC but significantly lower for Menelik II Referral Hospital,[15].

Patients who have previously visited the facility and are familiar with the waiting room are more likely to be satisfied with the service than those who have never visited the institution and are unfamiliar with the waiting area. This is because patients who had previously visited the hospital were familiar with the facility's operational procedures and had direct access to the service area. In terms of waiting spaces, those who have less time to wait at registration would not spend their time in a crowded setting. People who sustained privacy are more satisfied than those with inadequate privacy. Similar to a hospital-based study conducted in the Amhara Region, [22].

When compared to a previous study in Ethiopia on the pattern of EHR use and satisfaction, this one found a greater rate of satisfaction at Yekatit 12 Hospital Medical College, where EHR is in use, and similar findings at Menelik II Referral Hospital, where EHR is not in use. At both hospitals, maintaining privacy, maintaining eye contact, and maintaining excellent communication showed a favorable relationship with satisfaction.

The electronic medical record helps to enhance patient outcomes by reducing the risk of medical errors and improving the quality and safety of inpatient care. There is no replacement for having immediate access to precise information regarding a patient's condition and medical history in the office. With EMRs, critical patient information becomes as mobile as our patients. In line with this, the current study found a high level of satisfaction with the medical care outcome following the adoption of the EMR system. Individuals have the ability to better maintain and manage their health, as well as adhere to treatment plans more easily.

**Conclusion**

- The overall client satisfaction at yekatit 12 Hospital Medical College is 83.1% which has great improvement from the previous study that could be contributed to the implementation of EHR while it is low for Menelik II Referral Hospital which was 31.3%.
- Therefore I, recommend AARHB shall implement EHR in all health facilities to improve health outcomes especially to increase client satisfaction and to decrease waiting time to get health services.
- The Menelik II Referral Hospital needs to give CRC/MRC training/orientation to the staff as well as a follow-up.

**Abbreviations**

ED: Emergency Departments; EHR: Electronic Health Record; EOPD: Emergency Outpatient Department ICT: Information and Communication Technology; IQR: Inter Quartile Range; OPD: Outpatient department; PMR: Paper-Based Medical Record; PHC: Primary Health Care; RH:Referral Hospital; Y12HMC:Yekatit 12 Hospital Medical College.
Declarations

Ethical Consideration

After receiving ethical clearance from the Institutional Ethics Review Board and the Addis Ababa Health Bureau IRB, formal letters were written to Yekatit12 Hospital and Menelik II Referral Hospital, as well as written permission to conduct the study from both the hospitals' administration and the relevant body. Respondents were advised of their right to refuse or terminate the interview at any moment. They were also told that their data and information would be kept private and would not be shared with anybody outside of the relevant organizations.

Consent for publication

Not applicable

Availability of data and materials

All data relevant to the study are included in the article but upon reasonable request from the authors (garomakitesa@gmail.com) can be contacted.

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Competing interests - None

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Authors’ contributions

All authors had significant contribution in all aspects starting from conception to the current situation and have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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**Figures**

![Conceptual framework of the effect of EHR on patient satisfaction](image)

**Figure 1**

Conceptual framework of the effect of EHR on patient satisfaction
Figure 2

Level of patient satisfaction related to our patient department services at Yekatit 12 Hospital Medical College and Menelik II Referral Hospital, Addis Ababa, Ethiopia, 2021.
Figure 3

Waiting time from reception to physician visit at Yekatit 12 Hospital Medical College and Menelik II Referral Hospital, Addis Ababa, Ethiopia, 2021.

Supplementary Files

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