



# The Effect of Electronic Health Record on the Quality of Health Care Provision in Children and Their Parents

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## ABSTRACT

**Background:** Nowadays, with the advancement of technology, the use of electronic records instead of paper records has led to ease and increased access to information by members of the treatment cabinet. Therefore, the purpose of this study was to investigate the effect of using electronic records on the quality of services provided to patients in the health center.

**Methods:** This study was a descriptive-analytic study that was performed on 264 patients referred to the health center. In this study, The Iranian Ministry of Health's Official Checklists for the Children's Health Monitoring Plan was used. Finally, the data were entered into SPSS version 22 software and analyzed (mean, standard deviation, number of subjects and paired t-test).

**Results:** The implementation of electronic health records promotes the quality of health services in the treatment of children and have significant effect including information recording ( $P=0.001$ ) organization ( $P=0.001$ ), evaluation and classification of problems ( $P=0.001$ ), recommendations and actions ( $P=0.002$ ) and quality of service provider's performance ( $P=0.001$ ). However, there was no significant effect on their parent's satisfaction and awareness.

**Conclusion:** EHR in health care can reduce unavoidable paper errors and improve the quality and provide more quality services for children care.

**Key words:** EHR, Health services, Children, Parents

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## INTRODUCTION

The success of the Primary Health Care Program in implementing the Family Physician Plan in the villages has led to the application of four fundamental principles in the health care system of Iran, namely: establishing social justice, intergovernmental cooperation, public participation and the use of appropriate technology [1].

In the referral system, determining the referral path is the primary responsibility of the family doctor, and the physician should determine the best path according to the patient's circumstances [2].

The most important tool for evaluating and tracking the goals of the family physician plan of Iran is the household health questionnaire, which is currently being completed and executed in paper form by all of the groups [3]. The

Electronic Health Record is a digital repository of all patient information that includes retrospective, current, and prospective information, and its main objective is continuous, effective and integrated health care that provides information such as treatment, prescription, the results of tests, environmental information and health care information are included [4].

One of the major components of health care costs is the management of clinical data that uses them to provide high-quality services [5]. On the other hand, health related organizations focus on improving the quality of health, and this can only be achieved through access to qualified information [6].

In this regard, the paper file due to its shortcomings is not able to establish proper communication between experts and clients, and the data needed may not be immediately available to experts [7]. One of the benefits of an electronic record is the availability of complete patient information in the clinical care process, which allows for the detection of possible errors. Centers that

have an electronic health record have faster performance and higher service delivery. An Electronic Health Record will provide better decision-making in the treatment and development of health outcomes and will provide better data for public health and research. To achieve this goal, a standardized approach has to be chosen [8].

A report on the cost and benefits of IT-based systems has been used from several sources such as PubMed, the Clinical Trials Control Center, and the DARE Infodatabase (DARE). The final result is that a significant change in the provision of health care, reducing errors and increasing its impact has been noticed. Most of the benefits were about creating an HER [9].

In previous studies on the electronic health record, more research has been done on topics such as information needs assessment, enforcement barriers, and the challenges posed by the use of electronic health records. In this research, a practical and near-order process of the electronic health record has been reviewed and the results have been presented. In this research, one of the most important recipient groups was selected in the health centers of the community and the method of providing health services for these people and in the form of electronic health records was evaluated.

## METHOD

The present study is a descriptive-analytic study that was conducted on a sample of 264 referred patients to health care centers in Gachsaran city of Iran in 2017. The protocol of study was approved in ethics committee of Islamic Azad University of Marvdasht with the code of "IR-20352017". Sampling in this study was done by random sampling and clustering method. The researcher first selected health centers and then patients were selected randomly from the study population. After selecting the samples, the corresponding checklist was completed.

To determine the sample size, the statistical methods and the Cochran formula have been used which, with the coefficient of variation equal to 1.96, the probability of having a trait equal to 5%, the probability of absence of trait equal to 5% and the error rate equal to 0.05, the size of the statistical population calculated 264 patients.

Validity and reliability of the checklist used in the present study in the pediatric follow up program of Iranian Ministry of Health's have been reviewed and approved. After referring to health centers under the coverage of Gachsaran health care network, the cases of children covered by the relevant base were selected and sampled randomly. The Iranian Ministry of Health's Official Checklists for the Children's Health Monitoring Plan was completed. In the knowledge and satisfaction

section of the checklist, which requires an interview with the mother, questions were asked and completed.

This checklist that included 96 items was completed to examine the process of providing health services for children through the process of viewing, interviewing and reviewing process documents [10].

The method of scoring for each question is zero and one, so that in each question, if all the items were complete, score 1, and if there was even one of the cases of flaws or false, the score was given zero and if there was no case, The dark line (-) was set.

The checklist consisted of five sections, each section containing questions of its own.

The various sections of the checklist included the following: organization, service provider performance, service provider awareness, knowledge assessment and service provider satisfaction and performance of the service provider in the data recorder.

In this research, the frequency distribution and relative distribution table was used to describe the data. To determine the statistical differences between the variables studied in this study, SPSS version 22 was used for descriptive statistics (mean, standard deviation, number of subjects) and inferential statistics (paired t-test).

## RESULTS

Of the total 264 patients covered by the health centers of Gachsaran, 121 were boys and 143 were girls. The current study has evaluated the quality of health services for children under the age of one year such as information recording, organization, evaluation and classification of problems, recommendations and actions, planning and quality of performance; as well as, satisfaction and awareness of their parents by implementing an electronic health record.

As shown in Table 1 the implementation of electronic health records promotes the quality of health services in the treatment of children based on the results of the questionnaire outcomes and have significant effects on study variables including information recording ( $P=0.001$ ), organization ( $P=0.001$ ), evaluation and classification of problems ( $P=0.001$ ), recommendations and actions ( $P=0.002$ ) and quality of service provider's performance ( $P=0.001$ ). However, there was no significant effect on the field of planning of health related services. Also, as shown in Table 2 there was no significant effect on their parent's satisfaction and awareness. Therefore, the electronic health records improved the quality of health services in children, while it had no effect on their parents.

**Table 1: Quality of health services provision for children before and after EHR intervention**

Variables	Before (mean ± SD)	After (mean ± SD)	P-value
Information recording	67.13 ± 32.93	93.10 ± 78.83	0.001
Organization	73.11 ± 40.87	92.5 ± 19.73	0.001
Evaluation and classification of problems	40.5 ± 50.1	59.8 ± 85.51	0.001
Recommendations and actions	51.7 ± 87.03	65.8 ± 12.73	0.002
Planning	38.8 ± 36.57	44.6 ± 50.76	0.64
Quality of performance	20.6 ± 91.35	39.6 ± 11.09	0.001

The results are described as means ± Standard Deviation

P-value ≤ 0.05 was considered as statistically significant.

**Table 2: Quality of health services provision for parents of children before and after EHR intervention**

Variables	Before (mean ± SD)	After (mean ± SD)	P-value
Satisfaction	75.16 ± 28.72	84.11 ± 29.01	0.45
Awareness	76.12 ± 40.81	82.6 ± 30.50	0.78

The results are described as means ± Standard Deviation

P-value ≤ 0.05 was considered as statistically significant.

**DISCUSSION**

Although, previous studies have evaluated the EHR implementation in various diseases, the purpose of this study was to evaluate the EHR implementation in a vulnerable population of children under the age of one year. Moreover, the effect of EHR implementation on their mother’s children was also evaluated. The results of the current study demonstrated improvement of quality of health services in the treatment of children including information recording, organization, evaluation-classification of problems, recommendations-actions and quality of service provider’s performance. To our knowledge, due to the limited of studies in EHR and children field, we will also compare the current study with the studies in different populations.

Consistent with our result in improvement of quality of service provider’s performance, Menacheni *et al.* reported that the use of EHR in health care could improve maternal and child care [11]. Also, Romano *et al.* reported the impact of EHR implementation in improving the quality of health services [12]. However, Crosson *et al.* indicated that the use of EHR have no significant effect on the quality of service provider’s performance in diabetic patients [13]. The difference between the results of studies may be due to the various populations.

In line with our study about evaluation-classification of children problems and recommendations-actions for them, Denaxas *et al.* indicated that EHR can improve the quality of service providers in evaluation and classification problems as a valuable tool in cardiovascular patients [14]. Also, Tajolddini *et al.* reported that effective interventions such as EHR could improve the health care provision for children and their mothers including evaluation-classification of problems and recommendations-actions [15].

One of the most important changes in the service provider performance and the evaluation-classification process is the fact that before EHR implementation, there were many mistakes in the classification of children’s problems.

Classification means that the child should be assessed from various aspects, which include: signs of danger, general condition, jaundice, nutritional status, weight, height, head circumference, eyesight, development, vaccine status and pharmaceutical supplements. According to various aspects assessments, children are placed in a category and recommendations-actions are taken by health care providers for child. Since, EHR was intelligent system and the error rate in the classification of the children problem was zero, so all the assessments of children status calculated correctly. Although, recommendations-actions for children problems are another important issues in children care, this is done correctly if health care providers have addressed the evaluation-classification of the problems precisely [16,17].

Moreover, the results of the current study reported that EHR improved the quality of service providers’ performance in the field of organization. The organization field includes micro processes for instructions and training materials, estimation of medicine, supplement and equipment that all of them have been improved by EHR intervention. The main reason for this improvement is due to its electronic mode, so service provider can easily access them and offer the necessary training.

The present study elucidated the improvement of children information recording in medical records. Consistent with this result Ajami *et al.* reported HER reduce multiple problems of paper prescription, waste of time, care costs, medication errors, an adverse effect of medication and generally increasing the efficiency and quality of care [18].

In addition to all these effects, the EHR implementation has no significant effect on the parents’ satisfaction and awareness. Consistent with results Garrison *et al.* reported no change in satisfaction and awareness by HER intervention. Also, Stevenson *et al.* reported EHR implementation has no effect on parent’s children satisfaction and awareness [19]. The main reason is the requirement for enough time to educate parents and

increase their awareness that is limitation in the current study. In conclusion, EHR in health care can reduce unavoidable paper errors and improve the quality and provide more quality services for children care.

### CONCLUSION

EHR in health care can reduce unavoidable paper errors and improve the quality and provide more quality services for children care while it is cost effective and lead to fast services for patients from health care team.

### CONFLICT OF INTEREST

All authors declare that there is no conflict of interest.

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