



Designing a Model for Evaluating the Performance of Electronic Patient Referral System in the Healthcare System of Iran

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Abstract

Background: Electronic referral system (e-Referral system) in Iran was launched to increase access to care and improve interaction.

Objectives: The present study aimed to design an appropriate model for evaluating the performance of the e-Referral system in Iran.

Methods: This study was conducted in three stages: 1) review of literature related to electronic referral systems, 2) qualitative phase, and 3) quantitative phase. Participants in the qualitative phase included 42 managers, policymakers of the Ministry of Health, medical universities, service providers, and recipients who were purposively selected for this study. Data were analyzed through content analysis. In the quantitative phase, the target group consisted of 604 staff of medical universities implementing the e-Referral system. Data were analyzed using the EQS (version 6.3) and SPSS (version 20) software. Chi-square test, degree of freedom, the goodness of fit index, root mean square error, adjusted goodness of fit index, and the Friedman test were used to investigate the suitability of the model.

Results: Fourteen main themes were identified and classified for the model design. Based on the results of the present study. The components of developing rules and regulations, stakeholder advocacy, economic evaluation, and quality of health services had average ratings of 13.99, 13.00, and 11.35, respectively, regarding their role in designing the evaluation model for the e-Referral system in Iran.

Conclusion: The results of structural equation modeling showed that the components play an essential role in designing the performance evaluation model of e-Referral in the Iranian health system. This study addressed various aspects affecting the e-Referral and provided the possibility of performance evaluation in the health sector in a principled and systematic format. Health managers and policymakers can use the present study findings to discover the strengths and weaknesses of the e-Referral performance.

Keywords: Delivery of health care, Electronic health records, Electronic humans, Iran, Physician-patient relations, Referral and consultation

1. Background

The varying needs of societies have necessitated the reform and evolution of health systems in all countries (1). In the healthcare system, the volume of referrals from primary care physicians to specialized care professionals has steadily increased worldwide (2). Gaps in the referral process have led to interruptions in patients' access to care, negative patient experience, worse health outcomes, and increased operation costs (3). What is observed in paper-based referrals is a delayed referral and booking due to incomplete or missing information of patients or clinical laboratories (4, 5). To this end, health organizations have started using electronic referral systems (e-Referral systems) to simplify the process and alleviate some of the existing inefficiencies (3).

There are currently more than 17 e-Referral systems in various countries, including the United Kingdom, Norway, Finland, the Netherlands, Denmark, Scotland, New Zealand, Canada, Australia, and the United States (6).

The e-Referral system has been implemented in Iran since 2017. The Ministry of Health started prioritizing individuals' electronic health records to

solve the problems of the past manual referral system (7). This new technology is associated with greater provider satisfaction (8) and is likely to help address unfair access in fragmented and inefficient systems(9).

The results of a study by Shephard et al. showed that redesigning the paper-based referral system and turning it into an electronic system is more efficient and safer from patients' points of view (10). On the other hand, Osman et al. indicated that the obstacles to the application of e-Referrals include problems related to privacy and security, lack of sufficient knowledge, ease of using this technology, lack of acceptance of new technology, and the required costs (11). The design and appraisal of healthcare systems softwares are strongly influenced by local laws (12). For this reason, and due to the opportunities, benefits, effects, and harms of these systems, the significance of evaluating their performance is already apparent (13). Evaluations can identify the emerging unintended consequences and thus help prevent potential adverse outcomes (14). Stylianides et al. stated that for the evaluation framework to be effective, it must be designed and implemented based on the research objectives and specific needs of the treatment complex or hospital (15). Considering the

significance of economic costs, in addition to the potential social and cultural benefits and harms of such technologies, systems have been designed to evaluate the performance of health technology in many developed countries to provide information for decision and policymakers (16, 17).

The results of evaluating electronic systems and comparing them to international standards revealed that the quality of domestic electronic systems is far lower than the global standard. Based on the evaluation results, designers and manufacturers of these systems can identify strengths and weaknesses, update their products, and contribute to the advancement of technology in the country (18).

The review of Iranian studies conducted on the e-Referral system (7, 19, 20) has illustrated that due to the novelty of the subject, not much applied and analytical research has focused on this area of the health system, resulting in various research gaps in this regard. However, foreign studies dealing with this issue, such as Othman et al. (21), Bouamrane (2), and Cronholm (22), have pointed out the influencing factors in the process of improving the performance of the electronic system. Additionally, the studies for the evaluation of the e-Referral system were often conducted in hospitals, and all levels of the health system did not receive enough attention.

In previous research, there is no model related to e-Referral evaluation in Iran, and most of the studies presented the electronic health record evaluation model. The current study presented a model for evaluating the performance of the e-Referral system in Iran. Moreover, it aimed to provide an efficient and effective model following the social, cultural, economic, and managerial conditions of the country concerning the health system. Identification of effective components in evaluating the performance of these systems will help managers and officials active in the field of health services to better understand these factors and subsequently make appropriate decisions to provide better services and favorable conditions for the treatment of patients.

2. Objectives

This study designed and presented a model to evaluate the performance of the e-Referral system in Iran and provide the possibility of evaluating performance in a principled and systematic format in the health sector.

3. Methods

This study was conducted in Iran from 2020 to 2021. It was a mixed-methods study performed in three stages. Firstly, scientific articles and reports were reviewed based on the mentioned search criteria through browsing resources in domestic (IranMedex, Iran doc SID, medilib, and Magiran) and

foreign databases (Scopus, PubMed, and ProQuest). All published global reports on modeling interventions from 2005 onwards were cited. The background literature provided the theoretical basis for designing the interview questions.

In the second stage, qualitative data collection was performed through a semi-structured and in-depth interview. Snowball sampling was used to select the participants, and interviews were performed until achieving data saturation. In a qualitative study, it is necessary to continue until the researcher reaches theoretical saturation meaning that no new information will be obtained as the work continues. Therefore, in the present study, due to the repetition of themes, a sample size of 42 people was sufficient. All participants had specialized executive positions in the health system, including managers, policymakers, executive deputies of the Ministry of Health and medical universities, service providers, recipients, and faculty members in health services management, health policy, and health economics (Table 1). Criteria for the inclusion of experts in the study were the minimum requirement of a master's degree, enough knowledge of the e-Referral system, and willingness to participate in the present study. Inclusion criteria for the service recipients were the minimum requirement of a high school diploma and using an e-Referral system at least once (Table 2). On the other hand, individuals who did not have enough information on the subject or did not want to participate in the interview were excluded from the study.

Data collection tools included semi-structured interactive interviews in individual and sometimes group formats. The interview guide questions were designed based on a review of the literature and the comments made by informed advisers. Pilot interviews were then conducted with two experts. Afterward, their deficiencies were resolved by the research team. The interviews were conducted in the participants' workplace after setting an appointment with them and confirming the face and content validity of the interviews.

The interviews lasted between 30 to 75 min. After recording each of them, their audio files were immediately transcribed verbatim, and initial analysis of their content was performed to provide a guide to continue the process of data collection and analysis. The researcher recorded any uncertainties or questions that arose through reviewing the data and then followed up on them in telephone interviews or the following interviews with other participants. The data were analyzed manually through content analysis, which consisted of five steps: familiarization with the interview, developing a working analytical framework, indexing, charting, and interpreting the data.

In the familiarization step, the key themes were listed. In the second step, a thematic framework of the key topics was prepared, which was used in the

Table 1. Demographic characteristics of the participants in the qualitative phase

Variable	Grouping	Frequency / (percentage%)	Variable	Grouping	Frequency / (percentage%)
Gender	Male	34 (80.95)	Job position	Manager	14 (33.33)
	Female	8 (19.05)		University faculty member	7 (16.66)
Number Of Participants	Experts	38 (90.47)		Specialist at hospital	5 (11.90)
	Electronic referral service recipients	4 (9.52)		Medical Doctor in the health center	6 (14.28)
Work experience of experts (Years)	3-10	7 (16.6)		E-Referral service provider	6 (14.28)
	10-17	12 (28.57)		E-Referral service recipient	4 (9.52)
	17-24	9 (21.42)		Ministry of Health	4 (9.52)
	24-30	14 (33.33)		University of Medical Sciences	17 (40.47)
Level Of Education	Medical Doctor	22 (52.38)		Health center	9 (21.42)
	Bachelor's degree	4 (9.55)		Hospital	8 (19.04)
	Master's degree	4 (9.55)	Health insurance	2 (4.76)	
	Ph.D.	12 (28.57)	Management and Social Health Research Center	2 (4.76)	

E-Referral: Electronic Referral

Table 2. Demographic characteristics of participants in the quantitative phase

Variable	Grouping	Frequency / (percentage%)
Gender	Male	383 (63/41)
	Female	8 (19.05)
Work experience of experts (Years)	10>	186 (30.79)
	11-20	226 (37.42)
	21-30	171 (28.31)
	>30	21 (3.48)
Level of Education	Medical Doctor	262 (43.38)
	Bachelor's degree	225 (37.25)
	Master's degree	85 (14/07)
	Ph.D.	32 (5.28)
Job Position	Manager	30 (97/4)
	University faculty member	17 (2.81)
	Medical Doctor in the health center	251 (41.56)
	Headquarters expert	199 (32.95)
	E-Referral service provider	107 (17,72)

E-Referral: Electronic Referral

indexing stage for structuring all the data. In the charting step, a table was drawn for each theme, and the data were transferred to it. In the interpretation step, the relationships among codes, subthemes, and themes were described. Two professors and qualitative research experts verified the credibility of the data through accurate and stepwise control of the research process.

The third stage was the quantitative phase in which the research population and target group were 604 managers, staff experts, and service providers in medical universities who were implementing the e-Referral system. Participants were selected based on random cluster sampling from medical universities in five regions of the country (west, east, north, south, and center). In this phase, a structured questionnaire with 118 questions was designed based on the main categories and themes. It was a researcher-made questionnaire based on the qualitative analysis, and then its standardization steps were performed in the quantitative phase. The questionnaire consisted of three parts. The first part included demographic information. The second part contained 118 questions about resource management (8 questions),

information technology (IT) management (14 questions), stewardship (8 questions), health services rules, regulations, and guidelines (7 questions), stakeholder participation (7 questions), social commitment (4 questions), culturalization (7 questions), quality of health services (14 questions), supervision and control (11 questions), justice in the provision of health services (12 questions), payment system (3 questions), economic evaluation (12 questions), and promotion of health index (10 questions). The questions were designed in a 5-point Likert Scale format with the responses including strongly agree (1), agree (2), have no idea (3), disagree (4), and strongly disagree (5).

Content validity of the questionnaire items and the construct validity were checked and confirmed using confirmatory factor analysis. Based on the standardization results, the CVI value for all questions was higher than 0.49, and the CVR value was higher than 0.79. Its reliability was also confirmed by Cronbach's alpha coefficient (above 0.70).

The collected data were analyzed using the EQS (version 6.3) and SPSS (version 20) software. Descriptive statistics and analytical tests used for

data analysis included the Chi-square test, degree of freedom, the goodness of fit index, root mean square error, and adjusted goodness of fit index. The final model was also analyzed using the Friedman test for the factor loading. Ethical considerations in both qualitative and quantitative phases included completing the consent form by the participants, observing the confidentiality of information, the right to withdraw from the study at any stage, and obtaining the code of research ethics from the Ethics and Research Committee of the universities (IR.IAU.CHALUS.REC.1397.025).

4. Results

Based on reviewing previous studies, the theoretical framework of the present study was obtained. Furthermore, after reviewing the literature on issues related to e-Referral and e-health, a performance evaluation was performed on e-health programs in different countries and Iran using an interview guide for the target groups of policymakers and facilitators. The e-Referral program for service recipients was also prepared.

The research findings in the qualitative stage showed that the categories and themes for the e-Referral performance evaluation model can be categorized into 14 main themes (Figure 1). Table 2 shows the demographic characteristics of the participants in the quantitative phase.

As for evaluating the appropriateness of the proposed model, according to Table 3, the results showed that all indicators were suitable for designing a performance evaluation model for the e-Referral system in Iran. As it was observed, all the indicators for confirmatory factor analysis of the e-Referral performance of the Iranian health system did not exceed the limit, making it possible to confirm that the data fit this model. Additionally, the results of structural equation modeling, according to Table 4, showed that the components play a significant role in designing the performance evaluation model of e-Referral of the health system in Iran. For example, the first theme with a size of 0.89 and the fifth theme with a size of 0.82 justify the changes in the evaluation of electronic referral performance.

In order to rank the known components in the e-Referral performance system in Iran, the Friedman test was used, the results of which are shown in Table 5. The findings showed that developing rules and regulations, economic evaluation, and quality of health services with averages of 13.99, 13.00, and 11.35 were

Table 3. Report on the appropriateness of e-Referral performance in the Iranian health system

Indicator	Estimated Value	Limit
Chi-square test	430.49	
Root Mean Square Error of Approximation	0.10	Less than 0.8
Modified Fitness	0.94	Above 0.85

E-Referral: Electronic Referral

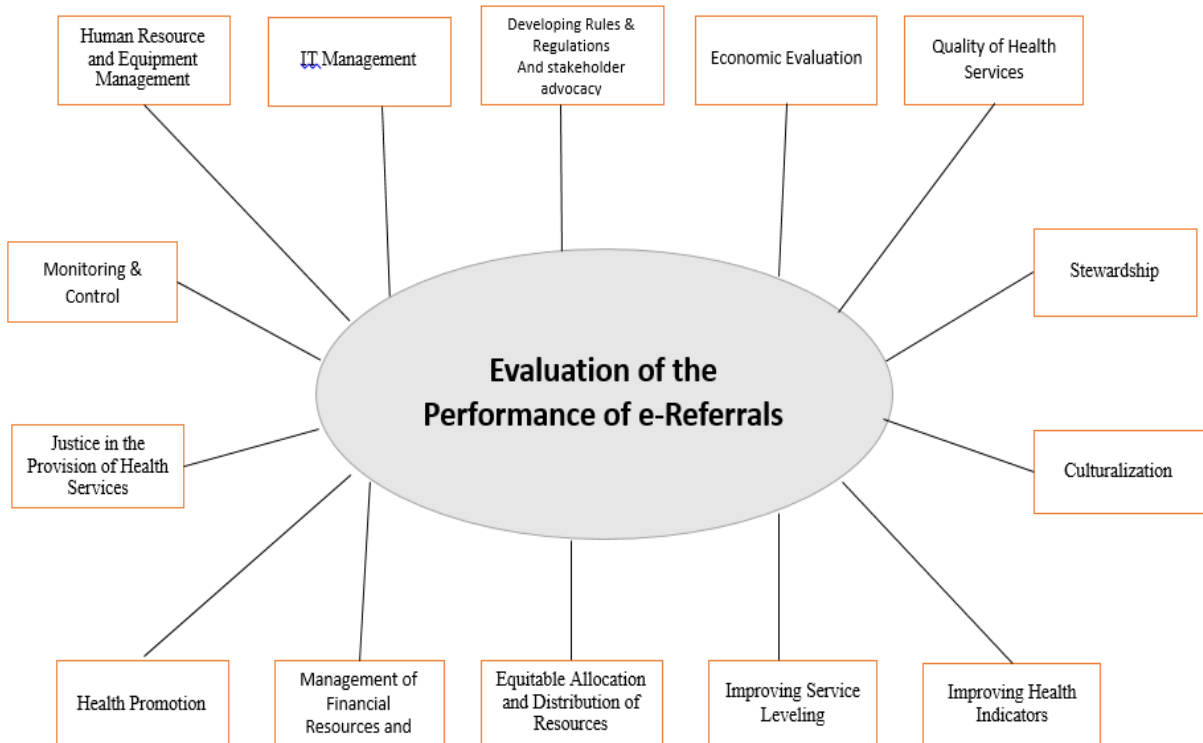


Figure 1. Categories extracted from the experiences of study participants

Table 4. Statistical characteristics of e-referral performance evaluation analysis in the Iranian health system

Factor load	Components		Number
	Model components (symbol)	Model main variable (symbol)	
0.89	Developing Rules & Regulations and stakeholder advocacy	Evaluation of the Performance of e-Referrals Model	1
0.87	Economic Evaluation		2
0.85	Quality of Health Services		3
0.84	Monitoring & Control		4
0.82	Justice in the Provision of Health Services		5
0.82	Stewardship		6
0.81	IT Management		7
0.77	Improving Health Indicators		8
0.75	Improving Service Leveling		9
0.74	Equitable Allocation and Distribution of Resources		10
0.70	Human Resource and Equipment Management		11
0.65	Culturalization		12
0.61	Continuity of care		13
0.57	Management of Financial Resources and Budget		14

Table 5. Rank of the known components in the e-Referral performance of the Iranian health system

Component	Average rating	Priority	The value of Friedman's statistics	P-value
Developing rules and regulations and stakeholder advocacy	13.99	1	7458.843	<0/001
Human resource and equipment management	5.72	9		
Information technology Management	11.28	4		
Improving health indicators	9.37	6		
Quality of health services	11.35	3		
Economic evaluation	13.00	2		
Justice in the provision of health services	7.18	8		
Stewardship	9.39	5		
Monitoring and control	8.09	7		
Improving service leveling	4.12	11		
Culturalization	5.35	10		
Equitable allocation and distribution of resources	3.11	12		
Management of financial resources and budget	2.01	13		
Health promotion	1.05	14		

the most essential components, respectively. Moreover, health promotion gained the lowest rank with an average of 1.05, as the weakest component in designing the e-Referral performance evaluation model of the Iranian health system. Furthermore, IT management, stewardship, improving health indicators, monitoring and control, justice in the provision of health services, human resource and equipment management, culturalization, improving service leveling, equitable allocation and distribution of resources, as well as management of financial resources and budget, ranked 4th to 14th in the model design, respectively.

5. Discussion

This study aimed to present a model to evaluate the performance of the e-Referral system in Iran. In the present study, 14 main components were identified to design the model (Table 4). Olyaeemanesh et al. in a study stated that health technology evaluation is one of the best scientific tools in the service of policymakers. For this purpose, the priorities of the Health Technology Assessment Group included health system management, stewardship, stakeholders, infrastructure, external

pressures, lack of coordination at the policy level, lack of legal support for health technology, and inadequate resource allocation (23). These findings were consistent with the results of the present study.

Based on the results of the present study, laws and regulations should be planned and implemented at the national level and all involved organizations (such as the Insurance, the Ministry of Health, and the Ministry of Communications and Information Technology) should participate in the development and implementation of laws. Naseriasl et al. in a study claimed that the common models of the referral system that have recently been established in developed countries have important features and capabilities, such as the use of referral guidelines, standard referral forms, and the integration of the referral system with electronic health records (6).

This study showed that it is very important to pay attention to the development of insurance and legal laws in the e-Referral system and that managers and policymakers should pay special attention to this issue. In the implementation of the e-Referrals, instructions and rules are not enough, and it is necessary to have stakeholders' advocacy and the support of all individuals, as well as organizations, that are involved in the implementation of this

program.

Based on the findings of this study, the most significant stakeholders in the implementation of the e-Referral system are service providers, service recipients, organizations, and institutions related to the program, such as the Insurance, the Ministry of Health, the Ministry of Communications and Information Technology, and the private sector. According to Bouamrane et al., it has taken over a decade and a half to successfully practice the adoption of e-Referrals through a continuous effort to engage with key stakeholders and allow changes in the practices, culture, and IT of the Scottish National Health System (2).

Service providers are considered the main complement to e-Referral information. Giuliani et al. indicated that individuals often focus on technology and ignore the programming and action of service providers. One of the cost-effective solutions is to train and provide more support for service providers to gain their advocacy (24).

It is also very essential to have service recipients' advocacy. Keely et al. stated that a successful service should be based on patient preferences (9), which can be achieved through the observance of the Charter of Patients' Rights and Privacy, belief and commitment of managers and service providers to provide quality services, meeting the needs of society, and using representatives of service recipients to participate in the design and implementation of the model.

Based on the results of the present study, economic evaluation ranked second among the main components in the proposed model. This component is involved in developing a model with the sub-areas of the payment system, benefit-cost, opportunity cost, cost-effectiveness, cost-utility, and financial protection. In a study, Signal et al. revealed that in recent years, efforts to reduce unnecessary costs and increase the efficiency of the health system were the most critical concerns of policymakers in most countries (25). Meanwhile, Lau stated that the results of the economic evaluation of the e-Referral system may be financial or non-financial (26). An economic evaluation of the e-Referral is needed to determine whether the costs of implementing e-Referrals are justified after the implementation of the program.

The quality of health services, gaining the third rank, is one of the main areas of the model. Service providers' and recipients' satisfaction should be examined to assess the quality of health services. Measures, such as electronic queue management, have reduced the waiting time, increased patient satisfaction, and increased the quality of care through patient records and referral feedback.

Another measure to assess the quality of e-Referral services was to establish a text message satisfaction survey system. Additionally, evaluating the quality of feedback improvement and reducing

referrals were significant. The results of the study by Bouamrane et al. showed that the overall benefits of using e-Referrals across the patient's path outweighed any potential problems (6). In another study, Scheibe et al. found an improvement in the relationship between service providers, as well as the ability to improve triage and increase the efficiency of patient visits (27), which was consistent with the results of the current study. Based on the findings of the present study, another item in evaluating the quality was the evaluation of community satisfaction. At first, people resisted the implementation of the e-Referral system as it increased the waiting time. However, electronic queue management, electronic prescription, and the implementation of e-Referral raised satisfaction in the long run. On the other hand, the results of a study by Kabir et al. showed that in pilot hospitals, the e-Referral system could not meet patients' expectations regarding any of the five components of service quality (28).

As the findings revealed, other effective components in the e-Referral system include human and equipment resource management, financial resource management, as well as information technology management. The results of the study by Tajari et al. denoted that resource management, stewardship, and stakeholder advocacy are the success factors of the e-Referral system (29). Abu Bashar et al. and Acquah-Swanzy indicated that shortcomings in the information and communication technology infrastructure could create problems in integrating services into different parts of the health system (30, 31). Furthermore, Kamau et al. suggested in their study that health systems should improve infrastructure and provide referral policies, guidelines, and standard referral forms. (32) The results of the study by Bastani et al. also confirmed this (33).

It was also found that providers' concerns about increasing workload, resistance to change, as well as lack of the required knowledge and skills, were among the most important issues that should be considered in human resource management. The findings of the previous studies were also consistent with the results of the present study regarding the significance of physical, equipment, and human resources management (34).

In this study, the role of IT management was examined in the areas of information security, information integrity, information exchange speed, and information access. The results showed that the implementation of e-Referral was a multidimensional process influenced by technical, human, and organizational factors and that information confidentiality, the development of patient data protection, and safety guidelines should be considered. Palvia et al. noted that backing up and facilitating the retrieval of patients' information, as well as anti-spyware and anti-spam software, should

be considered in the information security check-up (35). Moreover, Sittig et al. introduced a set of nine self-assessment tools called the Guarantee of Safety in Electronic Health Interventions (36).

Another sub-area of information technology management is information access. The results of the present study showed that it is essential that service providers and recipients increase access to patient care records, manage information accessibility, and increase patients' access to their health information. Furthermore, Tuot et al. in their study, stated that e-Referral and counseling systems have a high potential for easy access, coordination, and appropriateness in providing intensive care services (37), which confirmed the results of the present study.

The findings of the present study showed that evaluating the speed of information exchange is important in IT management. Warren et al. found that overall, referral management was faster, more reliable, and more transparent than the previous paper-based cases (38).

As the present study results indicated, service leveling is another major component. Some key features of the e-Referrals include the improvement of the referral process and feedback, reduction of arbitrary, unnecessary, and reverse referrals, as well as the possibility of tracking referrals and feedback in the e-Referral system. Accordion to Doumouras et al., referrals increased significantly after the implementation of the online referral system (8). Therefore, the successful implementation of this program requires the development of an operational plan that identifies the correct factors affecting the establishment and implementation of the program, as well as the cooperation and active participation of all responsible organizations in improving the establishment and sustainability of the program. The e-Referral is promising in that it helps to address inequitable access in fragmented and inefficient systems. In reviewing the related literature, the researchers found that local studies have so far investigated the challenges and provided solutions for the success of the e-Referral system. Moreover, in the foreign studies reviewed by the researchers, no model was found regarding the performance evaluation of the referral system that pays attention to both levels of healthcare centers and hospitals. To this end, the researchers investigated the effective dimensions in assessing the performance of the e-Referral system in the form of a model.

Based on the evaluation results, managers, health system policymakers, and designers of these systems can identify the strengths and weaknesses and help the advancement of technology in the country by examining the challenges and solving the existing problems.

The limitations of the present study included the difficulty in attracting the cooperation of experts and specialists due to the conditions of the country at the

time of the COVID-19 pandemic, the newness of the e-Referral system in the country, and the insufficient number of foreign and local studies. However, the researchers tried to fix them through their follow-up while considering the importance of the study.

6. Conclusion

The purpose of the current study was to present a model to evaluate the performance of Iran's e-Referral system. Fourteen main components were identified to design an e-Referral performance evaluation model using expert opinion and previous studies.

Finally, the results of the present study showed that the components of formulating laws, stakeholder advocacy, economic evaluation, and quality of health services gained the highest ranks with mean scores of 13.99, 13, and 11.35, respectively, whereas the component of continuity of care with a mean score of 1.05 had the lowest rank in designing the proposed model (Table 5).

This study provided rich documentation of the outcomes of managers', policymakers', and service providers' efforts to design a performance appraisal model for a successful e-Referral program. In the present study, various aspects affecting the e-Referral system have been addressed, and the possibility of performance evaluation in the health sector has been provided in a principled and systematic format. It is then suggested that health managers and policymakers use the results of the present study to discover the strengths and weaknesses of e-Referral performance.

Based on the components identified in this study, there is a need for specialized research to evaluate the performance of the e-Referral system, understand its efficiency and effectiveness, and design an instrument for a comprehensive evaluation of the performance of the e-Referral systems in Iran according to healthcare conditions.

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Footnotes

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References

- Mastaneh Z, Mouseli L. Health information position in new reform of american health care system. *Health Inf Manag.* 2011;**8**(1):97-101.
- Derakhshani N, Maleki M, Pourasghari H, Azami-Aghdash S. The influential factors for achieving universal health coverage in Iran: a multimethod study. *BMC Health Serv Res.* 2021;**21**(1):1-13. doi: [10.1186/s12913-021-06673-0](https://doi.org/10.1186/s12913-021-06673-0).
- Odisho AY, Lui H, Yerramsetty R, Bautista F, Gleason N, Martin E, et al. Design and development of referrals automation, a SMART on FHIR solution to improve patient access to specialty care. *JAMIA Open.* 2020;**3**(3):405-12. doi: [10.1093/jamiaopen/ooaa036](https://doi.org/10.1093/jamiaopen/ooaa036). [PubMed: 33215075].
- Hughes CA, Allen P, Bentley M. eReferrals: Why are we still faxing? *Aust J Gen Pract.* 2018;**47**(1):51-6. doi: [10.31128/AFP-07-17-4285](https://doi.org/10.31128/AFP-07-17-4285). [PubMed: 29429313].
- Mahmodi G, Omraninava M, Nikpour B, Qasemabad EO. Evaluation of the management of family physicians health care services to diabetic patients in rural areas of Northern Iran. *Int J Clin Med.* 2018;**9**(2):1-12. doi: [10.4236/ijcm.2018.92010](https://doi.org/10.4236/ijcm.2018.92010).
- Naseriasl M, Adham D, Janati A. E-referral solutions: successful experiences, key features and challenges- a systematic review. *Mater Sociomed.* 2015;**27**(3):195-9. doi: [10.5455/msm.2015.27.195-199](https://doi.org/10.5455/msm.2015.27.195-199). [PubMed: 26236167].
- Kabir MJ, Heidari A, Honarvar MR, Khatirnamani Z, Badakhshan A, Rafiei N, et al. Establishment of an electronic referral system in golestan province: opportunities and threats. *J Health Res.* 2020;**6**(2):151-67.
- Doumouras AG, Anvari S, Breau R, Anvari M, Hong D, Gmora S. The effect of an online referral system on referrals to bariatric surgery. *Surg Endosc.* 2017;**31**(12):5127-34. doi: [10.1007/s00464-017-5578-x](https://doi.org/10.1007/s00464-017-5578-x). [PubMed: 28447254].
- Keely E, Liddy C. Transforming the specialist referral and consultation process in Canada. *CMAJ.* 2019;**191**(15):408-9. doi: [10.1503/cmaj.181550](https://doi.org/10.1503/cmaj.181550). [PubMed: 30988040].
- Shephard E, Stockdale C, May F, Brown A, Lewis H, Jabri S, et al. E-referrals: improving the routine interspecialty inpatient referral system. *BMJ Open Quality.* 2018;**7**(3):1-8. doi: [10.1136/bmjopen-2017-000249](https://doi.org/10.1136/bmjopen-2017-000249). [PubMed: 30306139].
- Osman MA, Schick-Makaroff K, Thompson S, Featherstone R, Bialy L, Kurzawa J, et al. Barriers and facilitators for implementation of electronic consultations (eConsult) to enhance specialist access to care: a scoping review protocol. *BMJ Open.* 2018;**8**(9):1-8.
- Hekmat S, Dehnavieh R, Behmard T, Khajehkazemi R, Mehroolhassani M, Poursheikhali A. Evaluation of hospital information systems in Iran: a case study in the Kerman province. *Glob J Health Sci.* 2016;**8**(12):1-9. doi: [10.5539/gjhs.v8n12p95](https://doi.org/10.5539/gjhs.v8n12p95).
- Maneshgar H, Mohamadi SH, Karim Zadegan D, Madani SJ. A model for assessment of health care workers' health monitoring. *J Mil Med.* 2012;**13**(4):223-7.
- Mozaffar H, Cresswell KM, Williams R, Bates DW, Sheikh A. Exploring the roots of unintended safety threats associated with the introduction of hospital ePrescribing systems and candidate avoidance and/or mitigation strategies: a qualitative study. *BMJ Qual Saf.* 2017;**26**(9):722-33. doi: [10.1136/bmjqs-2016-005879](https://doi.org/10.1136/bmjqs-2016-005879). [PubMed: 28174319].
- Stylianides A, Mantas J, Roupas Z, Yamasaki EN. Development of an evaluation framework for health information systems (DIPSA). *Acta Inform Med.* 2018;**26**(4):230-4. doi: [10.5455/aim.2018.26.230-234](https://doi.org/10.5455/aim.2018.26.230-234). [PubMed: 30692704].
- Bennett S, Peters DH. Assessing national health systems: Why and How. *Health Syst Reform.* 2015;**1**(1):9-17. doi: [10.1080/23288604.2014.997107](https://doi.org/10.1080/23288604.2014.997107). [PubMed: 31519082].
- Nasrollahpour Shirvani D, Tahmasby B. A review of health systems performance assessment models. *Clin Exc.* 2016;**5**(2):98-116.
- Chen AH, Murphy EJ, Yee HF. eReferral--a new model for integrated care. *N Engl J Med.* 2013;**368**(26):2450-3. doi: [10.1056/NEJMp1215594](https://doi.org/10.1056/NEJMp1215594). [PubMed: 23802515].
- Kabir MJ, Haydari A, Honarvar MR, Khatirnamani Z, Badakhshan A, Rafiei N, et al. Executive Challenges of electronic referral system in the health centers and hospitals in golestan province, Iran: a qualitative study. *J Sch Public Health Inst Public Health Res.* 2021;**19**(2):157-72.
- Janati A, Amini A, Adham D, Naseriasl M. Referral system in Iran's health sector and world's leading countries. *Res J Pharm Technol.* 2017;**10**(6):1597-602. doi: [10.5958/0974-360X.2017.00281.5](https://doi.org/10.5958/0974-360X.2017.00281.5).
- Nassar DA, Othman M, Hayajneh JA, Ali Na. An integrated success model for an electronic health record: a case study of Hakeem Jordan. *Procedia Econ Financ.* 2015;**23**:95-103. doi: [10.1016/S2212-5671\(15\)00526-2](https://doi.org/10.1016/S2212-5671(15)00526-2).
- Cronholm S, Goldkuhl G. Strategies for information systems evaluation-six generic types. *Electron. J Inf Syst Eval.* 2003;**6**(2):65-74.
- Olyaeemanesh A, Doae S, Mobinizadeh M, Nedjati M, Aboee P, Emami-Razavi SH. Health technology assessment in Iran: challenges and views. *Med J Islam Repub Iran.* 2014;**28**:1-7. [PubMed: 25695015].
- Juliani C, MacPhee M, Spiri W. Brazilian specialists' perspectives on the patient referral process. *Healthcare.* 2017;**5**(1):1-12. doi: [10.3390/healthcare5010004](https://doi.org/10.3390/healthcare5010004). [PubMed: 28146046].
- Sanyal C, Stolee P, Juzwishin D, Husereau D. Economic evaluations of eHealth technologies: A systematic review. *PLoS One.* 2018;**13**(6):1-11. doi: [10.1371/journal.pone.0198112](https://doi.org/10.1371/journal.pone.0198112). [PubMed: 29897921].
- Lau F, Kuziemsky C. Handbook of eHealth evaluation: an evidence-based approach. Victoria (BC): University of Victoria; 2017.
- Scheibe MM, Imboden JB, Schmajuk G, Margaretten M, Graf JD, Chen AH, et al. Efficiency Gains for Rheumatology Consultation Using a Novel Electronic Referral System in a Safety-Net Health Setting. *Arthritis Care Res.* 2015;**67**(8):1158-63. doi: [10.1002/acr.22559](https://doi.org/10.1002/acr.22559). [PubMed: 25623810].
- Kabir MJ, Heidari A, Khatirnamani Z, Kazemi SB, Honarvar MR, Ebrazeah A, et al. Quality of health services and the factors affecting it: a cross-sectional study in pilot hospitals for electronic referral system. *Depiction of Health.* 2021;**12**(3):214-23. doi: [10.34172/doh.2021.22](https://doi.org/10.34172/doh.2021.22).
- Tajari F, Mahmoudi G, Dabbaghi F, Yazdani-Charati J. effective factors in the establishment and implementation of patient electronic referral system in the healthcare system: a qualitative study. *Iran J Health Sci.* 2021;**9**(3): 23-34.
- Acquah-Swanzy M. Evaluating electronic health record systems in Ghana: The case of Effia Nkwanta Regional Hospital. [Master's Thesis]. Norway: UiT Norges arktiske universitet; 2015.
- Bashar MA, Bhattacharya S, Tripathi S, Sharma N, Singh A. Strengthening primary health care through e-referral system. *J Family Med Prim Care.* 2019;**8**(4):1511-3. doi: [10.4103/jfmpc.jfmpc_184_19](https://doi.org/10.4103/jfmpc.jfmpc_184_19). [PubMed: 31143753].
- Kamau KJ, Osuga BO, Njuguna S. Challenges facing implementation of referral system for quality health care services in Kiambu county, Kenya. *Health Res Policy Syst.* 2017;**04**(1):1-9. doi: [10.21767/2254-9137.100067](https://doi.org/10.21767/2254-9137.100067).
- Bastani P, Abolhasani N, Shaarbafchizadeh N. Electronic health in perspective of healthcare managers: a qualitative study in south of Iran. *Iran J Public Health.* 2014;**43**(6):809-20. [PubMed: 26110152].
- Bouamrane MM, Mair FS. A qualitative evaluation of general practitioners' views on protocol-driven eReferral in Scotland. *BMC Med Inform Decis Mak.* 2014;**14**(1):1-14. doi: [10.1186/1472-6947-14-30](https://doi.org/10.1186/1472-6947-14-30). [PubMed: 24712766].

35. Palvia P, Lowe K, Nemati H, Jacks T. Information technology issues in healthcare: hospital CEO and CIO perspectives. *Commun Assoc Inf Syst.* 2012;**30**(1):293-312. doi:[10.17705/1CAIS.03019](https://doi.org/10.17705/1CAIS.03019).
36. Sittig DF, Salimi M, Aiyagari R, Banas C, Clay B, Gibson KA, et al. Adherence to recommended electronic health record safety practices across eight health care organizations. *J Am Med Inform Assoc.* 2018;**25**(7):913-8. doi: [10.1093/jamia/ocy033](https://doi.org/10.1093/jamia/ocy033). [PubMed: [29701854](https://pubmed.ncbi.nlm.nih.gov/29701854/)].
37. Tuot DS, Leeds K, Murphy EJ, Sarkar U, Lyles CR, Mekonnen T, et al. Facilitators and barriers to implementing electronic referral and/or consultation systems: a qualitative study of 16 health organizations. *BMC Health Serv Res.* 2015;**15**(1):1-10. doi: [10.1186/s12913-015-1233-1](https://doi.org/10.1186/s12913-015-1233-1). [PubMed: [26687507](https://pubmed.ncbi.nlm.nih.gov/26687507/)].
38. Warren J, White S, Day KJ, Gu Y, Pollock M. Introduction of electronic referral from community associated with more timely review by secondary services. *Appl Clin Inform.* 2011;**2**(4):546-64. doi: [10.4338/ACI-2011-06-RA-0039](https://doi.org/10.4338/ACI-2011-06-RA-0039). [PubMed: [23616895](https://pubmed.ncbi.nlm.nih.gov/23616895/)].