

Electronic Personal Health Record Assessment Methodology: A Review

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Abstract—ePHR (Electronic Personal Health Record) is not a new concept in the era of electronic health information. The advantages of ePHR in improving health outcomes through patient empowerment have been recognized globally and almost all countries that implement electronic health records (EHR) have created ePHR. This study identifies the components of the ePHR implementation study methodology that has been conducted throughout the country. The types of ePHR studies selected were adoption studies, acceptance studies, readiness studies, and evaluation studies. This study's systematic literature review process is identification, screening, eligibility, data abstraction, and analysis. A total of 16 final journals were analyzed from 173 journals identified from 5 databases (Science Direct, WoS, Scopus, JMIR, and PubMed) regardless of the year of publication until April 1st, 2021. Among the findings based on the four objectives of the study, there are two findings that are considered important and interesting by the author; first, the existence of 22 additional variables to the evaluation model by almost all studies in this study which shows a clear need to improve the evaluation model which is the TAM Model. Second, although the proposal of conducting a scientific study to evaluate the perspective of ePHR stakeholders before ePHR is developed only appeared once, based on this study and the knowledge of the authors, it is a starting point for the successful implementation of ePHR. These two findings contribute to the recommendations for the best design of the ePHR implementation study described in this paper.

Keywords—Personal health record; ePHR; ePHR evaluation variable

I. INTRODUCTION

A. PHR (Personal Health Record)

PHR is part of health information. Health Information can provide five supporting powers to individuals, namely prevention, treatment, protection, health service and resource planning [1]. A physician knows the more knowledge about a patient, the higher the patient's chances of receiving the best possible health care. Patients also need adequate health resources to recover more quickly while receiving fewer complications from the optimal treatment [2]. The increasing population equipped with new and complex health treatments has increased the demand for better and more efficient health services around the world. Complicated health problems have created more complex health care processes. The need for complete health information for better treatment is also increasing. Now, it can be seen that the increase in Electronic Health Record (EHR) initiatives is one of the methods of

winning this issue [3], [4]. PHR emerges from an EHR and is defined as a health record related to a patient-administered treatment [5]. PHR is a general data set of individual lifelong health information that the public understands that can be securely [6] accessed at any time for the purpose of treatment (illness) and wellness. PHR is owned and managed entirely by the individual or a party appointed by that individual. PHR can exist in the form of electronic health records that comply with recognized interoperability standards and can be sourced from a various sources while accessed, shared, and operated by individuals [7]. EHRs are generated throughout the patient's engagement with healthcare-related parties. This information consists of patient demographic data, patient progress records, patient problems, patient medications, patient health reading level information, patient medical history, patient immunizations, laboratory test result data and patient x-ray report. EHRs automate the workflow of physicians. EHR has some limitations because its records are based entirely on data reported by healthcare providers [8], [9] resulting in the existence of a trend that allows patients to gain access to their health data and makes them the owners of such data called PHR [10]. Based on the literacy study [10], PHR and EHR have different purposes, namely PHR is for the personal domain and EHR is for the organizational domain. The PHR is used for self-health management and monitoring that can be collaborated with the patient's digital device. At the same time PHR can integrate with EHR, EMR and other systems such as health insurance systems. PHR and EHR also can be integrated to exchange relevant patient health information [10]. Electronic Medical Record (EMR) is an application that consists of a repository of clinical data, clinical decision support, medical terminology, order requests by staff and medical practitioners and clinical documentation applications [7]. This environment supports patients' EMR in inpatient and outpatient environments and is used by healthcare practitioners to document, monitor, and manage health delivery services. Individual health information can be created, collected, managed and consulted by physicians and staff of healthcare organizations [7].

B. PHR Implementation

Based on this studies, it was found that PHR has existed since 1973 [11] and ePHR has existed since 2001 [12]. PHR is classified based the on health service provider, user type and system channel [5]. PHR user profiles are patients/individuals, health professionals and authorized third parties (patient/individual families and government parties) who perform the

process of consultation, monitoring and maintenance of individual health [10]. PHR exists in the form of paper, and computer systems integrated between several health facilities and hybrids (computer systems that can be accessed anywhere) [10]. There are 20 types of data (Allergies, Demographic, Documents, Evolution, Family History, General, Genetic, Home Monitor, Immunizations, Insurance, Laboratory Results, Major Illness, Medications, Prescriptions, Prevention, Providers, Scheduling, Social History, Summaries and Vital Signs) that exist in the PHR and half of them (Documents, Evolution, Immunizations, Insurance, Laboratory Results, Medications, Prescriptions, Scheduling, Summaries and Vital Signs) exist in the EHR [10].

C. Implementation of ePHR in Malaysia

Until April 1st, 2021, it shows that Malaysia has not yet conducted any ePHR acceptance study. Referring to the Information Technology Strategic Plan of the Ministry of Health Malaysia 2016-2020 [13], ePHR is not listed as one of the initiatives to be implemented. However, there is a journal [14] that shows the production of variable models (UTAUT2 and PMT) to study of ePHR acceptance in Malaysia. Still, the authors found no references to show the results of studies using such models. Next, there is a study [15] prepared for the Ministry of Health Malaysia (MoHM) to develop a Lifetime Health Record (LHR) system [13]. The study yielded the structure of the LHR dataset. This dataset is prepared for the MoHM based on the clinical consultation process and the use of patient demographic records in the clinic. This LHR dataset is provided according to the needs of healthcare professionals. The proposed LHR has three components namely Patient Master Information, Health Condition Summary and Episode Summary. This research concludes that ePHR needs to be developed by taking into account the structure and components of LHR records according to the needs and perspectives of Malaysians. Also, there was last finding a study [16] about LHR in hospital and clinic of Ministry of Defense Malaysia.

D. Need for the Review

According to Alsaifi [5] the implementation of the health record computer system is moving from a service provider control information system to a patient/individual control information system, namely, ePHR (electronic PHR). He also noted that several countries such as the United States, England and Australia have chosen to implement globally integrated ePHR to improve the quality of health service delivery. The results of his study concluded that, although the advantages of ePHR are agreed almost worldwide, the acceptance rate of the implementation of ePHR is still at a low level. The authors have agreed with HS Park's suggestion that research is needed before ePHR is developed to identify the real needs and concerns of those interested in ePHR [17] and thus be one of the ways to solve the problem of low ePHR acceptance rate. Based on the reading of the journal until April 1st, 2021, the authors have agreed that a systematic review of the literature on the methodology of existing ePHR implementation studies (readiness, adoption, adaptation and evaluation) is needed to determine the best study design for ePHR studies.

II. OBJECTIVE OF STUDY

The objectives of the study to be archived sequentially are as follows:

1) *To identify the scope of the ePHR implementation study:* The authors define the meaning of the scope of ePHR implementation as a study of two research boundaries, namely studies before or after the implementation of ePHR and the categories of ePHR study respondents such as patients, public, health professionals and others.

2) *To identify ePHR implementation research methodology:* The methodological component chosen in this study is the method of collecting and analyzing research data which is qualitative, quantitative or mixed methods. Next, the authors want to see, the method is categorized according to the scope of the study that has been identified when achieving the first objective.

3) *To identify ePHR implementation acceptance models and the results:* The authors want to identify the models that exist in ePHR implementation studies including the variables that exist in those studies. Next, the authors wanted to obtain all results from all selected studies.

4) *To identify ePHR implementation study recommendations:* The authors want to get specific improvement suggestions for the implementation of ePHR that exist and are not bound to the scope of the study that has been identified in the achievement of the first objective.

III. METHODOLOGY

Referring to systematic literature review study by Mohamed Shaffril [18], the systematic literature review process used for this study follow the same process which are identification, screening, eligibility, data abstraction and analysis.

A. Identification

To identify the journal topic for this study, the search was made based on the review searching topic map as in Fig. 1.

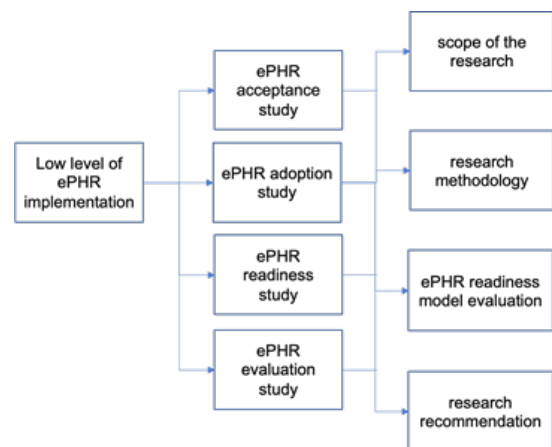


Fig. 1. Review Searching Topic.

Journal searches based on the topics in Fig. 1 were made in the databases of Science Direct (SD), World of Science (WoS), Scopus, Journal of Medical Internet Research (JMIR) and PubMed. As of April 1, 2021, the number of journals obtained based on the selected keywords and databases are as shown in Table I. The total number of a document identified was 173. The keywords used throughout this study are as follows:

- 1) Keyword A = “Personal Health Record” AND “Acceptance”
- 2) Keyword B = “Personal Health Record” AND “Adoption”
- 3) Keyword C = “Personal Health Record” AND “Readiness”
- 4) Keyword D = “Personal Health Record” AND “Evaluation”

TABLE I. NUMBER OF JOURNAL BY KEYWORD AND DATABASE

	SD	WoS	Scopus	JMIR	PubMed	Total
Keyword A	0	12	11	1	3	27
Keyword B	3	30	41	3	9	86
Keyword C	0	1	1	0	0	2
Keyword D	2	23	21	1	11	58
Total	5	66	74	5	23	173

B. Screening

The first screening is a review of the title and author of the document. Duplicate documents will be removed from the list. Next, a second screening was made by selecting published documents as journals and published in English. The journal is also a journal that is in the final stages. The screening results are as in Table II. Since the document identification results show that studies on the implementation of PHR are still lacking, this study does not specify the year of publication of the journal. The final number of journals after the second screening was 53.

TABLE II. NUMBER OF JOURNAL BY KEYWORD AFTER SCREENING

Keyword	Journal	Total
Keyword A	[19], [17], [20], [21], [14], [22], [23], [24],	8
Keyword B	[25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [46], [47], [48], [49], [50]	26
Keyword C	[51]	1
Keyword D	[52], [53], [54], [55], [56], [57], [58], [59], [60], [61], [59], [62], [63], [64], [65], [66], [67], [68]	18
Total Journal		N=53

C. Eligibility

At this stage, the journal abstract is read carefully to identify the scope, methodology, evaluation model, results and recommendations of the study. If such information is not available in the abstract, a reading will be performed on the main document of the journal. Journals containing incomplete

information are removed for further processing. Finally, a total of 16 articles as in Appendix I were selected for analysis. The percentage of the selected journal that provides sufficient information for the study is described in Table III. It shows only 9% of the journals found could be analyzed.

TABLE III. NUMBER AND PERCENTAGE OF SELECTED JOURNAL FOR THE STUDY

Identification		Screening			Eligibility	
Keyword A						
27	Y	8	8	Y	6	6
	N	19		N	2	
Keyword B						
86	Y	26	26	Y	8	8
	N	60		N	18	
Keyword C						
2	Y	1	1	Y	0	0
	N	1		N	1	
Keyword D						
58	Y	18	18	Y	2	2
	N	40		N	16	
173	Y	53 (31%)	53	Y	16 (30%)	16 (9% of journal found)
	N	120 (69%)		N	37 (70%)	

Notes:

Y = Selected journal after certain review process

N = Rejected journal after certain review process

D. Data Abstraction and Analysis

The methods of analysis used in this study are as follows:

1) *Data extraction*: Data related to the five major themes were extracted from the journal’s primary documents. The themes are the scope, methodology, evaluation model, results and recommendations of the study.

2) *Data grouping*: Data for the scope, methodology and evaluation model were consolidated and grouped according to sub-themes as in Appendix I. The original data for the results and recommendations were summarized and grouped according to the themes of the data as in Appendix II.

IV. FINDINGS

The findings of the study were compiled based on the objectives of the study.

A. Study about the Scope of the ePHR Implementation

Based on the analysis, it was found that 9 (56%) studies were implemented before ePHR was implemented. 8 (50%) studies were conducted before ePHR was implemented. 10 (62%) studies made patients as respondents, 5 (31%) studies used health professionals, 3 (19%) studies used the general public and 1 (6%) studies used health organization management staff. Only 1 of the 16 studies incorporated 3 groups of respondents: patients, health professionals and management staff of health organizations and the study was conducted before the implementation of ePHR. All studies (3

studies) involving the general public were evaluated before ePHR was implemented. Meanwhile, 6 out of 10 studies involving patients were evaluated after the implementation of ePHR.

B. Study about the Research Methodology for ePHR Implementation

It was found that 11 (69%) studies were conducted with a quantitative method, 3 (19%) studies with mixed-method and 2 (12%) studies with qualitative method. For the studies conducted before implementation of ePHR, only 7 (78%) studies were conducted quantitatively and the remaining 2 (22%) studies were conducted qualitatively. Furthermore, for the studies conducted after the implementation of ePHR, 4 (50%) studies were conducted quantitatively, 3 (38%) studies with mixed methods and 1 (12%) studies were conducted qualitatively. It is found that all studies that make the public as respondents use a similar method that is quantitative methods. Meanwhile, 6 (60%) studies on patients were conducted quantitatively, the remaining 3 (30%) studies were conducted qualitatively and 1 (10%) studies were mixed method.

C. Study about the Acceptance Models and Results for ePHR

It was found that eight (50%) studies adapted the TAM (Technology Acceptance Model) model as the evaluation model, two (12%) studies used the UTAUT (Unified Theory and Use of Technology) model and 6 (38%) studies used the SDT (Self-Determination Theory) model. Of the 16 studies, only 1 study used the TAM model completely without additional variables. The remaining 15 (94%) studies selected additional variables based on researcher’s knowledge named SDT. Of the 15 studies, 7 (47%) studies were combined with the TAM model, 2 (13%) studies were combined with the UTAUT model and the remaining 6 (40%) studies used the SDT model entirely. TAM combined variable model developed by Fred Davis in 1989 based on TRA (Theory of Reasoned Action) by Ajzen and Fishbein [24]. TAM contains two main factors of acceptance of a technology: Perceived Usefull (PU) and Perceived Ease-of-Use (PEOU). Venkatesh developed UTAUT in 2003 due to the integration of 8 models [69]. UTAUT has three factors that influence Behavioral Intention (BI) Factors: Performance Expectancy, Effort Expectancy, and Social Influence. Two factors that influence Use Behavior Factors are BI and Facilitating Conditions. There are four types of moderators, namely, Gender, Age, Experience and Voluntariness of Use. The SDT variables that has identified by this study are as shown in Table IV.

Referring to Appendix II, the results of the study are summarized into thhree themes, namely, all IVs have an effect on DV, some IVs do not have an effect on DV and the number of themes produced. It was found that almost all studies gave the same results, that is, all the variables (IVs and themes) studied have been scientifically proven to affect the implementation of ePHR.

D. Study about Recommendations for ePHR Implementation

Appendix II contains recommendations from 16 studies summarized into 8 themes and taken the total frequency of the recommendations were raised. Table V shows the list of suggestions arranged according to most frequently mentioned.

A summary of all the findings categorized according to the first three objectives of the study is as in Appendix III.

TABLE IV. SDT VARIABLE BY QUALITATIVE STUDY

SDT Variable (Quantitative Study)	Journal
1. Confidentiality 2. Privacy	[27]
3. e-Health Literacy	[19]
4. Physician Autonomy Support 5. Autonomous Causality Orientation 6. Basic Needs Satisfaction	[32]
7. Health-care technology self-efficacy	[31]
8. Perceived data privacy 9. Security protection 10. Perceived health-promoting role model	[22]
11. Subjective Norm, 12. Security & Privacy 13. Computer self-efficacy	[43]
14. Task Technology Fit 15. Patient Activation Measure	[33]
16. Physician-patient Relationship	[23]
17. Technology Barriers	[24]
18. Perceived Risk 19. Facilitating Conditions	[17]
20. Compatibility 21. Communicative	[70]
22. Impact on current workflow	[38]

TABLE V. LIST OF RECOMMENDATION

Percentage of frequency	Recommendation
62%	1) Increase ePHR awareness or education among stakeholder
50%	2) The health professional should play a central role to improve utility and consequently the adoption of the ePHR
31%	3) Design ePHR application according to stakeholder need and concern
19%	4) Policymakers, and health-care providers must pay additional attention to increasing individuals conviction and confidence in using the ePHR
6%	5) Conduct sufficient study to identify stakeholders’ perspective and need before ePHR development/ implementation.
6%	6) Healthcare policy-makers, physicians, and developers must consider actions to improve the usability of ePHR in the future
6%	7) Some legal and ethical issues also need to be considered for ePHR adoption
6%	8) Improve the quality of the physician-patient relationship

V. DISCUSSION OF RESULT

Based on the findings of the study, the matters to be discussed of result are divided into three, namely the improvement of the evaluation model, the selection of key recommendations and the best design for ePHR implementation study.

A. Improvement of ePHR Evaluation Model with SDT

Referring to Appendix I, 69% (11 out of 16) of the studies were carried out quantitatively using the popular model that is TAM or UTAUT and 91% (10 out of 11) of the studies created an additional variable (SDT) that was combined with the existing model. These additional variables are scientifically proven to impact ePHR implementation. This shows that there is a need for improvement of either TAM or UTAUT models to evaluate health digital initiatives and researchers cannot wait for these improvements and are forced to develop their own SDT. The scientific selection of SDT was not addressed clearly in most of the research paper. It was found that the additional variables used by the researchers were based on the knowledge of the researchers [27], [31].

Based on the findings of this study, it can be concluded that there is a significant scenario of adding variables to the TAM and UTAUT models. Therefore, researchers who want to study the implementation of ePHR and want to identify the appropriate evaluation model, the authors suggest that they refer to the list of SDT variables in Table IV to get broad ideas for determining additional variables that want to be combined with the TAM or UTAUT model. All SDT variables listed have been scientifically proven by researchers and almost all of these variables have been evaluated from the patient's point of view. Researchers who want to improve the TAM or UTAUT Model or want to create a new model, researchers can also refer to Table IV to develop the most suitable model to evaluate the implementation of digital health initiatives so that the initiative is finally accepted and used fully.

B. Selection of Key Recommendation of ePHR Implementation

Although the awareness program is the most frequently mentioned recommendation, but the authors strongly agreed that the fifth recommendation in Table VI is the main and best recommendation that should be considered by all parties involved in the implementation of ePHR. Directly, the fifth recommendation is the first step to the success of the third recommendation expressed by 31% of the study. The fifth recommendation can indirectly help implementation the remaining recommendations.

C. The Best Design for ePHR Implementation Study

From these two findings, 9/16 studies (56%) were conducted before the ePHR was implemented and 6% conducted sufficient studies to identify the perspectives and needs of stakeholders before the development/implementation of the ePHR, the authors argue that although the studies before and after did not show significant differences in the pattern of results and percentage of the population, there are research recommendations before the development/implementation of ePHR that are selected as key recommendations as described in

previous sub topic that can be taken seriously by ePHR implementation researchers.

It was found that seven out of nine (78%) studies conducted before the implementation of ePHR, were carried out qualitatively, since the majority of studies carried out before the implementation of ePHR were carried out qualitatively, this study uses the same approach. It is in line with the concept of research design [71] which is exploratory towards the perspective of the general public, patients and health professionals towards the development/implementation of ePHR which is more suitable to be carried out qualitatively.

As explained in sub-topic V(A), the ePHR implementation study is thought to be most suitable to be carried out by using the TAM model which is improved with SDT variables as in Table IV which can be studied on patients, the public and health professionals together or separately.

VI. LIMITATION AND RECOMMENDATIONS

From the point of view of digital initiative evaluation theory, this study only focuses on the evaluation of ePHR implementation. The authors chose to identify the components of the research methodology specific to ePHR before answering the question of whether the components of the ePHR evaluation model are similar to the digital initiative evaluation model in other areas such as finance, transportation and so on. Before comparisons can be made, a review of digital initiative evaluation studies in other fields must be conducted. The next question that may be studied is the model of evaluating health digital initiatives from the point of view of the public, patients, health professionals and health service providers as health digital initiatives have now changed from professional-centric to patient-centric.

VII. CONCLUSION

It is hoped that the results of this study can help those who want to develop, implement and evaluate ePHR. The authors believe that the new variables listed are realistic and up-to-date variables as well as recommendations that have been identified as relevant to be implemented for the successful implementation of ePHR.

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Appendix. I. LIST OF JOURNALS WITH METHODOLOGY INFORMATION FOR ANALYSIS

Journal (N=16)	Country	Period of Study		Respondent				Methodology			Evaluation Model		
		BFR	AFT	PB	P	O	HP	QTY	QLY	MM	TAM	UTAUT	SDT
ePHR Acceptance Study (n=6)													
[19]	Saudi Arabia	✓		✓				✓				✓	✓
[17]	Korea	✓					✓	✓				✓	✓
[21]	Canada		✓		✓		✓	✓			✓		✓
[22]	USA		✓				✓	✓			✓		✓
[23]	Taiwan		✓		✓			✓			✓		✓
[24]	USA	✓			✓			✓			✓		
ePHR Adoption Study (n=8)													
[27]	Iran	✓			✓			✓			✓		✓
[30]	UK		✓		✓					✓			✓
[31]	Taiwan	✓		✓				✓			✓		✓
[33]	North America	✓			✓			✓					✓
[32]	Canada	✓		✓				✓			✓		✓
[35]	Canada	✓			✓	✓	✓		✓				✓
[38]	USA		✓		✓					✓			✓
[43]	Taiwan		✓		✓			✓			✓		✓
ePHR Evaluation Study (n=2)													
[53]	German	✓	✓				✓		✓				✓
[60]	USA		✓		✓					✓			✓
% of sub theme		56	50	19	62	6	31	69	12	19	50	12	94

Note:

Period of Study : BFR=Before ePHR Implementation; AFT=After ePHR Implementation

Respondent : PB=Public, P=Patient, O=Organization, HP=Health Professional

Methodology : QTY=Quantitative, QLY=Qualitative, MM=Mix Method

Evaluation Model : UTAUT=Unified Theory Of Acceptance And Use Of Technology, TAM=Technology Acceptance Model, SDT=Self-Determination Theory

Appendix. II. LIST OF JOURNALS WITH RESULTS AND RECOMMENDATIONS FOR ANALYSIS

Result & Suggestion	Result			Suggestion									
	All IV effect DV	Some IV not effect DV	Number of theme identified	Increase ePHR awareness or education among stakeholder	Conduct sufficient study to identify stakeholders' perspective and need before ePHR development/ implementation	Design ePHR application according to stakeholder need and concern	The health professional should play a central role to improve utility and consequently the adoption of the ePHR	Policymakers, and health-care providers must pay additional attention to increasing individuals conviction and confidence in using the ePHR	Healthcare policy-makers, physicians, and developers must consider actions to improve the usability of ePHR in the future	Some legal and ethical issues also need to be considered for ePHR adoption	Improve the quality of the physician-patient relationship		
Journal (N=16)													
[19]	✓			✓	✓								
[17]	✓					✓							
[27]	✓					✓							
[30]	✓		3				✓						
[31]	✓			✓		✓		✓					
[70]	✓			✓			✓		✓				

[53]			4	✓			✓					
[32]		✓					✓	✓	✓			
[33]	✓			✓								
[35]			5	✓							✓	
[22]	✓			✓				✓				
[23]	✓			✓			✓					✓
[60]			3	✓								
[24]	✓							✓				
[38]	✓		4					✓				
[43]				✓				✓	✓			
Percentage of sub theme	89%	6%	NA	62%	6%	31%	50%	19%	6%	6%	6%	6%

Appendix. III. SUMMARY OF FINDINGS

No.	Objective of Study	Category	Findings
1.	Scope of ePHR Implementation Study	<ul style="list-style-type: none"> Study Time Category <ul style="list-style-type: none"> Before the implementation of ePHR After ePHR Implementation Respondent Category <ul style="list-style-type: none"> Patients Public Organization Health Professionals 	<ul style="list-style-type: none"> 9/16 studies (56%) were conducted before ePHR was implemented 8/16 studies (50%) were conducted after ePHR was implemented. 10/16 studies (62%) were conducted on patients 5/16 studies (31%) were conducted on health professionals 3/16 studies (19%) were conducted on the general public 1/16 studies (6%) were conducted on management staff. 1/16 studies combined 3 groups of respondents (patients, health professionals and management staff) conducted prior to ePHR implementation. 3 studies involving the public were evaluated before the ePHR was implemented 6 of the 10 studies involving patients were evaluated after ePHR implementation
2.	Methodology of ePHR Implementation Study	<ul style="list-style-type: none"> Methodology Category <ul style="list-style-type: none"> Quantitative Qualitative Mixed Methods 	<ul style="list-style-type: none"> 11 studies (69%) were conducted using quantitative methods 3 studies (19%) were conducted with mixed methods 2 studies (12%) were conducted with qualitative methods 7 out of 9 studies (78%) conducted before the implementation of ePHR, were carried out quantitatively. 7 out of 9 (78%) studies conducted before the implementation of ePHR, were carried out qualitatively. 4 out of 8 studies (50%) conducted after the implementation of ePHR, were carried out quantitatively. While 3 studies are mixed methods and the remaining 1 study is carried out qualitatively.
3.	Assessment Model of ePHR Implementation Study	<ul style="list-style-type: none"> Assessment Model Category <ul style="list-style-type: none"> Technology Acceptance Model (TAM) Unified Theory of Acceptance and Use of Technology (UTAUT) Self Determination Theory (SDT) 	<ul style="list-style-type: none"> 8 studies (50%) used TAM 2 studies (12%) used UTAUT 15 studies (94%) established additional variables (SDT) <ul style="list-style-type: none"> 7 out of 15 studies (47%) combined SDT with TAM 2 out of 15 studies (13%) combined SDT with UTAUT 6 out of 15 studies (40%) used SDT without TAM / UTAUT combination.