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## Article

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# **Impact of Health Information Technology Adoption and its Drivers on Quality of Care & Patient Safety in the Health Care Sector of Pakistan**

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## **Article History**

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## **Abstract**

This research aims to examine the impact of IT launch, technical support regarding IT, and the length of IT usage on healthcare outcomes including patient safety and quality of care. This study examines health information technology adoption as a mediator in this research model. To accomplish this purpose, the researchers collected data through a self-administered questionnaire from people working in the health sector of Pakistan. Data was analyzed by using two statistical software SPSS and AMOS covering descriptive analysis, confirmatory factor analysis, and structural equation modeling. Results of the study impose that IT launch has a positive and significant impact on patient safety and quality of care. Length of IT usage also has a positive and significant impact on patient safety and quality of care. The technical support regarding IT has a positive and significant impact on patient safety but an insignificant impact on the quality of care. Moreover, results indicate that health IT adoption plays a significant mediating role in this research model.

**Keywords:** health information technology adoption, patient safety, quality of care, technological factors, Information technology launch, technical support, length of usage of technology.

## **1. Introduction**

Health information technology is practically being adopted in the health care sector of developing countries. Using computerized system support the health data's organization and ensures the protected interchange of health statistics among customers, benefactors, financiers, and quality controllers. Health information technology also includes the adoption of communication and information expertise to collect, transmit, exhibit, or stock patient records (Alrahbi et al., 2021). In developing countries, the adoption of information and communication technologies and the deployment of different technical factors in the healthcare sector are recognized to be very influential for the improvement of healthcare

organizations and their efficiencies and competencies in the form of enhanced quality of care and improved patient safety.

Implementation of a countrywide electronic health record (EHR) scheme in an emerging nation like Turkey has presented a most important healthcare revolution manifest via reform of prime care distribution and the real application of infrastructural upgrading and technical support (Findikoglu & Watson-Manheim, 2016). The adoption of health information technology refers to the adoption of new health IT tools both as hardware and software that will be playing a major role in increasing productivity (Barton, 2010). It is widely believed to provide good quality health services and increased patient safety to the citizens. This is the reason why technically advanced nations like Europe are revolutionizing HIT adoption across the continent in the recent era.

A prospective benefit of keeping patient accounts by electronic means is the reduction of time to consult with a doctor. Many doctors are already using the phone and electronic mails to discuss and delight their patients and colleagues. Gradually, clinicians can use HIT to support the patient in controlling their prolonged diseases. According to Lavin, Harper, and Barr (2015), launching and penetration of new technology like the adoption of HIT through technical support can bring revolution in the health care industry across the globe. However, launching or implementing new technology is not a trivial task to do as the National Institute of Health additionally suggested that it is very important to have technical support on hand for accurately implementing healthcare technology and for reaping its benefits over time. For this important task to be accomplished, the National Health Service alongside the associated medical services needs qualified graduates to produce very important and efficient technical support in hospitals. Furthermore, researchers suggest that IT adoption is evolving as an important influencing factor in clinical gratification and quality improvement. Organizations across the world simply cannot realize the actual benefits of the adoption of HIT in a short period of time. The Healthcare sector's progress can be assessed by measuring the achievement of specified targets including both administrative and clinical targets which depend upon the length of use of technology. Eventually, health organizations aim to enhance healthcare (Khalifa, 2013). To fulfill this aim, there is an extreme need for persistent efforts and time to make IT an important part of the organizational culture of healthcare organizations (McIntosh & Shaw, 2003).

In the current unpleasant situation of the health systems across the globe, numerous health traders no longer retain the latest health innovations and implementations along with technical support. They keep an eye on recommendations but do not monitor and measure their routine of practice due to discrepancies in length of usage of information technology and lack of coordination with one another. This problem is not prevailing in developing countries only but it is also prevailing in technologically advanced countries (Chaudhry et al., 2006). According to Ud Din et al. (2017), circumstances are more alarming domestically as the governmental healthcare organizations in Pakistan have not adopted HIT or any good technical support at present. Adoption of one or more HIT utilities resulted in enhanced safety of the patients in different areas as it reduced errors and improved proficiency.

Therefore, the purpose of this study is to evaluate elements or factors that motivate clinicians to adopt HIT in the health sector. Secondly, it also aims to evaluate the outcomes of adopting HIT for the safety and security of patients as well as QC in Pakistan. The study tends to raise theoretical awareness regarding the importance of information technology in the healthcare sector, which is likely to enhance information technology adoption and utilization among different health care institutions in Pakistan. Moreover, the study has also improvised with the outcomes of the adoption of healthcare information technology, including patient safety and quality of care, which will be adopted in Pakistani health care institutions to raise standards. This study aims to examine the influence of information technology launch on a patient in the context of Pakistani healthy organizations. It further tests the relationship between the length of using technology and quality care for patient safety. Moreover, this study is testing the adoption of HIT as the mediating factor in the relationship between launch information technology and quality care and safety for the patient in hospitals of Pakistan, which is one of the novel aspects of this study.

The coming portion of the paper is organized as follows: in the second portion of the study, past relevant studies are discussed and reviewed to develop study hypotheses. The third portion gives information regarding methodology, study model, study sample, and ways for the measurement of the variables. The fourth portion of the study elaborates on finding while the fifth and last part of the study sheds light on discussion and conclusion, limitation, and recommendations for further research on the area.

## **2. Literature Review**

### *2.1 Information Technology launch and Healthcare Outcomes*

The information technology system is precariously used for a durable health care arrangement. This system is adopted to improve the services' quality through more efficient and efficacious care. Unluckily, the maintenance of these system facilities in some countries like African countries is questionable because of complaints associated with the issuance of the service (Magrabi et al., 2016). Commonly, the workers can understand the benefits and values of the health care information system (HCIH) to enhance the effectiveness and efficiency of the information health care mechanism. The issues in the implementation of this effective system are the lack of awareness as well as the absence of knowledge about information technology. This lack of awareness and knowledge can make the user confused while using the system resulting in less frequent usage (Meri et al., 2019). Information technology is considered an important part of health's E-health plan department in South Africa, where more than Rs 15 million have been invested in many information technologies projects in current years. The first Ethiopian information technology project's implementation was failed in different aspects of the National information technology project in South Africa. Lack of management plan, high staff turnover, inadequate buy-in from consultants, and no business model are regarded as some factors causing this failure (Campione et al., 2019). Further issues include the transmission and connectivity of large files, incompatibility of software, and a delegation of project management to health authorities who cannot estimate for ongoing information technology services. The method of "if you put it in place, they will use it" shows the absence of

understanding about human management along with cultural factors which are needed to be solved for achieving the goal of change management and technology adoption (Mars, 2013). On the other hand, the implementation of new technology is a difficult initiative. Persons become more comfortable as well as easy with the use of the system, which is already employed. Furthermore, they may worry about the time for relearning the new way to perform responsibilities that they are already doing without any deliberation. They may show resistance to adopt a new system even though in the end, the innovative HIT system helps to make all processes stress-free and more economical. According to the study of Sittig et al. (2020), information technology has an influential and significant impact on patient safety through enhanced technological advancements and improvements in the healthcare system. According to many researchers, information technology is likely to play a significant role in updating and improving the healthcare sector, which enhances the level of patient safety and quality of health care (Pisani et al., 2018; Seblega et al., 2015). An impulsive bombing or fault as well as this steep learning curve normally make new technical operations less appealing. Based on the above discussion, the following hypotheses are proposed:

- **H<sub>1a</sub>**: Information technology launch has a significant impact on patient safety.
- **H<sub>1b</sub>**: Information technology launch has a significant impact on the quality of care.

### *2.2 Technical Support Regarding Information Technology and Healthcare Outcomes*

Many epidemiological studies have focused on connecting measures of IT technical support and different physical health care outcomes. Nowadays, few studies are moving into fresher areas such as health associations with support receipt as well as provision. Researchers are also interested in the relevant pathways to outline involving potential biological (inflammation) as well as behavioral (health behaviors) appliances. Interventions struggling to apply basic effects of information technology support are extensive. However, the lengthier term effects of such interferences on physical health keep on being determined as such interferences show aptitude in manipulating the quality of life in many protracted disease populations (Xie & Carayon, 2015). In technical support, entities facilitate their workers through phones, television, product software, and other electronic or mechanical goods instead of training, customization services, or programs for health care (Fong et al., 2020). Regardless of the adjacent ubiquity of mobile phones, some researchers emphasize putting into practice mobile health care apps to support patients' treatment and primary care. Primary care clinicians habitually treat a long-lasting conditions such as asthma as well as diabetes but mobile health can help integrate addiction while dealing in primary care (Quanbeck et al., 2018). Several researchers have associated the measurement with the app-based factors along with self-assessments. Features of some apps are very popular such as mood diary, mechanically initiated penalties unfavorably perceived (Sittig et al., 2020). Among the biggest revolutions, the digital revolution has provided significant benefits to the health care sector as the digital revolution has revolutionized the methods to store data and access data which has enhanced patient safety for sure (Pisani et al., 2018). Healthcare professionals are retrieving and utilizing the data of the patients from anywhere however, it is kept safe and private. The facilities of the

Internet and intranet have also allowed the health care professionals to share the medical information significantly and rapidly, which has made the health care operations more efficient (Seblega et al., 2015). Several researchers suggest that the use of new technology features supports the health care of patients especially in the case of primary care (Daus et al., 2018). Hence, the following hypotheses can be proposed:

- **H2a:** Technical Support regarding IT has a significant impact on patient safety.
- **H2b:** Technical Support regarding IT has a significant impact on the quality of care.

### *2.3 Length of Information Technical Usage and Healthcare Outcomes*

Organizations across the world simply cannot realize the true benefits of acceptance of health information technology in a short period. The performance of this sector can be evaluated by measuring the fulfillment of specified targets, in both clinical and administrative terms which are observable depending on the duration of use of technology. The basic purpose of health organizations is to increase healthcare. Therefore, the effect of time for accessing primary care has not been completely captured in the current continuity of care indices (Ha et al., 2019). Electronic health record system provides a variety of substantial compensations that are composed of advanced maintenance as well as reduced health expense and prices. Plain involuntary consequences after the application of such approaches are emerging. The National Institute of Health stated that it is required to have practical support for IT along with its usage over a long period for gaining real success in the sector of health care technology (Singh & Sittig, 2016). Based on the above discussion regarding the length of information technical usage, the following hypotheses are developed.

- **H3a:** Length of information technology usage has a significant impact on patient safety.
- **H3b:** Length of information technology usage has a significant impact on the quality of care.

### *2.4 The Mediating Role of Health Information Technology Adoption*

Jones et al. (2014) suggest that the reason for using the system of information health technology for clinical as well as economic health act (HITECH) by the US is to provide health records electronically. Health information technology increases efficiency as well as the quality of patient care. In the US, an open-source health system was surveyed. This system consists of electronic medical records, personal health care records, and electronic health records. The functionality, security features, and implementation technologies of the system are impressive. Health information technology helps in proper health care of customers and it is also linked with the informational technical support in which, electronic devices or software are provided to workers or people so that, the treatment can be available on primary stages of care. Health information technology project provides online medical records of patients. In 2013, this system implementing team rolled out in 170 health services bringing the plan closer to the conventional target of 300 distributions by 2015. With inherent trials of setting up software arrangement joined with limited possessions, at that time, there is a need for advanced solutions to decrease the cost of this software. The

implementing team has to face some challenges such as software cost, unreliable electricity, inadequate skills capacity, hardware costs, and constant system support challenges that need to be met. However, HIT provides a lot of benefits as the data of HIS can be used for examining patients' records so, this system helps in the treatment of patients especially in primary care (Karisa et al., 2014). Health information technology is used to set records of patients online for primary care of patients. This document introduced eight dimensions to address many challenges for information technology including engagement in design, implementation, expansion, and use as well as assessment of HIT with the critical adaptive health system. Significant changes in healthcare have been observed by various researchers after the adoption of information technology as the health care operations have not only been modified and innovated but also have become more efficient (Seblega et al., 2015). With the help of improved access to medical information and data, the health care sector has become more efficient and the data and information have become more private and secure. Big data is now being considered a big success in the health care sector because it is allowing the healthcare sector to gather a significant amount of data in minimal time (Pisani et al., 2018). However, many researchers found that eight dimensions are not enough and they are somewhat codependent as well as similar to the concepts of the configuration of other adaptive mechanisms (Alotaibi & Federico, 2017). Two more dimensions of the system are internal organizational functions such as policies, culture, and procedures, and external organizational rules and regulations. HIS also plays an important role in the treatment of patients and it also serves a moderating role for information technical support (Sittig & Singh, 2015). Following are the hypotheses proposed about the mediation of HIT in the current study.

- **H<sub>4a</sub>**: Health IT adoption significantly mediates the relationship between IT launch and patient safety.
- **H<sub>4b</sub>**: Health IT adoption significantly mediates the relationship between IT launch and quality of care.
- **H<sub>5a</sub>**: Health IT adoption significantly mediates the relationship between IT technical support and patient safety.
- **H<sub>5b</sub>**: Health IT adoption significantly mediates the relationship between IT technical support and quality of care.
- **H<sub>6a</sub>**: Health IT adoption significantly mediates the relationship between the length of IT usage and patient safety.
- **H<sub>6b</sub>**: Health IT adoption significantly mediates the relationship between the length of IT usage and quality of care.

The theoretical model presented in figure 1 shows the direct effects of information technology launch, technical support regarding IT, and length of IT usage on health outcomes (i.e. quality of care and patient's safety). Moreover, health information technology adoption has been utilized as the major mediator in relationships of IT launch, technical support regarding IT, and length of IT usage with healthcare outcomes.

The following figure presents the theoretical model of the study:

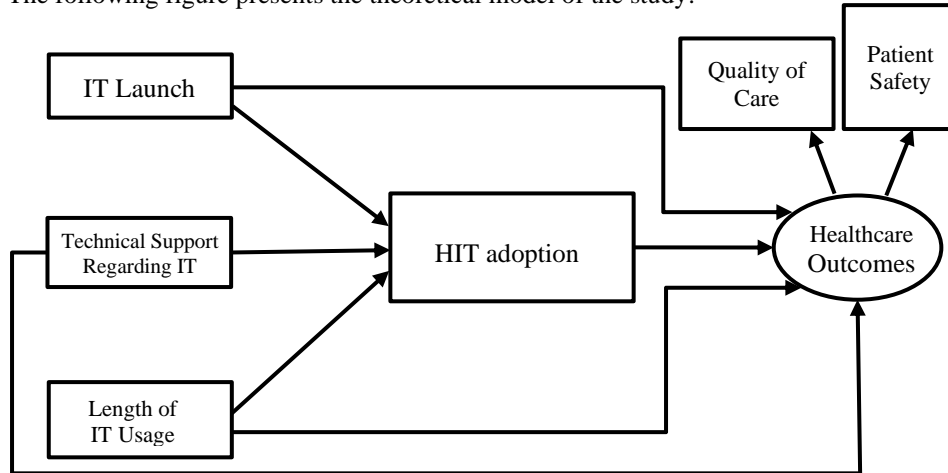


Figure 1: Theoretical Framework

### 3. Research Methodology

This study followed a quantitative approach as a research methodology. Population for this study involves healthcare organizations of Pakistan situated in Lahore and their staff members i.e., doctors, nurses, and managerial staff. The sample was selected with the utilization of the purposive sampling technique, which is suitable for this research because, in this study, participants were selected based on the judgment of the researchers. To obtain the required data from the selected sample, a self-administrative research instrument was compiled. To measure the responses given by the respondents, a Five-point Likert scale was used. This study was non-contrived as the research instrument was distributed in a natural setting and no manipulation was made in the environment of the respondents. Furthermore, researchers followed a cross-sectional research design for this study (Bryman & Bell, 2011). Respondents were accessed through personal meetings or e-mails and they were requested to fill the online questionnaire.

Respondents were guaranteed that their responses will be kept confidential and will not be misused. Confidence was provided to them that the investigation would take place at the summative level. According to formula, [number of questions in the instrument \* 10] at minimum, about 500 respondents were required to satisfy the generalizability of the results of this study. About 550 questionnaires were distributed through personal meetings and e-mail. Out of 550, a total of 417 received responses were complete and usable. Therefore, this study retained 417 responses so, the response rate for this study is 75.81%. The latest tools and techniques are applied to data through SPSS and Amos for data analysis. The normality of data is checked with descriptive analysis. Moreover, confirmatory factor analysis and structural equation modeling were performed for analysis results of which have been interpreted and presented in the fourth section of this paper.



3.1 Measures

The questionnaire for this study is adapted from prior studies and literature is the best source for this purpose. The scale for HIT adoption is adapted from the study of Alam, Masum, Beh, and Hong (2016). The scale to measure the IT launch is adapted from the study of Calantone and Di Benedetto (2012). The scale developed by the Aiken, Clarke, Sloane, and Consortium (2002) is used here to measure the quality of care. To measure the patient’s safety, the scale has been adapted from the study of (Xie & Carayon, 2015). The scale for technical support regarding IT is adapted from the study of Martín-Rojas, García-Morales, and Bolívar-Ramos (2013). The scale for measuring the length of IT usage is developed by the researcher and is evaluated through factor loading.

4. Study Findings

In this study, 204 females and 213 males participated. The total number of respondents is 417 from which 140 respondents (33.6%) reported their age falls within 41-45 years. 21 respondents (5%) reported their age less than 25 years. The age ranging from 26 to 31 years showed the frequency of 71, 31 to 35 years showed the frequency of 45, 36 to 40 years showed the frequency of 78, and the age above 45 years has shown the frequency of 62 with 14.9%. In the health sector, employee’s age factor plays a very important role. Of the total 417 respondents, 178 (41.2%) respondents are qualified MBBS degree holders, 148 respondents are FCPS degree holders while the remaining 97 participants have other degrees. The respondents' profile also shows that 181 respondents have 2 to 5 years’ experience, 141 respondents have 6 to 9 years of experience, 64 respondents have more than 9 years’ experience, and only 31 respondents have less than 2 years’ experience.

4.1 Descriptive Analysis

Descriptive analysis is performed for identifying outliers and the normality of data. Values of mean, minimum, and maximum tell about the presence or absence of outliers, while skewness value shows the normality of data:

Table 1: Descriptive Statistics

	N	Min	Max	Mean	SD	Skewness	
<b>IFL</b>	417	1.00	5.00	3.1442	1.1105	-.364	.120
<b>TSRIT</b>	417	1.00	5.00	3.3320	1.0938	-.549	.120
<b>LUIT</b>	417	1.00	5.00	3.5564	1.2232	-.603	.120
<b>HIT</b>	417	1.00	5.00	3.4506	1.1255	-.542	.120
<b>PS</b>	417	1.00	5.00	3.4868	1.1645	-.681	.120
<b>QS</b>	417	1.00	3.75	3.1001	.87484	-.580	.120
<b>Valid N (listwise)</b>	417						

Note: IFL=Launch of IT, TSRIT= technical support regarding IT, LUIT= length of IT usage, HIT= Health information technology adoption, PS= patient Safety, and QS= Quality of Care.

The findings of table 1 show that the minimum value for each construct is one and the maximum value is 5 so, there is no outlier in the data. The skewness value for each variable is under the range limit i.e. -1 to +1.

*4.2 Factor Analysis*

To test the suitability of data and constructs, factor analysis is performed. This test checks the selection capability for each variable with the whole model. It indicates the percentage of modification in the middle of variables affected by common variance. The coming two tables show the outcomes of Factor loading and KMO:

**Table 2: KMO and Bartlett's Test**

KMO of Sampling Adequacy		.959
Bartlett's Test	Approx. Chi-Square	36222.172
	Df	1225
	Sig.	.000

Results of KMO of sampling adequacy are considered significant and adequate if KMO is greater than 0.50. In this case, KMO is .959 which makes the result of the factor analysis to be useful. Bartlett's test is applied to test the correlation matrix hypothesis which states that it is an identity matrix implicating that variables are not related and not suitable for structure detection. A value less than .05 is considered significant in this case. The value in the current case at 1225 df is .00, which shows the significance of this factor analysis.

**Table 3: Reliability**

Constructs	N	Cronbach Alpha
IFL	7	.916
TSRIT	14	.931
LUIT	3	.897
HIT	11	.901
PS	11	.923
QS	4	.912

Cronbach Alpha is a measure of internal consistency, which represents how accurately a related set of items are representing and measuring a construct and how the variables are closely related to each other as a set. This is also known as the measure of scale reliability. A value greater than 0.9 is considered excellent, a value greater than 0.8 and less than 0.9 is considered good, a value greater than 0.7 and less than 0.8 is considered acceptable while a value lower than 0.5 is considered unacceptable. Based on this criterion, all of the values presented against the current variables in table 3 are showing that these variables have excellent internal consistency.

4.3 Measurement Model

CFA is a test applied to confirm the convergent and discriminant validity of the model. There are some indicators which are used to check the model fitness, like “ $\chi^2$ =Chi-square”, "DF=Degree of Freedom", "CMIN=Minimum Chi-square", "GFI=Goodness of Fit Index", "RMSEA=Root Mean Square Error of Approximation", "NFI=Normed Fit Index", and "CFI=Comparative Fit Index".

**Table 4: Model Fit Intercept (N=436)**

	Model Fit Indices	Threshold Range	Observed Values
Nested Model	$\chi^2$		4010.898
	Df	S	1147
	$\chi^2 / df$		Lesser than 5
	GFI		≤ .80
	IFI		≤ .90
	CFI		≤ .90
	RMSEA A		≥ .08

Outcomes of the study presented in the above table show that all values are under the threshold range, which shows that the model of the study is a good fit. For the model to be significantly fit, the observed values should be according to the threshold range. It can be observed that the value for GFI is .80 which is according to the threshold range. The same is the case for the values of IFI and CFI. Moreover, the value of RMSEA is equal to .077, which is according to the threshold range i.e. less than or equal to .08. The path diagram of the confirmatory factor analysis is presented in figure 2.

4.4 Structural Equation Modeling (SEM)

In AMOS, the most appropriate regression approach is SEM which is applied to examine the indirect as well as direct effects at the same time. This approach is generally the combination of multiple regression explorations and factor analysis. Utilized for the purpose to test the influence of one construct on another in the current study, it is run to check the hypotheses. The current study prefers to use the path analysis approach for SEM because the main advantage of this approach is the enclosure of relationships amongst variables working as interpreters in one single model.

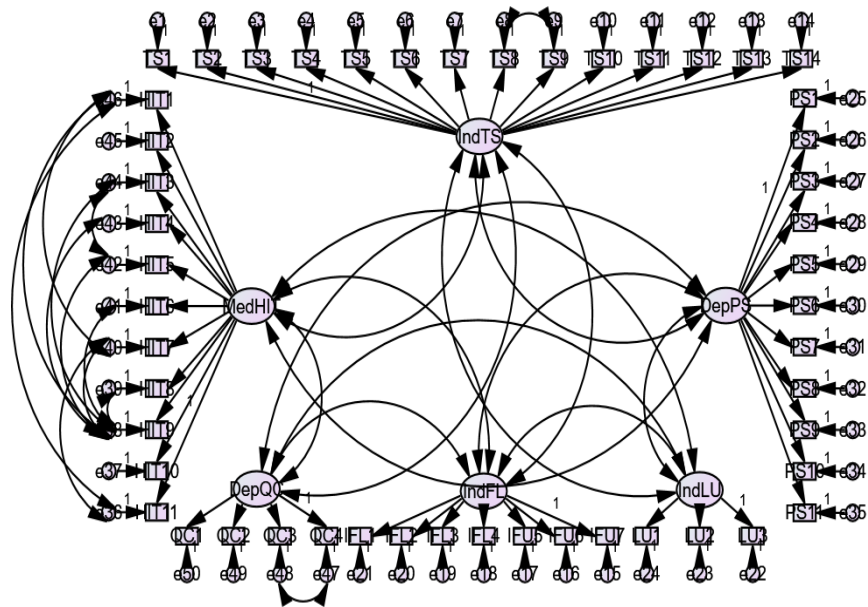


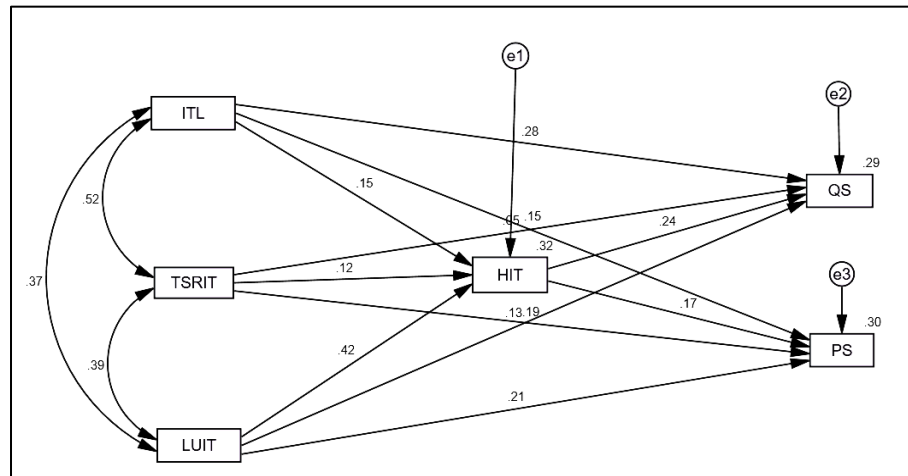
Figure 2: CFA

Table 6: Structural Equation Modeling

Effects	Hypothesized Path	B	S. E	P	Conclusion
<b>Linear Effects</b>					
Hypothesis 1a (+)	ITL→ PS	.149	.039	.000	Accepted
Hypothesis 1b (+)	ITL→ QC	.280	.052	.003	Accepted
Hypothesis 2a (+)	TSRIT→ PS	.192	.053	.000	Accepted
Hypothesis 2b (+)	TSRIT→ QC	.050	.040	.318	Rejected
Hypothesis 3a (+)	LUIT→ PS	.212	.048	.000	Accepted
Hypothesis 3b (+)	LUIT→ QC	.129	.036	.010	Accepted
<b>Mediation Effect</b>					
Hypothesis 4a (+)	ITL→HIT→PS	.027	.013	.010	Accepted
Hypothesis 4b (+)	ITL→ HIT→QC	.037	.019	.010	Accepted
Hypothesis 5a (+)	TSRIT→ HIT→PS	.020	.011	.021	Accepted
Hypothesis 5b (+)	TSRIT→ HIT→QC	.028	.012	.021	Accepted
Hypothesis 6a (+)	LUIT→ HIT→PS	.074	.026	.010	Accepted
Hypothesis 6b (+)	LUIT→ HIT→QC	.102	.023	.010	Accepted

Note: ITL=Launch of IT, TSRIT= technical support regarding IT, LUIT= length of IT usage, HIT= Health information technology adoption, PS= patient Safety, and QS= Quality of Care.

Table 6 presents the results of SEM, findings indicate that the launch of IT has a significant and positive influence on patient safety. It also has a significant and positive influence on the system of quality care. Results show that a one-unit increase in ITL brings a 14.9 percent increase in patient safety and a 28 percent increase in the quality of care. Findings of SEM modeling also indicate that technical support regarding information technology has a significant and positive effect on the safety of patients while it has an insignificant impact on the quality of care because the probability value against this effect is greater than .05. The impact of length of IT usage on patient’s safety is also significant and its size is .212 while the impact of length of IT usage on quality of care is .129 which is also significant. It means that if the length of IT usage increases by one unit, it will bring 21.2% positive and significant change in patient’s safety and 12.9% significant and positive change in the quality of care. Moreover, this study has checked the health information technology adoption as a mediator. The findings of this study indicate that it significantly mediates the relationship between all independent variables and dependent variables. So, all eleven hypotheses of the study were accepted while only one hypothesis was rejected. Figure 3 presents the snapshot of the structural model taken while running SEM in AMOS.



**Figure 3: Structural Equation Modelling**

Outcomes of the study show that the 11 hypotheses of the study were accepted, and one is rejected. The first hypothesis of the study indicated that information technology launch has a significant and positive influence on patient safety. The findings of the current research prove this hypothesis to be true so, the current results are similar to the results of Anderson, Frogner, Johns, and Reinhardt (2006) & McBride and LeVasseur (2017). Similarly, information technology launch has significant and a positive impact on the quality of care. These findings are also aligned with the literature. A study conducted by Ramesh, Wu, and He (2013) also shows that information technology launch is significantly correlated with health care outcomes. The second hypothesis of this study stated that technical support regarding IT significantly and positively influences health care outcomes while findings of

the current study showed that technical support regarding IT has an insignificant impact on quality of care. This outcome of the study is not consistent with the finding of Carayon et al. (2006). However, technical support regarding IT has shown a positive and significant impact on patient safety, Therefore, hypothesis 2a is accepted and 2b is rejected. Moreover, results regarding hypothesis 3a and hypothesis 3b revealed that length of IT usage has a significant and positive influence on health care outcomes and these results are also constant with several prior studies e.g. (Nguyen et al., 2010; Wang et al., 2006). Health information technology adoption is playing a mediating role in this research model as findings of the study indicated that healthy information technology significantly mediates relationships of Information technology launch, technical support, and length of usage of technology with healthcare outcomes. These findings are also consistent with prior studies such as (Koivusilta, Lintonen, & Rimpelä, 2007; Lee & Coughlin, 2015; Punamäki, Wallenius, & Rimpelä, 2007). Hence, the overall findings show the alignment with the existing literature.

## **5. Conclusion**

Numerous health care professionals encouraged the adoption of information technology healthcare (ITH). Despite the surplus proof on the paybacks of HIT, a substantial number of health professionals are still working manually. Present-day developments of swift technical tools are necessary to recognize the impact of technological factors on healthcare performance by the adoption of HIT. Therefore, the purpose of this study was to observe the influence of IT launch, technical support regarding IT, and the launch of IT usage on healthcare outcomes including quality care and patient safety. This study also evaluates the health information technology adoption as the mediator in the current research model. To accomplish this purpose, researchers collected quantitative data through a self-administrative questionnaire from the office of the health care department in Pakistan. Collected data was analyzed by using two statistical software SPSS and AMOS and different statistical tests were applied including descriptive statistics, confirmatory factor analysis, convergent validity, discriminant validity, and SEM. Findings of the study indicate that IT launch has a significant and positive influence on quality care and safety of patients. Length of IT usage also has a significant and positive effect on the quality of care and safety of patients. However, technical support regarding IT has a significant and positive impact on the safety of patients but it shows an insignificant influence on quality care. Results regarding the mediation indicated that health information technology adoption significantly mediates relationships of Information technology launch, technical support, and length of usage of technology with healthcare outcomes.

### *5.1 Research Implications*

Pakistan is a developing country and several areas require proper attention and improvement but before improvement, enhancing knowledge of the Pakistani people and increasing awareness regarding the importance of adoption of information technology for the health care sector are needed. This study tends to raise awareness regarding the importance of information technology in the healthcare sector, which is going to enhance the information technology adoption and utilization by different health care institutions in Pakistan. Moreover, the study has also discussed and evaluated different outcomes of the

adoption of healthcare information technology, including patient safety and quality of care, which will be adopted in Pakistani health care institutions to raise standards. This study has several theoretical and practical implications and policy-making recommendations. From a theoretical perspective, this study tends to enhance the literature of healthcare IT by gathering up-to-date factual indications and evidence of the relationship between funding in the adoption of HIT through the launch of information technology, usage of technology, and technical support and resulting benefits including quality care and safety of patients. From the practical perspective, the current study would help healthcare bodies/organizations to understand the importance of IT for the health care sector in Pakistan.

In Pakistan, progress and innovation regarding information technology are already under consideration, but this study has significantly considered patient safety and quality of care in the context of health care information technology adoption so, this study can motivate them towards the launch and utilization of information technology in the healthcare sector. The findings of this study show that the adoption of health care information technology boosts the progress of the health system in Pakistan. For example, it reduces financial expenses. According to a study of CCHIT.org, about 50 percent of resources of finance are wasted due to inefficient progress and technology so, we can save these resources by applying the IT system. HIT is also helpful for getting faster lab results. Despite the financial crisis, IT is one of the most lucrative sectors in Pakistan. We are still not realizing the true potential of IT. It is imperative to make use of IT in the health sector to accelerate the progress of the health sector. The greatest property, which attracts the interest of physicians to HIT is that it allows immediate accessibility of medical information to doctor and patient, which is crucial for the timely diagnosis and start of therapy. Therefore, this study recommends to the government as well as other officials to give serious attention to HIT in the health sector especially while making policies for the growth and improvement of this sector.

#### *5.2 Research Limitations and Further Suggestions*

The current study has several limitations that can be considered while defining avenues for further research. The major drawback of this research is related to the features of the study population and sample. The findings of this study will apply only to the healthcare sector of Pakistan. Some respondents may have been inclined in their replies by the favoritism of societal adequacy. However, the private nature of the survey may help in lessening such preferences. This kind of study is viewed as suspicious in Pakistan due to the conventional native approach of organizations and individuals. Both are unwilling to unveil their behavior, particularly to a stranger. All these limitations can be removed by improving research in the area of HIT and by expanding this research in multiple developed nations. Future studies can focus on a variable like innovation in the health care techniques as the outcome of the implementation of information technology in Pakistan. Such studies will raise awareness regarding different information technology techniques that can make treatments more efficient and quick.

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