

Perspective of Healthcare Workers about Digitization in the Healthcare Sector in Armed Forces Hospitals in Taif Region, Saudi Arabia

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Abstract. Aim: The purpose of the present study was to determine the impact of digitization in healthcare on health workers' perceptions in Armed Forces Hospital, Taif. Methodology: A quantitative descriptive design based on deductive approach was used in the study. 370 participants employed in Armed Force hospitals in Taif were recruited based on convenience sampling. A survey was distributed among participants to collect demographic data and data on digitization benefits, challenges, and status and perceptions of health workers. The collected responses were then entered into SPSS software for performing descriptive stats, ANOVA test and regression analysis to determine the relationship between research variables. Results: The demographic results showed more male participants (64.9%) than females (35%), with more participants having a Master's education. Results from the ANOVA test and regression analysis revealed a positive and significant correlation between digitization benefits (0.842), digitization challenges (0.838), and digitization status (0.898) with health workers' perceptions. Also, a 1% change in digitization benefits, challenges, and status can result in an 18% change in perceptions. Conclusion: Overall, the study found a significant and positive relationship impact of digitization of health on perceptions of health workers. Recommendation: It is suggested that future studies investigate the factors and strategies influencing the change of perceptions associated with the digitization of health.

Keywords: Perspective of Healthcare, digitization, healthcare sector, digitization in healthcare, healthcare workers, digital healthcare systems.

1 BACKGROUND

Digitization is considered to hold power to transform analog information into digital. The global shift towards a person-centered care model of the health sector has stimulated digital innovation within the delivery, organizing, and service management to improve collaboration between the patient and the healthcare workers (Ahlin and Snyder, 2021). The implementation of digital technologies in the health sector is being used as a solution to tackle the societal challenges faced in the contemporary uncertain environment (Gjellebæk et al., 2020). Healthcare is a pluralistic and complex public good that requires constant interaction between different stakeholders for effective organization of healthcare service delivery. Some of the key stakeholders within healthcare industry include the patients, physicians, nurses, insurers, administrators, policymakers, non-governmental organizations, health care delivery alternatives, clinical organizations, and alike (Neumann et al., 2021). Nevertheless, fulfilling the potential demand regarding the deployment of digital technologies in healthcare requires both the managers as well as employees to adapt to the evolving new needs and demands of the transformed working life.

Technology is reshaping the relationship between healthcare providers, patients and the healthcare system. Transformational changes in the healthcare industry today are possible because the patients feel empowered by using digital tools in every step of their healthcare journey. According to Deloitte (2018), digitization has the potential to transform the field of medicine and the healthcare sector in a sustainable way while also revolutionizing the way care is delivered through the creation of new opportunities for more personalized and precise healthcare delivery systems. Digitization in healthcare industry has become of even more significance since the onset of Covid-19 pandemic, as it accelerated the adoption of technology in every industry including healthcare (Ting et al., 2020).

There are many reasons behind the slow digital transformation process in the healthcare sector. One such important reason is the resistance from professionals when it comes to adapting to digital changes, as most professionals consider the deployment of technology as administrative nuisance (Gjellebæk et al., 2020). Resistance to change amongst the professionals is also attributed to the fact that they would be required to work outside their comfort zone to develop new skills and competencies (Sabbir et al., 2021). The resistance from professionals, along with patients' sensitivity to sharing highly personal medical information, are some of the causes for reluctance to adapt to digital technologies (Hermes et al., 2020). The paper focuses on the deployment of digital technologies in the healthcare sector of Armed Forces Hospitals in Taif Region and provides an in-depth analysis of the perception of healthcare workers regarding the implementation of digitally enabled technologies in the healthcare sector of Armed Forces Hospitals in Taif Region.

2 METHOD

A descriptive approach is chosen for the research in investigating the perspective of healthcare workers around digitization in the healthcare sector in Armed Forces Hospitals in the Taif region. A descriptive approach takes an investigative look at the current status, benefits and challenges of digitization in the healthcare sector.

This study will target all health worker in Armed Forces Hospitals in Taif region where there are 5,000 employees. The sample size for present population would be calculated using the sample size formula which would estimate an appropriate sample to justify findings of the study (Memon et al., 2020). The formula for calculating the minimum sample size for the present study is given as:

$$n = N/1+N(e)^2$$

where n represents sample

N shows population size

e is the standard error which is appropriately $\pm 5\%$ (Yamane, 1967).

$$n = 5000/1+5000(0.05)^2$$

$$n = 370 \text{ samples}$$

According to the formula, the estimated minimum sample size would be around 370 where participants' responses would show generalizability of the research findings for the targeted population of health workers employed within the region of Taif. Questionnaires will be distributed among samples to collect data using survey tool over the two-month period.

For the data collection purpose, a five-point Likert scale based survey questionnaire was developed to investigate the topic under study.

The questions of the survey inquired about the current status of digitization in the Armed Forces Hospitals of Taif, and the benefit and challenges of digitization in these health institutions as per the employee's perspective. The Likert scale is an effective way to determine and measure the agreeableness of the responses from the healthcare employees in the Armed Forces Hospitals in Taif. Thus, the questionnaire and its components are categorized into three dimensions, namely, the current status of digitization, the benefits of digitization and the challenges of implementing digital technologies. The Likert scale points range from 1 (strongly disagree) to 5 (strongly agree) scoring to determine the level of agreeableness within each dimension for a clearer picture of Armed Forces Hospitals in Taif.

The following statistical methods and tests were applied to analyze the data: correlation matrix, regression analysis and ANOVA.

3 RESULTS

This section analyses the results of the study. A total of 370 responses were collected using a questionnaire. Later, the responses were analyzed using statistical software, namely IBM SPSS STATISTICS. Specifically, the research has performed frequency analysis, descriptive statistics, matrix of correlations, and regression estimations. The results are discussed in detail as follows.

Table 1: Demographic Characteristic

	Frequency	Percent
Gender		
Female	133	35.95
Male	237	64.05
Age		
26 – 40 years	181	48.92
41 - 55 years	96	25.95
Above 55	36	9.73
Less than 25 years	57	15.41
Years of Experience		
5-10 years	185	50.00
Less than 5 years	100	27.03
More than 10 years	85	22.97
Education Qualification		
Bachelor's	144	38.92
Master's	150	40.54
PhD	76	20.54

The output in table 1 indicates that 64.05% of the respondents (237 out of 370) were male whereas the remaining 133 research participants were female. Additionally, most of the participants were aged 26 – 40 years (48.92%), with the number of participants amounting to 181. Of the remaining participants, 25.95% belong to 41-55 year old age group, 9.73% of the participants (36 out of 370) are above 55 whereas 15.41% of the participants stated they are less than 25 years old.

Furthermore, a significant part of the participants confirmed that they have an experience of 5-10 years of working in medical institutions (50.00%, 185 out of 370 respondents),. 100 respondents (27.03%) stated they have worked for less than 5 years whereas the remaining 22.97% of the respondents confirmed that they have worked for more than 10 years. Lastly, most of the participants confirmed they hold the Master's degree as their latest educational qualification (40.54%), with the number of participants amounting to 150, whereas 38.92% of the respondents stated their highest qualification is Bachelor's degree. 20.54% of the respondents stated they hold a doctorate (PhD) qualification.

The descriptive statistics assist in summarizing the supporting and non-supporting data. It includes variance, standard deviation, range, minimum, maximum, and mean of the sample.

This paper intends to discuss the significance and relevance of the perspective of healthcare workers about digitization in the healthcare sector in armed forces hospitals in the Taif region; as well as assess the influence of digitalization challenges, digitalization benefits, digitalization status, health worker's perception and determine the relationship between digitalization challenges, digitalization benefits, digitalization status upon health workers' perception (constant). Most participants have exhibited a mean value greater than 3, indicating higher support for the subject at hand. Qualitatively, most participants have shown their support for the digitalization challenges, digitalization benefits, digitalization status, and health workers' perceptions. Notably, the standard deviation and variance values are high and none closer to one, discerning a higher central tendency of the population's responses.

Table 2 : Reliability Statistics

Reliability Statistics		
	Cronbach's Alpha	N of Items
Digitalization Status	0.871	10
Digitalization Benefits	0.890	10
Digitalization Challenges	0.904	10
Health Worker's Perception	0.820	8

The responses data is valid, as the Cronbach's Alpha value for all reliability and validity tests is greater than 0.65.

Table 3 : Pearson Coefficient between Study Variables

	Digitalization Status
Digitalization Status	1
Digitalization Benefits	.814**
Digitalization Challenges	.723**
Health Worker's Perception	.898**

Digitalization benefits has a positive linear relationship with Digitalization Status (coefficient = +0.814), which confirms that an increase in Digitalization Status enjoyed by the respondents coincided with higher Digitalization benefits. The finding is significant at 5% level. Digitization Status has a positive linear association with Digitization Challenges (coefficient = +0.723). It demonstrates that an increase in Digitalization Status enjoyed by the respondents coincided with higher Digitalization Challenges experienced. The finding is significant at 5% level. Finally, Digitization Status has a positive linear relationship with Health Worker's Perception (coefficient = 0.898), the finding is significant at 5% level.

Table 4 : ANOVA test

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	97.99	3000	32.663	1005.984	.000b
	Residual	11.884	366000	0.032		
	Total	190.873	369000			
a. Dependent Variable: HWM						
b. Predictors (Constant), DCM, DSM, DBM						

The ANOVA test aims to determine the differences within the samples. The tables show that the differences are significant and useful for analyzing the other tables. This was discerned by the p-value, which showed to be 0.000.

Table 5: Regression

Model Summary	
R	.944
R Square	0.892
Adjusted R Square	0.891
Std. Error of the Estimate	0.180

This paper has considered digitalization status, digitalization benefits, and digitalization challenges as independent variables, while health workers' perception is taken as dependent variables.

The health workers' perception is highly explained by the independent variables (digitalization status, digitalization benefits, digitalization challenges) as the r-squared is 0.892. In other words, 1% changes in digitalization status, digitalization benefits, and digitalization challenges will bring around 18.00 percent variations in the health worker's perception.

4 DISCUSSION

One of the objectives of the study was to determine the correlation between digitization benefits and health workers' perceptions. Correlation matrix found a positive correlation of 0.842 between the two variables. This is consistent with the literature where despite the poor adaptation of digitization in healthcare, healthcare workers showed good knowledge and anticipation towards the use of technology for the growth of professional practices. For instance, a study in the Nigerian healthcare sector uncovered that participants reported digitization with information and communication technology (ICT) tools would improve the quality of medical care (Adeleke et al., 2015). Suzaki et al., (2019) also found

that digitization of health is a good fit for achieving service quality. There were positive perceptions of the meaningfulness of digitization. The findings are of relevance in the context of this paper because participants were nurses, who reflected on how the effective use of electronic medical records (EMR) in Japan's healthcare is vital for nurses to deal with the challenges of a dynamic healthcare environment (Suzaki et al., 2019).

The second objective was to analyze the change in healthcare perceptions with the challenges of digitization adoption and use. Correlation matrix showed the correlation of 0.838, illustrating a positive linear relationship between challenges of digitization and healthcare perceptions. This can be explained by explaining the findings of the literature. For decades, with the rapid integration of digital technology in the healthcare sector, there were policies which imposed the rules of labour cuts, expecting efficient results, and deficit discretion of health workers. Even though the policies aim at availing money for the healthcare setting, however, individual labour cuts make professionals show resistance to their adoption (Shulzhenko and Holmgren, 2020). A quantitative survey-based design was carried out among healthcare staff to report challenges associated with the digitization of health and the perceptions and attitudes of workers. It concluded that lack of knowledge is the most pertaining challenge of digitization that changes the views of healthcare professionals (Kuek and Hakkennes, 2020). Another qualitative interview-based design resulted in views of healthcare workers. A healthcare manager reported that there is a lack of lag period between the emergence of technology and adoption in healthcare. The period is required to fill the knowledge of digital technology. Lack of lag period for knowledge training would reduce the level of employee involvement, which contributes to occurrence of negative perceptions about the use of technology (Gjellebæk et al., 2020).

Another major finding of the study was reported as the intensity of change that occurs in healthcare perceptions with benefits and challenges of digitization. Regression analysis highlighted that R-squared is 0.892, highlighting that independent variables in the regression (current status of digitization, benefits of digitization and challenges of digitization) explain 89.2% of the variability in health workers' perception in Armed Forces Hospitals in Taif Region as a dependent variable. High R-squared is reflective of inclusion of suitable independent variables in this paper, which were selected based on the findings of literature review and highlight the benefits of deductive reasoning approach adopted in this paper.

The relationship between independent variables (current status of digitization, benefits of digitization and challenges of digitization) and variability in health workers' perception in Armed Forces Hospitals in Taif Region as a dependent variable in this study highlights that the impact could be the result of the progressive and rapid advancement of digitization with the emergence of medical informatics in healthcare (Lapão, 2016). As far as digitization grows, healthcare professionals may become unable to hold the confidentiality of data. A multicentric analysis was performed among medical students to assess how the challenges for healthcare professionals will rise. The results reported that low familiarity with digital health results in negative repercussions such as lack of data security (42%) and deteriorating relationships between patients and health workers (30%). On the other hand, the study also shared that healthcare access and outcomes will enhance by >80% and >60%, respectively (Nazeer et al., 2022). These results depicted a significant change in the effects of digitization, indicating a big impact on the perceptions of workers for healthcare adoption and use.

It was also emphasized that the status of digitization also impacts the perception of health workers. The way in which the status affects the perceptions of healthcare staff and the integration of digital technology can be reflected in the example of the Korean study. The study assessed the status of digitization in Korea and its impacts on the healthcare system. The status of digitization has advanced to medical AI with approving 20 AI solutions from FDA. An improvement in healthcare decision-making with the assistance of AI and virtual reality facilitated the doctors and staff (Shin, 2019). However, there are also challenges of regulations and reimbursement for the practical implication of digital health (Shin, 2019). Therefore, health workers have conflicted perceptions about the use of digital knowledge because of a lack of supportive integration and rationale for new advancements. It was throughout observed how the status of presented technology affects its integration mediated by knowledge, perceptions, and attitudes of stakeholders (healthcare professionals) involved. Both independent variables of the study i.e. digitization benefits and digitization challenges alongside reflecting the status of digitization, had a positive and significant correlation with perceptions of care staff. The literature regarded concepts of AI and ICT that are central to digitization in healthcare require an inherent and inclusive understanding; otherwise, there would remain conflicted perceptions and views about the utilization of such an anticipated technological tool. The positive nature of the relationship showed a strong effect on the independent variables.

5 Limitations of the Study

However, there are several limitations associated with this paper. Even though digitization benefits and challenges affect the perceptions of healthcare staff, there is a lack of investigation of factors that mediates the relation between two research variables. Knowledge and attitudes are surely the predictors of changing perceptions, but there can be some hidden variables such as demographic, socioeconomic, and political (policies) constraints that can affect the perceptions of workers. For example, literature studied that the perceptions of healthcare digitization can considerably vary between younger age nurses and old age nurses with skills in using the technology (Suzaki et al., 2019). Finally, convenience sampling has a sampling bias because being a non-probability sampling technique, the sample is not selected at random (Etikan et al., 2016).

6 CONCLUSIONS

The present study found a significant relationship between digitization in the healthcare sector and health professionals' perceptions, which was the primary aim of the study. Our results are statistically reliable and can be replicated in future research for the deduction of new knowledge that would be essential for implication in clinical practices.

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Authors' Contributions

All authors contributed to revision of the manuscript and approved the final version of the manuscript prior to its submission.

Data Availability Statement

The datasets generated during and/or analysed during the current study are not publicly available due to privacy, confidentiality and other restrictions, but are available from the corresponding author on reasonable request.

Compliance with Ethical Standards Institutional Review Board Opinion Letter, H-02-T-078.

Informed consent: Consent was secured from all the respondents who participated in the study.

Conflict of interest: No conflict of interest.

Ethical approval: Institutional Review Board Opinion Letter, H-02-T-078.

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