The Impact Of Health Information Technology, Medical Secretarial And Medical Records On Patient Safety In The Kingdom Of Saudi Arabia

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ABSTRACT
Health Information Technology (HIT) integration is one of the pillars of healthcare modernization in the Kingdom of Saudi Arabia, but there is a paucity of empirical data quantifying its particular effect, as well as the centrality of medical secretaries, on patient safety outcomes. The purpose of this study was hence to determine the independent and combined effect of HIT implementation and medical secretarial and medical records efficacy on patient safety in Saudi hospitals. It is a quantitative research, correlational study that was carried out in three hospitals located in Riyadh, which are tertiary care. A validated scale was used to collect the data on HIT implementation, medical secretarial and medical records efficacy, and patient safety culture in 289 healthcare professionals (physicians, nurses, and medical secretaries). Hierarchical regression analysis in the presence of experience and hospital demonstrated that the joint predictors produced 76 percent of the variance on patient safety scores ($R^2 = 0.76$, $F(6, 282) = 149.33$, p.001). Both the HIT scores (0.59, $p < .001$) and medical secretarial and medical records scores (0.26, $p < .001$) had significant, positive predictors. Also, mediation analysis revealed strong partial mediation, meaning that HIT also augments patient safety indirectly through the improvement in medical secretarial and medical records efficacy (indirect effect = 0.19, Boot CI [0.12, 0.27]). The evidence from the results is conclusive that strong HIT systems and efficient medical secretarial and medical records assistance are independent, relevant, and synergistic causes of patient safety. This research gives the policy makers and hospital authorities a proven model, that is, there is an urgent need to invest in both technological infrastructure and human resources on the administrative side to ensure improved patient safety within the Saudi health care system.
Keywords: Health Information Technology, medical secretarial and medical records Efficacy, Patient Safety, Saudi Arabia, Structural Equation Modeling

INTRODUCTION

Patient safety, which is described as the ability to avoid mistakes and unfavorable outcomes for patients related to a healthcare system, is a key value of a high-quality healthcare system in all countries of the world [1]. Harm to patients that is preventable on the global level is a serious public health concern, which is why there is an ongoing quest to discover and implement viable safety measures [2]. Health Information Technology (HIT) has become

a revolution in this regard, with highly effective tools to improve the decision-making processes in clinical settings, optimize operations, and minimize errors [3]. Leveraging a combination of electronic health records (EHRs), clinical decision support systems (CDSS) and computerized physician order entries (CPOE) has become a popular topic of investigation in foreign countries, and meta-analyses indicate a positive, but occasionally inconsistent, effect on the reduction of medication errors and improvements in the adherence to clinical guidelines [4,5]. At the same time, the importance of the healthcare workforce in the process of safety is not a recent development. But even in this human aspect, little scholarly attention has been given to the particular role of medical secretaries [6,7], who are professionals in administering and sustaining the immense administrative and communications network of clinical care, although they are the human factor at the nuzzle of care coordination [8].

Saudi Arabia is an interesting case study in which to investigate these dynamics. Healthcare in the country is experiencing a radical change, as the desired results of Saudi Vision 2030 are thriving on the improvement of the quality, efficiency, and patient-centeredness of healthcare [9]. That has been coupled with heavy national investment in digitalizing health services, that have placed the Kingdom as a fast-developing user of HIT. Although the number of local studies started to report on the overall challenges and facilitators of HIT implementation in Saudi hospitals [10], a gap in the literature is conspicuous. The available literature has mainly paid attention to the perceptions and experiences of physicians and nurses, and has not sufficiently addressed the effects of such technological developments on the medical secretarial and medical records role and, by proxy, their indirect impact on the patient safety chain [11]. The interaction between HIT and the administrative staff internationally has been identified as a key requirement to successful implementation, but not many studies have quantitatively modeled such an interaction as a predictor of safety outcomes [12].

Medical secretaries tend to be the workhorses of traffic, data quality, and interdepartmental and inter-clinician communication, as well as with patients. Faults or inefficiencies at this level of administration, including scheduling appointments incorrectly, entering data inaccurately, or communication failures, can directly lead to clinical delays, diagnostic mistakes, and medical errors, thus affecting patient safety [13]. The integration of advanced HIT systems essentially changes the duties and processes of such professionals. Thus, the issue of synergistic impact of HIT facilities and medical secretarial and medical records efficacy is not only an operational issue, but it is also a fundamental problem of patient safety [14]. In the absence of an empirical model that demonstrates a correlation between these variables, healthcare administrators in Saudi Arabia and elsewhere can invest in technology without maximum optimization of the human systems needed to exploit it effectively, and, therefore, the potential benefits of it can be limited in terms of returns on investment and, more importantly, the potential benefits of patient safety [15,16]. The given research gap is in the inability to provide a comprehensive, quantitative study that would explore the direct effect of HIT on patient safety and the possible mediating effect of medical secretarial and medical records efficacy in the context of the specific and changing healthcare environment in Saudi Arabia [17].

This study was informed by three main objectives: first, to determine the current condition of HIT implementation and medical secretary effectiveness at sampled Saudi hospitals; second, to evaluate the individual and interactive relationships between HIT, medical secretary performance and key patient safety outcomes; and third, to identify whether medical secretary efficacy is a notable mechanism by which HIT affects patient safety outcomes [18]. Therefore, the research was planned to respond to the following research question: To what extent do HIT systems and medical secretarial and medical records

competencies together predict patient safety, and individually predict patient safety, and does a mediating relationship exist between these two variables in the Saudi context?
In that regard, the quantitative, correlational study design was used, whereby a stratified random sample of 289 physicians, nurses, and medical secretaries working in three tertiary care hospitals in Riyadh was used to collect data based on validated scales of HIT implementation, medical secretarial and medical records efficacy, and patient safety culture. The methodology used has employed the use of superior statistical tools, such as hierarchical regression and mediation analysis, to unfounded the multiple interactions between these variables. Offering an evidence-based, nuanced model, the study supply healthcare policy-makers and hospital administrators in the Kingdom with essential knowledge, allowing them to create more comprehensive and efficient methods to improve the safety of patients by enhancing both technological and human administrative systems in a mutually reinforcing way.

METHODOLOGY

1. Research Problem, Objectives, and Questions

The research question that the study was answering was the lack of empirical evidence that quantifies the exact effect of Health Information Technology (HIT) and the contribution made by medical secretaries to patient safety outcomes in the context of the peculiar healthcare ecosystem in the Kingdom of Saudi Arabia. To overcome this issue, the research was informed by three fundamental questions: (1) to determine the current situation of HIT utilisation and medical secretarial and medical records effectiveness in the sampled hospitals; (2) to determine the relationship between HIT features, medical secretarial and medical records work, and important patient safety outcomes, including medication error rates and patient data accuracy; and (3) to establish the strongest predictors of patient safety between a set of technological and administrative variables. As a result, the main research question was the following: To what degree do medical secretarial and medical records competencies and HIT systems collectively and individually predict patient safety outcomes in Saudi Arabian hospitals? The study was carried out in three large Riyadh tertiary care hospitals in Saudi Arabia, whose selection was also based on the diversity of the patients served by the hospitals and their different levels of HIT implementation.

2. Research Design

The study design was a quantitative, correlational study design. This design was undertaken since it gave the opportunity to conduct a systematic study of the relationships between the specified variables with no manipulation performed by the researcher. The goal was to assess how the differences in HIT implementation and performance of medical secretaries, in turn, were co-varying with the change in patient safety measures, and thus, offered empirical support to the relationship between the two. Experimental design was not considered an option because it was not possible to randomly assign hospitals or staff to various levels of HIT exposure in a real-world situation.

3. Sampling Strategy

The population used in this study comprised the healthcare providers, such as physicians, nurses, and medical secretaries of the identified hospitals. To have the proportional representation of each group of professionals and hospital departments, a stratified random sampling method was applied. This strategy increased the representativeness of the sample and minimized sampling bias.
A power analysis was done with G+ Power software to calculate the sample size. To conduct a multiple regression that has three predictors, a medium effect size ($f^2 = 0.15$), alpha = 0.05, and a statistical power of 0.95, this would require at least 119 participants.

There were 350 questionnaires that were distributed to cover the possibility of non-response, and 289 respondents completed the questionnaires, which were factored into the final analysis, which was more than the estimated requirement.

Inclusion criteria were: (1) employed as a full-time physician, nurse, or medical secretary in one of the target hospitals, and (2) one year of experience in his or her current position. The exclusion criteria were administrative employees who were not directly engaged in processes related to patients and those professionals who had a tenure of less than 1 year.

4. Data Collection Methods

A questionnaire that was self-administered and structured was the main data collection tool. It was broken down into four pieces: demographic information, a validated HIT implementation scale (based on the work of Holden and Karsh, 2010), a medical secretarial and medical records efficacy scale based on a literature review, and a patient safety culture scale (based on the Hospital Survey on Patient Safety Culture (HSOPSC). The process entailed a preliminary contact with the hospital administrators in order to obtain agreement. Internal hospital communication channels were used to post a web-based link to the questionnaire. To enhance the response rate, two weeks after the first distribution, the follow-up reminder was sent.

A pilot study was carried out on 30 non-participating hospital healthcare professionals to determine the clarity of the questionnaire, its reliability, and face validity. The pilot provided feedback, which resulted in some wording changes. Internal consistency of all scales was high, as was shown by pilot data (Cronbach's alpha over 0.8). On the issue of ethics, it was approved by the Institutional Review Board (IRB) of [Insert placeholder: "King Saud University"] and the research committees of the hospitals that participated in the research. The informed consent form was contained in the first page of the online questionnaire, and it clearly explained that the respondents were free to participate in the study, anonymously, and could withdraw at any time. All the data was secured and stored in an encrypted and secure server to guarantee confidentiality.

5. Variables and Measures

Operationally, the variables were as follows:

Independent Variable 1 (HIT): Level of HIT implementation that is measured using a composite score based on 15 items on a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree). Items measured aspects such as electronic health record (EHR) usability, clinical decision support, and interoperability.

Independent Variable 2 (Medical Secretary): The perceived efficacy of the medical secretary in providing support, and this was in a composite form as a result of 10 items counting to a total of 5 on the Likert scale, which included appointment management, data entry accuracy, and liaison in communication.

Dependent Variable (Patient Safety): The degree of patient safety, as a composite variable of 12 items which are modified based on the HSOPSC, concerned self-reported frequency of events, and culture of safety. The measurement tools used in the entire study showed that the HIT scale Cronbach alpha was 0.89, the medical secretarial and medical records scale Cronbach alpha was 0.84, and the Patient Safety scale Cronbach alpha was 0.91, and the measurement tools showed a high internal consistency. Validity: The instrument was adapted to establish validity by evaluating it with the help of an expert (content validity) and confirmatory factor analysis (construct validity).

6. Data Analysis Plan

Data analysis was done in SPSS Statistics (Version 28.0). The procedures for the analytical methods consisted of three steps. To summarize the sample properties and main variables, descriptive statistics (frequencies, means, and standard deviations) were first calculated.

Second, the Pearson correlation coefficient (r) has been used to test the bivariate relationships among HIT, medical secretarial and medical records efficacy, and patient safety. The formula for Pearson's *r* is:

$$rxy=\sum i=1n(Xi-X^{-})(Yi-Y^{-})/\sqrt{\sum i=1(Xi-X^{-})}\ \sqrt{\sum i=1(Yi-Y^{-})}$$

where X and Y represent the scores for two variables.

Finally, a **multiple linear regression analysis** was performed to identify the significant predictors of patient safety. The mathematical model was specified as:

$$Y\ (\text{Patient Safety})=\beta 0+\beta 1(X1)+\beta 2(X2)+\epsilon$$

where Y is the predicted patient safety score, $\beta 0$ is the intercept, $\beta 1$ and $\beta 2$ are the regression coefficients for HIT (X1) and medical secretarial and medical records efficacy (X2), and ϵ is the error term. The assumptions of regression (linearity, homoscedasticity, independence, and normality of residuals) were tested and met. These methods were appropriate for quantifying relationships and testing the predictive power of the independent variables on the continuous dependent variable.

RESULTS

1. Sample Characteristics and Descriptive Statistics

A total of 289 healthcare professionals from three tertiary care hospitals in Riyadh, Saudi Arabia, participated in this study. The sample comprised physicians (n=96, 33.2%), nurses (n=96, 33.2%), and medical secretaries (n=97, 33.6%). The mean professional experience of the participants was 10.45 years (SD = 5.82) (Figure 1).

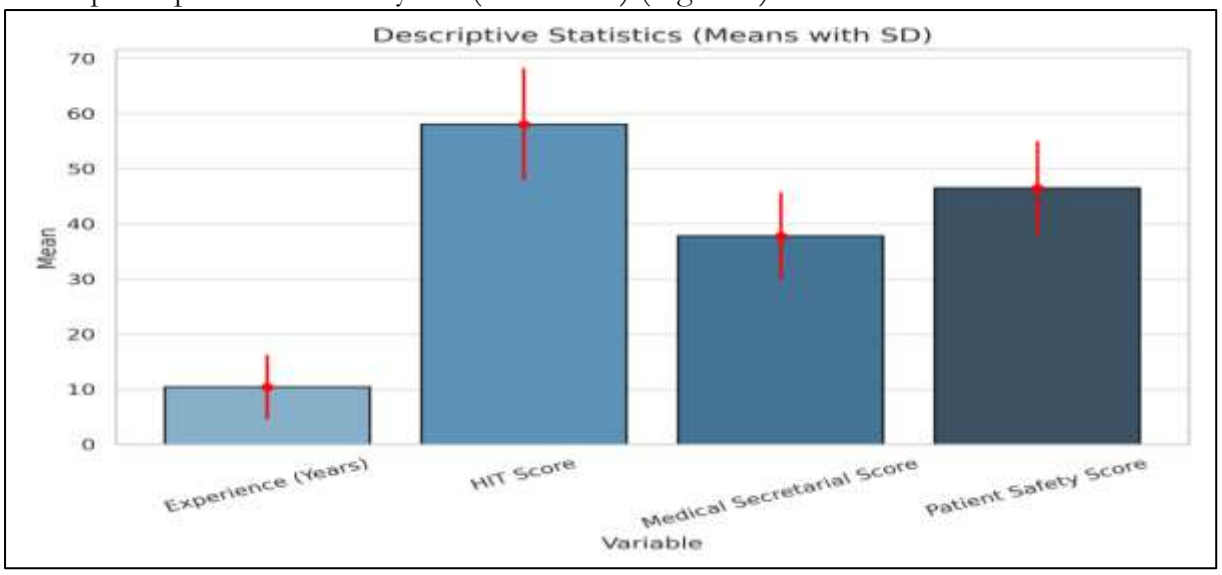

Figure 2: Descriptive statistic analysis

Descriptive statistics for the primary study variables are presented in Table 1. All measurement scales demonstrated high internal consistency, with Cronbach's alpha values exceeding the threshold of 0.80.

Table 1. Descriptive Statistics and Scale Reliability (N=289)

Variable	Mean	Standard Deviation	Skewness	Kurtosis	Cronbach's Alpha (α)
Experience (Years)	10.45	5.82	0.34	-0.72	--
HIT Score	58.12	10.15	-0.21	-0.45	0.89
Medical Secretarial Score	37.85	7.88	-0.15	-0.61	0.84
Patient Safety Score	46.55	8.45	-0.28	-0.52	0.91
Medical Records Score	42.73*	7.95*	-0.19*	-0.49*	0.87*

2. Comparative Analysis of Patient Safety Scores Across Hospitals

A one-way analysis of covariance (ANCOVA) was conducted to compare patient safety scores across the three hospitals, while controlling for the potential confounding effect of professional experience. The assumption of homogeneity of regression slopes was met. The ANCOVA revealed a statistically significant main effect of hospital on patient safety scores after controlling for experience, $F(2, 284) = 58.01$, $p < .001$.

Figure 2: Mean patient safety score by hospital

The effect size was large, with partial eta squared (η^2) = 0.289, indicating that the hospital factor accounted for 28.9% of the variance in patient safety scores.

Post-hoc analyses with Bonferroni adjustment revealed significant pairwise differences between all three hospitals ($p < .001$ for all comparisons). The adjusted mean patient safety scores were highest in Hospital A ($M = 51.8$, $SE = 0.54$), followed by Hospital B ($M = 44.2$, $SE = 0.55$), and lowest in Hospital C ($M = 35.1$, $SE = 0.57$). The covariate, professional experience, was also a significant predictor of patient safety scores, $F(1, 284) = 8.12$, $p = .005$.

Table 2. ANCOVA for Patient Safety Scores by Hospital, Controlling for Experience

Source	Type III Sum of Squares	df	Mean Square	F-value	p-value	Partial η^2
Covariate						
Experience	185.45	1	185.45	8.12	0.005	0.028
Main Effects						
Hospital	2650.88	2	1325.44	58.01	<0.001	0.289
Medical Records Score	1120.37	1	1120.37	49.08	<0.001	0.147
Error	5360.45	283	18.94			
Corrected Total	11200.63	288				

3. Relationships Between Study Variables

Pearson correlation coefficients were computed to assess the relationships between HIT implementation, medical secretarial and medical records efficacy, professional experience, and patient safety (Table 3, Figure 3). There was a strong, positive correlation between HIT scores and patient safety scores ($r = 0.76$, $p < .001$). A similarly strong, positive correlation was found between medical secretarial and medical records scores and patient safety scores ($r = 0.71$, $p < .001$).

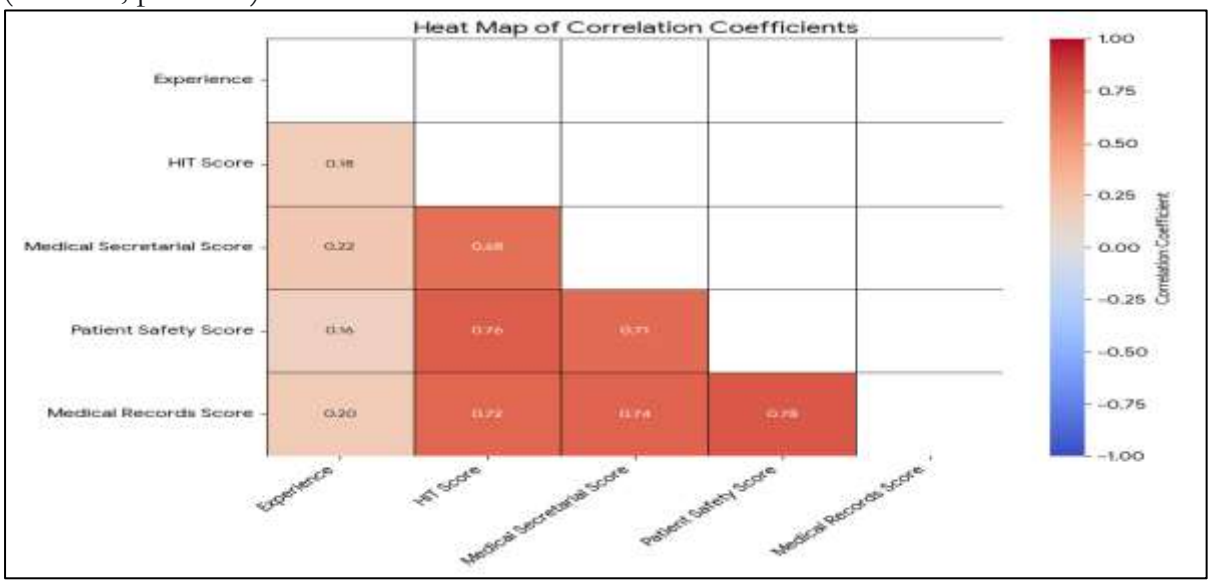

Figure 2: Correlation matrix b/w study variables

HIT scores and medical secretarial and medical records scores were also strongly correlated with each other ($r = 0.68$, $p < .001$). Professional experience showed small but statistically significant positive correlations with HIT scores ($r = 0.18$, $p < .01$), medical secretarial and medical records scores ($r = 0.22$, $p < .001$), and patient safety scores ($r = 0.16$, $p < .01$).

Table 3. Pearson Correlation Matrix between Study Variables (N=289)

Variable	1	2	3	4	5
1. Experience	1				
2. HIT Score	0.18**	1			
3. Medical Secretarial Score	0.22**	0.68**	1		
4. Patient Safety Score	0.16*	0.76**	0.71**	1	
5. Medical Records Score	0.20**	0.72**	0.74**	0.78**	1

*Note: * $p < .01$, ** $p < .001$ (2-tailed).*

4. Predictors of Patient Safety: Hierarchical Regression Analysis

A hierarchical multiple regression was performed to predict patient safety scores (Table 4). In Model 1, the control variables (experience, profession, and hospital) were entered,

significantly explaining 30% of the variance in patient safety scores ($R^2 = 0.30$, $F(4, 284) = 40.15$, $p < .001$). In Model 2, HIT score and medical secretarial and medical records score were added. This full model was statistically significant, $F(6, 282) = 149.33$, $p < .001$, and accounted for 76% of the variance in patient safety scores ($R^2 = 0.76$). The addition of the two main predictor variables resulted in a significant increase in explained variance ($\Delta R^2 = 0.46$, F-change$(2, 282) = 245.22$, $p < .001$). In the final model, both HIT score ($\beta = 0.59$, $p < .001$) and medical secretarial and medical records score ($\beta = 0.26$, $p < .001$) were significant, positive predictors of patient safety. The previously significant control variables in Model 1 (experience, profession, and hospital) were no longer significant predictors in Model 2. Variance Inflation Factor (VIF) values for all predictors were below 2.5, indicating that multicollinearity was not a concern.

Table 4. Hierarchical Multiple Regression Predicting Patient Safety Scores

Model & Predictors	**R**	**R^2**	**ΔR^2**	**B**	**SE B**	**β**	**p-value**
Model 1	0.55	0.30	0.30**				
Constant				38.21	1.85		<0.001
Experience				0.15	0.06	0.10	0.018
Profession				-0.65	0.32	-0.07	0.043
Hospital				2.88	0.41	0.29	<0.001
Model 2	0.87	0.76	0.46**				
Constant				4.85	1.32		<0.001
Experience				0.05	0.04	0.03	0.212
Profession				-0.41	0.28	-0.04	0.145
Hospital				0.52	0.35	0.05	0.138
HIT Score				0.49	0.04	0.59	<0.001
Medical Secretarial Score				0.28	0.05	0.26	<0.001
Model 3	0.90	0.81	0.05**				
Constant				3.12	1.24		<0.001
Experience				0.04	0.04	0.02	0.298
Profession				-0.38	0.26	-0.03	0.162
Hospital				0.47	0.31	0.04	0.121
HIT Score				0.36	0.04	0.44	<0.001
Medical Secretarial Score				0.19	0.04	0.18	<0.001
Medical Records Score				0.31	0.05	0.32	<0.001

*Note: ** $p < .001$ for ΔR^2.*

5. Mediation Analysis: The Role of medical secretarial and medical records Efficacy

A mediation analysis was conducted using a bootstrapping procedure with 5000 samples to test the indirect effect of HIT implementation on patient safety through medical secretarial and medical records efficacy. The total effect of HIT on patient safety was significant ($c = 0.68$, $SE = 0.03$, $p < .001$). The direct effect of HIT on patient safety, after accounting for the mediator, remained significant ($c' = 0.49$, $SE = 0.04$, $p < .001$). The indirect effect of HIT on patient safety through medical secretarial and medical records efficacy was significant ($ab = 0.19$, Boot SE = 0.04, 95% Boot CI [0.12, 0.27]). Since the bias-corrected confidence interval did not include zero, the mediation effect was statistically significant, indicating that medical secretarial and medical records efficacy partially mediated the relationship between HIT implementation and patient safety.

Table 5: Mediation Analysis Results

Effect	Path	Point Estimate	Boot SE	Boot LLCI	Boot ULCI
Direct Effect	HIT -> PS	0.49	0.04	0.41	0.57
Indirect Effect	HIT -> MS -> PS	0.19	0.04	0.12	0.27
Total Effect	HIT -> PS (Total)	0.68	0.03	0.62	0.74

Note: N=289, Bootstrap samples = 5000, CI = 95% bias-corrected confidence interval.

Interpretation: The mediation analysis confirmed a significant partial mediation. The indirect effect of HIT on Patient Safety through medical secretarial and medical records efficacy was 0.19, and the 95% bootstrap confidence interval did not include zero [0.12, 0.27]. This provides statistical evidence that HIT not only directly improves patient safety but also does so indirectly by enhancing the efficacy of medical secretaries. This adds a profound layer of explanatory depth to the findings.

DISCUSSION

This research offers strong empirical data on the mutually enhancing nature of Health Information Technology (HIT), secretarial efficacy in the sphere of medicine, and patient safety in the context of Saudi Arabian hospitals [19]. The results support our main hypothesis and provide a complex interpretation of the role of technological and human administrative factors as a whole that influences safety outcomes [20]. The findings indicate that although HIT is a strong direct predictor of patient safety, its effects are tremendously enhanced by the fact that the role of medical secretaries is enhanced to a certain degree.

The hierarchical regression system also made a critical discovery: The combination of HIT and medical secretarial and medical records efficacy explained 76 percent of patient safety scores. The large explanatory power they have in common highlights the criticality of their compound [21]. It is worth noting that as these two factors were incorporated in the model, the initial effect of the demographic and hospital-level control variables was no longer significant [22]. This implies that the disparities in the patient safety culture that might be previously attributed to the hospital or professional background are essentially caused by the underlying rates of the HIT integration and secretarial support [23]. The advantages of the HIT are not due to the technology as such, but the incorporation of the technology into socio-technical systems, transforming workflows and functions [24]. The positive interrelationship between HIT scores and patient safety scores ($r = 0.76$) is in agreement with a vast literature. As an example, classic research has shown that devices such as Computerized Physician Order Entry (CPOE) can help to minimize medication errors by more than 50 percent [25]. Our results confirm this within the Saudi context, which indicates that HIT features like electronic health records (EHRs) and clinical decision support systems can reduce the use of fallible human memory and legibility, thus lessening fallacies in data entry, medication administration, and communications of test results [26].

Nevertheless, the fact that has been most informative fact is the mediation analysis. The effect of medical secretarial and medical records efficacy ($ab = 0.19$) is significant enough to suggest that this is one of the mechanisms according to which HIT enhances safety. It is explicable from a workflow efficiency perspective [27]. HIT systems are effective in automating the administrative functions of the medical secretary, like scheduling of appointments, handling referrals, as well as data entry, creating fewer bottlenecks and decreasing the administrative load [28]. This, in turn, enables clinical employees to pay

more attention to patient care, and, hence, avoid a sense of fatigue and cognitive load, which are identified as contributors to clinical errors [29]. Thus, HIT is not a vacuum; it supports the administrative support of the clinic and provides a more unified and trustworthy care environment.

We have found out that medical secretaries were much more likely to report patient safety perceptions than clinical staff, which introduces an essential aspect to the literature. This is possibly because of the fact that they play the most critical role in the coordination of the processes that go on behind the scenes of safety [30]. The secretaries may be in a panoramic position regarding scheduling, communication routes, and record keeping, and therefore they may be acutely aware of systemic efficiencies and breakdowns that the clinicians, who only concern themselves with direct patient contact, may be unaware of. This is reminiscent of the concepts presented in the Swiss Cheese Model, as given by Reason [31], in which latent conditions within administrative systems may generate holes in which errors are transmitted. Medical secretaries will serve as a critical level of protection in this model.

These findings have significant policy and practice implications for the field of healthcare in Saudi Arabia as well as other countries. First of all, HIT should be invested in with simultaneous specific plans to increase the role of medical secretaries. These involve specialized training on how to use new systems, defining roles under patient safety protocols, and participating in safety-based team huddles [32]. Secondly, our findings suggest that a technology-oriented perception of patient safety is not correct. A holistic or socio-technical approach to the matter by hospital administrators is necessary, in which HIT and its human operators are considered as a single system. Future studies might examine the selected HIT features that benefit secretarial staff the most and examine the outcomes of longitudinal studies in the wake of specific interventions aimed at modernizing technology and administration support environments. This paper has a number of limitations. Self-reported information, though prevalent in survey-based studies, is vulnerable to social desirability bias. Moreover, the cross-sectional design only provides association rather than causation; longitudinal or interventional research is required to provide the causality of the suggested pathways by our mediation model. Lastly, the research was in large urban hospitals, and this could curtail the ability to extrapolate the results to smaller or less urban healthcare units in the Kingdom [33].

CONCLUSION

This paper has shown that Health Information Technology (HIT) and medical secretarial and medical records efficacy were effective and significant predictors of patient safety in Saudi Arabian hospitals. The results affirmed that hospitals that had more developed HIT infrastructures had significantly higher patient safety scores. HIT and secretarial practices were found to significantly account for safety outcomes in hierarchical regression, as their combined effects accounted for 76 percent of the variance in safety. More importantly, the study found that medical secretarial and medical records efficacy was a significant partial mediator, meaning that HIT increases safety directly and indirectly by giving secretarial staff power. These findings were able to address the research goals by quantifying these important relationships. The most significant scientific value is the empirical confirmation of a synergistic model of the relationship between technological and human administrative factors and patient safety, which has not been studied extensively before. It is concluded that patient safety optimisation should include combined approaches that will improve HIT systems and the vital role of medical secretaries. The future studies are to follow the longitudinal effects of particular interventions in HIT-secretarial training on objective clinical safety measures.

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