AN ASSESSMENT OF THE ROLE OF HEALTH INFORMATION SYSTEM (HIS) IN DECISION MAKING IN THE HOPSITALS OF QASSIM SAUDI ARABIA

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ABSTRACT: *The aim of this paper was to find the relationship between health information systems, its attributes and decision making. A survey approach was used by distributing questionnaires. The total population of this study was all focal persons and in charge of the health facility. 73 completed questionnaires were used in the analysis. Bivariate correlation, regression, and t-test were used for data analysis and testing hypotheses. It is found that all the research variables i.e. data collection and recording, data analysis, report generation, and decision making were positively and significantly related, and attributes of health information systems have a positive effect on decision making. Moreover, there was a difference in mean scores of trained and untrained staff, and the focal person score higher than the facility in charge, while there was no difference was found in mean scores of computer literate and illiterate staff.*

Keywords: Health information system, decision making, Data Analysis, Reports generation

INTRODUCTION

The health information system is playing a crucial role in the health planning and management process. It helps in providing correct information to doctors, physicians, nurses. It consists of employees and computers. It also supports to generate reports about a local information system to the national system also it generates reports about mortality.

HIS is very essential and in Saudi Arabia and especially in Qassim state as there is intense need of medical facilities in this state. There is no proper management of data, storage of data and collection of data. Second, there is a problem of quality decision making. Since the last few years, the health system in Saudi Arabia is changed due to the top priority of the government. Previously it was centralized now it is the hierarchical and decentralized system. [5].Due to changes in hierarchy and decentralization of system results are positive and helpful to successfully implement health management information system in Qassim state. Due to decentralization responsibilities are divided among individuals and there is freedom of work independently. Also due to responsibilities shared among employees skilled workforce and its demand has been increased. [5]

In order to meet the needs of patient's healthcare institutions needs correct and timely information. This can only be possible if the information communication technologies i.e. ICTs must be included in the health system. The sharing of knowledge and information through electronic means is called ICTs. Examples of ICTs are social media, electronic media, TVs, radio, phones, mobiles, etc. the internet. Nonelectronic devices and technologies are not included in it. But this does not mean that the importance of paper-based information sharing is lessened. [19].

The information system went through different phases of failure and success just because of the reason that organizations have their own problems. Eighty percent of success and failure depend on political and social intervention and twenty percent on dependency on hardware and software technological developments. [5, 9]. Culture of country and organizations also play a role in and there is another factor that is the extra income of the individual that's also a reason. It means due to the introduction of technology black money earned by an individual through illegal ways would become visible. There are other problems in developing countries that play a role in information systems in hospitals.

World health organization WHO also highlighted these issues that the health information system faced problems in developing countries and unable to achieve the targets through the successful implementation of HIS. Due to insufficient research in developing countries, there is a need to strengthen the system and new policies must be made to effectively implement HIS and decision making. [5].

There is no exact information provided on the health information system in developing countries. Through extensive research and with the introduction of new factors which can better explain the health information system must be introduced. So, policy at all national and local levels must be implemented to strengthen the HIS.

Problem Statement

Decision making is the main problem and issues in the health organizations and the quality decision can only be made if ICTs are effectively used in the organizations. Because ICTs help to change raw data into meaningful information and help in quality decision making. Those organizations that introduced new technologies survive in competition. In this study, a survey was conducted to record views of employees working in Buraydah hospitals about using HIS and how they make decisions.

Objectives:

1. To investigate Predictors and criterions are related to each other.
2. To determine the impact of Predictors on the Decision-making process.
3. To find the mean difference between research variables.

List of Hypotheses:

H1: predictors and criterions have a direct significant relationship.

H2: there is an impact of predictors on the process of decision making.

H3: untrained and trained employees have a difference in scores.

H4: illiterate and literate employees have a difference in scores

H5: Focal Persons (RHIS) are scoring greater than health facility in-charge

LITERATURE REVIEW

Health Management Information Systems (HMIS)

The first definition of health management information system is discussed followed by the use of information communication technologies i.e. ICTs and health systems in Saudi Arabia is discussed.

ICTs in Healthcare

Use of ICTs provide complete and accurate information to doctors at the time of need and it increases the performance, of doctors, system, enhance the reputation of health care organizations and health of patients is also affected din positive way[17]

All electronic means of sharing information such as radio, Televisions, internet, computers, social media, print media are called ICts but it does not mean that paper-based media is ignored and does not have any importance[18].In ICTs Telemedicine, E-health, health information system plays a significant role in their performance.

Telemedicine

Though this is so expensive and not good for developing countries it has been considered an effective tool for health care and diagnostic and used as pilot testing in many areas. Telemedicine is used in those areas where money and finance have no issue for organizations, it involves high cost, transportation. In Africa, it is helpful for village people because there is no need to travel to big cities and instead of traveling and accommodation cost money can be spent on telemedicine. [4].

E-health

New and advanced technology i.e. e-health involves the use of the internet to improve healthcare is called e-health. It can be sued in clinical and non-clinical areas. This technology can be used at local, regional and national levels. It is an attribute of ICTs. [4].It is useful for those medical staff who has no access and no opportunities to grow in their career and no means of communication to share information and experience with peers. This application and new technology help the medical staff to access information in backward areas.

Health systems

All those areas and activities related to health fall under this section it is preventive care, therapeutic care, and palliative care. Patients records are difficult to maintain so health information systems and EPR electronic patient records are used to maintain big data related to patients and their health records. The health system is used to collect, summarize, analyze and interpret to draw conclusions from the data to decide and bring meaningful information. Information communication technology helps in the making of applications. This application stores patients' records, diseases, and tracks, drug supplies and their monitoring, and billing procedures. [4].

Types of information systems in healthcare

The purpose of an information system is to know how to collect, process, analyze and interpret data. How to increase healthcare services delivery, the accuracy of data and to learn new trends in the health sector. Quality is maintained with the help of this system at different local and regional levels. Very limited countries in the world have used this system. Different names have been used for this system, such as hospital management information systems, health management information system, etc. [6].

Hospital information systems

This hospital information system is used to maintain patients' records, records of stock, management of human resources, diseases, acknowledgment management. [6]. The benefit of this system is to provide timely information, accurate information about diseases, and correct information about patients and their problems. Also, quality must be maintained in this system.

Health information systems

The system used to retrieve, collect and analyze information is called a health information system. Data needed for making policies, making quality decisions, data needed by clinicians, physicians, which add value to the health of population falls under the definition of a health information system [18]. The aim of this system is to check the performance of the system by comparing it with standards and if there are any changes required it can be made on time so that it must be helpful in health planning [6].

Data generated by surveys from households, surveillance of diseases, registration of new births and deaths, patient records, information about HIV, AIDS, TB, etc. fall under HIS.

Definition of an HMIS

The system used to retrieve, collect and analyze information is called a health information system. Data needed for making policies, making quality decisions, data needed by clinicians, physicians, which add value to the health of the population falls under the definition of health information system. There are two subsystems of HIS one is patient management information system i.e. data of patient, billing, medicines, treatments, the prescription is added second hospital management information system such as stock management, human resource management, asset management, etc.

Health information systems in developing countries

There are two methods of collecting data one is routine and the second is periodical. Periodic data is expensive needs more time but once it is collected it saves time for future analysis of data and interpretation, but as compared to routine data collection it is less expensive. Due to financial problems, developing countries are unable to collect periodic data. In Saudi Arabia routine data is collected at health centers and facilities. Like TB, Malaria, EPI, etc. maternal and child health.

Single source data does not provide full and complete information so periodic and routine data both can be used for people living in remote areas ad cannot travel to big cities for health. The national health information system must use different methods for collecting data and making decisions.

Use of ICTs provide complete and accurate information to doctors at time of need and it increase the performance, of doctors, system, enhance reputation of health care organizations and health of patients is also affected in positive way [17].

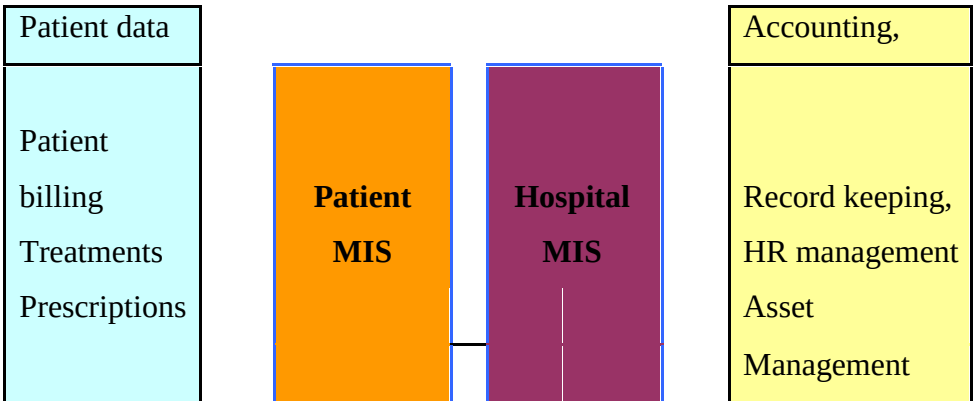

Figure 1: HIS ICTs in Developing Countries

All electronic means of sharing information such as radio, Televisions, internet, computers, social media, print media are called ICTs, [7] but it does not mean that paper-based media is ignored and does not have any importance [18]. In ICTs Telemedicine, E-health, health information system plays significant role in their performance.

ICTs and Health Information Systems

There are three roles so health information system one is working as instrument for education, learning to help doctors to know about latest development in the field. Second role is to work in remote areas where people have no access to health facilities third role is to act as transparent and efficient tool for governance to improve health services. [7].

In order to increase efficiency of services in health sector health organizations in Saudi Arabia must provide pre services and in services or training of ICTs and maintenance of software and hardware must be decentralized to reduce delay in process.

Decentralization of information management toward the Regional level

Majority of countries have already developed mechanism for routine data collection and all the necessary steps taken for this data collection are set up. [3,10]. Results of decentralization shows positive change in health system, delays are reduced, and equipment are maintained on time and services are provided to patients on time. [8]. In decentralization most of the activities are carried out by management team and cooperation of community and society.

World health organization and other societies also encourage importance of decentralized health information system. It consisted of all health-related activities.

Research Methodology

"Survey approach was used to collect data using questionnaires" [15]. There are different methods of collecting data archival research, primary data, secondary data case study, historical data. [20].survey is used to collect primary data and it is cost effective and time saving[1].In this approach data from large population can be collected in short time[20,15].

Population and sampling

Population of this study are all employees working in Qassim region at health facility convenience sampling was used and Weiers formula was used to calculate sample. Total 90 respondents were chosen a sample and questionnaires were distributed to alt he respondents.

Data Collection Methods

After getting permission questionnaires were distributed and total 73 complete filled questionnaires were received back and used in analysis.

Data analysis techniques

SPSS 20 was used, and correlation, regression, t-tests and ANOVA were used to test hypotheses.

RESULTS

Demographic information of respondents is given in Table 1.there are total 73 participants 38 respondents were trained i.e. 52.1% and 35 respondents were untrained i.e. 47.9%. Further there were 40 in charge i.e. 54.8% and HIS were 33 i.e. 45.2%.

Table 2 shows mean and standard deviation of four variables i.e. data collection and recording, data processing, reports, and decision making. Results revealed that mean score of data collection and recording is M= 3.9658, S.D= 0.83146, while mean score of data processing is M=3.7288, S.D=0.87074, mean score of reports M=3.9247, S.D=0.89107, mean score of decision making is M=3.6548, S.D=0.86491. it means that standard deviation of all variables are very close to each other it means there is homogeneity among responses of respondents and most dominant factor in all four variables is data collection and recording followed by reports on basis of highest mean and lowest mean is recorded for decision making so there needs attention of healthcare organizations.

Analysis

Hypothesis: 1 was that all variables are mutually correlated. Bivariate correlation was used to test the hypotheses. Pearson correlation between data collection and recording and decision making is found moderate positive and significant i.e. $r=0.679, p<0.01$, further analysis of results revealed that correlation between data processing and decision making is also found moderate positive and significant i.e. $r=0.689, p<0.01$, moreover relationship between reports and decision making is also positive and moderate significant i.e. $r=0.654, p<0.01$.positive correlation means increase in one variable will increase other variable. So, all variables have relationship with one another so H1 is accepted.

Hypothesis: 2 Decision-making is predicted by All the Predictors

Before regression few assumptions of regression must be fulfilled by data. There must be no outliers, no multicollinearity and no heteroscedasticity. These values were checked, and data already fulfilled these assumptions. Multiple regressions were used for testing second hypotheses. Below Table shows that all predictor variables i.e. data collection and recording, data analysis and reports generation shows variance upon decision making i.e. $R^2 = 0.515$, it means 51.5% variance is shown upon decision making.

Analysis

Table 5 shows Unstandardized and standardized regression coefficients. Standardized regression coefficients were used for testing hypotheses 2. Beta values of all predictors are given beta value for data collection and recording is $\beta = 0.177$, $p<0.05$ is significant further analysis of results revealed the beta value for data analysis i.e. $\beta=0.367$, $p=0.032$, while beta value for reports generation is $\beta=0.217$,$p<0.05$. Purpose of beta value means that one unit or one percent change in predictor will increase the criterion. It means one percent change in data collection and recording will bring 17.7% change in decision making, further one unit change in data analysis will change 36.7% change in decision making and one percent change in reports generation will change 21.7% change in decision making so most dominant factor among all variables in model is data analysis. Because of highest beta value so H2 is also accepted.

Analysis

Hypothesis: 3 significance mean difference among the trained staff and untrained staff for decision making. Independent sample t-test was used for testing third hypotheses. There were two groups i.e. trained staff and untrained staff. To check the difference in mean scores of trained and untrained staff is checked and decision is made on basis of p values. It is noted that significant value for trained, untrained staff for data collection and recording is significant i.e. $p=0.002<0.05$ further analysis of results revealed that significance value for data analysis is $p=0.006<0.05$ and for reports generation $p=0.000<0.01$ and for decision making $p=0.020<0.05$. it means that there is difference in mean scores of trained and untrained staff and their data collection and recording, data analysis, reports generation and decision making so on basis of above discussion H3 is accepted.

Table 1: Demographic profile of the respondents

Training					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Trained	38	52.1	52.1	52.1
	Untrained	35	47.9	47.9	100.0
	Total	73	100.0	100.0	
	HF In-charge	40	54.8	54.8	54.8
	FP DHIS	33	45.2	45.2	100.0
	Total	73	100.0	100.0	

Table 2: Descriptive Study Results:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Data collection and recording	73	1.00	5.00	3.9658	.83146
Data processing	73	1.00	5.00	3.7288	.87074
Reports	73	1.00	5.00	3.9247	.89107
Decision making	73	1.00	5.00	3.6548	.86491
Valid N (listwise)	73				

Testing of the Hypotheses

Hypothesis:1 Predictors are Highly Correlated with Criterion Variables

Table 3: Correlations (n=73)

Correlations					
		Data collection and recording	Data processing	Reports	Decision-making
Data collection & recording	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	73			
Data processing	Pearson Correlation	.862**	1		
	Sig. (2-tailed)	.000			
	N	73	73		
Reports	Pearson Correlation	.852**	.779**	1	.654**
	Sig. (2-tailed)	.000	.000		.000
	N	73	73	73	73
Decision-making	Pearson Correlation	.679**	.689**	.654**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	73	73	73	73

**. Correlation is significant at the 0.01 level (2-tailed).

Hypothesis:2 Predictors significantly predict the criterion variable

Table 4: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.718[a]	.515	.494	.61512

a. Predictors: (Constant), Reports Generation, data Analysis, data Collection and Recording

Table 5: Coefficients

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.737	.357		2.066	.043
	Data Collection and Recording	.885	.209	.177	.4.234	.000
	Data Analysis	.365	.167	.367	2.190	.032
	Reports Generation	.810	.158	.217	5.125	.000

a. Dependent Variable: Decision Making

H3: trained respondents score greater than untrained respondents.

Group Statistics							
	Training	N	Mean	S.D	SE Mean	T	P
Data Collection And Recording	Trained	38	4.2500	.63406	.10286	**3.191**	.002
	Untrained	35	3.6571	.91550	.15475		
Data Analysis	Trained	38	3.9947	.75622	.12267	**2.830**	.006
	Untrained	35	3.4400	.90463	.15291		
Reports Generation	Trained	38	4.2982	.63098	.10236	**4.059**	.000
	Untrained	35	3.5190	.96064	.16238		
Decision Making	Trained	38	3.8789	.82205	.13335	**2.377**	.020
	Untrained	35	3.4114	.85535	.14458		

H4: Computer literate score higher than the computer illiterate

Group Statistics						
	Computer Literate	N	Mean	S.D	T	p
Data Collection and Recording	Computer Illiterate	34	3.8725	.90830	-.882	.381
	Computer Literate	39	4.0470	.76084		
Data Analysis	Computer Illiterate	34	3.6353	.92438	-.848	.399
	Computer Literate	39	3.8103	.82456		.
Reports Generation	Computer Illiterate	34	3.9853	.84822	.544	.588
	Computer Literate	39	3.8718	.93460		
Decision Making	Computer Illiterate	34	3.5941	.98040	-.547	
	Computer Literate	39	3.7077	.75929		586

Analysis

Hypothesis: 4 The differences between 'computer literate and computer illiterate are not significant on any of the four variables. The hypothesis that computer literate score higher than the computer illiterate stands false on all research variables because of insignificant p-values which fall beyond the required critical value of 0.05. Decision: The hypothesis is therefore rejected.

Hypothesis: 5 Focal Persons (RHIS) are scoring greater than health facility in-charge

Analysis

This hypotheses is only accepted for data collection and recording and data analysis on basis of p values because for data collection and recording t=-1.96, p=0.050, it means that focal person score higher than facility in charge and for data analysis t= -2.24, p=0.028 it means that focal person score higher than facility in charge in data analysis. So, this hypothesis is partially accepted for first two variables and rejected for reports generation and decision making.

Group Statistics						
	Employee Status	N	Mean	Std. Deviation	T	Sig
Data Collection and Recording	Health Facility In charge	40	3.8000	.92234	-1.96	.050
	Focal Person DHIS	33	4.1667	.66536		
Data Analysis	Health Facility In charge	40	3.5300	.91321	-2.24	.028
	Focal Person DHIS	33	3.9697	.76178		
Reports Generation	Health Facility In charge	40	3.8333	.92681	-.972	.334
	Focal Person DHIS	33	4.0354	.84652		
Decision Making	Health Facility In charge	40	3.4900	.95321	-1.87	.065
	Focal Person DHIS	33	3.8545	.70759		

DISCUSSION AND CONCLUSION

Main purpose of this study was to find the relationship between health information systems its attributes and decision making. Also, researchers test the difference in mean scores of trained and untrained staff , in charge of health facility and focal persons and computer literate and computer illiterate staff about data collection and recording, data analysis, and reports generation and dependent variable decision making. It is found that all the predictor variables are positively and significantly related with decision making second hypotheses was to test the effect of predictor variables i.e. data collection and recording, data analysis, and reports generation and decision making. All the predictors have effect on decision making.

SUGGESTIONS:

1. There is a need of formulating clear-cut and comprehensive government e-health policies which are capable to guide the management in Hospitals to make successful implementation of HIS.
2. Workshops and training programs should be arranged for all types of employees, which should aim at educating them regarding all aspects of HIS.
3. There is need to work on the side of user participation at the time of developing HIS so that they can positively contribute to the effective development.
4. Finally, the all medical routines in the current work environments may to be replaced with internet, websites and emails. This change can be achieved through increasing the computer literacy of different users of HIS along with provision of computer facilities.

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