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Statistical Study to Measure the Medical Staff's Knowledge of Medical Information Integrated System in African Developing Countries

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Abstract: ***Health care community is directing intensive efforts toward emerging the information technology into medical services to simplify management of patient data, healthcare, and healthcare related processes; facilitating healthcare processes and data management across departments and institutions. Knowledge of clinical stuff of integrated health electronic system is a key factor in the advanced communities that have made smooth transition to efficient integrated health electronic system. African developing countries still face many difficulties to make such transition to the integrated health electronic system. One of the most important factors prevent smooth transition to the health electronic system in these countries is the lake of knowledge of the clinical stuff of such systems. In this paper a statistical field study conducted to study and measures the clinical stuff's different aspects of knowledge of health electronic system. These aspects of knowledge of health electronic system are general knowledge, knowledge in terms of design, and knowledge in terms of management.***

Keywords: Electronic health record, Electronic medical report, Information technology, Hospital Integrated information system

1. Introduction

The (EHR) is increasingly being used to deliver health information to the point of care. Considerable work is now underway in many countries to develop the components of effective and comprehensive EHRs, and EHR development is central to many national health information strategies. EHRs consist of components that enable health care providers to access a patient's health information regardless of geographical location. [1]

Health data are collected by physicians, nurses, office staff, admissions personnel, physical and respiratory therapists, laboratory personnel, radiology technicians, and pharmacists. Therefore, all those who work in health care collect data through the nature of their occupations, as these data are required in the performance of their jobs [2].

Orfanidis Found evidence that gaining the acceptance of EHR systems by physicians, nurses and other health care professionals is often problematic. A primary reason cited is a general lack of trust in EHR systems. A further barrier to effective understanding and use is the poor computer literacy of some health care personnel. [3]

Patients have a right to have personal health data kept private and the outcome of keeping record in an indiscreet way could be the cause for those patients no longer discloses intimate details that are necessary for their proper medical care, as they do not trust the clinician to keep this information private. [4]

In particular, components of the EHR, such as electronic prescribing, reduce likelihood of human error with as much as a 55% reduction in serious medication error rates. [3]

Healthcare, as in any other sector, has been pressing forth towards adopting and using Information Technology (IT) as a tool to simplify management of patient data, healthcare, and healthcare related processes [5];

It has been estimated that the average patient generates up to 50,000 data items during their life.

Even though the adoption rate was relatively slow, some countries have led the way in implementing IT in healthcare [5];

Around the world are pressing forth towards the realization of national electronic health information [5].It is not the same case in the developing countries. They mostly do not have such system and laws to protect personal information and the population also doesn't know their rights on that matter. [6]

In developing countries, they still have problems in providing basic needs to the population and infrastructures are still at a rudimentary level. However, the EMR should not be ignored given its role in improving healthcare quality. Low and middle-income countries share the largest part of disease burden with the rest of the world. Therefore, it is important to manage healthcare information efficiently. [7]

It may be an opportunity to encourage low-income countries to consider open source in EMR systems as good option for their health IT.

EMR implementations in developing countries seem to go on very slow speed especially in Africa. In middle-income countries of Asia and Latin America, EMR implementations are being done faster. [8]

The challenges in implementing EMR in Africa may include the lack of basic infrastructures, ICT equipment, and shortage in electricity, unclear policies, and poor planning due to the lack of financial capacity. Some projects are implemented without plans. This comes mostly with the availability of foreign development funds, which are not predictable. For the developing countries, to have a long-term development plan could help in investing in important projects progressively [9].

With this regard, the question remains what are the reasons for the absence of a MIS as comprehensive health system that can generate an EMR for the patient in Egypt, noting that Egypt is the largest Arab country developed in the continent of Africa. To further extend the discussion on this matter, we conducted Qualitative case study this study attempts to improve the understanding of MIS implementation in Egypt as a developing country, Data is collected with the help of interview and questionnaire as a tool for conducting the field study, Findings of this study are presented in the form of recommendations, which need to be considered and be done.

2. Methods and Validation

The researcher developed and validated a questionnaire to collect objective quantitative data from different types of the various clients of the electronic health system. The questionnaire contained three sections of questions; the first part consists of a set of statements that reflect the knowledge axis about the electronic health system in general. The second part includes a set of phrases that express the knowledge of the electronic health system in terms of design. The third part includes a set of phrases that reflect the knowledge of the system in terms of management.

The questionnaire used the classic three Likert scale format; agree, neutral (neither agree nor disagree), disagree. Acceptance and satisfaction among users.

The sample of the research was randomized to be representative of the original community in question. They are different categories and levels dealing directly or indirectly with the electronic health system and its networks. The sample consisted of 243 individuals distributed in the departments and departments of public and private hospitals and medical centers and clinics. This number represents the questionnaires returned after the exclusion of invalid forms, and after the division of the research community into the classes or categories mentioned above, which was limited to this number due to the large size of the original community.

2.1. Designing the Questionnaire and Drafting Its Paragraphs

Consistent with the nature of the research and to achieve its objectives, the researcher used the questionnaire as a tool to conduct the field study. The questionnaire is "an important way to obtain answers to a number of questions written in a form prepared for this purpose and completed by the respondent." It gives us the data responses needed to identify the aspects identified by the researcher.

The questionnaire was prepared in its initial form by studying and reviewing the theoretical literature, standards used in the studies, and extracting a set of appropriate statements with the nature of the subject and its limits. The first page of the questionnaire included the title of the research, the purpose of the questionnaire, basic data required from the sample, guidelines for answering the questionnaire and the terms of the questionnaire.

2.2. The Validity and Reliability of the Questionnaire

The next step in the data analysis process was to conduct a test of validity and reliability. Validity of the Knowledge of the design and management of medical networks for various clients of the electronic health system scale was established with The Comparison of Extreme Groups method. In this method the scale will be valid if the difference between the mean scores of the two extreme groups (high scores group-lowest scores group) is significant. Table 1 indicate that the differences among the mean scores of the two extreme groups at the total score of Knowledge of the design and management of medical networks for various clients of the electronic health system scale take the value (t= 13.439, $p<0.01$.) And this values is significant at 0.01 level, and which indicate that the scale was valid.

Table 1: Mean, Standard Deviation, and the differences among the scores of the two extreme groups (high scores group-lowest scores group) at the total score of (Knowledge of the design and management of medical networks for various clients of the electronic health system scale.

	Group(1) high scores group (n=25)		Group(2) low scores group (n=25)		t
	Mean	Std. Deviation	Mean	Std. Deviation	
Total Score	72.4	8.367	103.64	9.907	13.439 **

Note: * = significant at .05 level ($\alpha < .005$), ** = significant at .01 level ($\alpha < .001$).

Also, the reliability of the Knowledge of the design and management of medical networks for various clients of the electronic health system scale was tested by using Cronbach's alpha coefficients which indicate to internal

consistency reliability and split-half reliability (The most commonly used method to split the test into two is using the odd-even strategy). Split-half reliability represents the reliability of a test only half as long as the actual test, a correction formula must be applied to the coefficient. Spearman-Brown prophecy formula.

Cronbach's alpha coefficients and split-half coefficients in Table (2) indicate that Knowledge of the design and management of medical networks for various clients of the electronic health system Scale is a highly reliable.

Table 2: Knowledge of the design and management of medical networks for various clients of the electronic health system Scale: Reliability of Cronbach's alpha coefficients and split-half coefficients (n=100)

Subscales of the Scale	*Cronbach's alpha coefficients*	*Split-half coefficients*
1- Knowledge of the electronic health system in general	0.676	0.599
2- Knowledge of the electronic health system in terms of design	0.789	0.715
3- Knowledge of the system in terms of management	0.787	0.703

3. Sample Description

The researcher used the statistical package for social sciences (SPSS) to perform a group of statistical analyses including both descriptive and inferential statistics. The total number of valid responses was 243 participants, with a gender distribution that is almost one to one (male to female ratio). Tables 3, 4, and 5 show the distribution of sample members according to the category of gender, job, and type of hospital.

Table 3: Distribution of the sample according to the gender

Gender	Male	Female	Total
Frequencies	128	115	243
Percentage	52.67%	47.33%	100%

Table 4: Distribution of the sample according to the job

Job Category	Doctor	Nursing	Engineer	Technician	Employee	Total
Frequencies	196	41	0	1	5	243
Percentage	80.66%	16.87%	0%	0.41%	2.06%	100%

Table 5: Distribution of the sample according to the Type of hospital

Type of hospital	Public Hospital	Private Hospital	Teaching Hospital	Medical Center	Medical Clinic	other	total
Frequencies	86	93	25	22	0	17	243
Percentage	35.39	38.27	10.29	9.05	0%	7	100%

Table 5 shows the diversity of the sample of the field study to represent the different specialties and functions in public and private hospitals, medical centers and clinics.

4. Results

This section shows the results for each of the three aspects of knowledge of integrated health electronic system which are general knowledge, knowledge in terms of design, and knowledge in terms of management. After the statistical processing of the data, the results were monitored according to the research aspect in the form of statistical tables, calculation of the percentages, for each of the questionnaire terms, which aims to identify the degree of verification of these practices from the point of view of employees in public and private hospitals and medical centers and clinics for each axis of the questionnaire. The results conducted over three hypothesis including gender, job, and type of hospital.

4.1. For the first hypothesis

The hypothesis states that "there are no statistically significant differences between the average scores of the sample members on the dimensions the knowledge of design and management of the medical networks of the various clients of the electronic health system scale according to gender (male - female). To verify the validity of this hypothesis, the following table illustrates this.

Table 6: The significance of the differences between the average scores of the sample members on the dimensions of the knowledge of design and management of the medical networks of the various clients of the electronic health system scale according to gender (male - female)

Dimensions	Male (n=128)		Female (n=115)		t
	Mean	Std. Deviation	Mean	Std. Deviation	
1- Knowledge of the electronic health system in general	22.19	5.844	20.7	5.821	1.991*
2- Knowledge of the electronic health system in terms of design	10	2.726	10.04	2.761	-0.123
3- Knowledge of the system in terms of management	11.08	3.9	11.23	3.49	-0.329

Note: ** = significant at .01 level (p < .001); * = significant at .05 level (p < .005)

It is clear from the previous table that there are no statistically significant differences between the average scores of the sample members according to type (male and female) in the dimensions and the total score on the knowledge scale for the design and management of the medical networks for the various clients with the electronic health system except for the first dimension.

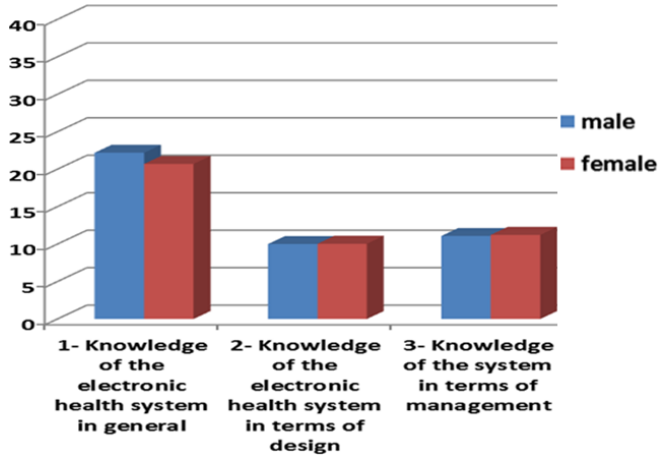

Figure 1: Differences between the average scores of the sample members on the dimensions of the knowledge scale for the design and management of the medical networks of the various clients of the electronic health system according to gender

4.2. For the second hypothesis

The hypothesis states that "there is a statistically significant effect on the variable of the type of hospital (general hospital, private hospital, educational hospital, medical center, medical clinic, etc.) on the degree of knowledge of the design and management of medical networks for the various clients of the electronic health system. In order to verify the validity of this hypothesis, a one-way contrast analysis was used, and the following tables illustrate this.

Table 7: The differences between the average scores of the sample according to the variable of the type of hospital (general hospital, private hospital, educational hospital, medical center, medical clinic, etc.) on the knowledge scale of design and management of medical networks for different clients of the health system

Dimensions	Hospital	n	Mean	Std. Deviation	min	max
1- Knowledge of the electronic health system in general	General Hospital	86	22.52	6.175	14	39
	Private Hospital	93	20.66	4.507	14	34
	Educational Hospital	25	19.16	7.598	14	35
	Medical Center	22	20.95	4.541	14	30
	Etc.	17	24.82	7.577	14	42
	Total Score	243	21.48	5.869	14	42
2- Knowledge of the electronic health system in terms of design	General Hospital	86	10.71	3.474	8	24
	Private Hospital	93	9.33	1.703	8	16
	Educational Hospital	25	10.08	3.239	8	19
	Medical Center	22	9.55	1.335	8	12
	Etc.	17	10.82	2.856	8	16
	Total Score	243	10.02	2.737	8	24
3- Knowledge of the system in terms of management	General Hospital	86	11.91	4.31	9	27
	Private Hospital	93	10.16	2.589	9	25
	Educational Hospital	25	11.4	3.606	9	21
	Medical Center	22	10.73	2.979	9	18
	Etc.	17	12.94	5.166	9	25
	Total score	243	11.15	3.705	9	27

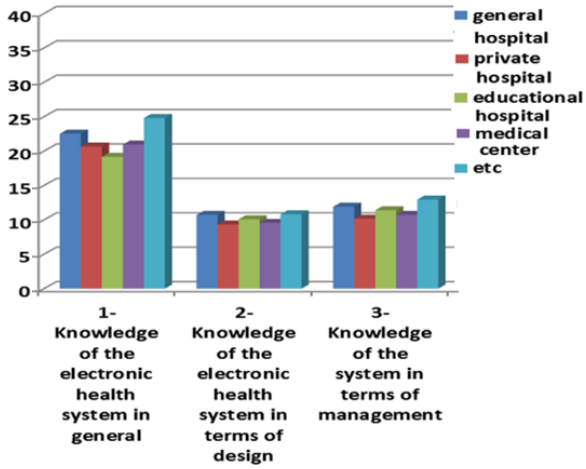

Figure 2: shows the differences between the average scores of the sample according to the variable of the type of hospital on the scale of knowledge design and management of medical networks for various clients with the health system

4.3. For the third hypothesis

The hypothesis states that "there is a statistically significant effect on the variable of job (doctor, nurse, technician, and employee) on the difference in the scores of sample members on the knowledge scale of designing and managing the medical networks of the various clients of the electronic health system. In order to verify the validity of this hypothesis, a one-way contrast analysis was used, and the following tables illustrate this.

Table 8: The differences between the average scores of the sample according to the variable of the job (doctor - nursing - technician - employee) on the scale of knowledge of the design and management of medical networks for various clients with the health system

Dimensions	Job	n	Mean	Std. Deviation	minimum	maximum
1- Knowledge of the electronic health system in general	Doctor	196	21.55	5.378	14	42
	Nursing	41	20.27	7.553	14	37
	Technician	1	27	0	27	27
	Employee	5	27.8	5.495	19	34
	Total Score	243	21.48	5.869	14	42
2- Knowledge of the electronic health system in terms of design	Doctor	196	9.84	2.292	8	24
	Nursing	41	10.66	4.187	8	22
	Technician	1	12	0	12	12
	Employee	5	11.4	3.578	8	16
	Total Score	243	10.02	2.737	8	24
3- Knowledge of the system in terms of management	Doctor	196	10.89	3.402	9	27
	Nursing	41	11.88	4.638	9	27
	Technician	1	12	0	12	12
	Employee	5	15.2	4.658	9	20
	Total Score	243	11.15	3.705	9	27

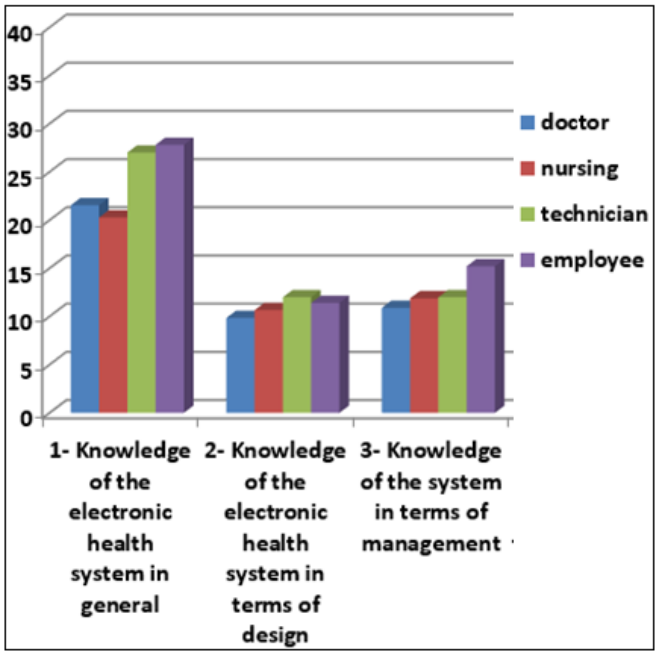

Figure 3: shows the differences between the average scores of the sample according to the variable of the job Scale knowledge of the design and management of medical networks for various clients with the health system

4.4. Summary of Results

The results of the statistical analysis confirmed the absence of statistically significant differences according to type in most aspects of the questionnaire of knowledge of design and management of medical networks for various clients with the electronic health system. The results confirmed the effect of hospital type on respondents' responses to all aspects and the overall score of the questionnaire. (Other) centers and private clinics, which may be due to the presence of elements of experience with knowledge of the design and management of medical networks, as well as a significant impact of the type of work on the knowledge of the electronic health system in general and knowledge of (The importance of the system to the sample members after knowing some of the surface information about it and the availability of its needs). The technicians were the most familiar group of the electronic health system and the most important sense of the system.

5. Conclusion

From the previous results, we can conclude that the low knowledge and know-how to design and manage the medical networks of various clients with the electronic health system as well as the low sense of importance in addition to the lack of cadres to work properly due to lack of sufficient experience. There are 243 individuals working in 25 hospitals. There is not one engineer specializing in eHealth systems, which is very dangerous, and one of the biggest challenges facing the application of an integrated health electronic system within medical entities. Therefore, the current study suggests the need to hold several seminars aimed at raising awareness of all hospital employees as well as the benefits that may benefit them in the case of the application of eHealth systems within medical entities. The current study also recommends the rehabilitation of employees and employees in hospitals. It is necessary to shed light on further scientific studies on the electronic health system, its importance, its importance, how it is designed and managed, and comparative studies of the results of work with the traditional system with the results of applying integrated electronic health system.

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