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**Factors that Affecting Collaboration among Physicians
 using Healthcare Information System in Developing
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A B S T R A C T

To analyze and propose the factors that affect the current levels of collaboration which exist among physicians in sharing healthcare information in the selected hospitals in developing countries using HISs. A quantitative method of enquiry was used for this study in the two public hospitals in Selangor state in Malaysia, by using questionnaire instrument. The responses received and analyzed using Statistical Package for the Social Science (SPSS). Using the descriptive statistics (e.g., percentage, standard deviations, and means), and five point Likert scales in order to describe the features of data collection to analyze the factors that affect the collaboration among physicians in the selected hospitals. The result of the analysis showed the current level of collaboration among physicians within the hospitals with regard sharing information using HIS, which was very weak according to many factors. An analysis of the seven kinds of collaboration that exists among physicians was conducted and a mean score of 2.6130 was obtained reflecting minimal collaboration which in other words can be regarded as weak collaboration. The lack of collaboration was found to be as a result of lack of information distribution systems alongside the independent information technology support. In this study it was also found that collaboration occurred only in the form of regular verbal meetings with no form of data sharing through the use of the system. Low rating was also recorded for collaboration among physicians in terms of information sharing among hospitals for the purpose of improving medical research as well as medical activities. This implies the absence of an efficient information system which enhances data sharing within the hospitals and with other hospitals. Furthermore, the results imply that the real-time sharing of new activity in the hospital and with other hospitals through an information system is yet to be achieved.

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Introduction

In most developing countries, there is a lack of collaboration among hospitals in sharing healthcare information. According to that, about 85% of public hospitals in Malaysia have delayed in adopting and implementing the HISs, which may negatively affect the Malaysian vision of 2020, which is to become a developed country [1]. In the healthcare sector, the term “collaboration” refers to the communication which takes place among healthcare practitioners during the information and skills sharing with regard caring of a patient [1]. In healthcare sector, collaboration takes place when healthcare professionals work with one another to achieve certain goals in patient care by sharing responsibility in solving a problem and taking decisions [3].

Team members’ awareness with regards to their respective knowledge and skills, is increased when collaboration takes place and this further leads to improvements in decision making [4]. According to [5], a suitable communication system is needed for proper collaboration among health workers and physicians. The main contribution of this study is to determine the existing level of collaboration among medical staff in the healthcare environment as Malaysian context, and what the factors that affect this collaboration. In the next sections, we review the relevant literature according to collaboration HISs among healthcare environment, integrated healthcare information system, and privacy preserving factor that affecting collaboration among physicians. As shown in next subsections

Collaboration of HISs within Healthcare Environment

In the healthcare sector, the term “collaboration” refers to the communication which takes place among healthcare practitioners during the information and skills sharing with regards caring of a patient [2]. In healthcare sector, collaboration takes place when healthcare professionals work with one another to achieve certain goals in patient care by sharing responsibility in solving a problem and taking decisions [3,6]. The types of communication and information exchanging that come along between the medical staff to sustain

collaboration in the health care sector, are four. Figure 1 shows a general model of collaboration in any systems [7].

According to [8] and [9] the medical services level of and the level of collaboration among physicians across distances can be improved by integrating HISs in hospitals. They also noted that the present of HISs in hospitals are secluded and are mostly tailored to serve only individual departments in hospitals [8,9]. Poor collaboration among medical staff in hospitals, which has an effect on quality care and service, was the result of disintegrated information in the Canadian health care sector and poor information sharing [10].

Furthermore, the present study reveals many issues that are related to collaboration in the healthcare sector through HISs. Decentralized and separate units reveal lack of shared goals, which usually occurs among healthcare systems [11,12]. Most researchers concentrate on studying the trust issues and how they affect medical staff collaboration. The importance of security issues and privacy concerns in improving medical staff collaboration through HISs has been revealed by such studies. Patients and healthcare providers that use HISs must trust the system in order for it to be effectively implemented [13]. More also, the current level of collaboration among physicians within the hospital environments in Malaysia. Results reveal that lack of collaboration among medical staff may be as a result of poor computerized systems and may eventually lead to patient harm [13,2]. Collaboration in HISs is important because it helps provide patients with good and fast treatment as well as appropriate medical data for research [13]. Besides, organizations are always willing to collaborate with other entities that carry out similar activities, such as hospitals, for mutual benefits [13,14]. A number of factors are responsible for failure in effective collaboration. The first factor is having autonomous, decentralized, units, and lack of similar goals, which is common among a number of healthcare systems. Many HISs are individualized because health care systems are fragmented and lack utilizing of real-time [15]. Secondly, most developing countries do

not adopt health care systems properly [16]. Therefore, in the health care system of developing countries, information technologies and effective collaboration should be encouraged especially with the management administration of the healthcare [1]. Thirdly, because of the large number of patients, physicians work independently. Fourth, in management, the challenges of socio-technical faced by some workers in health play a role. Fifth, the acceptance and of HISs in healthcare sectors, is met by issues of security, trust, and privacy concerns play important roles [17,18,19]. Sixth, laws and regulations allow for healthcare data sharing among different organizations', but the existing tools are not fully automated, cost-efficient, or truly real time [19].

Integrated Healthcare Information System

As indicated in different studies, HISs may be enhancing medical staff collaboration with other health workers by sharing healthcare information within and outside their hospitals, HISs may be an important factor. A powerful tool in the hands of healthcare providers is the Electronic Health Record (EHR) where it reduces medication errors that may occur as a result of handwritten prescription [20,21]. In the healthcare sector, the use of information systems (IS) is generally accepted, especially in hospitals. Such systems comprise of independent units that independently carry out activities and also collaborate work with other units [22,23]. In [24] revealed that in order to provide more effective support for collaborative working within distributed healthcare and to provide up-to-date information, there is a need for independent HIS units to collaborate in a flexible manner therefore allowing medical staff to make more informed decisions across organizational boundaries [25]. The integration HISs of plays a significant role in the improvement of medical treatment. Medical treatment quality and research can be improved through the use of medical resources; lower medical costs should be maximized [26].

HIS units are decentralized and autonomous, therefore, an integrated HIS is needed. Developing an efficient HIS collaborative environment is

important [22]. In order to achieve and enhance information collaboration among physicians in a real time, past researcher focused mainly on integrated HIS using fractal features. This collaboration happened in order to enhance the physicians' skills by sharing experience as a decision support system using fractal approach. Additionally, the collaboration feature between physicians in distributed healthcare system in the developing countries which can be improved using fractal approach in HISs was proposed by [12]. It was proposed to improve both the skills of physicians and healthcare services based on web based application.

Factor that Affecting Collaboration among Physicians

Different fields of study have given attention to the issue of privacy and privacy protection as a fundamental human right [27]. An important issue which must be considered when handling personal data is privacy protection. In [28] defines privacy protection as the protection of data which is sensitive prior to its release for analysis. Private information can be readily accessed and transmitted. EHRs have been described as computerized medical records, which have been created by healthcare providing organizations like hospitals. EHRs are components of traditional independent HIS through which medical records can be stored, retrieved and modified. In [29] found that 35% of the respondents expressed concern over the security of their personal health data. This shows how the issue of privacy can influence the acceptance and use EHR. To an extent, different fields like financial, medical and governmental have given great priority to the preservation of privacy.

METHODOLOGY

A quantitative method of research was used for this study. Quantitative method is used this will help in obtaining observable and measurable data on the variables [30]. The quantitative method involves solving problems through a formal, objective and deductive form. The purpose of the quantitative approach was to reaffirm from the literature, the current level of collaboration among physicians in

regard to sharing healthcare information. The study was conducted using the questionnaire survey. The targeted respondents for the survey were physicians with focus on the physician that works in the hospital where the records data can be obtained for the medical research from two government hospitals in Selangor state, Malaysia. The convenience sampling technique is used to select the participant's demands on time and cost. The data obtained from the questionnaire survey were analyzed using Descriptive analysis and Cronbach's alpha test.

RESULTS

A sample consisting of 150 physicians is used for this study. The convenience sampling technique is used to select the participants' demands on time and cost [31]. According to [32] the sample of participations is selected from populations due to the ease and availability of the groups. These subjects of the population are easily accessible to the researcher and available at a given time. The participants of this study were physicians from two public hospitals in Selangor, Malaysia. There are a lot of rationales behind the selected hospitals. First, the hospitals selected are public hospitals in Selangor, Malaysia. Secondly, these selected hospitals are also used as teaching. The hospitals for medical researchers and students from the Medicine Faculty. Thirdly, these hospitals administer and support programs whose sole objective is to study the causes of the diseases, avert, detect, diagnose, treat and control the diseases as well as publicize relevant information to medical patients, and practitioners. The fourth reason is that there is difficulty in connecting public and private hospitals since public hospitals provide free health services to the local residents [15]. The researcher attempted covering majority of the physicians in both selected hospitals. They consist of doctors, consultants, as well as specialists from all disciplines in various departments with different degrees of Bachelor, Master and Ph.D. Data were obtained through the use of questionnaire survey with 110 respondents who were physicians and have a knowledge about the health environment and the work in the selected hospitals. The respondents

were doctors, consultants, and specialists. The questionnaire was adopted from previous similar study and revised by experts in the domain, in order to ensure that respondents understand the questions of the survey. The distributed questionnaires among the respondents along with the number of complete and incomplete questionnaires for the two selected hospitals as shown in Table 1.

Demographic Characteristics of the Respondents

The respondents for the questionnaire were from different backgrounds in terms of their age, gender, and their level of education, years of employment, years of computer experience, and the occupation. Descriptive statistics was used in examining the different distributions of variables from their background as shown in Table 2 below. Table 2 shows the (110) participants' demographic characteristics. 80 participants (72.73%) were from the Hospital A and 30 (27.3%) were from the Hospital B. Of the total, 35 (31.8%) were male and 75 (68.2%) were female. The qualifications academic of the respondents are as follows: 75 (68.2%) Bachelor's degree, 29 (26.4 %) Master's degree, and 6 (5.4 %) PhD in medicine.

However, the result shows that a good number of specialists exist within the healthcare information system of the Selangor State particularly in the selected Malaysian hospitals. It is important for collaboration among the hospitals in medical research to be established so that relevant findings which could lead to effective treatment of patients can be achieved. The result of the years of employment showed that 88 respondents representing (80.0%) had 10 or less than 10 years and 22 (20.0%) have been working more than 10 years of employment, showing long term engagement in the medical field. In relation to the respondents' years of experience in the use of computer, it was found that 74 respondents (67.3%) have been using computer for six years, 13 respondents (11.8%) had between four to six years of experience in the use of computer and 23 (20.9%) respondents had experience between one to three years in using of computer. More so, in terms of occupation, it was found that two (1.8%) of

respondents were consultants, 103(93.6%) of the respondents were doctors, and five (4.5%) were specialists. The majority of the respondents were doctors (93.6%). This high rate gives the importance for this category they participate in this study. The low rate of the consultants and specialists because they always busy and difficult to find them free.

Reliability Analysis

The reliability test was conducted on the questions using Cronbach's alpha test to measure the questions reliability. The reliability analysis results are shown in Table 3. The information in Table 2 indicates the interval scale variables that were used in this study. The reliabilities presented in the above table are sufficient for use because the values are higher than the reliability indicator by [33].

Current level of physicians' collaboration in the selected hospital environment

In order to ascertain the current level of collaboration among healthcare providers in terms of sharing information that can be used in the treatment of patients within the hospital environment, seven kinds of collaboration with responses were given on a five-point Likert scale. Respondents were required to give their rating for the collaboration among them using a scale of 1 to 5 (1 = no collaboration, 2 = little collaboration, 3 = some collaboration, 4 = good collaboration, and 5 = very good collaboration). An analysis of the seven kinds of collaboration that exists among physicians was conducted and a mean score of 2.675 was obtained reflecting minimal collaboration which in other words can be regarded as weak collaboration. The result for this analysis is presented in Table4.

The results of the analysis showed that 54.5% indicated "no collaboration" and "little collaboration" respectively, and 40.9% indicated "some collaboration", and 4.5% indicated "good collaboration," and "very Good" respectively. The absence of collaboration among various hospitals located in the same town is indicated by these results.

DISCUSSION

The Result show the low level of collaborations types that mentioned above. This lack collaboration was mainly due the distributed and the standalone information systems. The collaboration in this case was limited to verbal and regular meeting without any sharing of data by using the system. The lack of collaboration was found to be as a result of lack of information distribution systems alongside the independent information technology support. In this study it was also found that collaboration occurred only in the form of regular verbal meetings with no form of data sharing through the use of the system. The results of the study are summarized as follows: Findings on information sharing or activities sharing between physicians of the two selected government hospitals within the state of Selangor is inconclusive due to the fact that the high ratings are weak. This can be explained by the lack of a healthcare system that is computerized and integrated thereby causing this lack collaboration in regards to the sharing information and skills for the treatment of patient inside the hospital and outside other hospitals. As shown in Figure 2, the mean level of collaboration among the physicians is (2.61), which is still need to be improved. Low rating was also recorded for collaboration among physicians in terms of information sharing among hospitals for the purpose of improving medical research as well as medical activities. This implies the absence of an efficient information system which enhances data sharing within the hospitals and with other hospitals. Furthermore, the results imply that the real-time sharing of new activity in the hospital and with other hospitals through an information system is yet to be achieved. In summary, it was revealed by the result that collaboration among medical staff in relation to information and research findings can be facilitated by some factors which were not found in this survey of the study. Such factors are explained as follows:

- 1- The hospital system is not fully computerized so the hospital uses paper to manually record patients' data which leads to incomplete patient information that cannot be managed, controlled or shared.

2- Medically staff in the hospital work independently in medical research and treatment of patient because of time factor and the unavailability of a fully electronic HIS.

3- There is a difficulty in using the existing healthcare system to acquire new knowledge from the same and different hospitals in real time by physicians.

4- Privacy issue during sharing the data.

CONCLUSIONS

The aim of this research is to determine the present levels of collaboration in sharing healthcare information among physicians as researchers in the healthcare environment. The significant factors which affect such collaboration are examined. More so, there is need for future study to develop a prototype model for enhancing the collaboration among physicians using integrated HIS. An integrated collaborative HIS model will have proposed for the improvement of collaboration between the physicians in relation to the healthcare information sharing within the hospital and outside other with the consideration to solve the affecting collaboration factors.

References

- [1] H. Ahmadi, M. Nilashi, and O. Ibrahim, Organizational decision to adopt hospital information system: An empirical investigation in the case of Malaysian public hospitals, *Int. J. Med. Inform.*, vol. 84, no. 3, pp. 166–188, 2015.
- [2] C. R. Weir, K. W. Hammond, P. J. Embi, E. N. Efthimiadis, S. M. Thielke, and A. N. Hedeem, An exploration of the impact of computerized patient documentation on clinical collaboration, *Int. J. Med. Inform.*, vol. 80, no. 8, pp. e62–e71, 2011.
- [3] H. Patel, M. Pettitt, and J. R. Wilson, Factors of collaborative working: A framework for a collaboration model, *Appl. Ergon.*, vol. 43, no. 1, pp. 1–26, 2012.
- [4] J. Dunham-taylor and J. Z. Pinczuk, *Financial Management for Nurse Managers* (3th ed.), Jones and Bartlett Learning. 2014, pp. 81–164.
- [5] M. C. Reddy, P. Gorman, and J. Bardram, Special issue on Supporting Collaboration in Healthcare Settings: The Role of Informatics, *Int. J. Med. Inform.*, vol. 80, no. 8, pp. 81–164, 2011.
- [6] C. M. Fagin, *Collaboration_between_nurses_and_physicians_no.2.pdf*, *Acad. Med.*, vol. 67, no. Number 5, pp. 295–303, 1992.
- [7] R. Abdullah, H. Ibrahim, R. Atan, S. Napis, A. Jaafar, and M. H. Selamat, Applying Agent Technology to Facilitate Knowledge Sharing Among Bioinformatics Communities of Practice, *Int. J. Comput. Sci. Netw. Secur.*, vol. 8, no. 4, pp. 310–317, 2008.
- [8] K. Li and D. Yao, Cooperative work in heterogeneous medical information systems, in *2006 International Conference on Communications, Circuits and Systems, ICCAS, Proceedings, 2006*, vol. 3, pp. 1821–1824.
- [9] H. Yang, K. Liu, and W. Li, Adaptive requirement-driven architecture for integrated healthcare systems, *J. Comput.*, vol. 5, no. 2, pp. 186–193, 2010.
- [10] L. Dong and K. Keshavjee, Why is information governance important for electronic healthcare systems? A Canadian experience, *J. Adv. Humanit. Soc. Sci.*, vol. 2, no. 5, pp. 250–260, 2016.
- [11] W. R. Fried, B. Carpenter and W. E. Deming, Understanding and improving team effectiveness in quality improvement. 2011.
- [12] N. S. Ahmed, A Fractal-Based Model To Improve Cooperation Among Physicians In Distributed Healthcare Information Systems, University of Malaya, 2013.
- [13] A. H. Rashid, Collaborative Healthcare Information Systems in Privacy Preservation Based on K-Anonymization Model, *Computer Science and Information Technology*, University of Malaya, 2014.
- [14] G. Loukides and A. Gkoulalas-Divanis, Utility-preserving transaction data anonymization with low information loss, *Expert Syst. Appl.*, vol. 39, no. 10, pp. 9764–9777, 2012.
- [15] N. I. Ismail, N. H. Abdullah, and A. Shamsuddin, Adoption of Hospital Information System (HIS) in Malaysian Public Hospitals, in *Procedia - Social and Behavioral Sciences*, 2015, vol. 172, pp. 336–343.
- [16] R. Kim, The U . S . Hospital Management from a Strategic Management Viewpoint Abstract Response to Regulatory Changes: Early Studies Financial Performance and Strategic Organizational Capabilities and Managerial Cognition, *iMedPub Journals / Hosp. Med.*

- Manag., vol. 1, no. 2:7, pp. 5–8, 2016.
- [17] O. Ben-Assuli, Electronic health records, adoption, quality of care, legal and privacy issues and their implementation in emergency departments, *Health Policy (New York)*, vol. 119, no. 3, pp. 287–297, 2015.
- [18] J. L. Fernández-Alemán, I. C. Señor, P. Á. O. Lozoya, and A. Toval, Security and privacy in electronic health records: A systematic literature review, *J. Biomed. Inform.*, vol. 46, no. 3, pp. 541–562, 2013.
- [19] M. Azarm-Daigle, C. Kuziemy, and L. Peyton, “A Review of Cross Organizational Healthcare Data Sharing, in *Procedia Computer Science- The 5th International Conference on Current and Future Trends of Information and Communication Technologies in Healthcare (ICTH 2015)* A, 2015, vol. 63, pp. 425–432.
- [20] N. Qureshi, D. Al-Dossari, I. Al-Zaagi, A. Al-Bedah, A. Abudalli, and H. Koenig, Electronic Health Records, Electronic Prescribing and Medication Errors: A Systematic Review of Literature, 2000-2014, *Br. J. Med. Med. Res.*, vol. 5, no. 5, pp. 672–704, 2015.
- [21] V. Mishra, S. Mohammed, and J. Fiaidhi, Towards Developing an Interoperability Framework for Healthcare Community of Practice, *Int. J. Bio-Science Bio-Technology*, vol. 8, no. 5, pp. 65–82, 2016.
- [22] N. S. Ahmed and N. M. Yasin, Factors affecting cooperation among physicians in sharing information within the hospital environment: A study of two hospitals, *J. Comput. Sci.*, vol. 10, no. 5, pp. 794–808, 2014.
- [23] E. Asnina, J. Osis, and M. Kirikova, Design of Fractal-Based Systems within MDA : Platform Independent Modelling, in *Sigsand-Europe: the 3rd AIS SIGSAND European Symposium on Analysis*, 2008, pp. 39–54.
- [24] Y. Benkaouz and M. Erradi, Towards a Decentralized OSN for a Privacy-preserving e-health System, *Procedia Comput. Sci.*, vol. 63, pp. 284–291, 2015.
- [25] A. Skilton, Supporting the Information Systems Requirements of Distributed Healthcare Teams, Cardiff University, 2011.
- [26] Z. Jun-ping, L. Yi, Z. Zhen-jiang, and G. Hua-yuan, Electronic Health in China: From Digital Hospital to Regional Collaborative Healthcare, in *BUJ Sci. & Tech. L.*, 2011, p. 2008.
- [27] F. Casino, J. Domingo-Ferrer, C. Patsakis, D. Puig, and A. Solanas, A k-anonymous approach to privacy preserving collaborative filtering, *J. Comput. Syst. Sci.*, vol. 81, no. 6, pp. 1000–1011, 2015.
- [28] E. Bertino, Editorial: Introduction to Data Security and Privacy, *Data Sci. Eng.*, vol. 1, no. 3, pp. 125–126, 2016.
- [29] A. Gkoulalas-Divanis and G. Loukides, Conclusion and Open Research Challenges - Chapter 6,” in *Anonymization of Electronic Medical Records to Support Clinical Analysis*, 2013, pp. 65–69.
- [30] J. W. Creswell, Planning, conducting, and evaluating quantitative and qualitative research, vol. 4. 2012.
- [31] Z. M. Zain, A. Azim, A. Ghani, R. Abdullah, and R. Atan, Blog Quality Measurement : Analysis of Criteria using The Rasch Model, *Int. J. New Comput. Archit. Their Appl.*, vol. 1, no. 3, pp. 665–682, 2011.
- [32] I. Etikan and R. S. A. Sulaiman Abubakar Musa, Comparison of Convenience Sampling and Purposive Sampling Comparison of Convenience Sampling and Purposive Sampling, *Am. J. Theor. Appl. Stat.*, vol. Vol. 5, No, pp. 1–4, 2016.
- [33] Nunnally, J. (1978). *Psychometric theory*: New York, McGraw-Hill. National Science Foundation.

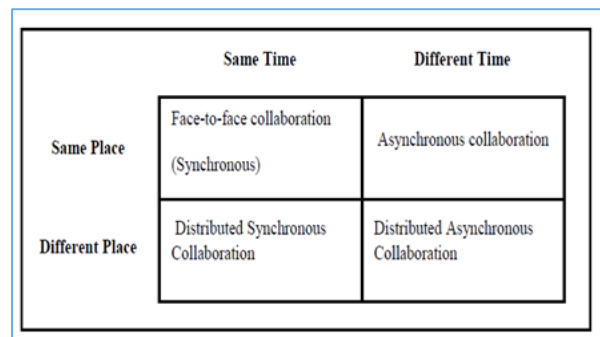


Figure 1. Collaboration types of working model [7]

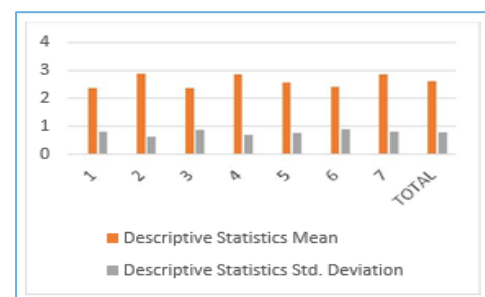


Figure 2. Mean Level of Collaboration among physicians

Table 1. Distribution of Pre-survey

	Hospital (A)	Hospital (B)	Total
Distributed Questionnaire	100	50	150
Received Questionnaire	90	40	130
Completed Questionnaire	80	30	110 (84.6%)
Incomplete Questionnaire	10	10	20

Table2. Demographic Variables of Respondents (N=110)

Demographics Variables	Frequency (Person) (110)	Percent (100%)
Hospital		
Hospital A	80	72.73%
Hospital B	30	27.27%
Gender		
Male	35	31.8%
Female	75	68.2%
Age		
	23	
under 26	76	20.9%
26-40	10	69.1%
41-55	1	9.1%
56 or Older		.9 %
Highest Level of education		
Bachelor	75	68.2%
Master	29	26.4 %
PHD	6	5.4 %
Years of employment		
10 or Less	88	80.0%
More than 10	22	20.0%
Years of computer experience		
1 to 3	23	20.9%
4 to 6	13	11.8%
More than 6	74	67.3%
Occupation		
Consultant	2	1.8%
Doctor	103	93.6%
Specialist	5	4.5%

Table3. The Scale Reliability and Consistency

Variable	N of Items	Cronbach's Alpha
The collaboration among Physicians	7	0.744

Table 4. Collaboration level among physicians

Questions	Responses	%	Mean & Std.
Q1 Collaboration medical research system and findings in various hospitals in your town.	No Collaboration	16 (14.5%)	2.3636
	Little Collaboration	44 (40.0%)	.80966
	Some Collaboration	45 (40.9%)	
	Good Collaboration	4 (3.6%)	
	V. Good Collaboration	1 (0.9%)	
Q2 Collaboration among medical staff (specialist and researchers) in your hospital environment.	No Collaboration	4 (3.6%)	2.8909
	Little Collaboration	15 (13.6%)	.62583
	Some Collaboration	81 (73.6%)	
	Good Collaboration	9 (8.2%)	
	V. Good Collaboration	1 (0.9%)	
Q3 Medical researchers sharing of activities from different hospitals to enhance scientific research findings and patient's treatment.	No Collaboration	19(17.3%)	2.3545
	Little Collaboration	42 (38.1%)	.86296
	Some Collaboration	40 (36.4%)	
	Good Collaboration	9 (8.2%)	
	V. Good Collaboration	0 (0.0%)	
Q4 Researchers sharing and access the medical research database in this hospital.	No Collaboration	5 (4.5%)	2.8455
	Little Collaboration	21 (19.1%)	.69317
	Some Collaboration	70 (63.6%)	
	Good Collaboration	14 (12.7%)	
	V. Good Collaboration	0 (0.0%)	
Q5 Researchers sharing findings among different hospitals to increase the use of human resources.	No Collaboration	6 (5.5%)	2.5727
	Little Collaboration	44 (40.0%)	.74758
	Some Collaboration	53 (48.2%)	
	Good Collaboration	5 (4.5%)	
	V. Good Collaboration	2 (1.8%)	
Q6 Collaboration of medical research among hospitals to distribute a new activity appeared in the system in real-time.	No Collaboration	18 (16.4%)	2.4091
	Little Collaboration	41 (37.3%)	.90153
	Some Collaboration	40 (36.4%)	
	Good Collaboration	10 (9.0%)	
	V. Good Collaboration	1 (0.9%)	
Q7 Collaboration and sharing activities among medical staff in the healthcare sectors in general.	No Collaboration	5 (4.5%)	2.8545
	Little Collaboration	26 (23.6%)	.79950
	Some Collaboration	62 (56.4%)	
	Good Collaboration	14 (12.7%)	
	V. Good Collaboration	3 (2.7%)	
Total			2.6130
			0.7771