

A Hospital Satisfaction Survey Report of Taiwan's Current Implemented Electronic Medical Records (EMRs) Systems

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Abstract—This article provides empirical data and findings in-regards to Taiwan's overall hospital EMRs and its EMR systems. In doing so, it aims to document information about the current status of the EMRs systems which have already been implemented and are currently in use in Taiwan. Objectively, this study contains breakthrough information for the international biomedical informatics community because it has been authorized to use the unpublished data and findings from one survey conducted during a major national Taiwanese project conducted by the National Taiwan Department of Health Committee. The title of this project is, "An evaluation on expediting the processing of Taiwan's health care plans; which ultimately produced a final report indexed as RDEC-MIS-100-010". The methodology of this paper and study uses several statistical methods to precisely deduce knowledge about the overall user satisfaction of the hospital participants whom were polled during the above mentioned project. Furthermore, the research and raw data of this paper was then sought to further elaborate on the issue of Taiwan's EMRs systems by developing this paper.

Specifically, this paper has revealed several insightful findings and statistical results based on analytical scientific methodology performed by using a 21 question hospital satisfaction survey which polled 137 public and private hospitals in Taiwan. Through this collaboration, a total of 782 completed surveys were tallied and provided us an ample amount of data to produce several statistical figures and models to support or coinciding discussion and result portion of this paper. In addition to statistical results about Taiwan's overall hospital EMRs and EMR systems based on the resulting data, all coming from a 21 question satisfaction survey, this paper also consists of a comparative analysis between both public Taiwanese hospitals vs. private Taiwanese hospitals. Finally, based on the data analysis of this paper, we provide some the possible implications for some of the high and low variance trends observed after processing this information.

Index Terms—electronic medical records (EMRs), hospital satisfaction survey, Taiwan health care, National Health Insurance (NHI)

I. INTRODUCTION

The objective of this study is in-line with the mission of the project entitled, *An evaluation on expediting the*

processing of Taiwan's health care plans. As such, the researcher of this paper [1] also strives to promote the integration of intercollegiate sharing of patient records, within Taiwan, to advance the effectiveness of its medical institutions. Furthermore, we believe that medical information technology and EMRs could reduce Taiwan's overall health care plan financial burden by reducing the amount of repeated laboratory tests and medication cost its pays [1], [2].

A. Background Information

Since the Taiwan Federal Government established its National Health Insurance (NHI) program, the government inadvertently became ultimately responsible for many health care related issues; in-regards to its hospitals and their patents. NHI is the universal health insurance program which provides comprehensive health care coverage to all Taiwanese citizens and foreign qualified residents whom qualify for it. Complete information and a full discussion of Taiwan's NHI is beyond the scope of the paper. Yet, basically all Taiwanese citizens and foreign resident's health care services are covered by this program and they are all compulsory required to supporting the federal program by federally mandated wage garnishments and/or monthly payments. Additionally, the elderly and disabled are subsequently not as responsible for the same premium amounts, when compared to the normal working NHI program participants. In continuation, one of the governmental regulations implemented after the establishment of the NHI program was that all hospitals and clinics must establish a Hospital Information System (HIS) which should include Electronic Medical Records (EMRs) of the patients they treat. The first evaluation study of the EMR systems in Taiwan post-implementation was conducted in 2005 according to an established federal regulation [3], [4]. The reasoning behind the implementation of EMRs systems was to provide the public with quick and convenient access to their own medical records via the usage of e-services, and to also provide clinicians a high quality and up-to-date medical records history report of individualized patients [5]. These medical records are invaluable reference reports for all of the parties involved with Taiwan's NHI program. Therefore, this paper was conducted as a plan benefit assessment because of the fashion in how it

subsequently analyses Taiwan EMRs and EMRs system [6], [7], [8]. For example, this paper focuses on assessing these systems to gain practical knowledge of their overall developmental state as five level systems, and it brings data to evidence through the usage of logical reasoning.

TABLE I. THE 21-QUESTION SURVEY

Dimensional Variable	The Survey Question and Corresponding Number
User-Functionality	1.)In the future, patient's data can be stored in cloud computing architecture. 2.)Patients should be able to have access their own EMRs. 9.)Exchange of EMRs should contain a serious and dangerous contagious diseases about a patient.
Hospital-Supportiveness	4.)Hospitals and clinics will use EMRs storage as a future trend. 5.) The Government should fully promote the implementation of EMRs in hospitals. 6.) EMR systems should be evaluated and necessary for hospital accreditation. 7.)Hospitals may re-plan their service processes due to the implementation of EMR systems. 14.)The disease coding of EMRs should conform to international standard coding being: ICD-10 (International Classification of Diseases – 10 th Edition).
Governmental-Supportiveness	8.)Department of Health should establish a secure trust information center for EMR storage and exchange control. 10.) Government should be more actively educate the public and promote the EMR exchange policy. 11.) Government should set up education and training team to help hospitals to promote EMR. 12.)Government should establish software standards for EMR system 15.)Relevant Laws and Regulations should be amended with the implementation of EMR.
Overall-Effectiveness	3.)Use of EMR can promote personal health management. 13.)Implementation of EMR can reduce the medical expenses for national health insurance. 16.)The use of EMR can promote the development of domestic information industry. 17.)Use of EMR can enhance the national competitiveness
Future-Developmental Outlook	18.)Healthcare authorities should be more widely to promote the interpretation and exchange of medical image. 19.)Healthcare authorities should be more widely to promote security RFID systems used in health care facilities. 20.)RFID chip technology can be used for hospital safety concern. 21.)Healthcare authorities should be more actively involved in funding and increasing manpower to accelerate the Smart Healthcare Project.

The content of this article is similar to an original report conducted by Taiwan's Ministry of Health's Research, Development, and Evaluation Committee because it includes one translated version of a single survey which they, being governmental authorized to do so, issued and collected data from the specific 137

Taiwanese hospitals which are all represent the participates of this report and are included within this paper. The title of this original report is "Expedite the processing of the wisdom learned from health care plans:" research report RDEC-MIS-100-010[1]. This report includes over 44 tables and graphs and has a total of 165 pages [1]. The raw-data of report RDEC-MIS-100-010 has been included in this particular paper with full-disclosure rights and exclusive access to supplement this paper with a highly reputable and sufficient database source of raw data. This raw data include both nominal and ordinal data sets. Moreover, this article independently analyzes this corresponding raw data of table 44 of report RDEC-MIS-100-010; to support its own unique findings. Thus, because some of the findings contained within this paper, coincide with report RDEC-MIS-100-010; weconclusively support some of the major and relevant finding of report RDEC-MIS-100-010. Yet, the objective of the paper specifically analysis the 21 satisfaction statement survey extensively (Table 1); in-order-to, systematically report on the overall satisfaction of Taiwan's governmental implemented EMRs systems. So, unlike report RDEC-MIS-100-010, the uniqueness of this article subjectively researches the previously mentioned topics through independent statistical calculations and analytical analyses.

B. Grouped Variables from Observational Data

Table1: This table lists the 21 questions which were included in the hospital survey, which is table number : 44 of report RDE-MIS-100-010 [1]. The various hospital staff members whom completed this survey were induced to rank their acceptance of the 21 question by using a 7 point Likert satisfaction scale.The table below (Table 2) is a statistical summary of the grouped data's results. It should be noted that the original 21-question survey (table 1) consisted of 21 survey questions/statements; yet, this paper excluded questions #19 and #20 from further analysis because the redundancy and irrelevance nature of their information in-scope with this paper's objective.

TABLE II.

Variable Group	Ques. #	Mean	Standard Deviation
User	1	5.369	1.358
	2	5.186	1.532
	9	5.968	1.225
Hospital	4	5.918	1.154
	5	5.743	1.298
	6	5.065	1.696
Government	7	5.421	1.204
	14	5.377	1.321
	8	5.922	1.219
Effectiveness	10	5.839	1.155
	11	5.909	1.148
	12	6.043	1.087
Development	15	5.810	1.142
	3	5.536	1.256
	13	5.384	1.448
	16	5.424	1.253
	17	5.371	1.296
	18	5.801	1.144
	21	5.848	1.162

In understanding the methodology logic behind the creation of this 21 question survey, please refer to figure 1. In this figure, we gained insight of five separate variables based on 19 of the 21 observations listed in table 1. Furthermore, the research team whom originally complied this survey was composed of national experts in the field of Multivariate Assessment Variables; to access the successfulness of the implemented EMR systems accordingly [9]. These research team members are mentioned within the acknowledgements portion of this paper.

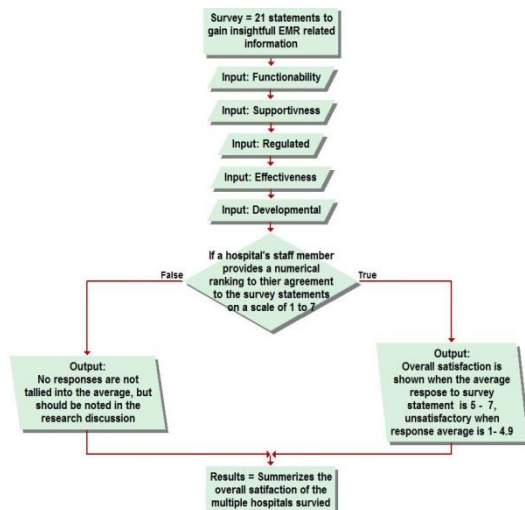


Figure 1. A logic tree denoting how the 5 grouped variables's input and output influence rational supporting results

II. RESULTS

A. Analysis on Grouped Variables

The result portion of this study presents a detailed analysis of the numerical values which correspond to the survey's 7-point scale rating system. For systematic organizational purposes, we further present the inclusion of this data in the tables, figures, and analytical summaries which will continue to be sub-categorized in order to summarize a clear depiction of five main surveys five main objectives; user ability, hospital functionality, governmental functionality, overall effectiveness, and its developmental prosperity (Fig. 2).

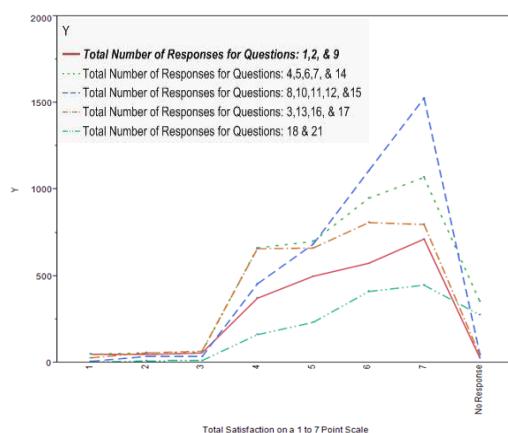


Figure 2. The 5 grouped variable's total satisfaction results

In this figure (Fig. 2) we show a representation of the group data in the form as a line graph. The production of this and later graphs included the usage of EXCEL 2010 and statistical tool JMP [10][11].

Next, the figure below (Fig. 3) shows the specifics results of the government supportiveness variable on a scale from 1 to 7, as a bar graph. Accordingly, 39.1% of the tallied hospital participants, extremely agree that the government supported variable is important.

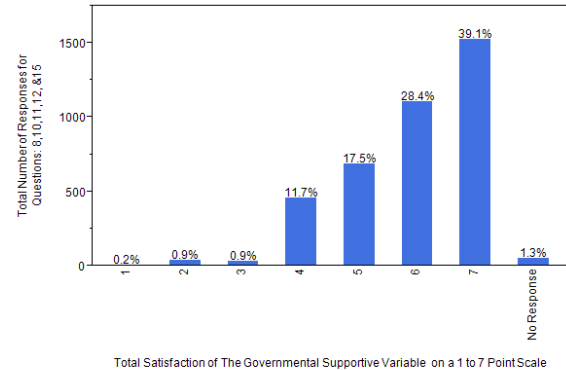


Figure 3. A bar graph representing the rankings of the governmental supportive variable's total satisfaction

B. Analysis on Private Hospitals vs. Public Hospitals

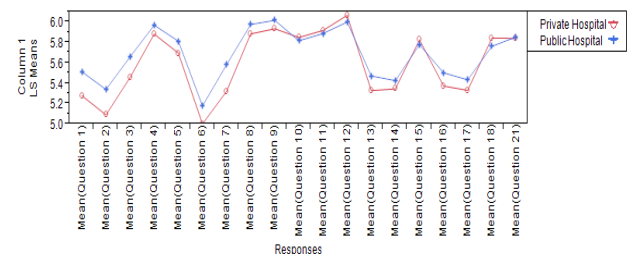


Figure 4. Line graph depicting the mean satisfaction of public hospital vs. private hospital for each individual question

The above figure (Fig. 4) graphs the results of the survey's raw data through a comparison of observational responses of the 19 selected observations. This data was then separately, by comparing spontaneous public hospitals and private hospitals.

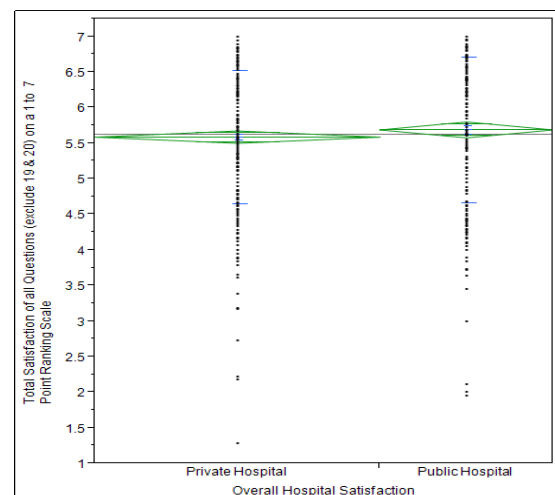


Figure 5. Total mean satisfaction of public hospitals vs private hospitals

This graph (Fig. 5) uses ordinal statistical information to determine and display the difference between the specification or speculation of private hospitals vs. public hospitals. Below, is the resulting mean data which was also resulting numerical information in-regards to figure 4&5.

Means and Std Deviations						
Level	Number	Mean	Std Dev	Std Err		
				Mean	Lower 95%	Upper 95%
Private Hospital	480	5.59163	0.93668	0.04275	5.5076	5.6756
Public Hospital	293	5.69332	1.02429	0.05984	5.5756	5.8111

Figure 6. Mean data results corresponding to Fig. 4 and Fig. 5

Below is the results of a variable t-test to produce data in regards to the difference of opinions of public hospitals and private hospitals, on observational question number 2(Fig. 7). Accordingly, the probability > F is 0.0279; which shows strong supports a difference between these two groups.

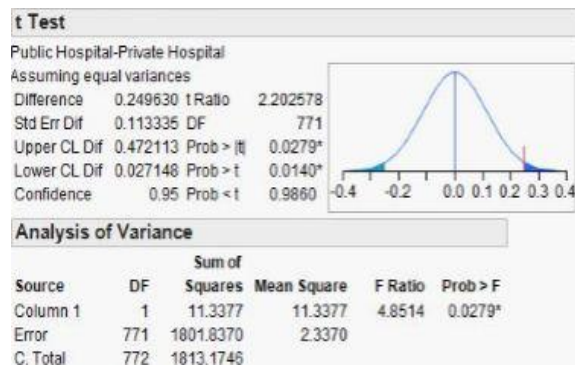


Figure 7. Anova t-test for the independent variable question 2 between public hospitals and private hospitals

III. DISCUSSION

The findings and results of this study are meaningful and insightful information; in-regards to several dimensions of Taiwan's EMRs and EMRs systems. First of all, this study supports several suggestions of RDEC-MIS-100-010 findings, such as: the adoption of EMRS in hospitals will become a trend of the future within Taiwanese hospitals. Thus, technical standards for EMR system software and privacy regulations should be implemented, which the hospital participants placed great importance on. Furthermore, we can conclude that the survived institutional hospital believe that EMRs should contain patient information pertaining to any dangerous or infectious diseases a person may have, as a component of exchangeable data.

In regards to the further analysis of this study paper, in using data from the several grouped variables, we find that hospitals placed the most agreement on how important they believe the government should be more involved in the implementation of EMRs (figure 3). This information also suggests that the government should be the ones whom train the hospitals staff on the design the standards in which they should create. Specifically,

questions 8, 10, and 12 are all shown as the some within the highest of ranked observations, which all fall within the governmental supportive variable. Overall, it's apparent that the hospitals in Taiwan place an importance on having standardization within all its governmental supported institutions. In continuation, this study points out strikingly interesting inferences on how public hospitals and private hospitals place their importance on issues through comparison.

One of the most important inferences or issues, which this study brings-to-light is that public and private hospitals in Taiwan defiantly has a difference of opinion on the issue of rather patients, should be able to access their own EMRs; refer to figure 7. This finding was one of the first points which ultimately lead us to the subsequently findings that since hospitals are more regulated, they place greater importance on keeping within the standards of governmental law which states that patient records belongs to the patient. This finding could also be depicted by the fact that the lowest ranking observation values the issue of EMR systems being evaluated and necessary for hospital accreditation, of the least importance. Although both public and private hospitals similarly place score this issue with the lowest importance –still private hospitals place this issue or least importance in comparison to the public hospital; refer to figure 4.

In conclusion, the overall satisfaction trend shows that hospitals are favorable with the implementations of EMRs and EMRs systems within hospitals. Yet, from this study we conclude that the overall topic of EMRs in Taiwan's hospitals is complex by nature, and encompasses a tremendous amount of interrelated issues and dimensions..

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