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Tuy Municipal Health Center Information System

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Abstract

Hospital Information System (HIS) is vital to decision making and plays a crucial role in the success of the institution. Computerization of the medical records and documentation has resulted in efficient data management and information dissemination for the users (Praveen Kumar A, Gomes L.A.)

The researchers decided to pursue this study in order to develop automated information system for Tuy Municipal Health Center that will help the institution on automating their day to day transactions. The proposed Tuy Municipal Health Center Information system will help the medical practitioners to fasten their recording of patient's data to save time and effort. Because automation now is demanded, the researchers had chosen this institution for them to adapt the new technology for better and faster working. This study used the SDLC Waterfall Model where the gathered data undergone to different phases and obtained the needed results.The proposed information system improved the reliability and security of some confidential information of patients. It has great advantage because the medical practitioners can easily obtain the information anywhere through the use of the windows tablet which is networked to the host or server. The staff can easily identify the patient's information from a card with an ID number written on it. The respondents have rated the system through the use of questionnaires and from that the researchers confirmed that it is highly acceptable for them.

Keywords: Tablet, Information System, Health Center, Hospital Information System

1. Introduction

The term information technology (IT) was a little known phrase that was used by those who worked in places like banks and hospitals to describe the processes they used to store information. With the typical shift to computing technology and "paperless" workplaces, information technology has come to be an everyday phrase. It defines an industry that uses computers, networking, software programming, and other equipment and processes to store, process, retrieve, transmit, and protect information.

Information technology has made a significant impact on the healthcare sector. The past decade has witnessed the foray of numerous information systems and their resultant products into the hospital scenario. The number of investments in computers and types of hospital systems has increased. This is because paper medical records are weighty, bulky to use and difficult to manage. On the other hand, digital records are much easier to handle and improve the workflow efficiency by integrating various tasks. (Burt, 2005)

It is commonly accepted that the changes in technology have been one of the most important drivers of health care spending growth over the past several years. One of the great innovations in health sector is the development of electronic medical records (EMR). The term has been used to describe automated systems based on document imaging or systems which have been developed within a medical practice or community health center. These have been used extensively by general practitioners in many developed countries and include patient identification details, medications and prescription generation, laboratory results and in some cases all healthcare information recorded by the doctor during each visit by the patient.

From admission to diagnostic and medical support services, the modern healthcare centers rely on wide range of software applications. Some of the distinctive advantages of Hospital Information System includes improved quality of patient care, increased productivity, reduced costs and reduced chances of errors and the enhanced ability to track patient records. Today HIS and electronic medical records (EMR) have become a prerequisite for delivering quality healthcare. Effectiveness of a hospital or nursing home depends on the efficiency of its operations and management systems. Some of the major factors determining the efficacy of a health institution include patient care management and patient satisfaction. In order to meet these requirements there has been the growing need to implement hospital information systems.

Tuy Municipal Health Center (formerly Tuy Rural Health Center) is a government hospital that is still suffering from the difficulties of manual system. That is the reason why the researchers created a health center information system. With the help of modern technology, the researchers used an advance computer or what we called as the "Tablet" that helped the health care practitioners to have more efficient and faster working system.

This system is considered to help evolve traditional transaction procedures of the health center into automated information system. The researchers used Microsoft Visual Studio 2008 (VB.NET) as the programming language,

Microsoft SQL Server Management Studio Express 2005 (MS SQL) for the databases.

The system had security features depending on the level of access – the Administrator/Doctor, Medical staff and the Clerk. Because of security reasons, the Administrator/Doctor has the majority of access to the system and can delete and view accounts, show the event log to detect the transaction made by the medical staff and clerk. The Medical Staff and Clerk cannot access the database, view the log history and schedule a patient for check-up for some security reasons and purposes.

1.1 Statement of the Problem

The researchers developed an Information System for Tuy Municipal Health Center.

Specifically this study sought answers to the following questions:

1. What is the level of acceptability of the existing system in terms of: a. Accuracy; b. Completeness; c. Efficiency; d. Maintainability; e. Reliability; f. Security; and g. User-friendliness?
2. What is the level of acceptability of the proposed system in terms of: a. Accuracy; b. Completeness; c. Efficiency; d. Maintainability; e. Reliability;f. Security; and g. User-friendliness?
3. What is the significant difference between the levels of acceptability of the existing system and the proposed system in terms of: a. Accuracy; b. Completeness; c. Efficiency; d. Maintainability; e. Reliability; f. Security; and g. User-friendliness?

1.2 Scope and Limitations of the Study

The proposed system "Tuy Municipal Health Center Information System" is a data processing system that helped the establishment in automating its information and transaction and created a useful and effective system that ensure the convenience of the establishment.

The proposed system is not just only an information system, it has a multi touch screen windows operated "Tablet" that handles the registration of patients. The server that holds all the information of the health center is accessible using the Tablet. The researchers used a cool application named as "Connectify" that easily create a Wi-Fi hotspot that centralized the connection of the server and the tablet automatically.

The system focused on the information tasks only. It does not provide the billing process because it is a public medical institution.

2. Literature Review

In late 1960s, computer-based hospital information system (HISs) began to emerge. These systems were intended primarily for communication. They gave clinician's electronic access to results of laboratory tests and other diagnostics procedure.

Almost all healthcare professionals need a vast amount of information. It is essential for the quality of patient care and for the quality of hospital management to fulfill these information needs. Nearly all people working in health care institutions have an enormous demand for information. The quality of information processing is important for the competitiveness of a hospital.

Today, computerization is a major advancement in technology that helped in many ways: it made information storage easier and faster thus it can save a lot of time and manpower, and many tasks are done in a certain amount of time.

Great amount of time is being consumed by information retrieval and the billing process of most Local Community Hospitals without computer generated system is time consuming. To be able to provide the medical needs of the rapidly growing population, Local Community Hospitals must be adaptable to the current trends and innovation of today's fast changing technology.

Paper-based records have been in existence for centuries and their gradual replacement by computer-based records has been slowly underway for over twenty years in western healthcare systems. Computerized information systems have not achieved the same degree of penetration in healthcare as that seen in other sectors such as finance, transport and the manufacturing and retail industries. Further, deployment has varied greatly from country to country and from specialty to specialty and in many cases has revolved around local systems designed for local use. National penetration of EMRs may have reached over 90% in primary care practices in Norway, Sweden and Denmark (2003), but has been limited to 17% of physician office practices in the USA (2001-2003) [HHS, 2005]. Those EMR systems that have been implemented however have been used mainly for administrative rather than clinical purposes.

Electronic medical record systems lied at the center of any computerized health information system. Without them other modern technologies such as decision support systems cannot be effectively integrated into routine clinical workflow. The paperless, interoperable, multi-provider, multi-specialty, multi-discipline computerized medical record, which has been a goal for many researchers, healthcare

professionals, administrators and politicians for the past 20+ Tony Abott (Australian Minister for Heath and Ageing) said in August 2005: "Better use of IT is no panacea, but there's scarcely a problem in the health system it can't improve".

The concept of EHR comprised a wide range of information systems, from files compiled in single departments to longitudinal collections of patient data. Only very few papers offered descriptions of the structure of EHRs or the terminologies used. EHRs were used in primary, secondary and tertiary care. Data were recorded in EHRs by different groups of health care professionals. Secretarial staff also recorded data from dictation or nurses' or physicians' manual notes. Some information was also recorded by patients themselves; this information is validated by physicians. It is important that the needs and requirements of different users are taken into account in the future development of information systems. Several data components were documented in EHRs: daily charting, medication administration, physical assessment, admission nursing note, nursing care plan, referral, present complaint (e.g. symptoms), past medical history, lifestyle, physical examination, diagnoses, tests, procedures, treatment, medication, discharge, history, diaries, problems, findings and immunization. In the future it will be necessary to incorporate different kinds of standardized instruments, electronic interviews and nursing documentation systems in EHR systems. The aspects of information quality most often explored in the studies reviewed were the completeness and accuracy of different data components. It has been shown in several studies that the use of an information system was conducive to more complete and accurate documentation by health care professionals.

The Federal Council of Medicine (FCM), by means of Resolution 1.638, defines patient records as a unique document made up of a set of recorded information, signs, and images, generated based on facts, occurrences, and situations on the health of the patient and the care that he is given, which is of legal, confidential, and scientific character, and which makes it possible to have communication among members of the multi-professional team and the continuity of the care given to the individual" (FCM, 2002). To satisfy these functions, patient records need to be legible, organized, documented, without erasures, and appropriately archived for several years. In large hospitals, there is a significant demand for space used for the storage of conventional records (printed records), which may make it difficult to maintain them or even to access the information. Furthermore, it is not rare to find that these documents are incomplete or have problems with legibility (Rodriguez, 2001).

An article from the internet (http://www.irpsys.com/articles/tw_rura.htm) on "Rural Local Community Hospitals Utilizes an Affordable Method to Generate Accurate Medicare Reimbursements" is also significant to the study because it gives an example on Local Community Hospitals system, whereby is East Adams Rural Local Community Hospitals is a 20 bed Local Community Hospitals in a town with a population of less than 2000. The elderly constitute a very high proportion of the population of our service area which means patients tend to be quite ill and stay for a long time. The current system of Medicare reimbursements, on the other hand, bases its payments strictly on the diagnosis related group (DRG) to which the patient's stay is grouped or assigned. Most large third party payers have also adopted the DRG system in the state of Washington. As a result, reimbursements frequently do not cover the cost of patient care. Further difficulties are generated by the fact that the terminal patients are frequently transferred to larger Local Community Hospitals in Spokane. This normally means the Spokane Local Community Hospitals gets the major portion of the reimbursement because their DRG assignment is based on the procedures performed and the larger Local Community Hospitals naturally is able to perform more procedures. Before this Local Community Hospitals had difficulties in the turnover of records, as well as manual billing system whose efficiency left much to be desired. In many cases, some charges were lost in transit because of poor paper handling and hence the Local Community Hospitals was receiving much less than the meager reimbursement it is entitled and that there was not enough time in the day to make manual system work so the need for computerized alternatives (Weiszbrod, 2004).

Another article from the internet (http://www.besoftware.co.uk/products-services/Local Community Hospitals-informations.html), "Local Community Hospitals Information Systems - Customized to meet all the Management Needs of a Local Community Hospitals", Local Community Hospitals Information technology: A main component of HIS is Local Community Hospitals information technology and Local Community Hospitals management software programs. These two arms of HIS are also referred to as integrated Local Community Hospitals information processing systems (IHIPS). The presence of automation and software as the mainframe of a Local Community Hospitals administration means that all information has to be processed onto two or three hard disks. In case of any malfunction or crash, the data

is still available in another disk.

Usually, Local Community Hospitals keep two to three 'mirror' disks - one in the archives and one under the scrutiny of management personnel. Remote data backup as well as control processing and tracking automated systems ensure the smooth non-stop functioning of these systems (Zwass, 2003).

According to Cannoly and Begg (2003)"Database is a collection of logically related data, designed to make the information needs of an organization". It is a single, large repository of data which can be used simultaneously by many department and users. Instead of disconnected files with redundant data, all data items are integrated with a minimum amount of duplication. The database has no longer owned by one department but is a shared corporate resource. The database holds not only the organization's operational data but also a description of this data (Cannoly et al, 2003).

Microsoft SQL Server is a relational database management system produced by Microsoft. It supported a superset of Structured Query Language SQL, the most common database language. With dedicated hosting there maybe also a few more fees to pay to get use of it – but it does stand up to all the rest as a great database setup to work with. (Richardson, 2008).

Visual Basic .NET has provided the features that are most important to programmers such as object-oriented programing, strings, graphics, graphical user interface (GUI) components, exception handling, multi-threading, multimedia (audio, video, images and animations) and file processing (Deitel H. M., 2004)

Research Literature

From the thesis entitled, "In-Patient Charting System (IPCS) for Nurse Station of Apacible Memorial District Hospital" by Roman Rodriguez et al. (2010). The computerization of charting became one of the strongest trends in documentation in developing or purchasing computerized information system that supports medical practices. Although many are reluctant to give up security of record with manually entered information, paper charts are familiar, portable, flexible and rapidly browsed for its users. It may become impossible to replicate a lost paper record. Undetected tampering with paper records may occur and it is impossible to determine who reviewed the paper chart. It may also difficult to find information within a paper chart. Handwritten charts are often illegible, increasing the risk of medical errors due to misinterpretation of an accessible date and intricacies of litigation.

From the thesis entitled, "Automated Inventory System of Apacible Memorial District Hospital" by Michael John Manalo et al. (2010). A computerized system to maximize inventory performance in a small hospital is described. An inventory control system, which has integrated economic orders quantity (EOQ) and ABC inventory models, was implemented in a 146-bed hospital. The perpetual inventory control database, supported by the hospital's mainframe computer, generates monthly inventory statistics that are segregated into A, B and C reports. Using a hand-held computer that interfaces with the perpetual inventory system, a series of inventory management reports were developed. These reports, which re based on the EOQ model, provide the following information for each drug line item: EOQ, EOQ proposed carrying cost actual inventory carrying costs, safety stock, order point, average inventory management reports were also developed.

From the thesis entitled "Exploring Interface Metaphors for Using Handhelds and PCs together", by Ole Andreas Alsos (2005), handhelds, like mobile phones and Personal Digital Assistants (PDAs), are used by almost everyone in the western world today. A handheld is very mobile but has a small screen size, limited power capacity, and low performance compared to a PC. By distributing the user interface between devices like for example a PDA and a PC, one can utilize the best characteristic from each device. Many different interface metaphors can be used when designing systems using handhelds and PCs together. The handheld can for example be used as an input device or remote control and parts of the user interface on the PC can be moved or duplicated to the PDA. Selecting the right conceptual model and interface metaphor of how the system should work is important to map the designer's intended model of the system onto the users' mental model of the system. If the designer succeeds in this, there is a greater chance that the users are able to use the system with higher effectiveness, efficiency and satisfaction. An important question when designing such systems is what conceptual model and interface metaphor one should use when designing such systems.

From the thesis entitled "Integration of Personal Digital Assistant (Pda) Devices into the Military Healthcare Clinic Environment" By Joseph Keltner Et. Al (2001), the early 1990's saw a new generation of hand-held computers. These hand-held weighed a pound or less, were half the cost of desktop PCs, possessed the memory necessary to store adequate amounts of medical reference and patient specific data,

and did not require the long boot up period of desktop PCs. The authors of this study found the majority of family practice physicians embraced this technology virtually from its inception. It may be the breadth of diagnoses encountered, rural practice locations, and/or greater involvement in administrative and financial tasks that made these early PDAs an invaluable tool to them. One such device, the Apple Newton Message Pad 120 released in 1995 contained a 20 mHz processor, large screen with a resolution of 320 x 240 pixels, built in speaker, 20 - 50 hour battery life, optional fax/ modem, handwriting recognition, infra-red capability, weighed 1 pound, and measured 8 x 4 x 1.2 inches. However, it was not without limitations. Its handwriting recognition software was inconsistent and required a lengthy period to adapt to the users handwriting. It has no illumination (screen not backlit) making it difficult to view text in poorly lit areas and its 2 MB memory precluded the loading of multiple large applications. Another much smaller device, the Franklin Digital Book System contained a 16 mHz processor, a screen with a resolution of 160 x 40 pixels, 200 hour battery life, a key board, weighed 4 ounces, and measured 5 x 3.5 x 0.5 inches. With no operating system, it was primarily a reference tool capable of holding two 20 MB digital books. (Ebell, 1995) With the next generation of PDAs and medical applications available in the market place, the PDA has evolved into a decision support tool that is saving lives. (Ram, 1994) Physicians in the private sector are using PDAs for practice management, patient tracking, dosage and pregnancy calculations, treatment protocols, pharmaceutical data and prescription ordering, patient education, coding, documenting patient encounters, and stress relief (playing games).

From the thesis entitled “A Computer Vision Based Barcode Reading System” By Mehmet Ilhamisafran (2008), Barcodes are very popular and are seen on almost every consumer products. Barcodes provide reliable data storing and quick input into a computer system. In this manner, price and product description can be obtained very fast. There exist various one dimensional barcode symbologies such as EAN13, EAN8, EAN128, UPC-A, UPC-E etc. However, mainly barcode consists of thick or thin parallel lines which are parallel to each other in the forms of rectangles. Traditionally, a laser barcode reader is used to read the embedded code. However, recently, image processing based barcode reading systems started to gain importance which provide more information than laser barcode readers at a time [1]. Similarly, the use of Personal Digital Assistance (PDA) and Mobile Phone (MP) are becoming increasingly widespread. They can be used to access the internet and take pictures and videos. They can be even used as a barcode reader [2]. Thus, consumer or user can capture an image of a barcode by using their PDA/MP. Such devices, which are programmed to decipher the barcode image, will be able to obtain the barcode information. By connecting online, consumer or user can access product information such as price, product description and price comparison.

3, Methodology

The proposed Information System for Tuy Municipal had undergone several processes. A software development process is a structure used in the development of a software product. It was analyzed by means of testing, debugging, validation and verification process. Otherwise, the project may deliver unproductive results.

Testing Process

Testing is important in the process of testing the system aiming to find errors. In the same way, testing also adds value to the output by meeting the requirements of the user. This process is necessary because of software accuracy, security, user friendliness, effectiveness, reliability, and efficiency. The researchers determined that the system was acceptable to the users.

Debugging Process

It is a process of finding and reducing number of bugs in a computer program.

To determine whether the system is suitable to the information system of Tuy Health Center, the researchers followed the debugging process and determine the errors and correct it so that the system will work better.

Validation Process

A validation process was used to validate a specific computer system. It was done on an existing computer system or on a new computer system.

To determine the functionality and acceptability of the system, the researchers provided some questionnaires for evaluating the system. Their comments and suggestions were considered for additional understanding of the system.

Programming Procedure

In developing a new system, it is important that the programming methodology must be discussed for it will give the next researchers as well as the users an overview about the system. The researchers used the Waterfall model that follows the following process: beginning with the planning, analyzing, designing, implementation, testing and maintenance.

The developers used the combination of Microsoft Visual Studio 2008 (VB.NET) as the programming language and Microsoft SQL Server as the database.

Instrumentation

The researchers prepared a survey form for Tuy Municipal Health Center for data gathering purposes. The researchers distributed the questionnaires consist of the evaluation of the existing system of the Tuy Municipal Health Center as well as the evaluation for the proposed system. The respondents answered the evaluation forms which have 7 questions regarding the characteristics of the system. The respondents evaluated the system by checking their desired answers based on the following qualitative scales: excellent, very satisfactory, satisfactory, fair and poor. By means of this, the level of acceptability as well as the capacity of the system will be tested.

Preparation and Evaluation

The researchers exert their efforts and time for the preparation and evaluation process. During the preparation, the researchers conduct interviews in Tuy Municipal Health Center to acquire the needed information. The researchers prepared questionnaires and validated by the adviser and panelist of the College of Engineering and Computing Sciences.

In order to determine the interval between ranking of the questionnaire, the researchers used the Likert Cycle:

wherein,

i = interval

h = highest value in the questionnaire's software level of acceptability option

l = lowest value in the questionnaire's software level of acceptability option

t = total number of preset options in the questionnaire

Applying our formula to our study, we have

$$\frac{i = 5 - 1}{5} = \textbf{0.8 interval}$$

The table below represent interval in determining the statistic level of accessibility of the developed software:

Table 3.2 Guideline in determining the level of Software Acceptability

Scale	Mean Range	Verbal Interpretation
5	4.21 – 5.00	Excellent (E)
4	3.41 – 4.20	Very Satisfactory (VS)
3	2.61 – 3.40	Satisfactory (S)
2	1.81 – 2.60	Fair (F)
1	1.00 – 1.80	Poor (P)

The statistical treatment used was mean (x) weighted mean to determine the perception of the students on the developed software application.

The weighted mean for each statement is computed. The qualitative descriptions of the weighted mean were determined using the following scale:

Table 3.3 Scale of Value and Descriptive Equivalent

Scale of Value	Descriptive Equivalent
5	Excellent (E)
4	Very Satisfactory (VS)
3	Satisfactory (S)
2	Fair (F)
1	Poor (P)

Table 3.3 shows how the qualitative descriptions of the weighted mean of the scale of value and descriptive equivalent.

$$WM=\frac{\sum fx}{N}$$

Where in:
WM= weighted mean
Fx= sum of the products of f and x where f is the frequency of each score and x is the weight of each score
N= total number of respondents

In order to determine the significant difference between the existing and proposed system, the researchers used the t-Test.
Formula:

$$t = \frac{\Sigma D}{\sqrt{\frac{n\Sigma D^2 - (\Sigma D)^2}{(n-1)}}}$$

Where:

ΣD is the sum of all the individuals' pre-post score differences.

ΣD^2 is the sum of all the individuals' pre-post score differences squared.

n is the number of paired observations.

Participants

The researchers will use 100% of the population of respondents because they were only thirteen employees in the Tuy Municipal Health Center. The researchers give the questionnaires to the exact number of population on the said establishment.

4. Findings and Discussions

The proponents provided questionnaires for the evaluation of system to determine the level of its acceptability. Tuy Municipal Health Center Information System was presented to the respondents and evaluated it based on the criteria on the questionnaire.

Table 4.3 Evaluation of Existing System in Tuy Municipal Health Center

Criteria	**5 Excellent** (5.00-4.21)	**4 Very Satisfactory** (4.20-3.41)	**3 Satisfactory** (3.40-2.61)	**2 Fair** (2.60-1.81)	**1 Poor** (1.80-1.00)	**Weighted mean**	**Verbal Interpretation**
Accuracy	0	3	9	2	0	3.07	S
Completeness	0	5	6	3	0	3.14	S
Efficiency	0	5	6	3	0	3.14	S
Maintainability	0	4	3	6	1	2.71	S
Reliability	0	5	3	6	0	2.93	S
Security	0	2	4	4	4	2.29	F
User-Friendliness	0	2	4	7	1	2.50	F
Average:						**2.83**	**S**

Table 4.3 shows the results of the evaluation of the existing Tuy Municipal Health Center.
The total number of respondents is 14.

$$Wm=\frac{\sum f(v)=f1v1+f2v2+\ldots+fnvn}{N}$$

Where:

Wm = Weighted Mean
f = Frequency
v = Value of scale
N = Total number of Respondents

- Data written in the table shows that in terms of accuracy, the existing system was rated as Satisfactory by the respondents with the weighted mean of 3.07.
- Data written in the table shows that in terms of completeness, the existing system was rated as Satisfactory by the respondents with the weighted mean of 3.14.
- Data written in the table shows that in terms of efficiency, the existing system was rated as Satisfactory by the respondents with the weighted mean of 3.14
- Data written in the table shows that in terms of maintainability, the existing system was rated as Satisfactory by the respondents with the weighted mean of 2.71
- Data written in the table shows that in terms of reliability, the existing system was rated as Satisfactory by the respondents with the weighted mean of 2.93.
- Data written in the table shows that in terms of security, the existing system was rated as Fair by the respondents with the weighted mean of 2.29.
- Data written in the table shows that in terms of user-friendliness, the existing system was rated as Fair by the respondents with the weighted mean of 2.50

According to the result of the evaluation of the traditional system of Tuy Municipal Health Center, the system was rated as Satisfactory based on different criteria that were indicated by the weighted mean of 2.83.

Table 4.4 Evaluation of Proposed System in Tuy Municipal Health Center

Criteria	**5 Excellent** (5.00-4.21)	**4 Very Satisfactory** (4.20-3.41)	**3 Satisfactory** (3.40-2.61)	**2 Fair** (2.60-1.81)	**1 Poor** (1.80-1.00)	**Weighted mean**	**Verbal Interpretation**
Accuracy	3	9	2	0	0	4.07	VS
Completeness	5	6	3	0	0	4.14	VS
Efficiency	5	7	2	0	0	4.21	E
Maintainability	4	7	3	0	0	4.07	VS
Reliability	5	6	3	0	0	4.14	VS
Security	8	5	1	0	0	4.50	E
User-Friendliness	5	6	3	0	0	3.79	VS
Average:						**4.13**	**VS**

Table 4.4 shows the results of the evaluation of the proposed Tuy Municipal Health Center.
The total number of respondents is 14.

$$Wm=\frac{\sum f(v)=f1v1+f2v2+\ldots+fnvn}{N}$$

Where

Wm = Weighted Mean
f = Frequency
v = Value of scale
N = Total number of Respondents

- Data written in the table shows that in terms of accuracy, the proposed system was rated as Very Satisfactory by the respondents with the weighted mean of 4.07.

- Data written in the table shows that in terms of completeness, the proposed system was rated as Very Satisfactory by the respondents with the weighted mean of 4.14.
- Data written in the table shows that in terms of efficiency, the proposed system was rated as Excellent by the respondents with the weighted mean of 4.21.
- Data written in the table shows that in terms of maintainability, the proposed system was rated as Very Satisfactory by the respondents with the weighted mean of 4.07.
- Data written in the table shows that in terms of reliability, the proposed system was rated as Very Satisfactory by the respondents with the weighted mean of 4.14.
- Data written in the table shows that in terms of security, the proposed system was rated as Excellent by the respondents with the weighted mean of 4.50.
- Data written in the table shows that in terms of user-friendliness, the proposed system was rated as Very Satisfactory by the respondents with the weighted mean of 3.79.

According to the result of the evaluation of the proposed system of Tuy Municipal Health Center, the system was rated as Very Satisfactory based on different criteria that were indicated by the weighted mean of 4.13.

Table 4.5 Computation of T-test

Evaluation of the significant difference between the levels of acceptability of the existing system and the proposed system

Criteria	Weighted Mean of the proposed system	Weighted Mean of the existing system	D	D^2
Accuracy	4.07	3.07	42.98	1
Completeness	4.14	3.14	43.96	1
Efficiency	4.21	3.14	43.96	1.07
Maintainability	4.07	2.71	37.94	1.36
Reliability	4.14	2.93	41.02	1.21
Security	4.50	2.29	32.06	2.21
User-friendliness	3.79	2.50	35.00	1.29
			$\sum D = 9.14$	$\sum D^2 = 14.99$

Table 4.5 shows the evaluation of the significant difference between the levels of acceptability of the existing system and the proposed system.

Tabular value of t at 6 df, 5% = 1.94

Observed Value of t = 4.81

$$t = \frac{\Sigma D}{\sqrt{\frac{n\Sigma D^2 - (\Sigma D)^2}{(n-1)}}}$$

$$t = \frac{9.14}{\sqrt{\frac{7\,(14.99) - (9.14)^2}{7-1}}}$$

1.90

t = 4.81

Since observed value of t > tabular value at 5% level of significance, the mean of the proposed system is significantly different from the existing system's mean. It further means that the proposed system increased achievement exposure to the processes of Tuy Municipal Health Center.

5. Summary of Findings and Conclusions

The conducted study has the goal to create a newly electronic health record system that may sustain the needs of the institution in acquiring patient's records. After the gathering of the needed facts, testing and evaluations, the respondents proved that the proposed system was accepted. The staffs including the municipal health officer strongly agreed and kindly suggested the implementation of the system.

The first one to consider in implementing the software is the availability of the needed equipment

for the operation. As the proponents have observed, the institution has the capability to implement the new system. They have the needed computer system where the program can be installed.

From the statements of the problems, the proponents concluded that the system was very reliable because of easy retrieval of patient's information using the patient ID, more convenient to store information, safer and free from damage.

1. The level of acceptability of the existing system rate by the respondents as Satisfactory in terms of Accuracy, Completeness, Efficiency, Maintainability and Reliability while Fair in terms of Security and User-friendliness.

2. The level of acceptability of the proposed system rate by the respondents as Excellent in terms of Efficiency and Security, while Very Satisfactory in terms of Accuracy, Completeness, Maintainability and User-friendliness.

3. There was a significant difference between the traditional data recording of Tuy Municipal Health Center and the proposed system.

Conclusions

Based on the processed data acquired, the following conclusions were drawn.

1. The existing system must be improved in terms of security and user friendliness.

2. The proposed Tuy Municipal Health Center Information System is better alternative to the traditional way of data recording of Tuy Municipal Health Center because the respondents rated the system Very Satisfactory. This simply denotes that the developed system conforms to the standards of the seven criteria, which means that the proposed system has a high level of acceptability.

3. The proposed Tuy Municipal Health Center Information System must be implemented to fasten their day to day transactions.

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