

# Applying Information Technology to Patient Safety Reporting System

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**Abstract:** After a nursing staff of North Town Woman & Children's Hospital made an error injection and caused one infant dead and six injured in 2002, the Taiwan government pays more attention to patient safety. Firstly, the Department of Health (DOH) established the Patient Safety Committee in February, 2003 to promote several patients' safety activities and education training. Secondly, the committee is actively planning a nationwide reporting system of patient safety to summarize the common causes of medical errors.

Most hospitals (about 70%) have not utilized information technology to construct a patient safety reporting system. The conventional reporting mechanism is to fill a paper form and circulate through out the organization. Therefore, in order to make the greater efficiency and effectiveness on a reporting system, this research develops a Patient Safety Reporting System (PSRS) used inside the hospital to solve the disadvantages of conventional reporting mechanism and enhance patient safety and medical quality.

The prototyping method was used to develop the PSRS to assure the communication between users and system designers about the actual system to be implemented. The results show that the PSRS has higher satisfaction than that of the traditional paper method. The PSRS not only save on time and man power for reporting but also improve the anonymity and security of reporting process. These advantages have a positive effect on staffs' willingness of reporting. The experience of developing this system could be used as reference for other hospitals to develop their own PSRS

**Keywords :** Patient Safety, Reporting System, Patient Safety Reporting System, Medical-Error, Hospitality Business & the Internet.

## I. Introduction

In 1999, Institute of Medicine (IOM) pointed out the average body count of medical error is more than traffic accident which caused international attention to medical error. The Patient safety then becomes a popular topic in the medical industry recently. In order to reduce the damage of medical error, various countries established the relevant committee to deal with the issues of patient safety and medical quality in the hope to prevent and reduce medical error.

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According to Shi's research (2003), about half of medical employees have experienced medical error events and about 70% regional hospitals and psychiatric hospital in Taiwan still using paper reporting mechanism. Studies indicate several reasons that prevent employee to report errors. Therefore, how to set up an efficient and effective yet unobstructed and secure reporting mechanism to offer medical staff first to recognize causes of errors and then to learn from the mistakes and decrease medical errors is an important issue which the medical administrators should concern. This study develops a computerized Patient Safety Reporting System (PSRS) to achieve the aforementioned goals.

## II. Research Methodology

This study first reviewed reporting system related research papers to obtain some ideas about design the computerized PSRS. Secondly, a case hospital was chose for implement the system. Interviewing was used to collect the users ' needs of the systems and questionnaire was used to find out their unwilling reasons to report a medical error. The questionnaire was revised from Uribe's (2002) study. Prototyping method was adopted to develop the PSRS. Finally, an evaluation questionnaire was used to compare the traditional paper reporting mechanism and the computerized PSRS from users. At the stage of system development, suggestions from experts and scholars are used in supporting the completion of system analysis and system design. The developing steps are as followed.

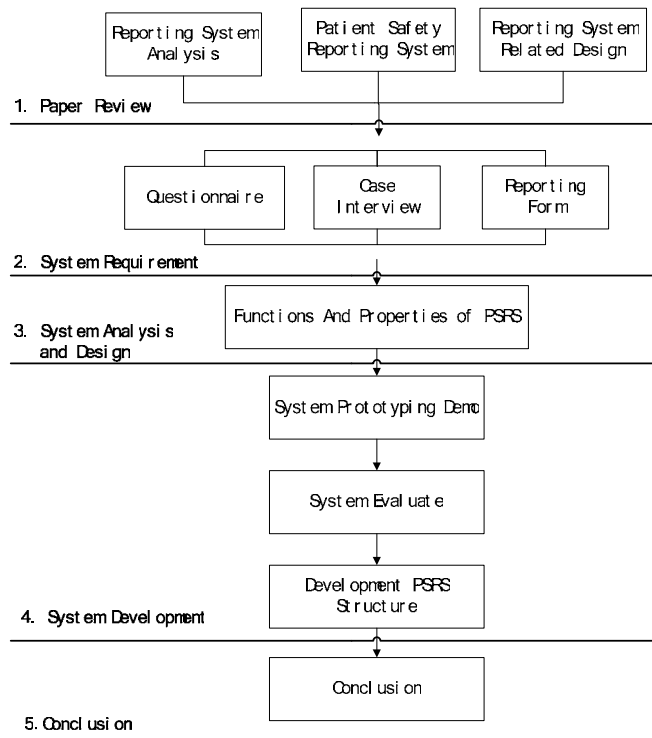


Figure 2 : Study Procedure

III. C

The research takes both the PSRS and the hospital information systems (HIS) into concern. In other words, the PSRS needs to be compatible with the existing HIS. The hardware and software structure are showed in figure 3. The system is developed by adopting Prototyping Method. Use PC to work as the system server, and SQL Server as the database. The system development tool is commonly used as ASP in HIS. Finally, Client/server structure is applied to construct the system on the internal network of the hospital.

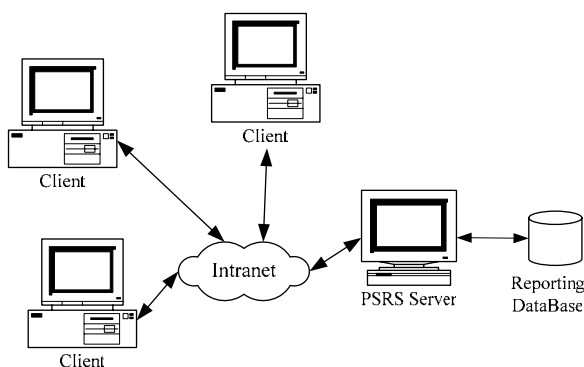


Figure3 : System Environment

SYSTEM FUNCTION

This PSRS is designed for a specific hospital by demand analysis of the interviewing, questionnaire investigation and literature reviewing. Figure 4 shows the PSRS functions and data need for the specific hospital. First, the input data

includes employee basic data, department structure data, and reporting data of medical error. Then, the system instantly deals with the reporting data as shown at the process stage. Finally, the system generates reporting events and reporting data analysis.

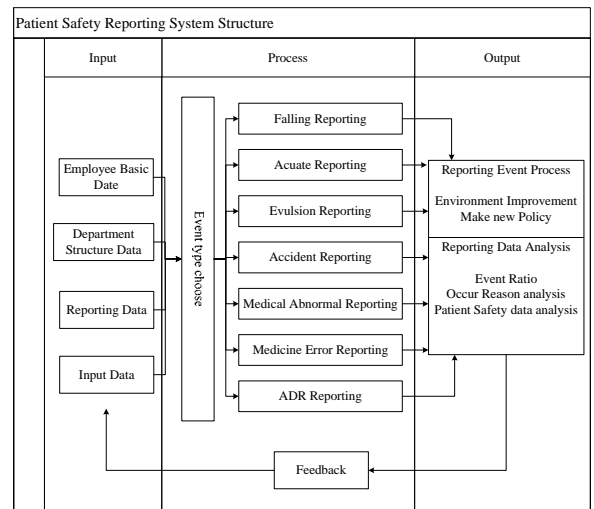


Figure 4 Patient Safety Reporting System Structure

IV. Display and Description

After logging the system (see figure 5), the reporting function page is show as figure 6. The users need to select the reporting type. Then, users have to input the needed data for the event that was intended to report as shown in figure 7. Since the description of the event is well structured, most of the inputs are just to click and check. There is a description box to enter text for anything that was not structured in beforehand. The system will store the input data automatically and send out an e-mail to notify the manager that supervises the reporter about the event. Then, the manager needs to log in the system and give suggestions or guidelines about the event to the reporter. If the event is cross departments, then the manager of the other department and the higher supervisor will be notified by e-mail automatically. In addition, the system also offers report and generates various types of statistical (see figure 8), depending on the type of report that users select. The monthly report of the events reported will be summarized and sent to the committee of patient safety of the hospital and further to the national patient safety committee.

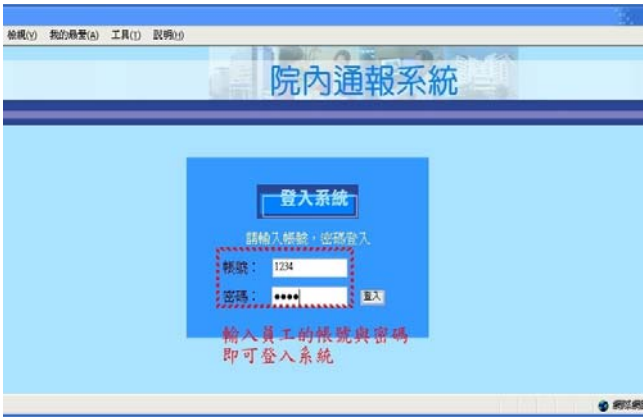


Figure 5: User Login

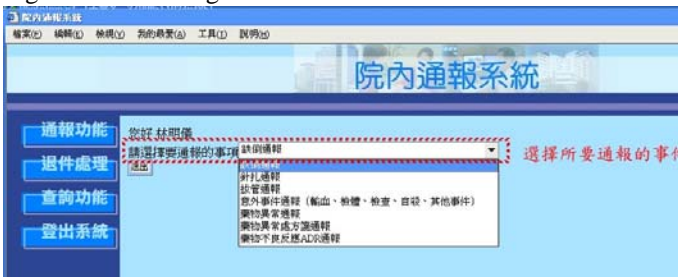


Figure 6: Select Reporting type

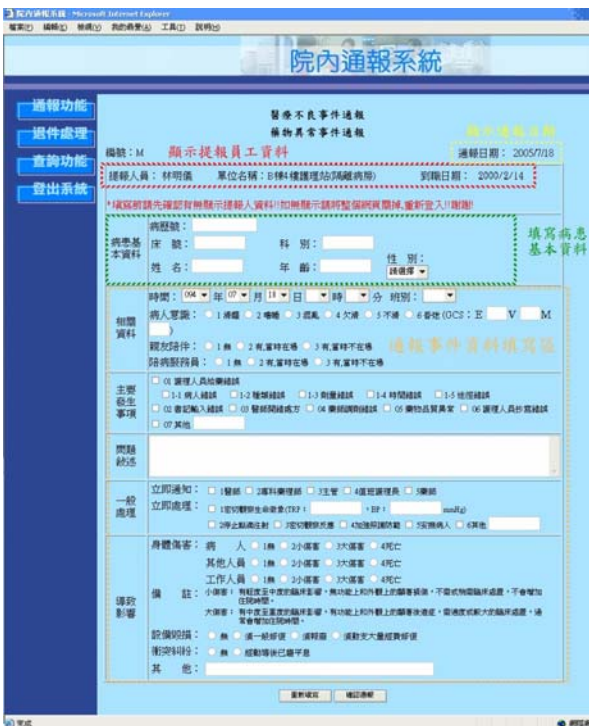


Figure 7: Reporting data input

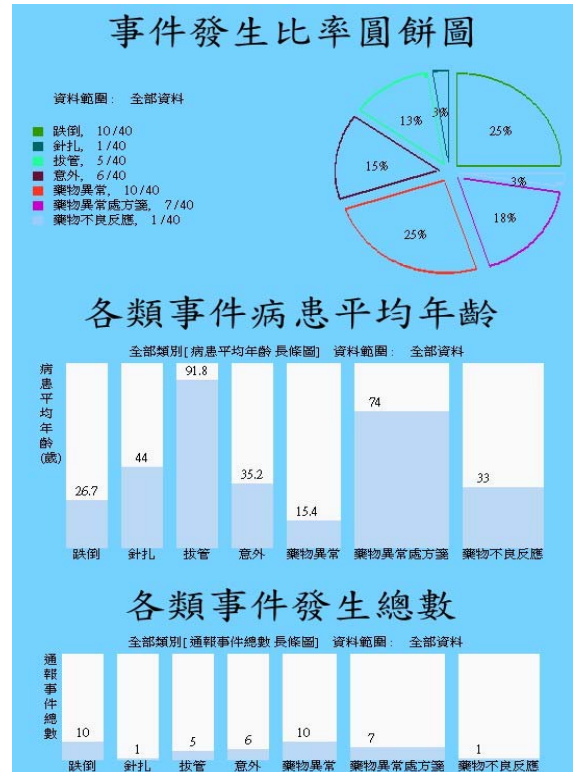


Figure 8: Data analysis and statistic

**System Assessment**

The assessment is done by questionnaire investigation through the internet. The subjects are staffs in the case hospital who have used the PSRS. The staffs give scores from 1 to 5 to represent first-rate to last-rate. Table 1 shows the comparison between the PSRS and the traditional paper reporting mechanism. The first-rates of paper reporting mechanism is easy to access the paper form to report while the PSRS is save on the manual distributing effort on the physical report. The best five that RSPR outperforms the paper mechanism are in the manual transferring effort on the physical report, environment protection, confidentiality, anonymity, and the efficiency of transferring the report.

Table 1: Comparison of Assessment between PSRS and paper reporting

System Property	PSRS		Improvement	
	Average	Rank	Average	Rank
Anonymity	3.39	11	0.84	4
Convenient to Report	3.42	8	0.39	13
Time Saving	3.39	10	0.45	12
Ease of Use	3.53	4	0.66	8
Transferring Time	3.55	3	0.81	5
Feedback	3.37	13	0.54	10
Confidentiality	3.41	9	0.92	3

Environment protection	3.50	6	0.96	2
Security	3.19	14	0.49	11
System Cost	3.48	7	0.78	6
Manual Transferring Report	3.63	1	0.99	1
State Monitor	3.52	5	0.74	7
Form making	3.58	2	0.65	9

According to the questionnaire results shown above, the average score of paper reporting system are all below than 3 except in the item of ease of access. Therefore, it is obvious that users were not satisfied with the paper reporting system. In the contrast, the average score of PSRS are all higher than 3 points which reveals that users are more satisfied with the PSRS. Hence, the computerized PSRS is extremely beneficial.

**V. Conclusion**

The result of this research shows that utilizing information science and technology to report medical errors can not only offering efficiency and reducing cost, but also improve the

shortcomings of the traditional paper reporting, such as lack of confidentiality, anonymity, security, as well as the trouble of manual transferring reports. The PSRS enhances the users' reporting willingness and forms a good reporting culture inside the institute. One observation is worth mentioned that the reporters of paper reporting mechanism were most nurses and medical staffs the rest while the reporters of PSRS even include janitors. Moreover, after the reporting culture inside the hospital is formed, staffs can learn to prevent medical errors from previous experiences. From the aspect of information science and technology, more data analysis can be carried out when more data are accumulated, such as Data mining, Neural Network, and OLAP analysis, in order to find the unexpected pattern related to causes. This study is to develop a specific information system for a case hospital. The external validity may not be satisfactory. However, the experience of developing the PSRS can serve as a reference for other hospitals that intend to build their own computerized reporting system. With more hospital establish inside-hospital reporting system, the national patient safety reporting system then can have true and solid data to analyze. Then the government can set up policies or regulations based on the analysis and enhance the medical quality nationwide.

(Reference upon request)