

19. WEB-BASED ELECTRONIC DATA COLLECTION SYSTEM TO Veterans General Hospital, Taipei, Taiwan; ³Department of Information Management Minghsin University of Science and Technology, Hsinchu, Taiwan

Introduction: Patient-Controlled Analgesia (PCA) has been widely used in postoperative pain management since it effectively relieves pain for the postoperative patient. Since the pain intensity plays an important role in pain management, and it reflects the postoperative pain relief of patients [1, 2]. The assessment of pain intensity usually requires specific measurement such as Visual Analogue Scale (VAS), Numerical rating Scale (NRS), Verbal Pain Score (VPS), etc.

Since the ever increasing dependency of the Internet, there has been a rapid evolution in the medical centers and hospitals, such as the electronic patient records (EPR) bring improvements in collecting and processing clinical data. Moreover, there is a marked increase in medical and healthcare industries which rely on information and communication technology (ICT) to improve the electronic data collection (EDC). However, EPR do not include all the required data for the PCA therapy, such as pain intensity and most PCA therapy data nowadays is

SUPPORT PATIENT-CONTROLLED ANALGESIA IN TAIWAN

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collected by paper form. In order to improve the defects and risks of paper-based data collection, such as careless of handwriting, we propose a web-based EDC system to support PCA electronic data collection. The system consists of following features: easy data access, device independent, platform independent, remote maintenance and online statistics [3, 4].

Methods: The successful website design involves a clearly communicated stepwise process that specifies the development of each PCA EDC module [5]. The development of a paper prototype is an important design phase. It is worthy of note that prototypes' problems could be cautiously and recurrently modified before expensive programming time has been invested. Finally, program coding based on the detailed programming specifications is imperative. In web-based PCA EDC system, the client software resides on the user's mobile internet device (MID). It provides friendly interface that allows a user to browse the web and access to the PCA patient database. The data security is assured on three levels, server level with firewall, data transmission level with secure socket layer (SSL) and application level with authentication/ authorization of users. Information within the web database server includes configurations of drug delivery system by doctor's prescription, daily visitation by PCA team staff, problem response chart, as shown in Figure 1. All the above information will aid the doctor in better understanding postoperative PCA results.

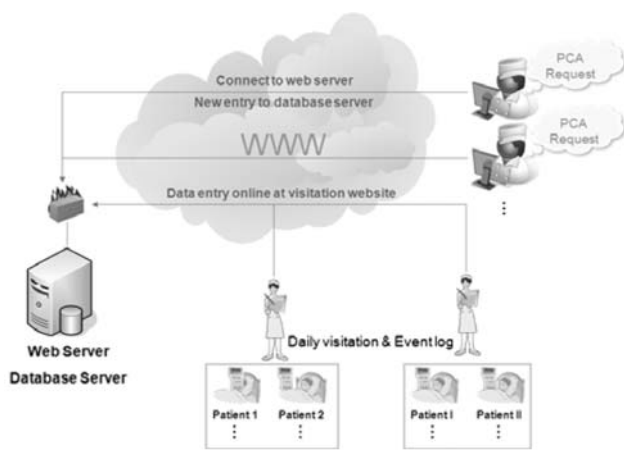


Fig. 1. Web-based EDC flowchart.

Results: We tried to use personal digital assistant (PDA) as data collection device in the migration phase, but there were several disadvantages, such as limited screen size, platform dependent, user interface not friendly, system reliability and stability questionable. In this paper, we present a web-based PCA EDC prototype performed in the department of anesthesiology, Taipei Veterans General Hospital, Taiwan. The system is based on Internet and wireless communication technologies to offer several advantages, such as ease of deployment, flexibility, mobility and wide user acceptance, as shown in Figure 2. In the period of 9 May 2008 till 19 June 2009, the testing web-based PCA EDC system had successfully collected 5,231 therapies which contain 11,203 daily visitation records and 62 problem response charts. As previous discussion, MID-based PCA EDC system is more efficient than previous method in saving manpower in recording and improving the process flow for migration of electronic data.

Discussion: The web-based PCA EDC system is still testing and not yet officially online. According to the steps in the website development process, the function usability of user interface needs to be evaluated over and over again, especially in medical environment. web-based PCA

EDC system still has some drawbacks. In the internet access failure, users should be able to have offline backup mechanism and re-upload function to the database when internet access becomes available.

In addition, the combination of web-based PCA EDC system and health information system (HIS) can support a diverse patients' data collection service. This will significantly improve the medical service quality. We try to share our experience and encourage others to exploit Internet and web technologies to improve PCA electronic data collection and the service of postoperative pain relief.

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Fig. 2. The web form of daily visitation and problem response chart.

