

The Development of an Incident Event Reporting System for Nursing Students

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Abstract. Incident events may occur when nursing students are present in the clinical setting. Their inexperience and unfamiliarity with clinical practice put them at risk for making mistakes that could potentially harm patients and themselves. However, there are deficiencies with incident event reporting systems, including incomplete data and delayed reports. The purpose of this study was to develop an incident event reporting system for nursing students in clinical settings and evaluate its effectiveness. This study was undertaken in three phases. In the first phase, a literature review and focus groups were used to develop the architecture of the reporting system. In the second phase, the reporting system was implemented. Data from incident events that involved nursing students were collected for a 12-month period. In the third phase, a pre-post trial was undertaken to evaluate the performance of the reporting system. The ASP.NET software and Microsoft Access 2003 were used to create an interactive web-based interface and design a database for the reporting system. Email notifications alerted the nursing student's teacher when an incident event was reported. One year after installing the reporting system, the number of reported incident events increased ten-fold. However, the time to report the incident event and the time required to complete the reporting procedures were shorter than before implementation of the reporting system. The incident event reporting system appeared to be effective in more comprehensively reporting the number of incident events and shorten the time required for reporting them compared to traditional written reports.

Key words: incident events, reporting system, nursing informatics, nursing education.

Introduction

Experiential learning in the clinical setting is a key component of the educational process for nursing students. As they are in a real environment, it is inevitable that students will be confronted with unexpected and unplanned incident events, such as needlestick injury, medication errors, harassment or violent attacks by patients or families, physical discomfort, or loss of emotional control. In Taiwan, needlestick injuries and medication errors are most common incident events that involve nursing students. [1, 2]

In our college, incident event reporting for incidents that involved nursing students in clinical settings was paper-based and moved slowly through the chain of command from nursing students to relevant teacher, then faculty in charge of the clinical practicum, and then to the director of the nursing department. The first report, written by the involved student(s), would be submitted for review to the appropriate teacher within 24 hours of the occurrence of the event. From there, it would move through the system as outlined above.

Even though a system was in place, it did have several weaknesses that had been identified, including: (1) the reporting system was not timely, due to the multiple reviews of the report by different people. (2) The incident events were being under-

reported. (3) The written reports were filed in the department office and thus were not easily available for a root cause analysis to understand the nature of the incident event and take steps to prevent its reoccurrence.

In some studies reporting incident events are problems that nursing students may encounter during their clinical training. It is including: needlestick injury, medication error, infection or disease, physical damage [3, 4].

But there is a lack of literature on the reporting of incident events with nursing students; however, it is known that with an efficient reporting system, incident event-related data can be collected and analyzed so as to implement effective prevention interventions. Therefore, the establishment of a convenient and efficient reporting system is of prime importance in the prevention of incident events [5-8]. This study was undertaken with the following purposes: (1) to develop an incident event reporting information system for nursing students in clinical settings and establish an incident event reporting database; and (2) to evaluate the effectiveness of the incident event reporting information system in reducing overall time required for the reporting process.

Material and Methods

This study used a before-and-after design and combined existing incident event reporting contents and flow to develop an incident event reporting system for nursing students. After implementation of the system, the effectiveness of the established information system was verified. This study was carried out in three stages:

1. Establishment of the incident reporting system: August 2005 to December 2005

To design the architecture and contents of the incident event reporting system, we used the literature to collect information on current incident event reporting at various nursing colleges. Then, a focus group was convened and six experts reviewed the initial architecture of the system and provided feedback. The expert comments were integrated into the revision and final architecture of the reporting system.

After developing the system, ten people, including students and clinical teachers, tested the system. Changes were made according to their suggestions so as to improve the functionality of the system.

2. Implementation of incident event reporting system: January 2006 to January 2007

The main task in this stage was to implement the incident event reporting system. Training to use the system was provided to students, teachers, and clinical mentors. The reporting system officially went online and was put into practice in March 2006. If, during the clinical practicum, a nursing student was involved in an incident event, the reporting system was used to complete incident reporting procedures.

3. Evaluation of the incident reporting system: October 2006 to January 2007

One year after implementation of the incident event report system an evaluation was undertaken. Four indicators were assessed: (1) the number of incident events reported by the nursing students; (2) time involved from the initial report through the hierarchy of faculty and clinical staff; (3) total time from initial report to the completion of the online report by the student; (4) total time to complete all reporting procedures. In the evaluation stage, baseline data pre-implementation were collected to allow for a comparison between old and new.

SPSS for Windows version 14 was used to analyze the data. Statistical methods included means, standard deviations, and Mann-Whitney testing. These methods were used to reveal any differences between the time of incident event reporting and the time of completion of reporting procedures before and after implementation of the reporting system.

Results

1. Development and implementation of an Incident Reporting System

Microsoft Access 2003 (Microsoft Inc., Redmond, WA, USA) was used to design the reporting database and store the report data. The system used a web-based interface and ASP.NET (Microsoft Inc., Redmond, WA, USA) software to create an interactive website. Finally, an Internet Explorer (IE) 6.0 browser (Microsoft Inc., Redmond, WA, USA) was used to execute ASP.NET on the system server. The system had functions including searches, replies, and so on.

In order to integrate content and procedures of the reporting system, in the initial stage of the study the research team classified incident events into seven categories in accordance with incident events that been reported previously, as well as relevant literature. The team clearly defined the significance and scope of each category. The incident event categories included: needlestick injury, medication error, infectious disease, physical damage, violent attacks, sexual harassment, and other.

We developed a web-based incident event reporting system in March 2006. The reporting system website was accessed by nursing students from the student page at the school of nursing. The reporting system contains three functions covering all aspects of the incident event, including incident event reporting, incident event search, and replying to the report.

When an incident event occurred, the student voluntarily reported it. When the report was sent through the reporting system website, an email was triggered to alert the relevant clinical teacher. Through the email notification, the faculty member could enter the system to send a reply or conduct a search. In order to reduce the time needed for teachers and students to operate the system and increase system accessibility, drop-down menus were used for incident event reporting and replying, while written input was required only for the detailed description of incident events and handling processes. This way, user operating time could be reduced.

2. Evaluation of the Efficiency of the Incident Reporting Systems

In the period from 2001 to 2005, a total of 15 incident events were reported by students, resulting in a mean of 3 incident events per year. These incident events were transmitted by written reports. After one year of implementation of the new system, reported incident events totaled 31, a ten-fold increase compared to before implementation of the system.

With regard to the time when relevant persons were notified, an alerting function using email notification was incorporated into the system, so after implementation of the system, the clinical training mentor, department teacher and department head would all receive an email notification within one to two minutes after the student reported an incident event online, notifying them of the incident event and relevant circumstances.

With regard to time of reporting incident events and the time of complete reporting procedures, in 4 of the 15 incident event reports from 2006 (before implementation of

the system), teachers did not indicate the date of their reply and suggestions, making it impossible to know when all reporting procedures were completed. Full information was only available for 11 incident events, so analysis could only be performed on these 11 incident events and the 31 incident events that were reported after implementation of the system.

The before implementation of the system, when students still used written reporting, the time from when incident events occurred to when students finished reporting the incident event was a mean of 4.36 days, while it took a mean of 12.09 days to complete all reporting procedures. After implementation of the system, when students used online reporting, students took a mean of 2.85 days to finish reporting, while it took a mean of 11 days to complete all reporting procedures. The Mann-Whitney test was used to compare differences in time of reporting incident events and the time to complete reporting procedures before and after implementation of the system, giving U-values of 99 and 101, respectively. The p-value was not significant.

Discussion

The established reporting system used a web-based interface, a common interface that is used by many systems and that enables users to operate the system in a friendly way. The interface is similar to the interface of reporting systems developed by Wu et al. [6] and France et al. [7] and is an efficient tool for incident event reporting.

The results of this study showed that 15 incident events were reported in the 5-year period before implementation of the system, while during the year after implementation of the system, reported incident events totaled 31. This may indicate that the system provides a more convenient reporting method as compared to written reporting, as both students and teachers can operate the system either at the hospital or at home, instead of having to go back to school to get a report sheet. It may also indicate that by communicating the significance of incident event reporting and the non-punitive attitude toward incident event reporting conveyed during the training course reduced students' anxiety and fear. A third explanation may be that the students' capability has changed in the past 5 years, and that the number of incident events has actually increased. In any case, the number of reported incident events gives an indication of the positive attitude of students and teachers toward incident event reporting and tells us that they are not afraid and therefore not unwilling to report incident events.

Uribe et al. [9] studied obstacles that influenced medical personnel to report incident medical events, and suggested that a reporting system should consider system operating convenience in order to enhance the willingness of medical personnel to use it. In the future, a help function may be integrated into the system, providing online assistance to users to diminish the effects of operation inconvenience or unfamiliarity with reporting procedures.

Currently the reporting system only has an incident event reporting function and does not link up with or incorporate student health data. It is therefore not possible to use the system to follow up with students who sustained a needlestick injury. In the future, student health data may be integrated into the reporting system to facilitate efficient follow-up of students' health status.

Conclusion

We combined existing incident reporting flow and sheets to develop a web-based reporting system for nursing students in clinical settings that facilitates timely and

interactive reporting. When a student reports an incident, the relevant clinical teacher or mentor immediately receive an email notification, so that they immediately get an insight into the circumstances of the incident.

After one year of implementation of the reporting system, an evaluation of the system efficiency was performed. The results showed that a total of 31 incidents were reported after system implementation, an annual ten-fold increase compared with the 15 incidents that were reported in the five-year period before system implementation. Overall it can be said that reporting time was cut in half and that reporting procedures could be completed more efficiently.

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