

## Awareness of high-risk intravenous medication safety issues among nurses

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**Abstract.** This survey study systematically investigated issues associated with medication-related procedures and elucidated the issues regarding high-risk intravenous medication safety among nurses. The results indicated that for nurses, high-risk intravenous medication safety issues included a lack of knowledge about administered medicines, patient confirmation negligence, inappropriate medicine management, inappropriate storage, lack of awareness about high-risk medicines, frequent verbal prescriptions, and confusion regarding packages and containers. This study therefore will contribute to improvements in nurses' work satisfaction, patient safety, and medication-related knowledge and performance in terms of the safety of high-risk medicines requiring caution.

**Keywords:** Nurses, Hospitals, Medication Safety, high-risk intravenous injection

### 1 Introduction

Medication safety refers to “an action to correct and prevent medication errors that can occur during medicine use, which are defined as accidents or errors that can occur during medicine utilization;” the establishment of medication safety through improvements to and prevention of the causes of medication errors using various literature and study results has been confirmed as a practical concept [1].

Medication errors were found to derive from a lack of knowledge, substandard work performance, and system defects. The following were suggested as issues related to work procedures: 1) cases without guidelines, regulations, and procedures; 2) cases with guidelines, regulations, and procedures but lacking education; 3) cases with guidelines, regulations, and procedures but no implementation assessment after education; 4) cases with education about guidelines, regulations, and procedures but no guideline implementation. All guidelines, regulations, and procedures were combined to analyze the factors that influenced medication safety practices [2]. Medication errors are reportedly among the most frequent accidents that threaten patient safety, with particular emphasis placed on patient confirmation for the purpose of patient safety in a hospital setting, indications for medication safety, and generation of a medication list for each patient [3]. In addition, the use of medication-related abbreviations and verbal prescriptions, particularly for warnings and guidelines

regarding high-risk and high-cautious medicines, has been described.

High-concentration electrolytes, which represent a class of high-risk medicines, refer to electrolytes that exceed isotonic concentrations and carry a high risk of adverse events because of the strong risks of medication errors and narrow treatment areas; these include NaCl and KCl. Heparin, an anticoagulant that prevents blood clotting during thrombotic and embolic treatments, cardiac surgery, transfusion, and hemodialysis, requires periodic blood testing and careful patient observation because of the strong bleeding tendency [4]. In addition, patients receiving chemotherapy are at risk of adverse events such as nausea, vomiting, and a loss of appetite, in contrast to the therapeutic effects of these agents, and for nurses, chemotherapy presents a risk of secondary anticancer medicine exposure through the respiratory and gastrointestinal system and skin during medicine preparation, administration, nursing care, examination procedures, and waste treatment [5].

Moreover, a study, in which an intravenous medication safety system was developed for high-risk, intravenously injected medicines, generated a profile based on patient types, such as adults receiving critical patient care, cancer patients, internal medicine and surgery patients, and pediatric patients, to define the characteristics of device operation (e.g., maximum injection speed and pressure settings) and thus secure patient safety; the authors subsequently applied this program, which included a range of variable medicine injection factors [6]. In that study, the patients' morbidity and mortality rates decreased and both patient and nurse satisfaction improved. Accordingly, high-risk medicines should be administered by nurses with appropriate medication experience and preparation, and nurses in charge of medication should be well aware of the potential adverse events associated with medicines and be responsible for the correct assessments and management of patients and medicines in order to provide safe and effective nursing care.

Therefore, the objective of this study was to investigate the issues associated with medication procedures and identify the causes of high-risk intravenous medication safety issues in order to increase the implementation of high-risk intravenous medication safety measures among nurses and provide basic data with which to improve the quality of medication care.

## **2 Method**

### **2.1 Study Design**

This was a survey study intended to elucidate the awareness of high-risk intravenous medication safety issues among nurses.

### **2.2 Sampling and Data Collection**

The study subjects included 50 nurses with high-risk intravenous medication related-experiences and knowledge who worked at a university hospital located in D city. Regarding the selection criteria, because this study assessed responses to semi-

structured questions, samples were selected in consideration of the depth and abundance of knowledge-rich data and information regarding the study topics.

### **2.3 Data Analysis**

A survey was performed using the following semi-structured question: "what are the issues and causes of high-risk intravenous medication procedures in nurses?"; the survey included 50 nurses who had experience with high-risk intravenous medication nursing care in corresponding wards, and affinity analyses were conducted to determine the main issues. A Pareto chart of the main issues associated with high-risk intravenous medication performance was created, and the final integrated results were determined and analyzed.

## **3 Results**

### **3.1 General characteristics of the subjects**

Twenty-seven subjects (54%) were aged 26–35 years, 30 (60%) had graduated from university, 38 subjects (76%) currently worked in wards, 24 (48%) had 25–74 months of clinical experience, 42 (84%) were general nurses, 34 (68%) scored 7–10 points on a high-risk medicine explanation confirmation, 46 (92%) responded positively regarding the presence of relevant education, 42 subjects (84%) continued their education while working at a hospital, and 40 (80%) received a lecture-type education.

### **3.2 Analysis of nurse-perceived medication safety issues**

The analysis of nurse-perceived high-risk intravenous medication safety issues assessed a total of 12 categorical issue items, including a lack of knowledge about the administered medicines, negligent patient confirmation, inappropriate medicine management, inappropriate storage, frequent verbal prescription use, confusion regarding packages and containers, poor medication device operation, lack of awareness about high-risk medicines, discontinuation during medication protocols, absence of manuals for medication procedures, and ineffective communication.

### **3.3 Analysis of the Pareto chart of nurse-perceived issues**

The Pareto analysis of nurse-perceived issues associated with high-risk intravenous medication procedures found that a total of 7 items, with a cumulative percentage of up to 82%, comprised the major nurse-perceived high-risk intravenous medication safety issues; these included a lack of knowledge about administered medicines, negligent patient confirmation, inappropriate medicine management, inappropriate storage, lack of awareness about high-risk medicines, frequent verbal prescription use,

and confusion regarding packages and containers <Figure 1>.

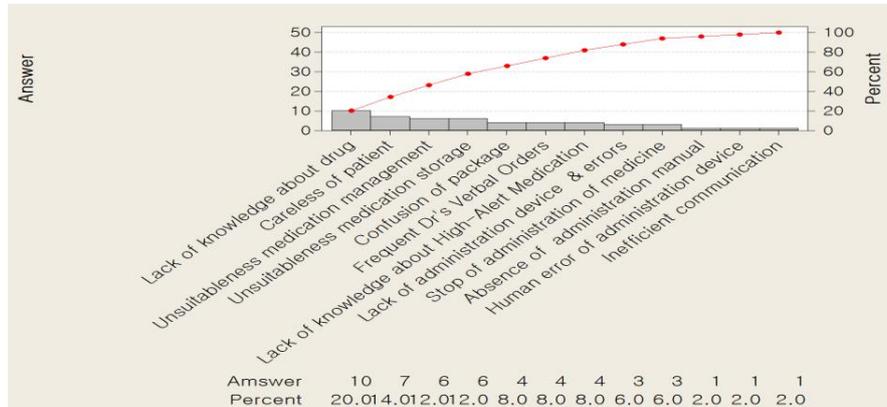


Fig. 1. Nurse-perceived medication safety issues

#### 4 Discussion and Conclusion

The analysis of major medication safety issues affecting nurses identified a lack of knowledge about administered medicines, negligent patient confirmation, inappropriate medicine management, inappropriate storage, lack of awareness about high-risk medicines, frequent verbal prescription use, and confusion regarding packages and containers. In other words, this investigation and analysis of nurse-perceived high-risk intravenous medication safety issues will contribute to improvements in nurses' work satisfaction and patient safety and can be applied to the establishment and preparation of programs with the expectation that it will yield improvements in medication knowledge and performance associated with the safety of careful high-risk medication.

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