

# Self-Reporting of Medication Errors in Critically Ill Surgical Patients in the THAI-SICU Study

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**Objective:** The objective of this study was to collect the data of medication errors by the self-report of doctors and nurses in critically ill surgical patients.

**Material and Method:** All data were collected from THAI-SICU database in nine medical schools in Thailand during a period of 22 months. The occurrence and medication error related factors were recorded.

**Results:** From 4,652 admissions, there were only 10 cases of medication error. Of these, there were only 7 cases of complete self-report medication error, and all of them had no critical side effects. Most cases were of receiving wrong doses of medicine especially overdosing. The medicine preparers, administrators and the error detectors were mostly nurses. For immediate outcomes, two cases were reported of low blood pressure and one case was reported of lowering self-conscious. For long-term outcomes, there were two cases of prolonged ICU stays. Regarding the contributing factors, the most frequent problem found was communication. The most important factor minimizing incidents was to increase proper care. As to suggested corrective strategies, it was found that improved supervision was most needed.

**Conclusion:** Reporting of medication errors by a self-report of doctors and nurses is low in this cohort, which might result from occurrences not being reported. The wrong dose is the most common occurrence and the communication is the most related factor.

**Keywords:** Critically ill patients, Medication error, SICU, Safety climate

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At present, care of critically ill patients is challenging. As the fast forward of modern medicine, now we can handle complicated patients that we could not treat in the past. There are many factors involving the sophisticated treatment, such as complex medical equipment, precise monitoring, and use of high-alert drugs. Combined with the overcrowding of patients in intensive care units (ICU) and increasing workloads, medication errors in the intensive care unit are not unexpected. Valentin A. et al demonstrated that parenteral medication errors in ICU were as common as 74.5 (95% CI; 69.5-79.4) events per 100 patient days and 0.9 % of the study population died or permanently be harmed<sup>(1)</sup>. The data prove that medication errors still exist and are a serious safety

problem in the ICU.

The primary goal of care in terms of safety is to do no harm. On the other hand, the error-free process of care is difficult to guarantee. We endeavor to uphold safety standards when dealing with critically ill patients<sup>(2)</sup> despite there being a lack of medication error information. Therefore, we do not truly understand the real situations of the problems which lead to the lack of appropriate planning and promotion for appropriate use of safe medication in the ICU. To gather all the information about the problems, the authors collect data of medication errors, recorded by intensivists and ICU nurses using a medication error self-reporting system to evaluate incidences and factors that relate to medication errors in critically ill patients.

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## Material and Method

The present study was a part of THAI-SICU study<sup>(3)</sup>, a multi-center prospective observational study, which mainly aimed to investigate data of

patients admitted in surgical intensive care units (SICU) of 9 medical schools in Thailand during a period of 22 months. The subjects who enrolled in this study were all patients at least 18 years old in SICUs. Some of the patients who might not benefit from ICU admission were excluded from the study.

Further than the baseline characteristics; the researchers collected information on medication errors via the self-reporting system from doctors or nurses who had direct experience of the medication errors. The first part was to record the details of the situations. The second part was a self-report of the possible causes relating to the situations by using multiple checkboxes. The continuous data were analyzed statistically with mean  $\pm$  standard deviation (SD). Categorical data were presented in the form of percentages or proportions. The research proposal and all case records form (CRF) were approved by the Thailand Joint Research Ethics Committees (JREC) and each Institutional Review Board (IRB) prior to the data collection.

## Results

From 4,652 admissions to SICU of the hospitals of the 9 medical schools during 22 months, it was found that there were only 10 cases of medication error. Of these, there were only 7 cases of complete self-report medication error. These cases were reported of medication errors from 2 out of 9 hospitals without critical side effects.

The data collection was divided into two parts. The first part as in Table 1 was the details of the situations. The patients reported that the medication errors average age was  $68.6 \pm 17.7$  years. 4 out of 7 cases were male which accounted for 57.1%. The average admission SOFA score was  $4.1 \pm 2.1$ . 5 out of 7 cases of medication error happened during the day which accounted for 71.4%. 5 out of 7 cases were reported of wrong doses of medication which was mostly overdosing. This accounted for 71.4%. The medication preparers, the medication administrators, and the error detectors were often nurses. For the immediate outcomes, no side effect was found among most of the cases or 4 cases which accounted for 57.1%. 2 cases had low blood pressure which accounted for 28.6%. 1 case was found with reduced consciousness which accounted for 14.3%. For long-term outcomes, there were 2 cases with prolonged ICU stays which accounted for 28.6%.

The second part was the factors relating to the situations in Table 2. The experimenter could give

**Table 1.** Baseline characteristics and details of medication error incidences

Case number	1	2	3	4	5	6	7
Age (year)	66	85	76	35	79	82	57
Sex	Female	Female	Male	Female	Male	Male	Male
Diagnosis	Broncho plural fistula	Femoral arterial occlusion	GI malignancy	Pancreatic duct stone	GI malignancy	Bowel obstruction	Skin cancer
Admission SOFA score	6	7	5	4	4	2	1
Incident time	24.01-8.00	8.01-16.00	8.01-16.00	8.01-16.00	16.01-24.00	8.01-16.00	8.01-16.00
Drug	Amiodarone	Albumin	Vancomycin	Acetylcysteine	Marcaine	Amiodarone	Depakin
Type of medication error	Wrong dose	Wrong time	Wrong dose	Wrong dose	Wrong dose	Wrong dose	Wrong dose
Medication error effect	Overdose	Omit dose	Overdose	Under dose	Overdose	Overdose	Overdose
Medication preparator	Nurse	Nurse	Nurse	Nurse	Nurse	Nurse	Pharmacist
Medication administrator	Nurse	Nurse	Nurse	Nurse	Nurse	Nurse	Nurse
Medication error detector	Nurse	Nurse	Nurse	Nurse	Resident	Nurse	Pharmacist
Affect to treatment Outcome							
1) Immediate	None	None	None	None	Hypotension	Hypotension	Drowsy
2) Long term	None	None	None	None	Prolonged ICU	None	Prolonged ICU

SOFA = sequential organ failure assessment; GI = gastrointestinal disease; ICU = intensive care unit

**Table 2.** The factors relating to the situations

Relating factors	Case (s)
Contributing factors	
Communication problems	3
Lack of working efficacy	2
Working rush	1
Inefficient monitoring tools	1
Fatigue from work	1
Unclear medicine label	1
Lack of experience	1
Factor minimizing incidence	
Increased carefulness	4
Good communication system	3
Guideline practice	3
Monitoring for analyzing	2
Enough experience	1
Enough staff members	1
Continued patient monitoring	1
Suggested corrective strategies	
Improved supervision	4
Improved communication	3
Guideline practice	2
More manpower	1

more than one answers to each topic. The most frequent problem found was communication breakdowns, which was found in 3 out of 7 cases, and it accounted for 42.9%. For the factors minimizing incidents, the first rank was increasing proper care. 4 out of 7 cases chose this topic, which accounted for 57.1%. The suggested corrective strategies were found that improved supervision was most often needed. 4 out of 7 cases chose this topic which accounted for 57.1%. Moreover, it was found from the survey of types of errors that rule-based errors ranked first and system-based errors ranked the second. Questions on the last topic asked for opinions on whether the mistakes could be prevented. All of the informant answered that all mistakes which happened were preventable.

## Discussion

From the self-report system data collection, there were only small numbers of medication errors. When compared to other studies e.g. Valentin A. et al, who found that medication errors in the ICU could be as high as 74.5 events per 100 patient days. It is evident that the differences were very high which indicated that medication errors were under reported with regard to the real number of incidences. It can be seen that there were many such differences, which were convincing enough to suggest that there was a serious

problem of not reporting all incidences for this report. Prior to the present study, there were studies of drug errors in Thailand e.g. in a study of patients under general anesthesia. Hinton T. et al also found incidences of anesthesia-related drug errors in 40 out of 202,699 anesthetized cases or 1:4,943<sup>(4)</sup>, a number quite low for the different groups of participants. Therefore, there must be a more efficient method of data collection in the future.

For the details of the incidences, it could be seen that the problems usually occurred during the daytime, which was under a doctor's supervision during normal working hours. Medicine preparers, medicine administrators and event detectors were mostly nurses. This might indicate that the nurses were responsible for different tasks in the medication process for each case, and suffered from cumulative stress and exhaustion. Errors in other groups of medical staff members were also found e.g. a case of a pharmacist's error in medicine preparation from the dispensary or the doctor's errors in the prescription of medicine process, which mostly resulted from a wrong medicine name, unclear handwriting, use of abbreviations, and finally oral or via telephonic treatment instructions. Most cases of errors were detected by nurses which prevented problems before they occurred. As a result, this information was always under reported.

When considering the related causes of medication errors as a starting contributing factor, it was found that communication problems ranked first. This could be reduced by clear and concise handover of the patients between each shift<sup>(5)</sup>. The first factor in minimizing incidents was to increase proper care followed by good communications and guideline practices. All of these could be solved by a creating a good organizational culture to promote a safe climate to ensure that patient's safety was always the priority<sup>(6,7)</sup>. For corrective strategies, it was found that improved supervision was most often needed and that there were many ways to make improvements such as setting measures to help check the doctors' medication administration in ICU by pharmacists<sup>(8)</sup>. Considering the types of errors, it was found that the most common error was rule-based. This can be solved by fostering a good attitude in the organization and encouraging information recording of the indicators, accepted as being necessary to develop the patients' treatment in the ICU. Following a task force on quality and safety of the European Society of Intensive Care Medicine (ESICM)<sup>(9)</sup>, consisting of 9 indicators, one of them was an adverse event reporting system of which the advice

for reducing the risks was to understand fully situations. One thing was to have a specific monitoring system in place in each unit to record clearly unwanted situations happening to each patient. Finally, from the present study, the consensus was that all the errors could have been prevented which corresponded to the study by Marino P et al. He conducted research on 79 Spanish ICUs of which the results confirmed that most errors could have been prevented<sup>(10)</sup> and should, thus, lead to the development of a prevention system for medication errors believed to be preventable.

This report might inspire concerned parties to find solutions to medication errors in the critically-ill patients especially in countries with limited resources. This might also lead to a proper study design, appropriate information gathering and the improvement of the working system that focuses on the patients' safety in the future.

### Conclusion

Reporting of medication errors by surveying the self-report of doctors and nurses is low, which might result from occurrences not being reported. However, various means used together could improve safety. The wrong dose of medicine is the most common failure and poor communications the most related factor. The creation of a safety-sensitive climate for everyone in the organization so that they are aware of the safety requirements needed in the administration of medication, which would very likely reduce problems of error.

### What is already known on this topic?

Medication errors in the intensive care units are not unexpected. The data in developed countries inform that these problems have a high incidence and are a serious safety problem in the ICU.

### What this study adds?

By self-reporting system of medication errors in the present study, the incidence of medication errors is low, which most likely result from inaccurate reporting and possible cover-up. Most cases were wrong doses of medication leading to drug overdoses. Various means, including stressing the importance in the care in handling of medications, could improve overall safety.

### The THAI-SICU study group was as listed below

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### Potential conflicts of interest

None.

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### การรายงานความคลาดเคลื่อนทางยาในการรักษาผู้ป่วยวิกฤตคัดลอกจากการศึกษา THAI-SICU

ธรรมศักดิ์ ทวีศรี, กวีศักดิ์ จิตตวัฒน์, อรุณา ชัยวัฒน์, สมรัตน์ จารุลักษณะนันท์, กลุ่มศึกษา THAI-SICU

**วัตถุประสงค์:** ผู้เขียนได้ทำการรวบรวมข้อมูลการใช้ยาที่ผิดพลาด ทำการสำรวจโดยให้แพทย์หรือพยาบาลผู้ประสบเหตุการณ์แบบฟอร์มด้วยตนเอง เพื่อประเมินอุบัติการณ์และปัจจัยต่างๆ ที่อาจจะเกี่ยวข้องเนื่องกับการให้ยาที่ผิดพลาดในผู้ป่วยวิกฤตในการศึกษานี้

**วัสดุและวิธีการ:** รายงานฉบับนี้เป็นส่วนหนึ่งของการศึกษา THAI-SICU ซึ่งเป็นการศึกษาแบบสหสถาบันเชิงสังเกตไปข้างหน้า ข้อมูลทั้งหมดมาจากการสำรวจผู้ป่วยที่เข้ารับการรักษานในหอผู้ป่วยวิกฤตคัดลอกในโรงเรียนแพทย์ 9 แห่งทั่วประเทศไทย รวมระยะเวลาทั้งสิ้น 22 เดือน นอกเหนือไปจากข้อมูลพื้นฐานของผู้ป่วย ผู้เขียนได้ทำการเก็บข้อมูลในส่วนของการให้ยาที่ผิดพลาด โดยในส่วนแรกได้มีการบันทึกรายละเอียดของเหตุการณ์ ในส่วนที่สองให้ผู้ประสบเหตุได้มีการบันทึกปัจจัยที่เกี่ยวข้องเนื่องกับการเกิดเหตุ

**ผลการศึกษา:** ในจำนวนการเก็บข้อมูลทั้งสิ้น 4,652 ราย มีการนำเสนอรายงานผู้ป่วยที่ได้รับการให้ยาผิดพลาดทั้งสิ้นเพียง 7 ราย ซึ่งทั้งหมดนี้ไม่มีผลข้างเคียงรุนแรงใดๆ เกิดขึ้น รายละเอียดของเหตุการณ์พบว่าช่วงเวลาที่เกิดเหตุส่วนใหญ่อยู่ในช่วงกลางวัน มักจะให้ยาผิดพลาดโดยส่วนใหญ่เป็นการให้ยาเกินขนาดที่เหมาะสม ผู้ทำการเตรียมยา ผู้ทำการให้ยาและผู้ตรวจพบเหตุผิดพลาดได้มักจะเป็นพยาบาลในส่วนของผลกระทบที่เกิดขึ้นทันที คือผู้ป่วย 2 ราย มีปัญหาความดันโลหิตต่ำและในส่วนของผลกระทบระยะยาว พบว่ามีผู้ป่วย 2 ราย ที่ต้องอยู่ในหอผู้ป่วยวิกฤตนานขึ้น ปัจจัยที่เอื้อให้เกิดปัญหาได้มีการลงความเห็นแล้วพบว่าปัญหาของการสื่อสารพบมากที่สุด ปัจจัยที่จะช่วยลดอุบัติการณ์พบว่าอันดับหนึ่งคือ ควรเพิ่มความระมัดระวังให้สูงขึ้น มาตราการที่แนะนำว่าจะช่วยแก้ไขปัญหามากที่สุดคือการให้การเพิ่มการควบคุมดูแล

**สรุป:** การรายงานผลความคลาดเคลื่อนทางยาในผู้ป่วยวิกฤต โดยใช้วิธีการแบบฟอร์มรายงานด้วยผู้ประสบเหตุด้วยตนเอง พบภาวะการให้ยาที่ผิดพลาดเป็นอุบัติการณ์ต่ำ ซึ่งอาจเกิดจากการรายงานผลต่ำกว่าความเป็นจริง การให้ยาผิดพลาดพบได้บ่อย และมักสัมพันธ์กับการสื่อสารในหน่วยงาน

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