



## Evaluation of Stress Ulcer Prophylaxis Guideline in the Intensive Care Units of a Teaching Hospital: A Cross Sectional Study

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### ABSTRACT

**Background:** One of the complications of critical ill patients admitted to intensive care unit (ICU) are stress-related mucosal damage. Stress ulcer prophylaxis (SUP) should be administered to all critically ill patients with at least one major risk factor and two or more minor criteria.

**Methods:** This study was performed during 6 months from October to December 2013 in Namazi Hospital intensive care units to assess the appropriate administration of SUP, according to American Society of Health-System Pharmacists (ASHP) protocol. Candidate for SUP according the ASHP guideline is considered if there is a at least one major risk factor or two or more minor risk factors.

**Results:** Ninety-four patients were enrolled (46 men and 48 women). The mean age of study subjects was 51.5 years. The most major risk factor to stress ulcer found to be mechanical ventilation more than 48 hours (53%). The most minor risk factor for stress ulcer was ICU admission for less than one week (23.5%). Most prescribed medication for stress ulcer prophylaxis was intravenous Pantoprazole (44.7%). Our results have shown that about 74% patients were candidate for SUP according the ASHP guideline. 13(13.8%) of patients had only major risk factors. 5 (5.3%) of patients received SUP while they did not have at least one major risk factor or two or more minor risk factors.

**Conclusion:** Our results have shown that 76.2% of the total SUP administrations were compliant with the ASHP guideline. Among the prescribed medication for SUP, intravenous pantoprazole had the highest percentage of administration (44.7%) and oral omeprazole had the lowest percentage of administration (7.4%). According to the results of our study, 72% of the route administrations are compliant with the ASHP guideline.

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### Introduction

One of the complications of critical ill patients admitted to intensive care unit (ICU) is stress-related mucosal damage. One of the most important complication of stress ulcer prophylaxis is upper gastrointestinal bleeding and is clinically the most important risk factor associated with morbidity and mortality in critically ill patients admitted to

ICU (1). The pathophysiology is not completely understood, but it has been hypothesized that stress ulcerations are caused by decreased mucosal blood flow, ischemia and reperfusion injury, and hence are less related to acid secretion than peptic ulcers (2-4). Stress ulcer prophylaxis should be administered to all critically ill patients if at least one major risk factor and two or more minor risk factors

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are detected (3-6). In 1990s, the American Society of Health-System Pharmacists (ASHP) published guidelines on the use of stress ulcer prophylaxis (SUP) in critically ill patients (7). Various medications are used to prevent ulcerative prophylaxis in critically ill patients admitted to ICU, including: antacids, sucralfate, histamine-2-receptor antagonists (H2RAs) and proton pump inhibitors (PPIs) (3-6, 8-10).

Irrational medicine use is a widespread problem in hospitals around the world and has raised concerns especially in developing countries due to financial constraints in the field of health care (11). In developing countries, although about half of the health budget is dedicated to supplying people with the necessary medicines, some people are deprived of access to basic medicines (12).

The present study was designed to evaluate appropriateness of SUP practice according to ASHP guideline in patients admitted to the ICU. It is hoped that the results of this survey will provide useful information on the administration of guideline-based prophylactic stress ulcer and be useful in the appropriate administration of SUP in accordance with

the guidelines in patients admitted to intensive care units and reduce the cost of the healthcare system.

**Methods**

This study was designed to assess the appropriate administration of SUP, according to American Society of Health-System Pharmacists (ASHP) protocol from October 2013 to December 2013 in Namazi Hospital intensive care units, Shiraz, Iran. The sample size included all patients received SUP in ICUs.

The primary outcome of this study was evaluation of stress ulcer prophylaxis guideline in the intensive care units and the secondary outcome includes determining the guideline adherence in administration of SUP by physician.

This survey has collected information such as age, gender, length of hospital stay and disease characteristics, i.e. past medical history of peptic ulcer diseases, past medical history of gastro-intestinal bleeding and past medical history of liver diseases. Assessment of the SUP administration appropriateness was based on ASHP protocol (Table 1). Patients were considered eligible for SUP, if they had at least one major risk factor or two or more minor risk factors.

**Table 1.** Guideline for stress ulcer prophylaxis prepared based on the American Society of Health-System Pharmacists protocol

Severity of risk factor	Risk factor
Major	Coagulopathy (platelet count <50,000 per mm <sup>3</sup> , an International Normalized Ratio (INR) >1.5, or a partial thromboplastin time (PTT) >2 times the control value.)
	Mechanical ventilation for >48 hours
	Patients with a history of GI ulceration or bleeding within 1 year before admission
	Spinal cord injury
	Thermal injury of >35%
	Partial hepatectomy
	Multiple trauma
	Hepatic or renal transplantation
	Hepatic failure
	Glasgow coma score of <10
Minor	Sepsis
	ICU stay for >1 week
	Occult bleeding lasting at 6 days
	High dose of corticosteroids (250 mg hydrocortisone or equal)
	Using anti-Plt agents

Abbreviations: GI, gastrointestinal; ICU, intensive care unit; INR, international normalized ratio; Plt, platelet

The exclusion criteria were (1) Patients younger than 18 years, (2) Patients who have died for any reason during length of hospital stay and (3) Patients who had active gastrointestinal bleeding at the time of admission.

Data were entered in SPSS 25 software. Descriptive statistic was used and data were expressed as mean ± SD or percentage.

**Results**

Among 94 patients included in this study, more than half were female 48 (51%), and the average length of hospital stay was more than 14 days. The mean age of patients was 51.5 ± 21.12 years (54±24 for female and 49.23±18.9 for men). The frequency of patients’ major and minor risk factors for stress ulcer is reported in (Table 2). The most major risk factor for stress ulcer was mechanical ventilation for more than 48

hours (52%), followed by coagulopathy (23.5%). Among the minor risk factors, the most minor risk factor for stress ulcer was ICU admission more than one week (51.5%), followed by glucocorticoid therapy (20.8%). Major and minor risk factors with details are shown in (Table1 and 2).

Most prescribed medication for SUP was intravenous (IV) pantoprazole (44.7%) and lowest prescribed medication for SUP was oral omeprazole (7.4%). Types and percentage of prescribed medications for SUP are shown in Figure 1.

Our results have shown that about 74% patients were candidate for SUP according the ASHP guideline. (Candidate for SUP according the ASHP guideline is considered if there is a at least one major risk factor or two or more minor risk factors) .13 (13.8%) of patients had only major risk factors. 5 (5.3%) of patients received SUP, While they did not have at least one major risk factor or two or more minor risk factors.

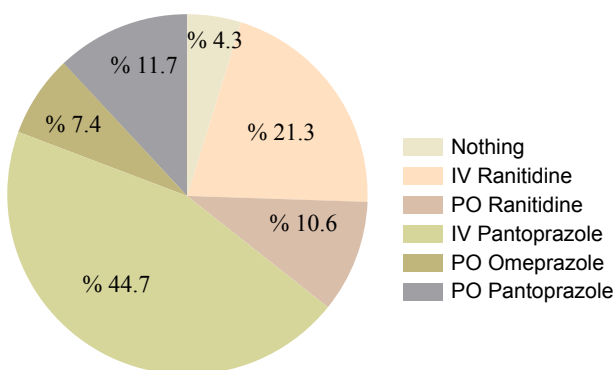
**Table 2.** The list of patients’ risk factors for stress ulcer.

Category	Indications for stress ulcer prophylaxis	Frequency	(%)
Major risk factors	Mechanical ventilation> 48 h	53	52
	History of GI ulceration or bleeding with the past year	9	8.8
	Traumatic brain injury	2	2
	Traumatic spinal cord injury	1	1
	Coagulopathy	24	23.5
	partial hepatectomy	3	2.9
	Hepatic Failure	4	3.9
Minor risk factors	Post-liver or renal transplant	6	5.9
	Sepsis	13	12.9
	ICU admission lasting >1 week	52	51.5
	Occult GI bleeding lasting >6 days	3	2
	Severe stroke	13	12.9
	Glucocorticoid therapy (>250 mg hydrocortisone or the equivalent)	21	20.8

GI:gastrointestinal, ICU:intensive care unit

**Figure 1.** Prescribed medications for stress ulcer prophylaxis (SUP)

Prescribed medication for stress ulcer prophylaxis



**Discussion**

We have assessed the appropriateness of SUP practice according to ASHP guideline in patients admitted to the ICU. Our results have shown that about 74% patients were candidate for SUP according the ASHP guideline. (Candidate for SUP according the ASHP guideline is considered if there is a at least one major risk factor or two or more minor risk factors). Our results have shown the most major risk factor to stress ulcer was mechanical ventilation for more than 48 hours (52%) followed by coagulopathy (23.5%). Also, the most minor risk factor for stress ulcer was ICU admission for more than one week (51.5%), followed by glucocorticoid therapy (20.8%). Most prescribed medication for SUP was IV pantoprazole (44.7%).

In a retrospective study conducted on 243 patients in the

neurology wards of two teaching and nonteaching hospitals in Iran, it was revealed that the majority of patients (84.6%) were not eligible for using SUP. The most major risk factor for stress ulcer was found to be coagulopathy (4.5%) and most minor risk factor for stress ulcer was a Heparin or Low molecular weight heparin (LMWH) (20.2%). In addition, most prescribed medication for SUP was H2 blockers (60%) (19). This result was not similar to ours. According to the studies conducted in this field, the results of our study indicate a favorable situation, because about 74% of SUP prescriptions were compliant with the ASHP guideline. And the difference between two studies major and minor risk factors could be due to difference in the settings.

Horsa et al., performed a cross sectional study to assess pharmacologic prophylaxis use against stress ulcer in the medical wards of university of Gondar hospital. The result of study showed the most common acute risk factor to stress ulcer was coagulopathy (18.4%), followed by hypoperfusion (9.8%). The concomitant use of non-steroidal anti-inflammatory drug (16.7%), mild-to-moderate brain or spinal cord injury (11.1%), and concomitant or recent corticosteroid use (9.4%) were frequently seen risk factors that necessitate administration of a prophylaxis. In total 82 (35%) participants were given stress ulcer prophylaxis, among which 52 (63.4%) were given without indication and 43 (18.4%) of them were not given stress ulcer prophylaxis while there was clear indications. The most commonly used drug class in the prevention of stress ulcer was proton pump inhibitors (76/82, 92.7%) (14).

Christopher et al., studied all ICU admissions for 4 months to evaluate overuse of SUP in the critical care setting and beyond. Risk factors for stress ulcer bleeding were collected. Patients were categorized into 4 groups: (1)  $\geq 1$  major risk factor; (2)  $\geq 1$  minor risk factor; (3) no risk factors; (4) preadmission use of acid-suppressive medication. Of the 210 patients, 87.1% (95% CI, 81.8, 91.4) were placed on SUP during ICU stay. By risk factor groups, 95.5% of patients in group 1 (major risk factors), 82.9% of patients in group 2 (minor risk factors), 68.1% of patients in group 3 (no risk factors), and 96.2% of patients in group 4 (previous ASM use) were placed on SUP. Of all the ICU admissions, 87.1% received SUP. Among patients with no risk factors, 68.1% were placed on prophylaxis on ICU admission 60.4% continued on treatment upon transfer from the ICU; 82.9% of patients with one or more of these risk factors received SUP. Furthermore, among the group with no identifiable risk factors for stress-related bleeding, 68.1%. The major risk factors for the development of stress ulcers have been Mechanical ventilation. Our results show that most people (95.5%) with one or more of these 2 major risk factors received SUP during ICU stay still received SUP (15).

We believe that the results of this survey will provide useful information on the administration of guideline-based prophylactic stress ulcer and be useful in the appropriate administration of SUP in accordance with the guidelines in patients admitted to intensive care units and reduce the cost

of the healthcare system. Our results have shown that about 74% of SUP administrations were compliant with the ASHP guideline. Only 66 (70.2%) of patients had a major risk factor. Among the prescribed medication for SUP, intravenous pantoprazole had the highest percentage of administration and oral omeprazole had the lowest percentage of administration. The current study had several limitations. First, current study was performed only in the ICU ward of Namazi Hospital and cannot be extrapolate to other hospitals. Second, some records of hospitalized patients were defective.

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