

Role of Clinical Pharmacist in Implementation of Stress Ulcer Prophylaxis Protocol: A Single Site Retrospective Study

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ABSTRACT

Authors' Contributions

1 Conception & study design, Data collection & processing, Data analysis and/or interpretation, Drafting of manuscript, Critical review.

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Introduction: The incidence of gastrointestinal bleeding is well documented in critical care patients; thus, stress ulcer prophylaxis therapy plays a vital role to prevent it. The guideline recommends the use of histamine antagonists such as ranitidine, famotidine etc. as a first line therapy for stress ulcer due to its cost effectiveness value. However, research show that 28% of intensive care units (ICU) received inappropriate stress ulcer therapy and 81 % were continued on inappropriately upon transfer from ICU. Furthermore, the disparity in the selection of acid-suppressing medication for stress ulcer is very common amongst and within institutions.

Objective: The aim of the study is to standardize stress ulcer therapy according to approved guideline in surgical ICU of a tertiary care hospital of Pakistan with the help of clinical pharmacist.

Methodology: A cross-sectional retrospective study was conducted to evaluate the effectiveness of clinical pharmacist in the implementation of stress ulcer guideline using the data of pharmaceutical intervention and utilization of ranitidine. A one-year retrospective data of pharmaceutical recommendations and drug utilization were collected from October 2017 to September 2018. Descriptive statistics and chi-square analysis were carried out to analyze the data of the study.

Result: A total of 540 patients records were evaluated for the study. Pre-intervention and post-intervention include 123 and 417 records, respectively. Whereas, pharmaceutical recommendations made by clinical pharmacist were 80 out of 337 (23%). The most common recommendations were conversion from parenteral to oral (40%). Drug utilization of ranitidine improved tremendously (60 vs 3932).

Conclusion: Clinical pharmacist can play a vital role in the implementation and compliance of clinical guideline along with optimization of pharmacotherapy.

Keywords: Stress ulcer, prophylaxis, developing country, clinical pharmacist, Pakistan, guideline

INTRODUCTION

In a healthcare setting, there is always a risk of stress gastropathy which can result in clinically significant gastrointestinal bleeding. The incidence occurs when the mucosal barrier of the gastrointestinal tract is unable to neutralize the harmful effects of hydrogen. The incidence of gastrointestinal bleeding is well documented in critical care patients; thus stress ulcer prophylaxis therapy plays a vital role to prevent it [1]. Pharmacological options for stress ulcer therapy includes antacids, sucralfate, histamine 2-receptor antagonists (H2RAs), and proton pump inhibitors (PPIs), collectively known as acid-suppressing medications (ASM). The use of stress ulcer therapy is very common in surgical ICU [2]. In 1999, The American Society of Health-System Pharmacists (ASHP) released its clinical guideline which is considered as most validated and accepted to date. The guideline recommends the use of histamine antagonists such as ranitidine, famotidine, etc. as a first-line therapy for stress ulcer due to its cost-effectiveness value [3]. However, research shows that 28% of intensive care units (ICU) received inappropriate ASM and 81 % were continued on inappropriately upon transfer from ICU [4]. Furthermore, disparity in selection of acid suppressing medication for stress ulcer is very common amongst and within institutions [5]. In general, PPIs are the most preferred SUP therapy due to their once-daily dose frequency.

Clinical pharmacy services are the specialized practices of pharmacist to provide pharmaceutical care through patient medication history, patient profile review, adverse drug management, drug information, and patient counselling. These activities are documented as pharmaceutical interventions [6].

The role of clinical pharmacist and their positive impact on pharmacotherapy is well defined in a developed country. Pakistan is a developing country the role of clinical pharmacist is in early stages [7]. Studies relating pharmacist positive impact on optimization of medication have been published for developing countries but very few studies are published relating to the role of clinical pharmacist in the implementation of clinical guideline. The aim of the study is to standardize stress ulcer therapy according to approved guideline in the surgical ICU of a tertiary care hospital of Pakistan with the help of clinical pharmacist.

METHODOLOGY

Study Type: A cross-sectional retrospective study was conducted to evaluate the effectiveness of clinical pharmacist in the implementation of stress ulcer guideline using the data of pharmaceutical intervention and utilization of ranitidine.

Study Site: A single-center study was conducted in surgical ICU of a well-established tertiary care hospital of Pakistan, Karachi. Pakistan. Surgical ICU is a nine beds unit that is led by a team of anesthesiologists, fellows, residents, physiotherapists and nutritionists. A team of physicians and nurses conducts bedside rounds every morning to assess admitted patients and plan for the day. Physiotherapists and nutritionists conduct independent rounds. Medications are prescribed using computerized physician ordering entry (electronic prescription) which aligns the physician with the satellite pharmacy. The satellite pharmacist will review all medication orders before dispensing them to the wards. Medication orders were reviewed by the pharmacist to ensure correct drug posology and the absence of major drug interactions or drug duplication. If any discrepancy was found in the order, the pharmacist will inform the respective physician and document in the system as pharmaceutical recommendations. (Figure 1: Green Box).

Intervention: Study intervention included the addition of a trained clinical pharmacist in the morning clinical round team for a period of 4 hours. Morning clinical round team included consultant, resident, fellow, nurse. The responsibility of the clinical pharmacist was to review the medication profile of the admitted patients and ensure that ulcer therapy is prescribed according to the approved guideline. He was also responsible for education sessions for healthcare professionals. (Figure 1: Red Box)

Duration of study: A one-year retrospective data of pharmaceutical recommendations were collected from October 2017 to September 2018. Patients admitted during 3 months period from October-December 2017 were assigned as pre-interventional stage and patient admitted from January- September 2018 were assigned as the post-interventional stage of the study.

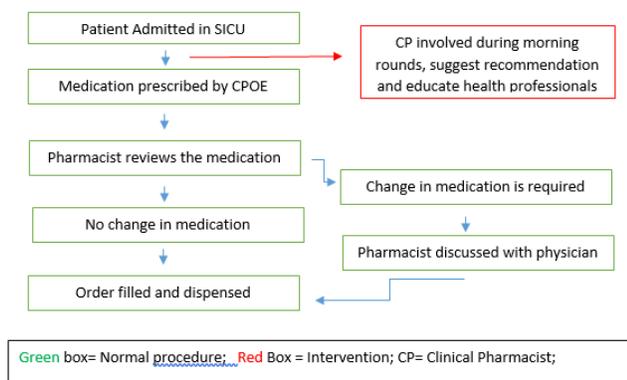


Figure 1. Pre interventional and post interventional medication review procedure.

Study Data: Study data were collected from patients' electronic medical records which included patients' gender and age, use of ranitidine and pharmaceutical recommendations.

Pharmaceutical Recommendations included conversion from omeprazole to ranitidine, conversion of stress ulcer therapy from parenteral to oral, correction of posology, and renal dose adjustments.

Study Analysis: We examine the impact of clinical pharmacist by comparing the data of pharmaceutical recommendations regarding stress ulcer therapy before and after the interventions. We also compared

the usage of ranitidine during this period. Descriptive statistics and chi-square analysis were carried out to analyze the data of the study. All analyses were carried out using Statistical Packages for Social Sciences version 21 (IBM Corp., Armonk, NY, USA). Statistical significance was indicated by $p < 0.05$.

RESULT

A total of 540 patients records were evaluated for the study. Pre-intervention and post-intervention include 123 and 417 records, respectively. (Table 1)

Pharmaceutical Recommendations: In pre-intervention period, only 4 % (7 out of 169) pharmaceutical recommendations relating stress ulcer therapy were documented by the pharmacists. Whereas, pharmaceutical recommendations made by clinical pharmacist were 80 out of 337 (23%). The most common recommendation was the conversion from parenteral to oral (40 %). Other major interventions included wrong frequency (17.5%), Conversion from omeprazole to ranitidine (17.5%), drug-drug interaction (11.25%), and renal dose adjustment (7.5%). One adverse event was reported. (Table 2)

Table 1. Details of patient enrolled in the study.

	Pre	Post
Number of patient's record (frequency)	123	417
Age Range (Mode)	18-87 (52)	18-93(40)
Male (percentage)	87 (71%)	266 (64%)
Female (percentage)	35 (29%)	151 (36%)

Table 2. Details of Therapeutic Recommendations.

Intervention	Pre		Post		p value
	169	%	337	%	
Total Intervention	7	4.1	80	23.7	< .00001
ASM relating intervention	5	71.4	32	40	< .00001
IV to Oral- Ranitidine	0	0	6	7.5	NA
Wrong Frequency	0	0	5	6.2	NA
Drug Duplication	0	0	9	11.2	NA
Drug - Drug interaction	0	0	8	10	NA
Low Dose	1	0	6	7.5	NA
Renal Dose Adjustment	0	0	14	17.5	NA
Conversion from Omeprazole to IV Ranitidine	1				NA
ADR					NA

Drug utilization of Ranitidine in SICU: Table 3 shows drug utilization of parenteral and oral ranitidine in SICU during the pre and post-intervention period. During the pre-interventional stage, the use of ranitidine IV or oral was very limited however, after January, 2018, usage of both forms increased tremendously (60 vs 3932). It is observed that the usage IV ranitidine in a few months have decreased such as in April and July. This is because during this month Ranitidine oral conversion has improved It shows a sudden increase of ranitidine of both dosage forms from January 2018.

Table 2. Drug Utilization of Ranitidine.

Month	Parenteral	Oral
Oct-17	26	5
Nov-17	12	0
Dec-17	10	7
Jan-18	40	27
Feb-18	230	33
Mar-18	345	132
Apr-18	271	160
May-18	437	157
Jun-18	364	198
Jul-18	259	303
Aug-18	365	121
Sep-18	312	178

DISCUSSION

The current study shows successful standardization of the treatment of stress ulcer prophylactic therapy in a surgical intensive care unit in a tertiary care hospital with the help of a clinical pharmacist in it. Thus, showing that the involvement of clinical pharmacist has a great impact on compliance of clinical guideline in an institution. To our best knowledge, our study is amongst few studies which have identified the role of the pharmacist in implementing guideline in developing country.

The involvement of clinical pharmacist in the multi-disciplinary team was initiated to improve the use of antibiotic in admitted patient. It was observed that intravenous omeprazole was the most prescribed for stress ulcer therapy in almost all admitted patients. Due to its drug interaction (QT-elongation and cytochrome P450), it remained a regular concern amongst team members. Furthermore, it was observed that parenteral omeprazole was not

converted to oral form when indicated. This resulted in the initiative by the head of the department to standardize therapy. Creating standardization reduces such risks, ineffectiveness and cost. This initiative resulted in the development of unit-based guideline and clinical pharmacist educational sessions for Surgical ICU physicians and nurses. With respect to guideline development, no drug has been found superior to each other for these indications in terms of health outcomes (benefit or adverse) and pharmacoeconomic bases. Sucralfate is commonly not been used as stress ulcer due to its increased drug interaction. Proton pump inhibitors and Histamine Antagonists are commonly used and suggested for therapy to prevent stress ulcer. We recommended ranitidine as the first-line therapy because of its better pharmacokinetic profile and cost minimization value. The pharmacokinetic profile also allows a dosing regimen that does not fully suppress gastric acid and may limit infection risk. Additionally, omeprazole interaction with QT prolonging drugs is an upcoming concern also. [8] However, indications other than stress ulcer therapy where omeprazole was recommended as initial therapy still remain intact. The developed guideline also suggested the eligibility criteria of stress ulcer therapy as recommended in international guideline. [3] New recommendation regarding discontinuing stress ulcer therapy on initiation of feeding was not completely endorsed by our guideline but was left at the discretion of the attending physician. However, guideline strongly suggested to convert parenteral to oral once the feeding was tolerated by the patient. The guideline went under rigorous review by the faculty of anesthesiologists and surgery before getting approved by the chair of the surgical department.

For the implementation of the guideline, two methodologies were used. First, direct approach in which clinical pharmacist review the Stress Ulcer therapy and discuss with the respective physician for compliance of guideline during rounds. Second, educational sessions were conducted to discuss the significance of the implementation of guideline and its advantages. It was decided that educational sessions will be conducted at the induction time of new SICU residents which occurs every quarter. Hence, three sessions were conducted in March, June and August. (Figure: 2)

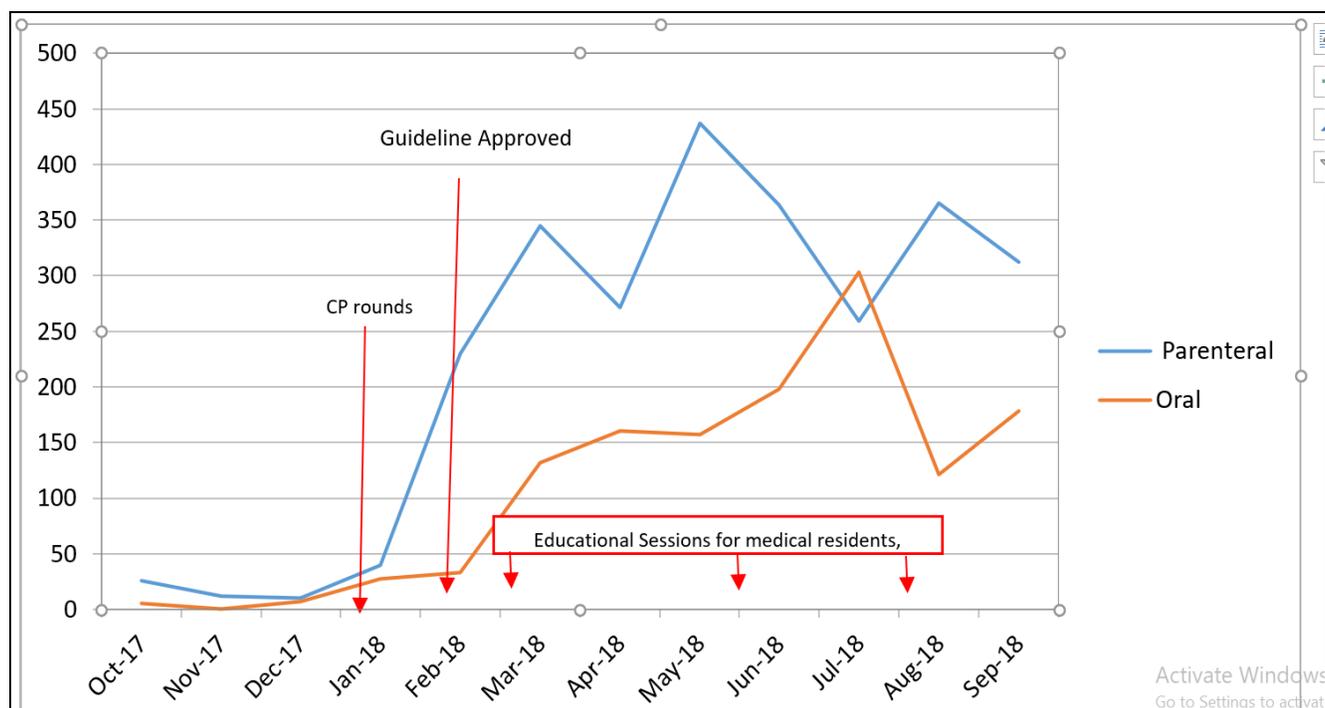


Figure 2. Graphical Representation of Clinical Pharmacist Activities

Different barriers from physicians and nurses were faced during this project. Two major hindrances from the physicians were ranitidine adverse effects, i.e. thrombocytopenia and its dose adjustment in renal failure. Nurses had concerns with the increased frequency of ranitidine administration that is three times a day compared to the PPI once daily regimen. Educational sessions with nurses and physicians helped to reduce these concerns by the explanation of the rationale of selecting medication described.

The stress ulcer prophylaxis guideline was later presented in Pharmacy & Therapeutic Committee, it was recommended that this guideline should be generalized and implemented in all units of the hospital. Discussion are being carried out in different departments to review the use of stress ulcer therapy. Surgical ward has started the initiative in this regard. Furthermore, new clinical guideline seizure prophylactic for traumatic brain injury has been initiated.

Many similar kind of researches have been conducted in resourceful and developed countries where the availability of the clinical pharmacist and its financial impact is well established. [9] However, in developing countries, financial resources and availability of the clinical pharmacist is a major limitation for the implementation such services. Regardless, few

studies from Pakistan relating to clinical pharmacy practice have recently been published. These studies involved antibiotic stewardship program [10], diabetic management [11], medication adherence [7,12], and Corona Virus [13]. Like these studies, our study showed that rendering reduced hours services by a trained pharmacist would be sufficient for the implementation of the clinical guideline. Our study also showed that only review of medication order is insufficient to create medication safety environment, involvement of pharmacist with healthcare team enhances the level.

A systematic review study was conducted to analyze different strategies for reducing inappropriate use of PPI. The study identified the most common method used was the educational sessions in combination with other resources. [14] Two studies [15,16] included pharmacist however, regardless of the different strategies, none of these strategies to produce higher impact collectively. In both studies, clinical pharmacists were utilized for educational sessions, clinical rounds, and clinical guideline. A major factor that played a vital role in this was leadership. Head of surgical ICU and surgical department emphasized the role clinical pharmacist as a team member of the multi-disciplinary team and creating standardization.

Limitation

A major limitation of the study remains monitoring of the adverse effect of standardization, particular gastrointestinal bleeding and monitoring of adverse effect in particularly thrombocytopenia.

CONCLUSION

The successful development and implementation of the guideline depended mainly on multi-disciplinary team efforts and educational program. In a developing country where the presence of clinical pharmacist is rare, this is a good example for utilization of resources and standardization of clinical guideline and reducing the patient medication cost and also reducing pharmacy inventory cost. Clinical guideline allows standardization of therapy and reduces the work load.

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