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ORIGINAL ARTICLE

Physicians' Opinions of Stress Ulcer Prophylaxis: Survey Results from a Large Urban Medical Center

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Abstract
Background Stress ulcer prophylaxis (SUP) has been increasingly prescribed for patients admitted to medical wards. The knowledge, attitudes, and practices of those in the healthcare profession regarding use of SUP in medical wards are understudied.
Methods A survey consisting of closed-ended questions and multiple-choice queries was handed out during grand rounds.
Results One hundred people (39 attending physicians, 61 residents) completed the survey. More attending physicians (41 vs. 30 %) believed SUP was indicated for patients treated in a non-intensive-care medical ward ($P = 0.2357$). All residents preferred a proton-pump inhibitor (PPI) for SUP compared with 85 % of attending physicians ($P < 0.05$). Despite equal agreement that PPIs were not harmless, more attending physicians than residents agreed that using PPIs increased the risk of community-acquired pneumonia ($P < 0.05$). More residents than attending physicians agreed on the use of SUP for patients suffering from major burns and for those with liver failure. In situations of respiratory distress not requiring intubation and in cases of steroid treatment for a chronic obstructive pulmonary disease flare, more attending physicians than residents felt SUP was required. Approaching a statistically significant difference, more attending physicians than residents felt that being too busy to question SUP indication and the perception of PPIs as harmless affected decision making.
Conclusion Despite the publication of guidelines, misuse of gastric acid suppressants continues to occur, even by attending physicians. More complete understanding of the need and occasion for SUP use should result in more cautious use.

Keywords Stress · Ulcer · Prophylaxis · Proton · Pump · Inhibitor · Knowledge · Practice · Attitude

Introduction

Stress ulcer prophylaxis (SUP), intended for patients under extreme physiologic stress, has been increasingly prescribed for patients admitted to medical wards. The epidemic of excessive use of medications for stress ulcer prophylaxis not only involves the United States but is prevalent worldwide [1–7].

Stress ulcers have multiple causes including:
- increased gastric acid secretion;
- alteration of epithelial turnover;
- reduced bicarbonate and mucus formation;
- release of arachidonic acid metabolites, inflammatory cytokines, and oxygen free radicals; and
- reduction in blood flow to the gastric mucosa [8].

Although physiologic stress is, not surprisingly, high in patients needing intensive medical care, such stress levels are not likely to occur in those admitted in less acute circumstances [9].

In 1999, the American Society of Health-System Pharmacists published guidelines for SUP. Prophylaxis was indicated for ICU patients with one of the following:

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- coagulopathy (platelets <50 K, INR >1.5);
- on mechanical ventilation for >48 h;
- a history of GI ulceration or bleeding within one year of admission;
- a Glasgow coma score of ≤10;
- burns to >35 % of body surface area;
- partial hepatectomy;
- multiple trauma;
- transplantation perioperatively in an ICU;
- spinal cord injury;
- hepatic failure; and
- two or more of the risk factors sepsis, ICU stay >7 days, occult bleed lasting at least 6 days, >250 mg/day hydrocortisone [10].

Proton-pump inhibitors (PPI) are among the most commonly used medications for stress ulcer prophylaxis. Patients are often admitted to a medical ward, placed on a PPI for SUP, and continue to take such medication after discharge [11]. Given the high efficacy (onset approx. 1 h) and low toxicity of PPIs, the practice of prescribing a PPI is seemingly benign, which encourages the overuse and misuse of such medications [12, 13].

The primary objective of our survey was to assess the knowledge, attitudes, and practices of clinicians in our institution regarding use of SUP on the medical ward and to identify potential factors implicated in their prescribing behavior.

Methods: Survey Design and Administration

The study was approved by the Institutional Review Board of SUNY Downstate Medical Center. The survey was anonymous and the requirement for written informed consent was waived. It was pre-tested and reviewed by a panel of gastroenterology fellows from SUNY Downstate Medical Center. Results were used to modify the survey instrument for clarity, lack of bias, and accuracy. Closed-ended questions were used, including five-point Likert scales (1 = strongly agree to 5 = strongly disagree; 1 = highly unlikely to 5 = strongly likely) and multiple-choice queries. Simple clinical vignettes were constructed to enable assessment of prescribing practices. Surveys were then distributed by a single investigator (C.P.K.) to attending physicians and house staff residents who attended weekly medicine ground rounds. Data were recorded in an electronic spreadsheet (Microsoft Excel, Microsoft, Redmond, WA, USA).

Data Analysis

Data obtained by use of multiple-choice questions were expressed as proportions. Chi-squared analysis was performed for categorical variables and Fisher's exact test when cell counts were expected to be less than five. An alpha of <0.05 was regarded as significant for all the analysis. All statistical analysis was done in SAS v.9.3.

Results

One hundred people (39 attending physicians, 61 residents) completed the survey.

Belief in and Provision of SUP

Different responses with regard to belief in and provision of SUP on the medical ward are listed in Table 1. One third of respondents from each group learned of SUP from other physicians. Numerically, more attending physicians responded affirmatively that SUP was indicated for patients treated in

Table 1 Responses to opinions on SUP

	Residents ($n = 61$)	Attending physicians ($n = 39$)	P Value
Agreed that SUP is indicated for patients on the medical ward	18 (30 %)	16 (41 %)	0.2357
Preferred PPIs for SUP	61 (100 %)	33 (85 %)	0.0027
Agreed that PPIs were harmless	9 (15 %)	6 (15 %)	0.9314
Admitted using SUP themselves on the medical ward either often or always	27 (44 %)	14 (36 %)	0.4068
Learned of SUP from other physicians	24 (39 %)	14 (36 %)	0.7291
Agreed that most patients are started on stress ulcer prophylaxis on admission to the medical ward	29 (48 %)	22 (56 %)	0.3868
Agreed that medications begun on admission as stress ulcer prophylaxis are often included in discharge medications	17 (28 %)	17 (44 %)	0.1055
Agreed that PPIs are associated with increased risk of community-acquired pneumonia	10 (16 %)	16 (41 %)	0.0062
Agreed that patients inquire why they are receiving an acid suppressant medication during their hospitalization	2 (3.3 %)	3 (8.7 %)	0.3233

SUP, stress ulcer prophylaxis; PPI, proton-pump inhibitor

Table 2 Responses to clinical scenarios

	Residents ($n = 61$)	Attending physicians ($n = 39$)	P Value
Agreed that SUP was required for a 47 year-old woman admitted to the ICU for burns to >35 % of BSA	56 (92 %)	32 (82 %)	0.2069
Agreed that SUP was required for a 39 year-old male with PCP admitted for respiratory distress	24 (39 %)	20 (51 %)	0.2408
Agreed that SUP was required for a 52 year-old chronic user of alcohol admitted for abdominal pain and jaundice who, on hospital day #4, was becoming somnolent and whose INR increases from 1.0 to 2.3	50 (82 %)	31 (79 %)	0.7578
Agreed that SUP was required for a 75 year-old male veteran who was treated with prednisone 60 mg for a COPD exacerbation	34 (56 %)	28 (72 %)	0.1066

SUP, stress ulcer prophylaxis; ICU, intensive care unit; BSA, body surface area; PCP, pneumocystis carinii pneumonia; INR, international normalized ratio; COPD, chronic obstructive pulmonary disease

Table 3 Responses to influences in decision-making

	Residents ($n = 61$)	Attending physicians ($n = 39$)	P Value
Agreed that an attending physician's request for SUP influenced decision making	41 (67 %)	22 (56 %)	0.2751
Agreed that fear of an unfavorable evaluation influenced decision making	18 (30 %)	11 (28 %)	0.8886
Agreed that being too busy to question indication of SUP was influential in decision making	16 (26 %)	17 (44 %)	0.0717
Agreed that the perception of PPIs as harmless influenced decision making	8 (13 %)	11 (28 %)	0.0606

SUP, stress ulcer prophylaxis; PPI, proton-pump inhibitor

a non-intensive care medical ward. Furthermore, although fewer attending physicians admitted using SUP for such patients either often or always, more of them believed SUP was being initiated at the time of admission and being continued at the time of hospital discharge. All residents preferred a proton-pump inhibitor (PPI) for SUP compared with 85 % of attending physicians ($P < 0.05$). Despite equal agreement that PPIs were not harmless, more attending physicians than residents agreed that using PPIs increased the risk of community acquired pneumonia ($P < 0.05$). Residents and attending physicians rarely agreed that patients would inquire why SUP was being used during their hospitalization.

Clinical Vignettes

Table 2 presents responses to four clinical scenarios. Although none of the differences was statistically significant, more residents than attending physicians agreed with the use of SUP for patients suffering from major burns and for those with liver failure. In situations where SUP was not indicated (respiratory distress but not intubated; steroid treatment for a chronic obstructive pulmonary disease flare), more attending physicians than residents felt SUP was required.

Factors Influencing Decision Making

Responses to factors influencing the provision of SUP are listed in Table 3. Most resident and attending physician responders agreed that an attending physician's request for SUP influenced their decision making, though one third from each group felt fear of an unfavorable evaluation from an attending physician would be as influential. Approaching statistical significance, more attending physicians than residents felt that being too busy to question SUP indication and the perception of PPIs as harmless influenced their decision-making.

Discussion

Worldwide, stress ulcer prophylaxis continues to be misused. In one Italian study, 46.8 % of patients had received acid-suppressive therapy; of these, 68 % had an inappropriate indication for the medication [3]. Similarly, in Eire, 68 % of patients were given a PPI without a valid indication [5]. In a Canadian retrospective chart review over 3 months, 90 % of those taking acid suppressants had an inappropriate indication [7]. Thirty-eight percent of the time the inappropriate use was noted to be for SUP or steroid-associated prophylaxis. We found that almost half of attending physicians believed SUP was indicated for patients in a non-critical care setting.

That use of SUP for patients started at the time of admission and continued after discharge was acknowledged, particularly by attending physicians. Nardino et al.

found that 55 % of patients were discharged on acid suppressants and that 65 % of these patients did not have an acceptable indication for its use [14]. In addition, reluctance to change medication previously started by another clinician, as occurs when medical teams change rotations and hence responsibility for patients' care, was regarded as a potential cause of inappropriate utilization of acid suppressant medications. In a randomized non-blinded clinical trial of patients admitted to the medical ward at a VA hospital in Indianapolis, disinclination to discontinue therapy initiated by another practitioner was identified as a factor for inappropriate continuation of therapy [15].

It is unknown why more attending physicians than residents felt SUP was indicated for patients treated on the medical ward, but may reflect variations in training practices over time.

Interestingly, although all residents and most attending physicians favored PPIs for SUP, most respondents from both groups felt that such medications were not benign. Knowledge of adverse effects of PPIs is incomplete, with significantly fewer residents knowing of the heightened risk of community-acquired pneumonia. For example, a case control study from the Netherlands calculated an adjusted relative risk of community-acquired pneumonia of 1.89 (95 % CI 1.36–2.62) for those using a PPI [16]. This increased risk occurs within the first 12 months of use, and can be as soon as two days [17, 18]. Oddly enough, the perception of PPIs as harmless is still influential in decision making, with close to significantly more attending physicians responding in the affirmative.

By constructing scenarios, we tested respondent knowledge of correct indications. Patients with significant burns across the body undisputedly require SUP [19, 20]. Our study population agreed, although, surprisingly, fewer attending physicians answered in the affirmative.

Half of attending physicians would have given SUP to a patient being treated for pneumocystis carinii pneumonia, again revealing knowledge was inadequate. SUP is not indicated merely for patients in respiratory distress or even those intubated for less than 48 h [21]. Hepatic failure and coagulopathy, on the other hand, are indications for SUP [21, 22]. In such scenarios, the proportion in agreement was almost identical for residents and attending physicians.

Because steroids reduce mucus production by the stomach lining, predisposing one to stress ulcers, many clinicians will use SUP, with most of our study's attending physicians holding a similar belief [23, 24]. However, this practice is not scientifically supported. In a rodent model, it has been observed that glucocorticoids had a gastroprotective effect, including maintenance of the gastric mucosal blood flow and mucus production and attenuation of the enhanced gastric motility and microvascular permeability [25]. In another study, adrenalectomies were performed on rats, creating a corticosterone-deficient state which was found to delay healing of gastric erosion and chronic gastric ulcers [26]. This effect was reversed by corticosterone replacement. In a 1994 meta-analysis of 93 randomized, double-blind, controlled trials of administered steroids with reported complications, 9/3267 (0.3 %) patients in the placebo group versus 13/3335 (0.4 %) in the steroid group developed peptic ulcers ($P > 0.05$) [27].

With respondent groups of small size, failure to realize statistical significance, although close in some situations, was obviously a limitation of this study. Furthermore, our assessment of practice and attitudes towards SUP reflected the opinions from one institution and may thus lack generalizability for academic institutions from other geographic regions of the United States and for non-academic healthcare settings.

The practice of SUP when not indicated not only exposes patients to unnecessary medication side effects but also has important economical implications. A study from 2006 calculated that unnecessary SUP given to patients cost $111,791 annually, with more than half of the cost arising from acid suppressants included at the time of discharge [28].

In conclusion, despite the publication of guidelines, misuse of gastric acid suppressants continues to occur, as demonstrated by the opinions of respondents in our survey. Knowledge of correct indications for SUP was lacking, particularly for attending physicians. This is particularly poignant, because almost one-third of our resident respondents admitted to learning SUP from other physicians. Supervising attending physicians should be mindful of their influence on trainees and maintain an evidence-based approach to patient care. Educational intervention targeting physicians has been proved to curtail misuse of SUP [29–31]. In an approach starting with attending physicians, more complete understanding of the need and occasion for SUP should result in more cautious use.

Conflict of interest None

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