VANDERBILT UNIVERSITY MEDICAL CENTER

Guideline: Burn Stress Ulcer Prophylaxis Guidelines

Revised Date: March 2023
Review Date: March 2025

Content Experts
Anne Wagner, MD Robel Beyene, MD Sarah Cogle, PharmD

Table of Contents

I. Background

Swan was the first to note the relationship between burn injury and GI mucosal damage in 1823.[11] This was followed by Curling in 1842 who reported on acute duodenal ulcers (Curling's Ulcers) in 10 patients with large burns.[12] Burn injuries increase the risk of GI ulceration and mucosal damage early after the injury has occurred. Endoscopy has shown gastric mucosal irritation within hours of the burn injury. Burn shock leads to an associated splanchnic hypoperfusion and gastric mucosal ischemia leading to mucosal atrophy, decreased capacity to neutralize hydrogen ions and impaired mucosal repair. In 1970, Puritt et al. reported the incidence of "Curling's ulcer to be as high as 40% in patients with burns over 70% TBSA.[13]

Currently, both an increase in the depth of a burn and an increased TBSA are associated with a higher occurrence of both gastric and duodenal ulceration. Duodenal ulcers appear to happen more often in patients with large TBSA and are more frequently associated with melena than other types of ulcers. Since the advent of the use of prophylactic ulcer therapies and early enteral nutrition the incidence of ulcers and mortality secondarily to them (1.9% mortality) has significantly decreased. Published rates in the development of upper GI ulceration range from 0.4% - 10%. A study by Yenikomshian, et al. found that in their patient population, women developed ulcers at almost double that for men (14% versus 8%).[14] In addition, for those patients that do develop ulcers, the incidence of significant bleeding has decreased by 50%.[14]

The most definitive indications for stress ulcer prophylaxis include:

1) Traumatic brain injury
2) Major burn injury
3) Mechanical ventilation (>48 hrs)
4) Coagulopathy (INR >1.5 or platelet count < 50,000).

Other risk factors for GI bleeding in the ICU setting include alcoholism, acute hepatic failure, sepsis, acute renal failure, trauma, prolonged NSAIDs, and high dose steroids (defined as equivalent of hydrocortisone 250 mg/day.

Literature indicates that H_2 receptor antagonists (H2RA) and proton pump inhibitors (PPI) are equally effective in reducing stress-related gastrointestinal bleeding. Meta-analyses describing superiority of PPIs are controversial. Per the EAST Practice Management Guidelines either H2RAs or PPIs may be used for stress ulcer prophylaxis in critically ill patients.

Some data have shown that early EN is effective in the prevention of stress related ulcer formation and bleeding in critically ill patients, though definitive data with contemporary SUP practices are lacking. It has the added benefit of not increasing the incidence of adverse effects encountered in the use of PPIs and H2Ras. Intolerance to enteral feeding has been hypothesized to be the first manifestation of impending ulcer formation/upper GI bleeding. Both PPIs and H2Ras act by blocking acid secretion and thus increasing the pH within the gastric lumen. This leads to loss of the protective environment of the stomach which allows bacteria to flourish. Potential complications from stress ulcer prophylaxis include the development of pneumonia, Clostridium difficile infection, diarrhea,

osteoporotic hip fracture and decreased bioavailability of medications such as clopidogrel (7). Additionally, there is a significant cost burden to the healthcare system due to routine use in patients without appropriate indications.

Numerous analyses describe the role of enteral nutrition (EN) in the prevention of stress-related gastrointestinal bleeding. EN prevents mucosal ischemia and ulceration by increasing splanchnic blood flow and increasing gastric pH (to a lesser degree). Feeding directly into the GI tract has the additional benefit of maintaining GI mucosal health and preventing bacterial translocation.[15] Pre- and post-pyloric EN should provide some degree of protection against stress-related mucosal ulceration.[14] However, data describing EN as the sole stress ulcer prophylaxis in hypersecretory states, including major head injury and burn patients, is lacking.

II. Indications for Prophylaxis

A. High Risk Patient:
- All patients to receive prophylaxis.

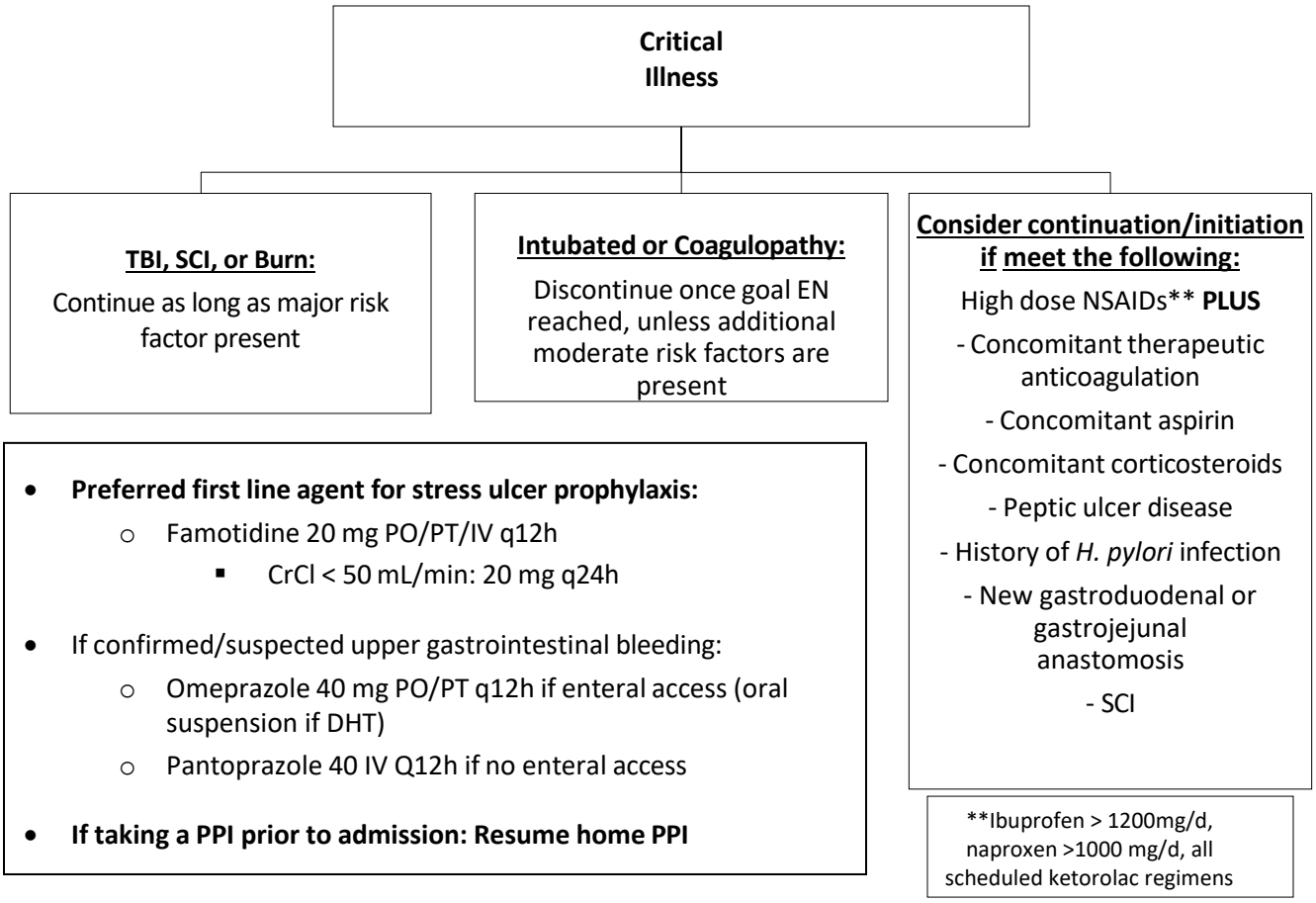
B. Moderate Risk Patient:
- Consider prophylaxis.

C. Low Risk Patient (≤1 moderate risk factor present)
- NO prophylaxis

HIGH RISK:
- TBSA >20% *prior to complete surgical coverage and excision of burns*
- Mechanical ventilation >48 hours
- Coagulopathy (plt<50,000 or INR >1.5 or PTT>60)
- Traumatic brain injury
- Spinal cord injury (SCI)
- History of previous gastrointestinal hemorrhage
- Current outpatient PUD treatment
- High dose, prolonged steroid therapy (equivalent to ≥hydrocortisone 250 mg/day)
- Intolerance to enteral nutrition

MODERATE RISK: (≥ 2 risk factors present)
- TBSA <20% *prior to complete Surgical coverage and excision of burns*
- Chronic NSAID or aspirin use
- Current high dose NSAID therapy (ibuprofen >1200 mg/day, naproxen >1000 mg/day, all scheduled ketorolac regimens)
- Sepsis
- Vasopressor/inotropic therapy
- New gastroduodenal or gastrojejunal anastomosis

III. Burn High Risk Prophylaxis Algorithm



*Patients with suspected/confirmed GI Bleeds should be treated with IV PPI BID initially and this protocol does not apply.

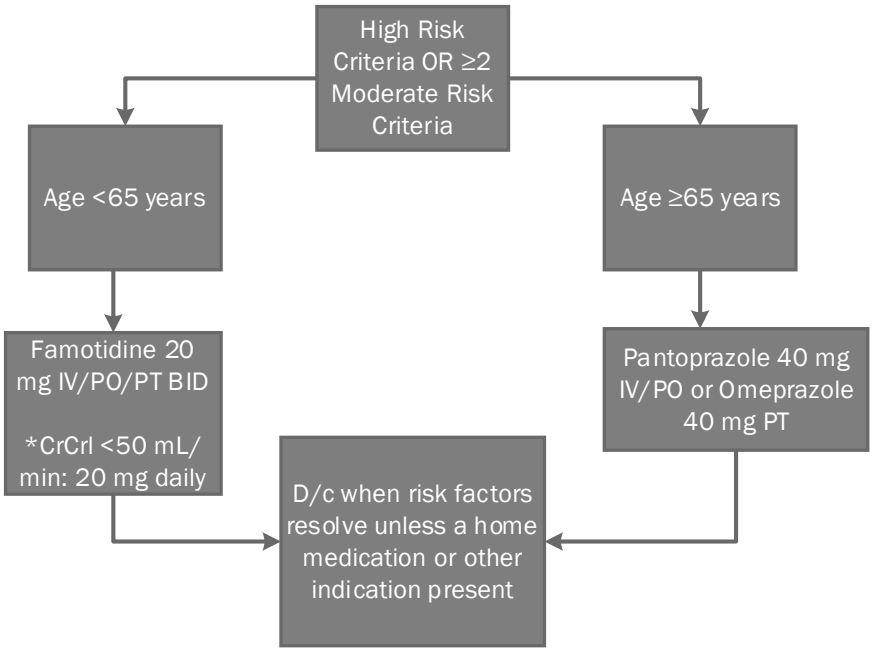
Major risk factor present:

- Continue SUP while major risk factor present.
- If major risk factor resolves, d/c (unless an appropriate continuation of a home med).

≥ 2 Moderate Risk Factors present:

- Consider SUP.
- If opting to treat, follow major risk factor recommendations.

When considering de-escalation/discontinuation of therapy – review home medication list and comorbidities to determine if patients require continuation.



1st line option (patients <65 yrs) – Famotidine 20 mg PO/PT/IV BID
1st line option (patients ≥ 65 yrs) – Pantoprazole 40 mg IV daily or Omeprazole 40 mg PO/PT daily

**If using IV formulation, change to PO/PT option when patients are taking other oral medications and tolerating EN at goal*

IV. References

1. Hurt RT, Frazier TH, McClave SA, et al. Stress prophylaxis in intensive care unit patients and the role of enteral nutrition. *J Parenter Enteral Nutr*. 2012;36(6):721-731.
2. Guillamondegui OD, Gunter OL, Bonadies JA, et al. Practice management guidelines for stress ulcer prophylaxis. Eastern Association for the Surgery of Trauma. 2008. Available at: http://www.east.org/resources/treatment-guidelines. Accessed, May2013.
3. Marik PE, Vasu T, Hirani A, Pachinburavan M. Stress ulcer prophylaxis in the new millennium: a systematic review and meta-analysis. *Crit Care Med*. 2010;38:2222-2228.
4. Lin PC, Chang CH, Hsu PI, Tseng PL, Huang YB. The efficacy and safety or proton pump inhibitors vs histamine-2 receptor antagonists for stress ulcer bleeding prophylaxis among critical care patients: a meta-analysis. *Crit Care Med*. 2010;38:1197-1205.
5. Alhazzani W, Alenezi F, Jaeschke RZ, Moayyedi P, Cook DJ. Proton pump inhibitors versus histamine 2 receptor antagonists for stress ulcer prophylaxis in critically ill patients: a systematic review and meta- analysis. *Crit Care Med*. 2013;41:693-705.
6. Liu Y, Li D, Wen, A. Pharmacologic prophylaxis of stress ulcer in non-ICU patients: A systematic review and network meta-analysis of randomized controlled trials. *Clinical Therapeutics*. 2020;42(3); 488-498.
7. Marker M, Perner A, Wettersley J, et al. Pantoprazole in patients at risk for gastrointestinal bleeding in the ICU. *N Engl J Med*. 2018;379(2): 199- 208.
8. Gwee K, Goh V, Lima G, et al. Coprescribing proton-pump inhibitors with nonsteroidal anti-inflammatory drugs: risks versus benefits. *Journal of Pain Research*. 2018:11; 361-374
9. Swan J. Case of severe burn. *Edinburgh Med J.* 1823;19:344.
10. Curling TB. On acute ulceration of the duodenum, in cases of burn. *Med Chir Trans.* 1842;25:260–81.
11. Pruitt BA, Jr, Foley FD, Moncrief JA. Curling's ulcer: a clinical-pathology study of 323 cases. *Ann Surg.* 1970;172:523–39.
12. Choi YH, Lee JH, Shin JJ, Cho YS. A revised risk analysis of stress ulcers in burn patients receiving ulcer prophylaxis. Clin Exp Emerg Med. 2015 Dec 28;2(4):250-255. doi: 10.15441/ceem.15.076. PMID: 27752605; PMCID: PMC5052912.
13. Haig Yenikomshian, BS, Matthew Reiss, MD, Reza Nabavian, MD, FACS, Warren Louis Garner, MD, FACS, Gastric Feedings Effectively Prophylax Against Upper Gastrointestinal Hemorrhage in Burn Patients, *Journal of Burn Care & Research*, Volume 32, Issue 2, March-April 2011, Pages 263–268, https://doi.org/10.1097/BCR.0b013e31820aafe7
14. Gottschlich MM, Jenkins ME, Mayes T, Khoury J, Kagan RJ, Warden GD. The 2002 Clinical Research Award. An evaluation of the safety of early vs delayed enteral support and effects on clinical, nutritional, and endocrine outcomes after severe burns. J Burn Care Rehabil. 2002 Nov-Dec;23(6):401-15.
15. Raff T, Germann G, Hartmann B. The value of early enteral nutrition in the prophylaxis of stress ulceration in the severely burned patient. Burns. 1997 Jun;23(4):313-8. doi: 10.1016/s0305-4179(97)89875-0. PMID: 9248640.
16. Reynolds PM, MacLaren R. Re-evaluating the utility of stress ulcer prophylaxis in the critically ill patient: a clinical scenario-based meta-analysis. *Pharmacotherapy*. 2019;39(3):408-420.
17. American Geriatrics Society 2019 updated AGS Beers Criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2019;67:674-694.
18. ASHP therapeutic guidelines on stress ulcer prophylaxis. *Am J Health Syst Pharm*. 1999;56:347-79.