

**Title:** CHEMOPROPHYLAXIS OF INCREASED GASTRIC ACIDITY AND BLEEDING IN BURNED PEDIATRIC PATIENTS

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**Introduction.** Acute gastric erosion and bleeding due to increased acidity is a serious complication following acute thermal injury that demands effective prophylactic control. The efficacy of the commonly used therapeutic agents used to prevent increased gastric acidity has not been evaluated in the pediatric burned population or in similar critically ill pediatric patients.

**Methods.** We performed a retrospective analysis in burned children to assess the therapeutic effectiveness of the control of gastric acidity and bleeding of histamine- $H_2$  receptor antagonist cimetidine (CIMET) administered alone intravenously at a dose of 5-10 mg/kg every 6 hours or antacid (ANTAC) alone 15-30 ml administered every 3 hours or a combination of the two drugs (CIMANT) administered in the same frequency and dose described above. The medical records of the 20 most recent patients with a total body surface area burn greater than 40 percent were selected. The mean ( $\pm$ SD) age of CIMET, ANTAC and CIMANT groups were  $6.3 \pm 3.2$ ,  $5.8 \pm 3.7$  and  $7.5 \pm 4.6$  years respectively and the mean ( $\pm$ SD) body surface area burn  $65.2 \pm 22.9$ ,  $79.8 \pm 20.0$  and  $71.6 \pm 20.8$  percent respectively. All patients had a nasogastric tube and in each patient the gastric pH, the presence of frank or occult blood and the volume of residue for that hour were assessed starting 1-2 hours after a dose until the administration of the next dose of drug(s). The study was begun as early as the first day post burn and was terminated as soon as tube feeding was commenced. Multiple observations were made in the same patient throughout the day. A total of 409 observations were made in the 20 patients in the three groups. The mean ( $\pm$ SD) time after burn during which these observations were made was  $9.1 \pm 8.9$ ,  $12.3 \pm 11.2$  and  $11.7 \pm 9.4$  days for CIMET, ANTAC and CIMANT groups respectively. The success of drug therapy was evaluated in terms of gastric pH and a value  $>3.5$  was designated a satisfactory response to drug. Chi square analysis was performed to compare the three groups.

**Results.** The age, size of burn and time of study after burn were not significantly different in the three groups. However, as indicated in the table, the number (percent) of observations with pH  $\leq 3.5$  was significantly greater in the CIMET group compared to the other two groups. In addition, it is important to note that of the patients who had pH  $\leq 3.5$ , the percent of patients who had positive guaiac was significantly higher in the CIMET group relative to the other two groups. It is also evident from the study

that the combination of the two drugs (CIMANT) did not result in improved effectiveness over antacid therapy (ANTAC) alone.

**Discussion.** Both cimetidine and antacids have been proven useful in the treatment of increased gastric acidity in critically ill patients.<sup>1</sup> The advantage of the former is that it can be administered intravenously and thus the danger of particulate lung aspiration of drug does not exist, particularly in patients with intestinal ileus. Following the shock phase, burned patients have an increased cardiac output<sup>3</sup> and increased glomerular filtration rate<sup>4</sup> resulting in rapid excretion of drugs eliminated via the kidneys.<sup>4,5</sup> Similarly, the decreased effectiveness of cimetidine may be due to subtherapeutic plasma levels of drug resulting from rapid elimination of drug via kidneys. We conclude that (i) presently used chemoprophylaxis for increased gastric acidity and bleeding is only partially effective in critically ill burned pediatric patients, (ii) dosage schedules for chemoprophylaxis, particularly for cimetidine, need to be further defined in view of the altered hemodynamics in these patients.

	CIMET	ANTAC	CIMANT
Number of observations	146	165	98
Number with pH $\leq 3.5$	28(19.2%)*	17(10.3%)	11(11.2%)
Number with guaiac positive	16(11.0%)**	9(5.4%)	7(7.1%)
* p < 0.10		** p < 0.025	

#### References.

1. Khan F, Parekh A, Patel S, Chitkara R, Rehman M, Goyal R: Results of gastric neutralisation with hourly antacids and cimetidine in 320 intubated patients with respiratory failure, *Chest* 79:409-412, 1981
2. Taylor G, Pryce-Davis J: The prophylactic use of antacids in the prevention of acid aspiration syndrome (Mendelson's syndrome) *Lancet* 1:288-291, 1966
3. Martyn JAJ, Snider MT, Szyfelbein SK, Burke JF, Laver MB: Right ventricular dysfunction in acute thermal injury, *Ann Surg* 191:330-335, 1980
4. Loirat P, Rohan J, Bailet A, Beaufils F, David R, Chapman A: Increased glomerular filtration rate in patients with major burns and its effect on pharmacokinetics of tobramycin, *N Engl J Med* 299:915-919, 1978
5. Martyn JAJ, Matteo RS, Greenblatt DJ, Lebowitz PW, Savarese JJ: Pharmacokinetics of d-tubocurarine in patients with thermal injury, *Anesth Analg* 61:241-246, 1982