against diabetic applicants and it appears that suitably qualified people with stable diabetes are now able to train as nurses.

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Activated charcoal, emesis, and gastric lavage in aspirin overdose

It is common practice to try to prevent intestinal absorption of ingested poisons. Controversy continues about the relative effectiveness of charcoal, ipecacuanha, and lavage in salicylate overdose,[1] but no study has yet compared all three methods. This study of simulated aspirin overdose in volunteers aimed to compare the effectiveness of gastric lavage, emesis induced by ipecacuanha, and activated charcoal. We also compared how easily these procedures could be performed in a busy accident and emergency department and their effects on the volunteers.

Subjects, methods, and results

Twelve healthy volunteers aged 21-34 attended at weekly intervals. They fasted overnight, voided, and took 1·5 g aspirin (20×75 mg tablets) with 200 ml tap water. After 60 minutes each was randomly assigned to one of four regimens: control (no further treatment); ipecacuanha (30 ml syrup of ipecacuanha with 200 ml water, repeated if emesis did not occur within 30 minutes); charcoal (50 g activated charcoal (Carbomix, Penn) in 400 ml water); and gastric lavage (performed with a 30 French gauge orogastric tube, using 3 litres of tap water in 300 ml aliquots and allowing the stomach to empty under gravity between aliquots). Subjects were monitored by electrocardiography, and urine was collected for 24 hours after aspirin was given. The time taken, effects on subjects, and cost of each procedure were recorded. After hydrolysis concentrations of salicylate were measured in urine by Trinder's method. The table gives the results.

Comment

Activated charcoal has been shown to be more effective than ipecacuanha in simulated salicylate poisoning,[2] but in our study the three treatments had almost equal effects on recovery of salicylate from urine. Animal studies have shown the efficacy of charcoal in adsorbing aspirin and that charcoal and gastric lavage combined might be more effective than charcoal alone.[3] In our study the ratio of charcoal to aspirin was higher than the ratio of charcoal to drug of 10:1 recommended for the treatment of acute poisoning, but the absorption of soluble aspirin may have been too rapid to show any superior effectiveness of charcoal. Comparing treatments less than one hour after overdose, however, would have had less clinical relevance.

Lavage took considerable time, although the nurses were experienced and the volunteers cooperative. Two nurses were used for safety and comfort; with difficult patients a third is sometimes needed. As lavage may have to be scheduled when the workload permits, delays could pose problems with drugs that are rapidly absorbed or when the conscious level may deteriorate quickly. Gastric lavage produced transient discomfort related either to insertion of the tube or to its position against the pharynx but was well accepted. No after effects were reported. Ipecacuanha produced emesis in all subjects, but all reported nausea and fatigue lasting several hours after a single dose. These symptoms were not related to inappropriate dosage, repeated doses, failure of ipecacuanha to induce vomiting, or vomiting on an empty stomach (water was given with the ipecacuanha). Protracted malaise or nausea after ipecacuanha might be incorrectly ascribed to the effects of the toxic substance ingested. Activated charcoal was easily prepared. No volunteer took more than 10 minutes to drink it, and no after effects were observed or reported. Supervision by a nurse was not required after its administration.

When several treatments are equally effective it seems sensible to choose the one that is most convenient to administer, least invasive, and potentially least harmful to the patient. The costs of all three treatments are fairly low and should not influence decisions on treatment. From our observations charcoal was easiest to administer, had fewest side effects, and was preferred by most volunteers. Given in repeated doses, it may have the added advantage of shortening the elimination half time of salicylate,[4] and this has been recommended but remains unconfirmed in large overdoses.[5]

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Results of treating aspirin overdose in 12 volunteers

	Control	Emesis	Gastric lavage	Charcoal
Mean (SD) recovery of salicylate (%)*	60·3 (13·3)†	55·6 (10·0)	55·5 (8·8)	52·5 (7·0)
Mean (SD) time taken for procedure (min)		16 (5) To first emesis 23 (5) Duration‡	Preparation 12·5 (4·4) Procedure 12·0 (3·1) Cleaning up 8-10	10 (Maximum)
Mean (SD) amount recovered (ml)		303 (62) Emesis	2755 (134) Fluid	
Cost of treatment per volunteer		50p Per 30 ml dose	£7.50	£7.80
Volunteers' responses		Discomfort of vomiting; nausea and malaise for 3-6 hours in all volunteers	Discomfort during procedure; no electrocardiographic abnormalities; no after effects	No adverse effects; no vomiting

*Urine volumes were not significantly different between groups.
†$p<0·025$ Compared with treatment groups.
‡Mean (SD) number of episodes of emesis was 3·1 (1·3).