Constipation and its implications in the critically ill patient

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Background. Motility of the lower gut has been little studied in intensive care patients.

Method. We prospectively studied constipation in an intensive care unit of a university hospital, and conducted a national survey to assess the generalizability of our findings.

Results. Constipation occurred in 83% of the patients. More constipated patients (42.5%) failed to wean from mechanical ventilation than non-constipated patients (0%), P<0.05. The median length of stay in intensive care and the proportion of patients who failed to feed enterally were greater in constipated than non-constipated patients (10 vs 6.5 days and 27.5 vs 12.5%, respectively (NS)). The survey found similar observations in other units. Delays in weaning from mechanical ventilation and enteral feeding were reported by 28 and 48% of the units surveyed, respectively.

Conclusions. Constipation has implications for the critically ill.

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Methods

Ethical approval for the audit was obtained from the Local Research Ethics Committee. The ICU is a mixed medical/surgical adult unit. All patients admitted to the ICU over a 3-month period were assessed for suitability for entry into the study. Patients were entered into the study if they required mechanical ventilation and were expected to survive and stay in the ICU for more than 3 days. Patients were excluded if they had recent bowel surgery or were not expected to live or stay more than 3 days in the ICU. Sedatives and opioids were given according to a standard protocol for sedation and pain relief. Enteral feeding and weaning from mechanical ventilation were similar in all patients, based on a standard protocol. Enteral feeding by a nasogastric tube was attempted in all patients.

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Administration rate was increased gradually from 20 ml h⁻¹ to the appropriate rate for the individual patient and the advice of the Dietician attached to the ICU.

Constipation was defined as ‘failure of the bowel to open for three consecutive days’. We recorded patients’ age, sex, APACHE II score, length of stay in ICU (LOS), diagnosis and outcome, and the incidence and duration of constipation episodes. We noted the ability of patients to enteral feed or wean from mechanical ventilation. Failure to feed was defined as stopping of enteral feeding because of large gastric aspirates (when the volume of fluid aspirated after a 4–6 h feeding period, which was tried again after a rest period of 4–6 h, was more than 50% of the volume administered) or repeated vomiting. Metoclopramide 10 mg and, if unsuccessful, erythromycin 125 mg were given intravenously if poor upper intestinal motility was suspected.

Weaning from mechanical ventilation was started when the cause or disease process necessitating mechanical ventilation had significantly improved or resolved; gas exchange was adequate (arterial oxygen tension >8 kPa and inspired oxygen fraction <0.5), sedation was being reduced with appropriate neurological and muscular status, cardiovascular function was stable, and the patient was considered ready to wean. Failure of weaning (to reduce or discontinue ventilatory support or a trial of spontaneous breathing) was recorded if a patient had any of the following: ventilatory frequency more than 35 bpm, arterial oxygen saturation less than 90%, heart rate more than 140 beats min⁻¹ or less than 20% sustained increase or decrease in heart rate, or systolic arterial pressure more than 180 mm Hg, or agitation, anxiety, or sweating.

Mann–Whitney and Fisher’s exact tests were used for statistical analysis.

The questionnaire for the national survey (Appendix) was designed to investigate four areas of interest: (i) the characteristics of the ICU, such as the type of unit and the number of admissions, patients’ age and APACHE II score; (ii) if constipation was a problem in the ICU and if the unit had a protocol for its management; (iii) the incidence of constipation and its prophylaxis in ICU; (iv) complications of constipation. The survey was sent to 250 ICUs in the UK.

**Results**

In 3 months, 158 patients were admitted to the ICU. We excluded 110 patients: 91 were admitted for less than 3 days; 12 had recent bowel surgery and the records of seven patients were not completed. Forty-eight patients (14 surgical and 34 medical cases) fulfilled the inclusion criteria. Diagnostic categories can be seen in Table 1. Twenty-three patients were male and 25 were female. Of the 48 patients, eight (17%) had normal bowel action (Group I) and 40 (83%) were constipated for between 4 and 14 days on one or more than one occasion (Group II) (Table 2). Eleven of the constipated patients (27%) were surgical and 29 (73%) were medical. The incidence of constipation in surgical and medical patients was similar (78 vs 85%, NS). No patient had complications from constipation.

There were no significant differences between constipated and non-constipated patients in gender (21 vs 2 males, 19 vs 6 females), median age (62 (range 21–81) vs 71 (21–80) yr) or APACHE II score (26 (range 10–31) vs 26 (19–32), respectively (Table 2). In Group I, the dose range of alfentanil and propofol were 1–3 and 50–250 mg h⁻¹ respectively, compared with 1–4 and 10–250 mg h⁻¹, respectively, in Group II. The doses given to each patient were difficult to calculate because of frequent dose changes. Alfentanil was given to a similar proportion of constipated and non-constipated patients, that is 29 out of 40 and six out of eight, respectively. Mortality did not differ between constipated and non-constipated patients (15 out of 40 and one out of eight respectively). The duration of ICU stay and the number of patients in whom enteral feeding failed was greater with constipation (10 (4–80) vs 6.5 (5–13) days) and (11 (27.5%) vs 1 (12.5%) patients, respectively) (Table 2). This was not significant. A significantly greater number of constipated patients failed to wean from mechanical ventilation (17 out of 40 vs 0 out of 8 patients, respectively, P<0.05).

The response rate to the survey was 57% (143 replies). Only 14% were specialized ICUs, the remainder (86%) were general units. Forty-eight units admitted more than 400 patients, 74 units admitted between 200 and 400, and 14 admitted less than 200 patients per year. The rate was not known in the remaining seven units. Median age and APACHE II score were 60 yr (range 45–76) and 18 (8–29), respectively.

Only 16 of the 143 units had protocols for enteral feeding. Although 75 of the units considered constipa-
Constipation is defined as infrequent or difficult defecation caused by decreased motility of intestine. As a result, faeces remain in the colon for prolonged periods of time, leading to water absorption and hardening of stool. The size, consistency, and ease of passage of stool may be additional criteria for assessing bowel function. Difficulty during defecation is highly subjective. In the sedated critically ill this is difficult to ascertain. Stool weight and consistency is difficult and unpleasant to measure and a potential infection risk. Bowel frequency, however, is easily measured. Constipation defies precise definition. Public surveys suggest that constipation is a frequency of defecation of twice weekly or less. At least 99% of the healthy population range from three bowel movements per week to three bowel movements per day. Critically ill patients require time to stabilize their condition. Time is also needed to establish enteral feeding in the critically ill. Three days to stabilize a patient and to establish enteral feeding is a pragmatic definition of constipation, which is reasonable, practical, and workable. The APACHE II score and duration of admission of the patients in this study were similar to the overall admissions to our ICU.

If enteral feeding were not given, more of our patients could have become constipated. However, enteral feeding was attempted in all patients and only 11 patients out of 40 with constipation failed to feed. The incidence of constipation, however, in this study was great (83%) despite excluding patients who had recent bowel surgery. This incidence may have been because our unit did not have a protocol for the management of constipation, but both constipated patients (26 cases) and non-constipated patients (4) had bowel care in the form of laxatives and prokinetic agents. We know of only one other study in intensive care patients, which reported an incidence of constipation of 16%. The study was a multicentre trial of enteral nutrition and constipation was defined as ‘the need for treatment according to the treating physician’s criteria for constipation’. In our study patients were treated similarly according to standard protocols for feeding, weaning from mechanical ventilation, sedation, and cardiovascular support. Fluid and electrolyte balance was measured daily and promptly treated, and the patients were haemodynamically stable.

The critically ill patient may become constipated for several reasons. Sedatives, particularly opiates, can decrease gut motility, but we found similar use of these agents in patients with and without constipation. Immobility, dehydration, lack of fibre in diet, and factors such as lack of access to appropriate facilities can also lead to constipation. In addition, critically ill patients cannot mobilize to the toilet, respond to the urge, or strain to defecate.

Constipation can cause abdominal distension, vomiting, restlessness, gut obstruction, and perforation. It is associated with fatal pulmonary embolism. We conducted this study partly because two patients in our unit developed large bowel perforation because of constipation despite attempts to alleviate the problem. The small size of the study caused by limiting the duration of the study to 3 months, may explain the lack of significance in LOS and failure to feed in the constipated patients, and the similar mortality. The high incidence of constipation that we found persuaded us to stop the study and start a treatment regime, which was set up with the help of the gastroenterologists.

We have noted that 42% of constipated patients failed to wean from mechanical ventilation, which was significantly more than in the non-constipated patients. Other factors may account for failure to wean, but weaning was protocol driven and clinically appropriate. A weaning protocol reduces the duration of mechanical ventilation and increases the probability of weaning. Distension, discomfort, and restlessness from constipation could explain failure to wean. This failure could be the inability of the ventilatory muscle function to cope with increased workload caused by distension from constipation. Patients who failed to wean had objective criteria for stopping a weaning trial such as

| Table 3 Results of survey of constipation in 143 intensive care units (n (%)) |
|-------------------------|------------------|------------------|
| Constipation            | Yes              | No               |
| Is a problem            | 75 (52.5)        | 68 (47.5)        |
| Guideline used          | 5 (3.5)          | 138 (96.5)       |
| May delay weaning from ventilators | 40 (28)         | 103 (72)         |
| May delay enteral feeding | 69 (48.3)       | 74 (51.7)        |
| May delay discharge     | 26 (18.2)        | 117 (81.8)       |

| Table 4 Results of survey of enteral feeding and method of prophylaxis against constipation by different units (n (%)) |
|---------------------------|------------------|------------------|
| Method                    | Routine (%) Yes No | As required (%) Yes No |
| Early enteral feeding     | 121 (84.6) 22 (15.4) | 10 (7) 133 (93) |
| Bulk forming laxative     | 3 (2.1) 140 (97.9) | 22 (14.4) 121 (84.6) |
| Stimulant laxative        | 12 (8.4) 131 (91.6) | 50 (35) 93 (65) |
| Osmotic laxative          | 14 (9.8) 129 (90.2) | 79 (55.2) 64 (44.8) |
| Faecal softener           | 3 (2.1) 140 (97.9) | 30 (21) 113 (79) |
| Prokinetic agent          | 21 (14.7) 122 (85.3) | 76 (53.1) 67 (46.9) |
rapid shallow breathing, which is a good indicator of weaning failure.\textsuperscript{16} The response to the survey was modest. Nevertheless, over 140 ICUs responded. The survey confirms a high prevalence of constipation in critically ill patients, with little attention to large bowel dysfunction. The definition of constipation in our survey was kept simple to encourage adequate responses. Many units used several types of laxatives (Table 4), but 8% of the units did not use any prophylaxis. Few ICUs (26.6\%) involved other specialties to address the problem. Constipation does not always respond to a particular laxative, and osmotic laxatives (such as lactulose), which were the most commonly used laxatives in the survey, can cause more distension and discomfort,\textsuperscript{17} perhaps making weaning from mechanical ventilation more difficult. Laxative agents, with an osmotic action, may be harmful in the critically ill as they can affect fluid balance.\textsuperscript{17}

Constipation delayed enteral feeding in nearly 50\% of the units surveyed. Some ICUs reported delayed weaning from mechanical ventilation, and even discharge from intensive care, because of constipation. This may delay the patient recovery. Constipation can also indicate colonic pseudo-obstruction, which can cause gut perforation and peritonitis, and requires specific investigations and management.\textsuperscript{18} The lack of involvement of gastroenterologists (in nearly 75\% of ICUs surveyed) in managing this condition is a matter of concern. The management of constipation may be given low priority in the acute care of the critically ill patient, but persistent constipation could delay progress, cause debilitation and increase length of stay. Guidelines to prevent, detect, and manage constipation in the critically ill are needed. Further investigation of the condition, its aetiology and management is warranted.

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References
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15 Kollef MH, Kollef RA. Pulmonary embolism associated with the act of defecation. Heart Lung 1993; 20: 451–4


17 Osmotic laxatives. In: British National Formulary, number 34, 1997; 51