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# The nursing management of diarrhoea and constipation before and after the implementation of a bowel management protocol

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Abstract:- Intensive care unit (ICU) patients frequently suffer problems associated with both diarrhoea and constipation. Strategies to optimise the management of these conditions need to focus on improving the communication between staff and ensuring effective treatment is implemented. The team involved in this study developed a Bowel Management Protocol (BMP). The effect of this BMP on the documentation of assessment and management of diarrhoea and constipation was evaluated using a quasi-experimental research design.

Data were collected via a retrospective audit of medical records. Two groups of patient records were randomly sampled. The records of 60 patients who were admitted to ICU in the 6 months before the introduction of the BMP were accessed together with the records of 60 patients admitted in the 6 months following the introduction of the BMP. Data were collected regarding patient demographics and the assessment and management of bowel function before and after BMP introduction.

The results indicated that a BMP improved documentation of the assessment of bowel function. In addition, there was an improvement in the documentation of nursing intervention in the presence of constipation and diarrhoea. These results have to be interpreted with caution because, despite random sampling over two 6 month periods, there were statistically significant differences in age, length of stay, method of feeding and medical diagnosis between the two groups. Further research into the effectiveness of using a BMP is recommended.

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#### INTRODUCTION

There is relatively little literature specifically related to bowel activity and associated problems in critically ill patients. Discussion and research on these topics has tended to concentrate on the nursing problems associated with diarrhoea rather than constipation. Indeed, one group of authors asserted that "Constipation *per se* is not a common ICU problem ... the most common problem in the ICU is diarrhoea".

This statement, however, does not appear to be based on evidence. In the literature over the last 9 years, articles on diarrhoea <sup>2,9</sup> are more numerous than those on constipation <sup>10,14</sup> and those on constipation primarily discuss constipation as a side effect of the administration of opioids. Yet anecdotal evidence, from experienced ICU nurses, suggests that critically ill individuals may suffer problems associated with both diarrhoea and constipation.

The team involved in this study, therefore, decided to develop and evaluate a Bowel Management Protocol (BMP) that could be used in the critical care environment to help identify and then improve the management of diarrhoea and constipation in ICU patients.

#### LITERATURE REVIEW

The common causes of diarrhoea in the critically ill are well described in the literature. latrogenic causes are most regularly described. Depending on the study, enteral feeding is cited as a major cause of diarrhoea for between 50-75 per cent of patients in receipt of this form of nutritional supplementation <sup>2,4,5,7,8,15-17</sup>. Drug administration is another possible iatrogenic cause and a wide range of drugs have been implicated including antibiotics, osmolar compounds and histamine antagonists <sup>4,5,8,15,16</sup>. Disease related causes described include pseudomembranous colitis <sup>5,8,15</sup>, hypoalbuminaemia <sup>4,5,15</sup>, immunosuppressive diseases, sepsis <sup>15</sup>, diabetes and malabsorption diseases<sup>3</sup>.

Common causes of constipation in critically ill patients are only infrequently referred to in articles directly related to ICU <sup>13</sup>. In other patient groups, commonly cited causes include spinal cord trauma <sup>18</sup>, advanced cancer <sup>11, 12, 14, 19</sup>, drugs such as opioids, diuretics, anticonvulsants and antidepressants <sup>10-12, 14, 19</sup>, a lack of both dietary fibre and exercise <sup>10, 11, 16, 20</sup> and psychological factors such as distress or loss of privacy <sup>12, 16, 19</sup>. This literature can be related to critically ill patients who frequently experience one or more of these predisposing factors.

Diarrhoea and constipation in the critically ill patient may cause both psychological and physiological problems. The psychological problems associated with both conditions include embarrassment and distress 1, 3, 5, 8, 9, 10, 12, 16. The physiological problems associated with diarrhoea include malnutrítion 3, 5, 8, 15, 17, electrolyte imbalance 3.5, 8, 15, 17, skin breakdown 5, 8, 15, 17, infection 5, 15, 17 and dehydration 8, 15, Physiological problems associated with constipation include pain 11.12, abdominal distension which may lead to bowel rupture and or obstruction 10-17, 18, nausea and vomiting with or without anorexia 1, 10, 12,18 and rectal tearing or fissure associated with the development or exacerbation of haemorrhoids 10, 12, These problems may significantly increase morbidity and mortality. Increased hospital costs associated with prolonged length of stay and the increased nursing workload involved in maintaining patient hygiene are also mentioned in the literature 3.8.

Assessment and documentation of diarrhoea is mentioned in many of the articles because of the impact on fluid and electrolyte balance, skin integrity and the ongoing maintenance of patient hygiene. Some tools designed to assess diarrhoea were vague and poorly described <sup>2, 7, 8, 15, 17</sup>. Others were well developed <sup>3, 21</sup> and had been tested for reliability and validity <sup>3, 19</sup>. Some reflected the difficulty with defining diarrhoea in different environments <sup>3, 15, 19</sup>.

The assessment and documentation of constipation were described in a number of articles <sup>10-12</sup> but often in vague terms. In one more detailed study <sup>13</sup>, the researchers found constipation to be a problem in both the ICU and the surgical ward they were studying. In the ICU, 70 per cent of patients had constipation when assessed using the Constipation Assessment Scale (CAS) developed in 1989 by McMillan and Williams <sup>14</sup>. The CAS had been tested for validity and reliability <sup>14</sup> and it relied on the patient to define the severity of the problems she/he was experiencing. In the surgical ward, 71 per cent had constipation according to the CAS scale but only a quarter of these patients had had any assessment documented. Tittle and McMillan suggest that "Although constipation is a common side effect of narcotic, analgesics, the lack of documentation indicates a lack of concern related to it" <sup>13</sup>.

Davies, Crowther, Reid and Dickerson <sup>21</sup> developed an extremely detailed eight point linear scale for the assessment of the form of the stool which applies to both diarrhoea and constipation. Their Form of Stool – Linear Scale subsequently scored highly when tested for validity and reliability by an independent researcher <sup>19</sup>.

While research studies examining effective assessment and documentation of bowel function may be lacking, there are numerous papers that focus on the treatment of diarrhoea and constipation. The major strategies cited to control diarrhoea were manipulation of enteral feeding <sup>1, 2, 4, 5, 8, 15, 17</sup>, stopping or changing drugs suspected of causing diarrhoea <sup>4, 5, 8, 15, 16</sup> and introducing those which might prevent it <sup>1, 4, 8, 15</sup>. In addition, the diagnosis and treatment of hypoalbuminaemia <sup>4, 5, 15</sup> and the treatment of underlying disease states, if possible, were suggested as mechanisms capable of reducing diarrhoea and its impact on the patient <sup>8, 15</sup>.

Recommendations for the treatment of constipation include managing underlying causes, although spinal cord trauma and cancer, while identified as conditions associated with the development of constipation, are not reversible in most cases <sup>10-12, 14, 18, 19</sup>. Therefore, management strategies revolve around attending to loss of privacy and embarrassment <sup>11, 12</sup>, increasing exercise, fibre and fluid in the diet <sup>10-12, 20</sup>, reducing constipating drugs such as opioids, diuretics, anti convulsants and anti depressants <sup>10, 11, 13, 14, 19</sup> and introducing appropriate laxatives <sup>10-13, 20</sup>.

The information gleaned from this review of the literature assisted the authors to define the aims of their study, develop the BMP, collect and analyse data by retrospective audit and make conclusions as to its usefulness as a tool for use in ICU.

#### **METHOD**

#### Research design

The study utilised quasi-experimentation; specifically, a simple interrupted time series design <sup>11,13</sup>. The design consisted of the pretest measurement of dependent variables in a number of subjects, followed by the initiation of a treatment which continued. Following this there was measurement of the same variables in a different set of subjects. Table 1 is a diagrammatic representation of the research design and sequencing of sampling.

The research study consisted of two phases. Firstly, the BMP was designed, reviewed by an expert panel, trialled and evaluated by the nurses on the unit and then implemented. The implementation phase included a program of in-service education for the registered

Table 1. Research design and sequencing of sampling.

Measurement of dependent variables	Manipulation of independent variable	Measurement of dependent variables		
PRETESTS	TREATMENT	POST TESTS		
Group I	Implementation of Bowel	Group 2		
(n=60)	Management Protocol	(n=60)		
Data collection from patients admitted to ICU in 6 months prior to introduction of BMP	One month implementation, including staff training in the use of BMP and evaluation of the BMP	Data collection from patients admitted to ICU in 6 months following the introduction of BMP		



nurses who would use the BMP. Secondly, data collection from the pre-implementation and later the post-implementation groups of patients was undertaken.

#### **BMP**

A BMP was designed by the nurse clinicians who were members of the research team. This BMP was used at the bedside by nursing staff to assess bowel function and to manage diarrhoea and constipation in ICU patients. The BMP was developed from a review of the literature, a review of protocols in use in other ICUs and in consultation with nurse clinicians.

Following development of the BMP, an expert panel consisting of experienced ICU nurses, a gastrointestinal surgeon, a medical intensivist and a hospital pharmacist were asked to review the BMP. They approved of the assessment guidelines, Form of Stool Scale and the flowchart. The medical and pharmacy department staff determined which aperient was routinely prescribed and ensured that this was in line with approved practice.

The implementation of the BMP was carried out over a period of 1 month. During this time, staff were educated on the purpose of the BMP and how to use it. At the end of this month, nursing staff were asked to complete a short evaluative questionnaire which explored the use of the assessment instruments and nurses' attitudes to the BMP. The nursing staff positively evaluated the BMP and no changes were made to the BMP while the study was in progress. When new nurses commence employment in the unit, education regarding the BMP is included in their orientation. The nurses were not informed that this study of the documentation of assessment and management of bowel functioning was to be conducted.

To use the BMP, the nurse first assesses the patient's gastrointestinal function and bowel activity using the Assessment guidelines (Table 2) and the Form of Stool – Linear Scale 11 (Table 3). After assessing gut function, the nurse follows the flowchart (Figure 1) to determine the appropriate management. The protocol specifies that the night staff should assess gastrointestinal function early in the morning and, as determined by the flowchart, implement any required treatment. The education program highlighted that each nurse should assess bowel function on every shift, that all bowel actions must be documented and that nurses working each shift should document the results of any bowel management interventions.

Table 2. Bowel function assessment guidelines.

	1. Document all bowel actions as they occur or record
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	inactivity daily on patient's chart
	2. Assess bowel functioning (at least once per shift):
	observe volume of nasogatric aspirate.
	auscultate for presence and character of bowel sounds
	observe for visible peristalsis
	Children and a contract of the
l	3 If bowels not opened for 3 days, perform a PR
ł	The second se
	examination and document findings:
	examination and document midnigs.
i	
	Empty Full of stool (hard or soft)
	4. Follow bowel management flowchart

#### Data collection

Permission to conduct the study and ethical clearance were granted by the relevant hospital committees. Data collection was performed by a retrospective audit of medical and nursing notes and thus informed consent was not required. All details were confidential and the data were de-identified. The introduction of the BMP would normally occur as a clinical nursing management decision and, as there was use of the time series methodology, no individuals were advantaged or disadvantaged by the intervention of the study.

A data collection tool was developed to collect demographic information about the patients and information on the nursing documentation of the incidence of constipation and diarrhoea in the two sample groups. The nursing management implemented, along with other relevant categories for each day of stay for each patient, was also assessed. Numeric data were entered directly from the collection tool into the statistical package while categorical data were coded prior to data entry.

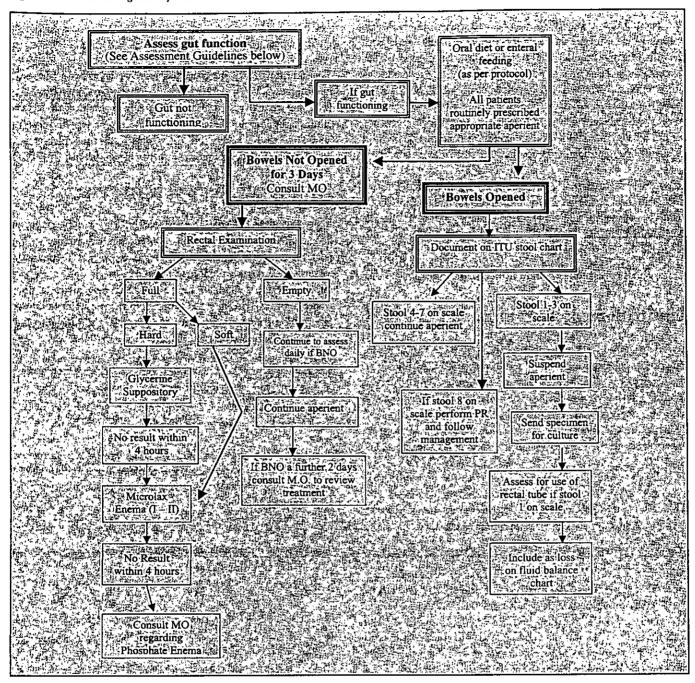
The demographic information collected included age, gender, presenting diagnostic category and length of stay in ICU. The bowel function data collected included documented gastrointestinal functioning assessment, documented bowel activity, documented bowel management intervention and evaluation. The data collection tool was designed so that the amount of detail recorded by the nurses pertaining to bowel assessment, functioning, intervention and evaluation could also be recorded. Following the literature review and in consultation with the expert panel, data were also collected on a range of extraneous variables which may affect bowel function, including medications, hydration, nutrition, mobility and airway.

Initially, it was planned to record all types and amounts of parenteral and enteral feeding and all drugs and their dosages. Following a trial audit of four patient records, it was discovered that ICU patients had a large variety of drugs and methods of food administration which could have simultaneously induced both diarrhoea and constipation. To record all instances of food or drug administration meant that data collection was taking up to 2 hours per patient record. In consultation with the members of the expert panel, it was decided to categorise the sections of the data collection tool related to medications and feeding.

Table 3. Description of form of stool - Linear scale.

0 Not opened
The status are considered in Astronomy of the San Old Consideration from the San
Loose, watery and runny
2 Mushy, flattened surface, definite flow
Mushy, heaped surface
4 (Collapsed, remnants of original shape visible 4 52 54)
4. (Collapsed: remnants of original snape visible
5% Snake-like coiled or cylindrical with a smooth surface
6 Cylindrical with superficial cracks
Cymrunicat with superficial cracks
7. Cylindrical with deep cracks
8. Fragmented segments: pellets
the day of the same are the same and the same and the same are the same and the same are the sam
(Davies et al. 1986)
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Figure 1. Bowel management flowchart.



For every day of each patient's stay in ICU, the method of food administration was recorded and all categories of drugs administered were recorded. The categories for food administration were; no feeding, oral feeding, enteral feeding only, enteral plus parenteral feeding and parenteral feeding only. The categories for medications were; opioids, antibiotics, antiemetics, gastric acid inhibitors, beta blockers, calcium channel blockers, ACE inhibitors, anticonvulsants, antipsychotics, antihypertensives, immunosuppressants, diuretics, antihistamines and other.

## Sample

The population studied in this research project was general ICU patients in a Sydney metropolitan teaching hospital over a 13 month period. Criteria for inclusion in the study were that patients were 15 years of age or over and admitted to ICU for at least4 consecutive days. Patients were excluded from the study if they were admitted immediately following gastrointestinal surgery or had a history of ulcerative colitis or Crohn's disease. These patient groups were

excluded from the study on the advice of the gastrointestinal surgeon, as these conditions interfere with bowel functioning.

During the period of the study, this ICU had a bed occupancy rate of 98 per cent and, on average, 53 patients were admitted each month. Having excluded those patients who did not meet the inclusion criteria, 60 patients' records were randomly chosen from those patients admitted in the 6 months prior to the implementation of the BMP and another 60 from those admitted in the 6 months following implementation. Once selected, the patients' notes were accessed from medical records and the relevant information collected from both medical and nursing notes. These data were coded and recorded on the data collection sheet for every day of stay for each patient.

#### Data analysis

Subject data were entered into the computer program Statistical Package for the Social Sciences (SPSS). Descriptive and



inferential statistics were undertaken on the data relating to patient demographics, extraneous variables and on the data relating to documented bowel activity. Data measured with an interval scale are reported as mean and standard deviation (sd) while data measured using ordinal and nominal scales are reported as percentages and sample size. Comparisons between pre- and post-implementation groups have been made using the Mann-Whitney test for interval level data (chosen because the data were not normally distributed) and the Chi-Square test (Pearson's version) for ordinal and nominal level data (to test association). The level of significance considered appropriate for this study was p≤0.05.

It was hypothesised that there would be a greater frequency of documentation of bowel activity in the post-implementation group relative to the pre-implementation group, and more details documented in the post-implementation group. It was also predicted that there would be a greater frequency of documentation of bowel management in the post-implementation group, with more patient assessment made.

#### Limitations of the methods

As the purpose of quasi-experimental designs is to measure causality, it is imperative that the researcher endeavours to control the external threats to validity as much as possible. In this simple interrupted time series design, the threats to validity include history, sample selection, seasonal trends, instrumentation and cyclic influences interpreted as treatment effects <sup>12</sup>. Maturation effects are considered to be well controlled by this design <sup>13</sup>.

The design would have been enhanced if the intervention (the introduction of the BMP) could have been implemented and withdrawn on a number of occasions (interrupted time series with multiple replications). This is not possible as the nurses had to be educated about the BMP and it is not possible to withdraw education once it is given. Alternatively, multiple measurement points could have been taken over time, both before and after implementation. This would have shown the effect of mastery of the BMP by the nurses and how this influenced documentation of assessment of bowel function and treatment of diarrhoea and constipation. This was not incorporated into the design of this study as the sample groups would have been small and this would have provided a further threat to the validity of the findings.

#### RESULTS

### Sample characteristics

The two random samples of 60 patients accessed for this study will be referred to as the pre-implementation and the post-implementation groups. The total number of subjects, therefore, was 120. The mean age of patients was 55.28 years (sd=18.58), the minimum age 15 years and the maximum age 87 years. There were 75 males and 45 females in the study. There was no significant difference in the numbers of men and women in the two groups (p=0.8). There were differences in age (p<0.001) and length of stay (p=0.002) between the two groups. The pre-implementation group was older, had a greater age range and had longer hospital stay than the post-implementation group (Table 4).

In addition, the methods by which patients were fed differed significantly between the two groups. More of the preimplementation group were fed with total parenteral nutrition (TPN) (17.8 to 10.4 per cent; p=0.001) and more of the post-implementation group received an oral diet (16.3 to 9.8 per cent; p=0.004). The two groups displayed no differences in airway maintenance, mobility or hydration.

The most frequently occurring diagnostic group in both groups was neurosurgery (29.9 per cent overall) followed by respiratory care (20.5 per cent overall). As can be seen in Table 5, there were clinically important differences with respect to patient diagnosis on admission to ICU between the groups and the difference in distribution of diagnoses reached statistical significance (p<0.001).

#### **Documented bowel activity**

It was hypothesised that there would be a greater frequency of documented bowel activity in the post-implementation group relative to the pre-implementation group. Figure 2 shows the frequency of documented bowel activity in the pre and post-implementation groups. As predicted, the percentage of times where nothing is documented is higher in the pre-implementation group. Non-parametric statistical tests indicate that this difference between the groups is statistically significant (p<0.0001).

The number of times details about bowel activity were recorded was higher in the post-implementation group than the pre-implementation group. Although the number of documented occasions bowels opened (BO) and bowels not opened (BNO) was

Table 4. Mean, standard deviation and range of age and length of stay for pre- and post-implementation groups.

		Age (Years)	Length of stay (Days)
Pre-implementation group  Post-implementation group	Mean SD Range Mean SD Range	-57-28 18.46 15-87 52.96 18.46 18-85 4	8.05 2.31 8.15 3.19 4.15

Table 5. Percentages of presenting diagnostic categories in the two groups.

	Pre- implementation diagnosis	Post- implementation diagnosis
Trauma  Multi system organ failur  Neurosurgical  Vascular  Sepric shock  Respiratory  Head and neck surgery  Cardiogenic shock  Cardiac  Renal	18.8% 1.8% 1.8% \$ 1.70%	8.5% 7.8% 25:2% 8.5% 6.4% 24:5% 9:2% 6.1%



greater in the pre-implementation group, this was due to a lower frequency of details being recorded. This indicates that after the introduction of the BMP, details of bowel activity were recorded more frequently.

# Documentation of nursing management

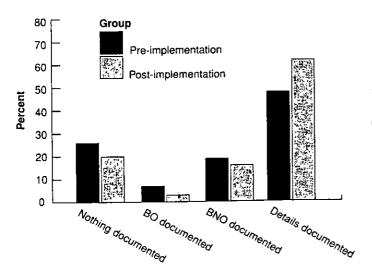
It was also hypothesised that there would be a greater frequency of documentation of nursing management of diarrhoea and constipation in the post-implementation group. This hypothesis was supported, as there was a greater incidence of 'no documented bowel management' for the pre-implementation group than for the post-implementation group (Figure 3). Figure 3 also indicates a greater incidence of treatment given without assessment in the pre-implementation group. The post-implementation group had a greater frequency of documented management both with evaluation of the result (9.4 per cent; p=0.01) and without evaluation of the result (8.2 per cent; p=0.005).

#### DISCUSSION

The results of this research study support the introduction and continuing evaluation of a BMP for use with ICU patients. The limitations of the study indicate that some caution must be used in the interpretation of the findings. However, overall, the implementation of a BMP resulted in improved documentation of bowel function in this patient group. The use of the BMP improved both the quality and quantity of documentation related to the management of diarrhoea and constipation.

The limitations of the study, despite random sampling over two 6 month periods, resulted in statistically significant differences in age, length of stay, method of feeding and presenting diagnostic categories between the two groups. These differences could mean that the improvement in documentation practice seen in the post-implementation group was due to the influence of patient demographic characteristics rather than the BMP. The literature has not investigated these demographic variables to a large extent. However, one study found that there was no correlation between age and the frequency or duration of diarrhoea in tube-fed

Figure 2. Documented bowel activity in pre- and postimplementation groups.



**Documented bowel activity** 

mechanically ventilated patients<sup>2</sup> which strengthens the findings of the present study.

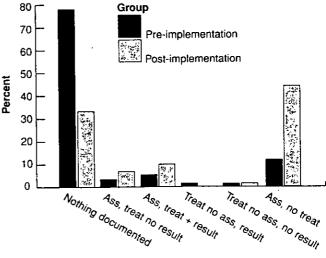
Numerous authors have suggested that a BMP should be used to improve assessment and documentation of bowel activity <sup>10-13, 15, 18</sup>. In this study, the implementation of the BMP resulted in fewer instances of no documentation of bowel activity, greater detail in the documentation of bowel activity, greater frequency of documented assessment and more frequent documentation of the implementation and evaluation of strategies designed to manage diarrhoea and constipation.

The implementation of the BMP included an extensive and ongoing in-service education program for the nursing staff. Prior to the introduction of the BMP, bowel management of ICU patients was only covered occasionally in in-service education sessions. One limitation of the study was that there was no concurrent and on-going measurement of staff knowledge or attitude. A subsequent study might benefit from including these elements.

In this study, monitoring the bowel activity of the patients was an important aspect of the protocol and, as a number of authors suggest, use of a reliable tool is crucial to this process <sup>3,19,21</sup>. This study used the Form of Stool – Linear Scale <sup>21</sup>. As part of the education program that accompanied the implementation of the BMP, the ICU clinical nurses were given a Likert scale evaluation questionnaire to complete after they had used the Form of Stool – Linear scale and the bowel management flowchart for approximately one week. The nurses evaluated both tools very positively but this measurement was highly subjective and there was no attempt to repeat the measure or assess knowledge at later times.

Some authors suggest that risk assessment or standing orders may be useful in some clinical settings <sup>12-13</sup>. The BMP used in this study included a standing order for an aperient, approved by the medical and pharmacy departments of the hospital, to be administered to all patients commenced on oral or enteral feeds. However, it did not include a risk of constipation or diarrhoea assessment because there are so many confounding variables involved in the development of diarrhoea and constipation in critically ill ICU patients that the BMP would have been rendered clinically irrelevant. This means that this BMP may not be of use in more stable clinical environments where it would be useful to include risk assessment <sup>12</sup>.

Figure 3. Documented management for pre- and postimplementation groups.



Documented bowel management



In this era of accountable professional practice, numerous authors have called for the accurate assessment and management of bowel functioning in critically ill patients <sup>2, 3, 13, 15</sup>. However, not all commentators have understood how accurate assessment of bowel functioning helps in practice <sup>3</sup>. The results of this study suggest that in an ICU setting, the adoption of a BMP along with a specific assessment tool can improve documentation and thus multidisciplinary communication related to this vital activity of daily living.

## IMPLICATIONS FOR NURSING PRACTICE

If professional nurses accept that, as identified by Halm <sup>18</sup>, better assessment and documentation of elimination leads to improved patient outcome, the BMP described in this study should be adopted in practice with the recommendation that further research be undertaken to evaluate outcomes. The BMP consisting of Assessment Guidelines, Form of Stool Scale and Bowel Management Flowchart need to be used together to improve the assessment and management of bowel activity in critically ill ICU patients.

This article seeks to build on the literature related to the management of bowel function in ICU patients. To improve the care of critically ill patients, there needs to be on-going debate regarding the routine prescription of aperients, the flexibility and appropriateness of flowcharts to guide management of bowel function and the need for structured assessment of bowel function. The authors of this study believe that the ICU involved in this study has initiated a culture of individual assessment of bowel function and improved documentation of bowel management. Ongoing staff education and further research are required to continue to improve this important aspect of the care of ICU patients.

## RECOMMENDATIONS FOR FURTHER RESEARCH

It is recommended that this study be repeated at multiple sites with pre- and post-implementation samples randomly selected from the annual population of the units to avoid seasonal variations in diagnoses. A randomised controlled trial should be designed to evaluate the BMP comparing documentation of bowel activity, nursing assessment of bowel functioning, implementation and evaluation of management strategies with objective, independent assessment of bowel functioning and the incidence of diarrhoea and constipation.

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