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Early discharge of patients with acute pancreatitis to enhanced outpatient care

Vineeth V. Kumar,* P. John Treacy,*† Minghao Li* and Anoj Dharmawardane*

*Department of Surgery, Royal Darwin Hospital, Darwin, Northern Territory, Australia and
†Northern Territory Medical School, Flinders University, Darwin, Northern Territory, Australia

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Correspondence
Dr P. John Treacy, Northern Territory Medical School, Flinders University, PO Box 43022, Casuarina, NT 0811, Australia. Email: pj.treacy@bigpond.com

V. V. Kumar MBBS; **P. J. Treacy** MD, FRACS; **M. Li** MBBS; **A. Dharmawardane** MBBS, FRACS.

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Abstract

Background: Acute pancreatitis (AP) is a common cause for hospital admission, but some patients have a prolonged stay. The aim of this study was to identify patients with mild AP who had a prolonged hospital stay, who potentially could be discharged at day 2 to enhanced outpatient care.

Methods: Data was retrospectively collected on all patients admitted to the Royal Darwin Hospital between May 2016 and February 2017 with a diagnosis of mild AP to identify factors that may safely predict early discharge to enhanced outpatient care.

Results: Of 115 admissions, 62% were male, 50% indigenous and alcohol was causative in 53%. A total of 75 (65%) patients stayed more than 2 days and used 342 bed-days. Factors identified in the first 2 days of admission associated with a length of stay more than 2 days ($R^2 = 0.56$, $P < 0.0001$) included pain score >5 ($P = 0.034$), temperature ≥38°C ($P < 0.0001$), white blood cell count >18 ($P = 0.036$), not tolerating oral diet by day 2 ($P = 0.002$), severe pancreatitis on imaging ($P = 0.008$) and readmission in the previous 30 days ($P = 0.035$). Using these criteria, 57% of all admissions and 87% of admissions greater than 2 days could potentially have been transferred to enhanced outpatient care at day 2 for management. This would have saved 277 inpatient bed-days and an estimated $122 771 over the 9-month study period.

Conclusions: A significant proportion of patients admitted with mild AP, who stay longer than 2 days in hospital, could potentially be identified and discharged early to enhanced outpatient care.

Introduction

Acute pancreatitis is a common acute surgical presentation, where the majority of patients make a quick and uneventful recovery,[1] requiring little more than analgesia with or without minor supportive measures such as intravenous therapy. However, around 15% of patients with acute pancreatitis develop more complicated disease, such as necrosis of the pancreatic parenchyma or extra-pancreatic tissue and organ failure.[2]

The incidence of acute pancreatitis has been on the rise worldwide,[3] with an approximate incidence of 13–45 new cases per 100 000 per year, which equates to estimated worldwide annual cost per admission of 2.2 billion dollars.[4,5] Prolonged hospital stay may occur, with associated high hospital occupancy, increased costs and adverse patient outcomes. If future cost saving is to be achieved in the management of acute pancreatitis, it will most likely occur by lowering the costs of managing the majority of patients who present with mild disease.[6]

Enhanced outpatient services, which provide close clinical review, management of analgesia and oral fluid intake plus other intravenous therapies, are on the rise worldwide.[7] Such services have recently been introduced at Darwin, by way of 'Hospital in the Home' care and at the Royal Darwin Hospital's new co-located short-term outpatient accommodation and care facility. Use of such services may be an effective method to achieve safe and early discharge of patients with mild acute pancreatitis.

The aim of this study was to identify a cohort of patients with mild acute pancreatitis who stay in hospital longer than 2 days, who could potentially be discharged at day 2 to enhanced outpatient services. A second aim was to assess potential bed-day and financial savings that such early discharge could achieve.

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Methods

Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors. For this type of retrospective study, formal consent was not required. The study was approved by the Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research (HREC 2016–2590).

Patient selection

All patients admitted to the Royal Darwin Hospital between May 2016 and February 2017, with a diagnosis of mild acute pancreatitis, were included in this study.

Inclusion criteria were:

(1) Diagnosis of acute pancreatitis based on abdominal pain, elevated lipase levels more than three times the upper limit of normal and/or abdominal imaging demonstrating changes of acute pancreatitis.
(2) Presentation within 48 h of onset of symptoms.
(3) Ranson's score[8] less than or equal to three within 48 h of presentation to the hospital.

Exclusion criteria were:

(1) Presence of organ failure on Atlanta criteria[9] on day 1 of presentation.
(2) Presence of sepsis on clinical or laboratory criteria.[10]
(3) Patients requiring endoscopic retrograde cholangiopancreatography for gallstone pancreatitis.
(4) Patients who self-discharged or were transferred to another hospital within 48 h of admission.
(5) Features that suggested chronic pancreatitis, such as steatorrhoea, diabetes mellitus or calcifications within the pancreas on imaging.

Outcome measures

Data was retrospectively collected on demographic details, biochemical and radiological investigations, total analgesic and intravenous fluid requirements within the first 48 h of admission, time to resolution of pain, time to resumption of an oral diet and all readmissions within 30 days of discharge. Duration of abdominal pain and resumption of oral solid diet were determined from the time of admission to the emergency department.

Statistical analysis

Data were analysed using stepwise backwards logistic regression, to identify those factors significantly associated with a length of stay more than 2 days. This analysis was performed using SPSS version 25 (IBM, Armonk, NY, USA).

Results

There were a total of 132 presentations with acute pancreatitis to the Royal Darwin Hospital for the duration of the study. Of these, 17 were excluded because they did not fulfil the inclusion criteria. Of the remaining 115 presentations, 62% were male, 50% were indigenous and alcohol was the causative factor in 53%. Aetiology of pancreatitis included gallstones in 23%, alcohol in 53%, other causes in 8% and idiopathic in 16%. A significant comorbidity was presented in at least 53% of patients (Table 1).

A total of 80 (70%) patients with mild acute pancreatitis were able to tolerate an oral solid diet within 48 h of admission; 69 (60%) patients did not require more than 20 mg opioids and were able to manage pain with paracetamol and non-steroidal anti-inflammatory drugs. Average intravenous fluid requirements were 2412 mL at 24 h and 2534 mL at 48 h from admission. Of the 115 admissions with mild acute pancreatitis, 10 (8.7%) required readmission within the 9 months duration of the study and only four (3.5%) required readmissions within 30 days.

A total of 75 (65%) patients stayed more than 2 days in the hospital (Fig. 1) and utilized 342 bed-days over the 9-month study period. Of all the demographic and clinical factors assessed (Table 1), only six were identified by logistic regression analysis as significantly associated with a length of stay more than 2 days ($R^2 = 0.56$, $P < 0.0001$) (Table 2).

By excluding those patients with these six identified criteria (Table 2), including a raised temperature (two patients), raised white blood cell count (nine patients) and severe pancreatitis on imaging (two patients), plus assuming oral analgesic, fluid and intermittent intravenous medication (primarily anti-emetic) requirements could be managed on an outpatient basis, a total of 65 patients (57% of all patients and 87% of patients staying more than 2 days) could

Table 1 Demographics and clinical characteristics of 115 admissions with mild acute pancreatitis

	Count	Percentage
Sex and race		
Male	71	62
Female	44	38
Indigenous	58	50
Non-indigenous	57	50
Aetiology		
Gallstone	26	23
Alcohol	61	53
Idiopathic	19	17
Other	9	7.8
Comorbidities		
One or more comorbidities	60	52
Diabetes	26	23
Cardiac disease	16	14
Respiratory disease	22	19
Obesity	10	8.7
Clinical data		
Pain score >5 over 48 h	5	4.3
Temperature >38°C over 48 h	2	1.7
Vomiting	66	57
White blood cell count >18	9	7.8
Systemic inflammatory response syndrome	1	0.9
Chest X-ray effusion	6	5.2
Ranson's score >3	18	16
Total no. of admissions staying >2 days	75	65
Opioids ≥20 mg at 48 h	46	40
Diet commenced by second day	80	70
Length of stay in hospital >2 days	75	65
Readmission <30 days	5	5.7

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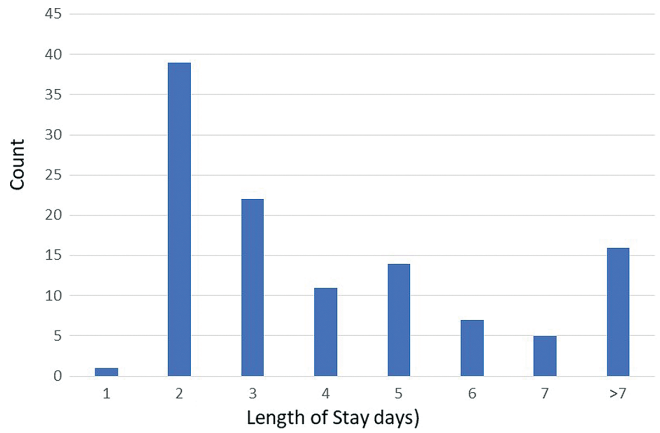

Fig. 1. Length of stay of patients with mild acute pancreatitis.

Table 2 Factors predictive of length of stay more than 2 days

Factor	% Positive	Coefficient	Probability
Pain score >5	4.3	0.14	0.034
Temperature >38°C	1.7	0.49	0.0001
White blood cell count >18	7.8	0.14	0.036
Not tolerating diet	17	0.23	0.002
Severity on imaging	0.9	0.19	0.008
Readmission <30 days	3.5	0.14	0.035

potentially have been discharged to enhanced outpatient care at day 2 for management of their pancreatitis. Discharge of these patients would have saved 277 inpatient bed-days, with an estimated savings of $122 771 over the 9-month study period.

When combining Ranson's criteria, to identify those patients with mild acute pancreatitis, with our six criteria, no patient in this group developed significant complications such as organ failure, pancreatic necrosis or death during the course of their hospitalization. Only four (6.2%) of this cohort of 65 patients required readmissions within the 9-month study duration and only one (1.5%) required readmission within 30 days.

Discussion

This study has evaluated the feasibility of early discharge of selected patients with acute pancreatitis to enhanced outpatient care, for ongoing management of pain and oral intake plus intermittent intravenous medications. Results have shown that a significant proportion of patients admitted with mild acute pancreatitis, who stayed longer than 2 days in hospital, could potentially be discharged early, using the six criteria identified in this study: pain score 5 or less, temperature less than 38°C, white blood cell count less than 18, tolerating a solid diet, pancreatitis not severe on imaging and no admission with acute pancreatitis within the last 30 days. The implication of such a protocol could result in a significant reduction of bed-day and financial costs to healthcare systems.

We identified patients who could be discharged to enhanced outpatient services. These patients largely were kept within the hospital not because of a failure to discharge safely within 48 h, but because it would not be possible or safe to administer the specific therapies available at enhanced outpatient care, such as close clinical review, management of analgesia and oral fluid intake plus other intravenous therapies, at the patient's own home. Such enhanced outpatient services have been reported in the literature previously,[7] for management of conditions such as diverticulitis,[11] acute cholecystitis[12] and following chemotherapy.[13,14] Early discharge with a diagnosis of mild acute pancreatitis has been reported in the literature, but the value of enhanced outpatient services, for improved patient safety and satisfaction has rarely been reported. Serra Pla *et al.*[15] applied five criteria for early discharge with mild acute pancreatitis, which identified 42% of their cohort (105/250 patients) for early discharge. However, details of aftercare were not reported in their study. Lack of enhanced outpatient care after discharge may have contributed to the significantly higher rates of 30–day readmission in their study (15%, compared to 1.5% in our study). Ince *et al.*[16] randomized half of their patients admitted with mild acute non-alcohol-induced pancreatitis to either very early home monitoring, at 24 h, or prolonged hospital stay. In their study, home monitoring similarly included the capability for intravenous medication administration, plus also intravenous fluids. Their safety, readmission rates and cost savings identified were comparable to those reported in the present study.

Statistical analysis helped to determine appropriate criteria for safe early discharge in the cohort of patients with mild acute pancreatitis. Although many scoring systems are available to prognosticate acute pancreatitis, the criteria we identified were developed specifically to identify those patients suitable for early discharge. We chose to combine Ranson's score with our six criteria, because all data were available within the 48 h of admission. Of importance, no patient in this cohort developed significant complications such as organ failure, pancreatic necrosis, or death, and only 1.5% required readmission within the subsequent 30 days.

It may be that utilization of these six criteria will facilitate criteria led discharge,[17] with the reassurance that the enhanced outpatient support services can provide safe care for their patients after discharge. Criteria led discharge has recently been introduced at our hospital, with identified patients discharged in the morning after review not by medical staff but by senior nursing staff. Such protocols can reduce hospital bed block, which is an increasing problem throughout Australian public hospitals.[18]

In the present study, only 26 (23%) patients had a diagnosis of gallstone pancreatitis. The majority of patients (53%) were diagnosed with alcohol-induced acute pancreatitis. Although some patients in this study may benefit from early cholecystectomy, as opposed to early discharge to enhanced outpatient services, the actual numbers were small.

The potential for cost savings to the healthcare system by early discharge to enhanced outpatient services may be substantial. One study of acute pancreatitis in the United States from 2013 reported a daily cost per patient per day of US$1670,[5] which is significantly greater than the US government reported cost of twice daily home visits for the same year of US$280.[19] At our hospital the estimated cost for inpatient care per patient per day was approximately $1222, which contrasts significantly with the estimated cost for

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enhanced outpatient care at our short-term facility, of about $779, which included $79 for accommodation and $700 for nursing care.

The benefits to improved patient satisfaction by early discharge, particularly for the indigenous population, should not be underestimated. Language and social barriers are significant for inpatient Aboriginal persons.[8] These barriers are thought to contribute significantly to delayed discharge or even self-discharge from care[20] in these patients. Optimal medical care may be achieved in a more acceptable environment with increased engagement and compliance to treatment.

The number of patients studied in this paper is relatively small and is a criticism of the paper. However, previous studies have assessed similar numbers of patients.[15,16] Despite the relatively small number of patients, statistical analysis did identify six factors that were statistically significant. A further criticism is that pain scores and diet tolerance are mostly subjective and difficult to rely on. It was for this reason that we deliberately chose not to assess pain scores at each of the 10 levels on the pain score system used, but chose a binary cut-off level for a pain score less than 5, to minimize the influence of subjectivity. Although diet tolerance is also mostly subjective, diet tolerance is known to be an excellent determinant of overall clinical improvement in acute pancreatitis.[21] Given the importance of diet tolerance, we aimed to minimize the subjectivity of the assessment by assessing diet tolerance directly from the nurse-recorded patient fluid balance chart and the diet chart.

Conclusion

A significant proportion of patients admitted with mild acute pancreatitis, who stay in hospital for specific therapies such as close clinical review, management of analgesia, oral fluid intake and intravenous therapies, could potentially be identified using six criteria and discharged at day two, to enhanced outpatient care. Such a protocol could result in a significant reduction of bed-day and financial costs, plus improved patient satisfaction.

Conflicts of interest

None declared.

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