Treat the Cause

A review of the quality of care provided to patients treated for acute pancreatitis

NCEPOD

Improving the quality of healthcare

Treat the Cause

A review of the quality of care provided to patients treated for acute pancreatitis

A report published by the National Confidential Enquiry into Patient Outcome and Death (2016)

Compiled by:
D A O'Reilly PhD FRCS – Clinical Co-ordinator
Central Manchester University Hospitals NHS Foundation Trust

S J McPherson BSc MRCP FRCR EBIR – Clinical Co-ordinator
Leeds Teaching Hospitals NHS Trust

M T Sinclair MB ChB FRCS – Clinical Co-ordinator
The Ipswich Hospital NHS Trust

K Kelly BA (Hons) PGC Health Research – Researcher
D Ellis – Administrative Officer
N Mahoney BA (Hons) – Research Assistant
N Smith PhD – Clinical Researcher and Deputy Chief Executive
M Mason PhD – Chief Executive

The study was proposed by: Mr Muralidharan Parthasarathy, The Ipswich Hospital NHS Trust

The study was commissioned by the Healthcare Quality Improvement Partnership (HQIP) on behalf of NHS England, NHS Wales, the Northern Ireland Department of Health, Social Services and Public Safety (DHSSPS), the States of Guernsey, the States of Jersey and the Isle of Man Government.

The authors and Trustees of NCEPOD would particularly like to thank the NCEPOD staff for their work in collecting and analysing the data for this study: Robert Alleway, Aysha Butt, Heather Freeth, Dolores Jarman, Kirsty MacLean Steel, Eva Nwosu, Karen Protopapa, Hannah Shotton and Anisa Warsame.

Contents

Acknowledgements 3
Foreword 5
Principal Recommendations 7
Introduction 9
1 – Method and data returns 11
2 – Patient characteristics 15
Key findings 19
3 – Presentation, diagnosis and admission 21
Key findings 25
4 – Initial management 27
Case studies 1, 2 & 3 28, 31, 35
Key findings 35
5 – Ongoing supportive management 37
Key findings 45
6 – Imaging 47
Case study 4 47
Key findings 50
7 – Treating the cause 51
Case studies 5, 6 & 7 53, 54, 58
Key findings 59
8 – Treatment of complications 61
Case study 8 62
Key findings 64
9 – Regional organisation of care 65
Case study 9 66
Key findings 66
10 – Outcomes and overall quality of care 67
Key findings 70
Recommendations 71
Summary 73
References 75

Appendices 79
Appendix 1 - Glossary 79
Appendix 2 - Grades of severity of acute pancreatitis 84
Appendix 3 - Drugs with a definite or probable association with pancreatitis 84
Appendix 4 - Morphological features of acute pancreatitis 85
Appendix 5 - The role and structure of NCEPOD 86
Appendix 6 - Participation 88

Acknowledgements

Back to contents

This report, published by NCEPOD, could not have been achieved without the support of a wide range of individuals who have contributed to this study.

Our particular thanks go to:

The Study Advisory Group who advised NCEPOD on the design of the study:
Ms Joanne Bishop, HPB Nurse Specialist
Mr Tim Brown, Consultant Pancreaticobiliary Surgeon
Dr Mark Callaway, Consultant Radiologist
Dr David Cressey, Consultant in Intensive Care Medicine
Mr Christopher Halloran, Consultant Pancreato-Biliary Surgeon
Dr Mike Mitchell, Consultant Gastroenterologist
Mr Murali Partha, SpR in General Surgery
Dr Stephen Pereira, Consultant Gastroenterologist
Ms Mary Phillips, HPB Advanced Specialist Dietitian
Dr Pat Twomey, Chemical Pathologist
Ms Marion Thompson, Lay Representative

The case reviewers who undertook the peer review:
Mr Anil Kumar Agarwal, Consultant in General Surgery & Coloproctology
Dr Torath Ameen, SpR in Hepatobiliary Surgery
Dr Jeremy Astin, Consultant in Anaesthesia & Intensive Care Medicine
Dr Cyril Chako, Advanced Trainee in Intensive Care Medicine
Dr Michael Chapman, Consultant in Pancreatobiliary Medicine
Dr Mukesh Chugh, Consultant Anaesthetist
Mr Matthew Clarke, Charge Nurse & Emergency Theatre Team Leader
Dr Ben Creagh-Brown, Consultant in Intensive Care Medicine
Mr Jean Deguara, Consultant General Surgeon
Dr Riaz Dor, Consultant Gastroenterologist
Dr William English, Consultant in Anaesthesia & Intensive Care Medicine
Mr Luke Evans, Consultant General Surgeon
Mr James Gardner-Thorpe, Consultant HPB Surgeon
Mr Martin Greensmith, SpR in Upper GI Surgery
Mr James Hewes, Consultant Surgeon
Ms Marianne Johnstone, SpR in Upper GI & HPB Surgery
Mr Sunjay Kanwar, Consultant General & Upper GI Surgeon
Mr Rajesh Kumar, Consultant HPB Surgeon
Dr Madhan Kumar Vijaya Kumar, Consultant in Intensive Care Medicine
Dr Lawrence McCrossan, Consultant in Intensive Care Medicine
Dr Nicholas Michell, Consultant Gastroenterologist
Dr Lee Poole, Consultant in Intensive Care Medicine
Ms Gaural Patel, Surgical Registrar
Professor Ashraf Rasheed, Consultant Upper GI Surgeon
Mr Gary Spence, Consultant Upper GI & General Surgeon
Dr Mark Turner, SpR in Anaesthesia
Mr YKS Viswanath, Consultant Upper GI Surgeon

Thanks also go to all the NCEPOD Local Reporters for facilitating the study at their hospital(s), the NCEPOD Ambassadors for championing the study and the Clinicians who took the time to complete questionnaires. Without your help this report would not have been possible.

Foreword

Back to contents

This report examines the quality of care received by patients admitted to hospital with a primary diagnosis of acute pancreatitis during the first 6 months of 2014. My first impression was that this report was a good news story, since a sizeable proportion of these patients received good care during a time when our daily press had started to regularly identify stories about how badly the NHS is handling patients, due to reduced resources. However, as with most NCEPOD reports, more detailed scrutiny reveals that the true picture is more complex and as a result my second impression is that there are many aspects of care in which we could be doing better. Our report has been able to identify these and make some practical recommendations to improve the situation.

This large scale assessment of the quality of care delivered to patients with acute pancreatitis is the first that has been performed in the UK. It was undertaken two years after evidence based consensus guidelines for the treatment of these patients were jointly approved and published by the International Association of Pancreatology (IAP) and the American Pancreatic Association (APA). Hence the key purposes of our study were to assess the quality of care provided to this group of patients and to assess how well, or otherwise, our UK colleagues have adopted and implemented these guidelines into their clinical practice. There are many examples of good medical practice to support the view that good treatment is usually cheaper as well as being more effective. When faced, as we are now, with a climate of austerity in the NHS, it becomes even more important to do our very best with limited resources, and this must start with doing the simple things well. What this report highlights is that in many cases where the care provided left room for improvement, in the view of the case reviewers, it was as a result of a failure to apply relatively simple and well established rules.

Chief among these was a failure to treat the underlying cause, to prevent recurrent acute pancreatitis. A number of previous NCEPOD reports have examined how well, or otherwise, we are doing at implementing simple, good practice, recommendations. For example, an important minority of acute pancreatitis occurs in patients who abuse alcohol. We know from our study of alcohol-related liver disease *'Measuring the Units'* (2013) that patients are often not referred to alcohol support services, because it is pessimistically assumed by their clinicians that they will refuse the offer of help or fail to comply. However, there is hard evidence demonstrating that this simple intervention does work for some patients if it is offered. Our finding that a referral to the alcohol support services had been recorded in only 54% of cases where alcohol was the cause of the acute pancreatitis, suggests that we are still failing to provide appropriate follow up care for these patients and that the availability of a specialist alcohol liaison service in every hospital should be an integral part of the acute medical care that these patients receive.

One of the key findings of this report is that two thirds of patients were admitted to surgical wards and about 85% continued to be under the care of surgeons. This reflects the fact that acute pancreatitis presents as an acute abdominal emergency and that the largest single sub-group have developed their acute disease because they have gallstones. Nevertheless, in this report only 19% of the patients with gallstone pancreatitis underwent definitive surgical management of their gallstones during the acute admission we studied. In a few cases definitive management was provided by ERCP, and it is likely that some patients would have been too ill to tolerate early surgery. That still left a very large number of acute admissions due to gallstones who were not offered definitive treatment when they should have been. Case studies 2 and 5 illustrate the types of cases where a decision on definitive treatment was deferred for far too long.

A particularly worrying aspect of the report was that over 60% of patients in this study were prescribed antibiotics despite the IAP/APA guidelines clearly stating that antibiotic prophylaxis is not effective in preventing infectious

complications in acute pancreatitis and should not be used for this purpose. We are currently being warned about the risks of antimicrobial resistance and this report provides clear evidence that dissemination of protocols and guidelines requires senior leadership / ownership to prevent inappropriate usage.

Another finding of this current report, suggesting that we are slow to implement the recommendations from previously published guidelines, is that few acute pancreatitis patients in the study were referred to specialist services. As the majority of hospitals stated that they did not provide the radiological, endoscopic or surgical facilities to deal with complications of acute pancreatitis, reliable access to specialist tertiary centres is necessary for all patients. Yet only one-third of hospitals in the current study reported being part of a formal regional care network for acute pancreatitis. Establishing well organised networks of care is important if we want to be able to do the complex things better.

This is a disease that can often be multi-factorial and complex and requires co-operative input from a core of surgical, gastroenterological, radiological and intensive care specialists. In this review, 10% of patients were considered not to have been seen by all the appropriate specialists, for their condition. In order to prevent patients falling between the gaps, acute pancreatitis should be managed by a multidisciplinary team, comprising all specialities needed to treat the condition as well as the underlying co-morbidities. This again echoed one of the findings from the *'Measuring the Units'* report, namely that the majority of patients were suffering from complicated disease and yet they continued to be managed by doctors who were neither hepatologists nor gastroenterologists with a particular interest in the subject.

Extreme pain is a common feature of acute pancreatitis and every service must ensure that patients have access to urgent pain relief from appropriately skilled teams that are present 24/7. Our study identified that 70% of hospitals do not. In this notoriously painful condition, assessment of pain was considered inadequate in 5% of patients as was the amount and type of analgesia in a further similar number of patients. Adequate staff and systems must be in place to provide timely pain management to all inpatients.

So my first report as Chair strikes many of the themes that will be familiar to readers of the last few years. We are not doing the simple things either as well or as consistently as we should do them.

On behalf of the Trustees of NCEPOD I am pleased to be able to thank everyone who has participated in the development of this report: the study proposers, the Study Advisory Group who steered its development, the Case Reviewers for their assessments, the Local Reporters for returning data to us and the Ambassadors who supported them, the clinicians who completed questionnaires on their cases, the authors who wrote the report, the NCEPOD staff for running the study and analysing the data and the Steering Group, representing the Royal Colleges, who have considered the data and supported the recommendations.

With all your help we can and will do better for our patients.

Professor Lesley Regan
NCEPOD Chair

Principal recommendations

Back to contents

Definitive eradication of gallstones prevents the risk of a recurrent attack of acute pancreatitis. This usually involves cholecystectomy and ensuring that no stones remain in the bile duct. For those patients with an episode of mild acute pancreatitis, early definitive surgery should be undertaken, either during the index admission, as recommended by the International Association of Pancreatology (IAP), or on a planned list, within two weeks. For those patients with severe acute pancreatitis, cholecystectomy should be undertaken when clinically appropriate after resolution of pancreatitis. *(Clinical Directors and All Clinicians)*

Given the increasing complexity of the management of acute pancreatitis and its multidisciplinary nature, formal networks should be established so that every patient has access to specialist interventions, regardless of which hospital they present to and are initially managed in. Indications for when to refer a patient for discussion with a specialist tertiary centre and when a patient should be accepted for transfer, should be explicitly stated. Management in a specialist tertiary centre is necessary for patients with severe acute pancreatitis requiring radiological, endoscopic or surgical intervention. *(Medical Directors and Clinical Directors)*

For all early warning scores and as recommended by the Royal College of Physicians of London for NEWS - all acute hospitals should have local arrangements to ensure an agreed response to each trigger level including: the speed of response, a clear escalation policy to ensure that an appropriate response always occurs and is guaranteed 24/7; the seniority and clinical competencies of the responder; the appropriate settings for ongoing acute care; timely access to high dependency care, if required; and the frequency of subsequent clinical monitoring. *(Medical Directors and Clinical Directors)*

Antibiotic prophylaxis is not recommended in acute pancreatitis. All healthcare providers should ensure that antimicrobial policies are in place including prescription, review and the administration of antimicrobials as part of an antimicrobial stewardship process. These policies must be accessible, adhered to and frequently reviewed with training provided in their use. *(Medical Directors, Clinical Directors, Medical Microbiology Directors, Clinical Pharmacy Lead and All Clinicians)*

Please see page 71-72 for the full list of recommendations.

Introduction

Back to contents

Acute pancreatitis is caused by an acute inflammatory process affecting the pancreas gland. The main causes are gallstones and an excess of alcohol. Most hospitals in the United Kingdom serving a population of 300,000 – 400,000 people admit around 100 patients with this condition each year.[1] The condition can be mild and self-limiting but can also be a severe illness causing multiple organ failure. Severity of acute pancreatitis is classified as:

- Mild acute pancreatitis - the most common form, has no organ failure, local or systemic complications and usually resolves in the first week.
- Moderately severe acute pancreatitis - defined by the presence of transient organ failure or local complications.
- Severe acute pancreatitis - defined by persistent organ failure beyond 48 hours. This often includes a prolonged hospital stay, admission to critical care and a 15-20% risk of death.[2] (see Appendix 2)

Optimal care of the patient with acute pancreatitis should include timely diagnosis and assessment of severity, imaging, fluid resuscitation to ensure adequate tissue perfusion and prevent later complications, nutritional support, analgesia, management of co-morbidities, appropriate antimicrobial therapy and an awareness of the possibility of deterioration of the patient during their admission. In addition, critical care outreach/admission, gallstone management, support services and interventions should all be available should they be required.

Patients should not be readmitted with acute pancreatitis due to the fact it was not treated appropriately when first diagnosed. It is essential that the management of the acute pancreatitis involves establishing the underlying cause and treating it appropriately and promptly. Subsequent treatment is mainly supportive, including ongoing analgesia, nutritional support and appropriate antimicrobial use. Referral to a specialist centre may be necessary for patients with severe acute pancreatitis in need of radiologic, endoscopic, or surgical intervention; this requires good co-ordination of care through the use of networks.[3]

There have been many practice guidelines for acute pancreatitis management published to date but with significant variation in their implementation.[4-7] The 2012 guidelines produced by the International Association of Pancreatology and the American Pancreatic Association (IAP/APA) provide the most recent recommendations concerning key aspects of medical and surgical management of acute pancreatitis based on the currently available evidence.[3] These guidelines serve as a reference standard for current management. A structured, ongoing effort to achieve optimal dissemination and implementation of guidelines that promote evidence based medicine remains a key challenge. Evidence suggests that audit and clinical review increases awareness of guidelines and improves implementation.[8]

The proposers of this study were motivated to suggest that a review of all aspects of the quality of care for patients with acute pancreatitis nationwide was needed based on work they had undertaken on early mortality from acute pancreatitis in Scotland.* The management of acute pancreatitis crosses many medical specialties and the complexity of care means that there are several areas where they believed the care for patients with acute pancreatitis could be improved. This view was supported by the NCEPOD Steering Group and the commissioners of this work programme. It has been known for many years that treating gallstones early prevents recurrent acute pancreatitis and interventions in patients drinking alcohol in excess can help reduce their intake. Yet concerns remained within the professional groups that patients may still not be receiving optimal care.

The study presented in this report is a comprehensive assessment of current practice and will go some way to identify and address the issues in the care of patients with acute pancreatitis with the aim of improving practice and outcomes for future patients.

*McKay CJ1, Evans S, Sinclair M, Carter CR, Imrie CW. High early mortality rate from acute pancreatitis in Scotland, 1984–1995. Br J Surg. 1999 Oct;86(10):1302–5.

1

Method and Data Returns

Back to contents

Method

Study Advisory Group

To develop this study a Study Advisory Group (SAG) was convened. This multidisciplinary group comprised clinicians in: gastroenterology, critical care, radiology, pharmacy, surgery, specialist dietetics, specialist nursing and lay representation.

Study aim

To identify the remediable factors in the quality of care provided to patients treated for acute pancreatitis.

Objectives

The Study Advisory Group identified a number of areas of care to review that would address the primary aim of the study, these included:

- The presentation, diagnosis & admission of patients with acute pancreatitis, including use of early warning scores (EWS)
- The quality of initial management
- The criteria used to determine severity of acute pancreatitis
- Whether critical care input was being sought appropriately and, when sought, whether there was an adequate response
- Ongoing supportive management, including the adequacy of nutrition, analgesia and the appropriateness of antimicrobial usage
- Radiological imaging and intervention
- Treating the cause, including appropriateness of endoscopic retrograde cholangiopancreatography (ERCP), timeliness of gallstone treatment and referral to alcohol cessation services, when indicated
- The treatment of complications, including use of the step-up approach for pancreatic necrosis and timing of interventions
- Co-ordination of care for patients with acute pancreatitis. This included whether well-established networks of care and robust clinical guidelines for transfer to a tertiary centre were in place
- Whether all deaths were discussed in a morbidity and mortality meeting

Hospital participation

National Health Service hospitals in England, Wales and Northern Ireland were expected to participate as well as hospitals in the independent sector and public hospitals in the Isle of Man, Guernsey and Jersey.

Within each hospital, a named contact, referred to as the NCEPOD Local Reporter, acted as a link between NCEPOD and the hospital staff, facilitating case identification, dissemination of questionnaires and data collation.

Study population and case ascertainment

Patients aged 16 years or older who were coded for a primary diagnosis of acute pancreatitis and admitted to hospital between 1st January 2014 and 30th June 2014 inclusive were included. The inclusion ICD10 diagnosis codes used were:

K85.0 Idiopathic acute pancreatitis
K85.1 Biliary acute pancreatitis
K85.2 Alcohol induced acute pancreatitis
K85.3 Drug induced acute pancreatitis
K85.8 Other acute pancreatitis
K85.9 Acute pancreatitis, unspecified

There were no specific exclusions.

Critical care admission data were also requested and the following subpopulations of patients were selected (one or more of the criteria below):

- An inpatient stay of three or more nights
- Admission to critical care
- Death in hospital

A sample of this subpopulation was then randomly selected (up to 5 cases per hospital) for inclusion.

Questionnaires and case notes

Two questionnaires were used to collect data for this study; a clinician questionnaire for each case and an organisational questionnaire for each participating hospital.

Clinician questionnaire

This questionnaire was sent to the consultant responsible for the care of the patient at the time of their discharge. If that consultant was not the most suitable person to complete the questionnaire they were asked to identify a more appropriate individual. Information was requested on the patient's presenting features, co-morbid conditions, initial management, investigations/procedures carried out, treatment, complications and escalation in care.

Organisational questionnaire

An organisational questionnaire was sent to every hospital where patients may be treated for acute pancreatitis. The data requested in this questionnaire included information on the teams that patients with acute pancreatitis are admitted under, ERCP services, radiology services, surgical services, guideline use and standard operating procedures relevant to the management of acute pancreatitis patients. Completion of the organisational questionnaire was the responsibility of the Medical Director of the Trust/Board or a person, nominated by them, who would be able to complete the form accurately. Input from the clinical leads for sub-speciality services, including surgery, radiology/interventional radiology and endoscopy was strongly recommended. Where data were incomplete NCEPOD staff contacted individual Trusts/Boards to maximise the percentage of full data sets.

Case notes

Photocopied case note extracts from the final inpatient admission were requested for each case that was to be peer reviewed. These included:

- All inpatient annotations/medical notes for the patient's final admission
- Nursing notes
- Critical care notes
- Operation/procedure notes
- Anaesthetic charts
- Observation charts
- Haematology/biochemistry results
- Fluid balance charts
- Blood transfusion records
- Drug charts
- Radiology reports
- Nutrition/dietitian notes
- Consent forms
- Discharge letter/summary
- Autopsy report if applicable

Peer review of the case notes and data

A multidisciplinary group of case reviewers was recruited to peer review the case notes and associated clinician questionnaires. The group of case reviewers comprised consultants, associate specialists, trainees and clinical nurse specialists, from the following specialties: gastroenterology, anaesthesia, intensive care medicine, acute medicine and surgery. Questionnaires and case notes were anonymised by the non-clinical staff at NCEPOD. All patient identifiers were removed so neither the Clinical Co-ordinators at NCEPOD, nor the case reviewers, had access to patient identifiable information.

Following anonymisation, each case was reviewed by one case reviewer within a multidisciplinary group. At regular intervals throughout the meeting, the Chair allowed a period of discussion for each reviewer to summarise their cases and ask for opinions from other specialties or raise aspects of the case for discussion. Case reviewers completed a semi-structured assessment form for each case which provided both quantitative and qualitative responses to their opinion on the care that had been provided.

The grading system below was used by the case reviewers to grade the overall care each patient received:

- **Good practice:** A standard that you would accept from yourself, your trainees and your institution.
- **Room for improvement:** Aspects of **clinical** care that could have been better.
- **Room for improvement:** Aspects of **organisational** care that could have been better.
- **Room for improvement:** Aspects of both **clinical and organisational** care that could have been better.
- **Less than satisfactory:** Several aspects of clinical and/or organisational care that were well below that you would accept from yourself, your trainees and your institution.
- **Insufficient data:** Insufficient information submitted to NCEPOD to assess the quality of care.

Information governance

All data received and handled by NCEPOD complies with relevant national requirements, including the Data Protection Act (DPA) 1998 (Z5442652), the NHS Act 2006 (PIAG 4-08(b)/2003, App No 0077) and the NHS Code of Practice.

Data quality

On receipt of the case data each case was given a unique NCEPOD number. The data from all questionnaires received were electronically scanned into a preset database. Prior to any analysis taking place, the data were cleaned to ensure that there were no duplicate records and that erroneous data had not been entered during scanning. Any fields that contained data that could not be validated were removed.

Data analysis

Following cleaning of the quantitative data, descriptive data summaries were produced. The qualitative data collected from the case reviewers' opinions and free text answers in the clinician questionnaires were coded, where applicable, according to content to allow quantitative analysis. The data were reviewed by NCEPOD Clinical Co-ordinators, a Clinical Researcher and a Researcher to identify the nature and frequency of recurring themes.

Case studies have been used throughout this report to illustrate particular themes.

All data were analysed using Microsoft Access™ and Excel™ by the research staff at NCEPOD.

The findings of the report were reviewed by the Study Advisory Group, case reviewers and the NCEPOD Steering Group prior to publication.

Data returns

In total 8,925 patients from 215 hospitals were identified as meeting the study inclusion criteria (Figure 1.1). When the sampling criteria of five cases per hospital was applied 987 cases were selected for inclusion in the main data collection. A total of 712/987 (72%) completed clinician questionnaires and 697 sets of case notes were returned to NCEPOD. The case reviewers were able to assess 418 cases, the remainder of the returned case note extracts were either too incomplete to allow assessment or were returned after the final deadline and last case reviewer meeting.

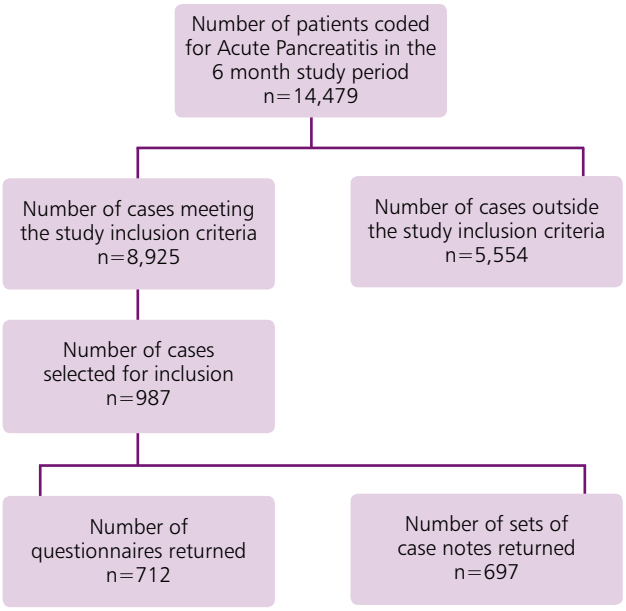

Figure 1.1 Data returns

Study sample denominator by chapter

Within this study the denominator will change for each chapter and occasionally within each chapter. This is because data have been taken from different sources depending on the analysis required. For example, in some cases the data presented will be a total from a question taken from the clinician questionnaire only, whereas some analysis may have required the clinician questionnaire and the case reviewers' view taken from the case notes. The term "clinician" is used to refer to data obtained from the clinician responsible for that patient's admission and care and the term "case reviewer" used to refer to data obtained from the multidisciplinary group who undertook peer review.

2

Patient characteristics

Back to contents

During the 6 month study period between 1st January and 30th June 2014, 14,479 patients were identified to NCEPOD as having been admitted to hospital with a primary diagnosis of acute pancreatitis (Table 2.1). The commonest diagnosis code (ICD10) was 'unspecified acute pancreatitis' which accounted for 52% of the total.

Table 2.1

ICD10 code description	Number of admissions	%
Acute pancreatitis, unspecified (K85.9)	7,572	52.3
Biliary acute pancreatitis (K85.1)	4,368	30.2
Alcohol induced acute pancreatitis (K85.2)	1,864	12.9
Other acute pancreatitis (K85.8)	360	2.5
Idiopathic acute pancreatitis (K85.0)	194	1.3
Drug induced acute pancreatitis (K85.3)	107	<1
Not answered	14	<1
Total	**14,479**	

Table 2.1 shows that coding did not accurately reflect the proportion of identified causes as shown in Table 2.3, as over half of all patients were coded as 'unspecified' or 'idiopathic pancreatitis'. This was likely due to an underlying general problem with the accuracy, complexity and quality of coding.[9] In an increasingly financially challenged healthcare system, poor coding may affect the maintenance and development of services, staff, equipment and perhaps viability. Moreover, it is likely to lead to the distortion of quality and safety outcome measures, such as hospital mortality indices.

Within the total population reported to NCEPOD during the sampling period 'biliary pancreatitis' was more common in females (40% vs.21.6%) and 'alcohol induced acute pancreatitis' in males (18.7% vs. 6.5%) (Table 2.2). This is in line with expected incidence and differences according to gender. Male patients were also more likely to be designated as 'unspecified acute pancreatitis' than females (55.1% vs. 48.8%).

Table 2.2 Number of admissions by gender

	Male		Female	
ICD10 code description	**Number of admissions**	**%**	**Number of admissions**	**%**
Acute pancreatitis, unspecified (K85.9)	4,136	55.1	3,262	48.8
Biliary acute pancreatitis (K85.1)	1,622	21.6	2,673	40.0
Alcohol induced acute pancreatitis (K85.2)	1,401	18.7	434	6.5
Other acute pancreatitis (K85.8)	184	2.5	168	2.5
Idiopathic acute pancreatitis (K85.0)	103	1.4	90	1.3
Drug induced acute pancreatitis (K85.3)	56	<1	46	<1
Not answered	8	<1	6	<1
Total	**7,510**		**6,679**	

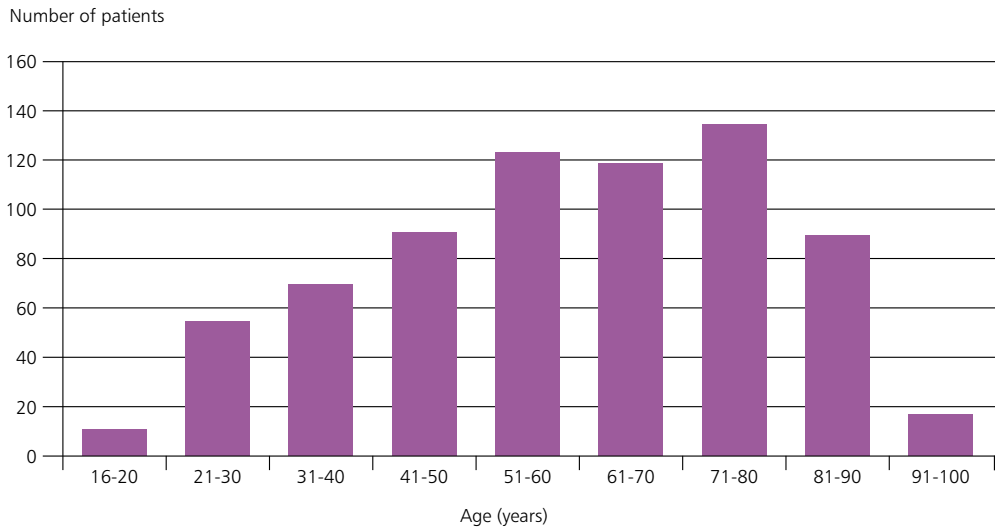

Figure 2.1 Age distribution

The age distribution for those in the study population is shown in Figure 2.1. The median age was 61 with a range of 17-99 years. In addition 387/712 (54%) patients were male.

Causes of acute pancreatitis

The causes of acute pancreatitis in the study population as determined by the clinicians who cared for the patients, are shown in Table 2.3. The commonest identified causes were gallstones in 322/692 (46.5%) patients and alcohol excess in 152/692 (22.0%) patients. In 121/692 (17.5%) patients no underlying cause had been identified. This was a higher rate than was expected and likely reflects a failure to elucidate an underlying cause in many cases. Acute pancreatitis as a complication of an endoscopic retrograde cholangio-pancreaticogram (ERCP) occurred in 28/692 (4%) patients. Prescription drugs were only implicated on their own or with another cause in 20 patients.

Patients who presented with alcohol-related acute pancreatitis were younger than those with gallstones or an unknown aetiology (Figure 2.2). The median age for alcohol-related acute pancreatitis was 49.5 years, compared to 67 years for gallstones and 69 years for an unknown aetiology. This difference was maintained across gender.

Table 2.3 Cause of acute pancreatitis

Cause	Number of patients	%
Gallstones	322	46.5
Alcohol	152	22.0
Unknown	121	17.5
Other	29	4.2
Post ERCP	28	4.0
Prescription drugs	14	2.0
Gallstones/alcohol	10	1.4
Alcohol/other	3	<1
Prescription drugs/other	2	<1
Unknown/other	2	<1
Alcohol/prescription drugs	2	<1
Gallstones/other	2	<1
Alcohol/unknown	2	<1
Gallstones/prescription drugs	2	<1
Gallstones/unknown	1	<1
Subtotal	**692**	
Not answered	20	
Total	**712**	

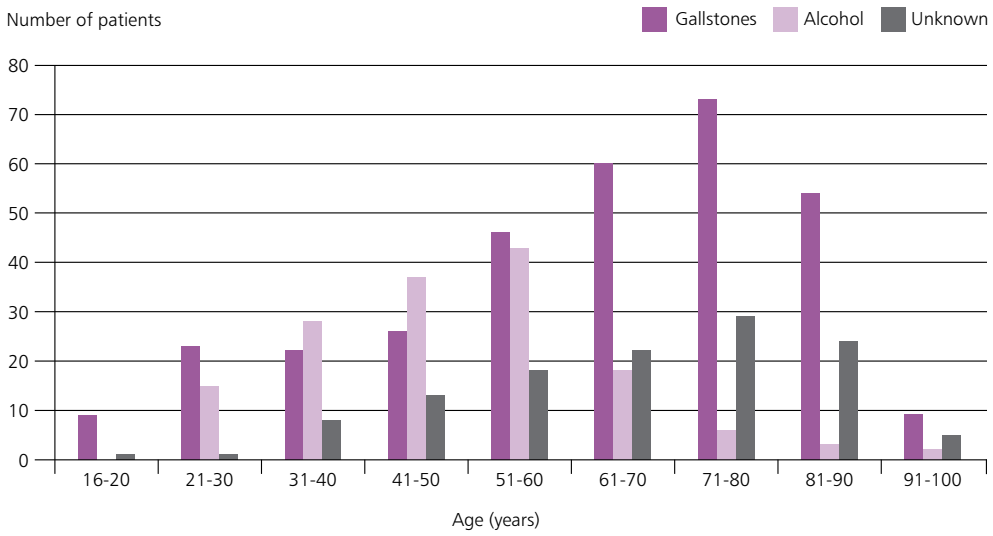

Figure 2.2 Age distributed by cause of acute pancreatitis

Determining the cause at the first presentation is very important, as it helps to direct therapy, limits further unnecessary evaluation, and prevents recurrence. In 17.5% (121/692) of patients no cause for acute pancreatitis was identified. Previous regional audits in the UK have revealed rates for unknown cause acute pancreatitis of 32% and 12.5%.[5,6] With thorough investigation a cause can be established in many more patients and truly idiopathic acute pancreatitis should account for less than 10% of patients.

Previous admissions with acute pancreatitis

Notably one in five patients included in this study had one or more previous episode of acute pancreatitis (20.6%; 143/694). It is known that many of these episodes may have been preventable if the underlying cause had been treated previously. The causes of the previous episode are shown in Table 2.4. In 93% (121/130) of cases the cause of the previous admission was the same as the current admission. The concordance rate was lower for unknown acute pancreatitis but this may be because the clinicians reclassified previous unknown causes with definitive ones upon further investigation. For a further discussion of recurrent admissions with gallstone and alcohol-related acute pancreatitis, see Chapter 7.

Table 2.4 Cause of previous episodes of acute pancreatitis compared with the present admission

	Previous admission					
Present admission	**Alcohol**	**Gallstones**	**Unknown**	**Other**	**Drugs/Other**	**Total**
Alcohol	56	1	2	0	0	**59**
Gallstones	1	34	5	0	0	**40**
Unknown	1	4	11	0	0	**16**
Other	0	1	4	7	0	**12**
Drugs/other	0	0	0	0	3	**3**
Total	**58**	**40**	**22**	**7**	**3**	**130**

Existing patient co-morbidities

Co-morbidities may influence both the cause and course of acute pancreatitis. For example, pre-existing cardiac or renal failure may render appropriate fluid therapy more challenging due to the greater potential for fluid overload. How well co-morbidities are managed may influence outcome. The majority of patients had one or more co-morbidity (Table 2.5). The commonest co-morbidity was known gallstones, followed by cardiac and respiratory disease (Table 2.6).

Table 2.5 Co-morbidities present at admission

Co-morbidities	Number of patients	%
Yes	492	72.8
No	184	27.2
Subtotal	**676**	
Unknown/not answered	36	
Total	**712**	

Table 2.6 Types of co-morbidities at admission

Co-morbidity	Number of patients
Gallstones	168
Respiratory	123
Cardiac	148
Hypertension	97
Diabetes	76
Other endocrine/metabolic	41
Renal	54
Neurological	61
Rheumatological	36
Current cancer treatment	32
Psychological	19
Obesity	16
Liver	14
Other gastrointestinal	28
Other	39

Answers may be multiple; n=712

The case reviewers considered that the patient's co-morbidities had contributed to the severity of their attack of acute pancreatitis and/or the outcome in 46.3% (106/229) (Table 2.7).

Table 2.7 Co-morbidities contributed to the severity of the acute pancreatitis and/or the outcome – reviewers' opinion

Co-morbidities contributed to the AP	Number of patients	%
Yes	106	46.3
No	123	53.7
Subtotal	**229**	
Unknown/not answered	40	
Total	**269**	

The clinicians caring for the patients identified that these co-morbidities were not well-controlled in 44/427 (10.3%) patients (Table 2.8).

Table 2.8 Co-morbidities were well controlled at admission

Co-morbidities controlled	Number of patients	%
Yes	383	89.7
No	44	10.3
Subtotal	**427**	
Unknown/not answered	65	
Total	**492**	

Specialist management of patient co-morbidities may improve outcomes. Overall 32.7% (124/379) of patients had specialist input into the control of their co-morbidities (Table 2.9). In those whom the clinicians deemed that the co-morbidities were not controlled on admission, 29/40 patients had appropriate onward specialist referral (Table 2.10).

Table 2.9 Patient referred for specialist input for control of comorbidity

Referral made	Number of patients	%
Yes	124	32.7
No	255	67.3
Subtotal	**379**	
Unknown/not answered	113	
Total	**492**	

Table 2.10 Appropriate specialist referral in patients with poorly controlled co-morbidities on admission – clinicians' opinion

Appropriate specialist referral	Number of patients
Yes	29
No	11
Subtotal	**40**
Unknown/not answered	4
Total	**44**

Key Findings

- The commonest identified causes of acute pancreatitis were gallstones in 322/692 (46.5%) patients and alcohol excess in 152/692 (22.0%) patients
- In 121/692 (17.5%) patients no underlying cause of the acute pancreatitis had been identified. By contrast the commonest diagnosis code (ICD10) used was 'unspecified acute pancreatitis' which accounted for 52% of the total population in this study
- 20.6% (143/694) of patients included in this study had one or more previous episode of acute pancreatitis
- In 121/130 (93%) patients the cause of the previous admission was the same as the current admission
- The case reviewers considered that the patient's co-morbidities had contributed to the severity of the attack of acute pancreatitis and/or the outcome in 46.3% (106/229) of patients
- The clinicians involved in the care of patients at the hospital identified that co-morbidities were not well-controlled on admission in 44/427 (10.3%) patients.

Recommendations: 1 & 2

The list of recommendations can be found on pages 71-72

3

Initial presentation, diagnosis and admission

Back to contents

Acute pancreatitis is diagnosed if two out of three of the following criteria are fulfilled:

1 Upper abdominal pain
2 Raised serum amylase or lipase three times greater than the upper limit of normal
3 Imaging such as computed tomography (CT) or magnetic resonance (MR) shows an inflamed pancreas.[3]

On admission, the cause of acute pancreatitis should be determined using a detailed personal history and physical examination. This should include a history of previous acute pancreatitis, gallstone disease, alcohol intake, medication and drug intake, hyperlipidaemia, trauma, recent invasive procedures (such as ERCP) and a family history of pancreatic disease. Laboratory serum tests, such as liver enzymes, calcium and triglycerides should be evaluated and all patients should have an ultrasound to exclude gallstones.[3]

Type of hospital where patients with acute pancreatitis were treated

Table 3.1 shows the types of hospital from which a completed organisational questionnaire was returned.

Table 3.1 Types of hospital where patients with acute pancreatitis may be treated

Type of hospital	Number of hospitals	%
District General Hospital ≤ 500 beds	71	40.6
District General Hospital > 500 beds	55	31.4
University Teaching Hospital	47	26.9
Other	2	1.1
Total	**175**	

Table 3.2 identifies the different teams patients with acute pancreatitis were admitted under. The data demonstrate that patients with acute pancreatitis were largely managed by surgeons, with both general and specialist surgical teams involved.

Table 3.2 Team under which patients with acute pancreatitis were admitted

Admitting team	Number of hospitals	%
General surgery	147	84.0
Emergency surgery	72	41.1
Upper gastrointestinal surgery	68	38.9
Gastroenterology	35	20.0
Hepatobiliary surgery	28	16.0
General medicine	21	12.0
Other	11	6.3

Answers may be multiple; n=175

Type and mode of admission

The majority of patients included in the study were admitted as an emergency (98.3%; 687/699) (Table 3.3). Only 12 patients were admitted electively and, of those, acute pancreatitis occurred as a complication of an elective admission for ERCP in six.

Table 3.3 Type of admission

Type of admission	Number of patients	%
Emergency	687	98.3
Elective	12	1.7
Subtotal	**699**	
Unknown/not answered	13	
Total	**712**	

The mode of admission is shown in Table 3.4.

Table 3.4 Mode of admission

Mode of admission	Number of patients	%
Via the emergency department	551	78.9
Direct from the general practitioner	86	12.3
Hospital transfer	30	4.3
Other	15	2.1
Following ERCP	12	1.7
Following outpatients	4	<1
Subtotal	**698**	
Not answered	14	
Total	**712**	

Only 30/698 (4.3%) patients in this study were transferred from another hospital for the management of their acute pancreatitis. This may be explained by the sampling criteria for the study as 5 cases were selected from every hospital which would have naturally biased the sample away from tertiary specialist centres.

Emergency department admission

The majority of patients who were admitted as an emergency were admitted via the Emergency Department (ED) 79% (551/698). In the opinion of the case reviewers the assessment in the ED was sufficiently prompt for the patient's condition in 94.8% (289/305) of cases that they assessed, (see Chapter 4 for discussion of early warning scores in the ED). In 11.1% (55/494) of the patients admitted via the ED the clinicians had concerns about the management in the ED (Table 3.5).

Table 3.5 Quality of management in the emergency department – clinicians' opinion

Satisfactory management	Number of patients	%
Yes	439	88.9
No	55	11.1
Subtotal	**494**	
Not answered	57	
Total	**551**	

The reasons for these concerns are shown in Table 3.6. The commonest being delays in senior medical review; delayed ward admission (with 6/16 delays due to a lack of beds); inadequate assessment and fluid resuscitation.

Table 3.6 Reason for unsatisfactory management in the emergency department – clinicians' opinion

Reason management in ED was classified as unsatisfactory	Number of patients
Condition required earlier/more senior input	19
Condition required earlier admission [incl. no beds]	16 [6]
Delayed resuscitation	12
Inadequate assessment	12
Delayed analgesia	8
Poor documentation	6
Inadequate monitoring	3
Inappropriate antibiotics	2

Answers may be multiple; n=55

Case reviewers similarly identified delayed or inadequate assessment and intravenous fluid resuscitation as the commonest reasons for an unsatisfactory ED management, along with inadequate diagnosis (e.g. "abdo pain – refer to surgeons") (Table 3.7).

Table 3.7 Reason for unsatisfactory management in the emergency department – reviewers' opinion

Reason	Number of patients
Delayed or inadequate assessment	13
Delayed or inadequate fluid resuscitation	9
Delayed or inadequate diagnosis	7
Inadequate monitoring	4
Delayed or inadequate analgesia	2
Inappropriate antibiotic use	2

Answers may be multiple; n=26

Ward admission

The majority of ward care was surgically led, with at least 483/701 (68.9%) patients admitted to a surgical ward or surgical assessment unit. Reflecting the severity of their condition at presentation, 66/701 (9.4%) patients were admitted directly to Level 2 (high dependency) or Level 3 (intensive care) facilities. Table 3.8 shows the location where patients were admitted.

Table 3.8 Location of admission

Location patient admitted	Number of patients	%
Surgical assessment/admissions unit	281	40.0
General surgical	193	27.5
Medical assessment/admissions unit	97	13.8
Other	38	5.4
Level 3	35	5.0
Level 2	31	4.4
General medical	8	1.1
Gastroenterology	8	1.1
Hepatobiliary surgery	7	1.0
Gastrointestinal surgery	2	<1
Hepatology	1	<1
Subtotal	**701**	
Not answered	11	
Total	**712**	

Clinical presentation

The commonest presenting symptoms were abdominal pain and vomiting, followed by back pain (Table 3.9). Haemodynamic compromise (shock) was present in 30 patients (4.7%) at presentation.

Table 3.9 Symptoms at presentation

Symptoms	Number of patients	%
Abdominal pain	659	93.5
Vomiting	317	45.0
Back pain	106	15.0
Other	79	11.2
Shock	33	4.7

Answers may be multiple; n=705

Half of the patients (361/648; 55.7%) had symptoms for more than 12 hours at the time of presentation (Table 3.10). Late presentation or referral from primary care delays initiation of fluid resuscitation and oxygenation and may affect outcome. However, this study did not show a difference in need for critical care admission or in mortality for patients presenting within 24 hours compared to those presenting after this time. Patients in this study who presented late were also no more likely to have had a previous admission for acute pancreatitis (77/414 versus 49/217).

Table 3.10 Time since onset of acute pancreatitis

Time since onset of acute pancreatitis	Number of patients	%
< 3 hours	68	10.5
3-6 hours	106	16.4
6-12 hours	113	17.4
12-24 hours	135	20.8
24-48 hours	61	9.4
2-5 days	97	15.0
5-7 days	20	3.1
> 7 days	48	7.4
Subtotal	**648**	
Not recorded/not answered	64	
Total	**712**	

Diagnosis of acute pancreatitis

In the opinion of the case reviewers, acute pancreatitis was diagnosed appropriately in 388/402 (96.5%) cases (Table 3.11).

Table 3.11 How acute pancreatitis was diagnosed

How acute pancreatitis was diagnosed	Number of patients	%
Pain, raised enzymes	185	44.3
Pain, raised enzymes, imaging	143	34.2
Raised enzymes	21	5.0
Pain, imaging	19	4.5
Raised enzymes, imaging	17	4.1
Imaging	13	3.1
Pain	6	1.4
Pain, raised enzymes, imaging, other	5	1.2
Pain, raised enzymes, other	4	1.0
Not answered	2	<1
Raised enzymes, other	2	<1
Pain, imaging, other	1	<1
Total	**418**	

Initial investigations

On admission, the aetiology of acute pancreatitis should be determined using detailed personal and family history of pancreatic disease, physical examination and laboratory serum tests. Arterial blood gas analysis is generally indicated whenever oxygen saturation is less than 95% or the patient is tachypnoeic.[2] Appropriate initial investigations were not undertaken in 22.5% (88/391) of cases, in the case reviewers' opinion. Similar conclusions were made by the clinicians who cared for the patient and who completed a questionnaire for the study (Table 3.12).

Table 3.13 shows the investigations that clinicians who cared for the patients stated were appropriate but omitted. Tests such as serum calcium and glucose may become significantly deranged in acute pancreatitis, requiring immediate correction. The absence of the liver enzyme test, lactate dehydrogenase is likely to represent its decreased overall use and general unavailability in most hospitals. Its traditional use in acute pancreatitis, as part of the Ranson and Glasgow scoring systems, has now assumed less importance (see discussion of scoring systems and risk assessment in Chapter 5).

Table 3.12 Appropriateness of investigations

	Case reviewers' opinion		Clinicians' opinion	
Appropriate investigations	**Number of patients**	**%**	**Number of patients**	**%**
Yes	303	77.5	494	72.8
No	88	22.5	185	27.2
Subtotal	**391**		**679**	
Unknown/not answered	27		33	
Total	**418**		**712**	

Table 3.13 Appropriate investigations that were omitted but should have been done – clinicians' opinion

Missing investigations	Number of patients	%
Lactate dehydrogenase	56	30.3
Lipid profile	53	28.6
Triglycerides	45	24.3
Clotting screen	45	24.3
Arterial blood gases	41	22.2
Serum calcium	35	18.9
Glucose	32	17.3
Group and save	27	14.6
ECG	28	15.1
Chest x-ray	19	10.3
C-reactive protein	18	9.7
Lipase	17	9.2
Troponin	11	5.9
Amylase	2	1.1
Liver function tests	2	1.1

Answers may be multiple; n=185

3

Key Findings

- Patients with acute pancreatitis were largely managed by surgeons; with both general and specialist surgical teams involved
- In 94.8% (289/305) of cases assessed, the case reviewers stated that the assessment in the emergency department was sufficiently prompt for the patient's condition
- In 11.1% (55/494) of the patients admitted via the emergency department the clinicians involved in the care at the hospital had concerns about the management of care in the emergency department, the commonest concerns being delays in senior medical review; delayed ward admission; inadequate assessment and resuscitation
- In 22.5% (88/391) of cases appropriate initial investigations were not undertaken, in the case reviewers' opinion.

4

Initial management

Back to contents

The main management goal in the initial treatment of acute pancreatitis is good resuscitation to ensure adequate tissue perfusion and prevent later complications. This includes administration of oxygen to maintain blood oxygenation and early optimal fluid management. The main symptom of acute pancreatitis is pain, so providing effective analgesia is essential. Control of existing co-morbidities is necessary. Ongoing monitoring is essential for all and Critical Care Outreach assessment and admission will be required for those with severe acute pancreatitis. Acute pancreatitis is not an infectious disease and early use of antibiotics is not recommended.

Risk assessment

Prediction of the course and outcome of a disease on admission (as opposed to diagnosis of clinical deterioration and organ failure) can help with tailoring observations and initial treatment but has little further clinical value in the management of patients. In acute pancreatitis, many different predictive scoring systems for risk assessment (e.g. APACHE II, Ranson and modified Glasgow score), as well as single serum markers (C-reactive protein, haematocrit, procalcitonin, blood urea nitrogen) have been employed but none of these have shown to be clearly superior to a persistent systemic inflammatory response syndrome (SIRS).[3] The widespread adoption of early warning scores (EWS) requires further evaluation as a risk assessment tool in acute pancreatitis, while serum amylase is a diagnostic test for acute pancreatitis and has no prognostic value.

Recent international consensus on definitions of sepsis has highlighted the inadequate sensitivity and specificity of SIRS.[10] Sepsis is now defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. Organ dysfunction is represented by an increase in the Sequential (sepsis-related) Organ Failure Assessment (SOFA) score of 2 points or more. Early initiation of broad spectrum antibiotics and aggressive resuscitative measures has been shown to decrease mortality in patients with severe sepsis and septic shock.[11] The early recognition of these conditions is therefore of the utmost importance. However, early antibiotic use is not part of the initial management of acute pancreatitis, as organ dysfunction is not driven by a bacterial cause at this point in the disease evolution. Hence, the need for a clear early diagnosis of acute pancreatitis, distinguishing it from causes of sepsis.

Early warning scores

The early warning score was developed with the aim of providing a simple scoring system which could be readily applied by nurses and doctors to help identify patients developing critical illness. The EWS is an aggregate weighted scoring system with six physiological parameters (respiratory rate, heart rate, systolic blood pressure, temperature, level of consciousness and oxygen saturations). The use of such early warning tools enhances equity in care by ensuring timely recognition of all patients with potential or established critical illness. This allows their treatment by individuals with appropriate skills, knowledge and experience to treat the patient effectively. Hence, an early warning scoring system, which incorporates these parameters, is ideally placed to help identify patients at risk of predicted or actual severe acute pancreatitis.

A number of EWS systems are currently in use across the NHS; this can result in a lack of familiarity with local systems when staff move between clinical areas/hospitals and lead to a lack of consistency in the approach to detection and response to acute illness. The National Early Warning Score (NEWS) has been developed as a system that can be adopted across the NHS to provide a standardised track-and-trigger system for acute illness in people presenting to, or within hospitals.[12] An early warning score, ideally NEWS should be performed at the earliest opportunity and an ongoing monitoring plan, which includes the frequency of NEWS monitoring, should also be put in place for all patients.

Prediction and assessment of severity - organisational data

Table 4.1 shows the parameters used by staff within hospitals to assess the severity of acute pancreatitis. Use of an early warning score was quoted as being used in the severity and prediction of acute pancreatitis in 71% (117/165) of hospitals from which a response was received. In keeping with a common misconception, serum amylase was quoted as a marker of severity by 24% (40/165) of hospitals, despite it being a purely diagnostic test with no prognostic value.

Table 4.1 Assessment of the severity of acute pancreatitis

Assessment made	Number of hospitals	%
Glasgow score	145	87.9
C-reactive protein	122	73.9
Early warning score	117	70.9
Amylase	40	24.2
Ranson score	28	17.0
Other	25	15.2

Answers may be multiple; n=165

Use of an early warning score in the emergency department and following admission to a ward

Although the initial assessment was deemed prompt in the majority of cases, it did not include any form of EWS in 154/502 (30.7%) of ED admissions for acute pancreatitis (Table 4.2).

Table 4.2 Completion of an early warning score in the emergency department

EWS completed in the ED	Number of patients	%
Yes	348	69.3
No	154	30.7
Subtotal	**502**	
Unknown/not answered	49	
Total	**551**	

When the EWS was performed in the ED the clinicians reported that it triggered a response in 85/329 (25.8%) patients (Table 4.3). The commonest response was an earlier medical review. Other responses included increased fluid resuscitation and oxygenation or a critical care outreach review (Table 4.4). In all but two cases, the case reviewers considered that the response to the EWS was appropriate.

Table 4.3 Early warning score triggered a response

EWS triggered response	Number of patients	%
Yes	85	25.8
No	244	74.2
Subtotal	**329**	
Unknown/not answered	19	
Total	**348**	

Table 4.4 Type of response triggered by the early warning score

Response triggered by EWS	Number of patients
Medical review	42
Increased IV fluids/oxygen	18
Critical care/outreach review	9
Increased monitoring	9
Increased analgesia	5

Answers may be multiple; n=81

CASE STUDY 1

An elderly patient with a history of temporal arteritis and gallstones but no surgery was admitted with acute abdominal pain. The first medical review was by a senior trainee doctor at 4 hours with no treatment given or early warning score calculated. Abnormal liver function tests suggested biliary obstruction. Ultrasound did not identify gallstones. The cause of the patients acute pancreatitis was attributed to their prednisolone medication.

The case reviewers considered IV fluids and oxygen should have been administered earlier and the abnormal liver function tests should have triggered a more thorough biliary tract assessment.

On admission to a ward, a EWS was performed in 571/662 (86.3%) cases (Table 4.5). The clinicians stated that the ward EWS score triggered a response in 23.9% (130/544) of patients (Table 4.6). A ward calculation of EWS altered care in a quarter of acute pancreatitis patients, similar to the result from the ED use of EWS.

Table 4.7 compares the use of EWS in the ED and on the ward for those 79% (551/698) of patients admitted via the ED. While 313/481 (65.1%) patients had an EWS recorded in both locations, 42/481 (8.7%) patients had no EWS performed in either location. Where EWS was performed in a single location it was more common for it to be omitted in the ED.

The type of EWS used in the ED and the ward was the same in 92% (263/285) of cases but in 8% (22/285) it was different.

Table 4.5 Completion of an early warning score on the ward

EWS completed on the ward	Number of patients	%
Yes	571	86.3
No	91	13.7
Subtotal	**662**	
Unknown/not answered	50	
Total	**712**	

Table 4.6 Early warning score triggered a response on the ward

EWS triggered a response	Number of patients	%
Yes	130	23.9
No	414	76.1
Subtotal	**544**	
Unknown/not answered	27	
Total	**571**	

Table 4.7 Comparison of the use of the EWS in the ED and on the ward – reviewers' opinion

	EWS completed on the ward				
EWS completed in the ED	**Yes**	**No**	**Subtotal**	**Not answered**	**Total**
Yes	313	21	334	14	**348**
No	105	42	147	7	**154**
Subtotal	**418**	**63**	**481**	**21**	**502**
Not answered	34	6	40	9	**49**
Total	**452**	**69**	**521**	**30**	**551**

Monitoring, early warning scores and critical care outreach response

Acute pancreatitis is an unpredictable illness; patients are at risk of deterioration due to the development of sepsis and other complications. Careful monitoring and prompt, appropriate responses are mandatory. This report records widespread ongoing use of EWS, with evidence in 93% (356/383) of patients having some form of regular monitoring on the ward, using one of the

recognised varieties of EWS (Table 4.8). This frequently led to an escalation of response (47.3% of cases; Table 4.9).

Table 4.8 Ongoing use of an early warning score

Ongoing use of an EWS	Number of patients	%
Yes	356	93.0
No	27	7.0
Subtotal	**383**	
Unknown/not answered	35	
Total	**418**	

Table 4.9 Escalation triggered by early warning score

Escalation triggered	Number of patients	%
Yes	158	47.3
No	176	52.7
Subtotal	**334**	
Unknown/not answered	22	
Total	**356**	

Responses included, review by a critical care physician or member of an outreach team in the majority of instances (Table 4.10). Effective responses must be both timely and appropriate. This review highlights that, while responses were almost always appropriate, they were not always timely (Table 4.11). There also remains a small group of patients (14/187; 7.5%), who did not receive a critical care review in whom the case reviewers considered that they may have benefited from this (Tables 4.12 and 4.13).

Table 4.10 Response triggered by an early warning score

Response triggered	Number of patients
Review by critical care clinician	73
CCOT review	73
Review by other clinician	56
Review by other emergency team	7
Other	7

Answers may be multiple; n=158

Table 4.11 Timeliness of response to an early warning trigger – reviewers' opinion

	Timeliness of response appropriate				
Response triggered by EWS score appropriate	**Yes**	**No**	**Subtotal**	**Unknown/ Not answered**	**Total**
Yes	115	15	**130**	3	**133**
No	2	3	**5**	1	**6**
Subtotal	**117**	**18**	**135**	**4**	**139**
Unknown/not answered	1	0	**1**	1	**2**
Total	**118**	**18**	**136**	**5**	**141**

Table 4.12 Evidence of a critical care outreach or equivalent review

Evidence of review	Number of patients	%
Yes	173	44.7
No	214	55.3
Subtotal	**387**	
Unknown/not answered	31	
Total	**418**	

Table 4.13 Patient should have had a critical care review but did not – reviewers' opinion

Should have been reviewed	Number of patients	%
Yes	14	7.5
No	173	92.5
Subtotal	**187**	
Unknown/not answered	27	
Total	**214**	

Table 4.14 Appropriate risk assessment

	Case reviewers' opinion		Clinicians' opinion	
Appropriate risk assessment	**Number of patients**	**%**	**Number of patients**	**%**
Yes	354	92.7	468	88.5
No	28	7.3	61	11.5
Subtotal	**382**		**529**	
Unknown/not answered	36		183	
Total	**418**		**712**	

CASE STUDY 2

An elderly patient with a clinical diagnosis of acute pancreatitis had a heart rate of 129/min and a NEWS score of 8. A timely Critical Care Outreach review was performed by a specialist registrar. Marked tachycardia was attributed to pain. Three further Critical Care Outreach reviews were performed overnight documenting persisting tachycardia, decreasing urine output and increasing respiratory rate and metabolic acidosis. Escalation to high dependency care occurred 10 hours after the first review by which time the patient was hypothermic. The patient died 3 days later on the intensive care unit.

The case reviewers considered that the care should have been escalated at the time of the first review and may have altered the outcome. They questioned whether senior support was available to the reviewing critical care outreach doctor as no discussion was documented.

Table 4.15 Medication prior to admission known to be associated with acute pancreatitis

Medication	Number of patients	%
Statins	176	54.0
Other medication relevant to acute pancreatitis	133	40.8
Diuretics	96	29.4
Steroids	36	11.0
5-aminosalicyclic acid	31	9.5
Azathioprine	10	3.1

Answers may be multiple; n=326

Overall risk assessment

It was considered that appropriate risk assessment was performed in 88.5% (468/529) of cases according to the clinicians and similarly, 92.7% (354/382) of cases according to the case reviewers (Table 4.14).

Management of medications on admission

Prescription drugs are thought to be a rare cause for acute pancreatitis; however 525 different medication are listed in the World Health Organisation (WHO) database suspected to cause acute pancreatitis as a side effect. Many of them are widely used to treat highly prevalent diseases. The true incidence is not entirely clear since only a few systematic population based studies exist. Furthermore, the causality for many of these drugs remains elusive and for only 31 of these 525 drugs a definite causality is established (see Appendix 3). Definite proof for causality is defined by the WHO classification if symptoms reoccur upon reintroduction of the drug.[13] Diagnosis of drug-induced acute pancreatitis requires not only a diagnosis of acute pancreatitis but the clear exclusion of other causes. Management of drug-induced acute pancreatitis requires withdrawal of the offending agent.

In this study, 326 of 712 patients were taking statins, diuretics, steroids, 5- aminosalicyclic acid, azathioprine or other medication relevant to acute pancreatitis prior to admission (Table 4.15). Of the 326 patients on medications relevant to acute pancreatitis, 174 were assessed by the case reviewers; medications were stopped in 114 cases and, in the reviewers' opinion, stopped appropriately in 98/114 cases.

Venous thromboembolism (VTE) prophylaxis

NICE guideline (CG92) *'Venous thromboembolism: reducing the risk for patients in hospital'* recommends that all patients be assessed on admission to identify those who are at increased risk of VTE.[14] Patients not undergoing surgery should be regarded as being at increased risk of VTE if they are expected to have significantly reduced mobility for three days or more, or ongoing reduced mobility relative to their normal state, along with one or more of the known risk factors: cancer, age over 60 years, dehydration, a critical care admission, obesity, significant medical co-morbidities, personal history or first-degree family history of VTE, or to have a known thrombophilia. All patients should be assessed for risk of bleeding before offering pharmacological VTE prophylaxis. Patients with acute pancreatitis assessed to be at increased risk of VTE should be offered pharmacological VTE prophylaxis.

In this study 90.8% (344/379) of patients were prescribed regular low molecular weight (LMW) heparin (Table 4.16). VTE prophylaxis was considered adequate by the case reviewers in 94.8% (348/367) of cases (Table 4.17). Where this was not considered adequate there was a delay in administering LMW heparin or it was omitted altogether.

Table 4.16 Prescribed prophylactic low molecular weight heparin

Prophylactic LMW heparin	Number of patients	%
Yes	344	90.8
No	35	9.2
Subtotal	**379**	
Unknown/not answered	39	
Total	**418**	

Table 4.17 Adequacy of VTE prophylaxis – reviewers' opinion

Adequate	Number of patients	%
Yes	348	94.8
No	19	5.2
Subtotal	**367**	
Unknown/not answered	51	
Total	**418**	

Table 4.18 Adequacy of oxygenation – reviewers' opinion

Adequate	Number of patients	%
Yes	385	95.3
No	19	4.7
Subtotal	**404**	
Unknown/not answered	14	
Total	**418**	

Oxygenation

Supplemental oxygen should be provided to maintain normal arterial oxygen saturation.[15] The case reviewers considered that adequate oxygenation was achieved in 95.3% (385/404) of cases (Table 4.18). Where adequate oxygenation was not achieved case reviewers noted a marked delay in administering supplemental oxygen or that this was omitted altogether.

IV fluid resuscitation

The main goal of initial management is adequate fluid resuscitation. Rapid infusion of crystalloid fluid or colloid may be needed to restore circulating volume and maintain urine output. A urinary catheter allows accurate measurement of output.

The International Association of Pancreatology (IAP) consensus guidelines on fluid therapy in acute pancreatitis recommend Ringer's lactate as the initial fluid but in the United Kingdom, Hartmann's solution is a widely used alternative.[3] Consensus opinion is that 2.5-4 litres in 24 hours will be sufficient for most patients, but that volumes infused should be determined by the clinical response and should be assessed by non-invasive clinical targets of heart rate <120/min, mean arterial pressure between 65-85 mmHg, and urinary output $>$ 0.5-1ml/kg/hour, and/or invasive clinical and biochemical targets (haematocrit).

Table 4.19 Adequacy of fluid management

	Case reviewers' opinion		Clinicians' opinion	
Adequate	**Number of patients**	**%**	**Number of patients**	**%**
Yes	333	86.9	456	86.2
No	50	13.1	73	13.8
Subtotal	**383**		**529**	
Unknown/Not answered	35		183	
Total	**418**		**712**	

Measurement of parameters provided by non-invasive means is useful on a regular ward, while invasive means are more appropriate in the intensive care unit.

IV fluid management was considered inadequate in a similar percentage of cases (13.8% and 13.1% respectively) by both the clinicians caring for the patient and the case reviewers (Table 4.19).

Renal function

The 2009 NCEPOD study *'Adding Insult to Injury'* examined the care of patients who died in hospital with a primary diagnosis of acute kidney injury (AKI).[16] This identified systematic failings in the management of AKI. Failure to recognise and manage AKI appropriately was compounded by a failure to recognise and appropriately treat the complications of AKI. As the condition was often recognised late, complications were more likely to be present. Recommendations included: all patients admitted as an emergency should have their electrolytes checked routinely on admission and appropriately thereafter; predictable and avoidable AKI should never occur; all acute admissions should receive adequate senior reviews; and the implementation of the relevant NICE Clinical Guideline. NICE guideline (CG169) *'Acute kidney injury: prevention, detection and management'*, provides guidance on: identifying AKI in patients with acute illness; prevention through ongoing assessment; and monitoring and prevention of deterioration in patients at high risk.[17]

In the present study, clinicians reported that 148/681 (22%) patients had or developed AKI (Table 4.20). Despite this, management of renal function was considered adequate in all but 5% (20/381) of cases assessed by the reviewers (Table 4.21). In 6 cases, causes of preventable AKI were identified as lack of appropriate IV fluid administration, lack of appropriate oxygenation and failure to discontinue a nephrotoxic drug.

Table 4.20 Patient developed acute kidney injury

Patient developed AKI	Number of patients	%
Yes	148	21.7
No	533	78.3
Subtotal	**681**	
Unknown/not answered	31	
Total	**712**	

Table 4.21 Appropriate management of renal function – reviewers' opinion

Renal function managed appropriately	Number of patients	%
Yes	361	94.8
No	20	5.2
Subtotal	**381**	
Unknown/not answered	37	
Total	**418**	

Approximately two-thirds of patients had a urinary catheter (Table 4.22) and in those catheterised, hourly monitoring of urine output was undertaken in 94% (401/427) of patients (Table 4.23).

Table 4.22 Urinary catheter

Urinary catheter	Number of patients	%
Yes	445	68.3
No	207	31.7
Subtotal	**652**	
Not answered	60	
Total	**712**	

Table 4.23 Hourly monitoring of urine output

Hourly monitoring	Number of patients	%
Yes	401	93.9
No	26	6.1
Subtotal	**427**	
Not answered	18	
Total	**445**	

Organ support

During initial management, 22% (89/406) of patients received organ support (Table 4.24). The numbers receiving cardiovascular, respiratory or renal support are given in Table 4.25. There were 12 cases where the case reviewers thought that organ support was inadequate; in half of these it was due to a delay in initiation.

Table 4.24 Organ support received

Organ support	Number of patients	%
Yes	89	21.9
No	317	78.1
Subtotal	**406**	
Unknown/not answered	12	
Total	**418**	

Table 4.25 Type of organ support received

Organ support received	Number of patients
Cardiovascular	55
Respiratory	43
Renal	18

Answers may be multiple; n=83

First consultant review

The Academy of Medical Royal Colleges has developed three patient-centred standards to deliver consistent inpatient care irrespective of the day of the week.[18] These standards reflect the importance of daily consultant review, and the consequent actions, to ensure progression of the patient's care pathway. Review by a consultant has also been recommended between 12-14 hours after admission.[19-21]

Where a first consultant review was identifiable (87.5% of cases; Table 4.26), this was considered not to be timely by the case reviewers in 9.5% of cases (Table 4.27).

Table 4.26 First consultant review recorded

Recorded	Number of patients	%
Yes	356	87.5
No	51	12.5
Subtotal	**407**	
Unknown/not answered	11	
Total	**418**	

4.27 First consultant review timely – reviewers' opinion

Timely	Number of patients	%
Yes	315	90.5
No	33	9.5
Subtotal	**348**	
Unknown/not answered	8	
Total	**356**	

CASE STUDY 3

A young patient was admitted with 12 hours of back pain and vomiting. Despite an elevated NEWS there was no senior input for 24 hours. Critical care input and transfer was also delayed. Nephrotoxic medications were not stopped despite the patient developing acute kidney injury. Ward discharge was considered too early as it occurred whilst still tachycardic and with markedly elevated C-reactive protein.

The case reviewers identified multiple failings which could have been addressed by earlier and more frequent senior input.

Successive NCEPOD reports have highlighted the importance of consultant review for acutely unwell patients. *'Just Say Sepsis!'*, the 2015 NCEPOD report on the process of care received by patients with sepsis found that 18% of patients did not receive a timely first consultant review;[22] the corresponding figure from *'Time to Get Control'*, an NCEPOD review of the care received by patients who had a severe gastrointestinal haemorrhage, was 16%.[23]

Key Findings

- Although the initial assessment was deemed prompt in the majority of patients it did not include any form of early warning score in 154/502 (30.7%) of emergency department admissions for acute pancreatitis
- On admission to a ward, an early warning score was performed in 571/662 (86.3%) cases
- The type of early warning score used in the emergency department and the ward was not the same in 8% (22/285) cases
- 93% (356/383) of cases had evidence of ongoing use of an early warning score. This frequently led to an escalation of response (47.3%). While responses were almost always appropriate, they were not always timely
- Intravenous fluid management was considered inadequate in a similar percentage of cases (13.8% and 13.1%, respectively) by both the clinicians caring for the patient and the case reviewers
- Clinicians reported that 148/681 (22%) patients developed acute kidney injury, and in six cases this was considered preventable
- Where a first consultant review was identifiable (87.5% of cases), this was considered not to be timely by the case reviewers in 9.5% of cases.

Recommendations: 3 & 4

The list of recommendations can be found on pages 71-72

5

Ongoing supportive management

Back to contents

Specialist reviews

Acute pancreatitis is a complex multisystem disorder. Moreover, the treatment is increasingly complex and input may be required from a range of different specialists. In the UK, patients with acute pancreatitis are traditionally admitted to general surgery, as they typically present with an acute abdomen. With increasing complexity, the management of acute pancreatitis requires a multidisciplinary approach. Severe acute pancreatitis typically requires co-operative input from a core of surgical, gastroenterological, radiological and intensive care specialists. Further input from renal specialists, cardiologists, etc. may be required, depending upon individual complications.

In this review, 90% (358/398) of patients were considered to have been seen by all the appropriate specialists for their condition (Table 5.1). Where this was lacking (40 cases), gastroenterological input was considered to be the missing specialty by the case reviewers in half of the cases, followed by general surgery (10 cases), specialist surgery (4 cases) and critical care medicine review.

Table 5.1 Patient reviewed by all appropriate specialties – reviewers' opinion

Appropriate review	Number of patients	%
Yes	358	89.9
No	40	10.1
Subtotal	**398**	
Unknown/not answered	20	
Total	**418**	

Critical care admissions

In the UK, early intervention and prevention of deterioration is the goal of critical care. A patient with severe acute pancreatitis as defined by the revised Atlanta Classification (i.e. persistent organ failure) should be treated in an intensive care setting.[3] In keeping with the inclusion criteria for this study, which selected those patients with a greater likelihood of having severe acute pancreatitis, a high proportion of patients were admitted to a critical care unit. Table 5.2 shows that 42% of patients were admitted to a critical care unit, with only two patients identified who the case reviewers believed would have benefitted, but who did not receive it (Table 5.2).

Table 5.2 Admission to critical care

Admission to critical care	Number of patients	%
Yes	174	42.0
No	240	58.0
Subtotal	**414**	
Unknown/not answered	4	
Total	**418**	

Pain management

The main symptom of acute pancreatitis is pain, and respiratory function may be impaired by restriction of abdominal wall movement. Providing effective analgesia may require the use of opioids. There are some theoretical risks of exacerbation of pancreatitis by morphine, which can increase pressure in the sphincter of Oddi, but there is little evidence that this is clinically significant and no evidence exists about the comparative effectiveness of different opioids in acute pancreatitis.[1]

Pain management – organisational data

Standards for acute pain services include consultant led teams supported by an adequate number of appropriately trained consultants, and clinical nurse specialists who should be able to prescribe independently.[24] Adequate staff and systems must be in place to provide timely pain management to all inpatients.

Most hospitals (95.9%) had an acute pain team on-site (Table 5.3) but only 28.6% reported that the service they provided was available 24/7 (Table 5.4).

Table 5.3 Acute pain team on-site

Acute pain team on-site	Number of hospitals	%
Yes	163	95.9
No	7	4.1
Subtotal	**170**	
Not answered	5	
Total	**175**	

Table 5.4 Acute pain service available 24/7

24/7 service	Number of hospitals	%
Yes	44	28.6
No	110	71.4
Subtotal	**154**	
Not answered	9	
Total	**163**	

Table 5.5 Specialist acute pain nurse

Specialist acute pain nurses	Number of hospitals	%
Yes	159	94.6
No	9	5.4
Subtotal	**168**	
Not answered	7	
Total	**175**	

Specialist acute pain nurses and consultant leads for acute pain management were present in 95% of hospitals (Tables 5.5 and 5.6)

A pain score was measured in 71.5% (379/530) of patients on admission (Table 5.7) and patients waited a median of 1 hour (range 0 hours to 7 days) before receiving their first analgesic.

In the opinion of the case reviewers, assessment of pain was considered inadequate in 5% (17/333) of cases. The amount/type of analgesia given was considered inadequate in 6% (20/357) of patients by the case reviewers, a view shared by the clinicians who completed a questionnaire on their patient (Table 5.8).

Table 5.6 Consultant lead for pain management

Consultant lead	Number of hospitals	%
Yes	155	93.9
No	10	6.1
Subtotal	**165**	
Not answered	10	
Total	**175**	

Table 5.7 Pain score calculated on admission.

Pain score on admission	Number of patients	%
Yes	379	71.5
No	151	28.5
Subtotal	**530**	
Unknown/not answered	182	
Total	**712**	

Table 5.8 Adequacy of analgesia

	Case reviewers' opinion		Clinicians' opinion	
Adequate analgesia	**Number of patients**	**%**	**Number of patients**	**%**
Yes	337	94.4	554	93.1
No	20	5.6	41	6.9
Subtotal	**357**		**595**	
Unknown/not answered	61		117	
Total	**418**		**712**	

Table 5.9 Patient seen by an acute pain team

Seen by acute pain team	Number of patients	%
Yes	106	17.1
No	515	82.9
Subtotal	**621**	
Unknown/not answered	91	
Total	**712**	

There were 17.1% (106/621) of patients seen by an acute pain team (Table 5.9). Clearly those deemed to have received inadequate analgesia may have benefitted from an acute pain team review.

Types of analgesics administered were predominantly intravenous paracetamol or opiate (Table 5.10). Intramuscular morphine, received by 64 patients, is likely to be ineffective and unsafe in a patient cohort usually intravascularly depleted on admission and undergoing subsequent fluid resuscitation.

Table 5.10 Type of pain relief

Type of analgesia	Number of patients	%
Intravenous paracetamol	251	39.1
Intravenous opiate (not patient-controlled)	240	37.4
Oral opiate	224	34.9
Oral paracetamol	189	29.4
Patient-controlled analgesia	73	11.4
Intramuscular morphine	64	10.0
Other	50	7.8
Oral non-steroidal inflammatory drugs	10	1.6
Intravenous non-steroidal inflammatory drugs	4	<1
Intramuscular non-steroidal inflammatory drugs	3	<1

Answers may be multiple; n=642

Antimicrobial management

There is strong agreement that intravenous antibiotic prophylaxis is not recommended for the prevention of infectious complications in acute pancreatitis.[3,25] The risks, of encouraging antibacterial resistance and opportunistic fungal infections, leading to even higher mortality rates, outweigh any benefits.[26] Despite this consensus, the continued use of antibiotic prophylaxis remains widespread. A recent global overview assessing compliance with national and international guidelines demonstrated that the lowest incidence of use of antibiotic prophylaxis was 41% and the highest 88%.[7]

Antibiotics were prescribed in 439/712 (61%) patients. Table 5.11 shows the indications for first antibiotic use as provided by the clinicians caring for the patients. Most commonly, the indication was not specified; followed by the indication "pancreatitis" in 65 cases and the term "sepsis" in 60.

Table 5.11 Indication for antibiotic use

Indication given by clinicians for first antibiotic prescription	Number of patients
Not specified	85
Pancreatitis	65
Sepsis	60
Biliary sepsis	35
Respiratory infection	28
Raised temperature	24
Raised white cell count	22
Pancreatic necrosis	17
Intra-abdominal sepsis	16
Raised C-reactive protein	13
Infected pancreatic necrosis	8
Empiric	8
Prophylactic prior to procedure	8
Prophylactic	7
Urinary tract infection	5
Confirmed bacteraemia	4
Clinical deterioration	4
Systemic inflammatory response syndrome	3
Septic shock	2
Organ failure	1
Raised procalcitonin	1
Clostridium difficile	1
Other	10

Answers may be multiple; n=439

In one fifth of cases, antimicrobial management was not considered appropriate by both the clinicians and the case reviewers (Table 5.12); the commonest reason of inappropriate antibiotic prescription being that antibiotics were not indicated (60/72 patients) (Table 5.13).

Table 5.12 Appropriateness of antimicrobial management

	Case reviewers' opinion		Clinicians' opinion	
Appropriate	**Number of patients**	**%**	**Number of patients**	**%**
Yes	321	81.7	302	80.7
No	72	18.3	72	19.3
Subtotal	**393**		**374**	
Unknown/not answered	25		338	
Total	**418**		**712**	

Table 5.13 Reason for inappropriate antimicrobial use - reviewers' opinion

Reason	Number of patients
Not indicated	54
Not indicated/other	3
Not indicated/inappropriate duration	3
Delay in administering	3
Other	6
Subtotal	**69**
Not answered	3
Total	**72**

One potential reason for over-use of antibiotics is that it can be difficult to distinguish a local or systematic inflammatory response from an episode of sepsis, as conventional markers such as leukocyte count and C-reactive protein (CRP) may be elevated in both conditions. Also, both conditions can co-exist. One method of distinguishing an infection-related white cell count/CRP response from systemic inflammation is by assessment of procalcitonin (PCT). Procalcitonin was assessed in only 11 cases.

Inappropriate use of antimicrobials has been a key driver in antimicrobial resistance, which has risen alarmingly over the last 40 years. NHS England, Health Education England and Public Health England have issued a joint Patient Safety Alert to all providers of NHS care in England to highlight the challenge of antimicrobial resistance and the need for antimicrobial stewardship.[27]

Nutrition and acute pancreatitis

For many years conventional teaching said that oral or enteral feeding might be harmful in acute pancreatitis; feeding was thought to stimulate exocrine pancreatic secretion and accelerate the autodigestive process. Today, enteral nutrition is considered an important component of acute treatment.[3] Enteral nutrition is thought to reduce the rate of infections and mortality in patients with acute pancreatitis, arising from bacterial translocation from the gut. Enteral feeding is believed to stimulate intestinal motility (reducing bacterial overgrowth) and stimulate intestinal blood flow, thereby preserving the integrity of the gut mucosa.[28]

Hospital nutrition teams

Data from the current study shows that 147/168 (87.5%) hospitals had a nutrition team in place (Table 5.14). This is a marked improvement from the 2010 NCEPOD report '*A Mixed Bag*', which examined the process of care of patients who receive parenteral nutrition, where only approximately 60% of hospitals reported having a nutrition team.[29] These teams comprised a multidisciplinary team of medical, dietetic and nursing staff (Table 5.15). Responses indicated that 113/147 nutrition teams undertook one or more ward round per week. The median number of ward rounds per week was three. Complete autonomy with respect to ordering and administering parenteral nutrition (PN) was present in 63% (85/134) of hospitals (Table 5.16).

Table 5.14 Nutrition team available

Nutrition team available	Number of hospitals	%
Yes	147	87.5
No	21	12.5
Subtotal	**168**	
Not answered	7	
Total	**175**	

Table 5.15 Nutrition team members

Team members	Number of hospitals	%
1st Doctor	127	90.1
2nd Doctor	57	40.4
3rd Doctor	16	11.3
Dietitian	137	97.2
Pharmacist	115	81.6
Nutrition nurse specialist	91	64.5
Chemical pathologist	32	22.7
1st other member	24	17.0
2nd other member	7	5.0

Answers may be multiple; n=141

Table 5.16 Decision making for parenteral nutrition by the nutrition team

Decision making	Number of hospitals	%
Complete autonomy	85	63.4
Advisory role	49	36.6
Subtotal	**134**	
Not answered	13	
Total	**147**	

Screening for malnutrition

All hospital inpatients should be screened for malnutrition on admission and this should be repeated weekly.[30] Screening should assess body mass index (BMI) and percentage unintentional weight loss. The use of The Malnutrition Universal Screening Tool (MUST) facilitates this.[31] Screening for malnutrition and the risk of malnutrition should be carried out by healthcare professionals with appropriate skills and training.

Table 5.17 A screening nutritional assessment performed

Nutritional assessment performed	Number of patients	%
Yes	368	67.4
No	178	32.6
Subtotal	**546**	
Unknown/not answered	166	
Total	**712**	

Table 5.18 Adequacy of the nutritional assessment

	Case reviewers' opinion		Clinicians' opinion	
Adequate	**Number of patients**	**%**	**Number of patients**	**%**
Yes	280	85.6	421	76.7
No	47	14.4	128	23.3
Subtotal	**327**		**549**	
Unknown/not answered	91		163	
Total	**418**		**712**	

A screening nutritional assessment was performed in only 67% (368/546) of cases (Table 5.17). Overall, nutritional assessment was deemed adequate in only 77% (421/549) of patients by the clinicians caring for these patients. According to the case reviewers, nutritional assessment was inadequate in 14% (47/327) of cases assessed (Table 5.18). In 29/47 of these cases it was classed as not adequate as no assessment was carried out at all and in a further 18 cases, where there was a nutritional assessment, it was delayed in six, incomplete in six, and not repeated in three.

Subsequent referral to a dietitian and nutrition team input occurred in 39% (201/521) (Table 5.19) and 25% (143/572) of cases respectively (Table 5.20), according to the clinicians.

Table 5.19 Patient referred to a dietitian

Referred	Number of patients	%
Yes	201	38.6
No	320	61.4
Subtotal	**521**	
Unknown/not answered	191	
Total	**712**	

Table 5.20 Involvement of a nutrition team

Nutrition team involved	Number of patients	%
Yes	143	25.0
No	429	75.0
Subtotal	**572**	
Unknown/not answered	140	
Total	**712**	

The case reviewers identified 33% (122/367) of patients who were referred to a dietitian (Table 5.21). Of the 210 patients who were not, the reviewers stated that they should have been in 27.1% (57/210) (Table 5.22).

Table 5.21 Patient seen by a dietitian – reviewers' opinion

Seen by a dietitian	Number of patients	%
Yes	122	33.2
No	245	66.8
Subtotal	**367**	
Unknown/not answered	51	
Total	**418**	

Table 5.22 Patient not seen by a dietitian but should have been – reviewers' opinion

Should have been seen	Number of patients	%
Yes	57	27.1
No	153	72.9
Subtotal	**210**	
Unknown/not answered	35	
Total	**245**	

Provision of supplemental nutrition

Oral feeding in predicted mild pancreatitis can be restarted once abdominal pain is decreasing and the patient is able to tolerate it. Nutrition support therapy is not needed in these patients.[32] Enteral tube feeding should be the primary therapy in patients with severe acute pancreatitis who require nutritional support.[3,33] Early enteral feeding is not superior to oral diet and later on-demand enteral feeding, so most specialist units refrain from early enteral nutrition and allow oral intake as tolerated.[34] Parenteral nutrition should only be started if the nutritional goals cannot be reached with oral or enteral feeding.[32]

Clinicians stated that supplemental nutrition was considered and used in 240/555 (43.2%) of patients (Table 5.23). This support took the form mainly of build-up drinks or oral diet supplementation (Table 5.24). Enteral feeding was provided in 119 patients, with the nasogastric route being generally preferred to the nasojejunal route; 35% versus 14% of patients receiving nutritional support. Forty-nine patients received parenteral nutrition, most commonly via a central line.

Table 5.23 Supplemental nutrition considered and used

Supplemental nutrition	Number of patients	%
Yes	240	43.2
No	315	56.8
Subtotal	**555**	
Unknown/not answered	157	
Total	**712**	

Table 5.24 Types of nutrition used

Nutrition used	Number of patients	%
Build up drinks	96	41.6
Nasogastric feeding	81	35.1
Oral diet	66	28.6
Parenteral nutrition via central line	41	17.7
Nasojejunal feeding	33	14.3
Peripheral parenteral nutrition	8	3.5
Other	5	2.2

Answers may be multiple; n=231

In 38% (139/365) of cases the case reviewers identified patients who received supplemental nutrition (Table 5.25). Of the 226 patients who did not, they stated that they should have had in a further 9% (12/131) of cases (Table 5.26). A delay in initiating nutrition support was identified in 8% (10/120) of patients receiving it (Table 5.27).

Table 5.25 Supplemental nutrition identified by case reviewers

Supplemental nutrition	Number of patients	%
Yes	139	38.1
No	226	61.9
Subtotal	**365**	
Unknown/not answered	53	
Total	**418**	

Table 5.26 Patient did not have supplemental nutrition but should have – reviewers' opinion

Should have had supplemental nutrition	Number of patients	%
Yes	12	9.0
No	121	91.0
Subtotal	**133**	
Unknown/not answered	93	
Total	**226**	

Table 5.27 Delay in commencing nutrition – reviewers' opinion

Delay	Number of patients	%
Yes	10	8.3
No	110	91.7
Subtotal	**120**	
Unknown/not answered	19	
Total	**139**	

Case reviewers considered that blood glucose was adequately monitored in 95% (330/344) of cases reviewed; one quarter (88/358) of patients required blood glucose control and this was considered to have been adequately managed in 99% (302/304) of cases (Table 5.28 to 5.30).

Table 5.28 Blood glucose adequately monitored – reviewers' opinion

Adequately monitored	Number of patients	%
Yes	330	95.9
No	14	4.1
Subtotal	**344**	
Unknown/not answered	74	
Total	**418**	

Table 5.29 Patient required blood glucose control

Blood glucose control required	Number of patients	%
Yes	88	24.6
No	270	75.4
Subtotal	**358**	
Unknown/not answered	60	
Total	**418**	

Table 5.30 Blood glucose adequately managed – reviewers' opinion

Adequately managed	Number of patients	%
Yes	302	99.3
No	2	0.7
Subtotal	**304**	
Unknown/not answered	114	
Total	**418**	

5

Overall management of the patients' nutrition was considered adequate by the reviewers in only 85% of cases (Table 5.31). Where it was considered inadequate the reasons are summarised in Table 5.32.

Table 5.31 Overall management of patient's nutrition adequate – reviewers' opinion

Adequate	Number of patients	%
Yes	281	84.6
No	51	15.4
Subtotal	**332**	
Unknown/not answered	86	
Total	**418**	

Table 5.32 Reasons patients' nutrition was considered inadequate – reviewers' opinion

Reasons	Number of patients
Inadequate nutritional support	15
Inadequate assessment	11
Inadequate assessment of pancreatic exocrine function	8
Absence of dietitian	7
Delays in providing nutrition support	3
Absence of nutrition team	1
Inappropriate mode of nutrition support	1
Other	2
Not answered	6

Answers may be multiple; n=51

Key Findings

- 90% (358/398) of patients were considered to have been seen by all the appropriate specialists for their condition. Where this was lacking (40 cases), gastroenterological input was considered to be the missing specialty in half of these cases
- 42% (74/414) of patients were admitted to a critical care unit, with only two cases identified where they believed the patient would have benefitted, but who did not receive it
- A pain score was measured in 71.5% (379/530) of patients on admission and patients waited a median of 1 hour before receiving their first analgesic
- In one fifth of cases, antimicrobial management was not considered appropriate by both the clinicians and the case reviewers; the commonest reason of inappropriate antibiotic prescription being that antibiotics were not indicated (60/72 patients)
- 147/168 (87.5%) of hospitals had a nutrition team in place
- A screening nutritional assessment was performed in only 67.4% (368/546) of cases
- Subsequent referral to a dietitian and nutrition team input occurred in 39% (201/521) and 25% (143/572) of cases, respectively
- Overall, nutritional assessment was deemed adequate by clinicians in only 77% (421/549) of cases
- Supplemental nutrition was considered and used in 240/555 (43.2%) patients. Of 226 patients who did not, case reviewers stated that they should have in a further 9% (12/131)
- Overall management of the patients' nutrition was considered adequate by the case reviewers in only 85% of cases and by the clinicians in 77%.

Recommendations: 5, 6, 7 & 8

The list of recommendations can be found on pages 71-72

6

Imaging

Back to contents

Imaging may be used to establish the diagnosis of acute pancreatitis. It is also used to establish the cause. In those patients developing severe acute pancreatitis, imaging is used to diagnose complications, to guide treatments and to monitor resolution.

The value of ultrasonography lies in its ability to show gallstones and dilated bile ducts, and it is recommended as the initial investigation in all patients with acute pancreatitis. Computed tomography (CT) scanning is occasionally needed for diagnosis, when clinical and biochemical findings are equivocal and the possibility exists of an alternative abdominal emergency that would require a laparotomy. The main indication for CT scanning is to detect and stage complications of acute severe pancreatitis, especially pancreatic necrosis. The full extent of pancreatic necrosis cannot be appreciated until at least three days after the onset of symptoms so optimal timing for initial CT assessment is at least 72-96 hours after onset of symptoms.[3] Patients with persisting organ failure, signs of sepsis, or clinical deterioration occurring after an initial improvement should undergo a CT scan. This should be done according to a defined protocol with intravenous contrast unless contraindicated. Follow-up scans are needed if the clinical status fails to improve or deteriorates.

Gallstone and bile duct dilatation identification

It is important to exclude gallstones in all patients with acute pancreatitis as this is a readily correctable cause. Ultrasound identifies gallstones and also bile duct dilatation, which suggests an obstructive cause, such as distal stone impaction in the common bile duct or a pancreatic tumour. Magnetic resonance cholangio-pancreatography (MRCP) is a more sensitive non-invasive test for the assessment of obstructive biliary pathology.

There were 482/691 (69.8%) patients who had an ultrasound scan during their admission (Table 6.1). The ultrasound scan identified gallstones in 216/466 (46.4%) of these and bile duct dilatation in 60 (12.9%) (Table 6.2).

Table 6.1 Ultrasound scan performed

Underwent ultrasound scan	Number of patients	%
Yes	482	69.8
No	209	30.2
Subtotal	**691**	
Unknown/not answered	21	
Total	**712**	

CASE STUDY 4

A middle-aged patient with declared alcohol abuse presented with atypical abdominal pain and minimally raised amylase. Case reviewers considered the emergency department treatment poor. Ward admission was delayed, as was subsequent escalation to the intensive care unit. Antibiotics were given for three days despite no evidence to support infection. No assessment for gallstones was performed. The first of three CT scans in 10 days confirmed pancreatitis at 48 hours. Following a drop in haemoglobin, a CT on day 10 showed haemorrhage in a previous area of pancreatic necrosis with an adjacent splenic artery pseudoaneurysm. Tertiary transfer to treat this was prompt.

The case reviewers consider the transfer for embolisation was appropriate but recognised multiple deficiencies in care including delayed diagnosis, presuming alcohol was the aetiology without excluding other causes and also highlighted the unnecessary use of antibiotics.

Table 6.2 Findings of the ultrasound scan

Findings of ultrasound scan	Number of patients	%
Gallstones	216	46.4
Normal	107	23.0
Other	103	22.1
Pancreatitis	65	13.9
Dilated common bile duct	60	12.9
Pancreatic collection	7	1.5
Common bile duct stones	6	1.3

Answers may be multiple; n=466

One-third of patients (30.2%; 209/691) did not have an ultrasound. In 23/209 patients the acute pancreatitis was attributed to a recent ERCP (Table 6.3). An ultrasound is unlikely to alter care in such patients. Of the 209 patients who did not have an ultrasound, 54 had a previous admission with acute pancreatitis and may have had one during that episode or during a previous admission; however, the details of imaging assessment at previous admission were unknown. Others who did not have an ultrasound either had known gallstones, other imaging performed or planned to identify gallstones or died during the acute pancreatitis admission (Table 6.3).

Table 6.3 No ultrasound during admission

Reason	Number of patients
Post ERCP	23
Previous admission	54
ERCP/MRCP	31
CT showed gallstones	17
Planned outpatient investigation for gallstones	11
Died during admission	29
None of above	44
Total	**209**

One-fifth (44/209; 21%) of patients who did not have an ultrasound had no reason identified to omit this simple non-invasive test. Twenty-seven patients who did not undergo an ultrasound scan were diagnosed with alcohol-related acute pancreatitis and had no previous acute pancreatitis admissions; 3/27 had a MRCP or gallstones seen on CT. The remaining 24/27 had no additional assessment for gallstones.

In the absence of cholangitis and / or abnormal liver function tests suggesting biliary obstruction, MRCP or endoscopic ultrasound (EUS) rather than diagnostic ERCP should be used to screen for choledocholithiasis if this is suspected.[3] Although EUS is superior to MRCP in excluding the presence of small (<5 mm) gallstones, MRCP is less invasive, less operator-dependent and more widely available than EUS. MRCP can detect gallstones as small as 3mm with sensitivity of 98% when compared to ERCP.[35]

An MRCP was performed in 29.8% (200/671) of patients (Table 6.4). The MRCP scan identified gallstones in 62.4% (113/181) and bile duct dilatation in 25.4% (46/181). The particular benefit of MRCP is the ability to identify stones in the common bile duct (CBD). Of the patients who had an MRCP 14.4% (26/181) had ductal stones identified (Table 6.5).

Table 6.4 MRCP was performed

Underwent MRCP	Number of patients	%
Yes	200	29.8
No	471	70.2
Subtotal	**671**	
Unknown/not answered	41	
Total	**712**	

Table 6.5 Findings of the MRCP

Findings	Number of patients	%
Gallstones	113	62.4
Other	63	34.8
Dilated common bile duct	46	25.4
Common bile duct stones	26	14.4

Answers may be multiple; n=181

Assessment of local complications

Contrast enhanced CT is the imaging method of choice for the overall assessment of acute pancreatitis because of its accuracy and wide availability. MR is an acceptable alternative but is less widely available and has longer scanning times, more motion artefacts and needs specialised monitoring equipment in the critically ill. MR's role is largely complementary to CT in assessing local complications of acute pancreatitis.

The 2012 Revised Atlanta Classification describes the morphological types of acute pancreatitis and characterises pancreatic collections based on their contents, wall, site and evolution[2] (See Appendix 4).

In severe acute pancreatitis, imaging is pivotal to the assessment of pancreatic and extra-pancreatic complications and in guiding invasive management. It identifies patients who may require transfer to tertiary centres.

CT Scanning during this admission

Two-thirds of patients 416/692 (60.1%) had one or more CT scan during their admission. CT confirmed a diagnosis of acute pancreatitis (interstitial oedematous pancreatitis) in 83.3% (340/408). CT identified acute pancreatitis associated collections in 118/408 patients and pancreatic necrosis in 73/408 (Table 6.6). The case reviewers considered that the timing of the CT scan(s) was appropriate in 90% (226/251) of patients.

Infected pancreatic necrosis is associated with a mortality of 20-30% compared to 9-12% with sterile necrosis.[36] Infection is most common 2-4 weeks after symptom onset.[37] The presence of gas within previous areas of necrosis signifies infection. In the remainder positive culture from fine needle aspiration or an elevated procalcitonin level indicates infection. In this study 13 patients had CT evidence of infected pancreatic necrosis. Vascular complications were rare with 14 portal vein thromboses and two pseudo-aneurysms identified. Whilst pseudo-aneurysms are rare they may be fatal and are optimally demonstrated on contrast enhanced CT. *See Chapter 8 for interventional radiological procedures in acute pancreatitis.*

Table 6.6 Findings at CT

CT findings	Number of patients	%
Acute pancreatitis	340	83.3
Gallstones	71	17.4
Pancreatic necrosis	73	17.9
Acute fluid collection	66	16.2
Other	84	20.6
Acute peripancreatic fluid collection and pseudocysts	52	12.7
Obstructing gallstones	15	3.7
Pancreatic calcification	14	3.4
Portal vein thrombosis	14	3.4
Infected necrosis	7	1.7
Pancreatic abscess	6	1.5
Pseudo-aneurysm	2	<1

Answers may be multiple; n=408

Appropriate use of imaging overall

The case reviewers identified deficiencies in the use of imaging in 12.5% of cases (Table 6.7). MRCP (22/48) and ultrasound (17/48) were the most commonly omitted investigations (Table 6.8 overleaf).

Table 6.7 Appropriate use of radiology

Appropriate use of radiology imaging	Number of patients	%
Yes	357	87.5
No	51	12.5
Subtotal	**408**	
Unknown/not answered	10	
Total	**418**	

Table 6.8 Omitted use of radiological investigations

Omitted	Number of patients
MRCP	17
Ultrasound	14
CT	8
Other	3
MRCP and CT	3
Ultrasound and MRCP	2
Ultrasound and CT	1
Subtotal	**48**
Not answered	3
Total	**51**

There has been concern about the over-use of CT because of the risks associated with unnecessary exposure to radiation. When those cases of patients who had CT scans were reviewed, the case reviewers considered that just 2.7% (10/367) of patients had too many scans and a similar number (3.8%; 14/367) had too few CTs for their clinical condition (data combined in Table 6.9).

Table 6.9 Number of CTs appropriate

Appropriate	Number of patients	%
Yes	340	93.4
No	24	6.6
Subtotal	**364**	
Unknown/not answered	54	
Total	**418**	

Key Findings

- There were 482/691 (69.8%) patients who had an ultrasound scan during their admission. The ultrasound scan identified gallstones in 216/466 (46.4%) of these
- One-fifth (21%; 44/209) of patients who did not have an ultrasound had no reason identified to omit this simple non-invasive test
- Two-thirds of patients 416/692 (60.1%) had one or more CT scan during their admission
- The case reviewers considered that the timing of the CT scan(s) was appropriate in 90% (226/251) of patients
- The case reviewers considered that just 2.7% (10/367) of patients had too many scans and a similar number (3.8%; 14/367) had too few CTs for their clinical condition
- The case reviewers identified deficiencies in the use of imaging in 12.5% of cases. MRCP (22/48) and ultrasound (17/48) were the most commonly omitted investigations.

Recommendation: 9

The list of recommendations can be found on pages 71-72

7

Treating the cause

Back to contents

Definitive management of gallstones in acute pancreatitis

Expert consensus is that the best time to operate to deal definitively with gallstones is during the index admission for patients with mild acute pancreatitis, after the initial symptoms have resolved.[3] For patients with severe biliary pancreatitis, cholecystectomy (surgical removal of the gallbladder) should be delayed until after peripancreatic collections resolve or for at least 6 weeks, at which time a cholecystectomy can safely be performed.[3] Failure to definitively clear gallstones results in unacceptable rates of readmission to hospital with recurrent pancreatitis and/or other gallstone related complications. The risk of recurrent pancreatitis is directly related to the interval between first attack and cholecystectomy.[38]

Availability of urgent cholecystectomy

The commissioning guide jointly prepared by the Royal College of Surgeons of England and the Association of Upper Gastrointestinal Surgeons 2013 for the treatment of patients with gallstones, recommends bespoke measures for inclusion in quality dashboards.[39] These include the proportion of patients with an emergency admission for gallstone disease (excluding pancreatitis) who have a cholecystectomy within ten-days of initial admission date or within 14 days of discharge from the initial admission for those with gallstone acute pancreatitis. NICE guidline CG188 '*Gallstone disease: diagnosis and initial management*' reinforces the need for the availability of resources to treat gallstone related emergencies on an urgent basis.[40]

Information was collected on the prioritisation of cholecystectomy in patients with acute pancreatitis. Approximately 56% (91/162) of hospitals reported that pancreatitis patients requiring a cholecystectomy would have their procedure done either during the index admission, or within two-weeks of discharge. Almost a quarter stated that it would be prioritised but not within two weeks, while 22% stated that it would not receive any prioritisation at all (Table 7.1).

Table 7.1 Priority of cholecystectomies in pancreatitis patients

Priority of cholecystectomies in pancreatitis patients	Number of hospitals	%
During Index admission	41	25.3
During index admission/within 2 weeks	26	16.0
Within 2 weeks of discharge	24	14.8
Prioritised but not within 2 weeks	36	22.2
Post discharge but not prioritised	35	21.6
Subtotal	**162**	
Not answered/Not applicable	13	
Total	**175**	

If a patient with acute pancreatitis required an urgent cholecystectomy, the majority of hospitals (119) reported that they would be added to the emergency list; 20 hospitals had a dedicated list for urgent cholecystectomy. However, 63 hospitals stated that these cases would be added to a routine elective list. Fourteen hospitals reported that cholecystectomies were not done urgently.

Table 7.2 Lists on which an urgent cholecystectomy would be undertaken

List	Number of hospitals	%
Emergency list	119	75.8
Added to routine list	63	40.1
Dedicated list	20	12.7
Not done urgently	14	8.9
Other	4	2.5

Answers may be multiple; n=157

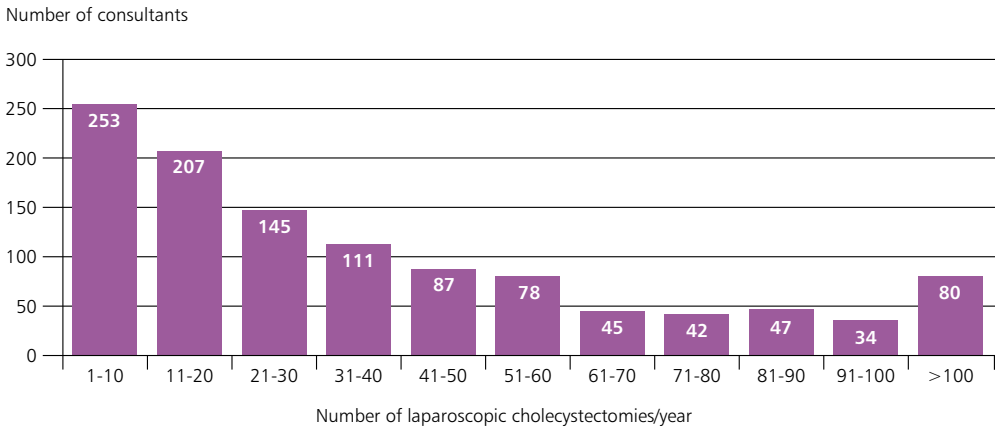

Figure 7.1 Volume of laparoscopic cholecystectomies performed by individual consultants per year

Analyses of volume-outcome relationships in adult surgery have found that hospital and clinical characteristics affect patient outcomes, such as length of stay, costs, complications, and mortality. These studies usually focus on specialist interventions (such as cancer resections or cardiovascular procedures). Less attention has been given to high volume, general surgical procedures with a low risk, such as cholecystectomy. Using a high quality national dataset in Scotland, which encompassed all emergency and elective surgical procedures, researchers found a wide variation in the management of gallstone disease and an association between higher hospital volume and better outcome after a cholecystectomy.[41] The relative risk of death was lower in high volume centres and this was significant for elderly patients and patients with co-morbidity.

Data on the number of laparoscopic cholecystectomies performed by each consultant surgeon in a hospital was received from 167 hospitals. In total 1,129 consultants were reported as performing one or more laparoscopic cholecystectomies in the 2014 – 2015 financial year. Figure 7.1 shows the volume of laparoscopic cholecystectomies performed by individual consultants per year. There was 22% (253/1,129) of consultants who were reported as undertaking between 1-10 cholecystectomies in their hospital that year. While it is likely that some consultants may undertake cholecystectomy in more than one hospital, occasional practitioners of cholecystectomy should be discouraged from continuing this operation at a low annual volume.

Previous admissions with gallstone acute pancreatitis

Gallstones were the cause of a recurrent acute pancreatitis admission in 40/132 (30.3%) patients who were recurrent admissions during this study. In patients with gallstone acute pancreatitis, a further episode is preventable if the patient undergoes definitive gallstone treatment within an appropriate time frame. This comprises cholecystectomy and also ensuring that no residual stones remain within the biliary tree, by use of imaging (MRCP, EUS or intra-operative cholangiogram) or, if present, their therapeutic removal by endoscopic or operative means. For those patients unfit to undergo cholecystectomy, endoscopic sphincterotomy alone is considered sufficient treatment to prevent recurrent acute pancreatitis.

Of the 40 patients who were readmissions due to gallstone acute pancreatitis, 16 were known to have had no treatment for their gallstones and in a further four the clinicians could not determine if they had had prior treatment or not. Despite some degree of previous treatment, a further 12 patients had recurrent admission with acute pancreatitis (Table 7.3).

Table 7.3 Treatment for a previous episode of gallstone pancreatitis

Previous treatment	Number of patients
No treatment	16
Cholecystectomy	11
ERCP	1
Unknown	4
Other	6
Subtotal	**38**
Not answered	2
Total	**40**

Definitive management of gallstones

Only 19% (61/ 322) of patients with acute pancreatitis due to gallstones had definitive management during their admission (Table 7.4). In severe acute pancreatitis, it is appropriate to delay cholecystectomy until peripancreatic collections resolve or for at least 6 weeks.

Table 7.4 Definitive gallstone management during current admission

Definitive management	Number of patients	%
Yes	61	18.9
No	261	81.1
Subtotal	**322**	
Unknown/not answered	15	
Total	**337**	

In the reviewers opinion there were 179 patients who did not undergo definitive treatment during the index admission. Of the 143 that could be assessed, it was their opinion that 53/143 (37%) should have done (Table 7.5). Clinicians similarly reported that the date of first definitive treatment was not acceptable in nearly one-third of cases (71/216) (Table 7.6).

Table 7.5 Patient should have had definitive management - reviewers' opinion

Should have had definitive management	Number of patients	%
Yes	53	37.1
No	90	62.9
Subtotal	**143**	
Unknown/not answered	36	
Total	**179**	

Table 7.6 Date of first definitive treatment acceptable - clinicians' opinion

Acceptable	Number of patients	%
Yes	145	67.1
No	71	32.9
Subtotal	**216**	
Unknown/Not applicable	121	
Total	**337**	

CASE STUDY 5

Patient 1 - A teenage patient was admitted with mild pancreatitis. Ultrasound scan identified gallstones. The patient was discharged 7 days later with a laparoscopic cholecystectomy booked for one month's time. The patient was re-admitted for eight days with a second attack of acute pancreatitis two-weeks post discharge. The laparoscopic cholecystectomy was performed on the planned date.

Patient 2 - A teenage patient was admitted with mild pancreatitis. Ultrasound demonstrated gallstones and an MRCP excluded ductal stones. The patient had good supportive and analgesic care and had a laparoscopic cholecystectomy five days after admission and was discharged a few days later.

The case reviewers considered Patient 2 had excellent care. They considered Patient 1's recurrent acute pancreatitis would have been avoided if they had received a standard of care similar to Patient 2.

The reasons given by the clinicians for deferral of cholecystectomy beyond the index admission or beyond an early planned operation were often appropriate, such as ongoing severe acute pancreatitis or a patient being medically unfit for surgery. However, lack of access to appropriate lists was a factor in 69 cases and lack of access to ERCP in another eight (Table 7.7). The clinicians stated that "list pressures" contributed to delay in 52/67 of those cases (Table 7.8).

Table 7.7 Reason for deferral of cholecystectomy – clinicians' opinion

Reason	Number of patients	%
Severe Pancreatitis with ongoing complications	85	33.7
Lack of access to emergency theatres	69	27.4
Medically unfit for cholecystectomy	36	14.3
Lack of access to ERCP	8	3.2
Further investigation planned	15	5.9
Others	39	15.5
Subtotal	**252**	
Not answered	9	
Total	**261**	

Table 7.8 List pressures contributed to delay – clinicians' opinion

List pressures	Number of patients
Yes	52
No	15
Subtotal	**67**
Unknown/Not applicable	4
Total	**71**

The clear discrepancy between the stated aim of providing a timely cholecystectomy and the reality of delayed definitive management of gallstones and recurrent admissions with biliary acute pancreatitis, is supported by hospital episode statistics data, for England from the same period. While over half of hospitals reported that acute pancreatitis patients requiring a cholecystectomy would have their procedure done either during the index admission, or within two-weeks of discharge, HES data showed that only 17 – 18% of patients with gallstone pancreatitis received their cholecystectomy in line with this guidance (Figure7.2).

CASE STUDY 6

An elderly patient with diabetes mellitus presented with abdominal pain and shock. They required escalation from the high dependency unit to the intensive care unit and inotropic support. Gallstones were identified. A cholecystectomy was planned for six weeks later but the patient re-presented to hospital one week post-discharge with a further bout of acute pancreatitis.

The case reviewers considered the clinical care excellent but were critical of the organisation of care. Given the severity of the initial episode and the preventability of the second episode the patient should have had a cholecystectomy pre discharge. The case reviewers were struck by the frequency of this scenario in their review of cases.

Management of the biliary tract

Endoscopic retrograde cholangio pancreatography (ERCP) is a widely used technique to diagnose and/or treat conditions of the biliary system. ERCP and sphincterotomy is indicated early in the course of biliary pancreatitis in patients with biliary pancreatitis and cholangitis. According to IAP/APA guidelines, it is "probably indicated" in biliary pancreatitis with common bile duct obstruction but not in predicted mild or severe acute pancreatitis without cholangitis.[3] Later, ERCP is also used as part of the definitive management of gallstone acute pancreatitis, to clear stones from the biliary system and finally, for those unfit to undergo cholecystectomy, ERCP and EUS alone is considered sufficient treatment.

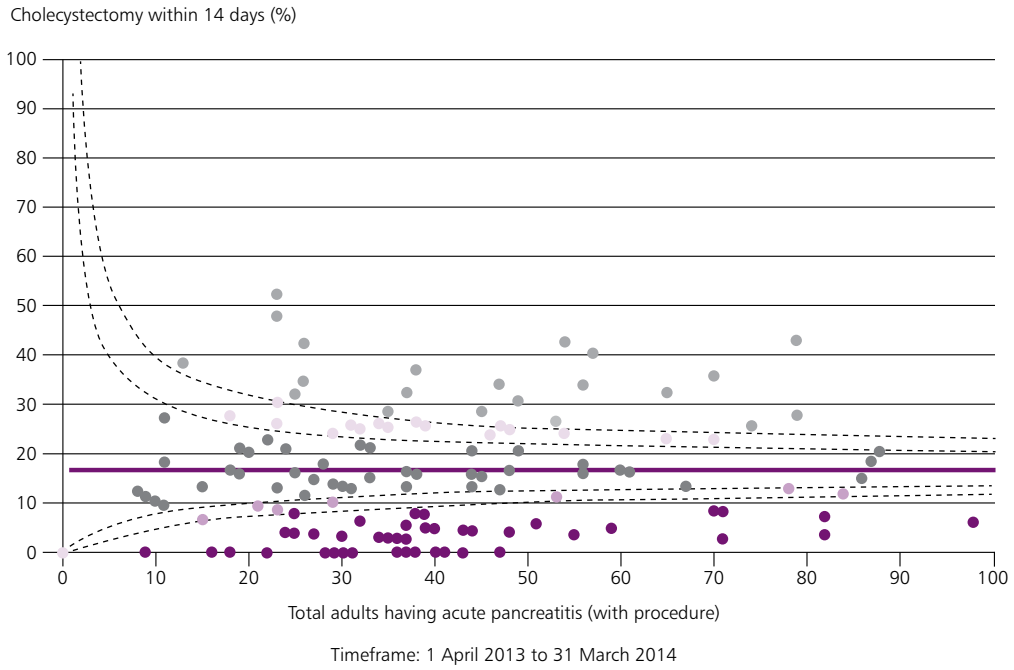

Figure 7.2 HES data for England shows that only 17% of patients with gallstone pancreatitis received their cholecystectomy within 14 days of admission

Availability of ERCP

The British Society of Gastroenterology (BSG) guidance document '*ERCP – The Way Forward, A Standards Framework*' recommends that facilities for urgent or emergency ERCP "should be widely available".[42]

There were 93% (159/171) of hospitals that had a service to perform this procedure on-site (Table 7.9). In this study, 23/156 (14.7%) respondents stated that this was available on a 24 hours, 7 days per week basis (Table 7.10).

Table 7.9 Availability of ERCP on-site

ERCP on-site	Number of hospitals	%
Yes	159	93.0
No	12	7.0
Subtotal	**171**	
Not answered	4	
Total	**175**	

Table 7.10 Availability of ERCP on-site 24/7

ERCP 24/7	Number of hospitals	%
Yes	23	14.7
No	133	85.3
Subtotal	**156**	
Not answered	3	
Total	**159**	

For those hospitals not providing ERCP on a 24/7 basis, Table 7.11 details how ERCP was covered out of hours. In 41 hospitals there was no coverage and the large majority of other sites relied on ad hoc goodwill cover.

Table 7.11 Cover for ERCP outside normal working hours

Out of hours coverage	Number of hospitals	%
Ad hoc goodwill cover	52	36.9
Formal network	15	10.6
Informal network	10	7.1
Informal network, ad hoc	12	8.5
On call rota	5	3.5
Other	6	4.3
Not covered	41	29.1
Subtotal	**141**	
Not answered	11	
Total	**152**	

The majority of hospitals that could undertake ERCP on-site reported having 1 - 3 dedicated lists for the procedure per week (Table 7.12).

Table 7.12 Number of ERCP lists/week

Number of ERCP lists/week	Number of hospitals	%
1	24	16.0
2	64	42.7
3	33	22.0
4	17	11.3
5	4	2.7
6	2	1.3
7	2	1.3
8	1	<1
9	3	2.0
Subtotal	**150**	
Not answered	9	
Total	**159**	

Approximately one-third hospitals that reported having ERCP on-site provided a tertiary ERCP service to other hospitals (Table 7.13). Eleven hospitals provided this service via a formal network, while 26 reported that it was via an informal network. The remaining 12 did not specify the network arrangements, consistent with the lack of formal network arrangements quoted by hospitals not providing out of hours ERCP.

Table 7.13 Provision of a tertiary ERCP service to other hospitals

Tertiary ERCP service	Number of hospitals	%
Yes	53	34.0
No	103	66.0
Subtotal	**156**	
Not answered	3	
Total	**159**	

ERCP in acute pancreatitis

There were 75/686 (10.9%) patients who underwent an ERCP in this study (Table 7.14). The reasons given were consistent with appropriate current indications in acute pancreatitis (Table 7.15).

Table 7.14 Patient underwent an ERCP

ERCP	Number of patients	%
Yes	75	10.9
No	611	89.1
Subtotal	**686**	
Unknown/not answered	26	
Total	**712**	

The BSG Standards Framework states that there is no expectation that all acute Trusts/Boards should offer ERCP. It recognises that meeting these standards will result in ERCP being consolidated to fewer centres with services focused around the requirements of a particular region. These standards include that there should be a minimum of 75 cases per annum for ERCP endoscopist, and 150 cases minimum per facility.[42,43]

Table 7.15 Reason for the ERCP

Reason	Number of patients
Common bile duct stones	35
Cholangitis/common bile duct stones	7
Prevention of gallstone pancreatitis	6
Cholangitis	3
Cholangitis/other	2
Prevention of gallstone pancreatitis/ common bile duct stones	2
Common bile duct stones/stricture	1
Common bile duct stones /suspected ampullary lesion	1
Common bile duct stones /other	1
Stricture	2
Other	12
Subtotal	**72**
Not answered	3
Total	**75**

Alcohol-related pancreatitis

The association between alcohol abuse and pancreatitis has long been known and accepted. As early as in 1878, Friedreich wrote '*I am inclined to believe that a general chronic interstitial pancreatitis may result from excessive alcoholism (drunkard's pancreas)*'.[44] The incidence of alcoholic-related pancreatitis is known to be proportional to the level of alcohol consumption, suggesting that alcohol exerts dose-related effects on the pancreas. However, it is also clear that only a minority of heavy drinkers develop alcohol-related pancreatitis, indicating that some individuals have an increased susceptibility to the disease.[45]

Half of patients with alcohol-related acute pancreatitis develop recurrent acute pancreatitis in the long term. Interventions such as structured talks with patients by nurses trained to inform patients how and why they should stay abstinent at 6-month intervals significantly lowers the recurrence rate of alcohol-induced pancreatitis within two years.[46] It was therefore essential to enquire about alcohol liaison services within hospitals that manage patients with acute pancreatitis.

Alcohol liaison services

Only 80% (133/166) of hospitals reported having some form of alcohol liaison service on-site (Table 7.16). This was not available at weekends in 110/133 hospitals.

Table 7.16 Alcohol liaison service

Available	Number of hospitals	%
Yes	133	80.1
No	33	19.9
Subtotal	**166**	
Not answered	9	
Total	**175**	

Previous admissions with alcohol-related acute pancreatitis

The clinicians caring for patients who had a documented previous admission with acute pancreatitis due to alcohol could only confirm that a referral had occurred to an alcohol liaison service in 28/52 patients (Table 7.17). In a further 21 patients it was unknown whether a referral had been made or not, suggesting either a failure to deal with the problem of alcohol dependency or a failure of documentation.

Table 7.17 Referred to alcohol cessation service

Referral made	Number of patients
Yes	28
No	3
Unknown	21
Subtotal	**52**
Not answered	6
Total	**58**

The 2013 NCEPOD report, '*Measuring the Units*' was a review of patients who died with alcohol-related liver disease.[47] Clinicians and case reviewers found opportunities had been missed in previous admissions that would have had the potential to influence outcome. The main opportunity to change the outcome in previous admissions was by referral to alcohol support services. Hence, a key recommendation of that report was that all patients presenting to acute services with a history of potentially harmful drinking should be referred to alcohol support services for a comprehensive physical and mental assessment. The referral and outcomes should be documented in the notes and communicated to the patient's general practitioner. This is the responsibility of all doctors. Moreover, it advised that each hospital should have a 7-day Alcohol Specialist Service, to provide comprehensive physical and mental assessments, Brief Interventions and access to services within 24 hours of admission. The data on multiple previous admissions and low rates of referral to alcohol liaison services for patients with alcohol-related acute pancreatitis in the current report reinforces these recommendations.

CASE STUDY 7

A middle-aged patient was admitted with acute pancreatitis. The patient had early critical care review for possible haemodynamic and respiratory compromise but this did not require escalation. Gallstones were excluded. Late in the admission the patient admitted to excessive use of alcohol. The opportunity for alcohol cessation advice was taken and was effective. The patient remained abstinent 6 months post discharge.

The case reviewers considered the quality of the clinical care contributed to the patient's motivation to remain abstinent. They recognised that reconsidering the causation had allowed effective treatment.

This current report highlights much excellent and often highly sophisticated care for those with acute pancreatitis, especially in the critical care and minimally invasive interventional settings. However, the extraordinary situation exists that one of the major factors responsible for the illness, namely excessive alcohol intake, receives little attention in its routine medical management. Despite evidence that abstinence from alcohol decreases the frequency and severity of attacks, little is done in routine clinical practice to prevent subsequent attacks of pancreatitis in patients who drink alcohol in excess by reducing their consumption of (and dependence on) alcohol. Moreover, measures to reduce alcohol consumption are not even mentioned in many published guidelines. As clearly highlighted in a recent seminal review, it is time for all clinicians to pay attention to the root cause of the condition-that is, alcohol-rather than just responding to its effects.[48]

7

Key Findings

- 56.2% (91/162) of hospitals reported that acute pancreatitis patients requiring a cholecystectomy would have their procedure done either during the index admission, or within two-weeks of discharge. Almost a quarter stated that it would be prioritised but not within two weeks, while 22% stated that it would not receive any prioritisation at all
- 22% (253/1,129) of consultants were reported as undertaking 1-10 laparoscopic cholecystectomies during the 2014-2015 financial year in their hospital
- Gallstones were the cause of a recurrent acute pancreatitis admission in 40/132 (30.3%) patients who were recurrent admissions during this study
- Only 18.9% (61/ 322) of patients with acute pancreatitis due to gallstones had definitive management during their admission
- In the case reviewers opinion, of 179 patients not undergoing definitive treatment for gallstones during the index admission, 53/143 (37%) should have done
- Clinicians similarly reported that the date of first definitive treatment was not acceptable in nearly one-third of cases (71/216). Lack of access to appropriate lists was cited as a factor in 69 cases and lack of access to ERCP in another eight
- 23/156 (14.7%) hospitals stated that ERCP was available on a 24 hours, 7 days per week basis
- 75/686 (10.9%) of patients underwent an ERCP in this study. The reasons given were consistent with appropriate current indications in acute pancreatitis
- Only 80% (133/166) of hospitals reported having some form of alcohol liaison service on-site. This was not available at weekends in 110/133 hospitals
- For patients who had a documented previous admission with acute pancreatitis due to alcohol, the clinicians caring for these patients could only confirm that a referral had occurred to an alcohol liaison service in 28/52 patients.

Recommendations: 10, 11, 12 & 13

The list of recommendations can be found on pages 71-72

8

Treatment of complications

Back to contents

Interventional procedures in acute pancreatitis

Indications for intervention (radiological, endoscopic or surgical) in necrotising pancreatitis include infected necrotising pancreatitis with clinical deterioration or ongoing organ failure.[3] The optimal timing is when the necrosis has become walled off, which usually occurs >4 weeks after the onset of acute pancreatitis. The optimal interventional strategy for patients with suspected or confirmed infected necrotising pancreatitis is a "step-up approach", comprising an initial image-guided percutaneous (retroperitoneal) catheter drainage or endoscopic trans-gastric drainage followed, if necessary, by endoscopic or surgical necrosectomy.

Availability of radiology services

Radiology guided drainage of pancreatic collections is generally a procedure that should be performed within normal working hours, but occasionally patients will require more urgent intervention, particularly over the weekend. It is increasingly undertaken under the direction of, or within, a specialist centre. It is a procedure that may be performed by a mixture of interventional and diagnostic radiologists depending on local skills and experience. Although the large majority 161/171 (94%, data not shown) of hospitals had an on-call rota for radiology out of hours, only 47/172 (27%) hospitals who stated that they could provide pancreatic drainage on-site 24/7 (Table 8.1). In addition 28/114 (24.6%) hospitals who reported that they could not provide this procedure out of hours stated that they were part of a formal network to cover this, with the remainder relying upon "informal networks" and "local goodwill". Respondents from 14 hospitals stated that there were no arrangements in place to cover this indication (Table 8.2). These data are consistent with the 52 hospitals that reported they provided a tertiary service as part of a formal or Informal network, often to more than one hospital.

Table 8.1 Pancreatic drainage 24/7

Pancreatic drainage 24/7	Number of hospitals	%
Yes	47	27.3
No	125	72.7
Subtotal	**172**	
Not answered	3	
Total	**175**	

Table 8.2 Availability of out of hours pancreatic drainage procedures

Availability	Number of hospitals	%
Formal network	30	26.1
Informal network	24	20.9
Ad hoc, goodwill local cover	28	24.3
Not covered	15	13.0
Informal network/ad hoc, goodwill cover	11	9.6
Other	7	6.1
Subtotal	**115**	
Not answered	10	
Total	**125**	

As observed in previous NCEPOD reports, e.g. '*Time to Get Control*', an NCEPOD review of the care received by patients who had a severe gastrointestinal haemorrhage,[23] informal networks and ad hoc/goodwill cover are not robust and lead to delays in treatment or the use of alternative, more invasive treatments.

Availability of specialist surgery

About 5-10% of patients develop necrosis of the pancreatic gland, the peripancreatic tissue or both that may require specialist interventional procedures including surgery.[2] One-third (51/170) of hospitals in the current study reported that surgery for acute pancreatitis complications was carried out on their site (Table 8.3). For 42/49 of these it was hospital policy that all operations for acute pancreatitis complications are carried out with a consultant surgeon present.

Table 8.3 Surgery for acute pancreatitis complications

Surgery	Number of hospitals	%
Yes	51	30.0
No	119	70.0
Subtotal	**170**	
Unknown/not answered	5	
Total	**175**	

There were 27/48 hospitals who reported that they provided a surgical service for the management of acute pancreatitis complications to other hospitals, largely via informal networks (13/21; 6 not answered). The large majority of hospitals for which surgery for acute pancreatitis complications was not performed on-site, would transfer patients requiring this to a tertiary centre (Table 8.4).

Table 8.4 Surgical management of acute pancreatitis complications

Surgical management	Number of hospitals	%
Transferred to tertiary centre	101	95.3
Other	5	4.7
Subtotal	**106**	
Unknown/not answered	13	
Total	**119**	

The majority of hospitals did not perform all the potential procedures a patient with severe acute pancreatitis might require. This reflects the increasing complexity of managing this condition and the recent development of complex minimally invasive methods to deal with complications of acute pancreatitis that require intervention. With increasing sub-specialisation within general surgery, this trend is likely to continue. Hence adequate and equitable access to appropriate, modern treatments requires participation in a formal regional network.

CASE STUDY 8

A middle-aged patient was admitted with acute pancreatitis due to gallstones. An ERCP five days later showed no gallstones. CT scan demonstrated a large acute necrotic collection. Transfer for endoscopic surgical drainage was advised but there was a one week delay in availability of the service. The patient deteriorated during this time and underwent a laparotomy instead.

The case reviewers commented that networks should be responsive. They considered the escalation to laparotomy inappropriate and questioned why the endoscopic drainage was not expedited.

Networks of care may be formal or informal. The definition of a formal network that was used in this study was the following: "A linked group of health professionals and organisations from primary, secondary and tertiary care and social care and other services working together in a coordinated manner with clear governance and accountability arrangements".[49] An informal network was defined as: "A collaboration between health professionals and/or organisations from primary, secondary and/or tertiary care, and other services, aimed to improve services and patient care, but without specified accountability to the commissioning organisation".[49]

Interventional procedures performed

The optimal interventional strategy for patients with suspected or confirmed infected necrotising pancreatitis is initial image-guided percutaneous (retroperitoneal) catheter drainage or endoscopic transluminal drainage, followed, if necessary, by endoscopic or surgical necrosectomy.[3,50,51]

Radiological, endoscopic and surgical intervention was performed in 49, 2 and 23 patients respectively, of the 613 patients where it was known (Table 8.5). Of the radiological procedures 38 were for drain insertion. There were nine percutaneous fine needle aspirations for bacteriology.

Table 8.5 Interventions performed

Intervention	Number of patients	%
Radiological	49	8.0
Surgical	23	3.8
Endoscopic	2	<1
No	539	87.9
Subtotal	**613**	
Unknown/not answered	99	
Total	**712**	

Of the 25 patients undergoing endoscopic or surgical interventions, 18/25 were for proven or suspected infected necrosis (Table 8.6). Eleven patients had open necrosectomy surgery (Table 8.7). The median length of time to surgery from admission was 27 days (range 1 – 80 days) for the patients having a necrosectomy. In the opinion of the case reviewers and clinicians, the timing of necrosectomy was considered consistent with optimal timing for walling off of necrosis to take place and appropriate in all of the cases where a judgement could be made.

Table 8.6 Reason for surgery

Reason for surgery	Number of patients
Infected necrosis	15
Suspected infected necrosis	3
Pancreatic abscess	5
Pancreatic pseudocyst	1
Bowel ischaemia	3
Pancreatic fistula	1

Answers may be multiple n=23

Table 8.7 Surgery undertaken

Surgery undertaken	Number of patients
Open necrosectomy	7
Endoscopic necrosectomy	2
Percutaneous necrosectomy	4
Open necrosectomy/other	2
Percutaneous/endoscopic/open necrosectomy	2
Other	6
Total	**23**

Key Findings

- Only 47/172 (27%) hospitals stated that they could provide pancreatic drainage on-site
- Only 28/114 (24.6%) hospitals where interventional radiological cover was not provided for pancreatic drainage out of hours stated that they were part of a formal network to cover this, with the remainder relying upon "informal networks" and "local goodwill". Fourteen hospitals stated that there were no arrangements in place to cover this indication
- The majority of hospitals (119/170; 70%) did not provide the service to perform all the potential surgical procedures a patient with severe acute pancreatitis might require
- Radiological, endoscopic and surgical intervention was performed in 49, 2 and 23 patients respectively, of the 712 patients. For patients undergoing necrosectomy, the median length of time to surgery from admission was 27 days (range 1 – 80 days). In the opinion of the case reviewers and clinicians, the timing of necrosectomy was considered consistent with optimal timing for walling off of necrosis to take place and appropriate in all of the cases where a judgement could be made.

Regional organisation

Back to contents

Regional networks

Approximately one-third of hospitals in the current study reported being part of a formal regional care network for acute pancreatitis (Table 9.1).

Table 9.1 Hospital part of a formal regional care network

Formal regional care network	Number of hospitals	%
Yes	57	33.7
No	112	66.3
Subtotal	**169**	
Unknown/not answered	6	
Total	**175**	

Furthermore, 81/107 hospitals that were not part of a formal care network reported being part of an informal network.

Table 9.2 Hospital part of an informal regional care network

Informal regional care network	Number of hospitals	%
Yes	81	75.7
No	26	24.3
Subtotal	**107**	
Unknown/not answered	11	
Total	**118**	

Hospital guidelines for acute pancreatitis

Information regarding the availability and content of specific written guidelines for the management of acute pancreatitis was collected from each participating hospital. Just under half of all hospitals that responded reported having guidelines for acute pancreatitis (Table 9.3).

Table 9.3 Written guidelines for acute pancreatitis

Written guidelines	Number of hospitals	%
Yes	86	50.9
No	83	49.1
Subtotal	**169**	
Unknown/not answered	6	
Total	**175**	

There were 62/86 hospitals that reported having a written guideline for the management of acute pancreatitis where that hospital did not manage all the potential complications of acute pancreatitis on-site. While the majority of patients with acute pancreatitis have a mild self-limiting disease and will not require discussion or transfer to a specialist centre, this is likely to be required in about 10% of cases. Therefore, it would seem reasonable that a written guideline should include contact details for the tertiary centre and the indications as to when to discuss/transfer a patient to the centre for those hospitals who rely upon tertiary transfer for the treatment of their patients who develop complications of acute pancreatitis. Indications for appropriate antibiotic use (71%), nutritional support (66%) and alcohol liaison (34%), among other aspects of care, also warrants greater guidance (Table 9.4 overleaf).

Table 9.4 Processes included in guidance

Processes	Number of hospitals	%
Severity scoring	72	83.7
Antibiotics indications	61	70.9
Nutrition	57	66.3
Timing of gallstone treatment	52	60.5
CT scanning intervals	51	59.3
Contact details for tertiary centre	40	46.5
Indications for surgery	40	46.5
Indications for discussion with tertiary centre	35	40.7
Indications for transfer to tertiary centre	33	38.4
Referral to alcohol services	29	33.7
Other	12	14.0

n=86

Multidisciplinary team discussion of acute pancreatitis

Nearly one-third 29.7% (51/172) of hospitals reported having a multidisciplinary team (MDT) meeting where patients with acute pancreatitis are discussed (Table 9.5), with seven hospitals stating that all patients with acute pancreatitis were included. Fourteen hospitals that did not have an MDT meeting on-site stated that they did refer patients to a regional MDT. The nature of these MDT meetings is unclear but most are likely to be meetings under the auspices of hospital Cancer Services, as funding already exists to underpin such activity in compliance with NHS Peer Review guidelines for cancer. This finding of a lack of structured MDT discussion for acute pancreatitis is supported by the fact that only ten hospitals reported that they hosted a regional MDT meeting for acute pancreatitis patients.

Table 9.5 MDT meetings held to discuss acute pancreatitis

MDT meeting	Number of hospitals	%
Yes	51	29.7
No	121	70.3
Subtotal	**172**	
NA/Unknown	3	
Total	**175**	

CASE STUDY 9

A middle-aged patient with hypercalcaemia from hyperparathyroidism presented with abdominal pain and a high lipase. The patient had a high NEWS score in the emergency department and was admitted directly to the high dependency unit. CT at five days demonstrated extensive pancreatic necrosis. Respiratory deterioration required escalation to critical care for continuous positive airway pressure (CPAP). The patient received good nutritional support and was regularly discussed with the tertiary centre. On discharge, three weeks later endocrine and mental health follow-up was in place.

The case reviewers considered the patient had excellent care and particularly noted the timely escalation, multidisciplinary input, valuable tertiary centre input and good discharge planning.

Key Findings

- Approximately 1/3 of hospitals in the current study reported being part of a formal regional care network for acute pancreatitis
- 81/107 hospitals that were not part of a formal care network reported being part of an informal network
- Nearly a quarter (26/107; 24%) of those hospitals not covered by a formal network were not part of an informal network
- Just under half of all hospitals that responded reported having guidelines for acute pancreatitis
- Nearly one-third (28.4%; 42/148) of hospitals reported having a multidisciplinary team meeting where patients with acute pancreatitis are discussed.

Recommendations: 14, 15 & 16

The list of recommendations can be found on pages 71-72

10

Outcomes and overall quality of care

Back to contents

Outcomes

It should be remembered that this study sample purposely attempted to select for those patients with severe acute pancreatitis (i.e. were admitted to critical care, had an inpatient stay of 3 or more nights and/or died in hospital). During this admission, 89/712 (13%) patients died and 35/712 (5%) of patients were transferred to another hospital (Table 10.1). The majority of patients (77%; 547/712) were discharged to their previous place of residence.

Clinicians reported that further investigations were planned in 60% (329/551) of cases (Table 10.2) but those clinicians and the case reviewers concurred that further investigation was needed in an additional 9% (48/538) and 21% (73/336) of patients respectively (Table 10.3).

Table 10.1 Outcome of hospital episode

Outcome of hospital episode	Number of patients	%
Discharged to previous place of residence	547	79.4
Patient died during the admission	89	12.9
Discharged to other hospital	35	5.1
Other	18	2.6
Subtotal	**689**	
Not answered	23	
Total	**712**	

Table 10.2 Further investigations planned

Further investigations planned	Number of patients	%
Yes	329	59.7
No	222	40.3
Subtotal	**551**	
Unknown/not answered	72	
Total	**623**	

Table 10.3 Additional investigations required

	Case reviewers' opinion		Clinicians' opinion	
Additional investigations required	**Number of patients**	**%**	**Number of patients**	**%**
Yes	73	21.7	48	8.9
No	263	78.3	490	91.1
Subtotal	**336**		**538**	
Unknown/not answered	31		85	
Total	**367**		**623**	

After excluding the commoner causes of acute pancreatitis, IAP guidelines recommend that those in whom the cause remains unknown should undergo MRCP and/or endoscopic ultrasonography to detect occult microlithiasis, neoplasms or chronic pancreatitis as well as rare morphologic abnormalities. A CT of the abdomen should also be considered. If the cause still remains unidentified, especially after a second attack of idiopathic pancreatitis, genetic counselling (prior to genetic testing for hereditary pancreatitis) should be considered.[3]

Morbidity and mortality meetings

Individual cases discussed at morbidity and mortality (M&M) meetings can inspire changes to working practices and bring about improvements to patient care. There should also be a concerted effort to monitor trends in the cases brought to these meetings and explore what lessons can be learned from them. The identification of patterns in M&M data is vital for the prevention of repeat instances of poor care over time.[52]

In this study, clinicians reported that 55 of 61 patients who died were discussed at an M&M meeting (Table 10.4). The case reviewers' found evidence that the death was discussed in only 7/39 of cases. This is not the surprising discrepancy that this at first appears (Table 10.5). Traditionally, there was an argument for not minuting M&M meetings to promote a more open discussion between participants. However, NCEPOD endorses the Royal Colleges' view that maintaining a formal record of the analysis of adverse outcomes demonstrates to all that a surgical team is open and willing to learn from incidents.[53]

Over time, the M&M meeting has evolved to epitomise many of surgery's core underlying principles. To ensure its continued relevance and utility to surgical care and training, these conferences will need to harness modern data analytic strategies, standardise case presentations to delve into root-cause analyses, and capitalise on valuable conference discussion to inform and complement frontline Quality Improvement efforts.[52] NCEPOD strongly endorses this process.

Table 10.4 Death discussed at a morbidity and mortality meeting

Death discussed	Number of patients
Yes	55
No	6
Subtotal	**61**
Unknown/not answered	27
Total	**88**

Table 10.5 Evidence that death discussed at morbidity and mortality meeting

Evidence present	Number of patients
Yes	7
No	32
Subtotal	**39**
Unknown/not answered	5
Total	**44**

Overall quality of care

The case reviewers deemed that, overall, 45% of patients received Good Practice, i.e. a standard that they would accept from themselves, their trainees and their institution. It is the purpose of NCEPOD reports to identify opportunities for improvement; these can be aspects of clinical or organisational care or both. In total, this was identified in 52% of the cases reviewed. Less than satisfactory care is defined as that where several aspects of clinical and/or organisational care were well below that which the reviewers would accept from themselves, their trainees or their institution. This occurred in 3% of cases (Figure 10.1). While less than satisfactory care can never be accepted, this figure of 3% for this category represents one of the lowest observed in an NCEPOD report.

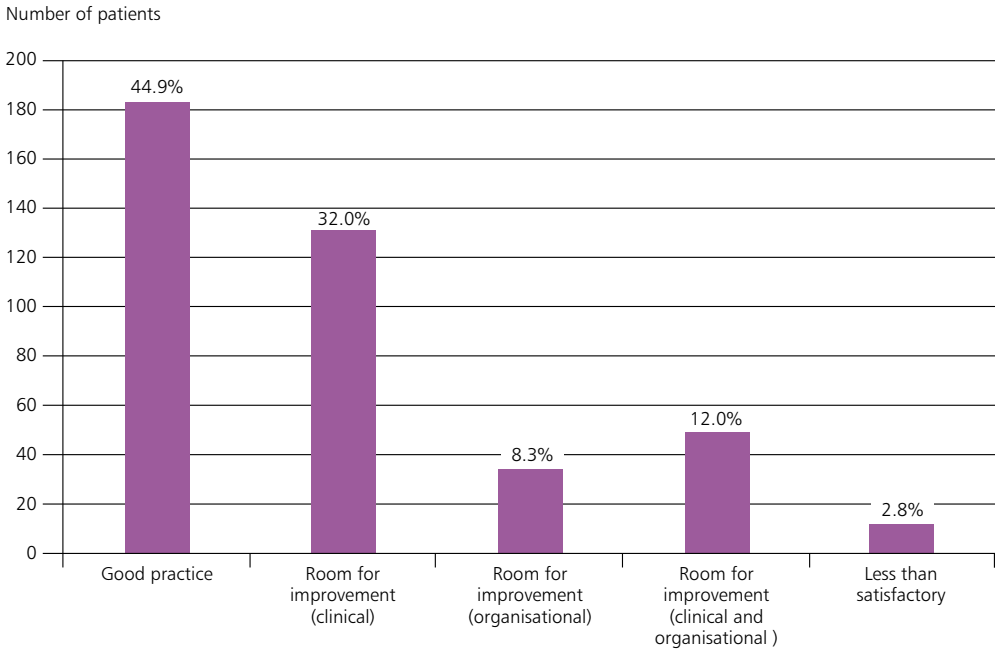

Figure 10.1 Overall assessment of care

Key Findings

- During this admission, the majority of patients (78%; 547/701) were discharged to their previous place of residence
- 89/712 (13%) patients died during the admission and (35/712) 5% of patients were transferred to another hospital
- Clinicians and the case reviewers determined that further investigation beyond that planned was needed in an additional 9% (48/538) and 21% (73/336) of patients respectively
- Clinicians reported that 55 of 61 deaths were discussed at an M&M meeting
- Overall, 45% of patients received 'Good Practice'; 'Room for improvement' (either clinical or organisational care or both) was identified in 52% of the cases; and 'Less than satisfactory' care occurred in 3% of cases.

Recommendations: 17 & 18

The list of recommendations can be found on pages 71-72

Recommendations

Back to contents

1. Hospital coders and clinicians should work more closely together to ensure coding for acute pancreatitis is accurate. This will aid local quality improvement initiatives and national reporting while facilitating the commissioning of services according to the needs of patients. *(Hospital Coders, Professional Association of Clinical Coders, Clinical Directors and All Clinicians)*

2. Better management of co-morbidity in patients with acute pancreatitis is needed, especially through the involvement of the relevant specialists, as this represents an opportunity to improve overall outcomes. *(All Clinicians)*

3. All patients presenting to the Emergency Department with an acute illness, such as acute pancreatitis, should have physiological parameters recorded as part of their initial assessment. These measurements should form part of an early warning score, such as the National Early Warning Score (NEWS). *(Emergency Medicine Doctors)*

4. An early warning score should be used in the emergency department and throughout the patient's stay in hospital to aid recognition of deterioration. The score should be standardised within and across hospitals. Use of the National Early Warning Score (NEWS) would facilitate this standardisation. *(Medical Directors and All Clinicians)*

5. For all early warning scores and as recommended by the Royal College of Physicians of London for NEWS - all acute hospitals should have local arrangements to ensure an agreed response to each trigger level including: the speed of response, a clear escalation policy to ensure that an appropriate response always occurs and is guaranteed 24/7; the seniority and clinical competencies of the responder; the appropriate settings for ongoing acute care; timely access to high dependency care, if required; and the frequency of subsequent clinical monitoring. *(Medical Directors and Clinical Directors)*

6. Acute Pancreatitis may require input from a number of different specialities. Therefore it should be managed by a multidisciplinary team, comprising all specialities needed to treat the condition as well as the underlying co-morbidities. *(Clinical Directors and All Clinicians)*

7. Antibiotic prophylaxis is not recommended in acute pancreatitis. All healthcare providers should ensure that antimicrobial policies are in place including prescription, review and the administration of antimicrobials as part of an antimicrobial stewardship process. These policies must be accessible, adhered to and frequently reviewed with training provided in their use. *(Medical Directors, Clinical Directors, Medical Microbiology Directors, Clinical Pharmacy Lead and All Clinicians)*

8. All patients admitted to hospital with acute pancreatitis should be assessed for their overall risk of malnutrition. This could be facilitated by using the Malnutrition Universal Screening Tool (MUST) and provides a basis for appropriate referral to a dietitian or a nutritional support team and subsequent timely and adequate nutrition support. *(Medical Directors, Clinical Directors and All Clinicians)*

9. Gallstones should be excluded in all patients with acute pancreatitis including those thought to have an alcohol-related acute pancreatitis, as gallstones are common in the general population. Abdominal ultrasound scanning is the minimum that should be performed. *(Clinical Directors and All Clinicians)*

10. Definitive eradication of gallstones prevents the risk of a recurrent attack of acute pancreatitis. This usually involves cholecystectomy and ensuring that no stones remain in the bile duct. For those patients with an episode of mild acute pancreatitis, early definitive surgery should be undertaken, either during the index admission, as recommended by the International

Association of Pancreatology (IAP), or on a planned list, within two weeks. For those patients with severe acute pancreatitis, cholecystectomy should be undertaken when clinically appropriate after resolution of pancreatitis. *(Clinical Directors and All Clinicians)*

11. As recommended by the British Society of Gastroenterology, ERCP services should work collaboratively in a regional or hub-and-spoke model, with simple and rapid referral pathways established. Through this method, facilities for urgent or emergency ERCP should be widely available. *(Clinical Directors and Endoscopy Leads)*

12. As previously supported and recommended by NCEPOD, each hospital should have a 7-day Alcohol Specialist Service, to provide comprehensive physical and mental assessments, 'brief interventions' and access to services prior to discharge. *(Medical Directors)*

13. All patients with suspected alcohol-related acute pancreatitis should be discussed with the hospital alcohol support service at every admission. Efforts to deal with this underlying cause of acute pancreatitis should equal those of gallstone acute pancreatitis. Future clinical guidelines on acute pancreatitis should incorporate this. *(Clinical Directors, All Clinicians, Specialist Associations, NICE, BSG, IAP, APA)*

14. Given the increasing complexity of the management of acute pancreatitis and its multidisciplinary nature, formal networks should be established so that every patient has access to specialist interventions, regardless of which hospital they present to and are initially managed in. Indications for when to refer a patient for discussion with a specialist tertiary centre and when a patient should be accepted for transfer, should be explicitly stated. Management in a specialist tertiary centre is necessary for patients with severe acute pancreatitis requiring radiological, endoscopic or surgical intervention. *(Medical Directors and Clinical Directors)*

15. The 2012 IAP/APA guidelines provide recommendations concerning key aspects of medical and surgical management of acute pancreatitis based on the currently available evidence. These recommendations should serve as a reference standard for current management of acute pancreatitis. *(Clinical Directors and All Clinicians)*

16. Specialist tertiary centres for acute pancreatitis should be commissioned. A specialist tertiary centre is defined by the IAP as a high volume centre with intensive care facilities, daily access to radiological intervention, interventional endoscopy including EUS and ERCP and surgical expertise in managing necrotising pancreatitis. An example model to base this on from the English Department of Health could be the existing 'Improving Outcomes Guidance' compliant hepato-pancreato-biliary cancer units. *(Specialist Commissioners and Medical Directors)*

17. NCEPOD supports the IAP recommendation that after excluding the commoner causes of acute pancreatitis, those in whom the cause remains unknown should undergo MRCP and/or endoscopic ultrasonography to detect occult microlithiasis, neoplasms or chronic pancreatitis as well as rare morphologic abnormalities. A CT of the abdomen should also be considered. *(Clinical Directors and All Clinicians)*

18. All patient deaths should be discussed at morbidity and mortality meetings and learning should be shared through network meetings and their annual reports. Adequate time for structured assessment of deaths and complications should be provided by hospital Trusts/ Boards. *(Medical Directors, Clinical Directors and All Clinicians)*

Summary

Back to contents

Guidelines for the management of acute pancreatitis have existed for many years; the British Society of Gastroenterology guidelines were last updated nearly 10 years ago. The latest International Association of Pancreatology & American Pancreatic Association guidelines were published in 2012. However, audits of guideline use in acute pancreatitis have often shown poor compliance. The proposers of the study felt that despite the existence of management guidelines the care of these patients was variable nationwide.

Therefore NCEPOD was asked to assess the quality of care given to patients with acute pancreatitis. We used our standard method of assessment of all hospitals in our study. This included assessment of care at an organisational level, clinical level within hospitals and external peer review of selected cases. We identified 14,479 patients with acute pancreatitis during a six month period from 1st January 2014. From these we selected a group of 8,925 patients who had either stayed in hospital three or more nights, gone to critical care or died. From a random sample, 712 patients underwent hospital clinician review and 418 patients had external peer review.

Overall, we found that there was room for improvement in care in 50% of patients with acute pancreatitis. 21% of patients in the study had one or more previous episodes of acute pancreatitis, 93% of those for the same cause. Case reviewers felt that efforts to prevent recurrent episodes due to gallstones and alcohol were inadequate. Clinicians reported that the date of first definitive treatment for gallstones was not acceptable in nearly one third of cases.

Aspects of general care where improvements could be made include avoidance of inappropriate antibiotic prescription; 1/5 of patients were being given antibiotics unnecessarily. The use of an early warning score was omitted in 31% of emergency department admissions and appropriate investigations were omitted in 22% of cases. We also found that 21% of patients who did not have an ultrasound had no reason identified to omit this, potentially missing cases of gallstones.

We recommend that clinicians fully investigate patients for the cause of acute pancreatitis. They should ensure early treatment for patients with gallstones and alcohol cessation advice where indicated. We recommend the judicious use of antibiotics as most patients with acute pancreatitis do not require them.

The organisation of care should be improved. Hospitals should develop standardised early warning scoring systems which are used throughout the hospital and commenced in the emergency department. At a regional and national level, the processes of care for patients with acute pancreatitis need to be reviewed. The development of better networking arrangements and regional pancreatitis units, with shared management guidelines, is essential to improve the co-ordination of care.

References

Back to contents

1. Johnson CD, Besselink MG, Carter R. Acute pancreatitis. BMJ 2014;349:g4859.

2. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG et al. Acute Pancreatitis Classification Working Group Classification of acute pancreatitis -2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013; 62:102-111.

3. Working Group IAP/APA Acute Pancreatitis Guidelines. IAP/APA evidence-based guidelines for the management of acute pancreatitis. Pancreatology 2013;13:e1- e15.

4. Barnard J, Siriwardena AK. Variations in implementation of current national guidelines for the treatment of acute pancreatitis: implications for acute surgical service provision. Ann R Coll Surg Engl. 2002;84:79–81.

5. Toh SKC, Phillips S, Johnson CD. A prospective audit against national standards of the presentation and management of acute pancreatitis in the South of England. Gut 2000;46:239–243.

6. Mofidi R, Madhavan KK, Garden OJ, Parks RW. An audit of the management of patients with acute pancreatitis against national standards of practice. British Journal of Surgery 2007; 94:844–848.

7. Baltatzis M, Jegatheeswaran S, O'Reilly DA, Siriwardena AK. Antibiotic use in acute pancreatitis: global overview of compliance with international guidelines. Pancreatology 2016;16(2):189–193.

8. Grimshaw JM, Thomas RE, MacLennan G, Fraser C, Ramsay CR, Vale L et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. Health Technol Assess. 2004;8(6)iii-iv:1-72.

9. Mirza S. An introduction to clinical coding. Health Service Journal. 2013;14 January.

10. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016;315(8):801-10.

11. Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, Opal SM et al. Surviving Sepsis Campaign Guidelines Committee including the Pediatric Subgroup. Surviving sepsis campaign: international guidelines for management of severe sepsis and septic shock: Crit Care Med. 2013;41(2):580-637.

12. The Royal College of Physicians. National Early Warning Score (NEWS) Standardising the assessment of acute-illness severity in the NHS. Report of a working party July 2012

13. Nitsche C1, Maertin S, Scheiber J, Ritter CA, Lerch MM, Mayerle J. Drug-induced pancreatitis. Curr Gastroenterol Rep. 2012;14:131–38.

14. NICE guideline [CG92] Venous thromboembolism: Reducing the risk for patients in hospital (published January 2010) http://www.nice.org.uk/guidance/cg92/chapter/1-recommendations.

15. Lankisch PG, Apte M, Banks PA. Acute pancreatitis. The lancet 2015;386(9988):85–96.

16. Adding Insult to Injury. NCEPOD. 2009. London http://www.ncepod.org.uk/2009report1/Downloads/AKI_report.pdf

17. NICE guideline [CG169], Acute kidney injury: prevention, detection and management, published August 2013

18. Academy of Medical Royal Colleges 2012. Seven day consultant present care. http://www.aomrc.org.uk/doc_view/9532-seven-day-consultant-present-care

19. Emergency Admissions: A Journey in the right direction. NCEPOD. 2007. London http://www.ncepod.org.uk/2007report1/Downloads/EA_report.pdf

20. Royal College of Physicians, Setting higher standards: Acute care toolkit 2 High-quality acute care. 2011 http://www.rcplondon.ac.uk/ sites/default/files/acutecare-toolkit-2-high-qualityacute-care.pdf

21. NHS England. NHS Services, Seven Days a Week Forum Paper. 2013. http://www.england.nhs.uk/ourwork/qual-clin-lead/7- day-week/

22. Just Say Sepsis! NCEPOD. 2015. London http://www.ncepod.org.uk/2015report2/downloads/JustSaySepsis_FullReport.pdf

23. Time to Get Control? NCEPOD. 2015. London http://www.ncepod.org.uk/2015report1/downloads/TimeToGetControlFullReport.pdf

24. Core Standards for Pain Management Services in the UK. 2015 www.rcoa.ac.uk/system/files/FPM-CSPMS-UK2015.pdf

25. Wittau M, Mayerb B, Scheele J, Henne-Brunsa D, Dellinger EP. Systematic review and meta-analysis of antibiotic prophylaxis in severe acute pancreatitis. Scand J Gastroenterol. 2011;46(3):261-270.

26. O'Reilly DA, Kingsnorth AN. Management of acute pancreatitis: role of antibiotics remains controversial. BMJ 2004;328:968-9.

27. NHS England, Health Education England and Public Health England. Patient Safety Alert. Addressing antimicrobial resistance through implementation of an antimicrobial stewardship programme. 18 August 2015. https://www.england.nhs.uk/wp-content/uploads/2015/08/psa-amr-stewardship-prog.pdf

28. McClave SA, Heyland DK. The physiologic response and associated clinical benefits from provision of early enteral nutrition. Nutr Clin Pract 2009;24:305-15.

29. A Mixed Bag. NCEPOD. 2010. London http://www.ncepod.org.uk/2010report1/downloads/PN_report.pdf

30. NICE guidelines [CG32] Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition. Published date: February 2006

31. Malnutrition Universal Screening Tool http://www.bapen.org.uk/pdfs/must/must_full.pdf

32. Mirtallo JM, Forbes A, McClave SA, Jensen GL, Waitzberg DL, Davies AR. International Consensus Guidelines for Nutrition Therapy in Pancreatitis. J Parenter Enteral Nutr. 2012;36:284-291.

33. Al-Omran M, Albalawi ZH, Tashkandi, MF, Al-Ansary LA. Enteral versus parenteral nutrition for acute pancreatitis. Cochrane Database Syst Rev 2010;1:CD002837.

34. Bakker OJ, van Brunschot S, van Santvoort HC, Besselink MG, Bollen TL, Boermeester MA et al. for the Dutch Pancreatitis Study Group. Early versus On-Demand Nasoenteric Tube Feeding in Acute Pancreatitis. N Engl J Med. 2014;371:1983-93.

35. Shanmugam V. Is magnetic resonance cholangiopancreatography the new gold standard in biliary imaging? BJR. 2014;78(934):888–893.

36. Tenner S, Baille J, Dewitt J, Vege SS. Management of acute pancreatitis. Am J Gastroenterol. 2013;108:1400-15.

37. Besselink MG, van Santvoort HC, Boermeester MA, Nieuwenhuijs VB, van Goor H, Dejong CHC et al. Timing and impact of infections in acute pancreatitis. Br J Surg. 2009;96: 267-73.

38. Van Baal MC, Besselink MG, Bakker OJ, van Santvoort HC, Schaapherder AF, Nieuwenhuijs VB, et al. Timing of cholecystectomy after mild biliary pancreatitis: a systematic review. Ann Surg 2012;255:860-6.

39. Royal College of Surgeons of England and Association of Upper Gastrointestinal Surgeons 2013 Commissioning guide: Gallstone disease https://www.rcseng.ac.uk/healthcare-bodies/docs/published-guides/gallstones

40. NICE. Gallstone disease: diagnosis and initial management. NICE Guidelines CG188 Published date October 2014. http://www.nice.org.uk/guidance/cg188

41. Harrison EM, O'Neill S, Meurs TS, Wong PL, Duxbury M, Paterson S. Hospital volume and patient outcomes after cholecystectomy in Scotland: retrospective, national population based study. BMJ 2012;344:e3330

42. The British Society of Gastroenterology ERCP – The Way Forward, A Standards Framework June 2014 http://www.bsg.org.uk/clinical-guidance/endoscopy/ercp-%E2%80%93-the-way-forward-a-standards-framework.html

43. JAG Accreditation system incorporating GRS global rating scale https://jagaccreditation.org.uk

44. Freidreich N. Disease of the Pancreas. New York: William Wood, 1878.

45. Apte MV, Pirola RC, Wilson JS. Individual susceptibility to alcoholic pancreatitis. Journal of Gastroenterology and Hepatology. 2008;23:S63–S68.

46. Nordback I, Pelli H, Lappalainen–Lehto R, Järvinen S, Räty S, Sand J. The Recurrence of Acute Alcohol-Associated Pancreatitis Can Be Reduced: A Randomized Controlled Trial Gastroenterology 2009;136:848–855

47. Measuring the Units. NCEPOD. 2013. London http://www.ncepod.org.uk/2013report1/downloads/MeauringTheUnits_SummaryReport.pdf

48. Apte M, Pirola RC, Wilson JS. Alcoholic pancreatitis – it's the alcohol, stupid. Nat Rev Gastroenterol Hepatol 2009;6:321-322.

49. Department of Health. A Guide to Promote a Shared Understanding of the Benefits of Managed Local Networks. http://www.dh.gov.uk/assetRoot/04/11/43/68/04114368.pdf

50. van Santvoort HC, Besselink MG, Bakker OJ, Hofker HS, Boremeester MA, Dejong CH et al. for the Dutch Pancreatitis Study Group. A step-up approach or open necrosectomy for necrotizing pancreatitis. N Engl J Med. 2010;362(16):1491-502.

51. Bakker OJ , van Santvoort HC, van Brunschot S, Geskus RB, Besselink MG, Bollen TL et al. for the Dutch Pancreatitis Study Group. Endoscopic Transgastric vs Surgical Necrosectomy for Infected Necrotizing Pancreatitis - A Randomized Trial. JAMA. 2012;307(10):1053-1061.

52. Greg D. Sacks GD Elise H. Lawson EH, Tillou A, Hines OJ. Morbidity and Mortality Conference 2.0. Annals of Surgery _ Volume 262, Number 2, August 2015. 228-9.

53. The Royal College of Surgeons of England. Morbidity and Mortality Meetings- A GUIDE TO GOOD PRACTICE. Professional and Clinical Standards Published 2015

Appendices

Back to contents

Appendix 1 – Glossary

Term	Abbreviation	Definition
5- aminosalicyclic acid	5-ASA	An anti-inflammatory drug used to treat inflammatory bowel disease.
Acute kidney injury	AKI	Acute kidney injury (AKI), previously called acute renal failure (ARF), is an abrupt loss of kidney function that develops within 7 days.
Acute pancreatitis	AP	Acute pancreatitis is a serious condition where the pancreas becomes inflamed over a short period of time.
Acute peripancreatic fluid collections	APFC	An early complication of acute pancreatitis that usually develop in the first four weeks.
Amylase		An enzyme that helps digest carbohydrates. It is made in the pancreas and the glands that make saliva. When the pancreas is diseased or inflamed, amylase releases into the blood. A test can be done to measure the level of this enzyme in blood.
Analgesia		Medication that acts to relieve pain.
APACHE II		A scoring system designed to measure the severity of disease in patients admitted to the intensive care unit.
Azathioprine		An immunosuppressive drug.
Biliary tract/tree/system		This refers to the liver, gall bladder and bile ducts, and how they work together to make, store and secrete bile.
Blood urea nitrogen	BUN	A test that measures the amount of nitrogen in the blood that comes from the waste product urea.
Cholangitis		An infection of the biliary tract with the potential to cause significant morbidity and mortality.
Cholecystectomy		A surgical procedure to remove the gallbladder.
Choledocholithiasis		The presence of at least one gallstone in the common bile duct.
Chronic pancreatitis		A long-standing inflammation of the pancreas that alters the organ's normal structure and functions.
Clotting screen		A bundled group of tests used pre-operatively to assess bleeding risk and used to monitor bleeding conditions and some therapies.
Common bile duct	CBD	The duct that carries bile from the gallbladder and liver into the duodenum (upper part of the small intestine).

Term	Abbreviation	Definition
Co-morbidities		The presence of one or more additional disorders (or diseases) co-occurring with a primary disease or disorder.
Continuous positive airway pressure	CPAP	A treatment that uses mild air pressure to keep the airways open.
C-reactive protein	CRP	A substance produced by the liver in response to inflammation.
Critical care outreach team	CCOT	A specialist critical care outreach team has been set up to support clinical staff in managing acutely ill patients in hospital.
Computed tomography	CT	An imaging procedure that uses special x-ray equipment to create detailed pictures, or scans, of areas inside the body.
Diuretics		Any substance that promotes the production of urine.
Early warning score	EWS	A guide used by healthcare professionals to quickly determine the degree of illness of a patient.
Endocrine system		The collection of glands that produce hormones that regulate metabolism, growth and development and tissue function for example.
Endoscopic ultrasound	EUS	A minimally invasive procedure to assess digestive (gastrointestinal) and lung diseases. It uses high-frequency sound waves to produce detailed images of the lining and walls of your digestive tract and chest, nearby organs such as the pancreas and liver, and lymph nodes.
Enteral nutrition		Any method of feeding that uses the gastrointestinal (GI) tract to deliver part or all of a person's caloric requirements.
Enzymes		Biological molecules (proteins) that act as catalysts and help complex reactions occur everywhere in life.
Endoscopic retrograde cholangio pancreatography	ERCP	ERCP is a procedure that uses an endoscope and X-rays to look at the bile duct and the pancreatic duct. ERCP can also be used to remove gallstones.
Exocrine pancreatic secretion		Pancreatic juice is composed of two products critical to proper digestion: digestive enzymes and bicarbonate.
Fine needle aspiration		A type of biopsy procedure.
Fluid resuscitation		The medical practice of replenishing bodily fluid lost through sweating, bleeding, fluid shifts or other processes.
Gallstones		Small stones, usually made of cholesterol that form in the gallbladder.
Glasgow scoring system		A clinical prediction tool for predicting the severity of acute pancreatitis.
Group and save		Determining the patient's ABO blood group and screening serum for the presence of antibodies to common red cell antigens that can cause transfusion reactions.

Term	Abbreviation	Definition
Haematocrit		A blood test that measures the percentage of the volume of whole blood that is made up of red blood cells.
Hartmann's solution		A fluid used to replace body fluid and mineral salts that may be lost for a variety of medical reasons.
Hepatobiliary		Having to do with the liver plus the gallbladder, bile ducts, or bile.
Hepatology		The branch of medicine that incorporates the study of liver, gallbladder, biliary tree, and pancreas as well as management of their disorders.
Hypercalcaemia		High levels of calcium in the blood.
Hyperlipidaemia		Abnormally high levels of any or all lipids and/or lipoproteins in the blood.
Idiopathic		Of unknown cause.
Lactate dehydrogenase		An enzyme that helps the process of turning sugar into energy for cells to use.
Laparotomy		A surgical procedure involving a large incision through the abdominal wall to gain access into the abdominal cavity.
Leukocyte		White blood cell.
Level 2	HDU	High dependency care.
Level 3	ITU	Intensive care.
Lipase		An enzyme the body uses to break down fats in food so they can be absorbed in the intestines.
Liver function tests	LFTs	Groups of blood tests that give information about the state of a patient's liver.
Low molecular weight heparin	LMW	An anti-clotting drug.
Magnetic resonance cholangio pancreatography	MRCP	A medical imaging technique that uses magnetic resonance imaging to visualise the biliary and pancreatic ducts in a non-invasive manner. This procedure can be used to determine if gallstones are lodged in any of the ducts surrounding the gallbladder.
Malnutrition		Lack of proper nutrition, caused by not having enough to eat, not eating enough of the right things, or being unable to use the food that one does eat.
Metabolic acidosis		This occurs when the body produces too much acid, or when the kidneys are not removing enough acid from the body.
Magnetic resonance imaging	MRI	A test that uses a magnetic field and pulses of radio wave energy to make pictures of organs and structures inside the body.
Nasogastric		A small tube that is passed through the nose and guided into the stomach.

Term	Abbreviation	Definition
Nasojejunal tube		A small tube that is passed through the nose and guided into the small bowel.
National Early Warning Score	NEWS	A standardised approach to the detection of clinical deterioration in acutely ill patients in the United Kingdom.
Necrosectomy		Surgical removal of dead tissue.
Necrosis		The death of body tissue.
Neoplasms		An abnormal growth of tissue.
Nephrotoxic		A poisonous effect on the kidneys.
Pancreas		A glandular organ in the digestive system and endocrine system. It is about 6 inches long and sits across the back of the abdomen, behind the stomach.
Parenteral nutrition		The feeding of a person intravenously, bypassing the usual process of eating and digestion.
Percutaneous		Through the skin.
Prednisolone		A steroid medicine.
Procalcitonin	PCT	A marker of inflammatory response.
Prophylactic		A preventive measure.
Pseudoaneurysm		Sometimes called a false aneurysm, occurs when a blood vessel wall is injured, and the blood is held by the surrounding tissues.
Pseudocyst		A fluid-filled sac that looks like a cyst on scans. It may also have pancreatic tissue, digestive juices (enzymes), and blood.
Ranson score		A clinical prediction tool for predicting the severity of acute pancreatitis.
Retroperitoneum		The anatomical space in the abdominal cavity behind the peritoneum.
Ringer's lactate		A solution is often used for fluid resuscitation.
Sepsis		A life-threatening condition that arises when the body's response to infection injures its own tissues and organs.
Sphincter of Oddi		The smooth muscle that surrounds the end portion of the common bile duct and pancreatic duct.
Sphincterotomy		An operation to cut the muscle between the common bile duct and the pancreatic duct.
Splenic artery		The blood vessel that supplies oxygenated blood to the spleen.

Term	Abbreviation	Definition
Statins		A group of medicines that can help lower the level of low-density lipoprotein (LDL) cholesterol in the blood.
Steroids		An anti-inflammatory medicine.
Systemic inflammatory response syndrome	SIRS	An inflammatory state affecting the whole body.
Tachycardia		An abnormally rapid heart rate.
Tachypnoeic		Abnormally rapid breathing.
Temporal arteritis		A condition in which the temporal arteries, which supply blood to the head and brain, become inflamed or damaged.
Triglycerides		A form of dietary fat found in meats, dairy produce and cooking oils.
Troponin		A complex of three regulatory proteins that is integral to muscle contraction.
Venous thromboembolism	VTE	The formation of blood clots in a vein.

Appendix 2 - Grades of severity of acute pancreatitis - revised Atlanta definitions

Grades of severity:

- Mild acute pancreatitis
  - No organ failure
  - No local or systemic complications
- Moderately severe acute pancreatitis
  - Organ failure that resolves within 48 hours (transient organ failure) **and/or**
  - Local or systemic complications without persistent organ failure
- Severe acute pancreatitis
  - Persistent organ failure (>48 hours)

Two peaks of mortality:

- ***An early phase*** - during which mortality is due to the body reacting to the injury to the pancreas causing systemic inflammatory response syndrome. When this persists there is an increased risk of developing organ failure.
- ***A late phase*** - this is characterised by persistence of systemic signs of inflammation or by the presence of additional local complications

Banks PA, Bollen TL, Dervenis C et al. Acute Pancreatitis Classification Working Group Classification of acute pancreatitis -2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013; 62: 102-111.

Appendix 3 - Drugs with a definite or probable association with acute pancreatitis

Definite - a drug reaction that follows a reasonable temporal sequence from administration of the drug; that follows a known response pattern; that is confirmed by stopping the drug (dechallenge); and that is confirmed by reappearance of the symptoms upon repeated exposure to the drug (re-challenge):

Acetaminophen, Asparaginase, Azathioprine, Bortezomib, Capecitabine, Carbamazepine, Cimetidine, Cisplatin, Cytarabine, Didanosine, Enalapril, Erythromycin, Estrogens, Furosemide, Hydrochlorothiazide, Interferon-α Itroconazol, Lamivudine, Mercaptopurine, Mesalamine/olsalazine, Methyldopa, Metronidazole, Octreotide, Olanzepine, Opiates, Oxyphenbutazone, Pentamidine, Pentavalent antimonials, Phenformin, Simvastatin, Steroids, Sulfasalazine, Sulfmethaxazole/Trimethoprim, Sulindac, Tamoxifen, Tetracycline, Valproic acid.

Probable - a drug reaction that follows a reasonable temporal sequence from administration of the drug; that follows a known response pattern; that is confirmed by dechallenge; and that could not be explained by the known characteristics of the patients clinical state:

Atorvastatine, Carboplatin/ Docetaxel, Ceftriaxon, Cyclopenthiazide, Didanosine, Doxycycline, Enalapril, Estrogens, Famotidine, Furosemide, Hydrochlorothiazide, Ifosphamid, Imatinib, Liraglutide, Maprotiline, Mesalazine, Orlitostat, Oxalipllatine, Rifampin, Secnidazole, Sitagliptine, Sulindac, Sorafenib, Tigecyclin, Vildagliptine

Nitsche C, Maertin S, Scheiber J et al. Drug-induced pancreatitis. Curr Gastroenterol Rep 2012; 14: 131–38.

Appendix 4 - Revised Atlanta definitions of morphological features of acute pancreatitis

1. **Interstitial oedematous pancreatitis** Acute inflammation of the pancreatic parenchyma and peripancreatic tissues, but without recognisable tissue necrosis CECT criteria
   * Pancreatic parenchyma enhancement by intravenous contrast agent
   * No findings of peripancreatic necrosis

2. **Necrotising pancreatitis** Inflammation associated with pancreatic parenchymal necrosis and/or peripancreatic necrosis CECT criteria
   * Lack of pancreatic parenchymal enhancement by intravenous contrast agent and/or
   * Presence of findings of peripancreatic necrosis (see below—ANC and WON)

3. **APFC (acute peripancreatic fluid collection)** Peripancreatic fluid associated with interstitial oedematous pancreatitis with no associated peripancreatic necrosis. This term applies only to areas of peripancreatic fluid seen within the first 4 weeks after onset of interstitial oedematous pancreatitis and without the features of a pseudocyst. CECT criteria
   * Occurs in the setting of interstitial oedematous pancreatitis
   * Homogeneous collection with fluid density
   * Confined by normal peripancreatic fascial planes
   * No definable wall encapsulating the collection
   * Adjacent to pancreas (no intrapancreatic extension)

4. **Pancreatic pseudocyst** An encapsulated collection of fluid with a well defined inflammatory wall usually outside the pancreas with minimal or no necrosis. This entity usually occurs more than 4 weeks after onset of interstitial oedematous pancreatitis to mature. CECT criteria
   * Well circumscribed, usually round or oval
   * Homogeneous fluid density
   * No non-liquid component
   * Well defined wall; that is, completely encapsulated
   * Maturation usually requires >4 weeks after onset of acute pancreatitis; occurs after interstitial oedematous pancreatitis

5. **ANC (acute necrotic collection)** A collection containing variable amounts of both fluid and necrosis associated with necrotising pancreatitis; the necrosis can involve the pancreatic parenchyma and/or the peripancreatic tissues CECT criteria
   * Occurs only in the setting of acute necrotising pancreatitis
   * Heterogeneous and non-liquid density of varying degrees in different locations (some appear homogeneous early in their course)
   * No definable wall encapsulating the collection
   * Location—intrapancreatic and/or extrapancreatic

6. **WON (walled-off necrosis)** A mature, encapsulated collection of pancreatic and/or peripancreatic necrosis that has developed a well defined inflammatory wall. WON usually occurs >4 weeks after onset of necrotising pancreatitis. CECT criteria
   * Heterogeneous with liquid and non-liquid density with varying degrees of loculations (some may appear homogeneous)
   * Well defined wall, that is, completely encapsulated
   * Location—intrapancreatic and/or extrapancreatic
   * Maturation usually requires 4 weeks after onset of acute necrotising pancreatitis

Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, Tsiotos GG, Vege SS. Acute Pancreatitis Classification Working Group Classification of acute pancreatitis -2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013; 62: 102-111.

Appendix 5 - The role and structure of NCEPOD

The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) is an independent body to which a corporate commitment has been made by the Medical and Surgical Colleges, Associations and Faculties related to its area of activity. Each of these bodies nominates members on to NCEPOD's Steering Group.

Steering Group as at 7th July 2016

Dr A Hartle	Association of Anaesthetists of Great Britain and Ireland
Mr F Smith	Association of Surgeons of Great Britain and Ireland
Mr K Altman	Faculty of Dental Surgery, Royal College of Surgeons of England
Vacancy	Faculty of Public Health Medicine
Mr S Barasi	Lay Representative
Ms S Payne	Lay Representative
Dr J Fazackerley	Royal College of Anaesthetists
Vacancy	Royal College of Anaesthetists
Dr C Mann	Royal College of Emergency Medicine
Dr D Cox	Royal College of General Practitioners
Mrs J Greaves	Royal College of Nursing
Dr E Morris	Royal College of Obstetricians and Gynaecologists
Mr W Karwatowski	Royal College of Ophthalmologists
Dr I Doughty	Royal College of Paediatrics and Child Health
Dr L Igali	Royal College of Pathologists
Mr M McKirdy	Royal College of Physicians and Surgeons of Glasgow
Dr M Jones	Royal College of Physicians of Edinburgh
Dr A McCune	Royal College of Physicians of London
Dr M Ostermann	Royal College of Physicians of London
Dr M Cusack	Royal College of Physicians of London
Dr J Carlile	Royal College of Psychiatrists
Dr T Sabharwal	Royal College of Radiologists
Mr W Tennant	Royal College of Surgeons of Edinburgh
Mr J Abercrombie	Royal College of Surgeons of England
Mr M Bircher	Royal College of Surgeons of England

Observers

Vacancy	Coroners' Society of England and Wales
Ms T Strack	Healthcare Quality Improvement Partnership

Trustees

Professor L Regan - Chair
Dr D Mason - Honorary Treasurer
Ms J Barber
Professor R Endacott
Professor T Hendra
Mr I Martin

Company Secretary Dr M Mason

NCEPOD is a company, limited by guarantee (Company number: 3019382) and a registered charity (Charity number: 1075588)

Clinical Co-ordinators

The Steering Group appoint a Lead Clinical Co-ordinator for a defined tenure. In addition there are 12 Clinical/Nursing Co-ordinators who work on each study. All Co-ordinators are engaged in active academic/clinical practice (in the NHS) during their term of office.

Lead Clinical Co-ordinator	Dr M Juniper (Medicine)
Clinical Co-ordinators	Dr V Srivastava (Medicine)
Dr K Wilkinson	(Anaesthesia)
Dr A P L Goodwin	(Anaesthesia)
Mr M Sinclair	(Surgery)
Mr D O'Reilly	(Surgery)
Dr S McPherson	(Radiology)
Ms G Ellis	(Nursing)
Dr S Cross	(Liaison Psychiatry)
Dr K Horridge	(Paediatrics)
Dr M Allsopp	(Adolescent Psychiatry)
Dr A Michalski	(Paediatric Oncology)

Commissioning and supporting organisations

The Clinical Outcome Review Programme into Medical and Surgical Care is commissioned by the Healthcare Quality Improvement Partnership (HQIP) on behalf of NHS England, NHS Wales, the Northern Ireland Department of Health, Social Services and Public Safety (DHSSPS), the Health and Social Care division of the Scottish Government, the States of Jersey, Guernsey, and the Isle of Man.

Members of the Clinical Outcome Review Programme into Medical and Surgical Care Independent Advisory Group:

Karen Gully (Chair)
Rachel Binks
Fergal Bradley
Mike Dent
Mark Ferreira
Margaret Hughes
Donal O'Donoghue
Peter Lamont
Rose Naylor
Terence O'Kelly
Joan Russell
David Saunders
Roger Taylor
William Taylor
Barbara Scott
Phil Willan
Paddy Woods

The organisations that provided additional funding to cover the cost of this study:

Aspen Healthcare
Beneden Hospital
BMI Healthcare
BUPA Cromwell
East Kent Medical Services Ltd
Fairfield Independent Hospital
HCA International
Hospital of St John and St Elizabeth
King Edward VII's Hospital Sister Agnes
New Victoria Hospital
Nuffield Health
Ramsay Health Care UK
Spire Health Care
St Anthony's Hospital
St Joseph's Hospital
The Horder Centre
The London Clinic
Ulster Independent Clinic

Appendix 6 – Participation

Trust Name	Number of hospitals participating	Number of organisational questionnaires returned	Number of cases included	Number of clinician questionnaires received	Number of sets of case notes returned
Abertawe Bro Morgannwg University Health Board	2	2	10	10	10
Aintree Hospitals NHS Foundation Trust	1	1	5	5	5
Airedale NHS Foundation Trust	1	1	5	5	5
Aneurin Bevan University Health Board	2	2	11	1	1
Ashford & St Peter's Hospital NHS Trust	1	1	5	5	5
Barking, Havering & Redbridge University Hospitals NHS Trust	2	2	9	9	9
Barnsley Hospital NHS Foundation Trust	1	1	5	4	3
Barts Health NHS Trust	5	3	16	2	0
Basildon & Thurrock University Hospitals NHS Foundation Trust	1	1	5	5	5
Bedford Hospital NHS Trust	1	1	5	3	2
Belfast Health and Social Care Trust	3	3	12	3	9
Betsi Cadwaladr University Local Health Board	4	3	15	6	3
Blackpool Teaching Hospitals NHS Foundation Trust	1	1	4	4	4
Bradford Teaching Hospitals NHS Foundation Trust	1	0	5	5	3
Brighton and Sussex University Hospitals NHS Trust	3	3	9	8	9
Buckinghamshire Healthcare NHS Trust	1	1	5	4	4
Burton Hospitals NHS Foundation Trust	1	1	4	4	4
Calderdale & Huddersfield NHS Foundation Trust	2	2	6	6	6
Cambridge University Hospitals NHS Foundation Trust	1	1	4	4	3
Cardiff and Vale University Health Board	2	2	8	6	8
Central Manchester University Hospitals NHS Foundation Trust	1	1	7	6	1
Chelsea & Westminster NHS Foundation Trust	2	1	5	4	2
Chesterfield Royal Hospital NHS Foundation Trust	1	1	5	5	5
City Hospitals Sunderland NHS Foundation Trust	1	1	5	5	5
Colchester Hospital University NHS Foundation Trust	2	1	5	4	3
Countess of Chester Hospital NHS Foundation Trust	1	1	5	5	5
County Durham and Darlington NHS Foundation Trust	2	2	10	6	10
Croydon Health Services NHS Trust	1	1	5	5	5

Trust Name	Number of hospitals participating	Number of organisational questionnaires returned	Number of cases included	Number of clinician questionnaires received	Number of sets of case notes returned
Cwm Taf Local Health Board	2	2	11	7	8
Dartford & Gravesham NHS Trust	1	0	5	0	0
Derby Teaching Hospitals NHS Foundation Trust	1	1	4	4	4
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	2	2	10	6	4
Dorset County Hospital NHS Foundation Trust	1	1	5	5	5
East & North Hertfordshire NHS Trust	2	1	4	4	4
East Cheshire NHS Trust	1	1	5	4	2
East Kent Hospitals University NHS Foundation Trust	3	3	13	13	13
East Lancashire Hospitals NHS Trust	1	1	5	5	5
East Sussex Healthcare NHS Trust	2	2	9	5	9
Epsom and St Helier University Hospitals NHS Trust	2	0	9	2	0
Frimley Health NHS Foundation Trust	3	2	9	7	6
Gateshead Health NHS Foundation Trust	1	1	5	3	3
George Eliot Hospital NHS Trust	1	1	2	2	2
Gloucestershire Hospitals NHS Foundation Trust	2	0	10	5	2
Great Western Hospitals NHS Foundation Trust	1	1	5	5	5
Guy's & St Thomas' NHS Foundation Trust	2	2	5	5	5
Hampshire Hospitals NHS Foundation Trust	2	2	10	3	0
Harrogate and District NHS Foundation Trust	1	1	5	5	5
HCA International	1	0	1	0	0
Health and Social Services Department, States of Guernsey	1	1	5	5	3
Heart of England NHS Foundation Trust	3	3	8	8	8
Hillingdon Hospitals NHS Foundation Trust (The)	1	1	3	3	0
Hinchingbrooke Health Care NHS Trust	1	1	5	5	0
Homerton University Hospital NHS Foundation Trust	1	1	5	4	2
Hull and East Yorkshire Hospitals NHS Trust	2	2	7	4	4
Hywel Dda Local Health Board	4	4	15	14	15
Imperial College Healthcare NHS Trust	3	0	13	11	11
Ipswich Hospital NHS Trust	1	1	4	4	4
James Paget University Hospitals NHS Foundation Trust	1	1	5	3	3
Kettering General Hospital NHS Foundation Trust	1	1	5	5	5

Appendix 6 – Participation (continued)

Trust Name	Number of hospitals participating	Number of organisational questionnaires returned	Number of cases included	Number of clinician questionnaires received	Number of sets of case notes returned
King's College Hospital NHS Foundation Trust	2	2	10	8	8
Kingston Hospital NHS Trust	1	1	5	5	5
Lancashire Teaching Hospitals NHS Foundation Trust	2	0	8	3	0
Lewisham and Greenwich NHS Trust	2	2	10	10	10
London North West Healthcare NHS Trust	3	3	13	13	8
Maidstone and Tunbridge Wells NHS Trust	2	2	8	8	8
Medway NHS Foundation Trust	1	1	5	5	5
Mid Cheshire Hospitals NHS Foundation Trust	1	1	5	1	0
Mid Essex Hospitals NHS Trust	1	1	5	4	4
Mid Yorkshire Hospitals NHS Trust	3	3	11	4	11
Milton Keynes Hospital NHS Foundation Trust	1	0	5	4	5
Newcastle upon Tyne Hospitals NHS Foundation Trust	3	2	11	2	9
Norfolk & Norwich University Hospital NHS Trust	1	1	5	3	5
North Bristol NHS Trust	2	1	10	6	10
North Cumbria University Hospitals NHS Trust	2	2	9	9	9
North Middlesex University Hospital NHS Trust	1	1	5	5	5
North Tees and Hartlepool NHS Foundation Trust	1	1	4	4	4
Northampton General Hospital NHS Trust	1	1	5	5	5
Northern Devon Healthcare NHS Trust	1	1	5	5	5
Northern Health & Social CareTrust	4	1	5	3	2
Northern Lincolnshire & Goole NHS Foundation Trust	2	2	9	9	9
Northumbria Healthcare NHS Foundation Trust	3	2	10	5	3
Nottingham University Hospitals NHS Trust	2	1	10	10	10
Oxford University Hospitals NHS Foundation Trust	3	3	11	5	2
Pennine Acute Hospitals NHS Trust (The)	3	3	7	7	7
Peterborough & Stamford Hospitals NHS Foundation Trust	1	1	5	5	5
Plymouth Hospitals NHS Trust	1	1	5	5	5
Poole Hospital NHS Foundation Trust	1	1	5	4	0
Portsmouth Hospitals NHS Trust	1	1	6	4	4

Trust Name	Number of hospitals participating	Number of organisational questionnaires returned	Number of cases included	Number of clinician questionnaires received	Number of sets of case notes returned
Royal Berkshire NHS Foundation Trust	1	1	5	5	5
Royal Bolton Hospital NHS Foundation Trust	1	1	5	5	5
Royal Bournemouth and Christchurch Hospitals NHS Trust	1	1	5	5	5
Royal Cornwall Hospitals NHS Trust	1	1	5	5	5
Royal Devon and Exeter NHS Foundation Trust	1	1	6	6	6
Royal Free London NHS Foundation Trust	3	3	10	10	10
Royal Liverpool & Broadgreen University Hospitals NHS Trust	1	1	6	6	6
Royal Surrey County Hospital NHS Trust	1	1	5	5	5
Royal United Hospitals Bath NHS Foundation Trust	1	1	5	5	5
Salford Royal Hospitals NHS Foundation Trust	1	1	6	3	6
Salisbury NHS Foundation Trust	1	1	5	5	5
Sandwell and West Birmingham Hospitals NHS Trust	2	2	10	9	8
Sheffield Teaching Hospitals NHS Foundation Trust	3	3	5	5	5
Sherwood Forest Hospitals NHS Foundation Trust	2	2	3	3	3
Shrewsbury and Telford Hospitals NHS Trust	2	2	8	8	8
South Eastern Health & Social Care Trust	1	0	5	1	1
South Tees Hospitals NHS Foundation Trust	2	2	9	8	6
South Tyneside NHS Foundation Trust	1	1	4	2	2
South Warwickshire NHS Foundation Trust	1	0	5	1	1
Southend University Hospital NHS Foundation Trust	1	1	5	4	3
Southern Health & Social Care Trust	2	2	10	10	10
Southport and Ormskirk Hospitals NHS Trust	1	1	5	1	5
Spire Healthcare	1	1	1	1	1
St George's University Hospitals NHS Foundation Trust	1	1	5	5	5
St Helens and Knowsley Teaching Hospitals NHS Trust	1	1	5	5	5
States of Jersey Health & Social Services	1	1	5	5	5
Surrey & Sussex Healthcare NHS Trust	1	0	5	3	0
Tameside Hospital NHS Foundation Trust	1	1	5	5	5
Taunton & Somerset NHS Foundation Trust	1	1	5	5	5
The Dudley Group NHS Foundation Trust	1	1	5	5	5
The Leeds Teaching Hospitals NHS Trust	2	2	6	6	5

Appendix 6 – Participation (continued)

Trust Name	Number of hospitals participating	Number of organisational questionnaires returned	Number of cases included	Number of clinician questionnaires received	Number of sets of case notes returned
The London Clinic	1	0	0	0	0
The Princess Alexandra Hospital NHS Trust	1	0	3	0	0
The Queen Elizabeth Hospital King's Lynn NHS FoundationTrust	1	0	5	3	1
The Rotherham NHS Foundation Trust	1	1	3	3	3
The Royal Wolverhampton Hospitals NHS Trust	1	1	5	3	5
The University Hospitals of the North Midlands NHS Trust	2	0	10	0	0
Torbay and South Devon NHS Foundation Trust	1	0	5	2	1
United Lincolnshire Hospitals NHS Trust	3	2	9	9	9
Univ. Hospital of South Manchester NHS Foundation Trust	1	1	5	5	5
University College London Hospitals NHS Foundation Trust	1	1	5	5	5
University Hospital Southampton NHS Foundation Trust	1	1	5	5	5
University Hospitals Birmingham NHS Foundation Trust	1	1	5	5	5
University Hospitals Coventry and Warwickshire NHS Trust	2	1	5	4	4
University Hospitals of Bristol NHS Foundation Trust	1	1	5	0	0
University Hospitals of Leicester NHS Trust	3	3	10	6	10
University Hospitals of Morecambe Bay NHS Trust	2	2	10	10	10
Walsall Healthcare NHS Trust	1	1	5	1	0
Warrington & Halton Hospitals NHS Foundation Trust	1	1	5	3	0
West Hertfordshire Hospitals NHS Trust	1	1	5	5	5
West Suffolk NHS Foundation Trust	1	1	3	3	3
Western Health & Social Care Trust	2	2	10	2	0
Western Sussex Hospitals NHS Foundation Trust	2	2	10	9	6
Weston Area Health Trust	1	0	5	3	1
Whittington Health	1	1	5	5	5
Wirral University Teaching Hospital NHS Foundation Trust	1	1	4	4	4
Worcestershire Acute Hospitals NHS Trust	2	2	10	3	10
Wrightington, Wigan & Leigh NHS Foundation Trust	1	1	5	4	2
Wye Valley NHS Trust	1	1	4	3	4
Yeovil District Hospital NHS Foundation Trust	1	1	5	5	5
York Teaching Hospitals NHS Foundation Trust	2	2	10	9	9

Published June 2016
by the National Confidential Enquiry
into Patient Outcome and Death

Ground Floor
Abbey House
74-76 St John Street
London EC1M 4DZ

T 0207 251 9060
F 0207 250 0020
E info@ncepod.org.uk
w www.ncepod.org.uk

ISBN 978-0-9926184-5-2

A company limited by guarantee Company no. 3019382
Registered charity no. 1075588