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Original Article

Gallstone Pancreatitis: Clinical outcomes and economic impact at a tertiary UK Hepatobiliary centre

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ABSTRACT

Background: Gallstone pancreatitis (GSP) accounts for nearly 50 % of acute pancreatitis admissions in the NHS. Post-COVID-19 delays in laparoscopic cholecystectomy (LC) have amplified the clinical and financial burden. This study evaluates outcomes and preventable costs associated with GSP at a UK tertiary centre.

Method: A prospective cohort of 185 GSP patients was analysed over 30 months at Nottingham University Hospitals NHS Trust. Patients were stratified into three age groups: 20–49, 50–69, and ≥70 years. Data included demographics, disease severity, LC timing, readmissions, and healthcare costs.

Results: The median length of hospital stay was 4 days (IQR: 2–7), increasing slightly with age and disease severity. Severe pancreatitis occurred in 29.2 % of patients aged ≥70. ICU admissions were highest in the 50–69 years group (9.7 %), with mortality and complication rates peaking in those ≥70 years (16.7 % and 19.4 %, respectively). Median LC waiting times increased through age groups: 61.0, 100.0, and 272.0 days, respectively. Readmission rates rose progressively with age, reaching 43.1 % in the oldest group. Delays beyond 121 days were associated with higher readmission risk. Hot cholecystectomy was most frequent in younger patients (15.7 %). The total cost of inpatient care for GSP reached £1.12 million (median cost of £6663 per patient). Readmissions accounted for 58 % of the total cost (£4250 per episode).

Conclusions: Readmission-related expenditure, largely preventable with timely surgery, represents a key target for intervention. Prioritising early cholecystectomy, particularly within 121 days of index admission, may substantially reduce the financial burden and improve patient outcomes across the NHS.

1. Introduction

Acute pancreatitis is a common cause of emergency hospital admission in the UK, with an annual incidence of approximately 56 per 100,000 people. Gallstones account for nearly 50 % of all cases, of which approximately 25 % progress to severe disease, potentially leading to respiratory failure, renal impairment, peripancreatic collections, and prolonged critical care requirements. The overall mortality for acute pancreatitis is around 5 %, rising to approximately 25 % in severe cases [1].

Extensive evidence from randomised trials and meta-analyses indicates that early (same-admission) laparoscopic cholecystectomy (LC) for mild gallstone pancreatitis reduces recurrent biliary events, complications, length of stay, and healthcare costs, without increasing operative risk [2]. International guidelines therefore strongly recommend performing LC during the index admission for mild gallstone pancreatitis [2,3]. Despite this, achieving timely LC remains challenging across many healthcare systems.

The COVID-19 pandemic placed unprecedented strain on elective surgical services worldwide. In England alone, more than seven million individuals were on waiting lists by late 2022, and only 62 % met the 18-week NHS Referral-to-Treatment (RTT) standard [4]. Over 400,000 patients had waited more than a year for elective surgery, prompting a national directive to increase elective activity by 30 % by 2024–2025 [5]. These delays have had

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important consequences for conditions such as gallstone pancreatitis, where late cholecystectomy increases the risk of recurrent pancreatitis, biliary colic, cholangitis, and emergency readmission [2,6,7].

While the economic burden of gallstone pancreatitis is substantial—estimated at $2.2 billion annually in the United States—the true cost to the NHS has not been well quantified [8]. Understanding this burden is essential for informing service planning, surgical prioritisation, and resource allocation.

The aim of this study was therefore to evaluate the clinical outcomes and economic impact of gallstone pancreatitis at a tertiary hepatopancreatobiliary (HPB) centre in England. Specifically, we assessed waiting times for LC, readmission patterns, complications, and the overall financial burden to the NHS, with a particular focus on potentially preventable costs arising from delays in definitive surgical management.

2. Methods

2.1. Study design and patient selection

This prospective observational study included all patients diagnosed with gallstone pancreatitis at Nottingham University Hospitals NHS Trust over a 30-month period, from February 2021 to August 2023. Patients were identified through a prospective clinical database and cross-referenced with hospital records using acute pancreatitis diagnostic coding to ensure completeness and accuracy.

As the study was classified as a service evaluation, individual patient consent was not required, in accordance with guidance from the UK NHS Health Research Authority Decision Tool (http://www.hra-decisiontools.org.uk/research/index.html). All data were anonymised and securely stored using the REDCap Cloud electronic data capture system (https://www.redcapcloud.com), and a Data Protection Impact Assessment (DPIA) was completed. Ethical approval was obtained from the institutional review board (Project Number: 23–293C). Data accuracy and completeness were independently verified by two principal investigators. Patients with incomplete follow-up data due to transfer of care (n = 13) were excluded from the analysis.

2.2. Diagnosis of acute pancreatitis and biliary aetiology

Acute pancreatitis was diagnosed using internationally accepted criteria (NICE; IAP/APA; Revised Atlanta Classification) [3,9,10], requiring at least *two of the following criteria*: characteristic upper abdominal pain; serum amylase or lipase $\geq 3 \times$ the upper limit of normal; radiological features consistent with acute pancreatitis. Once acute pancreatitis was confirmed, biliary aetiology was established using ultrasound as the first-line modality, identifying gallstones.

Patients with alternative aetiologies—including alcohol-related disease, hypertriglyceridemia, autoimmune pancreatitis, drug-induced pancreatitis, and post-ERCP pancreatitis—were excluded. Alcohol consumption was documented for all patients, and none met diagnostic criteria for alcoholic pancreatitis.

2.3. Age group stratification

For comparative analysis, the cohort was stratified into three age groups: 20–49 years, 50–69 years, and ≥70 years. These thresholds reflected NHS perioperative risk categories, increasing comorbidity burden, and frailty thresholds relevant to HPB surgical planning.

2.4. Clinical variables and definitions

Baseline data included age, sex, and Charlson Comorbidity Index (CCI). Clinical outcomes included: length of stay (LOS), defined as the cumulative inpatient stay across index admission and readmissions; disease severity, initially assessed using the Modified Glasgow Score (as mandated in local pathways) and validated retrospectively using the Revised Atlanta Classification whenever imaging was available, including grading of pancreatic necrosis (<30 %, 30–50 %, >50 %); Intensive Therapy Unit (ITU) admission, in-hospital mortality; complications; and timing of laparoscopic cholecystectomy (days from index admission to definitive surgery).

2.5. Readmission analysis

Readmissions were analysed across three intervals post-discharge: within 30 days, between 1 and 3 months, and 3 months after index admission. A *time-at-risk* approach was used: patients were censored at the date of cholecystectomy, and biliary/pancreatitis-related readmissions occurring after surgery were excluded from primary analyses. Non-biliary readmissions (e.g., cardiac or infectious conditions) were not recorded or included in our analysis.

Readmission episodes were categorised as: recurrent gallstone pancreatitis; biliary complications without pancreatitis (e.g., biliary colic, jaundice, cholangitis, cholecystitis); mixed presentations with features of both.

2.6. Interventions and medical management

Where required, interventions included ERCP, endoscopic ultrasound-guided drainage, percutaneous drainage, or surgical management of complications. In accordance with local institutional practice, ursodeoxycholic acid (UDCA) was not given to any patient. Nutritional support followed institutional practice prioritising early enteral feeding unless contraindicated.

2.7. Cost analysis

Cost data for all inpatient episodes—including index admission, readmissions, and inter-hospital transfers—were obtained directly from the Trust's finance department. These data included ward costs, ITU costs, radiology, endoscopy, theatre utilisation, and specialist interventions.

2.8. Statistical analysis

Statistical analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY). Descriptive statistics were used to summarise baseline characteristics. Group comparisons employed independent t-tests, Kruskal–Wallis tests, and Chi-square tests as appropriate. Correlation analyses evaluated relationships between variables. Multivariable regression models adjusted for age, sex, and CCI. A p-value <0.05 was considered statistically significant.

2.9. Results

A total of 185 patients were included: 51 aged 20–49 years, 62 aged 50–69 years, and 72 aged ≥70 years. Baseline characteristics are summarised in Table 1.

2.10. Length of stay

The median length of hospital stay for the overall cohort was 4

Table 1
Baseline demographics, clinical severity, and in-hospital outcomes across age groups in patients with gallstone pancreatitis.

Variable	20–49 years	50–69 years	≥70 years	Whole cohort
Number of patients	51	62	72	185
Age (years), median (IQR)	35 (27–45)	60 (52–65)	76 (73–82)	61 (49–73)
Length of hospital stay (days), median (IQR)	4 (2–7)	4 (3–6)	5 (3–7)	4 (3–7)
Charlson Comorbidity Index, median (IQR)	0 (0–1)	2 (1–2)	4 (4–5)	3 (1–5)
Severe pancreatitis	15.7 % (8/51)	17.7 % (11/62)	29.2 % (21/72)	21.6 % (40/185)
Mild pancreatitis	84.3 % (43/51)	82.3 % (51/62)	70.8 % (51/72)	78.4 % (145/185)
Mortality	0 %	3.2 % (2/62)	16.7 % (12/72)	7.6 % (14/185)
ICU admission	5.9 % (3/51)	9.7 % (6/62)	8.3 % (6/72)	8.1 % (15/185)
ICU LOS (days), median (IQR)	42 (9–63)	4.5 (2–52)	18 (6–21)	17 (9–42)

Continuous data are presented as median (interquartile range, IQR) and categorical variables as n/N (%). Variables include patient age, length of stay (LOS), Charlson Comorbidity Index (CCI), severity of pancreatitis, mortality, and Intensive Care Unit (ICU) admission.

days (IQR 3–7), with no significant differences between age groups ($p = 0.45$). Comorbidity burden (CCI) did not correlate with LOS, whereas disease severity and complications were associated with longer stays ($p < 0.05$). Severe pancreatitis accounted for delays more than age alone.

2.11. Pancreatitis severity, mortality, and Intensive Care Unit (ICU) admission

Severe pancreatitis occurred in 21.6 % of patients, increasing with age (15.7 % in <50 years, 17.7 % in 50–69 years, and 29.2 % in ≥70 years). ICU admission was required in 8.1 % overall, with similar rates across age groups. Median ICU LOS showed wide variability due to a small number of prolonged admissions. The Kruskal–Wallis H test showed no statistically significant difference ($p = 0.051$), despite the observed trend toward longer stays in the younger cohort.

In-hospital mortality was 7.6 % (14/185), rising sharply in older patients (16.7 % in ≥70 years) and absent in the youngest group. Mortality correlated strongly with pancreatitis severity ($p = 0.001$).

2.12. Complications

The overall incidence of complications was 16.8 % (30/185), with comparable rates between patients aged 20–49 years (13.7 %) and those aged 50–69 years (14.5 %), but the highest incidence among patients aged ≥70 years (19.4 %). Among older patients, complications were exclusively short-term, with no cases of long-term pancreatic insufficiency.

In both the youngest (20–49 years) and oldest (≥70 years) age groups, peripancreatic fluid collections or pseudocysts and necrosis/walled-off necrosis (WON) occurred at equal frequencies—each accounting for 3.9 % (2/51) in the 20–49 group and 9.7 % (7/72) in the ≥70 group. Patients aged 50–69 years demonstrated a higher incidence of peripancreatic fluid collections or pseudocysts (19.4 %, 12/62) and necrosis/WON (9.7 %, 6/62). Rare complications such as portal vein or superior mesenteric vein thrombosis, pseudoaneurysm formation, and ARDS were infrequent (<1 % of the cohort).

Most complications were managed conservatively or with minimally invasive approaches such as ERCP or EUS-guided drainage. A detailed summary of complication types, their distribution across age groups, and management strategies is provided in Table 2.

2.13. Timing of laparoscopic cholecystectomy (Table 3)

The overall median waiting time for laparoscopic cholecystectomy (LC) in the cohort was 133 days (IQR: 43–313.5). It increased with age: 61 days in patients <50 years, 100 days in those aged 50–69 years, and 272 days in patients ≥70 years. “Hot” cholecystectomy occurred in 10.3 % of the cohort and was most frequent among younger patients.

A mong patients with severe or necrotizing pancreatitis ($n = 40$), 67 % had their LC necessarily deferred until radiological resolution of collections, clinical stabilization, or optimization of comorbidities was achieved. Patients aged ≥70 years required additional preoperative assessment significantly more often than younger groups (29 % vs. 8 % under 50 years). Planned post-operative high-dependency unit (HDU) care was required in 24 % of patients ≥70 years compared with only 2 % of those under 50 years, contributing to prolonged delays.

Patients who underwent ERCP experienced longer waiting times for LC (median increase 42 days) and had lower recurrence of pancreatitis (14 % vs 36 %) compared with those not undergoing ERCP. ERCP was most frequently used in patients ≥70 years (13.9 %). Waiting time to LC did not significantly influence the risk of readmission within the first 121 days ($p > 0.05$). However, a significant increase in readmissions occurred beyond 121 days, showing a mild positive correlation ($r = 0.23$).

3. Readmissions (rate, frequency, LOS, ICU admission, ICU LOS, reason for readmission) (Table 3)

3.1. Readmission rates, patterns, and frequency

Overall, 40 % of patients (74/185) were readmitted. Rates increased modestly with age: 37.3 % (<50 years), 38.7 % (50–69 years), and 43.1 % (≥70 years). Readmissions occurred across three intervals: 15.1 % within 30 days, 11.4 % between 1 and 3 months, and 18.4 % between 3 and 12 months. Although late readmissions (>3 months) were more common in older patients, cumulative readmission rates within the first three months were similar across the age groups. To ensure accurate rate estimation, patients were censored at the time of cholecystectomy, and only readmissions occurring prior to surgery were included.

Among patients who were readmitted, half had a single episode, one-third had 2–3 episodes, and 12 % had ≥4 episodes. Late readmissions (>3 months) were most common in older patients.

Kruskal–Wallis analysis demonstrated no statistically significant difference in the distribution of readmission frequencies among the three age groups ($H = 3.48$, $p = 0.175$). Of the 173 readmission episodes, 41 were due to pancreatitis alone, 89 to biliary pathology alone, and 26 were mixed presentations.

3.2. LOS during readmissions

The length of stay during readmissions showed notable

Table 2
Complications related to gallstone pancreatitis and interventions performed across age groups.

Variable	20–49 years	50–69 years	≥70 years	Whole cohort
Number of patients	51	62	72	185
Complications				
Total complications	7/51 (13.7 %)	9/62 (14.5 %)	14/72 (19.4 %)	30/185 (16.8 %)
Peripancreatic collection	1/51 (1.9 %)	3/62 (4.8 %)	5/72 (6.9 %)	9/185 (4.9 %)
Pseudocyst	1/51 (1.9 %)	9/62 (14.5 %)	2/72 (2.8 %)	12/185 (6.5 %)
Necrosis	0 %	6/62 (9.7 %)	5/72 (6.9 %)	11/185 (5.9 %)
WON	2/51 (3.9 %)	0 %	2/72 (2.8 %)	4/185 (2.2 %)
PV/SMV thrombosis	1/51 (1.9 %)	3/62 (4.8 %)	3/72 (4.2 %)	7/185 (3.8 %)
Chronic pancreatitis	1/51 (1.9 %)	1/62 (1.6 %)	0 %	2/185 (1.1 %)
Pancreatic insufficiency	1/51 (1.9 %)	0 %	0 %	1/185 (0.5 %)
Gastric outlet obstruction	1/51 (1.9 %)	0 %	0 %	1/185 (0.5 %)
ARDS	0 %	2/62 (3.2 %)	0 %	2/185 (1.1 %)
Pseudoaneurysm	0 %	0 %	1/72 (1.4 %)	1/185 (0.5 %)
Intervention				
ERCP	3/51 (5.9 %)	1/62 (1.6 %)	10/72 (13.9 %)	14/185 (7.6 %)
EUS + Hot Axios stent	2/51 (3.9 %)	12/62 (19.35 %)	3/72 (4.2 %)	17/185 (9.2 %)
CT angioembolisation	0 %	1/62 (1.6 %)	0 %	1/185 (0.5 %)
EUS necrosectomy	0 %	0 %	0 %	0 %
Surgical necrosectomy	0 %	0 %	1/72 (1.4 %)	1/185 (0.5 %)
NJ feeding	2/51 (3.9 %)	5/62 (8.1 %)	1/72 (1.4 %)	8/185 (4.3 %)
TPN	0 %	1/62 (1.6 %)	0 %	1/185 (0.5 %)

Complications include peripancreatic collections, pseudocysts, necrosis, walled-off necrosis (WON), portal vein (PV) or superior mesenteric vein (SMV) thrombosis, acute respiratory distress syndrome (ARDS), and other systemic or local sequelae. Interventions include endoscopic retrograde cholangiopancreatography (ERCP), endoscopic ultrasound (EUS)–guided drainage with Hot Axios stent, angioembolisation, necrosectomy, nasojejunal (NJ) feeding, and total parenteral nutrition (TPN). All data are presented as n/N (%) unless stated otherwise.

Table 3
Waiting times to laparoscopic cholecystectomy (LC), readmission patterns, and causes of readmission across age groups.

Variable	20–49 years	50–69 years	≥70 years	Whole cohort
Number of patients	51	62	72	185
Waiting times to laparoscopic cholecystectomy and readmissions				
Median waiting time to LC (days)	61 (37–182)	100 (73–428)	272 (108–383)	133 (43–313.5)
Hot cholecystectomy	8/51 (15.7 %)	6/62 (9.7 %)	5/72 (6.9 %)	19/185 (10.3 %)
Readmission rate	19/51 (37.3 %)	24/62 (38.7 %)	31/72 (43.1 %)	74/185 (40 %)
Frequency	20–49 years	50–69 years	≥70 years	Whole cohort
Frequency of Readmissions				
Single	10/19 (52.6 %)	10/24 (41.7 %)	11/31 (35.5 %)	37/74 (50 %)
2–3 episodes	6/19 (31.6 %)	11/24 (46 %)	13/31 (41.9 %)	28/74 (37.8 %)
>4 episodes	3/19 (15.8 %)	3/24 (12.3 %)	7/31 (22.6 %)	9/74 (12.2 %)
Readmission Timing				
Within 1 month	8/51 (15.7 %)	8/62 (12.9 %)	12/72 (16.7 %)	28/185 (15.1 %)
1–3 months	4/51 (7.8 %)	6/62 (9.7 %)	11/72 (15.3 %)	21/185 (11.4 %)
3–12 months	9/51 (17.6 %)	8/62 (12.9 %)	17/72 (23.6 %)	34/185 (18.4 %)
Total Readmission Episodes				
Number of episodes	53	51	69	173
Causes of Readmission				
Recurrent acute pancreatitis				
Mild	9/14 (64.3 %)	11/22 (55.6 %)	14/22 (63.6 %)	35/58 (60.3 %)
Severe	5/14 (35.7 %)	10/22 (45.4 %)	8/22 (36.4 %)	23/58 (39.7 %)
Other biliary reasons				
Obstructive jaundice	2/53 (3.8 %)	2/51 (3.9 %)	6/69 (8.7 %)	10/173 (5.8 %)
Acute cholangitis	1/53 (1.9 %)	0 %	2/69 (2.9 %)	3/173 (1.7 %)
Biliary colic	32/53 (60.4 %)	24/51 (47.1 %)	33/69 (47.8 %)	89/173 (51.4 %)
Acute cholecystitis	4/53 (7.5 %)	3/51 (5.9 %)	6/69 (8.7 %)	13/173 (7.5 %)

Waiting times are presented as median days (IQR). Readmissions are categorised by timing (within 1 month, 1–3 months, 3–12 months), frequency, and cause (recurrent acute pancreatitis—mild or severe—or other biliary pathology including biliary colic, obstructive jaundice, acute cholangitis, and acute cholecystitis).

variation across age groups. For the overall cohort, the median LOS was 7 days (IQR = 2.5–19.5). Older patients had the longest median LOS at 9 days (IQR = 3.5–22), followed by 7.5 days (IQR = 3–15.5) in those 50–69 years. Patients <50 years had the shortest median LOS at 4 days, but with greater variability (IQR = 2–25), influenced by a small number of outliers (LOS 51 and 154 days). The Kruskal–Wallis test confirmed a significant difference in LOS across age groups ($p = 0.006$).

3.3. Pancreatitis severity during readmission

Recurrent pancreatitis episodes demonstrated a high severity rate, with 39.7 % (23/58) classified as severe. Severe recurrent pancreatitis occurred in 35.7 % of patients aged <50 years (5/14), 45.4 % in those aged 50–69 years (10/22), and 36.4 % in those ≥70 years (8/22). Patients with a mild, uncomplicated initial episode had significantly lower readmission rates ($p = 0.002$).

3.4. Cost

The total cost of inpatient care for patients admitted with gallstone pancreatitis reached £1.12 million, with a median cost of £6663 per patient. However, there was considerable variation—some patients required minimal intervention, costing as little as £729, while others with complex, prolonged admissions cost up to £277,691.

Readmissions, excluding post-cholecystectomy biliary events, accounted for £692,000 of the total cost, with a median cost of approximately £4250 per episode. Inter-hospital transfers from district general hospitals (DGHs) accounted for £297,000, reflecting the financial impact of tertiary-centre centralisation. Patients who developed severe pancreatitis with complications incurred the highest costs, with a median of £18,600 per admission. These cases often involved intensive care, prolonged LOS, and multispecialty involvement.

Unsurprisingly, costs increased significantly with longer LOS and the presence of complications ($p < 0.001$) (Chart 1).

4. Discussion

This 30-month population-based case series highlights the significant clinical and financial burden of gallstone pancreatitis at a tertiary NHS centre. Despite strong international and national guideline recommendations for same-admission laparoscopic cholecystectomy in mild disease, timely surgery was frequently delayed—largely due to system pressures intensified by the post–COVID-19 backlog [2,5]. These findings illustrate the persistent gap between evidence-based practice and real-world service capacity across the NHS.

Our findings reveal that the severity of pancreatitis and the development of complications were the primary factors influencing length of stay (LOS). Although not statistically significant, older age groups demonstrated marginally longer LOS, likely due to non-medical factors such as discharge planning, frailty, and safeguarding considerations.

Similar to the UK's national PANC study [11], mortality increased with advancing age, peaking in patients ≥70 years, while no deaths occurred in patients <50 years. ICU admission rates were highest in the 50–69 age group, which may reflect selective escalation in patients with reasonable physiological reserve, whereas in the frail elderly, severe pancreatitis may be considered a terminal presentation managed with ward-based or palliative care. This aligns with national frailty and personalised-care strategies (NHS England FRAIL Strategy; NICE NG103) [12]. Disease severity was the strongest predictor of ICU admission and mortality, while ICU admission alone did not independently predict death.

Patients aged ≥70 years experienced the highest rate of short-term complications, while younger patients displayed higher rates of fluid collections and walled-off necrosis. Most complications were managed with minimally invasive endoscopic or radiological techniques. This is consistent with current evidence favouring step-up approaches and early enteral feeding, which in our cohort was associated with low parenteral nutrition use and limited need for surgical necrosectomy [3,13–15].

With regard to cholecystectomy timing, younger patients experienced the shortest waiting times and highest rates of hot cholecystectomy. Our median waiting time of 133 days is comparable to national GIRFT data (120–180 days) and findings from other UK tertiary HPB units (Manchester, Leeds, Birmingham), reflecting widespread post-pandemic strain on elective LC pathways [16–18]. Patients ≥70 years required additional preoperative assessment in 29 % of cases, and planned postoperative HDU care in 24 %, compared with 8 % and 2 % respectively in those under 50 years, contributing to significant delays [19–21].

In our cohort, ERCP was more frequently performed in patients ≥70 years (13.9 %). This group demonstrated longer LC delays but a reduced risk of recurrent pancreatitis, consistent with ERCP providing temporary biliary decompression. However, ERCP alone did not eliminate biliary risks, and patients remained susceptible to recurrent cholecystitis, cholangitis, or biliary colic—reinforcing the importance of definitive LC.

Readmission rates increased progressively with waiting time,

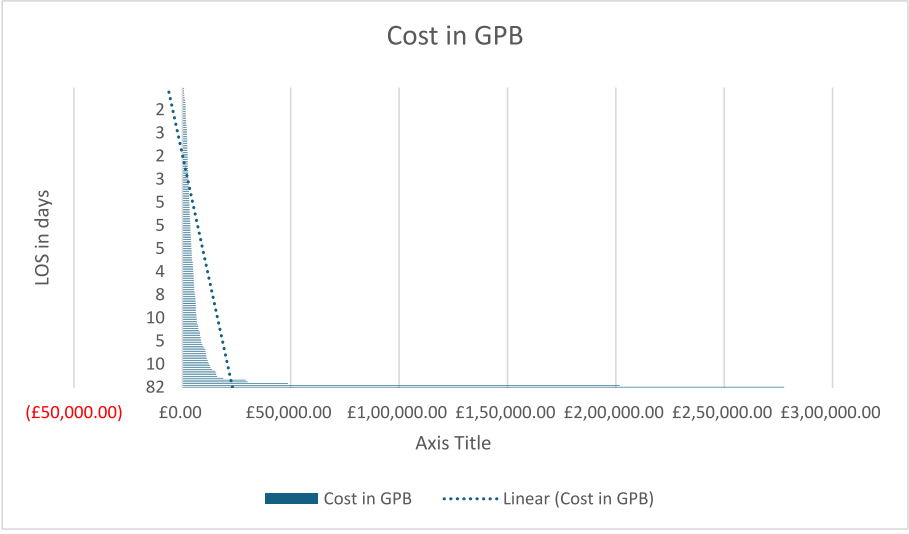

Chart 1. Summary of cost of each admission episode of gallstone pancreatitis.

particularly beyond 121 days. Patients with mild index episodes had significantly fewer readmissions, supporting early cholecystectomy as an effective strategy to minimise recurrence. Conversely, delays in definitive management substantially increased preventable morbidity and healthcare usage. This supports existing evidence showing that same-admission or early cholecystectomy reduces readmissions, complications, and financial burden [2,6,7].

The financial burden associated with gallstone pancreatitis is substantial, with the observed total cost reaching £1.12 million over a 30-month period. This high expenditure was primarily driven by prolonged length of stay (LOS), the intensive management of complications, and numerous repeated readmissions, where 58 % of those readmissions were preventable with timely surgical intervention. To demonstrate the potential for savings, an ideal-pathway model was constructed based on established guidelines, which assumed same-admission laparoscopic cholecystectomy (LC) for all mild cases (78.4 %), delayed LC only for severe or necrotizing pancreatitis (21.6 %), and the subsequent elimination of preventable recurrent biliary events. Under this optimized model, the estimated total inpatient cost would have been only £680,000, revealing £440,000 (39 %) in potentially avoidable expenditure that could be saved by consistently adhering to these evidence-based surgical protocols.

These findings clearly demonstrate that delayed cholecystectomy is not only clinically detrimental but also economically inefficient.

Emerging pathways such as ambulatory pancreatitis management [22] and protected “hot” cholecystectomy lists show promise in reducing such burdens. Early implementation of these pathways may be particularly impactful for frail elderly patients, who are less physiologically tolerant of recurrent biliary events yet face the longest delays to surgery. However, persistent capacity constraints, staffing shortages, and theatre availability continue to challenge widespread adoption.

5. Conclusion

Gallstone pancreatitis continues to pose a significant yet underrecognised burden on NHS surgical services. In this population-based case series, we observed wide variation in both clinical severity and associated costs, with potentially preventable readmissions alone accounting for more than half of the total financial burden.

Our findings demonstrate that early laparoscopic cholecystectomy—*ideally during the index admission for mild gallstone pancreatitis*, in line with international guidelines—is critical for reducing recurrent biliary events, complications, readmissions, and preventable expenditure. The observation that readmission rates and severity increased significantly beyond 121 days further reinforces the need to avoid prolonged delays in definitive surgical management. Timely cholecystectomy was associated with improved outcomes, particularly in younger patients, while frail and elderly patients experienced the longest delays despite their higher clinical risk.

Emerging ambulatory care pathways and dedicated “hot” cholecystectomy lists offer promising strategies to streamline management and reduce system pressures. A robust national health economic analysis is urgently needed to quantify the true burden of gallstone pancreatitis and to support investment in pathways that prioritise early cholecystectomy. Such measures are essential for ensuring equitable, cost-effective, and clinically safe care across the NHS.

Declarations

The authors have nothing to declare.

Availability of data and material

All data and material can be obtained after author approval.

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Conflict of interest

The authors indicate that they do not have conflicts of interest.

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