

Characteristics of Pediatric Pancreatitis and Their Association with Clinical Outcomes at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

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ABSTRACT

Pediatric pancreatitis is increasingly recognized worldwide, yet data from Indonesian children remain scarce. This study aimed to describe the characteristics of children with pancreatitis and their association with clinical outcomes at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia. This retrospective analytical study used medical records of hospitalized patients aged <18 years with pancreatitis from January 2023 to September 2025; the total sample yielded 21 eligible patients. Data were analyzed descriptively, and associations were tested using the Fisher–Freeman–Halton exact test, Fisher’s exact test, and the Kruskal–Wallis test ($\alpha = 0.05$). Females accounted for 57.1% of patients, and adolescents aged 12–17 years were the largest group (61.9%). Abdominal pain was the most frequent symptom (90.5%), followed by vomiting (57.1%) and fever (33.3%). Normal nutritional status and wasting were equally common (33.3% each), and acute pancreatitis predominated (71.4%). Computed tomography was the most frequently used imaging modality, with peripancreatic fat stranding as the most common finding. Most patients received non-operative management (66.7%). The median length of stay (LOS) was 18 days (range 3–105). Fifteen patients (71.4%) were discharged improved, five (23.8%) died, and one (4.8%) was discharged against medical advice. No variable was significantly associated with clinical outcome, although nutritional status ($p = 0.065$) and LOS ($p = 0.093$) showed non-significant trends. Pediatric pancreatitis in this tertiary center mainly affected adolescents, presented predominantly with abdominal pain, and had a favorable outcome in most patients; however, its in-hospital mortality warrants further multicenter studies.

Keywords: pancreatitis; children; clinical characteristics; clinical outcome; length of stay; Indonesia

INTRODUCTION

Pancreatitis is an inflammatory disorder of the pancreas that can present as acute, acute recurrent, or chronic disease. The process typically begins with premature activation of zymogens within acinar cells, leading to acinar cell injury, autodigestion, and local and systemic inflammation [1], [2]. Although pancreatitis has traditionally been regarded as an adult disease, it also occurs in children, in whom its etiological spectrum differs from that of adults and includes congenital anatomical anomalies, biliary

obstruction, infections, blunt abdominal trauma, metabolic disorders, drugs, and genetic variants such as PRSS1, SPINK1, CFTR, and CTSC [2], [3], [4]. The recognition of pediatric pancreatitis has increased globally. The annual incidence of acute pancreatitis in children is estimated at 0.78–13.2 cases per 100,000, and that of chronic pancreatitis at 0.5–2 cases per 100,000 children. [5]. Analyses of the Global Burden of Disease Study 2021 showed a substantial and changing burden of pancreatitis among children and adolescents, with the highest

incidence in older adolescents and marked differences between countries and regions [6], [7], [8]. Single-center series from Asia also document a steady flow of pediatric cases, including recurrent disease [9], [10], [11]. Recurrent episodes may progress to chronic pancreatitis, which is associated with chronic abdominal pain, exocrine insufficiency, pancreatogenic diabetes, malnutrition, and impaired quality of life [12].

Although most pediatric cases are mild and self-limiting, a proportion of children develop severe disease, organ failure, or death, and outcomes vary considerably between settings [4], [13]. In Indonesia, published data on the clinical profile of pediatric pancreatitis are limited [3], which hinders the understanding of local disease patterns and the planning of care in referral hospitals. Therefore, this study aimed to describe the characteristics of children with pancreatitis treated at Dr. Soetomo General Academic Hospital, Surabaya, a national tertiary referral center in East Java, and to analyze the association of these characteristics with clinical outcomes during the period January 2023 to September 2025.

MATERIALS AND METHODS

Study Design and Setting

This was a descriptive-analytical study with a retrospective approach using secondary data from the medical records of Dr. Soetomo General Academic Hospital, Surabaya, Indonesia. Medical records of admissions between January 2023 and September 2025 were reviewed, and data collection and analysis were performed from October 2025 to June 2026.

Study Population

The population comprised all pediatric patients (aged <18 years) diagnosed with pancreatitis and hospitalized during the study period. Inclusion criteria were inpatient admission, a diagnosis of pancreatitis recorded in the medical record, and sufficient data on the study variables (sex, age, body weight, height, clinical symptoms, type of pancreatitis, imaging, therapy, length of stay, and clinical outcome). Records with a final diagnosis other than pancreatitis and patients who were not hospitalized were excluded. A total sampling technique was applied, so all eligible patients were analyzed (Figure 1).

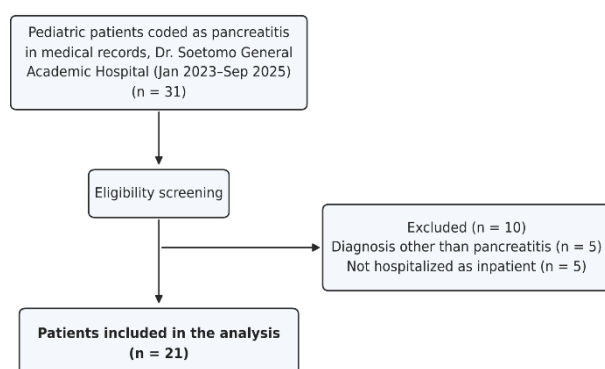


FIGURE 1: Flow Diagram of Patient Selection.

Variables and Definitions

Age was calculated at admission and grouped according to the Munich Age Classification System (MACS) into toddlers (13 months–2 years), early childhood (3–5 years), school-age children (6–11 years), and adolescents (12–17 years) [14]. Clinical symptoms were abdominal pain (mainly epigastric, with or without radiation to the back), vomiting (active expulsion of gastric contents through the mouth and/or nose), and fever (body temperature >38 °C); each was recorded as present, absent, or not recorded. Nutritional status was assessed by the weight-for-height index according to the recommendations of the Indonesian Pediatric Society: WHO 2006 growth standards (z-scores) for children aged 0–5 years and the CDC 2000 growth charts with the Waterlow percentage (actual weight divided by the ideal weight at the 50th percentile for actual height) for children older than 5 years; status was classified as obese, overweight, normal, wasted, or severely wasted [15], [16].

The type of pancreatitis was determined based on the diagnosis documented in medical records and categorized as acute or chronic pancreatitis. Laboratory variables included pancreatic enzymes (amylase, lipase), hematology (hemoglobin, leukocytes, platelets), renal function (blood urea nitrogen [BUN], creatinine), liver function (aspartate aminotransferase [AST/SGOT], alanine aminotransferase [ALT/SGPT], direct and total bilirubin, serum albumin), and electrolytes (calcium, potassium, sodium, chloride), interpreted against the age-specific reference values of the hospital laboratory. Imaging (abdominal ultrasonography [US], computed tomography [CT], and magnetic resonance imaging [MRI]) was categorized as supportive or not supportive of pancreatitis, and specific findings were recorded [17]. Therapy was classified as operative or non-operative, together with supportive (intravenous fluids, nil per os [NPO], total parenteral nutrition [TPN]) and symptomatic (analgesics, antiemetics) treatment. Length of stay (LOS) was the number of days from admission to discharge. Clinical outcome was classified as improved (discharged with clinical improvement as decided by the attending physician), died (in-hospital death), or discharged against medical advice (DAMA).

Data Processing and Statistical Analysis

Data were processed through editing, coding, entry, and cleaning in Microsoft Excel and analyzed with the Statistical Package for the Social Sciences (SPSS). Categorical variables are presented as frequencies and percentages. The normality of continuous laboratory data within each age group was assessed with the Shapiro–Wilk test; normally distributed data are presented as mean (minimum–maximum) and non-normally distributed data as median (minimum–maximum), while values from groups with a single patient are presented as individual values. Associations between categorical characteristics and clinical outcome were analyzed using the Fisher–Freeman–Halton exact test for contingency tables larger than 2 × 2 and Fisher's

exact test for 2×2 tables (US and MRI). The association between LOS and clinical outcome was analyzed using the Kruskal–Wallis test. A p-value <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was submitted to and approved by the Health Research Ethics Committee of Dr. Soetomo General Academic Hospital, Surabaya. Informed consent was waived because only medical record data were used. Patient confidentiality was maintained by anonymizing all records with code numbers.

RESULTS

Patient Characteristics

Of 31 pediatric records screened, 10 were excluded

(five with a diagnosis other than pancreatitis and five who were not hospitalized), leaving 21 patients for analysis (Figure 1). The demographic and clinical characteristics are shown in Table 1. Females slightly outnumbered males (57.1% vs. 42.9%). Adolescents (12–17 years) formed the largest age group (61.9%), followed by school-age children (28.6%). Abdominal pain was reported in 19 patients (90.5%), vomiting in 12 (57.1%), and fever in 7 (33.3%); five patients (23.8%) had abdominal pain with vomiting and six (28.6%) had all three symptoms. Normal nutritional status and wasting were each found in seven patients (33.3%), while three patients (14.3%) were severely wasted and four (19.0%) were overweight or obese. Acute pancreatitis accounted for 71.4% of cases and chronic pancreatitis for 28.6%.

TABLE 1: Demographic and Clinical Characteristics of Pediatric Pancreatitis Patients (N = 21).

Characteristic	n	%
Sex		
Female	12	57.1
Male	9	42.9
Age group (MACS)		
Toddler (13 months–2 years)	1	4.8
Early childhood (3–5 years)	1	4.8
School-age (6–11 years)	6	28.6
Adolescent (12–17 years)	13	61.9
Abdominal pain		
Yes	19	90.5
No	1	4.8
Not recorded	1	4.8
Vomiting		
Yes	12	57.1
No	5	23.8
Not recorded	4	19.0
Fever		
Yes	7	33.3
No	8	38.1
Not recorded	6	28.6
Nutritional status (weight-for-height)		
Obese	3	14.3
Overweight	1	4.8
Normal	7	33.3
Wasted	7	33.3
Severely wasted	3	14.3
Type of pancreatitis		
Acute	15	71.4
Chronic	6	28.6
Type of therapy		
Non-operative	14	66.7
Operative	7	33.3
Clinical outcome		
Improved	15	71.4
Died	5	23.8
Discharged against medical advice	1	4.8

MACS, Munich Age Classification System.

Laboratory Findings

Laboratory results by age group are summarized in Table 2. Mean amylase was 522.7 U/L (107–985) in school-age children and 386.2 U/L (37–1183) in adolescents, whereas median lipase was 248 U/L (21–1676) and 576 U/L (33–2188), respectively. The median hemoglobin among adolescents was 9.90 g/dL (8.4–15.6). Leukocyte counts were elevated in several patients, with a median of $11.80 \times 10^3/\mu\text{L}$ in school-age children and a mean of $12.19 \times 10^3/\mu\text{L}$ in

adolescents. Mean BUN and creatinine values were within normal limits in both large age groups. Marked aminotransferase and bilirubin elevations were observed in the toddler, early-childhood, and one school-age patient, while adolescents had a median total bilirubin of 0.58 mg/dL. Mean serum albumin was 3.68 g/dL in school-age children and 3.46 g/dL (2.79–4.65) in adolescents, and the median calcium level in adolescents was 8.30 mg/dL (8.1–9.3).

TABLE 2: Laboratory Findings of Pediatric Pancreatitis Patients by Age Group.

Parameter	Toddler (13 mo–2 y) n = 1	Early childhood (3–5 y) n = 1	School-age (6–11 y) n = 6	Adolescent (12–17 y) n = 13
Pancreatic function				
Amylase (U/L)	152	1130	522.7 (107–985) ^a	386.2 (37–1183) ^a
Lipase (U/L)	615	2772	248 (21–1676) ^b	576 (33–2188) ^b
Hematology				
Hemoglobin (g/dL)	9.4	12.6	11.5 (9.4–13.0) ^a	9.90 (8.4–15.6) ^b [n = 12]
Leukocytes ($10^3/\mu\text{L}$)	19.49	13.89	11.80 (4.36–49.56) ^b	12.19 (2.51–25.53) ^a [n = 12]
Platelets ($10^3/\mu\text{L}$)	422	354	243 (158–1038) ^b	347.2 (35–605) ^a [n = 12]
Renal function				
BUN (mg/dL)	NT	9.2	9.8 (8.0–11.3) ^a	13.26 (8.0–19.0) ^a [n = 11]
Creatinine (mg/dL)	NT	0.4	0.53 (0.40–0.60) ^a	0.65 (0.40–0.90) ^a [n = 11]
Liver function				
AST/SGOT (U/L)	52.0	205.0	26.50 (17–443) ^b	28.17 (9–59) ^a [n = 12]
ALT/SGPT (U/L)	150.0	225.0	12.50 (3–396) ^b	16.00 (7–71) ^b [n = 12]
Direct bilirubin (mg/dL)	2.91	13.3	10.0 [n = 1]	0.21 (0.10–1.60) ^b [n = 6]
Total bilirubin (mg/dL)	3.33	19.5	12.2 [n = 1]	0.58 (0.28–2.70) ^b [n = 6]
Serum albumin (g/dL)	3.02	3.68	3.68 (3.11–4.47) ^a [n = 4]	3.46 (2.79–4.65) ^a [n = 11]
Electrolytes				
Calcium (mg/dL)	NT	NT	9.27 (8.6–10.2) ^a [n = 3]	8.30 (8.1–9.3) ^b [n = 9]
Potassium (mmol/L)	4.1	NT	4.35 (3.7–4.9) ^a	3.99 (3.2–4.8) ^a [n = 12]
Sodium (mmol/L)	137	NT	134.3 (128–142) ^a	136.0 (130–148) ^a [n = 12]
Chloride (mmol/L)	95	NT	99.33 (86–108) ^a	101.75 (92–112) ^a [n = 12]

^aMean (minimum–maximum) for normally distributed data; ^bmedian (minimum–maximum) for non-normally distributed data (Shapiro–Wilk test). Groups with n = 1 are presented as individual values. [n] indicates the number of patients tested when different from the group size. NT, not tested; BUN, blood urea nitrogen; AST, aspartate aminotransferase; ALT, alanine aminotransferase.

Imaging Findings

Nineteen patients (90.5%) underwent at least one imaging modality, while two (9.5%) did not. CT was performed in 15 patients (78.9% of imaged patients), US in 12 (63.2%), and MRI in 5 (26.3%); 11 patients underwent more than one modality (CT and US in seven, US and MRI in two, and all three in two). Findings supportive of pancreatitis were obtained in 41.7% of US, 66.7% of CT, and 80.0% of

MRI examinations (Table 3). The most frequent CT finding was peripancreatic fat stranding (60.0%), followed by pancreatic cystic lesions (40.0%). Pancreatic cystic lesions were the most common US finding (60.0%), and pancreatic duct dilatation, pancreatic enlargement, and peripancreatic fluid collection were the most frequent MRI findings (50.0% each).

TABLE 3: Imaging Modalities and Findings.

Modality/finding	n	%
Modality performed (n = 19 imaged)		
CT	15	78.9
Abdominal US	12	63.2
MRI	5	26.3
Supportive of pancreatitis		
US (n = 12)	5	41.7
CT (n = 15)	10	66.7
MRI (n = 5)	4	80.0
US findings (n = 5 supportive)		
Pancreatic cystic lesion	3	60.0
Pancreatic duct dilatation	2	40.0
Pancreatic enlargement	1	20.0
Peripancreatic fluid collection	1	20.0
CT findings (n = 10 supportive)		
Peripancreatic fat stranding	6	60.0
Pancreatic cystic lesion	4	40.0
Pancreatic edema	3	30.0
Pancreatic enlargement	3	30.0
Peripancreatic fluid collection	3	30.0
Pancreatic duct dilatation	3	30.0
Pancreatic necrosis	2	20.0
Pancreatic atrophy	1	10.0
MRI findings (n = 4 supportive)		
Pancreatic duct dilatation	2	50.0
Pancreatic enlargement	2	50.0
Peripancreatic fluid collection	2	50.0
Pancreatic cystic lesion	1	25.0
Pancreatic parenchymal rupture	1	25.0

Patients could undergo more than one modality and have more than one finding. US, ultrasonography; CT, computed tomography; MRI, magnetic resonance imaging.

Therapy, Length of Stay, and Clinical Outcome

Fourteen patients (66.7%) were managed non-operatively, and seven (33.3%) underwent surgical procedures in addition to supportive and symptomatic treatment (Table 4). Laparotomy and percutaneous abdominal drainage were the most frequent procedures (three patients each), and one patient underwent more than one procedure. All patients received intravenous fluids; TPN was given to 17 patients (81.0%) for a median of 16 days (2–69), and NPO was applied in 15 patients (71.4%) for a median of 8 days (1–36). Analgesics were administered to 19 patients (90.5%) and antiemetics to 5 (23.8%). The median LOS was 18 days (range 3–105). Fifteen patients (71.4%) were

discharged improved, five (23.8%) died during hospitalization, and one (4.8%) was discharged against medical advice.

TABLE 4: Therapeutic Management and Length of Stay (N = 21).

Therapy	n (%)
Surgical procedures (n = 7)	
Laparotomy	3 (42.9)
Percutaneous abdominal drainage	3 (42.9)
Cystojejunostomy	1 (14.3)
External drainage of pancreatic pseudocyst	1 (14.3)
Supportive therapy	
Intravenous fluids	21 (100)
Total parenteral nutrition	17 (81.0)
Duration, days, median (range)	16 (2–69)
Nil per os	15 (71.4)
Duration, days, median (range)	8 (1–36)
Symptomatic therapy	
Analgesics	19 (90.5)
Antiemetics	5 (23.8)
Length of stay	
Days, median (range)	18 (3–105)

Patients could receive more than one procedure or therapy.

Association between Patient Characteristics and Clinical Outcome

The results of the bivariate analysis are presented in Table 5 and Figures 2 and 3. All deaths and the single DAMA occurred in the adolescent group (38.5% and 7.7%, respectively), whereas all younger children improved; however, the association between age group and outcome was not significant ($p = 0.394$). Mortality was higher among patients with normal nutritional status (57.1%) than in other nutritional categories, and all wasted patients improved; this association approached but did not reach significance ($p = 0.065$). Sex ($p = 1.000$), abdominal pain ($p = 0.500$), vomiting ($p = 0.878$), fever ($p = 0.294$), type of pancreatitis ($p = 0.723$), US ($p = 0.576$), CT ($p = 1.000$), MRI ($p = 1.000$), and type of therapy ($p = 0.397$) were not associated with clinical outcome. Patients who died had a longer median LOS (25 days, range 11–105) than those who improved (17 days, range 3–74), but the difference was not significant (Kruskal–Wallis $H = 4.747$, $p = 0.093$).

TABLE 5: Association Between Patient Characteristics and Clinical Outcome.

Variable	Improved n (%)	Died n (%)	DAMA n (%)	Total	p-value
Sex					1.000 ^a
Female	8 (66.7)	3 (25.0)	1 (8.3)	12	
Male	7 (77.8)	2 (22.2)	0 (0)	9	

Variable	Improved n (%)	Died n (%)	DAMA n (%)	Total	p-value
Age group					0.394 ^a
Toddler (13 months–2 years)	1 (100)	0 (0)	0 (0)	1	
Early childhood (3–5 years)	1 (100)	0 (0)	0 (0)	1	
School-age (6–11 years)	6 (100)	0 (0)	0 (0)	6	
Adolescent (12–17 years)	7 (53.8)	5 (38.5)	1 (7.7)	13	
Abdominal pain					0.500 ^a
Yes	14 (73.7)	4 (21.1)	1 (5.3)	19	
No	1 (100)	0 (0)	0 (0)	1	
Not recorded	0 (0)	1 (100)	0 (0)	1	
Vomiting					0.878 ^a
Yes	9 (75.0)	2 (16.7)	1 (8.3)	12	
No	3 (60.0)	2 (40.0)	0 (0)	5	
Not recorded	3 (75.0)	1 (25.0)	0 (0)	4	
Fever					0.294 ^a
Yes	6 (85.7)	0 (0)	1 (14.3)	7	
No	5 (62.5)	3 (37.5)	0 (0)	8	
Not recorded	4 (66.7)	2 (33.3)	0 (0)	6	
Nutritional status					0.065 ^a
Obese	2 (66.7)	0 (0)	1 (33.3)	3	
Overweight	1 (100)	0 (0)	0 (0)	1	
Normal	3 (42.9)	4 (57.1)	0 (0)	7	
Wasted	7 (100)	0 (0)	0 (0)	7	
Severely wasted	2 (66.7)	1 (33.3)	0 (0)	3	
Type of pancreatitis					0.723 ^a
Acute	11 (73.3)	3 (20.0)	1 (6.7)	15	
Chronic	4 (66.7)	2 (33.3)	0 (0)	6	
Abdominal US (n = 12)					0.576 ^b
Supportive	4 (80.0)	1 (20.0)	–	5	
Not supportive	4 (57.1)	3 (42.9)	–	7	
CT (n = 15)					1.000 ^a
Supportive	6 (60.0)	3 (30.0)	1 (10.0)	10	
Not supportive	3 (60.0)	2 (40.0)	0 (0)	5	
MRI (n = 5)					1.000 ^b
Supportive	3 (75.0)	1 (25.0)	–	4	
Not supportive	1 (100)	0 (0)	–	1	
Type of therapy					0.397 ^a
Non-operative	11 (78.6)	2 (14.3)	1 (7.1)	14	
Operative	4 (57.1)	3 (42.9)	0 (0)	7	
Length of stay, days, median (range)	17 (3–74)	25 (11–105)	3	21	0.093 ^c
Total	15 (71.4)	5 (23.8)	1 (4.8)	21	

^aFisher–Freeman–Halton exact test; ^bFisher's exact test; ^cKruskal–Wallis test ($H = 4.747$, $df = 2$). DAMA, discharged against medical advice; US, ultrasonography; CT, computed tomography; MRI, magnetic resonance imaging.

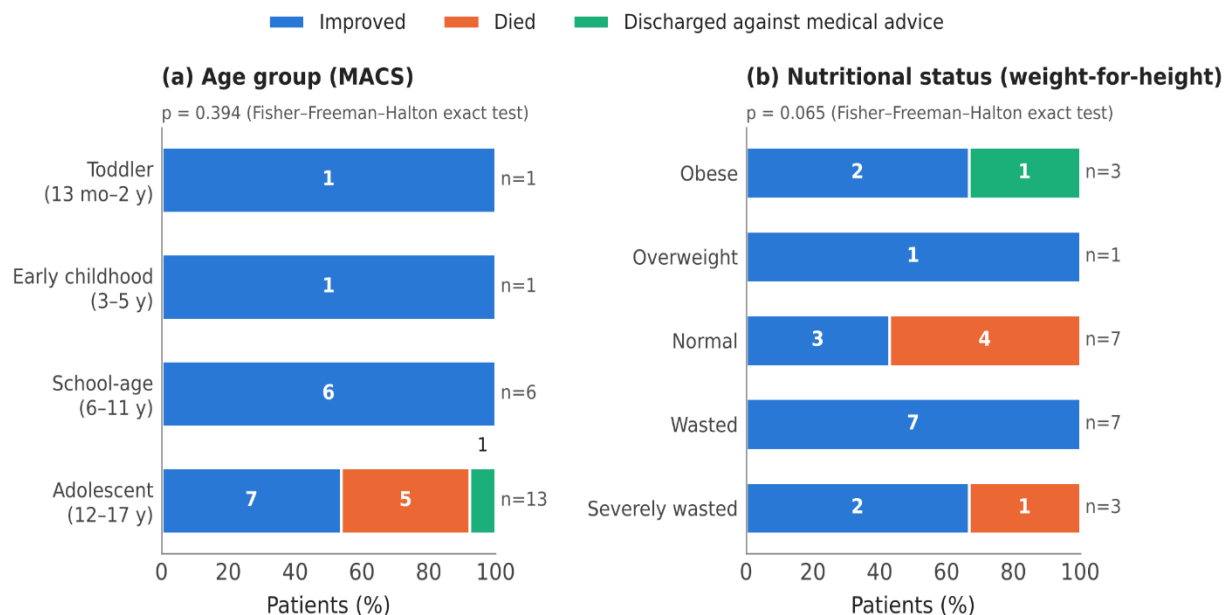


FIGURE 2: Distribution of Clinical Outcomes By (a) Age Group and (b) Nutritional Status. Numbers Inside Bars Indicate Patient Counts.

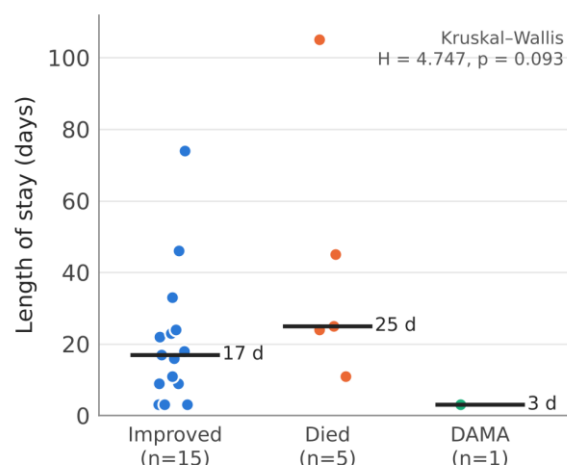


FIGURE 3: Length of Stay by Clinical Outcome. Each Dot Represents One Patient; Horizontal Lines Indicate Medians. Dama, Discharged Against Medical Advice.

DISCUSSION

Demographic and Clinical Characteristics

In this study, the proportions of girls and boys were relatively balanced, with a slight female predominance (57.1%). This finding is consistent with a Chinese series of 95 children with nearly equal numbers of boys and girls, in which girls predominated among those aged 15–17 years [10] and with global burden analyses that found no meaningful sex difference in the incidence of pediatric pancreatitis [6] even though the burden of death and disability-adjusted life years was higher among males [7]. Sex therefore does not appear to be a major determinant of pancreatitis occurrence in children.

Adolescents aged 12–17 years were the largest age group (61.9%). Global estimates likewise show the highest incidence of pancreatitis in the 15–19-year

age group [6]. Older children are more exposed to infections and trauma through outdoor activities and peer interactions, and adolescents may develop etiologies that resemble those of adults [3]. The referral pattern of our hospital may also have influenced the distribution, because some older adolescents are managed by internal medicine or digestive surgery services and would therefore not appear in pediatric records.

Abdominal pain was the dominant symptom (90.5%), followed by vomiting (57.1%) and fever (33.3%). This order matches previous reports from China, India, Bahrain, and Morocco, in which abdominal pain, typically epigastric and sometimes radiating to the back, was the leading complaint, vomiting the second most frequent, and fever less common [11], [18], [19], [20]. Abdominal pain reflects pancreatic autodigestion and inflammation following premature enzyme activation [2]. Vomiting results from gastrointestinal irritation and visceral reflexes, and fever indicates a systemic inflammatory response.

Normal nutritional status and wasting were equally common (33.3% each), and 14.3% of patients were severely wasted. A large analysis of 39,805 pediatric admissions demonstrated that both undernutrition and obesity were associated with adverse clinical outcomes in acute pancreatitis [21]. Differences in anthropometric indicators should be considered when comparing studies; in this study, nutritional status was assessed with age-appropriate weight-for-height references (WHO 2006 and CDC 2000 with Waterlow criteria), an approach also used in hospitalized children [15]. Acute pancreatitis was the predominant type (71.4%), in line with reports that acute disease is much more common in children than chronic disease and that only a minority of acute cases progress to recurrent or chronic pancreatitis [5], [22].

Laboratory and Imaging Findings

Amylase and lipase rise as a result of pancreatic parenchymal injury, and an elevation of at least three times the upper limit of normal is one of the INSPPIRE diagnostic criteria [17], [23]. Lipase is generally preferred because of its higher diagnostic accuracy [24]. Not all of our patients met the enzyme criterion, which may be explained by the timing of laboratory tests, since enzyme levels peak early and decline within a few days, and by the occurrence of pancreatitis with normal enzyme levels [23]. The relatively low hemoglobin levels among adolescents may reflect inflammation-driven interleukin-6 and hepcidin activity that limits iron availability [25] whereas leukocytosis in some patients indicates systemic inflammation. Although mean BUN and creatinine values were normal, early changes in BUN are known predictors of mortality in acute pancreatitis [26]. Elevated aminotransferase and bilirubin levels in the youngest patients suggest hepatobiliary involvement, and the AST-to-ALT ratio has been associated with severity, complications, and prognosis [27]. Hypoalbuminemia, present in some adolescents, has been independently associated with organ failure and mortality [28]. Hypocalcemia due to fat saponification, as well as hyponatremia, hypokalemia, and hypochloremia caused by fluid shifts and vomiting, are common electrolyte disturbances in pediatric pancreatitis [29], [30], [31], underscoring the need for regular electrolyte monitoring.

CT was the most frequently used imaging modality, yielded findings supportive of pancreatitis in two-thirds of examinations, and most often showed peripancreatic fat stranding. Fat stranding was likewise reported in most patients with acute pancreatitis in a recent comparative study of US, CT, and MRI [32]. Pediatric imaging recommendations, however, place US as the first-line modality, CT for suspected complications or diagnostic uncertainty, and MRI/magnetic resonance cholangiopancreatography for ductal anatomy and complications [17]. The high proportion of cystic lesions on US in our cohort, in contrast to pancreatic enlargement reported elsewhere [32] may reflect later timing of examinations and the referral of complicated cases. MRI was the least used modality but had the highest proportion of supportive findings, consistent with its role in characterizing the biliary tree and complications [33].

Therapy, Length of Stay, and Outcomes

Two-thirds of the patients were managed non-operatively, in agreement with the view that most pediatric pancreatitis can be treated conservatively and that surgery is reserved for complications, failed endoscopic therapy, or chronic disease [34]. Laparotomy is indicated for severe acute pancreatitis complicated by abdominal compartment syndrome, necrosis, or hemorrhage [35] and percutaneous drainage is used for symptomatic pancreatic fluid collections [36]. All patients received intravenous fluids, which is supported by evidence that liberal fluid resuscitation is associated with improved outcomes in pediatric acute pancreatitis [37]. The

frequent and prolonged use of NPO and TPN in our cohort contrasts with current evidence favoring early enteral nutrition, which is associated with shorter hospital stays [38]. Analgesics were given to almost all patients, reflecting the central role of pain control in pediatric pancreatitis [39].

The median LOS of 18 days (3–105) was longer than the median of 8 days reported in pediatric cohorts from Mexico and Turkey [22], [40]. Longer stays are associated with the need for TPN, which was given to most of our patients; in one series, patients receiving TPN had a median LOS of 37 days compared with 13 days in those who did not [41]. The heterogeneity of disease severity, comorbidities, complications, and the tertiary referral character of the hospital likely contributed to the wide LOS range.

Most patients (71.4%) were discharged improved, which is lower than the 89.8% improvement reported among 49 children with pancreatic disorders [42] and the 59% full recovery without recurrence at one year in a British cohort [13]. The in-hospital mortality of 23.8% is notable but close to the 27.8% reported in a Thai surgical center, where most deaths occurred in children with underlying systemic disease and multiorgan failure [4]. Information on comorbidities was not analyzed in this study and may partly explain the mortality observed in this tertiary referral population.

Association of Characteristics with Clinical Outcome

None of the examined characteristics was significantly associated with clinical outcome. The absence of an association with sex and age agrees with a meta-analysis of admission risk factors in pediatric acute pancreatitis, which did not identify sex or age as consistent predictors of severe disease [43]. Clinical symptoms are essential for diagnosis but did not predict prognosis; fever, for example, was not associated with LOS in a series of 133 children [44]. For nutritional status, the p-value of 0.065 suggests a possible trend, and the concentration of deaths in patients with normal weight-for-height in this small sample contrasts with evidence that undernutrition and obesity increase the risk of severe disease [21], which should be explored in larger studies.

The type of pancreatitis was not associated with outcome, although chronic and acute recurrent pancreatitis carry a substantial long-term disease burden [12], [45]. Imaging results were not associated with outcome, supporting the notion that US, CT, and MRI serve primarily to establish the diagnosis and characterize complications rather than to predict prognosis [17], [33]. Patients who underwent surgery had a lower proportion of improvement (57.1% vs. 78.6%), but the difference was not significant; surgical interventions are mostly performed to manage complications and therefore mark more severe disease rather than determine the final outcome [34]. Finally, patients who died tended to have longer hospital stays, a pattern consistent with adult data showing higher

mortality among patients with severe acute pancreatitis requiring prolonged intensive care [46], although this did not reach significance in our cohort.

Limitations

This study has several limitations. Its retrospective design relied on medical records, which resulted in incomplete data for some variables (e.g., symptoms not recorded and laboratory tests not performed in all patients) and in the exclusion of some records. The small sample from a single tertiary center limits statistical power and generalizability, and severity scores, etiology, and comorbidities were not analyzed. Multicenter prospective studies with larger samples are needed.

CONCLUSIONS

Pediatric pancreatitis at Dr. Soetomo General Academic Hospital during January 2023–September 2025 occurred slightly more often in girls, predominantly affected adolescents aged 12–17 years, and presented mainly with abdominal pain. Normal nutritional status and wasting were the most common nutritional categories, and acute pancreatitis was the predominant type. Laboratory findings varied across age groups; CT was the most frequently used imaging modality with peripancreatic fat stranding as the main finding, and most patients were managed non-operatively with intravenous fluids and analgesics. The median LOS was 18 days, and most patients were discharged improved. Sex, age, symptoms, nutritional status, type of pancreatitis, imaging results, type of therapy, and LOS were not significantly associated with clinical outcome. Multicenter collaboration is recommended to provide a more comprehensive picture of pediatric pancreatitis in Indonesia and the factors associated with its outcomes.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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