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Global mortality and complications of severe acute pancreatitis between 1986 and 2025: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 May 2026 and was last updated on 27 May 2026.

INTRODUCTION

Review question / Objective To evaluate the mortality rate, leading causes of death, and the incidence of various short-term and long-term complications in patients with severe acute pancreatitis. Also, to explore differences and temporal trends by WHO region.

Rationale Severe acute pancreatitis is a life-threatening condition with high mortality and complication rates, but large-scale systematic evaluations of its clinical outcomes are lacking. This meta-analysis aims to provide comprehensive, up-to-date global data to support clinical risk stratification and treatment decisions.

Condition being studied Severe acute pancreatitis is a life-threatening condition defined by persistent organ failure for more than 48 hours, with or without local complications such as pancreatic necrosis or pseudocysts. It remains a major challenge in gastroenterology and critical care due to its high mortality and complication rates. However, because of variations in study designs, diagnostic criteria, and geographic populations, precise estimates of its clinical outcomes and the incidence of various complications have been inconsistent. Reported mortality rates vary widely across different WHO regions, with some regions reporting much higher rates than others, yet a systematic global temporal trend and a comprehensive profile of complications are still lacking.

METHODS

Search strategy Pubmed: (((((((pancreatitis, acute necrotizing[MeSH Terms]) OR (pancreatic necrosis[MeSH Terms])) OR (acute necrotizing pancreatitis[Title/Abstract])) OR (necrotizing pancreatitis[Title/Abstract])) OR (severe acute pancreatitis[Title/Abstract])) OR (severe pancreatitis[Title/Abstract])) OR (SAP[Title/Abstract])) AND ((((((((((complication[Title/Abstract]) OR (infected necrosis[Title/Abstract])) OR

(pancreatic pseudocyst[Title/Abstract])) OR (sepsis[Title/Abstract])) OR (exocrine insufficiency[Title/Abstract])) OR (endocrine insufficiency[Title/Abstract])) OR (PEI[Title/Abstract])) OR (quality of life[Title/Abstract])) OR (diabetes[Title/Abstract])) OR (chronic pancreatitis[Title/Abstract])) OR (chronic pain[Title/Abstract])) AND (1986/1:2025/12[pdat])
Embase: Date of pub From 1986-2025.
#1 'pancreatitis, acute necrotizing'/exp/mj OR 'pancreatic necrosis'/exp/mj OR 'acute necrotizing pancreatitis':ab,ti OR 'necrotizing pancreatitis':ab,ti OR 'severe acute pancreatitis':ab,ti OR 'severe pancreatitis':ab,ti OR sap:ab,ti
#2 complication:ab,ti OR 'infected necrosis'/exp/mj OR 'pancreatic pseudocyst':ab,ti OR sepsis:ab,ti OR 'exocrine insufficiency':ab,ti OR 'endocrine insufficiency':ab,ti OR pei:ab,ti OR 'quality of life':ab,ti OR diabetes:ab,ti OR 'chronic pancreatitis':ab,ti OR 'chronic pain':ab,ti
#1 AND #2
Cochrane: Date of pub From 01/011986 to 31/12/2025.
#1 MeSH descriptor: [Pancreatitis, Acute Necrotizing] explode all trees
#2 (acute necrotizing pancreatitis):ti,ab,kw
#3 (necrotizing pancreatitis):ti,ab,kw
#4 (severe acute pancreatitis):ti,ab,kw
#5 (severe pancreatitis):ti,ab,kw
#6 (SAP):ti,ab,kw
#7 (complication):ti,ab,kw
#8 (infected necrosis):ti,ab,kw
#9 (pancreatic pseudocyst):ti,ab,kw
#10 (sepsis):ti,ab,kw
#11 (exocrine insufficiency):ti,ab,kw
#12 (endocrine insufficiency):ti,ab,kw
#13 (PEI):ti,ab,kw
#14 (quality of life):ti,ab,kw
#15 (diabetes):ti,ab,kw
#16 (chronic pancreatitis):ti,ab,kw
#17 (chronic pain):ti,ab,kw
(#1 OR #2 OR #3 OR #4 OR #5 OR #6) AND (#7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17).

Participant or population Patients diagnosed with severe acute pancreatitis or necrotizing pancreatitis, regardless of age, sex, or etiology.

Intervention Not applicable.

Comparator Not applicable.

Study designs to be included Randomized controlled trials, prospective and retrospective cohort studies, cross-sectional studies.

Eligibility criteria Inclusion: (1) subjects with severe or necrotizing pancreatitis; (2) reports at least one outcome of interest (mortality, MODS, sepsis, bleeding, gastrointestinal perforation/fistula, pancreatic fistula, infected pancreatic necrosis, pseudocyst, exocrine insufficiency, new-onset diabetes); (3) sample size ≥10; (4) published 1986–2025.
Exclusion: conference abstracts, editorials, reviews, case reports, animal studies; studies limited to patients with a specific complication; duplicate publications; incomplete outcome data.

Information sources PubMed, Embase, Cochrane Library. Reference lists of included articles were also screened. No contact with authors.

Main outcome(s) 247 studies from 36 countries or regions across six WHO regions were included. The pooled mortality rate of severe acute pancreatitis was 17% (95% CI: 0.15-0.18), with MODS (46.27%) and sepsis (32.36%) being the leading causes of death. The mortality rate showed a declining trend over time, from 25% before 1995 to 14% in 2016-2025. The incidence of various complications was as follows: MODS 24%, sepsis 26%, bleeding 12%, gastrointestinal perforation/fistula 11%, pancreatic fistula 14%, infected pancreatic necrosis 42%, pseudocyst 13%, exocrine insufficiency 26%, and new-onset diabetes 26%. The incidence of new-onset diabetes increased with longer follow-up (38% at >5 years).

Data management EndNote 21 was used to identify and remove duplicate records. Two independent authors screened titles/abstracts and full texts. Disagreements resolved by consensus or consultation with a senior author. Data extraction performed independently using a standardized form.

Quality assessment / Risk of bias analysis Two independent authors assessed methodological quality using the Newcastle-Ottawa Scale (NOS) for non-randomized studies and the Cochrane risk-of-bias tool for randomized trials. No study was excluded based on quality score.

Strategy of data synthesis Heterogeneity was assessed by use of the I^2 index and Cochran Q test. Pooled prevalence and the corresponding 95% confidence interval were carried out by the random-effects model. P-value of less than 0.05 was deemed statistically significant in all analyses.

Subgroup analysis The synthesized study results were used for subgroup analysis to account for

heterogeneity in the clinical outcomes of severe acute pancreatitis. Subgroup analyses were conducted based on study period (≤1995, 1996–2005, 2006–2015, 2016–2025), WHO region (African, Eastern Mediterranean, European, Americas, South-East Asia, Western Pacific), follow-up duration (5 years), and study phase (in-hospital vs. post-discharge).

Sensitivity analysis Sensitivity analysis was performed by sequentially excluding each individual study (leave-one-out method) to assess the robustness of pooled effect sizes and to identify influential studies.

Language restriction No language restrictions.

Country(ies) involved China.

Keywords Severe acute pancreatitis, mortality, complications, diabetes, meta-analysis.

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