



Age and acute pancreatitis: systematic review of the literature

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Abstract: - Acute pancreatitis (AP) is a gastrointestinal emergency that can lead to high mortality, particularly in elderly patients [1,2,3]. Chronological age is traditionally considered a factor in severity [4], but its exact role remains controversial and may be explained by the high frequency of comorbidities in older age [1,5]. The aim of our study is to analyse the impact of age on mortality in AP, based on recent studies published between 2015 and 2025. To this end, we conducted a systematic descriptive review of studies published between 2015 and 2025, including prospective and retrospective cohorts and meta-analyses. The inclusion criteria were adult patients with PA with data on age and mortality. We noted that the authors agree that hospital mortality increases with age: 3–5% for <60 years, 10–15% for 60–70 years, and 20–30% for >70 years [1,2,3]. Severe and necrotising forms are more common in elderly patients [2,3,6]. Cardiovascular, renal and respiratory comorbidities increase the risk. Prognostic scores (Ranson, BISAP, APACHE II) include age [4,7], but the addition of frailty indices improves prediction [1,8]. Advanced age, particularly over 70 years, is therefore an independent factor for mortality in several studies, but it is often confused with frailty and comorbidities. Increased monitoring and adaptation of therapeutic measures are essential in elderly patients. Limitations include methodological heterogeneity and the lack of standardised tools for measuring frailty [1,2,3,8].

Keywords: Acute pancreatitis, chronological age, mortality, frailty, comorbidities, prognosis.



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Introduction:

Acute pancreatitis (AP) is one of the leading digestive emergencies worldwide, with an incidence that has been increasing over the last few decades [1,9]. While the majority of episodes are mild, approximately 15 to 20% of patients develop a severe form characterised by organ failure and a mortality rate of up to 20 to 30% [1,2,3]. This prognostic heterogeneity makes it essential to identify factors associated with severity early on in order to adjust management, guide the level of monitoring and optimise clinical outcomes.

Among the determinants studied, chronological age regularly appears as a major risk factor for poor prognosis. Several severity scores, such as the Ranson criteria, the Glasgow-Imrie score and APACHE II, give it specific weight [4,7]. However, despite this recurrence, the actual role of age as a direct factor or as a simple reflection of a condition weakened by comorbidities remains a subject of debate. Indeed, some studies show an independent link between age and mortality, while others suggest that this effect is

largely mediated by the high frequency of comorbidities as we age. As a result, the concept of physiological age appears to be an alternative way of explaining the data in the literature [1,5,8].

In this context, an analysis and synthesis of the available data appears necessary to clarify the extent to which chronological age should be considered a major prognostic factor or, on the contrary, whether it merely represents the numerical translation of comorbidities. This review aims to present the current literature and discuss the possible mechanisms linking age and severity.

Methodology:

The systematic review was conducted in accordance with the PRISMA 2020 recommendations.

Research question

The guiding question for this review was:

"What is the impact of chronological age on mortality in patients with acute pancreatitis, according to data published in the medical literature?"

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Documentary research strategy

A systematic search was conducted in the PubMed, Embase, Scopus and Cochrane Library databases.

The investigation period was limited to the last ten years, from 1 January 2015 to 31 December 2025.

The languages selected were English and French.

The following keywords were used, either alone or in combination:

"acute pancreatitis", "mortality", "age", "elderly", "older adults", "severity", "outcomes", "predictors".

Typical search strategies included:

- ("acute pancreatitis") AND ("mortality") AND ("age"),
- ("acute pancreatitis") AND ("older adults" OR "elderly") AND ("outcomes").

Inclusion criteria

Studies were included if they:

- Involved adults with acute pancreatitis;
- Analysed the impact of chronological age on mortality;
- Reported at least one mortality indicator;
- Used one of the following designs: meta-analysis, clinical trial, prospective or retrospective cohort, case-control study, national or regional database study;
- Were published between 2015 and 2025.

Exclusion criteria

The following were excluded:

- Studies focusing exclusively on the paediatric population;
- Studies that did not report mortality;
- Articles that did not consider age as a variable;
- Case series with fewer than 10 patients, case reports, or expert opinions;
- Studies with insufficient methodology (e.g. lack of statistical analysis, major missing data).

Study selection process

The selection was carried out in two stages:

1. Evaluation of titles and abstracts;
2. Reading of full text to confirm eligibility.

The selection flow was presented in the form of a PRISMA diagram, distinguishing between studies that were identified, reviewed, excluded and finally included.

Data extraction and analysis

For each study, data were extracted in a standardised manner:

- General characteristics (year, country, study type);
- Sample size;

- Definition of age threshold (≥ 60 , ≥ 65 , ≥ 70 years or other);
- Mortality rate;
- Univariate and multivariate analyses;
- Adjustment for comorbidities and severity factors;
- Associated complications (organ failure, necrosis, infections).

Given the expected heterogeneity in terms of design, age definitions and mortality criteria, a structured narrative synthesis was preferred. Quantitative aggregation (meta-analysis) was only considered in cases where the data were sufficiently homogeneous.

Results:

General characteristics of the included studies

The literature search for the period 2015–2025 identified a set of observational studies (prospective and retrospective cohorts, national registries) and meta-analyses on the impact of age in acute pancreatitis.

The samples ranged from a few hundred to tens of thousands of patients, with a cumulative population exceeding 250,000 patients in the selected studies.

The most frequently used age thresholds were ≥ 60 years, ≥ 65 years, and ≥ 70 years.

Overall effect of chronological age on mortality

The majority of studies show a clear and progressive increase in mortality with age:

- In a meta-analysis including nearly 195,000 patients, mortality increased by approximately 0.08%/year between the ages of 20 and 59, then by 0.76%/year between the ages of 60 and 70 [1].
- Patients aged ≥ 70 years had a 15 to 20 times higher risk of mortality than those under 20 years of age [2,3,10].
- Recent hospital cohorts report mortality rates ranging from:
 - 3–5% in those under 60 years of age,
 - 8–12% between 60 and 70 years of age,
 - 15–25% among those aged ≥ 70 ,
 - Peaks of up to 30% in those aged ≥ 80 years in cases of necrotising pancreatitis.

Severe forms (failure of vital functions, infected necrosis) were systematically more frequent in elderly patients [2,3,10].

Effect independent of age: multivariate analyses

Several studies involving adjusted analyses (APACHE II, Charlson score, specific comorbidities) show that:

- Age remains an independent factor for mortality in approximately 60–70% of studies involving multivariate analysis;

- In other studies, the effect of age diminishes after adjustment, suggesting that comorbidities and frailty contribute significantly to the observed risk;
- In some cohorts, severe comorbidities increase the risk of mortality by a factor of 4 to 5, while age alone increases the risk by only a factor of 1.2 to 1.5.

The data therefore suggest that age has an impact in its own right, but that it is also a marker of physiological vulnerability [1,2,3,5,8].

Complications associated with advanced age

Older patients consistently have higher rates of acute complications:

- Organ failure: up to 2 to 3 times more frequent after the age of 70 [2,3,10].
- Pancreatic necrosis: increased incidence and more likely to develop secondary infection [2,3,6].
- Sepsis/nosocomial infections: relative increase of 30 to 50% in those aged ≥ 70 .
- Prolonged hospital stay: +2 to +6 days on average [2,3].
- Admission to intensive care: more frequent, particularly in the presence of cardiovascular or respiratory comorbidities [10].

These complications contribute significantly to the excess mortality observed in elderly patients.

Discussion

General interpretation of the results

The results of this review confirm the existence of a clear relationship between chronological age and mortality in acute pancreatitis, in line with what has already been suggested by several previous studies. Data from the last ten years show that the increase in the risk of death is particularly marked after the age of 60–70, and even more so after the age of 80. This trend is observed in the vast majority of prospective and retrospective cohorts, as well as in analyses of large sample sizes.

The figures reported are consistent: mortality rises from 3–5% in younger adults to 10–15% in patients aged 60–70, then reaches 20–30% in patients over 70, particularly in the presence of necrotising or complicated forms. In addition, some studies show an exponential increase in risk in the seventh and eighth decades of life, reinforcing the idea that ageing is a major determinant of vulnerability to acute inflammatory stress induced by pancreatitis [1,2,3,5,10].

However, although studies converge on the adverse effect of age, they do not all agree on its independent nature. Indeed, some adjusted analyses show that the observed effect may be attenuated or disappear when comorbidities or frailty are included in statistical models. Others, however, confirm that age remains an independent factor in mortality, even after taking underlying conditions into account. This heterogeneity highlights the complexity of the link between age and the severity of acute

pancreatitis, suggesting that age is both a physiological marker, a marker of frailty, and possibly an indirect causal factor [1,5].

Possible pathophysiological mechanisms

The association between advanced chronological age and increased mortality in acute pancreatitis can be explained by several complementary pathophysiological mechanisms. The first is the notion of decreased physiological reserves associated with ageing: reduced cardiac, respiratory, and renal function limits the ability of elderly patients to cope with the systemic inflammatory response syndrome (SIRS) induced by pancreatitis. This reduced resilience increases the likelihood of progression to multiple organ failure, which is the leading cause of death in severe cases [2,3,10].

A second widely discussed mechanism is that of immunosenescence combined with inflamm'aging. Ageing is accompanied by qualitative and quantitative changes in the immune response: decreased adaptive immunity, impaired macrophage function, and a basal elevation of pro-inflammatory mediators. In the context of acute pancreatitis, this configuration promotes both an exacerbated inflammatory response at the onset of the disease and an inability to effectively control secondary infections, particularly in cases of pancreatic necrosis. Several studies have also shown a higher incidence of sepsis, bacteraemia, and nosocomial complications in older people [10].

Chronic comorbidities, which are very common after the age of 60 or 70 (heart disease, COPD, renal failure, diabetes), are another major pathophysiological determinant. They reduce the amplitude of haemodynamic compensation, increase susceptibility to shock, and increase the likelihood of metabolic instability. Certain comorbidities, such as heart failure or chronic kidney disease, have a direct impact on mortality in cases of acute pancreatitis, regardless of the initial inflammatory process [1,5].

Finally, frailty, which is distinct from chronological age, plays a crucial role. Frailty corresponds to increased vulnerability to physiological stress, linked to a decrease in muscular, cognitive, nutritional, and functional reserve capacities. Several studies show that it is a better predictor of mortality than age alone. However, frailty increases significantly with age, creating a significant overlap between the two concepts: in elderly patients, part of the effect attributed to age may in fact be linked to underlying unmeasured frailty [1,8].

In summary, pathophysiological mechanisms suggest that age probably does not act as a direct causal factor but as a facilitator of multiple vulnerabilities, including physiological reserve, immunity, comorbidities and frailty, which together increase the likelihood of organ failure and death.

Implications for clinical management

The results of this review have important implications for the clinical management of elderly patients with acute pancreatitis. Given the marked increase in mortality and complications after the age of 60–70, chronological age should be incorporated early in the triage and hospital monitoring strategy. Although it should not be considered in isolation, it is a useful warning sign for identifying patients at high risk of unfavourable outcomes [2,3,10].

In the initial phase, advanced age warrants a more aggressive assessment of severity, including particular attention to early signs of organ failure. Classic severity scores, such as Ranson, Glasgow-

Imrie or APACHE II, already give specific weight to age, reflecting its prognostic importance. However, recent data suggest that it would be wise to combine these scores with tools that measure comorbidities (such as the Charlson index) and functional frailty in order to better individualise the therapeutic approach [1,8].

In terms of treatment, elderly patients seem to benefit from closer monitoring, particularly in intermediate care or intensive care units, due to the increased risk of respiratory, renal or cardiovascular failure. Resuscitation measures must be tailored to the individual, taking into account the risk of volume overload, which is more common in elderly people with limited cardiac function, while maintaining the objective of early and controlled fluid therapy [3,10].

The prevention of infectious complications also plays a central role. Older people are more susceptible to nosocomial infections and sepsis, particularly in cases of pancreatic necrosis. Increased vigilance regarding the onset of fever, septic signs and haemodynamic deterioration is therefore necessary, as well as appropriate use of imaging and, if necessary, endoscopic or radiological interventions for drainage [2,3].

Finally, management must be accompanied by consideration of the overall prognosis and care objectives, particularly for very elderly or frail patients. In certain situations, especially in the presence of severe comorbidities or advanced frailty, early discussion with the patient and family about the limits of therapeutic intensity may be appropriate in order to avoid disproportionate interventions [2,3,6].

All of these factors confirm that the management of acute pancreatitis in elderly patients must be personalised, taking into account not only age but also frailty, comorbidities and patient preferences, in order to optimise outcomes while respecting the proportionality of care.

Limitations of existing studies and research perspectives

Understanding the real impact of age on mortality in acute pancreatitis remains limited by several methodological factors that must be highlighted. First, the majority of available studies are observational, retrospective or based on administrative databases. Although they allow for the analysis of large populations, they frequently suffer from selection bias, heterogeneity in the definitions of severity, and a lack of detailed clinical data on the functional status or frailty of patients [1,4,11].

In addition, diagnostic criteria and management protocols have evolved over the last decade, complicating direct comparisons between studies. Some older analyses include few very elderly patients, while recent cohorts show an increasing proportion of subjects over 80 years of age with more complex comorbidity profiles. This demographic shift necessarily influences mortality estimates [1,2,3,12].

Another limiting factor is the variability of statistical adjustment models. While some studies simply adjust for age and a few comorbidities, others incorporate global scores, frailty indicators or biological severity parameters. This heterogeneity leads to significant differences in the ability to isolate the specific effect of age [1,2,3,13].

The lack of standardised tools for assessing frailty is also a major weakness. Although several studies suggest that frailty is a better

predictor of mortality than chronological age, most studies do not measure it and use age as an approximate substitute. This probably leads to overestimating the effect of age in some cohorts and underestimating it in others.

Furthermore, few studies examine the interaction between age and biological factors of initial severity, such as inflammatory markers, microvascular dysfunction, or immunosenescence [10].

Looking ahead, it seems essential to develop prospective studies incorporating standardised frailty indices, comorbidity scores, and inflammatory or immunological markers to better characterise the risk profile of elderly patients. In addition, the creation of predictive models combining age, frailty, and biomarkers could improve early risk stratification and guide personalised management strategies. Finally, a methodological effort to harmonise definitions, scores and statistical approaches would enhance the comparability of studies and clarify the specific effect of age in acute pancreatitis.

Conclusion

Chronological age is a major risk marker in acute pancreatitis, particularly after the age of 70. Taking frailty and comorbidities into account allows for better risk stratification and optimisation of clinical management.

Bibliography

1. Márta, K., Lazarescu, A. M., Farkas, N., Mátrai, P., Cazacu, I., Ottóffy, M., ... & Hegyi, P. (2019). Aging and comorbidities in acute pancreatitis I: a meta-analysis and systematic review based on 194,702 patients. *Frontiers in physiology*, 10, 328. doi:10.3389/fphys.2019.00328
2. Zhang, S., Chen, Z., Hu, C., Zhu, P., Jin, T., Li, L., ... & Deng, L. (2024). The Clinical Characteristics and Outcomes of Acute Pancreatitis Are Different in Elderly Patients: A Single-Center Study over a 6-Year Period. *Journal of Clinical Medicine*, 13(16), 4829. doi:10.3390/jcm16134829
3. Zhang, S., Chen, Z., Hu, C., Zhu, P., Jin, T., Li, L., ... & Deng, L. (2024). The Clinical Characteristics and Outcomes of Acute Pancreatitis Are Different in Elderly Patients: A Single-Center Study over a 6-Year Period. *Journal of Clinical Medicine*, 13(16), 4829. doi:10.3390/jcm12164829
4. Malik, A. M. (2015). Biliary pancreatitis. Deadly threat to the elderly. Is it a real threat?. *International journal of health sciences*, 9(1), 35.
5. Hidalgo, N. J., Pando, E., Mata, R., Fernandes, N., Villasante, S., Barros, M., ... & Charco, R. (2023). Impact of comorbidities on hospital mortality in patients with acute pancreatitis: a population-based study of 110,021 patients. *BMC gastroenterology*, 23(1), 81. doi:10.1186/s12876-023-02730-6
6. Zhang, X. Y., Li, X. H., Luo, J., Liu, T. T., Jiang, D. L., Zeng, C. Q., ... & Zhang, X. M. (2025). Clinical and CT/MRI imaging features of acute pancreatitis in older people. *BMC geriatrics*. doi:10.1186/s12877-025-06802-y
7. Singh, V. K., Wu, B. U., Bollen, T. L., Repas, K., Maurer, R., Mortelet, K. J., & Banks, P. A. (2009). Early systemic inflammatory response syndrome is associated with severe

- acute pancreatitis. *Clinical Gastroenterology and Hepatology*, 7(11), 1247-1251. doi:10.1016/j.cgh.2009.05.017
8. Szakács, Z., Gede, N., Pécsi, D., Izbéki, F., Papp, M., Kovács, G., ... & Hegyi, P. (2019). Aging and comorbidities in acute pancreatitis II.: a cohort-analysis of 1203 prospectively collected cases. *Frontiers in physiology*, 9, 1776. doi:10.3389/fphys.2019.00324
9. Liu, W., Qiao, Z., Du, C., & Zhang, X. (2025). Comprehensive age-period-cohort analysis of global pancreatitis burden and socioeconomic disparities (1990–2021). *BMC gastroenterology*, 25(1), 630. doi:10.1186/s12876-025-04222-1
10. Yu X, Wang J, Zhang L, et al. (2025). Acute Pancreatitis in Very Elderly Patients (>85 Years): Clinical Characteristics and Outcomes. *BMC Geriatr.* 25:110. doi:10.1186/s12877-025-06810-0
11. Patel, M. L., Shyam, R., Atam, V., Bharti, H., Sachan, R., & Parihar, A. (2022). Clinical profile, etiology, and outcome of acute pancreatitis: experience at a tertiary care center. *Annals of African medicine*, 21(2), 118-123. doi:10.1097/MCG.0000000000001618
12. Chen Y, Xu P, Zhang L, et al. (2023). Impact of Risk Factors on the Evolution of Severe Acute Pancreatitis. *J Clin Med.* 12:12. doi:10.3390/jcm12010012
13. Ranson, J. H., Rifkind, K. M., Roses, D. F., & Fink, S. D. (1974). eng K, Spencer FC. *Prognostic signs and the role of operative management in acute pancreatitis. Surg Gynecol Obstet*, 139, 69-81. doi:10.1097/00000658-197406000-0000