# Cost and Clinical Characteristics of Acute Pancreatitis Hospitalizations Related and Unrelated to Hypertriglyceridemia

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## AP+PC have significantly higher AP hospitalization costs and more hospitalization days than typical AP hospitalization patients

## BACKGROUND

AP is one of the leading gastrointestinal causes of hospitalizations in the US.

Risk and severity of AP increases substantially with TG levels[5,6]

Patients with HTG*+AP have higher rates of comorbidities compared to patients without HTG[7]

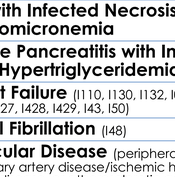
Patients with PC tend to have the highest levels of TGs and are at especially high risk of recurrent or more severe episodes of AP

PC is reported to be associated with a lifetime AP risk of up to 76%, even without other secondary risk factors

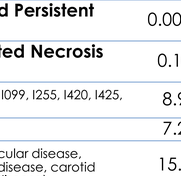
Progression from an initial AP episode to recurrent attacks and eventually to CP increases markedly with each new episode and at higher TG levels[11]

**$2.6 BILLION**

**Annual US AP Hospitalization Costs[1,2]**




HTG+AP[3,4]




can develop pancreatic necrosis[10]

**36% of PC+Recurrent AP**

**Rate of Chronic Pancreatitis[8,9]**

## OBJECTIVES

To describe total hospitalization cost (THC), length of stay (LOS), and mortality rate (MR) in patients with AP with/without hypertriglyceridemia (HTG), PC, substance-related AP, and infected/ necrotic pancreas in a real-world setting, focusing on AP hospitalizations overall and among PC patients experiencing an AP event

## METHODS

- Data from the US National Inpatient Sample (NIS) were used to identify cohorts of AP- and PC-related hospitalizations using ICD-10 codes
  - A subset of 356,453 hospitalizations from 2017 through 2021 was created by restricting the data to observations that had the ICD-10 AP diagnosis code in any position:
    - K85 (AP)
    - Excluding K851 (Biliary AP)
- Descriptive characteristics of the hospitalizations were calculated, including THC, LOS, MR, and presence of diagnosis codes for other related conditions
- Generalized linear and logistic regression models were used to examine independent predictor variables for THC, LOS, and MR
  - Independent variables included age, sex, LOS, indicators for death, PC, HTG, sepsis, infected necrosis, uninfected necrosis, substance-related, diabetic ketoacidosis, DRG with CC, and DRG with major CC

### REFERENCES

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### ABBREVIATIONS

**AP**, acute pancreatitis; **CC**, complications/comorbidity; **CP**, chronic pancreatitis; **DRG**, Diagnostic Related Group; **FCS**, Familial Chylomicronemia Syndrome; **HTG**, hypertriglyceridemia; **HCUP**, Hospitalization Cost and Utilization Project; **ICD-10**, International Classification of Diseases, Tenth Revision; **LOS**, length of stay; **MR**, mortality rates; **NIS**, Nationwide Inpatient Sample; **PC**, persistent chylomicronemia **THC**, total hospitalization cost; **US**, United States

## BASELINE

**Table 1. Hospitalizations for AP (N=356,453)**

| Demographics and Comorbidities | Mean (STD) |
|---|---|
| **Age** | 51.3 (17.2) |
| **Female** | 44.3% |
| **Persistent Chylomicronemia** (E783) | 0.05% |
| **Hypertriglyceridemia** (E781) | 6.9% |
| **Acute Pancreatitis with Infected Necrosis** (K85x2) | 1.2% |
| **Alcohol or Drug Related Acute Pancreatitis** (K852, K853) | 29.2% |
| **Diabetes with Ketoacidosis** (E081, E091, E101, E111, E131) | 4.2% |
| **IV Insulin** (3E033VG) | 0.04% |
| **AP with Infected Necrosis and Persistent Chylomicronemia** | 0.0003% |
| **Acute Pancreatitis with Infected Necrosis and Hypertriglyceridemia** | 0.10% |
| **Heart Failure** (I110, I130, I132, I0981, I099, I255, I420, I425, I426, I427, I428, I429, I43, I50) | 8.9% |
| **Atrial Fibrillation** (I48) | 7.2% |
| **Vascular Disease** (peripheral vascular disease, coronary artery disease/ischemic heart disease, carotid artery disease, or atherosclerotic aortic disease) | 15.5% |
| **Diabetes Mellitus** (E10, E11, E12, E13) | 30.1% |
| **Hypertension** (I10, I11, I12, I13, I14, I15, I674) | 56.9% |
| **Stroke, Transient Ischemic Attack (TIA) or Systemic Thromboembolism** | 9.1% |
| **Obesity** | 16.8% |
| **Acute Kidney Injury** (N170, N171, N172, N178, N179) | 20.1% |

## RESULTS

| | THC | LOS | MR |
|---|---|---|---|
| AP hospitalizations | $15,631 | 5.59 days | 2.46% |
| AP + HTG hospitalizations | $14,653 | 5.27 days | 0.97% |
| AP + PC hospitalizations | $16,762 | 5.95 days | 1.76% |
| Substance-related AP hospitalizations | $12,594 | 5.02 days | 1.23% |
| AP + infected necrosis hospitalizations | $61,244 | 17.73 days | 7.35% |

- All independent variables were significant ($p<0.05$) in THC and LOS models, and most were significant in MR models.
- Holding other variables constant, largest influences on THC were death and major CC, on LOS were sepsis and infected necrosis, and on MR were sepsis and PC (not significant).

| PC Hospitalizations: | AP+PC | AP |
|---|---|---|
| Lower age | 38.5 years | 51.3 years |
| Longer LOS | 6.0 days | 5.6 days |
| Higher cost | $16,762 | $15,631 |
| More HTG | 77.1% | 6.9% |
| More diabetic ketoacidosis | 13.5% | 4.2% |
| More diabetes | 65.9% | 30.1% |
| More obesity | 32.4% | 16.8% |
| Less acute kidney injury | 10.6% | 20.1% |

**AP Hospitalization Deaths**
Sepsis+major CC was the most common reason for AP deaths

**HTG Hospitalization Deaths**
Respiratory failure & sepsis+major CC were most common reasons for death

**PC Hospitalization Deaths**
Sepsis+major CC was the most common reason for PC deaths

**AP + HTG Hospitalization Deaths**
AP+major CC was the most common reason for AP+HTG deaths

**AP + PC Hospitalization Deaths**
AP+major CC was the most common reason for AP+PC deaths

**Figure 1. Common Principal Reasons for Hospitalizations; %**

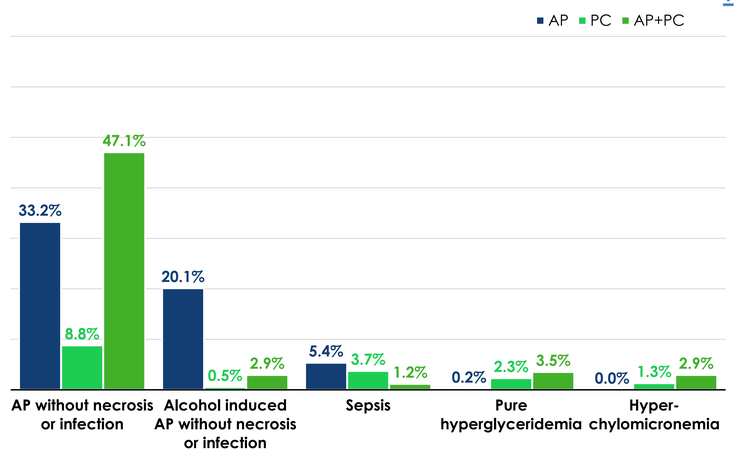
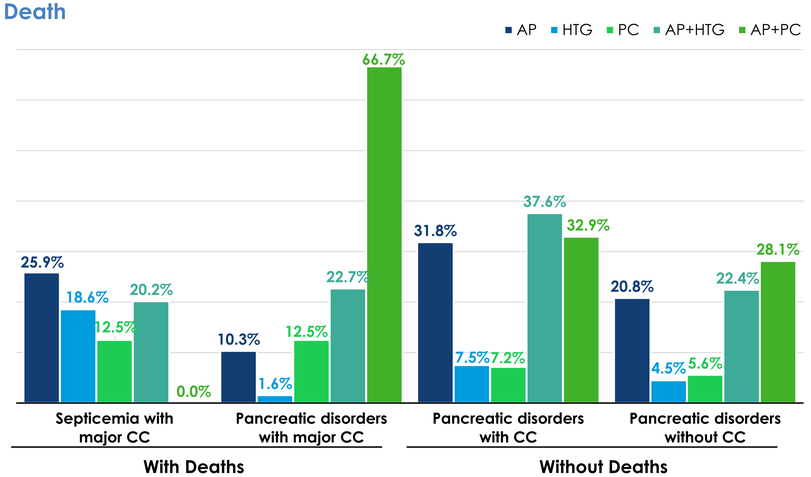



**Figure 2. Common Reasons for AP Hospitalization Deaths; % Hospitalizations ± Death**




## CONCLUSIONS

- AP+PC have significantly higher days and costs in hospital than typical AP hospitalization patients
- PC, sepsis, infected necrosis, and other major complications and comorbidities were predictive of significantly worse outcomes
- Fewer than 1 in 2000 hospitalizations for AP also have PC diagnosis, attributed to the rarity of the disease
- The most common principal diagnosis among hospitalizations for PC, AP, and AP+PC was "AP without necrosis or infection" (K85.90)
- In PC, more severe septicemia and pancreatic disorders with major complications/comorbidities were the most common reason among AP hospitalizations for mortality
- AP is the most serious, severe, and potentially fatal complication of PC
- PC is underdiagnosed in patients with AP but significantly contributes to higher healthcare costs + worse outcomes

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