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Current epidemiological aspects of the most common etiologies of acute pancreatitis in the Bucharest-Ilfov region

-PHD THESIS SUMMARY-

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INTRODUCTION

Acute pancreatitis, irrespective of etiology, constitutes a significant global public health concern, being a common condition encountered in departments of internal medicine, gastroenterology, and abdominal surgery. The leading causes are biliary lithiasis and excessive alcohol consumption.

In the United States, approximately 300,000 cases of acute pancreatitis are admitted annually to emergency departments, making it the fifth most common cause of non-oncological mortality (1).

In Romania, it was estimated that in 2019 there were approximately 14,000 cases, resulting in 1,042 deaths (2). Nevertheless, national data regarding the incidence of different etiologies, hospitalization costs, disability rates, and mortality associated with acute pancreatitis remain limited. This gap in epidemiological evidence has motivated the present study, aimed at a more thorough investigation of this pathology.

Early severity assessment and identification of high-risk patients are essential for timely intervention and the initiation of early intensive care. Risk stratification using various internationally validated scoring systems has been shown to significantly improve both prognosis and survival outcomes.

There are significant differences in mortality among patients with acute pancreatitis, depending on the form of the disease. This has long been a subject of concern among specialists, which has led to the development of several prognostic scoring systems.

Initially, the Ranson score was introduced in 1974 by John H. Ranson (3), followed by the Glasgow score in 1984, applied at 48 hours after admission (4), in 1985, Emil Jacques Balthazar developed a radiology-based scoring system using computed tomography (5), which was revised in 1990 with the inclusion of dynamic CT imaging to determine the extent of pancreatic necrosis (6). In 2008, Wu and collaborators developed the BISAP score (Bedside Index of Severity in Acute Pancreatitis), based on clinical and biological criteria (7).

The number of acute pancreatitis cases has been steadily increasing annually, leading to overcrowding in gastroenterology and surgical departments. A significant proportion of these cases require hospitalization, with consequent increases in healthcare costs (8). Through the use of early diagnostic tests and severity scores, which guide the level of care, a decrease in hospitalization costs was observed in the United States between 2007 and

2014—from USD 7,602 to USD 6,766 per hospitalization (9). At present, such data are not available at the national level in Romania.

The pancreas is often described as an organ with self-destructive potential when injured. Thus, acute pancreatitis is a destructive disease of the parenchyma, often involving surrounding organs, which contributes to its high mortality rate.

Diagnosis is usually straightforward, based on a combination of clinical history (epigastric pain radiating posteriorly, nausea, vomiting, and food intolerance), biological markers (elevated serum lipase and amylase), and imaging criteria (ultrasound or CT).

From an etiological perspective, two main categories predominate: biliary lithiasis and alcohol consumption. These etiologies vary geographically: in Eastern Europe, alcohol-induced pancreatitis is more frequent, while in the rest of Europe and in the United States, biliary causes are more common (10). Data from Romania indicate the following distribution: alcohol-related etiology accounts for 58.1% of cases (predominantly in men), biliary dysfunction 22.6%, hypertriglyceridemia 8.1%, and post-ERCP pancreatitis 3.2% (11).

The present paper is structured as follows: the first part presents a literature review and the current state of knowledge regarding this pathology, while the second part includes the results of studies conducted on the most frequent etiologies of acute pancreatitis. The structure complies with the current methodology for doctoral theses of the Doctoral School at the “Carol Davila” University of Medicine and Pharmacy in Bucharest.

The data used for this study were collected from the University Emergency Hospital Bucharest (SUUB), specifically from the following departments: Gastroenterology I, Gastroenterology II, Internal Medicine II, and General Surgery I–IV.

The study included patients discharged with a diagnosis of acute pancreatitis during the period 2020–2023, thus constituting a retrospective analysis.

Eligible participants were adults over 18 years of age who had signed informed consent for the use of their data in medical research and were diagnosed with acute pancreatitis. Exclusion criteria included failure to meet diagnostic criteria and the absence of discharge documentation in the hospital’s electronic system. Ethical approval was obtained from the SUUB Ethics Committee.

A total of 2,520 cases were identified. Of these, 52 were excluded due to incorrectly coded diagnoses and 426 were duplicate records resulting from a system error.

For the purpose of this paper, we used data from 1,263 cases (those with alcohol-related, biliary, or hypertriglyceridemic etiology) from the period 2020–2023, included in the BUC-API (Bucharest Acute Pancreatitis Index) registry, approved by SUUB. Based on the collected data, alcohol-related pancreatitis ranked first, accounting for 45.7% of cases, with an average hospitalization duration of 7 days and an incidence of 29.2 cases per 100,000 individuals.

Despite the large number of patients included in the BUC-API registry, this study is limited by its retrospective design. Therefore, there is a clear need for prospective studies and meta-analyses to enhance the available data and understanding of this pathology.

I. GENERAL SECTION

1. Acute Pancreatitis

1.1. Anatomical and Physiological Concepts of the Pancreas

1.1.1. Embryology and Anatomy of the Pancreas

The term *pancreas* originates from the Greek word *πάγκρεας* (*pànkreas*), meaning “all flesh.”

The pancreas is present in all vertebrates, with the exception of bony fish.

Initially an intraperitoneal organ, the pancreas becomes secondarily retroperitoneal and plays essential roles in digestion and metabolic regulation, particularly in glucose homeostasis. It develops from the endodermal epithelium of the duodenal loop via two ventral pancreatic buds and one dorsal bud, which give rise to the future head, body, and tail of the pancreas. Histologically, it is composed of pancreatic lobules separated by interlobular septa containing pancreatic acini and excretory ducts, as well as pancreatic islets (islets of Langerhans) that secrete insulin, glucagon, and somatostatin.

Developmental anomalies can occur for example, annular pancreas arises when the ventral bud fails to rotate properly and remains anterior to the duodenum, together with the dorsal bud encircling it, potentially leading to duodenal stenosis or even complete obstruction. Occasionally, the pancreatic bud may migrate along with the hepatic bud, giving rise to a pericholecystic pancreatic nodule. Ectopic (heterotopic) pancreas is defined as pancreatic tissue located in the walls of the stomach or intestine, with no anatomical or vascular connection to the main pancreas (12).

The pancreas is a mixed gland annexed to the digestive tract, it weighs on average 80–90 grams, with a pinkish-grey color at rest and reddish during active digestion. Its lobulated surface and firm yet elastic consistency have drawn analogies to salivary glands (13).

Due to its lobulated appearance, exocrine function, and involvement in mumps virus infection, it has historically been referred to as the “abdominal salivary gland” (14).

The pancreas measures 16–20 cm in length, 4–5 cm in height, and 2–3 cm in thickness. In adult males, it weighs between 70–80 g, while in females, it weighs 60–70 g. It grows until the age of 40 and begins to decrease in weight after the age of 50 (15).

Arterial blood supply is provided by the celiac trunk via branches of the common hepatic artery, the splenic artery, and the superior mesenteric artery.

1.1.2. Physiological Concepts

Histologically, the pancreas contains two major types of functional units: the islets of Langerhans, scattered within the glandular tissue, form the endocrine component, responsible for regulating glucose, lipid, and protein metabolism. The pancreatic acini, which form the exocrine component, secrete digestive enzymes into progressively larger ducts.

The pancreas secretes between 1,500–3,000 mL of isoosmotic, alkaline fluid daily (pH >8), containing around 20 active enzymes. These secretions provide the digestive enzymes necessary for gastrointestinal function and maintain an optimal pH environment for their activity.

Exocrine secretion is tightly regulated by interactions between the nervous and endocrine systems. The main stimulatory agents are acetylcholine, cholecystokinin, and secretin, the latter two being secreted by the duodenal and jejunal mucosa.

Autodigestion of the pancreas is prevented by several protective mechanisms: enzymes are secreted in inactive forms. Protease inhibitors, such as the pancreatic secretory trypsin inhibitor (PSTI or SPINK1), inactivate up to 20% of trypsin. Additional enzymes, including mesotrypsin, chymotrypsin C, and enzyme Y, further degrade activated trypsin. These inhibitors are present in acinar cells, pancreatic secretions, and in plasma α1- and α2-globulin fractions. Furthermore, the low intracellular calcium concentration in healthy acinar cells promotes the destruction of spontaneously activated trypsin. Disruption of any of these protective mechanisms leads to premature activation of digestive enzymes, resulting in autodigestion and acute pancreatitis(16).

1.2. Pathogenesis of Acute Pancreatitis

The mechanisms that initiate acute pancreatitis are not fully understood and vary depending on the underlying etiology. For example, the passage of a gallstone through the common bile duct into the sphincter of Oddi can cause localized edema and inflammation. This triggers a cascade that includes the reflux of pancreatic juice through the main pancreatic duct (Wirsung) into the pancreatic parenchyma, resulting in the activation of trypsinogen into trypsin and leading to autodigestion of the pancreas and surrounding structures(17).

1.3. Clinical Presentation

Pain is the main symptom that brings the patient to medical attention. It is typically located in the upper abdominal region (epigastrium), often extending to the right and left upper quadrants and radiating to the back. The onset is sudden, frequently occurring after meals or alcohol intake. The pain may improve when the patient assumes a knee-chest position and worsen with movement. It is usually intense and may be accompanied by abdominal muscle guarding.

Other associated symptoms include nausea and vomiting, which are typically not relieved by antiemetic medication. A thorough history should include questions about substance use (smoking, alcohol, drugs) and recent endoscopic procedures.

On clinical examination, the patient may present with fever, jaundice (in cases of biliary obstruction), tachycardia, hypotension (due to third-space fluid losses), abdominal tenderness with guarding, and reduced or absent bowel sounds due to functional ileus. Muscle spasms related to hypocalcemia may also be observed(18).

In severe cases, specific clinical signs may appear, such as periumbilical or flank bruising, subcutaneous nodules, and respiratory difficulty due to inflammatory involvement of the lungs.

1.4. Laboratory and Imaging Findings

Diagnosis is supported by a serum increase in amylase or lipase levels, typically at least three times above the normal limit, with lipase being more specific.

Imaging modalities such as computer tomography (CT), magnetic resonance imaging (MRI), and ultrasound can reveal typical findings.

Additional diagnostic procedures may include endoscopic ultrasound in idiopathic cases and secretin-stimulated magnetic resonance cholangiopancreatography.

1.5. Differential Diagnosis

Acute pancreatitis is often a diagnosis of exclusion. It must be distinguished from several other conditions, including myocardial infarction, mesenteric ischemia, aortic dissection, perforated peptic ulcer, intestinal obstruction, biliary colic, acute cholecystitis, and duodenal diverticulitis. Chronic diseases that can mimic some features of acute pancreatitis include pancreatic, gastric, and colonic tumors, hepatitis, and chronic pancreatitis.

1.6. Medical Treatment

There is no specific curative treatment; management is supportive and aims to restore fluid balance, ensure pancreatic rest, control pain, modify risk factors, and administer antibiotics in selected cases. The goal is to limit inflammation, prevent infection, and manage complications.

Initial digestive rest is essential, with gradual reintroduction of oral intake after 24 to 48 hours, starting with liquids and progressing to solids as tolerated(19). Enteral nutrition is preferred over parenteral feeding, as it is associated with reduced mortality and fewer infectious complications(20).

According to the AGA guidelines (21) it is recommended early fluid resuscitation is critical to prevent hypovolemia caused by third-space fluid loss. Preferred fluids include balanced crystalloid solutions such as lactated Ringer's, administered at 5–10 mL/kg/hour.

Pain control is initially managed with non-opioid analgesics (such as metamizole or paracetamol, the latter avoided in patients with liver disease). Opioids may be used if pain is not adequately controlled (Petidine, Phentanyl).

Proton pump inhibitors or H2-receptor antagonists may be administered for stress ulcer prophylaxis, although they do not influence disease outcomes and are not routinely recommended.

Anticoagulation is used to prevent venous thromboses (in portal, splenic, or mesenteric veins), which are inflammatory complications of pancreatitis between 13% and 30-37%(22). However, anticoagulant use must be balanced against the increased risk of gastrointestinal bleeding(23).

Antibiotics are not administered empirically and are reserved for cases with confirmed or highly suspected pancreatic infection, identified through clinical signs, laboratory markers, and imaging.

1.6.1. Endoscopic and Surgical Management

In cases of biliary acute pancreatitis, cholecystectomy is recommended during the same hospital admission to reduce the risk of recurrence and improve cost-effectiveness (24).

Emergency endoscopic retrograde cholangiopancreatography (ERCP) is indicated only when acute pancreatitis is complicated by cholangitis.

Surgical interventions for necrotizing pancreatitis should be performed using minimally invasive techniques, such as laparoscopy or robotic surgery, to reduce mortality.

Sterile pseudocysts may be drained percutaneously under ultrasound or CT guidance, endoscopically via transgastric approach, or surgically. Disconnected duct syndrome can be managed with stent placement, either percutaneously or endoscopically.

1.7. Complications

Complications occur in approximately 15% of acute pancreatitis cases and can be classified as local (fluid collections or necrosis), regional (thrombosis, paralytic ileus, intestinal obstruction or ischemia, cholestasis), and systemic.

Pancreatic necrosis is one of the most serious complications and is associated with higher mortality, particularly in cases caused by hypertriglyceridemia(25).

Systemic complications arise from the toxic effects of pancreatic enzymes and may include acute renal failure, respiratory distress syndrome, and shock. Some patients require prolonged dialysis. Respiratory complications are often triggered by pro-inflammatory cytokines. Disseminated intravascular coagulation, although rare, may cause significant bleeding and worsen outcomes. A persistent systemic inflammatory response syndrome (SIRS) may lead to diagnostic challenges, particularly in distinguishing between sterile inflammation and bacterial sepsis. Imaging-guided aspiration of retroperitoneal collections may aid in differential diagnosis (26).

1.7.1. Mortality in Acute Pancreatitis

Mortality in acute pancreatitis can occur early or late. Early death, typically within the first one to two weeks, is usually due to metabolic and inflammatory responses that lead to multiple organ failure. Late mortality, occurring after two weeks, is often the result of infection, particularly sepsis associated with pancreatic necrosis(27).

1.8. Prognostic Scoring Systems in Acute Pancreatitis

Among the earliest prognostic scores developed for acute pancreatitis is the Ranson score, introduced in 1974(28). It remains widely used to this day and is considered one of the most prevalent scoring systems. However, it has the disadvantage that full calculation requires 48 hours from the onset of symptoms.

The APACHE II score (Acute Physiology and Chronic Health Evaluation), standardized in 1985 (29) as an improvement over the original 1978 version, is a comprehensive tool used primarily in intensive care units to assess disease severity. While it can assist with clinical management, it is typically used in conjunction with other scoring

systems to improve accuracy. Its complexity makes it less practical for routine use in general medical or gastroenterology wards.

The Balthazar score, introduced in 1990, assesses the severity of acute pancreatitis based on computed tomography (CT) findings. With subsequent updates, it has evolved into the Modified CT Severity Index (CTSI)(30).

In 2008, the BiSAP score (Bedside Index for Severity in Acute Pancreatitis)(31) was introduced. It offers a simple and rapid method for evaluating disease severity and is useful for predicting the risk of mortality and complications within the first 24 hours of hospital admission.

The HAPS score (Harmless Acute Pancreatitis Score)(32), developed in 2009, is another user-friendly tool aimed at identifying patients with mild acute pancreatitis who are unlikely to develop severe complications.

None of these scores is flawless, and each has limitations in clinical practice(33). Therefore, physicians often rely on a combination of scoring systems to achieve a more accurate and comprehensive assessment

1.9. Etiology of Acute Pancreatitis

Acute pancreatitis is a severe inflammation of the pancreas, with sudden onset and a variable clinical course. The condition has multiple causes, often closely associated with the patient's metabolic, behavioral, or medical background. Accurate identification of the etiology is essential for determining the appropriate therapeutic management, preventing recurrence, and reducing associated mortality (34).

Biliary acute pancreatitis is the most common etiological form, primarily caused by gallstone disease.

Alcoholic acute pancreatitis ranks second in frequency and is predominantly encountered in young or middle-aged men with chronic, excessive alcohol intake.

Hypertriglyceridemia-induced acute pancreatitis, although less frequent than the aforementioned forms, has shown an alarming rise in incidence in Romania. This form is often observed in young male patients with severe dyslipidemia, frequently undiagnosed or inadequately treated.

In addition to the classical forms, there exists a group **of rare or atypical causes** of acute pancreatitis that require a rigorous, interdisciplinary diagnostic approach. These include post-ERCP pancreatitis, drug-induced, autoimmune, genetic, and idiopathic forms.

Understanding the differences among these etiologies not only guides therapeutic decisions but also underpins prevention strategies and the optimization of healthcare resources in systems facing complex challenges(35).

II.PERSONAL CONTRIBUTIONS

2. General Aspects of Acute Pancreatitis in the Bucharest-Ilfov Region

The purpose of this study is to identify the dominant epidemiological patterns of acute pancreatitis in the Bucharest-Ilfov region and to correlate these with clinical severity, the frequency of complications, associated costs, and resource utilization.

The specific objectives aim to clearly define the patient profile for each etiological form, analyze the geographical and socio-demographic distribution of cases, assess the incidence of recurrences and intensive care unit (ICU) admissions, and quantify the direct and indirect costs associated with each episode.

In parallel, this research seeks to highlight differences in clinical and morphological evolution of the cases, the use of severity scoring systems, as well as the impact of early versus delayed therapeutic interventions.

2.1 Research Methodology – Retrospective Study

We chose the retrospective research method because it allows for a detailed analysis of a large volume of pre-existing clinical data without influencing the natural progression of the disease or the treatment administered to patients. This approach proved particularly efficient in evaluating the epidemiological aspects of acute pancreatitis, as it provides valuable information on incidence, etiology, demographic distribution, severity, and associated costs of different disease forms—without requiring a costly and time-consuming prospective cohort study.

The data analyzed in this study were sourced from a regional clinical registry called BUC-API, which includes all recorded cases of acute pancreatitis hospitalized in the gastroenterology and general surgery departments of seven hospitals in the Bucharest-Ilfov region over a consecutive four-year period (2020–2023).

One of the key advantages of the retrospective method is the large amount of available data, which allows for robust statistical analyses and the identification of significant patterns.

In this study, 1,263 cases of acute pancreatitis were analyzed, of which: 47.6% were biliary forms, 35.2% were alcohol-related forms, 12.4% were associated with hypertriglyceridemia (HTG), and the remaining 4.8% had other etiologies or remained idiopathic.

In addition to its quantitative relevance, the retrospective approach enabled the evaluation of correlations between etiology, severity, length of hospital stay, clinical scoring systems applied, and resources used (including ICU admissions). These relationships were identified using descriptive and inferential statistical analyses, employing tools such as the χ^2 test, ANOVA, and logistic regression, depending on the nature of the variables.

Given the predominantly descriptive and analytical goal of the research, the retrospective method proved to be optimal for identifying significant epidemiological trends, such as the increasing incidence of alcohol-induced pancreatitis among young people or the overuse of ICU resources in HTG-related cases.

2.2 Structure of the BUC-API Registry

The BUC-API Registry (Bucharest Acute Pancreatitis Index) was designed as a centralized tool for the collection and analysis of data related to acute pancreatitis cases admitted to hospitals in the Bucharest-Ilfov region. Its primary purpose is to support epidemiological research and to improve the clinical management of this pathology.

The structure of the registry was developed to ensure standardized and detailed documentation for each case, with data selection based on strict clinical and administrative criteria, in order to guarantee the statistical validity and comparability of the information.

To be included in the registry, only cases that met the following conditions were selected: primary diagnosis of acute pancreatitis according to ICD-10 classification (codes K85.0 – K85.9), age over 18 years, admission to one of the seven participating medical units between January 2020 and December 2023, availability of a minimum set of essential clinical data.

The diagnosis was confirmed based on: imaging criteria (ultrasound, CT scan, MRI), laboratory tests (amylase, lipase, triglycerides), standardized clinical evaluation according to the 2012 Atlanta classification.

The following were excluded: cases of chronic pancreatitis, isolated post-traumatic pancreatitis, repeated episodes in the same patient, if there were no significant differences in the disease course.

2.3 Patient Selection Criteria

The main inclusion criterion was the existence of a clinically, biologically, and imaging-confirmed episode of acute pancreatitis, according to the revised Atlanta 2012

classification. Only cases that met at least two of the following three mandatory conditions were considered eligible: characteristic acute abdominal pain (pain in the upper abdominal quadrant radiating to the back), serum levels of amylase or lipase at least three times above the upper limit of normal, imaging evidence (ultrasound, CT scan, or MRI) consistent with acute pancreatic inflammation.

These criteria ensured the exclusion of suspected cases without clinically confirmed basis and maintained a high level of specificity in the database.

In addition to the diagnostic criterion, only patients who were at least 18 years old at the time of admission were included, in order to maintain the homogeneity of the cohort regarding etiological, metabolic, and therapeutic aspects.

2.4 Data Analysis

The data were processed and analyzed using IBM SPSS Statistics v27, selected for its flexibility in handling medical data and its ability to manage complex sets of variables. The complete dataset included 1,263 validated cases and more than 30 variables per patient, some of which were continuous (e.g., age, length of hospitalization, clinical scores, costs), while others were categorical (e.g., sex, etiology, severity, type of department).

To test statistical significance between categorical variables (e.g., the association between etiology and admission to the ICU), the Chi-square test (χ^2) was used, with adjustments of p-values for multiple comparisons where applicable.

To compare mean values between three or more etiological groups (e.g., duration of hospitalization, clinical scores, costs), one-way analysis of variance (ANOVA) was used, followed by post hoc tests (Bonferroni or Tukey) to identify statistically significant differences between group pairs.

3. Biliary Acute Pancreatitis in the Bucharest-Ilfov Region

3.1 Demographic Characteristics

The demographic analysis of patients diagnosed with biliary acute pancreatitis in the Bucharest-Ilfov region, based on data from the BUC-API registry, highlighted a specific epidemiological profile, characterized by a clear predominance of the female sex and a major concentration of cases in the 50–70 age group.

Out of the total 1,263 cases recorded during the period 2020–2023, 602 were classified as having biliary etiology, representing 47.6% of the total sample. Among these, 410 cases

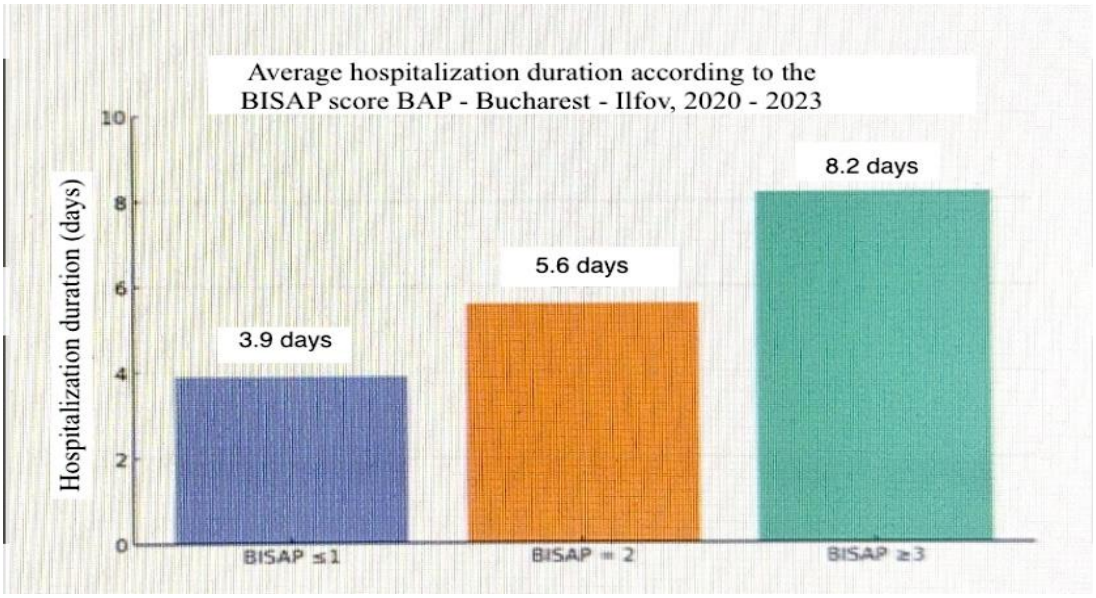
(68.1%) were female, and 192 cases (31.9%) were male, resulting in a sex ratio of approximately 2.1:1 in favor of females.

3.2 Clinical and Hospital Characteristics

The tendency to admit patients with biliary acute pancreatitis to surgical vs. gastroenterology wards reflects not only the policies of each hospital in the region, but also the severity of the disease, the availability of resources, and the experience of medical teams in managing this pathology.

Out of the total 602 cases of biliary pancreatitis analyzed between 2020 and 2023, 328 patients (54.5%) were admitted and primarily managed in general surgery departments, while 274 patients (45.5%) were admitted to gastroenterology or internal medicine wards with a gastroenterological profile.

The graph below (Figure 2.1) shows a comparison of average hospitalization duration according to the BISAP score, highlighting the increased resource requirements in relation to clinical severity.



3.3 Morphology and Severity of Cases

The BISAP score was the most frequently used due to its simplicity and quick applicability at the bedside. The included parameters (elevated urea, Glasgow Coma Scale <15, respiratory failure, age >60 years, and presence of SIRS) were documented at admission in over 91% of cases.

The distribution of scores shows that 52.8% of patients had a BISAP score ≤1, indicating a mild form with favorable evolution. 31.6% had a score of 2, corresponding to

moderate forms, while 15.6% had a score ≥3, classifying them as severe cases with increased risk of complications and mortality.

The ICU transfer rate was 53.4% for patients with a score ≥3, while only 4.2% of those with a score ≤1 required intensive monitoring.

3.4 Costs and Resources Consumed

In cases of mild biliary acute pancreatitis, which represented approximately 52.8% of the total 602 analyzed cases, the average daily cost was estimated at 980 lei, reflecting a conservative therapeutic approach. This included short-term clinical monitoring, intravenous treatment, basic imaging investigations (ultrasound and possibly non-contrast CT), and an average hospital stay of 3–4 days.

In contrast, severe forms, which accounted for 94 cases (15.6%), generated an average daily cost of 1,640 lei, nearly double that of mild cases. This difference is explained by the complexity of care required, such as: prolonged ICU stays (81% of severe cases), broad-spectrum antibiotic administration, continuous vital function monitoring, access to high-performance imaging (repeated contrast-enhanced CT scans, MRI), multidisciplinary consultations, and in some cases, percutaneous drainage procedures or temporary renal support.

The average hospitalization duration for these cases was 8.9 days, and the total estimated cost per episode reached 14,596 lei, compared to an average of 3,920 lei in mild cases.

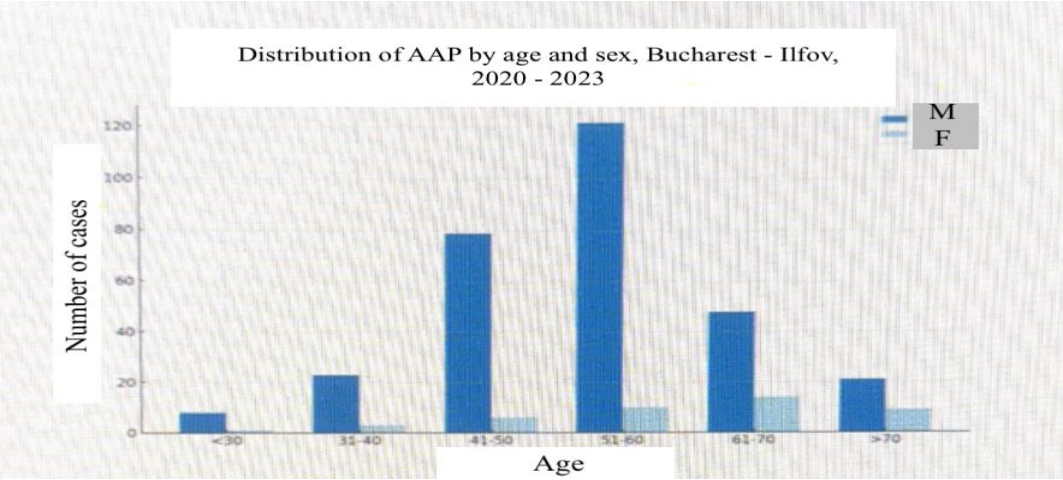
4. Acute Alcoholic Pancreatitis in the Bucharest-Ilfov Region

4.1 Demographic Characteristics

The demographic analysis of patients hospitalized with acute alcoholic pancreatitis in the Bucharest-Ilfov region during the 2020–2023 period reveals a profile markedly different from that observed in biliary pancreatitis, both in terms of sex distribution and age group allocation.

Of the 344 cases of alcoholic pancreatitis recorded in this period in the BUC-API registry, 87.5% (301 cases) were male, confirming the strong male predominance of this type of pancreatitis. Only 43 cases (12.5%) were recorded in female patients, most of whom were concentrated in the over-60 age group, in the context of chronic liver disease or a history of chronic ethanol use often associated with psychiatric disorders.

The chart below (Figure 2.2) illustrates the distribution of alcoholic pancreatitis cases by age and sex within the Bucharest-Ilfov region.



4.2 Clinical Course and Recurrence

Acute alcoholic pancreatitis (AAP) is characterized by a significantly higher recurrence rate compared to other etiological forms of pancreatitis—a trend also observed in the data collected in the BUC-API registry for the Bucharest-Ilfov region.

Out of the 344 cases of AAP recorded between 2020 and 2023, 145 patients (42.2%) had at least one previous documented episode of pancreatitis, while 73 cases (21.2%) experienced two or more acute episodes during the analyzed period.

The overall average length of hospitalization among patients with AAP was 6.8 days, but there was significant variation depending on clinical presentation.

Patients without complications and with mild forms had an average hospital stay of 4.1 days, while those with pseudocysts or acute peripancreatic fluid collections (APFC) required hospitalization between 7–9 days. In contrast, patients with infected necrosis or walled-off necrosis (WON) had an average hospitalization duration of 13.5 days, of which more than half was spent in ICU (Intensive Care Unit).

4.3 Severity and Clinical Scores

In the analysis of the 344 cases of acute alcoholic pancreatitis (AAP) in the Bucharest-Ilfov region (2020–2023), morphological and clinical classification allowed for the identification of the following distribution: 149 cases (43.3%) were classified as mild forms, without local complications or organ dysfunction, and had a favorable clinical course.

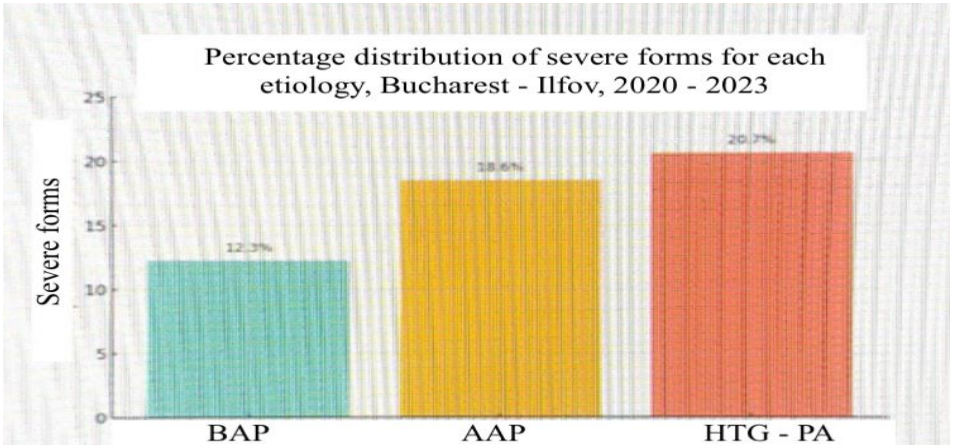
Moderate forms were identified in 134 cases (38.9%), characterized by transient organ dysfunction (lasting less than 48 hours) or local complications (such as fluid collections, pseudocysts, or acute peripancreatic fluid collections – APFC).

The most severe forms, or severe acute pancreatitis, were recorded in 61 cases (17.7%), of which: 39 patients had persistent organ dysfunction, and 22 were diagnosed with infected pancreatic necrosis or walled-off necrosis (WON).

4.4 Costs and Resources

In mild to moderate cases, treated exclusively in standard hospital wards, the average daily cost ranged around 780–920 lei. This amount is 20–40% lower than in cases requiring transfer to the ICU, where costs can exceed 2,500–3,200 lei/day, depending on the level of vital support and the complexity of the interventions required.

The adjacent chart (Figure 2.3) reflects the difference in average daily costs between non-ICU treated cases and those that required intensive care, highlighting the significant economic impact of disease severity and the type of treatment administered.



5. Acute Pancreatitis Induced by Hypertriglyceridemia in the Bucharest-Ilfov Region

5.1 Epidemiological Profile

The data highlight a clear predominance of HTG-induced acute pancreatitis (AP-HTG) cases among men aged between 30 and 50, a profile that differs from that of biliary pancreatitis (more common in older women) or alcohol-induced pancreatitis (typically affecting men aged 40–60).

Out of the 58 cases identified during the analyzed period, 41 patients (70.7%) were male, and the dominant age group was 31–45 years, accounting for 55.1% of all cases.

Within this subgroup, nearly 60% of patients had a documented history of severe hypertriglyceridemia (>1000 mg/dL) prior to the acute episode.

Moreover, 48.2% of the patients were diagnosed with type 2 diabetes mellitus, and 67% presented with grade I or II obesity.

5.2 Clinical Characteristics

In the analysis of cases from the Bucharest-Ilfov region between 2020 and 2023, the average length of hospitalization for HTG-induced acute pancreatitis (AP-HTG) was 8.9 days, longer than for biliary pancreatitis (7.3 days) and alcoholic pancreatitis (6.8 days), reflecting the increased complexity of managing this particular pathology.

Compared to other etiologies, AP-HTG is thus distinguished by a significantly longer hospital stay and by a complex therapeutic burden, requiring a multidisciplinary approach involving gastroenterologists, endocrinologists, cardiologists, and nutritionists.

AP-HTG is well-documented in medical literature as being associated with a higher risk of severe clinical forms compared to other causes, a finding also confirmed by data collected in the Bucharest-Ilfov region during the 2020–2023 period.

This increased risk is determined by the specific pathophysiological mechanism of AP-HTG, in which excess triglycerides, through enzymatic hydrolysis, generate toxic free fatty acids that cause endothelial injury and extensive pancreatic necrosis. In the context of systemic lipotoxicity, SIRS (Systemic Inflammatory Response Syndrome) can occur rapidly, increasing the likelihood of multiple organ dysfunction.

5.3 Morphology and Severity

Among the 58 cases analyzed, 31 patients (53.4%) presented peripancreatic, perirenal, mesenteric, or Douglas pouch fluid collections, confirmed by CT or abdominal ultrasound imaging. An important observed particularity was the relatively high frequency of encapsulated collections with incompletely formed walls (early pseudocysts), especially among patients with extremely elevated triglyceride levels (>2000 mg/dL) and BISAP scores ≥3.

In 8 cases (13.7%), well-defined collections were noted after the 10th day, which required either ultrasound-guided drainage or imaging follow-up at 4 weeks, depending on symptomatology and size.

Four cases (6.9%) presented imaging features of non-homogeneous collections with mixed liquid-solid content, suggestive of Walled-Off Necrosis (WON), requiring prolonged hospitalization, antibiotic therapy, and repeat CT monitoring.

The overall rate of severe forms (as per the 2012 Atlanta classification) was 20.7%, which significantly exceeds the prevalence of severe forms in biliary pancreatitis (12.3%) and alcoholic pancreatitis (13.9%) in the same BUC-API registry.

5.4 Costs and Challenges

The average estimated costs for patients hospitalized in standard wards (gastroenterology, surgery) indicate a daily cost of approximately 970–1,150 lei. In cases that required transfer to intensive care (ICU), the daily cost ranged between 2,600–3,200 lei, increasing depending on the complexity of the case and the treatments applied.

Overall, the average cost per acute episode of HTG-induced acute pancreatitis (AP-HTG) was estimated at 10,600 lei for mild to moderate forms, and over 26,000 lei for severe forms requiring intensive care therapy.

In addition, AP-HTG often requires additional investigations (extended lipid profiling, genetic testing for familial dyslipidemias, endocrinological evaluations), which further contributes to the increased financial burden on the hospital budget.

6. Comparative Analysis of the Etiologies of Acute Pancreatitis

6.1 Recurrence

Acute biliary pancreatitis (ABP) is characterized by a relatively low recurrence rate, especially when appropriate therapeutic management is applied, including etiological treatment through cholecystectomy. The analysis of cases from the Bucharest-Ilfov region between 2020 and 2023 confirms this trend, highlighting a recurrence rate of only 9.7%.

Acute alcoholic pancreatitis (AAP) stands out due to its strongly recurrent nature, representing one of the most frequent forms with episodic chronic progression, where relapses are common, occur rapidly, and are often more severe than the initial episode. The retrospective analysis of cases in the Bucharest-Ilfov region, collected between 2020 and 2023 within the BUC-API registry, shows that AAP recurrence reaches a rate of 42.5%.

Hypertriglyceridemia-induced acute pancreatitis (HTG-AP) lies between biliary and alcoholic forms in terms of recurrence frequency, with a recurrence rate of 22.4%,

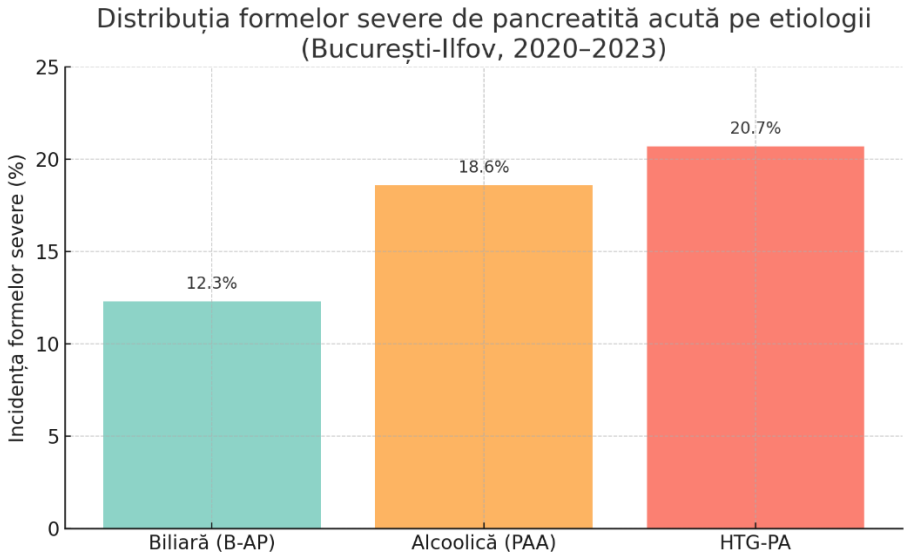
according to data extracted from the BUC-API registry for the Bucharest-Ilfov region in the 2020–2023 period.

6.2 Severity and Morphology

Biliary pancreatitis remains the least severe on average, with a low rate of severe forms, whereas alcoholic pancreatitis (AAP) and especially hypertriglyceridemia-induced pancreatitis (HTG-AP) show a considerably higher incidence of severe cases, reflecting the metabolic risk and aggressive systemic inflammation involved.

This distribution justifies the differences in hospitalization duration, the need for ICU admission, and the per-case costs, necessitating a differentiated and intensive approach for etiologies with higher risk.

For a synthetic representation of these differences between etiological forms, the following chart (Figure 2.4) illustrates the percentage distribution of severe forms for each etiology.



6.3 Costs and Resources

Biliary acute pancreatitis (ABP) generates the lowest direct costs per episode, with an average of approximately 6,800 lei per case. This value mainly reflects the shorter hospital stay (an average of 5.1 days), the lack of severe complications in most cases, as well as a well-defined and applicable etiological treatment (cholecystectomy or sphincterotomy).

In contrast, alcoholic acute pancreatitis (AAP) involves higher average costs—around 9,500 lei per case, generated especially by the longer hospital stay (an average of 6.4 days), the frequent recurrences requiring rehospitalization, and the need for extended monitoring.

A significant part of these costs derives from repeated imaging investigations (CT, MRI), laboratory tests for hepatic or nutritional complications, and symptomatic and supportive treatment.

The highest average costs are recorded in hypertriglyceridemia-induced acute pancreatitis (HTG-AP), where a severe episode can reach average values of 13,700 lei per case, with significant variations depending on severity. These costs are influenced by the longer hospitalization duration (an average of 7.3 days) and the high rate of ICU transfers (31%).

6.4 Clinical and Administrative Implications

Data obtained from the Bucharest-Ilfov region during the period 2020–2023, within the BUC-CAPI registry, clearly support the fact that a correct etiological diagnosis significantly reduces the risk of recurrences, decreases the need for ICU transfer, and shortens the total duration of hospitalization.

Early and well-documented diagnosis of alcoholic acute pancreatitis (AAP) allows for the activation of a multidisciplinary team (gastroenterologist, psychologist, psychiatrist) starting from the first episode, which increases the chances of efficient intervention on the causes and reduces subsequent hospitalizations.

In the case of hypertriglyceridemia-induced acute pancreatitis (HTG-AP), an early etiological diagnosis is vital for the rapid initiation of specific treatment and prevention of systemic complications. Lack of recognition of HTG-AP often leads to delayed therapy, aggravation of the clinical picture, and prolonged ICU stays. Additionally, identifying this etiology requires a chronic-type approach, including family screening, nutritional counseling, hypolipidemic treatment, and outpatient follow-up.

For example, in biliary acute pancreatitis (ABP), confirmation of calculi migration by ultrasound, CT, or ERCP allows for rapid cholecystectomy or sphincterotomy, thereby preventing a new episode. Without this diagnosis, the patient risks recurrence that may lead to severe complications (cholangitis, jaundice, severe necrotizing pancreatitis). A correct diagnosis can direct the patient promptly to the appropriate department (surgery, gastroenterology, ICU), optimizing admission flow and avoiding unjustified overloading of certain departments.

7. Perspectives and Recommendations for the Healthcare System

7.1 Early Diagnosis and Treatment

Data collected in the Bucharest-Ilfov region through the BUC-CAPI registry show that in over 22% of cases with severe evolution, transfer to the ICU was performed late, after the appearance of organ dysfunction, indicating a clear deficit in early clinical triage.

For an efficient system, triage must include both internationally validated clinical scores (such as BISAP, Ranson, or APACHE II), as well as rapidly accessible biomarkers (CRP, hematocrit, serum urea) and early imaging evaluation. Correct direction of cases even from the emergency room can reduce the number of unjustified ICU transfers, allow rapid therapeutic intervention, and contribute to lowering costs per case.

The timing of intervention plays a fundamental role in establishing the prognosis of patients diagnosed with acute pancreatitis, directly influencing clinical evolution, the risk of systemic complications, and the duration of hospitalization. Acute pancreatitis is a pathology with dynamic evolution, characterized by a rapid transition from the mild inflammatory stage to severe forms, with necrosis, multiple organ dysfunction, and even death.

7.2 Recurrence Prevention

Effective strategies for preventing recurrence in alcoholic pancreatitis must begin during hospitalization, through the early identification of patients at risk of continued alcohol consumption and their referral to psychological counseling services, psychiatry, and addiction centers. Short interventions delivered by current physicians — known as "brief interventions" — have proven effective in reducing alcohol consumption and increasing adherence to recovery programs.

Prevention of hypertriglyceridemia-induced pancreatitis (HTG-AP) is closely linked to the early identification of patients with severe dyslipidemia by systematically implementing lipid screening. It is essential that this screening be integrated into the baseline evaluations of patients with type 2 diabetes, abdominal obesity, metabolic syndrome, hepatic steatosis, or a family history of dyslipidemia — all known groups with a high prevalence of hypertriglyceridemia. Additionally, screening should be extended to pregnant women in the third trimester and to patients undergoing treatments with the potential to increase serum lipid levels (such as estrogens, retinoids, or certain antipsychotics).

Early cholecystectomy represents one of the most effective interventions for preventing recurrence of acute biliary pancreatitis, and implicitly for reducing the associated morbidity, mortality, and healthcare costs.

7.3 Resource Management

Data from the Bucharest-Ilfov region show significant differences in the average costs per case depending on etiology, severity, and timing of intervention. For example, a severe episode of acute pancreatitis involving transfer to the ICU can exceed 15,000 lei per patient, while mild forms treated promptly can be managed at costs 4 to 6 times lower.

The development of specialized centers with integrated treatment and the establishment of permanent interdisciplinary councils is not only an efficient clinical solution but also a strategic necessity for the romanian healthcare system. This approach not only significantly improves patient prognosis but also contributes to reducing the pressure on general wards, optimizes resource utilization, and allows for smarter and more sustainable management of acute diseases with major impact, such as pancreatitis.

7.4 Future Research Directions

Retrospective studies, although valuable for describing epidemiological trends and analyzing existing data, are limited by their passive nature and the inability to directly control variables. Prospective studies allow for the uniform application of inclusion criteria, validated severity scores (such as BISAP or Ranson), diagnostic and treatment algorithms, as well as real-time patient monitoring — including post-discharge — which is essential for evaluating recurrence, quality of life, and the effectiveness of preventive interventions. Only prospective studies can accurately assess the impact of new (therapeutic or administrative) interventions, providing solid evidence to support clinical guidelines or public policy.

Well-designed multicenter prospective studies with consistent implementation represent the only path to overcome the limitations of retrospective investigations and to formulate clinical and administrative conclusions with national applicability. These studies would enable the transformation of current knowledge into modern, evidence-based medical practice aimed at reducing the burden of acute pancreatitis on both patients and the healthcare system.

Meta-analyses also play a crucial role in validating hypotheses generated from local studies, increasing statistical power and the generalizability of results. They provide a solid

foundation for planning healthcare investments at the regional level — whether in establishing specialized treatment centers, expanding ICU capacity, or developing prevention programs.

BUC-API has demonstrated, in the Bucharest-Ilfov context, that a well-structured platform can systematically collect standardized data on etiology, severity, applied treatments, hospitalization duration, and associated complications, generating valuable information for both clinicians and authorities. Scaling this model to a national level would lead to uniform diagnostic and reporting criteria, improved inter-institutional communication, and optimized resource allocation by identifying the most affected areas and the specific causes of recurrence and mortality.

Conclusions

The conclusions of this paper confirm the essential role of a differentiated etiological approach in the management of acute pancreatitis and highlight the major impact that early diagnosis, personalized prevention, and rational resource allocation have on clinical outcomes and healthcare system costs. The main objective of this research — to analyze the current epidemiological aspects of acute pancreatitis in the Bucharest-Ilfov region, with emphasis on variations based on frequent etiologies — was achieved through a combination of detailed retrospective analysis and comparative interpretation of data collected between 2020 and 2023.

The results revealed significant differences among the various forms of acute pancreatitis: biliary pancreatitis proved to be the most common, with the best prognosis when early etiological intervention (e.g., cholecystectomy) was performed; alcoholic pancreatitis was marked by high recurrence and required integration of psychosocial interventions; and hypertriglyceridemic pancreatitis had the highest rate of severe complications and ICU transfers, thus requiring advanced metabolic prevention strategies. The study demonstrated that early application of clinical scoring systems (Ranson, BISAP), the use of high-performance imaging, and rapid access to intensive care are key determinants of survival and complication reduction.

From a cost perspective, the paper highlighted important discrepancies between mild and severe forms, between well-equipped hospitals and those with limited resources, and between patients who received complete etiological treatment and those with recurrence. The average cost per case doubled when etiological treatment was delayed, validating the need for budget planning based on cost-effectiveness analyses and for differentiated funding depending on case severity.

The theoretical and practical contribution of this work lies in providing a faithful and structured radiography of the clinical reality in a region representative of the Romanian healthcare system, exposing current limitations in hospital organization and inconsistent therapeutic approaches. At the same time, it proposed viable reform directions: developing an interoperable national registry, institutionalizing multidisciplinary clinical boards, expanding lipid and alcohol abuse screening programs, and establishing specialized centers for acute pancreatitis.

The study shows that in the absence of a precise etiological diagnosis and timely intervention, acute pancreatitis remains a potentially lethal and resource-intensive condition. However, through coherent and etiologically differentiated measures, it can become one of the most manageable digestive emergencies. In this regard, the research results not only reflect the current state of the system, but also provide a solid foundation for clinical, administrative, and public health policy decisions in the field of healthcare.

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