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Diagnostic and Therapeutic Approach to Acute Pancreatitis: Paraguayan National Consensus

Guido Parquet, MD, FICS, FACS[1,2] — ORCID 0009-0002-1294-5274
Rosa Sánchez, MD, FICS[1,2,3] — ORCID 0000-0003-1988-7134

[1] 1st Chair of Surgical Clinics, Hospital de Clínicas, Faculty of Medical Sciences, National University of Asunción (UNA). San Lorenzo, Paraguay.
[2] Paraguayan Chapter of Hepato-Pancreato-Biliary Surgery (HPB), Paraguayan Society of Surgery (SOPACI). Asunción, Paraguay.
[3] Minimally Invasive Surgery Service (SCMI), Social Security Institute (IPS), Central Hospital. Asunción, Paraguay.

Corresponding Author:

DR. GUIDO PARQUET

E-mail: gparquet@hotmail.com

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Abstract

Background. Acute pancreatitis is a leading cause of hospital admission for inflammatory disease of digestive origin worldwide and in Latin America. Its clinical spectrum ranges from mild, self-limiting episodes to critical illness with multi-organ failure and high mortality. Management in Paraguay remains heterogeneous, and practices persist that may adversely affect outcome.

Methods. The Hepato-Pancreato-Biliary Surgery Chapter of the Paraguayan Society of Surgery convened 24 surgeons in three thematic working groups. Statements were validated by a modified Delphi process with a pre-specified approval threshold of 80% and a final plenary vote.

Results. Thirty-two statements and recommendations were approved, covering diagnosis and severity classification, initial management and therapeutic support, and the management of local and other surgical complications. Gallstones account for more than 80% of cases nationally. Recommendations include the two-of-three diagnostic rule with serum lipase as the preferred assay, restricted and appropriately timed computed tomography, determinant-based and revised Atlanta severity classification with the modified Marshall score, moderate goal-directed resuscitation with Ringer's lactate, early oral or enteral nutrition, antibiotics only for suspected or confirmed infected necrosis, early cholecystectomy in mild biliary disease, and a step-up approach with intervention deferred beyond four weeks wherever tolerated.

Conclusions. This English-language report presents a national consensus intended to standardize practice across

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a health system with uneven access to interventional radiology, therapeutic endoscopy and critical care, and sets out the structural limitations to its implementation.

Key words: Acute pancreatitis; Severity classification; Modified Marshall score; Fluid resuscitation; Step-up approach; Paraguayan consensus.

Introduction

Acute pancreatitis is one of the most challenging gastroenterological conditions in the field of medical-surgical emergencies. In recent decades, a sustained increase in its global incidence has been documented, a phenomenon strongly linked to transitions in sociocultural and demographic habits, such as changes in alcohol consumption patterns, and the rising prevalence of obesity and metabolic syndrome[1,2].

Clinically, the disease behaves variably from patient to patient. The vast majority, 80–85% of patients, experience benign interstitial oedema that resolves within a few days with supportive care. A minority, 15–20%, develop pancreatic necrosis, and in these patients the course is characteristically bimodal[3]. In the first stage, systemic inflammatory response syndrome and multiple organ failure predominate and account for the first peak of mortality[3,4,5,6]. The second stage occurs in the third and fourth weeks after the onset of the disease due to infection of pancreatic necrosis, which produces a second peak of organ failure and death[4,5,6].

Despite growing evidence on the management of acute pancreatitis (AP), in Paraguay there is no uniformity of criteria for managing patients with AP, especially those with severe presentations involving pancreatic necrosis and multiple organ failure. Practices that could potentially lead to an unfavorable prognosis for these patients persist[7].

With the aim of unifying diagnostic and treatment criteria based on scientific evidence, adapted to the local context, and seeking to improve the quality of healthcare in this area, the Hepatobiliary and Pancreatic Surgery Chapter of the Paraguayan Society of Surgery convened a group of experts to discuss and reach a consensus on different aspects of the epidemiology, diagnosis, classification, and treatment of acute pancreatitis. The objective of this article is to present the results obtained from this consensus in English, in an abbreviated form and with comments , for an international readership; the full consensus has been published in Spanish[7].

Materials and Methods: Consensus Development

To develop the consensus statement, a panel of 24 leading surgeons was formed, selected through a nationwide survey based on their experience and track record in managing acute pancreatitis. The Board of Directors of the Paraguayan Chapter of Hepato-Pancreato-Biliary (HPB) Surgery entrusted this committee of experts with formulating specific statements and recommendations for each thematic area, based on evidence and personal experience but strictly adapted to the healthcare context of Paraguay.

The work was structured into three thematic sections: Section 1, focused on general information, definitions, and diagnosis; Section 2, centered on initial management; and Section 3, dedicated to addressing complications. Each of these working groups consisted of a panel of eight experts coordinated by two members of the Paraguayan HPB Chapter's Board of Directors.

As a result of the deliberations, a series of statements and recommendations were developed. These were subsequently submitted to a modified Delphi validation process[8] which was carried out in the following stages: The panel was not blinded, and voting was conducted in plenary rather than anonymously; this is a recognized departure from classical Delphi methodology and is acknowledged as a limitation.

- Discussion and initial voting: a joint plenary session of the panel of 24 experts was held, during which the proposed texts were read, debated, and voted on individually. A minimum approval threshold of 80% was strictly established for the immediate validation of each statement.
- Re-evaluation of discrepancies: the two statements that did not reach the required threshold at first vote were reformulated and submitted to a further cycle of debate and voting until the pre-specified level of agreement was achieved.
- Final plenary approval: after consolidation of the complete document, a final reading was carried out before the plenary. Submitted to a global vote, the final consensus text was approved unanimously (100%).
- Institutional endorsement and dissemination: once completed, the document was submitted to the Paraguayan Society of Surgery (SOPACI) for review and approval. It was also sent to the Ministry of Public Health and Social Welfare (MSPyBS) of the Republic of Paraguay, which has formally recommended its application and adoption as a reference guide in healthcare centers nationwide.

We translated the consensus document into English and prepared an abridged version that highlights the key aspects and recommendations derived from it. Comments were added, particularly regarding the applicability of the guideline in a developing country like Paraguay.

Results

Following the epidemiological and etiological evaluation in Paraguay, the consensus developed 32 statements and recommendations for the management of acute pancreatitis.

In the epidemiological context of the Republic of Paraguay, the reported annual incidence fluctuates between 13 and 45 cases per 100,000 inhabitants[7]. The etiological profile in the Paraguayan population is dominated by gallstones, accounting for over 80% of total diagnoses. This figure significantly exceeds the global averages of other regions of the world, where alcoholism or hypertriglyceridemia are close contenders to gallbladder disease[9,10]. The second most prevalent etiology nationally is alcohol abuse, representing 10% of cases[7], with the risk directly proportional to the volume and chronicity of consumption[11].

In the specific biliary etiology, which dominates the Paraguayan scenario, three fundamental causal mechanisms are described: direct biliary reflux towards the main pancreatic duct due to obstruction by a stone impacted in the common ampulla; mucosal edema and inflammation of the sphincter of Oddi after the migration and repeated passage of stones towards the duodenum; and the transient incompetence or dysfunction of said sphincter apparatus after the mechanical trauma caused by the same stones[12,13].

The statements and recommendations are grouped into the three thematic sections defined for the development of the consensus.

Section 1: Diagnosis and severity classification

1. The diagnosis of acute pancreatitis requires at least two of the following three characteristics: compatible abdominal pain (epigastric, sharp, severe, frequently radiating to the back or hypochondria); serum lipase or amylase greater than or equal to three times the upper limit of normal; or characteristic findings on computed tomography (CT), ultrasound or magnetic resonance imaging (MRI).

2. Serum lipase is the most useful and specific laboratory test for confirmation.

3. Transabdominal ultrasound is established as the initial study of choice to identify biliary etiology and detect early collections or free fluid.

4. Indications for computed tomography: CT is not routinely recommended for purely diagnostic purposes. Its precise indication is reserved for severity stratification and detection of necrosis between the third and tenth days of evolution (ideally between the third and fifth); diagnostic uncertainty or blunt trauma in the emergency department; and clinical deterioration or suspected complications.

5. Magnetic resonance imaging: indicated in patients with contrast allergy and for assessment of the biliary tree in biliary tract disease, particularly in children.

6. Classification systems: it is recommended to use the determinant-based classification (local determinants and organ failure)[14] or failing that, the revised Atlanta classification (2012)[15], to define severity in four categories: mild (no necrosis or organ failure), moderate (sterile necrosis or transient organ failure), severe (infected necrosis or persistent organ failure) and critical (infected necrosis with persistent organ failure).

7. For the objective assessment of systemic organ dysfunction, the modified Marshall score must be strictly applied [15, 16].

Section 2: Initial management and therapeutic support

8. Moderate, goal-directed hydration is prescribed, preferably using Ringer's lactate at 1.5 mL/kg/h, adding a bolus of 10 mL/kg only in case of hypovolaemia[17].

9. The use of colloids is not recommended, and close clinical reassessment is required every 6 hours during the first 24 hours, adjusting volume to the patient's comorbidities.

10. In mild acute pancreatitis, oral intake should be started early as soon as pain and vomiting improve, avoiding prolonged fasting.

11. In moderate and severe cases, the oral route remains the first option if tolerated; otherwise, enteral nutrition by nasogastric or nasojejunal tube should be initiated by the third day.

12. Total parenteral nutrition is reserved exclusively for intolerance of, or failure of, the enteral route to meet minimum caloric needs.

13. Routine antibiotic prophylaxis is not recommended in acute pancreatitis.

14. Broad-spectrum antibiotics with good pancreatic penetration (carbapenems, quinolones, or third-generation

cephalosporins combined with metronidazole) are indicated only on clinical, analytical (CRP or procalcitonin trend) or imaging confirmation of infected necrosis, usually documented after 14 days of evolution.

15. Pain will be addressed under the WHO stepwise approach[18], avoiding NSAIDs if there is renal impairment.

16. Ondansetron is approved for nausea in the intensive care unit.

17. Conventional prokinetics are left to the physician's discretion, with neostigmine suggested only in selected cases of intra-abdominal hypertension in the intensive care unit.

18. In cases of necrosis exceeding 50% of the gland, or exocrine pancreatic insufficiency confirmed by faecal elastase, enzyme replacement therapy (pancreatin) is indicated.

19. In mild acute pancreatitis of biliary etiology, cholecystectomy with intraoperative cholangiography, or preoperative magnetic resonance cholangiopancreatography (MRCP) should be performed early, during the same hospital admission.

20. In moderate acute pancreatitis, treatment is delayed for at least 4 weeks after discharge, and in severe disease it is postponed for more than 4 weeks after complete resolution of the inflammatory and infectious process.

Section 3: Management of local and other surgical complications

21. Definition of collections (revised Atlanta 2012)[15]: collections are divided temporally into those before 4 weeks (acute peripancreatic fluid collection and acute necrotic collection) and those after 4 weeks (pseudocyst and walled-off necrosis), differentiated by the presence of a solid component detectable on contrast-enhanced CT.

22. Asymptomatic collections do not require intervention, regardless of their size.

23. Surgical or interventional treatment is restricted to documented infection (fever, gas on CT, clinical deterioration) or persistent symptoms from mass effect (biliary obstruction or impaired gastric emptying).

24. Routine fine-needle aspiration (FNA) for the diagnosis of infection is not recommended.

25. In infected necrosis or symptomatic walled-off necrosis an initial conservative approach with antibiotics is justified[19,20,21]. With poor response to antibiotics after 24–48 hours, the step-up approach should be implemented as the standard of care[22,23].

26. Endoscopic transmural drainage is the preferred first step where the collection is adjacent to the stomach or duodenum.

27. Percutaneous drainage is indicated as the first step in collections distant from the upper gastrointestinal tract, using multifenestrated catheters guided by ultrasound or CT, with regulated aseptic lavage. Postponed drainage is preferred over immediate drainage[19].

28. Minimally invasive surgical approach: if there is no clinical improvement or the patient deteriorates after drainage, video-assisted retroperitoneal debridement (VARD) will be performed using the matured tract of the percutaneous drain, strictly avoiding open necrosectomy or routine laparostomy.

29. Controlled delay: any major intervention or pancreatic debridement should ideally be delayed until after the fourth week from onset, since debridement in the first two weeks critically increases morbidity and mortality[24].

30. In intestinal perforation, particularly colonic, damage control is required by resection of the affected segment and proximal stoma.

31. In massive haemorrhage, endovascular embolization is prioritized over laparotomy.

32. In abdominal compartment syndrome (sustained intra-abdominal pressure > 20 mmHg with new organ dysfunction)[25], if medical measures fail, decompression will be carried out by evacuative paracentesis or decompressive laparotomy, always respecting the pancreatic compartment.

Special clinical scenarios

There are specific subpopulations in which acute pancreatitis carries particular diagnostic and therapeutic considerations:

Acute post-ERCP pancreatitis is the most frequent complication after endoscopic instrumentation of the biliary tract, manifesting as new abdominal pain with elevation of pancreatic enzymes to more than three times the upper limit of normal at 24 hours after the procedure[4,10]. It requires hospitalization and monitoring for a minimum of 48 hours with intravenous hydration and regulated analgesia.

Acute pancreatitis during pregnancy is infrequent but serious, capable of inducing preterm labor, severe pre-eclampsia, fetal loss and maternal death. It is strongly linked to pro-lithogenic metabolic changes induced by gestational hormones. Early diagnosis requires a high index of suspicion, with ultrasound or magnetic resonance imaging for structural assessment and avoidance of ionizing

radiation unless strictly necessary. Treatment is primarily conservative and supportive [4,26].

Acute pancreatitis in the pediatric population is uncommon, and its causes differ substantially from those in adults, with idiopathic factors, congenital anatomical abnormalities of the biliary tree or pancreatic duct (pancreas divisum), systemic disease or trauma predominating. Early diagnosis and timely admission to pediatric referral centers are essential to establish appropriate metabolic support and avoid long-term functional sequelae.

Discussion

Adopting the two-of-three diagnostic rule and prioritizing serum lipase over amylase effectively mitigates underdiagnosis in emergency care. The superior specificity of lipase prevents misinterpretation of hyperamylasemia of non-pancreatic origin[27].

One of the greatest challenges of the consensus lies in optimizing the use of computed tomography. The Paraguayan panel agrees with the guidelines of the International Association of Pancreatology and the American Pancreatic Association[28] in advising against routine use before 72 hours, since necrosis requires 4 to 7 days to be reliably assessed. Early CT increases hospital costs and radiation exposure without altering the initial therapeutic approach.

Regarding staging, systematic implementation of the determinant-based classification[14] together with the revised Atlanta criteria[15] provides Paraguayan surgeons with a four-category scheme that discriminates prognosis. Integrating the modified Marshall score[16] to define transient or persistent organ failure (> 48 hours) unifies clinical terminology with international intensive care standards and facilitates early identification of severe and critical disease requiring referral to high-complexity centers.

Fluid resuscitation with Ringer's lactate represents a paradigm shift from traditional overhydration with normal saline. Evidence supports that Ringer's lactate reduces hyperchloremic acidosis and modulates the systemic inflammatory response, decreasing intensive care admission[29]. A moderate regimen with reassessment every 6 hours prevents volume overload, a complication associated with respiratory distress and raised intra-abdominal pressure.

The consensus breaks with the dogma of pancreatic fasting in mild and moderate cases, promoting early oral refeeding to attenuate catabolism and shorten hospital stay. In severe cases, prioritizing enteral over parenteral feeding reduces bacterial translocation across the intestinal barrier and mitigates the principal cause of superinfection of necrosis[30].

The consensus emphasizes that routine antibiotic prophylaxis should be omitted, as it does not prevent infection of necrotic tissue and promotes bacterial and fungal resistance. Restricting antibiotics to suspected or confirmed infected necrosis, typically documented after the second week, preserves the usefulness of carbapenems for true septic conditions.

Performing early cholecystectomy in mild acute pancreatitis during the same admission substantially reduces recurrence[31].

Modern management of pancreatic fluid collections is governed by two principles endorsed in this document: asymptomatic collections do not require intervention, and early surgical debridement increases mortality. Postponing any major invasive procedure until after the fourth week allows maturation of a fibrotic wall and a safer technical approach[32,33].

The consolidation of the step-up approach, validated by the PANTER trial[22,23], is reshaping pancreatic surgical practice in the country. The algorithm replaces classic open necrosectomy with minimally invasive options. Endoscopic transmural drainage[34] and percutaneous drainage[35] are positioned as first-line therapies, limiting surgical trauma in critically ill patients[36]. The timing of the first drainage has itself been tested: in a randomized trial, immediate catheter drainage was not superior to postponement until walled-off necrosis had developed, and the postponed group required fewer interventions, with a substantial proportion treated with antibiotics alone[19]. The evidence supports that patients with signs of infected necrosis should be initially treated with broad-spectrum antibiotics and maximum supportive care[19,20,21]. VARD is reserved for failure of initial drainage, using the matured tract. Randomized evidence comparing endoscopic and minimally invasive surgical step-up strategies shows equivalent mortality with lower hospital stay and fewer pancreatic fistulae after endoscopic treatment[37]. This distinction may have relevance where long-term external drainage is difficult to manage in decentralized settings. This sequential strategy optimizes the institutional resources available in the national healthcare system and reduces perioperative morbidity[38,39,40].

In Paraguay the health System Network is divided in 18 Regions. In each region the health care facilities are classified in levels of complexity according to the services they can deliver.

Table 1. Integrated and comprehensive health service networks.

Instances	Complexity	Level of Care	Operational Correspondence.
Individual, Family, and Community Care.	Low Complexity	First Level	USF* (ESF) 3 types: USF Satellite, USF Standard, USF Mobile
Hospital Care	Low Complexity	First level	USF Expanded
	Median Complexity	Second Level	District Hospitals
	High Complexity	Third Level	Regional Hospitals
	High Complexity**	Third level	National Hospitals General Hospitals Specialized Hospitals Institutes Other (IPS Central Hospital)

* Family Health Unit

**Highest complexity facilities have national coverage

Extracted from https://www.mspbs.gov.py

The applicability of each of the recommendations of this Consensus is different at each level of Health Care Facility. Table two summarizes the applicability of the recommendations at different health care levels.

Table 2. Applicability of the recommendations at different health care levels

Recommendation	First Level	Second level	Third level
1- Diagnosis	YES	YES	YES
2- Lipase	NO	YES	YES
3- Ultrasound	NO	YES	YES
4- CT[1]	NO	YES/NO (not always available)	YES
5- MRI[2]	NO	NO	YES
6- Classification	NO	YES/NO (yes where CT is yes)	YES
7- Marshall Score	NO	YES	YES
8, 9- Hydration	YES (Ringer Lactate not available, only saline solution)	YES (Ringer Lactate not always available)	YES
10- Oral intake	YES	YES	YES
11- Enteral nutrition	NO	YES	YES
12- Parenteral nutrition	NO	NO	YES
13- No ATB prophylaxis	YES	YES	YES
14- ATB	NO	YES (usually out of the pocket)	YES
15-Pain relief	YES	YES	YES
16-Ondasentron	YES (out of the pocket)	YES (out of the pocket)	YES
17-Prokinetics	YES	YES	YES
18-Enzyme replacement	NO	NO	YES (out of the pocket)
19-Early cholecystectomy	NO	YES (without IOC[3] or preop MRCPI[4])	YES

20-postponed cholecystectomy	NO (Remission to third level)	NO (Remission to third level)	YES
21-Definition of Collections	NO	YES/NO (yes where CT is yes)	YES
22-No intervention in Asymptomatic Collections	YES	YES	YES
23-Dx of Infection	YES	YES	YES
24-no FNA[5]	YES	YES	YES
25-ATB treatment	NO	YES	YES
26- Endoscopic drainage	NO	NO	YES
27- Percutaneous Drainage	NO	NO	YES
28- VARD[6]	NO	NO	YES
29- Delay intervention	YES (referral to third level)	YES (referral to third level)	YES
30-Treatment for Surgical Complication	NO	NO	YES
31- Embolization	NO	NO	YES
32-ACS[7] treatment	NO	NO	YES

1- Computed Tomography, 2- Magnetic Resonance Imaging, 3- Intraoperative Cholangiography, 4- Magnetic Resonance CholangioPancreatography, 5- Fine Needle Aspiration, 6- Video Assisted Retroperitoneal Debridement, 7- Abdominal Compartmental Syndrome

In the theory of the Paraguayan health system, the categorization of an establishment as a 3rd level (or high complexity) hospital implies the capacity to offer specialized and subspecialized medical care, advanced diagnostic support and intensive care.

However, in clinical and healthcare practice, a marked geosanitary asymmetry is observed: there is a clear gap in problem-solving capacity between the 3rd level centers located in the Metropolitan Area (Asunción and Central Department) and the so-called regional or general hospitals in the interior of the country.

This fragmentation is evident in the management of WON or infected necrotic collections:

a- In Greater Asunción (Hospital de Clínicas, IPS Hospital Central, Hospital Nacional de Itauguá): The minimally invasive strategy can be systematically applied.

Table 3. Comparison of third level hospitals in the Central Department and the interior of Paraguay

Analytical Dimension	Asunción and Central Department	Regional Hospitals in the Interior
Diagnostic Infrastructure	Contrast-Enhanced Computed Tomography (CECT) with contrast, CT angiography and MRI available 24/7	CT equipment with frequent interruptions due to maintenance or lack of injector/contrast contract.
Critical Care Support	ICU* beds with advanced monitoring, hemodynamic support and pre/continuous hemodialysis.	ICU beds are scarce, overcrowded, and have limitations for dialysis or prolonged multi-organ support.
Minimally Invasive Procedures	Interventional radiology/percutaneous surgery equipment (ultrasound/CT guided drainage).	Shortage or lack of trained specialists, or lack of percutaneous or endoscopic drainage kits 24/7
Advanced Endoscopic Support	Availability of ERCP** and emergency therapeutic endoscopy (stents, endoscopic necrosectomies).	Endoscopy is limited to diagnostic studies or management of basic upper bleeding; ERCP is almost nonexistent in the public network.
Multidisciplinary Management	Active consultation between General Surgery/ HPB, Intensive Care,	Management by isolated general surgeons or intensivists, without a subspecialized support team.

* Intensive Care unit

** Endoscopic Retrograde Colangiopancreatography

This includes serial CT scans, ultrasound- or CT-guided percutaneous drainage as a first-line treatment, the option of endoscopic bypass, and, if necessary, laparoscopic or VARD access.

b- In the interior of the country (e.g., Encarnación, Ciudad del Este, Coronel Oviedo, Concepción): Although they have the designation of high complexity, the lack of technology, equipment, supplies and specialized medical workforce forces the referral of the patient to the Central Department hospitals or to early/inappropriate open laparotomy, increasing morbidity and mortality.

A gap in resolution capacity exists: while regulations assign the role of high complexity care to the main regional centers, the effective implementation of the multidisciplinary approach, such as the step-up approach for local complications of severe acute pancreatitis, is often disrupted in the interior due to a lack of infrastructure, supplies, or specialists.

There are limitations to the application of this consensus. Some recommendations require technology or expertise that is not available in all hospitals in Paraguay, particularly in rural or under-resourced areas; the availability of specialized intensive care or percutaneous drainage may be a limiting factor. Implementation also depends on institutional and individual practice: lack of training, resistance to change, or excessive workload can hinder adoption. Cultural differences and health beliefs can influence adherence to treatment and prevention recommendations[41].

Continuing medical education, support materials such as clinical practice guidelines, and public awareness campaigns are recommended to support successful implementation, together with adaptation to local realities through phased priorities and the creation of collaborative networks.

Conclusion

This consensus establishes a normative framework for standardizing the management of acute pancreatitis in Paraguay, adapted to what the national health system can deliver rather than to the resources of high-volume referral centers. Its formal, interdisciplinary adoption should reduce unwarranted variation in practice, and its principal recommendations — restricted early imaging, moderate resuscitation, early enteral feeding, antibiotics only for infection, early cholecystectomy in mild biliary disease, and deferred, staged intervention for necrosis — are achievable in the different complexity level institutions in the country. Implementation now depends on regional capacity development, continuing education, phased local adaptation, and prospective audit of outcomes, without which the effect of the consensus on complications and mortality will remain unmeasured.

Declaration of Conflicts of Interest

The authors declare that the preparation, review, and writing of this manuscript were carried out with complete scientific and academic independence. There are no financial, commercial, personal, or institutional relationships with public or private entities that could bias or influence the recommendations or conclusions expressed in this document.

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