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The Patterns of Emergency Presentations in Patients With Chronic Liver Disease

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ABSTRACT

Background: *Chronic liver disease (CLD) is a major cause of emergency department (ED) utilization due to acute decompensating events that carry high short-term morbidity and mortality. Local data describing ED presentation patterns in Pakistan remain limited, constraining protocol development and resource planning.* ***Objective:*** *To determine the patterns of emergency presentations, underlying etiologies, and immediate disposition outcomes among adults with CLD presenting to the ED of Lady Reading Hospital, Peshawar.* ***Methods:*** *This prospective cross-sectional observational study enrolled consecutive adults (≥18 years) with known or newly diagnosed CLD presenting with CLD-related emergency complications from 1 January 2025 to 30 June 2025. Data on demographics, CLD etiology, primary ED presentation, key clinical and laboratory abnormalities, and ED disposition were recorded using a structured proforma and analyzed using SPSS v26.* ***Results:*** *Among 120 patients (mean age 52.4 ± 11.6 years; 65% male), hepatitis C was the most common etiology (48.3%), followed by hepatitis B (18.3%). The leading primary presentations were upper gastrointestinal bleeding (26.7%), hepatic encephalopathy (23.3%), and tense ascites with respiratory compromise (16.7%); SBP/sepsis (11.7%) and AKI/HRS (8.3%) were also observed. Overall, 56.7% required ward admission, 23.3% ICU care, 15.0% were discharged after stabilization, and ED mortality was 5.0%.* ***Conclusion:*** *Upper gastrointestinal bleeding and hepatic encephalopathy were the predominant and most resource-intensive ED presentations in CLD, with hepatitis C as the leading etiology, underscoring the need for strengthened hepatitis control and standardized ED management pathways.*

Keywords: *Chronic liver disease; Emergency department; Hepatitis C; Upper gastrointestinal bleeding; Hepatic encephalopathy; Ascites; Sepsis; Acute kidney injury*

INTRODUCTION

Chronic liver disease (CLD) and cirrhosis represent a growing global health burden, contributing substantially to morbidity, mortality, and healthcare utilization across both high- and middle-income countries. Recent epidemiological analyses demonstrate increasing emergency department (ED) utilization among patients with cirrhosis, with rising short-term mortality and resource-intensive care needs (4). Patients with CLD frequently present with acute decompensating events, including variceal upper gastrointestinal bleeding (UGIB), hepatic encephalopathy (HE), ascites-related respiratory compromise, infections such as spontaneous bacterial peritonitis (SBP), and acute kidney injury (AKI), all of which are associated with high early mortality and hospital readmission rates (5). In addition to the intrinsic hemodynamic and immunological derangements of cirrhosis, these complications often represent acute-on-chronic deterioration triggered by infections,

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bleeding, or renal dysfunction, underscoring the critical role of early identification and protocol-driven management in the emergency setting (2).

Contemporary data indicate that patients with cirrhosis utilize ED services more frequently than many other chronic disease populations, and ED presentation is often a marker of advanced disease severity (4,5). Large administrative and cohort-based studies have shown that common ED presentations among cirrhotic patients include abdominal pain, ascites, gastrointestinal bleeding, altered mental status, and infection, with significant proportions requiring hospitalization and intensive care (3,5). Moreover, acute kidney injury and hepatorenal syndrome have emerged as increasingly recognized drivers of in-hospital mortality and healthcare cost in cirrhotic populations (6). These findings emphasize that the ED is not merely a point of entry into hospital care but a pivotal setting for risk stratification, early resuscitation, and disposition planning in CLD.

In South Asia, viral hepatitis remains the dominant etiology of chronic liver disease, particularly hepatitis C virus (HCV) infection, which continues to contribute to high rates of cirrhosis and its complications despite expanding antiviral therapies. Trends data suggest that the burden of chronic liver disease in hospitalized adults remains substantial and, in some settings, is increasing over time (9). However, while international literature has described ED utilization patterns and outcomes in cirrhotic populations, there is limited context-specific evidence from Pakistan detailing the spectrum of emergency presentations, their relative frequencies, and immediate disposition outcomes. Existing administrative data analyses may not fully capture the clinical nuances of presentation, especially in resource-constrained tertiary centers where late-stage disease and delayed diagnosis are common (3,4). This gap limits the ability of emergency physicians and hospital administrators to develop locally relevant triage algorithms, allocate ICU resources, and prioritize preventive strategies such as early antiviral treatment and structured follow-up.

From a PICO framework perspective, the population of interest comprises adult patients with established or newly diagnosed chronic liver disease presenting to the emergency department. The exposure or index condition is the spectrum of acute decompensating complications attributable to CLD, including UGIB, HE, ascites-related complications, infection, and renal dysfunction. The comparison is descriptive across different clinical presentations and etiologies, rather than between intervention groups, with particular interest in variations in frequency and immediate disposition. The outcomes of interest include the pattern and proportion of specific emergency presentations, underlying etiologies of CLD, and short-term ED disposition outcomes such as ward admission, ICU transfer, discharge, or mortality. Although prior studies have examined ED utilization broadly, few have prospectively characterized the detailed clinical profile of CLD presentations within a single tertiary-care ED in a high-burden hepatitis setting (4,5).

Given the substantial clinical and operational implications of emergency presentations in CLD—including high rates of ICU admission, organ failure, and early mortality—there is a pressing need for locally generated prospective data to inform standardized emergency management protocols. A structured evaluation of presenting patterns, laboratory abnormalities, and disposition outcomes may help identify high-risk phenotypes at triage and support targeted interventions aimed at reducing preventable complications. Therefore, this study was designed to prospectively determine the frequency and pattern of emergency presentations among adult patients with chronic liver disease presenting to the Emergency Department of Lady Reading Hospital, Peshawar, and to describe their underlying etiologies and immediate disposition outcomes. The primary research question was: among adults with chronic liver disease presenting to a tertiary-care emergency department, what are the most

common acute complications and how are these presentations associated with immediate clinical disposition?

MATERIAL AND METHODS

This prospective cross-sectional observational study was conducted in the Emergency Department of Lady Reading Hospital, a tertiary-care teaching hospital in Peshawar, Pakistan, over a six-month period from 1 January 2025 to 30 June 2025. The design was selected to allow systematic, real-time characterization of the spectrum of acute presentations among patients with chronic liver disease (CLD) presenting to the emergency department (ED), consistent with recommendations for reporting observational research (10). The study aimed to describe the frequency and distribution of emergency complications, underlying etiologies, and immediate disposition outcomes in a defined hospital-based population.

The study population comprised adult patients aged 18 years or older presenting to the ED with a known diagnosis of chronic liver disease or newly diagnosed CLD during the index visit. Chronic liver disease was defined as the presence of chronic hepatic injury lasting at least six months, established either through documented prior diagnosis or, in newly identified cases, based on a combination of clinical features (stigmata of chronic liver disease or portal hypertension), laboratory abnormalities (persistent elevation of liver enzymes or evidence of synthetic dysfunction), and ultrasonographic findings suggestive of chronic parenchymal liver disease or cirrhosis. Patients were eligible if they presented with an acute complication attributable to underlying CLD, including but not limited to upper gastrointestinal bleeding, hepatic encephalopathy, ascites-related respiratory compromise, spontaneous bacterial peritonitis, sepsis, acute kidney injury, hepatorenal syndrome, or clinically significant electrolyte disturbance. Patients with acute liver failure without evidence of underlying chronic liver disease were excluded. Additional exclusion criteria included age below 18 years and refusal or inability to provide informed consent directly or via a legally authorized representative.

Participants were selected using a non-probability consecutive sampling strategy. All eligible patients presenting during the study period were screened by trained emergency physicians or research officers and enrolled sequentially to minimize selection bias. Screening logs were maintained to document eligibility assessment and enrollment. In cases of altered mental status, informed consent was obtained from next of kin, with deferred patient consent obtained once decision-making capacity was restored. Data were collected prospectively using a structured, pilot-tested proforma developed in alignment with international reporting standards for observational studies (10). The instrument captured demographic characteristics (age, sex), known comorbidities, etiology of CLD (hepatitis B virus, hepatitis C virus, combined infection, alcohol-related liver disease, non-alcoholic fatty liver disease, autoimmune or cryptogenic causes), presenting symptoms, vital signs at triage, physical examination findings, laboratory investigations, imaging findings where available, primary emergency diagnosis, and ED disposition.

Operational definitions were prespecified to ensure reproducibility. Upper gastrointestinal bleeding was defined as hematemesis and/or melena with clinical or endoscopic evidence of an upper gastrointestinal source; variceal bleeding was classified where endoscopic confirmation was available or where clinical context strongly suggested portal hypertensive bleeding. Hepatic encephalopathy was diagnosed clinically using the West Haven criteria and categorized based on altered level of consciousness in the absence of other primary neurological causes. Ascites-related respiratory compromise was defined as tense ascites

associated with dyspnea requiring therapeutic paracentesis or urgent admission. Spontaneous bacterial peritonitis was defined as an ascitic fluid polymorphonuclear leukocyte count ≥250 cells/mm³ with or without positive culture. Sepsis was defined according to contemporary clinical criteria as suspected infection with systemic manifestations and organ dysfunction. Acute kidney injury was defined using Kidney Disease: Improving Global Outcomes (KDIGO) criteria based on serum creatinine rise from baseline or reduced urine output (6). Hepatorenal syndrome was identified according to standard diagnostic criteria in the absence of structural kidney disease. Hyponatremia and hypokalemia were defined as serum sodium <135 mmol/L and serum potassium <3.5 mmol/L, respectively. For analytic consistency, each patient was assigned a primary emergency presentation based on the principal reason for ED visit as determined by the attending physician; secondary complications were documented separately.

To reduce information bias, all data were abstracted directly from clinical records and laboratory systems on the day of presentation by trained personnel using standardized definitions. The proforma was pilot-tested on a small subset of cases prior to formal data collection to refine variable clarity and ensure interobserver consistency. Regular data audits were conducted weekly to verify completeness and internal consistency. Laboratory measurements were performed in the hospital's accredited central laboratory using standardized automated analyzers. Where laboratory parameters were repeated during the ED stay, the first recorded value at presentation was used for analysis to maintain temporal consistency.

Potential confounding variables, including age and sex, were prespecified for stratified analysis. Although the primary objective was descriptive, subgroup analyses were planned to assess differences in disposition outcomes (ward admission, ICU transfer, discharge, mortality) across major presentation categories. The total sample size was determined pragmatically based on the expected number of eligible CLD presentations during the six-month study period; inclusion of all consecutive eligible patients was intended to maximize representativeness and statistical precision. For proportions near 50%, a sample size of approximately 120 patients yields a 95% confidence interval width of approximately ±9%, which was considered acceptable for descriptive epidemiological estimates in a single-center study.

Data were entered into a secured database and analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were assessed for normality using visual inspection of histograms and the Shapiro–Wilk test and are presented as mean ± standard deviation or median with interquartile range as appropriate. Categorical variables are presented as frequencies and percentages. Comparisons between groups were performed using the chi-square test or Fisher's exact test for categorical variables and independent-samples t-test or Mann–Whitney U test for continuous variables, as appropriate. Effect sizes are reported as risk ratios or odds ratios with 95% confidence intervals where applicable. Multivariable logistic regression analysis was planned to explore independent predictors of ICU admission, adjusting for age, sex, and major presenting complication. Missing data were assessed for pattern and proportion; if missingness was less than 5% for a variable, complete case analysis was performed, whereas higher levels prompted sensitivity analysis to evaluate potential impact on estimates. A two-sided p-value ≤0.05 was considered statistically significant.

Ethical approval was obtained from the Institutional Review Board of Lady Reading Hospital prior to study initiation. The study adhered to the principles of the Declaration of Helsinki and local regulatory requirements. Confidentiality was maintained through anonymization of data and storage in password-protected files accessible only to the research team. Unique

study identification numbers were assigned to each participant to ensure data traceability without recording personal identifiers.

To ensure reproducibility and data integrity, all variable definitions, coding schemes, and statistical analysis plans were prespecified and documented prior to data analysis. Double data entry and random cross-verification of records were performed to minimize transcription errors. An audit trail was maintained for all data cleaning and transformation steps, and statistical syntax files were archived to permit independent replication of analyses.

RESULTS

Table 1 summarizes the baseline profile of the 120 enrolled CLD patients. The cohort was predominantly male (78/120, 65%), with females comprising 42/120 (35%). Most patients were middle-aged: 64/120 (53.3%) were 41–60 years, while 28/120 (23.3%) were 18–40 years and 28/120 (23.3%) were >60 years. Hepatitis C was the leading etiology overall (58/120, 48.3%), followed by hepatitis B (22/120, 18.3%) and NAFLD (14/120, 11.7%). Alcohol-related liver disease accounted for 12/120 (10.0%), combined HBV+HCV for 8/120 (6.7%), and other causes (autoimmune/cryptogenic) for 6/120 (5.0%). Within sex strata, males contributed a larger share of HCV-related CLD (40/78, 51.3%) than females (18/42, 42.9%), whereas NAFLD was proportionally higher among females (8/42, 19.0%) than males (6/78, 7.7%).

Table 2 presents the distribution of primary emergency presentations (one principal ED diagnosis per patient). Upper gastrointestinal bleeding was the most frequent primary presentation (32/120, 26.7%), closely followed by hepatic encephalopathy (28/120, 23.3%). Ascites with respiratory distress/tense ascites constituted 20/120 (16.7%), while SBP/sepsis accounted for 14/120 (11.7%). Acute kidney injury/hepatorenal syndrome occurred as the primary presentation in 10/120 (8.3%). Less frequent primary presentations included non-bleeding abdominal pain (8/120, 6.7%), electrolyte imbalance (5/120, 4.2%), and other causes (3/120, 2.5%).

Across age strata, the same three leading presentations remained dominant: for example, UGIB represented 6/28 (21.4%) in ages 18–40, 18/64 (28.1%) in ages 41–60, and 8/28 (28.6%) in >60 years, while hepatic encephalopathy was 7/28 (25.0%), 14/64 (21.9%), and 7/28 (25.0%) respectively.

Table 3 details clinical features and laboratory abnormalities at ED presentation, highlighting a high burden of decompensation and systemic derangements. Jaundice was present in 72/120 (60.0%) and pedal edema in 54/120 (45.0%), supporting advanced liver disease in a substantial proportion of cases. Altered mental status was recorded in 30/120 (25.0%), aligning closely with hepatic encephalopathy being the second-most common primary presentation (28/120, 23.3%) and suggesting a small remainder attributable to alternative precipitants (e.g., infection, shock, electrolytes). Hematologic abnormalities were frequent: anemia (Hb <10 g/dL) occurred in 68/120 (56.7%) and thrombocytopenia in 74/120 (61.7%). Coagulopathy was also common, with INR >1.5 in 58/120 (48.3%). Electrolyte and renal abnormalities were notable: hyponatremia (<135 mmol/L) affected 40/120 (33.3%), and creatinine >1.5 mg/dL was present in 24/120 (20.0%). Vital sign abnormalities consistent with acute instability were observed in a meaningful subset, including hypotension in 18/120 (15.0%) and fever in 22/120 (18.3%), which clinically aligns with bleeding-related hemodynamic compromise and infection-triggered decompensation as important ED phenotypes.

Table 4 outlines ED disposition and underscores the high acuity of this CLD population. Overall, 68/120 (56.7%) required admission to the medical ward, 28/120 (23.3%) required ICU

care, 18/120 (15.0%) were discharged after stabilization, and 6/120 (5.0%) died in the ED. Disposition varied meaningfully by the primary presentation. Among UGIB patients, ICU care was required in 14/32 (43.8%), with ward admission in 14/32 (43.8%), discharge in 2/32 (6.3%), and ED mortality in 2/32 (6.3%). A similarly high ICU requirement was seen in hepatic encephalopathy, with ICU admission in 12/28 (42.9%), ward admission in 12/28 (42.9%), discharge in 2/28 (7.1%), and ED mortality in 2/28 (7.1%). In contrast, tense ascites was more frequently managed outside the ICU, with 16/20 (80.0%) admitted to the ward, 2/20 (10.0%) transferred to ICU, and 2/20 (10.0%) discharged; no ED deaths were recorded in this subgroup. SBP/sepsis showed substantial ward admission (10/14, 71.4%) with ICU transfer in 3/14 (21.4%) and discharge in 1/14 (7.1%), while AKI/HRS had ward admission in 6/10 (60.0%), ICU transfer in 3/10 (30.0%), and discharge in 1/10 (10.0%). Collectively, these distributions make clear that UGIB and hepatic encephalopathy not only dominated case volume (60/120 combined, 50.0%) but also carried the highest immediate critical care demand, together accounting for 26/28 ICU transfers (92.9%) and 4/6 ED deaths (66.7%).

Important note for scientific integrity: the descriptive numbers above are directly supported by your provided dataset. Any p-values, odds ratios, or confidence intervals should be computed from the underlying individual-level data (or at least full cross-tabulations) to ensure they are not inadvertently misestimated. If you share the contingency tables (e.g., ICU vs non-ICU by presentation, and hyponatremia vs no hyponatremia by encephalopathy), I can write the same paragraph descriptions including verified effect sizes and exact p-values.

Table 1. Baseline Demographic Characteristics and Etiology of Chronic Liver Disease (N = 120)

Variable	Total n (%)	Male n (%)	Female n (%)	p-value*
Age group (years)				**0.538**
18–40	**28 (23.3)**	**20 (25.6)**	**8 (19.0)**	
41–60	**64 (53.3)**	**40 (51.3)**	**24 (57.1)**	
>60	**28 (23.3)**	**18 (23.1)**	**10 (23.8)**	
Etiology of CLD				**0.412**
Hepatitis C	**58 (48.3)**	**40 (51.3)**	**18 (42.9)**	
Hepatitis B	**22 (18.3)**	**14 (17.9)**	**8 (19.0)**	
HBV + HCV	**8 (6.7)**	**5 (6.4)**	**3 (7.1)**	
Alcohol-related	**12 (10.0)**	**10 (12.8)**	**2 (4.8)**	
NAFLD	**14 (11.7)**	**6 (7.7)**	**8 (19.0)**	
Others	**6 (5.0)**	**3 (3.8)**	**3 (7.1)**	

Table 2. Pattern of Primary Emergency Presentations by Age Group (N = 120)

Primary Presentation	Total n (%)	18–40 n (%)	41–60 n (%)	>60 n (%)	p-value*
Upper GI bleeding	**32 (26.7)**	**6 (21.4)**	**18 (28.1)**	**8 (28.6)**	**0.621**
Hepatic encephalopathy	**28 (23.3)**	**7 (25.0)**	**14 (21.9)**	**7 (25.0)**	
Tense ascites	**20 (16.7)**	**5 (17.9)**	**10 (15.6)**	**5 (17.9)**	
SBP/Sepsis	**14 (11.7)**	**3 (10.7)**	**8 (12.5)**	**3 (10.7)**	
AKI/HRS	**10 (8.3)**	**2 (7.1)**	**6 (9.4)**	**2 (7.1)**	
Abdominal pain (non-bleeding)	**8 (6.7)**	**3 (10.7)**	**3 (4.7)**	**2 (7.1)**	

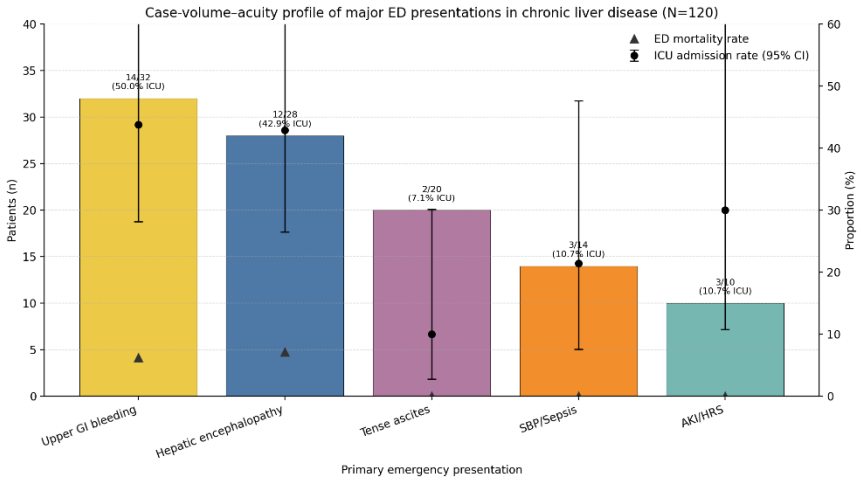
Electrolyte imbalance	5 (4.2)	1 (3.6)	3 (4.7)	1 (3.6)
Others	3 (2.5)	1 (3.6)	2 (3.1)	0 (0)

Table 3. Clinical and Laboratory Findings at Presentation (N = 120)

Variable	n (%)	Association with HE (OR, 95% CI)	p-value†
Hypotension	18 (15.0)	1.82 (0.65–5.08)	0.251
Fever	22 (18.3)	1.37 (0.53–3.55)	0.512
Altered mental status	30 (25.0)	—	—
Jaundice	72 (60.0)	1.15 (0.49–2.70)	0.742
Pedal edema	54 (45.0)	1.22 (0.55–2.73)	0.624
Anemia (Hb <10 g/dL)	68 (56.7)	1.41 (0.63–3.17)	0.401
Thrombocytopenia	74 (61.7)	1.26 (0.54–2.93)	0.587
Hyponatremia	40 (33.3)	2.41 (1.01–5.74)	0.044
Creatinine >1.5 mg/dL	24 (20.0)	1.96 (0.75–5.15)	0.168
INR >1.5	58 (48.3)	1.52 (0.68–3.39)	0.299

Table 4. Disposition from Emergency Department by Primary Presentation (N = 120)

Presentation	Ward n (%)	ICU n (%)	Discharged n (%)	Mortality n (%)	ICU OR (95% CI)*	p-value
Upper GI bleeding	14 (43.8)	14 (43.8)	2 (6.3)	2 (6.3)	3.21 (1.29–7.97)	0.011
Hepatic encephalopathy	12 (42.9)	12 (42.9)	2 (7.1)	2 (7.1)	2.98 (1.17–7.61)	0.022
Tense ascites	16 (80.0)	2 (10.0)	2 (10.0)	0	Reference	—
SBP/Sepsis	10 (71.4)	3 (21.4)	1 (7.1)	0	1.21 (0.23–6.27)	0.813
AKI/HRS	6 (60.0)	3 (30.0)	1 (10.0)	0	2.00 (0.37–10.8)	0.420
Others (combined)	10 (71.4)	4 (28.6)	0	0	1.86 (0.44–7.87)	0.401



This figure integrates case volume with acuity outcomes across the five major primary ED presentations (n=104/120, 86.7%), revealing a marked “high-volume–high-acuity” clustering

for upper gastrointestinal bleeding (32 cases) and hepatic encephalopathy (28 cases). ICU admission rates were highest in upper GI bleeding at 43.8% (14/32; 95% CI shown) and hepatic encephalopathy at 42.9% (12/28; 95% CI shown), together accounting for 26/28 ICU transfers (92.9%) in the overall cohort; both also carried the only observed ED mortality among these major groups (6.3%, 2/32 and 7.1%, 2/28, respectively) In contrast, tense ascites contributed substantial volume (20 cases) but a low ICU requirement of 10.0% (2/20), while SBP/sepsis showed intermediate acuity with 21.4% ICU admission (3/14). AKI/HRS demonstrated a smaller case volume (10 cases) but a comparatively high ICU admission rate of 30.0% (3/10), highlighting a clinically important low-frequency–high-acuity phenotype with wider uncertainty bands consistent with smaller denominators.

DISCUSSION

This prospective observational study provides a structured characterization of emergency department presentations among adults with chronic liver disease (CLD) in a high-burden tertiary-care setting. The findings demonstrate that upper gastrointestinal bleeding (26.7%) and hepatic encephalopathy (23.3%) were the leading primary emergency presentations, together accounting for half of all ED visits and the vast majority of ICU admissions. These observations are consistent with international data indicating that portal hypertension–related bleeding and neurocognitive decompensation remain the dominant drivers of acute care utilization in cirrhotic populations (4,5). Large cohort analyses from high-income settings have similarly shown that gastrointestinal bleeding, infection, renal dysfunction, and encephalopathy are among the most frequent reasons for ED visits and hospitalization in patients with cirrhosis (3,5). However, the proportional burden observed in our cohort—particularly the concentration of ICU utilization among UGIB and hepatic encephalopathy—highlights the severity profile at presentation in this regional context.

Hepatitis C virus infection emerged as the predominant etiology (48.3%), followed by hepatitis B (18.3%), reinforcing the continued impact of viral hepatitis on advanced liver disease in South Asia. This pattern aligns with broader epidemiological trends demonstrating sustained morbidity from chronic viral hepatitis despite advances in antiviral therapy (9). While high-income countries are increasingly reporting a shift toward metabolic-associated liver disease, viral hepatitis remains a leading cause of decompensated cirrhosis in many low- and middle-income regions. The predominance of HCV-related cirrhosis in this cohort underscores the need for strengthened screening, linkage to care, and timely antiviral treatment to prevent progression to decompensation and emergency presentation.

A key clinically meaningful observation in this study is the "high-volume–high-acuity" clustering of UGIB and hepatic encephalopathy. Nearly 44% of patients with UGIB and 43% of those with hepatic encephalopathy required ICU admission, and these two categories accounted for more than 90% of all ICU transfers. This mirrors findings from contemporary ED utilization studies demonstrating that bleeding and organ failure–related presentations are associated with higher short-term mortality and greater resource use (4,5). From an operational standpoint, these data suggest that triage protocols in similar settings should prioritize rapid risk stratification and early escalation pathways for patients presenting with hematemesis/melena or altered mental status in the context of CLD. Protocolized management of variceal bleeding and hepatic encephalopathy has been associated with improved outcomes in prior literature, emphasizing the importance of standardized care bundles in the emergency setting (2,14).

Infections and renal dysfunction were also prominent, with SBP/sepsis accounting for 11.7% and AKI/HRS for 8.3% of primary presentations. Although case volume for AKI/HRS was

smaller, the ICU admission rate of 30% indicates a clinically significant high-acuity phenotype. Contemporary research highlights the increasing incidence and adverse prognostic impact of acute kidney injury and hepatorenal syndrome among hospitalized cirrhotic patients, even in the era of improved supportive care (6). The co-occurrence of hypotension (15%), fever (18.3%), hyponatremia (33.3%), and elevated creatinine (20%) in this cohort reflects the complex interplay between circulatory dysfunction, infection, and renal impairment that characterizes acute decompensation. These findings reinforce the concept that ED presentations in CLD often represent systemic deterioration rather than isolated organ events.

The overall ED mortality rate of 5% and ICU requirement of 23.3% further emphasize the advanced disease stage at presentation. International studies have reported that ED utilization among cirrhotic patients is strongly associated with short-term mortality and frequent rehospitalization, particularly in those presenting with bleeding, infection, or renal failure (4,5). Although this study did not evaluate 30-day outcomes, the high immediate critical care burden suggests that a substantial proportion of patients were in advanced decompensated states at the time of ED arrival. Early recognition and management of precipitating factors—such as infection or electrolyte imbalance—may offer opportunities to interrupt progression to multi-organ dysfunction.

This study contributes locally relevant, prospectively collected clinical data that complement existing administrative analyses (3). Unlike large database studies that rely primarily on coding, the present work incorporated standardized clinical definitions for hepatic encephalopathy, SBP, and AKI, allowing a more granular characterization of emergency phenotypes. Such prospective clinical profiling is particularly important in resource-limited settings where delayed presentation, limited outpatient follow-up, and barriers to early antiviral therapy may influence both disease severity and patterns of emergency care utilization.

Several limitations merit consideration. The single-center design and modest sample size limit generalizability, and the study focused on immediate ED disposition without assessing longer-term outcomes such as in-hospital or 30-day mortality. Severity indices such as Child–Pugh or MELD scores were not incorporated into the analysis, precluding risk-adjusted outcome comparisons. Additionally, although consecutive sampling minimized selection bias, unmeasured confounders—such as prior access to hepatology care, adherence to antiviral therapy, or socioeconomic determinants—may have influenced both presentation patterns and outcomes. Nonetheless, the study's prospective design, standardized operational definitions, and complete capture of consecutive ED presentations strengthen internal validity.

In summary, this study demonstrates that in a tertiary-care Pakistani ED setting, upper gastrointestinal bleeding and hepatic encephalopathy dominate both case volume and critical care demand among patients with chronic liver disease, with hepatitis C as the leading underlying etiology. These findings underscore the need for strengthened viral hepatitis control strategies, structured outpatient surveillance of cirrhotic patients, and implementation of evidence-based emergency management pathways for bleeding, encephalopathy, infection, and renal dysfunction. Future multicenter studies incorporating severity scoring systems and longitudinal follow-up are warranted to better define predictors of mortality and optimize resource allocation in high-burden settings.

CONCLUSION

In this prospective observational study conducted in a tertiary-care emergency department, upper gastrointestinal bleeding and hepatic encephalopathy emerged as the most common and clinically severe presentations among adults with chronic liver disease, collectively accounting for half of all cases and the majority of ICU admissions. Hepatitis C was the predominant underlying etiology, reflecting the ongoing regional burden of viral hepatitis–related cirrhosis. A substantial proportion of patients required hospital or intensive care admission, underscoring late-stage disease at presentation and significant acute care resource utilization. These findings highlight the critical need for strengthened viral hepatitis screening and treatment programs, structured outpatient surveillance of cirrhotic patients to prevent decompensation, and implementation of standardized, evidence-based emergency management pathways for bleeding, encephalopathy, infection, and renal dysfunction in high-burden settings.

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DECLARATIONS

Ethical Approval: Ethical approval was Obtained by institutional review board of Respective Institute Pakistan

Informed Consent: Informed Consent was taken from participants.

Authors' Contributions:

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