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Journal of Cancer Prevention & Current Research

Research Article

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An insight into the interplay between immune thrombocytopenic purpura (ITP) and heart failure: a retrospective analysis of national inpatient data in the United States

Abstract

Background: Patients admitted with autoimmune thrombocytopenic purpura (ITP) tend to be high-risk individuals, primarily because of their susceptibility to bleeding and the constraints on potential medical interventions. Heart failure (HF) is a complex and widespread condition that significantly impairs quality of life. These patients face a multitude of respiratory and cardiovascular complications, compounded by the fact that they are often prescribed blood thinner medications which can exacerbate these risks. We analyzed the data to comprehensively understand the far-reaching impact and varied outcomes of underlying heart failure on patients diagnosed with autoimmune thrombocytopenic purpura.

Materials and Methods: The National Inpatient Sample database for 2019-2020 was utilized to identify individuals admitted with ITP. The cohort was further divided into patients with and without a secondary diagnosis of concomitant HF. Multivariate regression analysis was performed to evaluate the impact of HF on ITP patients and the outcomes.

Results: The study cohort consisted of 27885 patients hospitalized with ITP; among these patients, 1950 (7%) had the concurrent diagnosis of HF. Primary and secondary outcomes were analyzed after adjustment of confounding variables through multivariate regression analysis. There was no difference in Mortality (OR 1.1, 95% CI 0.52-2.29, P=0.795) and length of stay between the two patient groups (+1.14 days, 95% CI 0.32-1.95, P=0.006). However, the total cost of hospitalization increased significantly in patients with concurrent HF (+17762 USD, 95% CI 3439-35439, P=0.04). Patients with HF also had increased odds of acute respiratory failure (OR 2.44, 95% CI 1.31-4.52, P=0.005) ICU admission (OR 1.86, 95% CI 1.015-3.41, P=0.044), and acute coronary syndrome (OR 6.27, 95% CI 1.05-37.47, P=0.04). However, no statistically significant difference was observed in the odds of major (OR 1, 95% CI 0.66-1.51, P=0.983) and minor bleeding (OR 1.36, 95% CI 0.33-5.58, P=0.666), blood transfusions (OR 0.81, 95% CI 0.52-1.25, P=0.352), platelets transfusions (OR 0.98, 95% CI 0.73-1.30, P=0.897), venous thromboembolism (OR 0.93, 95% CI 0.36-2.38, P=0.887), mechanical ventilation (OR 1.79, 95% CI 0.92-3.48, P=0.084), cardiac arrest (OR 3.04, 95% CI 0.65-14.11, P=0.156), acute kidney injury (OR 1.07, 95% CI 0.77-0.47, P=0.661), and sepsis (OR 1.61, 95% CI 0.59-4.39, P=0.346).

Conclusion: Heart failure in hospitalized patients with immune thrombocytopenia was found to be significantly associated with a range of adverse outcomes, including increased total cost of hospitalization, higher rates of acute respiratory failure, more frequent ICU admissions, and an elevated risk of ischemic cardiac events. Surprisingly though, HF did not emerge as an independent predictor of mortality and bleeding instances, and there were no notable differences observed in the length of hospital stay between the two groups. Heart failure management in ITP patients requires greater exactitude to mitigate adverse outcomes and optimize resource utilization effectively. A more comprehensive approach is essential for improving control and patient care outcomes.

Volume 15 Issue 1 - 2024

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Received: December 25, 2023 | **Published:** January 03, 2024

Introduction

In the realm of hematological disorders, autoimmune thrombocytopenic purpura (ITP) stands out due to its unique challenges and implications. Characterized by the autoantibody-mediated destruction of platelets leading to a persistently low platelet count (<100 x 10^9/L), ITP manifests through symptoms such as purpura and hemorrhagic episodes.[1] Its incidence is estimated at about 3.3 per 100,000 annually in the United States.[2] As we delve deeper into the complexities of ITP, its association with other significant health conditions, such as heart failure, emerges as a critical area for exploration.

Heart failure (HF), affecting around 6.2 million adults in the United States, adds a layer of complexity to the management of ITP (CDC). Patients with concurrent ITP and HF face an increased risk of complications, particularly in cases like acute myocardial infarction, where the propensity for bleeding due to thrombocytopenia complicates clinical decision-making.[3] Additionally, the abnormally enlarged immature platelets and increased antibody-mediated damage to the endothelium contributes to a heightened risk of thrombotic complications. This combination of factors highlights the need for a more nuanced understanding of the interplay between ITP and heart failure, and the consequential impacts on patient outcomes.

Given the relatively low incidence of ITP in the general population, there remains a significant gap in knowledge regarding the specific effects of HF on hospitalized patients with ITP. This study aims to fill this gap by conducting a retrospective analysis of national-level inpatient data from the United States. The goal is to identify underlying correlations that could lead to more effective management strategies for patients suffering from both ITP and heart failure. Considering the autoimmune characteristics of ITP and the hemodynamic challenges posed by heart failure, the knowledge derived from this research has the potential to significantly enhance the safety and efficacy of treatment approaches for this unique patient population.

Methods and Materials

Data design and source

This investigation employed the National Inpatient Sample for the years 2019-2020, an extensive repository of inpatient care information spanning the entirety of the United States. Distinguished as the most extensive publicly accessible database, it encompasses data from over 21 million hospital admissions, with an annual sample size ranging from 7 to 8 million. Noteworthy is its representation of a stringent 20% sample of all national hospital admissions, excluding entries pertinent to rehabilitation and federal institutions such as Veterans Affairs hospitals. Encompassing data from 46 states along with the District of Columbia, this dataset achieves an approximate coverage of 98% of the U.S. population. Administered by the Agency for Healthcare Research and Quality through the Healthcare Costs and Utilization Project, this invaluable resource facilitates the analysis of a myriad of healthcare phenomena, owing to its expansive sample size that comprises approximately 8 million hospital stays annually. This characteristic renders it particularly apt for generating national estimates and analyzing the intricate details of rare diseases.

Study population

Our research entailed a thorough examination of discharge data sourced from the National Inpatient Sample (NIS) database, focusing specifically on a cohort of adult patients aged 18 and above who had a primary diagnosis of Immune thrombocytopenic purpura (ITP) upon discharge. In order to carry out this analysis, we utilized the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) as our coding framework. Following the segmentation of the patient population, we conducted a meticulous categorization, resulting in the formation of distinct groups based on the presence or absence of heart failure. Our study population included individuals with both reduced and preserved ejection fraction.

Study variables and outcomes

The study aimed to compare the effects of heart failure on outcomes in hospitalized patients diagnosed with immune thrombocytopenia. The primary endpoint was inpatient mortality rates among patients with autoimmune thrombocytopenic purpura with and without heart failure. Secondary outcomes included length of hospital stay and overall treatment costs of hospitalization. Other secondary outcomes included odds of acute respiratory failure, ICU admission, acute coronary syndrome, major and minor bleeding episodes, blood transfusions, platelets transfusions, venous thromboembolism, mechanical ventilation, cardiac arrest, acute kidney injury, and sepsis.

Covariates

The patients' demographic attributes encompassed a spectrum of factors, including age groups stratified as 18-35, 36-45, 46-64, and >65 years, gender, race/ethnicity, household income level, and insurance status (Medicare, Medicaid, private, and uninsured). Additionally, the study considered relevant comorbidities, such as diabetes, hypertension, hyperlipidemia, and fluid and electrolyte disorders. Hospital-related characteristics incorporated parameters like hospital bed size (small, medium, large), location (rural-urban), teaching vs. non-teaching status, and hospital region (Northeast, Midwest, South, West). The assessment of comorbidity burden was executed through the use of the Elixhauser Comorbidity Index, a meticulously validated metric relying on ICD-10-CM codes. Tailored for application in extensive administrative datasets, this index serves the dual purpose of prognosticating both mortality and the utilization of hospital resources, providing a robust framework for comprehensive patient profiling in the study.

Statistical analysis

Categorical data were represented as percentages, while continuous variables were characterized by mean values and standard deviations. To compare outcomes among different groups for categorical variables, Pearson's chi-square test or Fisher's exact test was employed, whereas the student's t-test was utilized for continuous variables. The investigation encompassed both univariate and multivariate analyses to ascertain associations between heart failure and key parameters, including in-hospital mortality, length of stay, total treatment cost, and adverse outcomes. All statistical analyses were executed using Stata 17 software (College Station, TX, USA). The insights garnered from these analyses contributed substantially to addressing the research questions and hypotheses, augmenting the overall quality and rigor of the study.

Results

The average age of individuals with ITP and HF was significantly higher (72.83 +/- 13.26 years) compared to those without HF (45.86 +/- 25.65 years). A higher proportion of White and Black populations had HF (72.83% vs. 62.37% & 16.58% vs. 14.02%, P<0.001), while Hispanic and other races had fewer patients with HF (8.42% vs. 19.7% & 2.17% vs. 3.91%, P<0.001). Medicare had a higher percentage of ITP patients with HF (78.01% vs. 31.68%, P<0.001), while Medicaid (6.02% vs. 22.6%, p<0.001), private insurance (15.18% vs 40.67%, P<0.001), and patients with no insurance (0.79% vs 5.05%, P<0.001) had fewer patients with HF. Hypertension was less common in ITP patients with HF (1.54% vs. 33.14%, P<0.001), while a higher percentage of Heart failure patients had Diabetes Mellitus (36.41% vs 15.81%, P<0.001), Hyperlipidemia (50% vs 20.15%, P<0.001), and fluid and electrolyte disorders (28.97% vs 12.7%, P<0.001). A greater proportion of ITP patients with HF were discharged to skilled nursing facilities (3.58% vs. 1.54%, P<0.001) and home with home health services (25.08% vs. 5.91%, P<0.001), while a higher percentage of non-HF patients were discharged to home (91.27% vs 69.38%, P<0.001) (Table 1).

After accounting for confounding variables, no significant difference in mortality was observed between the two patient groups (OR 1.1, 95% CI 0.52-2.29, P=0.795). Initial analysis revealed an increase in length of stay for patients with HF (+3.22 days, 95% CI 2.50-3.93, P<0.001), but following adjustment for confounding factors through multivariate linear regression, no significant difference was observed in length of stay between the two groups (+1.14 days, 95% CI 0.32-1.95, p=0.006). However, patients with HF exhibited a significant increase in overall hospitalization costs (+ USD 17762, 95% CI 3439-354439, P=0.04) (Table 2).

Table 1 Comparison of baseline demographic characteristics of ITP patients with and without concomitant HF

	ITP without HF	ITP with HF	P-Value
No. of Patients	25935	1950	
Patient Characteristics			
Gender (%)			P=0.510
Male	11411 (44)	910 (46.67)	
Female	14290 (55.1)	1040 (53.33)	
Age			P<0.001
Mean Age (SD)	45.86(25.65)	72.83(13.26)	
Age Distribution (%)			P<0.001
18-35	5802 (22.37)	35 (1.79)	
36-45	3177 (12.25)	45 (2.31)	
46-64	7861 (30.31)	360 (18.46)	
>65	9095 (35.07)	1510 (77.44)	
Race (%)			P<0.001
White	16176 (62.37)	1420 (72.83)	
Black	3636 (14.02)	323 (16.58)	
Hispanic	5109 (19.7)	164 (8.42)	
Other	1014 (3.91)	42 (2.17)	
Median household income national quartile for patient zip code (%)			P = 0.825
$1-$49,999	7085 (27.32)	571 (29.27)	
$50,000-$64,999	6899 (26.6)	495 (25.39)	
$65,000-$85,999	6427 (24.78)	460 (23.58)	
>$86,000	5524 (21.3)	424 (21.76)	
Charlson comorbidity index (%)			P<0.001
0	14129 (54.48)	0 (0)	
1	5566 (21.46)	150 (7.69)	
2	2656 (10.24)	360 (18.46)	
3 or more	3584 (13.82)	1440 (73.85)	
Insurance Provider (%)			P<0.001
Medicare	8216 (31.68)	1521 (78.01)	
Medicaid	5861 (22.6)	117 (6.02)	
Private	10548 (40.67)	296 (15.18)	
Uninsured	1310 (5.05)	15 (0.79)	
Comorbidities (%)			
Hypertension	8595 (33.14)	30 (1.54)	P<0.001
Diabetes Mellitus	4100 (15.81)	710 (36.41)	P<0.001
Chronic Kidney Disease			
CKD2	101 (0.39)	10 (0.51)	P=0.698
CKD3	890 (3.43)	400 (20.51)	P<0.001
CKD4	174 (0.67)	145 (7.44)	P<0.001
CKD5	31 (0.12)	10 (0.51)	P=0.055
CKD Unspecified	521 (2.01)	120 (6.15)	P<0.001
ESRD	226 (0.87)	95 (4.87)	P<0.001
Hyperlipidemia (HLD)	5226 (20.15)	975 (50)	P<0.001
Fluid and Electrolyte Disorders	3294 (12.7)	565 (28.97)	P<0.001
Discharge Disposition (%)			P<0.001
Home	23671 (91.27)	1353 (69.38)	
Home with home health	1533 (5.91)	489 (25.08)	
Skilled nursing facility	399 (1.54)	70 (3.58)	
Against Medical Advice	332 (1.28)	38 (1.95)	
Hospital characteristics (%)			
Bed size of hospital (STRATA)			P=0.907
Small	4956 (19.11)	365 (18.72)	
Medium	6979 (26.91)	545 (27.95)	
Large	14000 (53.98)	1040 (53.33)	
Hospital location			P=0.458
Rural	996 (3.84)	90 (4.62)	
Urban	24939 (96.16)	1860 (95.38)	
Hospital Teaching Status			P=0.135
Non-teaching hospital	4541 (17.51)	400 (20.51)	
Teaching hospital	21394 (82.49)	1550 (79.49)	
Region of hospital			P=0.117
Northeast	5156 (19.88)	350 (17.95)	
Midwest	5169 (19.93)	490 (25.13)	
South	10104 (38.96)	705 (36.15)	
West	5506 (21.23)	4050150 (207700)	

ITP, immune thrombocytopenic purpura; HF, heart failure; SD, standard deviation; ESRD, end stage renal disease

Citation: Javaid S, Frasier K, Carll O, et al. An insight into the interplay between immune thrombocytopenic purpura (ITP) and heart failure: a retrospective analysis of national inpatient data in the United States. *J Cancer Prev Curr Res.* 2024;15(1):1–6. DOI: 10.15406/jcpcr.2024.15.00540

Table 2 Comparison of Primary and secondary outcomes in ITP patients with and without HF

	ITP with and without HF		
Length of hospitalization (days)	**Coefficient**	**95 % CI**	**P value**
LOS Days (Univariate linear Regression)	3.22	(2.50- 3.93)	P<0.001
LOS Days (Multivariate linear Regression)	1.14	(0.32-1.95)	P=0.006
Total hospital cost (USD)			
TOTCHG USD (Univariate linear Regression)	46105	(31419-60791)	P<0.001
TOTCHG USD (Multivariate linear Regression)	17762	(3439-35439)	P=0.04
	Odds Ratio	95 % CI	P value
Mortality			
Unadjusted Odds Ratio (Univariate logistic regression)	5.45	(3.00- 9.88)	P<0.001
Adjusted Odds Ratio (Multivariate logistic regression)	1.1	(0.52- 2.29)	P=0.795

LOS, length of stay; USD, united states dollar; CI, confidence interval; TOTCHG, total charges; ITP, immune thrombocytopenic purpura; HF, heart failure

Furthermore, patients with HF were found to be at increased risk of acute respiratory failure (OR 2.44, 95% CI 1.31-4.52, P=0.005), acute coronary syndrome (OR 6.27, 95% CI 1.05-37.47, P=0.04), and ICU admission (OR 1.86, 95% CI 1.015-3.41, P= 0.04). Nevertheless, no significant differences were observed in the risk of major (OR 1, 95% CI 0.66-1.51, P=0.983) and minor bleeding episodes (OR 1.36, 95% CI 0.33-5.58, P=0.666), blood transfusions (OR 0.81, 95% CI 0.52-1.25, P=0.352), platelet transfusions (OR 0.98, 95% CI 0.73-1.30, P=0.897), venous thromboembolism (OR 0.93, 95% CI 0.36-2.38, P=0.887), sepsis (OR 1.61, 95% CI 0.59-4.39, P=0.346), acute kidney injury (OR 1.07, 95% CI 0.77-0.47, P=0.661), and cardiac arrest (OR 3.04, 95% CI 0.65-14.11, P=0.156) (Table 3 & 4).

Table 3 Comparison of proportions and univariate analysis of secondary outcomes in ITP patients with and without HF

Secondary outcomes	ITP without HF(%)	ITP with HF(%)	Unadjusted OR(95%CI)	P-Value
Acute respiratory failure	1.06	8.71	8.91(5.79-13.71)	P<0.001
Cardiac arrest	0.19	1.02	5.3(1.67-17.14)	P=0.005
Acute coronary syndrome	0.15	1.53	10.11(3.49-29.29)	P<0.001
Acute Kidney Injury	6.4	25.38	4.97(3.85-6.41)	P<0.001
Sepsis	0.63	3.07	4.95(2.53-9.69)	P<0.001
Invasive Mechanical ventilation	1.19	6.66	5.90(3.72-9.37)	P<0.001
Intensive care unit (ICU)	1.48	7.69	5.53(3.55-8.61)	P<0.001
Vasopressors	0.25	0.76	3.08(0.64-14.83)	P=0.160
Blood Transfusion	5.91	10.76	1.91(1.37-2.68)	P<0.001
Platelets Transfusion	23.69	32.3	1.53(1.22-1.92)	P<0.001
Venous thromboembolism (VTE)	0.112	0.213	2.28(1.13- 4.61)	P=0.021
Major Bleeding	6.03	11.02	1.92(1.38-2.68)	P<0.001
Minor Bleeding	0.36	0.51	1.40(0.32-6.08)	P=0.652

Table 4 Multivariate regression analysis of secondary outcomes in ITP patients with and without HF

	Multivariate regression analysis of secondary outcomes		
	Adjusted odds ratio	**95% Confidence Interval**	**P- value**
Secondary outcomes			
Acute respiratory failure	2.44	(1.31-4.52)	P=0.005
Cardiac arrest	3.04	(0.65-14.11)	P=0.156
Acute coronary syndrome	6.27	(1.05-37.47)	P=0.04
Acute Kidney Injury	1.07	(0.77-0.47)	P=0.661
Sepsis	1.61	(0.59-4.39)	P=0.346
Invasive Mechanical ventilation	1.79	(0.92-3.48)	P=0.084
Intensive care unit (ICU)	1.86	(1.015-3.41)	P=0.044
Vasopressors	0.58	(0.12-2.77)	P=0.502
Blood Transfusion	0.81	(0.52-1.25)	P=0.352
Platelets Transfusion	0.98	(0.73-1.30)	P=0.897
Venous Thromboembolism (VTE)	0.93	(0.36-2.38)	P=0.887
Major Bleeding	1	(0.66-1.51)	P=0.983
Minor Bleeding	1.36	(0.33- 5.58)	P=0.666

Discussion

Our retrospective study, utilizing the National Inpatient Sample database for 2019-2020, examined the impact of heart failure on patients admitted with autoimmune thrombocytopenic purpura. The cohort of 27,885 ITP patients revealed that 7% had a concurrent diagnosis of HF. Contrary to expectations, the study found no significant difference in mortality rates between ITP patients with and without HF. Moreover, the length of hospital stay remained consistent, indicating that HF did not independently affect the overall duration of hospitalization. However, the economic burden was notably amplified in patients with HF, as reflected by a substantial increase in the total cost of hospitalization. The elevated utilization of healthcare resources in the case of heart failure patients can be attributed to the substantial disease burden they carry, as demonstrated by our study. These patients are at a heightened risk of developing acute respiratory failure, necessitating intensive care and ICU admissions, which could have contributed to the increased consumption of resources and the associated cost of treatment. This finding underscores the financial implications of managing HF in ITP patients, emphasizing the necessity for resource optimization. A study was conducted by An R et al. using the National Inpatient Sample (NIS) dataset

from 2006 to 2012 to examine hospitalized patients with Immune Thrombocytopenic Purpura (ITP) without any secondary diagnosis. The results of the retrospective study indicated that patients with ITP had a higher risk of mortality, longer hospital stays, and higher overall treatment costs.[4] However, the findings of this study were not consistent with our study that focused specifically on heart failure, as the increased cost of hospitalization was the only result that was supported by both studies.

Furthermore, HF in ITP patients demonstrated a profound association with adverse clinical outcomes. Notably, patients with HF exhibited increased odds of acute respiratory failure, necessitating heightened medical intervention and potentially contributing to the complex nature of their hospital course. The augmented likelihood of ICU admission further underscores the severity of the clinical trajectory in ITP patients with concurrent HF. A retrospective cohort study was conducted by Seri et al, examining patients with a primary discharge diagnosis of left atrial appendage occlusion (LAAO) and a secondary diagnosis of heart failure. The primary outcomes of the study were mortality, acute respiratory failure, and mechanical ventilation. The study found that patients with heart failure had a higher incidence of acute respiratory failure, both noninvasive and invasive mechanical ventilation, but no significant difference in mortality was observed between the two groups.[5] In a separate retrospective study, Javaid et al utilized the National Inpatient Sample (NIS) to analyze the impact of heart failure on hospitalized multiple myeloma patients. The study concluded that both types of heart failure were associated with an increased risk of acute respiratory failure and invasive and noninvasive mechanical ventilation.[6]

Our study also revealed an elevated risk of acute coronary syndrome in this population, emphasizing the intricate interplay between immune thrombocytopenia and cardiovascular events. Govender et al. conducted a retrospective investigation utilizing national population data from the United Arab Emirates (UAE) to examine the risk of mortality and cardiovascular events within this population. The study found that heart failure (HF) served as an independent predictor of mortality and cardiovascular events in the patient cohort under analysis.[7]

He X et al conducted a prospective trial involving 1767 patients with heart failure with preserved ejection fraction (HFpEF) to study the incidence of ischemic events, defined as myocardial infarction or ischemic stroke. The study concluded that HFpEF was considered an independent predictor of mortality and ischemic events.[8]

Chandan JS et al. conducted a retrospective analysis of 6,591 individuals diagnosed with Immune Thrombocytopenic Purpura (ITP) and 24,275 randomly matched controls. The primary objective of the study was to determine the incidence of cardiovascular disease (CVD) in ITP patients. The results indicated that ITP patients had an odds ratio (OR) of 1.38 for CVD events, and the risk was even higher for those who underwent splenectomy for ITP.[9] Our study aligns with these findings, demonstrating that the risk of acute coronary syndrome was increased in patients with heart failure (HF) and coexisting ITP.

Despite the increased risks of respiratory and cardiovascular complications in ITP patients with HF, the study did not identify significant differences in the odds of major or minor bleeding, blood transfusions, platelet transfusions, venous thromboembolism, mechanical ventilation, cardiac arrest, acute kidney injury, and sepsis between the two groups. This intriguing finding challenges conventional assumptions regarding the interplay of HF and bleeding risks in ITP patients. It prompts further exploration into the nuanced pathophysiological mechanisms and potential therapeutic implications of these observations.

Although our study did not identify a significant difference in the odds of thromboembolic events, prior studies have shown positive correlation with ITP, HF and thrombotic events.[10] Previous literature reviews have shown increased rates of arterial thrombotic events compared to venous events due to the significant rates of atherosclerosis seen in many autoimmune diseases. Therefore, those with predisposing factors such as coronary artery disease and heart failure are at increased risk of thrombotic events.[11]

Both major and minor bleeding are inherent risks in severe immune thrombocytopenic purpura. Though our study did not indicate an increase in the odds of major or minor bleeding, one study has specified several risk factors associated with increased bleeding in these patients; several of which are common in those hospitalized for severe ITP. These factors include advanced age, previous minor bleeding episodes and the presence of severe thrombocytopenia which is defined by a platelet count of less than 10-20x10^9/L.[12] NIS does not possess information pertaining to laboratory outcomes. Therefore, despite the patients in the HF cohort being older, as evidenced by the mean age of both cohorts in our analysis, it remains undetermined which cohort or subcategory of patients experienced a specific degree of thrombocytopenia that might have contributed to bleeding events.

This study did not identify a significant difference in the odds of platelet or blood transfusions. However, previous reports indicate that overall, those who are admitted with ITP are more likely to require transfusions compared to those without ITP .Those who receive platelet transfusions have a significantly greater risk of developing an acute ischemic stroke and cardiac complications.[13] Although these correlations were not identified in this study, they present an opportunity for further exploration in those with heart failure.

Our study provides a comprehensive understanding of the multifaceted implications of HF in hospitalized ITP patients. While HF did not independently predict mortality or alter the length of hospital stay, it substantially increased the economic burden and conferred a higher risk of respiratory and cardiovascular complications. The unexpected lack of impact on bleeding outcomes prompts a reevaluation of the conventional paradigm in managing bleeding risks in ITP patients with HF. This research underscores the imperative for precision in HF management within the ITP population to optimize resource utilization and enhance patient care outcomes.

This research showcases a unique combination of strengths and limitations that warrant extensive examination. As an administrative database, the NIS may be susceptible to sampling bias resulting from potential inaccuracies in data entry, incomplete information, and coding discrepancies. Despite housing extensive patient data, the absence of specific clinical details, laboratory findings, and post-discharge patient outcomes could potentially impede the interpretation of study results. Moreover, excluding outpatient care and readmissions limits a comprehensive assessment of long-term complications and fatalities using solely NIS data. In addition to this limitation, inpatient data fails to provide insights into critical events during surgery or complications that can impact length of stay and hospital costs at a depth necessary for comprehensive analysis. However, one notable advantage lies in utilizing NIS as it enables the evaluation of a nationally representative study population derived from one of the largest publicly available inpatient databases. This capability allows for the generation of comprehensive regional and national statistics, together with estimates on patient outcomes, inpatient utilization, healthcare costs, and various other related factors.

Conclusion

Heart failure (HF) in hospitalized patients with immune thrombocytopenia (ITP) is closely linked to a range of unfavorable consequences, including a substantial increase in hospitalization costs, elevated incidence rates of acute respiratory failure, increased frequency of admissions to the intensive care unit (ICU), and a heightened susceptibility to ischemic cardiac events. Notably, despite these associations, HF does not emerge as an independent predictor of either mortality or hemorrhagic events. Additionally, there are no discernible differences in hospital stay duration between ITP cohorts with and without HF. Appropriate management strategies and measures ought to be implemented to manage heart failure, with the aim of achieving improved outcomes and minimizing hospitalizations in patients with ITP. A comprehensive and nuanced approach is crucial for refining control strategies and enhancing patient care outcomes.

Acknowledgments

None.

Conflicts of interest

Authors declare that there is no conflicts of interest.

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