Peptic Ulcer Bleeding in End-Stage Renal Disease Hospitalizations: A Comparative Analysis in the United States

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Abstract

ESRD has becoming more prevalent worldwide. In relation to general population, patients with ESRD are more likely to develop PUB, a significant contributor to mortality in peptic ulcer disease patients. Despite significant advancements in medical and endoscopic therapy, PUB continues to be a severe and life-threatening condition associated with considerable mortality, decreased overall quality of life, and higher healthcare costs. In this study we tried to assess and compare hospitalization characteristics, clinical outcomes, and the healthcare burden of PUB in patients with and without ESRD. Furthermore, we also identified the rates of utilization of esophagogastroduodenoscopy (EGD) in these hospitalizations and predictors of inpatient mortality.

Introduction

PUD is associated with several complications, the most cited of which is peptic ulcer bleed (PUB), seen in up to 73% of the patients [2]. It has been identified as the most common cause of non-variceal upper GI bleeding (UGIB) worldwide [3-5]. Similarly, in the US, there are about 350,000 hospitalizations annually for UGIB, of which PUB has been a leading cause. Despite significant advancements in medical and endoscopic therapy, PUB continues to be a severe and life-threatening condition associated with considerable mortality, decreased overall quality of life, and higher healthcare costs have reported patients with End Stage Renal Disease (ESRD) are more prone to PUB secondary to a cluster of complex pathophysiological mechanisms. This study aims to assess the influence of ESRD on PUB hospitalizations in the United States (US). A higher rate of haemodialysis utilization, which is independently associated with a higher occurrence of PUB, has also been reported in the US population and may amplify the rate of PUB [7]. However, there continues to be a significant knowledge gap on the exact influence of ESRD status on PUB.

Methods

This retrospective study obtained data from National Inpatient Sample to identify all adult (≥ 18 years) hospitalizations with a primary diagnosis of PUB in the US between 2007 – 2014. Hospitalizations of PUB in the US between 2007–2014. The study population was subdivided based on the presence or absence of ESRD. Demographic characteristics and outcomes including hospitalization length of stay (LOS), mortality rate and in-patient procedures was compared. Predictors of inpatient mortality were also identified. A multivariable logistic regression model was adopted to identify associations between in-hospital mortality and demographic variables. All analytical results were considered significant when p-values were ≤0.05. The analysis was performed via SAS 9.4 using Cochrane-Armitage trend test for continuous variables and The Rao-Scott design-adjusted chi-square test, for categorical variables.

Results

- Between 2007–2014, there were 351,965 and 2,037,037 PUB hospitalizations with and without ESRD, respectively, in the US (Table 1). PUB hospitalizations with ESRD had a higher mean age (71.6 vs 63.6 years, p< 0.001), and proportion of males (55.5 vs 44.2%, p< 0.001), higher proportion of ethnic minorities such as Blacks (20.2 vs 12.4%, p< 0.001), Hispanics (9.2 vs 8.5%, p<0.001), and Asians (4.5 vs 3.3%, p< 0.001) compared to the non-ESRD PUB cohort. However, non-ESRD PUB hospitalizations had a higher proportion of Whites (72.2 vs 63.2%, p< 0.001) compared to the ESRD cohort.
- Furthermore, we noted higher inpatient mortality (5.4% vs 2.6%, p< 0.001), mean length of stay [LOS] (8.2 vs. 6 days, p< 0.001), and rates of esophagogastroduodenoscopy (EGD) (20.9 vs 19.1%, p< 0.001) for PUB hospitalizations with ESRD compared to the non-ESRD PUB cohort. cohort. Interestingly, rates of H. Pylori infection were lower (3.8 vs 5.7%, p< 0.001) for PUB hospitalization with ESRD compared to the non-ESRD PUB cohort.

Results (cont.)

- After multivariate logistic regression analysis, whites with ESRD had higher odds of inpatient mortality from PUB compared to other races. To our surprise, the odds of inpatient mortality from PUB decreased by 0.6% for every one-year increase in age for patients with ESRD. Compared to the 2011–2014 study period, the 2007–2010 period had 43.7% higher odds of inpatient mortality for PUB hospitalizations with ESRD.

Chart 1: Comparative Analysis of demographic characteristics for Peptic Ulcer Bleeding (PUB) in patients with and without End-stage renal disease (ESRD).

Variable	PUB with ESRD	PUB without ESRD	p-value
Sample Size (N)	351,965	2,037,037	p<0.001
Age	71.6 years	63.5 years	p<0.001
Gender			
I. Male	55.8% (196,360)	49% (997,936)	p<0.001
II. Female	44.2% (155,605)	51% (1,039,101)	p<0.001
Race			
I. White	63.2% (198,644)	72.4% (1,297,454)	p<0.001
II. Black	20.2% (63,585)	12.4% 221,799	p<0.001
III. Hispanic	9.2% (28,831)	8.5% (152,650)	p<0.001
IV. Asian	4.5% (14,125)	3.3% (59,707)	p<0.001
V. Native American	0.5% 1,677	0.6% 10,830	p<0.001
VI. Others	2.4% (7,648)	2.8% (49,999)	p<0.001
Hospital Bed Size			
I. Large	62.7%	60.7%	p<0.001
II. Medium	25.6%	26.3%	p<0.001
III. Small	11.8%	12.9%	p<0.001
Hospital Location			
I. Urban Teaching	47.9%	45.6%	p<0.001
II. Urban Non-Teaching	42.9%	43%	p<0.001
III. Rural	9.2%	11.3%	p<0.001
Hospital Region			
I. Northeast	17.1%	18.1%	p<0.001
II. Midwest	24.7%	23.7%	p<0.001
III. South	37.3%	38.6%	p<0.001
IV. West	21%	19.7%	p<0.001

Chart 2: Comparative Analysis of clinical outcomes for Peptic Ulcer Bleeding (PUB) in patients with and without End-stage renal disease (ESRD)

Mortality	5.4% (18,949)	2.6% (53,352)	p<0.001
Length of Stay (LOS)	8.2 days	6 days	p<0.001
Esophagogastroduodenoscopy (EGD)	20.7% (72,840)	19.1% (389,784)	p<0.001
H. Pylori Infection	13,527 (3.8%)	116,849 (5.7%)	p< 0.001

Discussion

PUD is associated with several complications, the most cited of which is peptic ulcer bleed (PUB), seen in up to 73% of the patients [1]. Compared to the general population, patients with ESRD have a higher incidence of PUD complicated by UGIB, leading to higher mortality, healthcare costs, and reduced quality of life [2]. Initially thought to be secondary to H. Pylori infection, the epidemiology of PUD and its complications have evolved over the years [3]. A longer life expectancy, widespread use of NSAIDs, higher co-morbidities, and ESRD requiring dialysis are responsible for higher rates of PUB [3]. Despite significant advancements in the management strategies for PUB, the mortality rate remains high, ranging from 5–10% worldwide [4]. Numerous studies have focused on the short-term mortality after PUB; however, only some estimate the long-term complications. Furthermore, we also identified the rates of utilization of esophagogastroduodenoscopy (EGD) in these hospitalizations and predictors of inpatient mortality.

Conclusions

In conclusion, our study explored, in-depth, the relationship between PUB and ESRD. We report higher mortality rates, longer length of hospitalizations and higher utilization of esophagogastroduodenoscopy for PUB in a setting of ESRD compared to the non-ESRD cohort. However, over the study period, the overall inpatient mortality rates for PUB in ESRD hospitalizations are on a steady decline reflecting a significant improvement in management strategies.

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References

1. Wang YR, Richter JE, Dempsey DT. Trends and outcomes of hospitalizations for peptic ulcer disease in the United States, 1993 to 2006. Ann Surg. 2010;25151-8.
2. Abbasi MA, Chertow GM, Hall YN. End-stage renal disease. BMJ Clin Evid. 2010;2010:2002
3. Kyaw MH, Lau JYW. High Rate of Mortality More Than 30 Days After Upper Gastrointestinal Bleeding. Clin Gastroenterol Hepatol. 2017;15:1858-1859
4. Sung JJ, Tsoi KK, Ma TK, et al. Causes of mortality in patients with peptic ulcer bleeding: a prospective cohort study of 10,428 cases. Am J Gastroenterol. 2010;105:84-9.