

## Original Article

# Impact of Weekend Admission on the Outcome of Patients with Acute Gastro-Esophageal Variceal Hemorrhage

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## ABSTRACT

**Objectives:** To evaluate the impact of weekend admission on the outcome of patients with acute variceal hemorrhage (AVH)

**Design:** Retrospective study

**Setting:** Department of Surgery, College of Medicine, King Saud University, KSA

**Main Outcome Measures:** AVH, weekend admission and clinical outcome

**Subjects:** Nine hundred and thirty-seven admitted during the period 1<sup>st</sup> January 2005 to 31<sup>st</sup> July 2013 and documented to have AVH. The selected patients were divided into two groups based on the admission day (weekday or weekend admission). The data regarding patients characteristics and outcome in both the groups were retrieved from medical records and compared by using c2 test / Fisher's exact and student T- test.

**Results:** Weekday admissions included 685 patients,

while the weekend group comprised of 252 patients. The demographic, clinical and laboratory characteristics of patients admitted with AVH in both the groups were comparable. Statistically, there was no significant difference in the need for blood transfusion (46% versus 48%,  $p = 0.5868$ ), and surgical intervention (5.4 % versus 4.7 %;  $p = 0.6595$ ) between the groups. There was a little, but statistically significant delay in endoscopic intervention in the weekend group ( $7.56 \pm 7.8$  hours versus  $9 \pm 2.32$ ;  $p = < 0.0001$ ). However, this delay did not lead to adverse outcome for patients (mortality rate 6.8% versus 5.25%;  $p = 0.389$ ).

**Conclusions:** The weekend admissions were not associated with increased mortality in patients with AVH. Moreover, the length of hospital stay, need for blood transfusion, and rate of surgical intervention were similar in weekdays and weekend admissions.

**KEY WORDS:** endoscopy, gastro-esophageal variceal, upper gastrointestinal hemorrhage, mortality, weekend effect

## INTRODUCTION

Upper gastrointestinal hemorrhage (UGIH) remains a major indication for emergency hospital admission<sup>[1]</sup>. Although, many episodes of hemorrhage are self-limiting, yet associated with significant morbidity and mortality (5 to 10%)<sup>[2]</sup>. Acute non-variceal hemorrhage (ANVH) accounts for a majority of UGIH, followed by acute variceal hemorrhage (AVH) secondary to portal hypertension. The management of these patients requires a multidisciplinary approach which includes prompt resuscitation, triage to appropriate level of care, medical and supportive management, risk

stratification, and access to early endoscopy. The outcome depends upon the patient's factors, course of primary disease, associated co-morbid conditions, expertise of the treating team, and level of the facilities available at the presenting hospital<sup>[3,4]</sup>. Over the past two decades, substantial evidence in medical literature has demonstrated an association between weekend admission and increased mortality for various medical and surgical emergencies, termed as "weekend effect"<sup>[5,6]</sup>. This effect has been attributed to reduced hospital staffing, delay in the invasive procedure and treatment on weekends<sup>[5-9]</sup>. The adverse outcome of patients with UGIH, admitted on

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weekend has also been observed in some reports,<sup>[3,10,11]</sup> while others failed to demonstrate this effect<sup>[12-14]</sup>. The majority of these studies focused on patients with ANVH, and only few studies addressed this issue in patients with AVH. Therefore, the objectives of this study were to evaluate the impact of weekend admission on the outcome of patients with AVH in terms of mortality, hospital stay, need for blood transfusion and surgery.

## SUBJECTS AND METHODS

This retrospective cohort study was conducted in the department of surgery, King Saud Medical City; Riyadh, Kingdom of Saudi Arabia. It included all the patients with symptoms of UGIH, (hematemesis or melena or both) who were admitted through the emergency department (ED) to hematemesis and melena unit (HMU) between 1<sup>st</sup> January 2005 to 31<sup>st</sup> July 2013. Patients, who were managed by conservative treatment, had not undergone esophagogastroduodenoscopy (EGD) or who found to have non-variceal source of bleeding on EGD were excluded from the study. The selected patients were divided into two groups based on the admission day (weekday or weekend admission).

Weekend admission was defined as from Wednesday at 16:00 hrs to Friday at midnight and others were those of weekday admissions.

It is the policy in our institution that general surgical (GS) team, lead by board certified senior registrar or consultant surgeon, is responsible for care of all the patients with gastrointestinal bleeding (GIB). General surgeons assess these patients, resuscitate them, request appropriate investigations and involve the gastroenterologist to perform EGD at appropriate stage of the management. After EGD, these patients are admitted in HMU under the care of general surgeons. However, hepatologists and gastroenterologists closely follow up these patients as a part of multidisciplinary team.

This HMU is well equipped with critical care monitoring devices and fully trained nursing staff. The endoscopy services are available around the clock during the weekdays and weekend, covered by two gastroenterologists (one senior registrar and one consultant gastroenterologist) with all the tools needed for management of UGIH. The routine management of all patients with portal hypertension related UGIH includes : 1) Intravenous infusion of

**Table 1:** Characteristics of weekday and weekend admission of patients with AVH

Characteristics	Weekday Admissions	Weekend Admissions	p-value
Age (years)	57 ± 9.3 ( range 37 - 77 )	56 ± 8.8 (range 36 - 78 )	0.1391
Gender			0.188
Male	77	81	
Female	23	19	
Presenting symptoms			
Hematemesis	28	26	0.5387
Melena	60	63	0.4011
MH	12	11	0.6678
Presenting vital signs/Hemoglobin (Hgb)			
SBP (mean ± SD)	118.7 ± 28.6	117.5 ± 45.7	0.6325
HR (mean ± SD)	86.3 ± 21.3	87.6 ± 17.6	0.3867
Hgb (mean ± SD)	9.3 ± 3.5	9.1 ± 6.7	0.5539
Liver related variables :			
1) Cirrhotic liver	82	84	0.4650
2) Non-cirrhotic liver	18	16	0.4650
3) Hepatic decompensation	55.6	53.5	0.5674
4) Hepatic encephalopathy	17	18.2	0.6708
5) Ascites	33.4	31.1	0.5024
6) Hepatorenal syndrome	3.3	4.5	0.4156
7) Spontaneous bacterial Peritonitis	1.4	1.3	0.9056
8) Coagulopathy	33	31.5	0.6623
9) Hepatocellular carcinoma	2.2	1.9	0.7702
Child-Pugh score			
A	32	34	0.5652
B	57	59	0.5818
C	11	9	0.3554
Comorbid conditions (n)			
0	11.8	10.5	0.5705
1	32	31	0.7697
2	28	27	0.7606
≥3	28.2	31.5	0.3311

The data for comparisons between the two groups are presented as proportion (%) unless otherwise specified.

Abbreviations: SD: standard deviation; SBP: systolic blood pressure (mmHg); HR: heart rate (beats/min); MH: melena and hematemesis. AVH: acute variceal hemorrhage, Hgb: hemoglobin

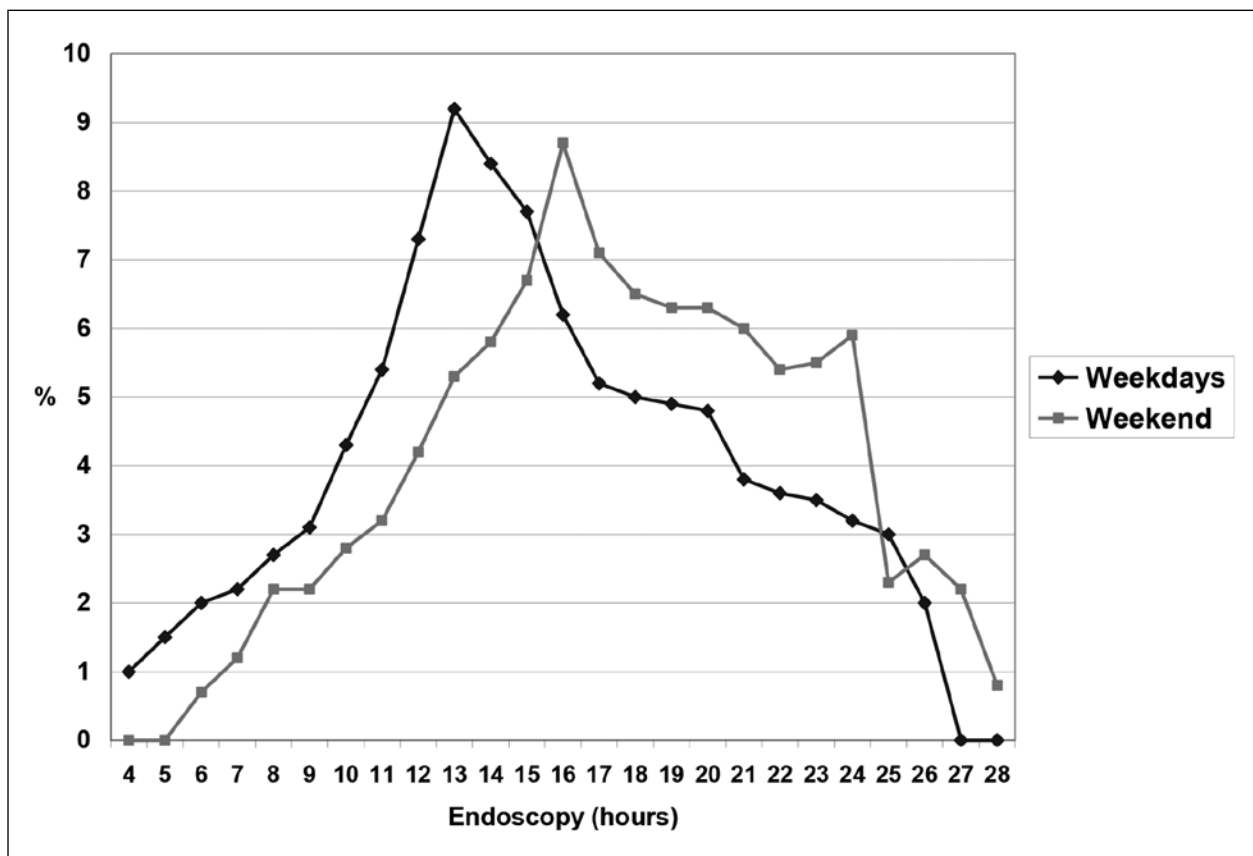


Fig.1: Difference in endoscopic timing between weekday and weekend admissions

octreotide, 2) intravenous proton pump inhibitors, 3) Intravenous Ceftriaxone, 4) Oral lactulose, 5) Rectal wash, 6) Nil orally, 7) Intravenous infusion of low sodium containing fluids, 8) Blood testes: complete blood count, renal profile, serum electrolytes, liver function test, coagulation profile, hepatitis screening, and bilharziasis titer when indicated, 9) Ultrasound abdomen and computed tomography when indicated and 10) Second therapeutic endoscopy within one week from the first endoscopy.

Medical records of all these patients were reviewed after the approval of local research and ethical committee of the King Saud Medical City. The data regarding demography, time of admission, presenting symptoms, vital signs and hemoglobin concentration on presentation, coagulation parameters and the need for international normalized ratio (INR) reversal prior to endoscopy, blood transfusion, endoscopic therapy, re-endoscopy, re-bleeding, experience of the gastroenterologist, surgical intervention, length of hospital stay (LOS) and in-patient hospital mortality was collected. The main outcome measures studied were in-patient's mortality, LOS, need of blood transfusion and surgery.

**Statistical analysis:** Statistical analysis was performed by using Statistical Package for the

Social Sciences (SPSS) version 19 software (SPSS Inc. Chicago, IL, USA). Data for dichotomous variables and nominal variables are expressed as percentages and were compared by a  $\chi^2$  test or Fisher's exact test. Means of numerical or continuous variables were compared by student T- test. The P-value of  $<0.05$  was considered as statistically significant.

## RESULTS

A total of, 937 patients were admitted with a diagnosis of AVH during the study period. Their mean age was  $57 \pm 9.5$  years (range 36 - 78 years) and men outnumbered women; 761 to 176. All the patients were subjected to EGD within 28 hours of presentation to ED and documented to have AVH. Six hundred and eighty-five patients were admitted during the weekday while the weekend admissions comprised of 252 patients. The demographic features, clinical and laboratory characteristics of patients admitted with AVH both on weekends and weekdays were comparable (Table 1).

A significant number of patients received blood transfusion with no difference between the groups. (46% weekday versus 48% weekend group,  $P = 0.5868$ ). EGD was performed within 24 hours in 95% and 92 % of the patients in weekday and weekend admissions respectively; however, it was performed within 28

hours in all patients of both the groups. Endoscopic therapy (band ligation or sclerotherapy) was performed with similar proportion in both groups (88% weekday versus 91 % weekend,  $P = 0.1709$ ). The percentage of patients, who required repeat EGD was significantly higher in weekend admissions (7% Vs. 14 %;  $P = 0.0035$ ). Obscured bleeding was the probable cause in most of these cases. Moreover, most of the primary interventions were performed by the clinical fellows/ senior registrars.

The proportion of patients who re-bleed after first endoscopy, (8% weekday versus 7% weekend;  $P = 0.6012$ ), required balloon tamponade (6% weekday versus 5.11% weekend;  $P = 0.5914$ ) and surgical intervention (5.4 % versus 4.7 %;  $P = 0.6595$ ) was almost similar in both the groups. There was a small, but statistically significant differences ( $7.56 \pm 7.8$  hours versus  $9 \pm 2.32$ ;  $P = <0.0001$ ) in the timing of endoscopy between the two groups (Fig. 1). This delay was due to correction of coagulopathy before intervention, not because of the non availability of endoscopist. However, this delay did not affect the outcome of the patients. The in-hospital mortality was slightly higher in weekend admissions (6.8% weekday versus 5.25% weekend admissions), but it was not statistically significant ( $P = 0.389$ ). Similarly the length of hospital stay in both the groups was  $8 \pm 6$  and  $8 \pm 9$  days, respectively ( $P = 0.999$ ).

## DISCUSSION

Patients with AVH secondary to portal hypertension require complex management (initiation of early resuscitation, specific medical therapy and supportive therapy to manage the complications of portal hypertension) with multidisciplinary team approach.<sup>[3,4]</sup> We examined the impact of weekend admissions on the outcome of patients with AVH and found no difference in the mortality of these patients admitted on weekdays or weekends. Our results are in accordance with the published series<sup>[5,12-14]</sup>. Bell CM and Redelmeier DA<sup>[5]</sup> failed to demonstrate any weekend effect on the mortality of their patients with unspecified UGIH. Myer RP and colleagues<sup>[13]</sup> concluded that weekend effect did not apply to their patients hospitalized with AVH. Nevertheless, the delay encountered in the endoscopic intervention didn't contribute to the increased mortality. Similarly, Jairath V et al<sup>[14]</sup> found to have no difference in the mortality for weekend versus weekday presentation despite the fact that patients were more critically ill and had greater delay to EGD at weekends.

However, contrary evidence also exists in the medical literature describing the adverse outcome of patients admitted on weekends with UGIH<sup>[3,10,11]</sup>. Dorn SD *et al*<sup>[10]</sup> have observed increased mortality, longer hospital stay, overall higher medical

expenditures, and long waiting time for EGD for weekend admission in patients with UGIH. They have related their adverse outcome with fewer and less experienced medical staffing, increase work load and suboptimum quality of care provided to these patients on weekends. In addition, admission of relatively sicker patients on weekends could be the probable reason of the increased mortality.<sup>[10]</sup>

Two other trials<sup>[2,11]</sup> from the United States of America (USA) have demonstrated an increased mortality (10 - 13%) and delayed endoscopy in patients with UGIH admitted at weekends compared to weekdays. The difference of higher mortality in their studies can be explained by their patient's selection and multi institutional study design. They included all the patients admitted both from clinics and ED in their weekday group. The outcome of both groups could vary, because majority of the patients presented in ED were critically ill and hemodynamically unstable at presentation. Eventually, their outcome was expected to be the worst compared to weekday admissions. Secondly, there was a great variation in delivery of health care system across USA.<sup>[14]</sup> Hence, the quality of resuscitation, availability of endoscopic therapy and general medical care of these complicated patients might be different from place to place, which affected the outcome of these patients. But our study included only the patients admitted through ED in a specialized unit (HMU) of a single tertiary care hospital.

Early endoscopic intervention within 24 hours has proved to reduce the LOS, overall cost of treatment, need of surgery, blood transfusion, and the mortality of those patients with UGIH.<sup>[12,15-17]</sup> We have observed a statistically significant delay in endoscopic intervention during weekends compared to weekday's admission, but all these patients underwent EGD within 28 hours of admission. Therefore, this delay was not long enough to increase the mortality of these patients. These findings are in agreement with some other studies.<sup>[11,13]</sup>

Some authors suggested that weekend admissions comprised of critically sick patients who had advanced primary liver disease<sup>[10,14]</sup>. Hence, they needed more blood transfusions for resuscitation. Our findings are contrary to them, because the blood transfusion requirement and need of surgical intervention in our groups were similar. We think, prompt resuscitation, and stabilization of the patients with fluids and drug therapy are of utmost importance prior to endoscopy in patients with AVH. Delay in the endoscopic intervention on weekends may contribute to longer hospital stay and higher hospitalization costs.<sup>[3,10,13]</sup> Length of hospital stay was almost the same in our groups.

Our study is limited by its retrospective study design, which is usually associated with selection bias. We tried to remove the selection bias by including all the consecutive patients admitted through ED and divided them into two groups based on the admission day, irrespective of their demographic, clinical and laboratory characteristics. Secondly, it was a single institutional study conducted in a specialized unit of a teaching hospital. Therefore, the results of this study can't be applied over a whole population. We recommend conducting a multi-centric country based study to determine the weekend effect on the outcome of patients with UGIH. That will help to know about the standard of care, and availability of endoscopic facilities in both teaching and non-teaching hospitals. Thirdly, our analysis of patient's outcome was limited to in-patient mortality. Further studies are required to evaluate an association between weekend admissions and increased mortality in patients with AVH over the long term follow up.

## CONCLUSIONS

The weekend's admission was not found to be associated with increased mortality of the patients with AVH. Moreover, the length of hospital stay, need of blood transfusion and rate of surgical intervention were similar on weekdays as well as weekend's admissions.

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