# Outcomes of Difficult Airway (DA) patients presenting with Upper Gastrointestinal Bleed (UGIB): 4-year retrospective study using National Inpatient Sample (2016-2019)

Sriram B. Chowdary MD, Dhruv Lowe MD, Abhinav Goyal MD, Divey Manocha MD, Soohwan Chun MD, Kishore Kumar MD, Birendra Amgai MD

## Introduction

Difficult airway patients presenting with upper gastrointestinal bleeding present unique challenge due to increased risk of respiratory complications such as from aspiration or from airway obstruction during anesthesia for urgent upper endoscopy. Limited data are available regarding clinical outcomes in difficult airway patients presenting with Upper gastrointestinal bleed.

## **Methods and Materials**

Using National Inpatient Sample databases from 2016 to 2019. We identified patients presenting with Upper gastrointestinal bleed, the population were then divided based on the presence and absence of difficult airway using appropriate ICD-10-CM/PCS codes. STATA 17.0 software was used for the analysis. Pearson's Chi-Square test was used to analyze categorical variable, whereas the student t-test was used to analyze continuous variables. Univariate and multivariate logistic regression was used to adjust for potential confounders. Primary outcome was in hospital mortality due to upper gastrointestinal bleed in patients with and without difficult airway.



COMORBIDITIES   CHF	TABLE 1: DEMOGRAPHIC CHARACTERISTICS AND OUTCOMES				
N (%)   N (%		UGIB With DA.	UGIB Without DA.	P value	
TOTAL (1555580) 140(0.000899) DEMOGRAPHICS  MEAN AGE (YEARS) 58.89±15.93 67.91±15.68 GENDER (FEMALE) (%) 20.02 (20.2) 731212 (47.01) 0.00 COMORBIDITIES  CHF 10(7.14) 372838(23.97) 0.00 ARRYTHMIA 50 (35.71) 490275(31.52) 0.6 CHRONIC PULMONARY DISEASE 25(17.86) 362729(23.32) 0.4 CHRONIC PULMONARY DISEASE 65(46.43) 266447(17.33) <0.00 COAGULOPATHY 16(11.32) 213406(13.72) <0.00 ANEMIA 20(14.29) 29300(19) 0.5 PULMONARY CIRCULATION DISORDERS 5(3.5) 166277(10.69) 0.22 RENAL FAILURE 15(10.71) 417949(26.87) 0.00 ANEMIA 20(14.29) 29300(19) 0.5 PULMONARY CIRCULATION DISORDERS 5(3.5) 166277(10.69) 0.22 RENAL FAILURE 15(10.71) 417949(26.87) 0.00 COAGULOPATHY 1004(74.07) 1079631(69.41) NON-CAUCASIAN (%) 104(74.07) 1079631(69.41)		•			
DEMOGRAPHICS   MEAN AGE (YEARS)   58.89±15.93   67.91±15.68   GENDER (FEMALE) (%)   20.02 (20.2)   731212 (47.01)   0.0	TOTAL (1555580)				
GENDER (FEMALE) (%)         20.02 (20.2)         731212 (47.01)         0.00           COMORBIDITIES           CHF         10(7.14)         372838(23.97)         0.0           ARRYTHMIA         50 (35.71)         490275(31.52)         0.6           CHRONIC PULMONARY DISEASE         25(17.86)         362729(23.32)         0.4           OBESITY         20(14.29)         199407(12.82)         0.8           LIVER DISEASE         65(46.43)         266447(17.33)         <0.0           COAGULOPATHY         16(11.32)         213406(31.72)         <0.0           ANEMIA         20(14.29)         29300(19)         0.5           PULMONARY CIRCULATION DISORDERS         5(3.5)         166277(10.69)         0.2           RENAL FAILURE         15(10.71)         417949(26.87)         0.0           CAUCASIAN (%)         104(74.07)         1079631(69.41)         0.0           CHARLSON CO-MORBIDITY INDEX         <0.0         777720(50)         0.0           CHARLSON CO-MORBIDITY INDEX         <0.0         777720(50)         0.0           PUMOYACIAL (%)         N (%)	· · · · · · · · · · · · · · · · · · ·	,	, ,		
GENDER (FEMALE) (%)         20.02 (20.2)         731212 (47.01)         0.00           COMORBIDITIES           CHF         10(7.14)         372838(23.97)         0.0           ARRYTHMIA         50 (35.71)         490275(31.52)         0.6           CHRONIC PULMONARY DISEASE         25(17.86)         362729(23.32)         0.4           OBESITY         20(14.29)         199407(12.82)         0.8           LIVER DISEASE         65(46.43)         266447(17.33)         <0.0           COAGULOPATHY         16(11.32)         213406(31.72)         <0.0           ANEMIA         20(14.29)         29300(19)         0.5           PULMONARY CIRCULATION DISORDERS         5(3.5)         166277(10.69)         0.2           RENAL FAILURE         15(10.71)         417949(26.87)         0.0           CAUCASIAN (%)         104(74.07)         1079631(69.41)         0.0           CHARLSON CO-MORBIDITY INDEX         <0.0         777720(50)         0.0           CHARLSON CO-MORBIDITY INDEX         <0.0         777720(50)         0.0           PUMOYACIAL (%)         N (%)	MEAN AGE (YEARS)	58.89±15.93	67.91±15.68		
COMORBIDITIES   CHF   10(7.14)   372838(23.97)   0.00   ARRYTHMIA   50 (35.71)   490275(31.52)   0.60   CHRONIC PULMONARY DISEASE   25(17.86)   362729(23.32)   0.40   0.00   0	GENDER (FEMALE) (%)	20.02 (20.2)	731212 (47.01)	0.00	
ARRYTHMIA CHRONIC PULMONARY DISEASE CHRONIC PULMONARY DISEASE 25(17.86) 362729(23.32) 0.4  OBESITY 20(14.29) 199407(12.82) 0.8  LIVER DISEASE 65(46.43) 266447(17.33) <0.0  COAGULOPATHY 16(11.32) 213406(13.72) <0.0  HYPERTENSION 80(57.84) 1202340(70.87) 0.0  ANEMIA 20(14.29) 29300(19) 0.5  PULMONARY CIRCULATION DISORDERS 5(3.5) 166277(10.69) 0.22  RENAL FAILURE 15(10.71) 417949(26.87) 0.0  ETHNICITY 0.  CAUCASIAN (%) 104(74.07) 1079631(69.41) NON-CAUCASIAN (%) 36(25.93) 475,809(30.59)  CHARLSON CO-MORBIDITY INDEX  CO.0  O-2 70(50) 777720(50)  PRIMARY OUTCOME N (%) N (%) P val  MORTALITY (%) 45(32.14) 36708(2.36) <0.001  SECONDARY OUTCOMES Mean P val  LENGTH OF STAY (DAYS) 6.035±5.02 4.288±4.45 0.00			,		
CHRONIC PULMONARY DISEASE       25(17.86)       362729(23.32)       0.4         OBESITY       20(14.29)       199407(12.82)       0.8         LIVER DISEASE       65(46.43)       266447(17.33)       <0.0         COAGULOPATHY       16(11.32)       213406(13.72)       <0.0         HYPERTENSION       80(57.84)       1202340(70.87)       0.0         ANEMIA       20(14.29)       29300(19)       0.5         PULMONARY CIRCULATION DISORDERS       5(3.5)       166277(10.69)       0.22         RENAL FAILURE       15(10.71)       417949(26.87)       0.0         CAUCASIAN (%)       104(74.07)       1079631(69.41)       0.0         NON-CAUCASIAN (%)       36(25.93)       475,809(30.59)       0.0         CHARLSON CO-MORBIDITY INDEX       <0.0       777720(50)       777720(50)         A OR >3       70(50)       777720(50)       777720(50)       P Val         MORTALITY (%)       45(32.14)       36708(2.36)       <0.001         SECONDARY OUTCOMES         Mean       P val         LENGTH OF STAY (DAYS)       6.035±5.02       4.288±4.45       0.0	CHF	10(7.14)	372838(23.97)	0.03	
OBESITY 20(14.29) 199407(12.82) 0.8  LIVER DISEASE 65(46.43) 266447(17.33) < 0.0  COAGULOPATHY 16(11.32) 213406(13.72) < 0.0  HYPERTENSION 80(57.84) 1202340(70.87) 0.0  ANEMIA 20(14.29) 29300(19) 0.5  PULMONARY CIRCULATION DISORDERS 5(3.5) 166277(10.69) 0.22  RENAL FAILURE 15(10.71) 417949(26.87) 0.0  ETHNICITY 0.0  CAUCASIAN (%) 104(74.07) 1079631(69.41)  NON-CAUCASIAN (%) 36(25.93) 475,809(30.59)  CHARLSON CO-MORBIDITY INDEX <0.0  CHARLSON CO-MORBIDITY INDEX <0.0  O-2 70(50) 777720(50)  FRIMARY OUTCOME  N (%) N (%) P val  MORTALITY (%) 45(32.14) 36708(2.36) <0.001  SECONDARY OUTCOMES  Mean P val  LENGTH OF STAY (DAYS) 6.035±5.02 4.288±4.45 0.00	ARRYTHMIA	50 (35.71)	490275(31.52)	0.63	
LIVER DISEASE   65(46.43)   266447(17.33)   <0.00   COAGULOPATHY   16(11.32)   213406(13.72)   <0.00   COAGULOPATHY   16(11.32)   213406(13.72)   <0.00   COAGULOPATHY   16(11.32)   213406(13.72)   <0.00   COAGULOPATHY   16(11.32)   213406(13.72)   <0.00   COAGULOPATHY   1202340(70.87)   0.00   COAGULA   1202340(70.87)   0.00   0.20   COAGULA   1202340(70.87)   0.00   0.20   COAGULA   1202340(70.87)   0.00   COAGULA   1202340(70.87)   0.00   COAGULA   1202340(70.87)   0.00   0.20   COAGULA   1202340(70.87)   0.00	CHRONIC PULMONARY DISEASE	25(17.86)	362729(23.32)	0.47	
COAGULOPATHY         16(11.32)         213406(13.72)         < 0.00           HYPERTENSION         80(57.84)         1202340(70.87)         0.00           ANEMIA         20(14.29)         29300(19)         0.5           PULMONARY CIRCULATION DISORDERS         5(3.5)         166277(10.69)         0.22           RENAL FAILURE         15(10.71)         417949(26.87)         0.0           ETHNICITY         0.         CAUCASIAN (%)         104(74.07)         1079631(69.41)           NON-CAUCASIAN (%)         36(25.93)         475,809(30.59)         CHARLSON CO-MORBIDITY INDEX         <0.0           CHARLSON CO-MORBIDITY INDEX         <0.0         777720(50)         777720(50)           PRIMARY OUTCOME           N (%)         N (%)         N (%)         P val           MORTALITY (%)         45(32.14)         36708(2.36)         <0.001           SECONDARY OUTCOMES           Mean         P val           LENGTH OF STAY (DAYS)         6.035±5.02         4.288±4.45         0.0	OBESITY	20(14.29)	199407(12.82)	0.81	
HYPERTENSION   80(57.84)   1202340(70.87)   0.00	LIVER DISEASE	65(46.43)	266447(17.33)	<0.00	
ANEMIA 20(14.29) 29300(19) 0.5 PULMONARY CIRCULATION DISORDERS 5(3.5) 166277(10.69) 0.22  RENAL FAILURE 15(10.71) 417949(26.87) 0.0 ETHNICITY 0.0 CAUCASIAN (%) 104(74.07) 1079631(69.41) NON-CAUCASIAN (%) 36(25.93) 475,809(30.59) CHARLSON CO-MORBIDITY INDEX <0.0 CHARLSON CO-MORBIDITY INDEX <0.0 PRIMARY OUTCOME N (%) N (%) P val MORTALITY (%) 45(32.14) 36708(2.36) <0.001  SECONDARY OUTCOMES Mean P val LENGTH OF STAY (DAYS) 6.035±5.02 4.288±4.45 0.00	COAGULOPATHY	16(11.32)	213406(13.72)	<0.00	
PULMONARY CIRCULATION DISORDERS         5(3.5)         166277(10.69)         0.22           RENAL FAILURE         15(10.71)         417949(26.87)         0.0           ETHNICITY         0.         0.0           CAUCASIAN (%)         104(74.07)         1079631(69.41)           NON-CAUCASIAN (%)         36(25.93)         475,809(30.59)           CHARLSON CO-MORBIDITY INDEX         <0.0           0-2         70(50)         777720(50)           PRIMARY OUTCOME         N (%)         N (%)         N (%)         P val           MORTALITY (%)         45(32.14)         36708(2.36)         <0.001           SECONDARY OUTCOMES           Mean         P val           LENGTH OF STAY (DAYS)         6.035±5.02         4.288±4.45         0.0	HYPERTENSION	80(57.84)	1202340(70.87)	0.09	
RENAL FAILURE 15(10.71) 417949(26.87) 0.00 ETHNICITY 0.00 CAUCASIAN (%) 104(74.07) 1079631(69.41) NON-CAUCASIAN (%) 36(25.93) 475,809(30.59)  CHARLSON CO-MORBIDITY INDEX <0.00 0-2 70(50) 777720(50)  PRIMARY OUTCOME  N (%) N (%) P val  MORTALITY (%) 45(32.14) 36708(2.36) <0.001  SECONDARY OUTCOMES  Mean P val  LENGTH OF STAY (DAYS) 6.035±5.02 4.288±4.45 0.00	ANEMIA	20(14.29)	29300(19)	0.53	
ETHNICITY   0.0.0	PULMONARY CIRCULATION DISORDERS	5(3.5)	166277(10.69)	0.223	
CAUCASIAN (%)       104(74.07)       1079631(69.41)         NON-CAUCASIAN (%)       36(25.93)       475,809(30.59)         CHARLSON CO-MORBIDITY INDEX       <0.0         0-2       70(50)       777720(50)         3 OR >3       70(50)       777720(50)         P Val         MORTALITY (%)       N (%)       N (%)       P Val         SECONDARY OUTCOMES         Mean       P Val         LENGTH OF STAY (DAYS)       6.035±5.02       4.288±4.45       0.0	RENAL FAILURE		417949(26.87)	0.05	
NON-CAUCASIAN (%)       36(25.93)       475,809(30.59)         CHARLSON CO-MORBIDITY INDEX       <0.0			1070621/60 41\	0.2	
CHARLSON CO-MORBIDITY INDEX < 0.0  0-2 70(50) 777720(50) 777720(50)  3 OR >3 70(50) 777720(50)  PRIMARY OUTCOME  N (%) N (%) P val  MORTALITY (%) 45(32.14) 36708(2.36) <0.001  SECONDARY OUTCOMES  Mean P val  LENGTH OF STAY (DAYS) 6.035±5.02 4.288±4.45 0.0			, ,		
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3 OR >3 70(50) 777720(50)  PRIMARY OUTCOME  N (%) N (%) P val  MORTALITY (%) 45(32.14) 36708(2.36) <0.001  SECONDARY OUTCOMES  Mean P val  LENGTH OF STAY (DAYS) 6.035±5.02 4.288±4.45 0.0			77770(50)	<b>\U.U</b> U	
PRIMARY OUTCOME           N (%)         N (%)         P val           MORTALITY (%)         45(32.14)         36708(2.36)         <0.001           SECONDARY OUTCOMES         Mean         P val           LENGTH OF STAY (DAYS)         6.035±5.02         4.288±4.45         0.0					
N (%)       N (%)       P val         MORTALITY (%)       45(32.14)       36708(2.36)       <0.001         SECONDARY OUTCOMES         Mean       P val         LENGTH OF STAY (DAYS)       6.035±5.02       4.288±4.45       0.0			777720(30)		
MORTALITY (%)       45(32.14)       36708(2.36)       <0.001			N (%)	P valu	
SECONDARY OUTCOMES           Mean         P val           LENGTH OF STAY (DAYS)         6.035±5.02         4.288±4.45         0.0	MORTALITY (%)				
Mean P val <b>LENGTH OF STAY (DAYS)</b> 6.035±5.02 4.288±4.45 0.0					
<b>LENGTH OF STAY (DAYS)</b> 6.035±5.02 4.288±4.45 0.0				P valu	
· · ·	LENGTH OF STAY (DAYS)		4.288+4.45	0.06	
	TOTAL CHARGE (US\$)	27111	13183	<0.00	

#### TABLE 2: IN PATIENT OUTCOMES IN DA GROUP PRESENTING WITH UGIB

Variables	Odds ratio	95% CI	P-value
In-patient mortality	5.06	1.62-15.81	<0.001
ALL EGD	0.425	0.131-1.378	<0.001
IR intervention	1.23	0.206-7.31	< 0.001
ICU Stay	34.641	13.61-88.11	<0.001
<b>Blood Products Transfusion</b>	0.935	.408-2.14	<0.001
Blakemore tube insertion	0.95	.373-2.458	<0.001

### References

Airway Management During Upper GI Endoscopic Procedures: State of the Art Review, Goudra et al Dig Dis Sci DOI 10.1007/s10620-016-4375-z

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## Results

Amongst total of 1555580 patients admitted with upper gastrointestinal bleed, 140 patients had diagnosis of difficult airway and 1555440 patients did not have difficult airway diagnosis, male gender and white ethnicity was predominant in both populations. The mean LOS was 6.035±5.02 days in difficult airway group, 4.288±4.45 in non-airway group, this result was statistically significant. The mean total hospitalization charges in difficult airway group were 27111\$, in the non-difficult airway group were 13183\$ and this was found to be statistically significant. There were 45(32.14%) and 36708(2.36%) mortality in patients with and without difficult airway diagnosis. The difference is statistically significant with OR:5.06, 95% CI: 1.62-15.81, and p < 0.001. Odds of using IR intervention and ICU admissions were higher and EGD were lower in difficult airway group, found to be statistically significant, as shown in table 2.

## Conclusion

Patient with diagnosis of difficult airway presenting with upper gastrointestinal bleed symptoms were younger, had higher healthcare utilization and were associated with higher inpatient mortality and complications.