Analysis of Alcohol Use Disorder in the Management and Outcomes of Laryngeal Malignancy

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Introduction

- Laryngeal malignancy (LM) comprises approximately one-third of all head and neck cancers and can be associated with cervical metastasis, dysphonia, or dyspnea.[1, 2, 3]
- Smoking, alcohol, and HPV are some of the most established risk factors for development of LM.[2,3]
- Role of alcohol use disorder (AUD) management, progression, and outcomes of LM is unclear.
- National Inpatient Sample is the largest inpatient care database with clinical and non-clinical data on over 7 million hospital stays.
- We conducted this database study to investigate the complex interaction between AUD, comorbidities, and patient outcomes.

Methods and Materials

- The 2017 National Inpatient Sample was queried using ICD-10 codes to identify adults with LM (C32) and AUD (F10.0-10.9, G62.1, I42.6, K29.2, K70.0-70.4, K70.9, O99.31).
- Univariate and multivariable analyses performed using Statistical Package for the Social Science (SPSS) to identify statistical associations.
- Logistic regression was done while controlling for demographic variables.

Table 1: Demographics of Laryngeal Malignancy by Alcohol Use Disorder Status

		No Alcohol Use Disorder	Alcohol Use Disorder	Total	*p*-value
		N = 5,960 87.3%	N = 865 12.7%	N = 6,825	
Age	Age, years (mean [SE])	63.93 [0.14]	60.25 [0.26]	63.46 [0.13]	**< 0.001**
Sex	Male (%)	76.8%	89.0%	78.3%	**< 0.001**
Race	White (%)	69.9%	64.3%	69.2%	**< 0.001**
	Black (%)	16.4%	24.6%	17.4%	
	Hispanic (%)	6.8%	5.8%	6.7%	
	Other (%)	6.9%	5.3%	6.7%	
Median Income Quartile – Patient Zip Code	0 – 25%	37.0%	46.2%	38.2%	**< 0.001**
	26 – 50%	27.4%	21.9%	26.7%	
	51 – 75%	21.2%	20.7%	21.1%	
	76 – 100%	14.4%	11.2%	14.0%	
Primary Payer Status	Medicare (%)	49.2%	39.3%	48.0%	**< 0.001**
	Medicaid (%)	22.4%	37.6%	24.4%	
	Private Insurance (%)	21.5%	13.9%	20.5%	
	Other (%)	6.8%	9.2%	7.1%	
Hospital Region	Northeast (%)	17.4%	13.3%	16.9%	**0.005**
	Midwest (%)	22.9%	25.4%	23.2%	
	South (%)	44.8%	43.9%	44.7%	
	West (%)	14.8%	17.3%	15.2%	
Hospital Location/ Teaching Status	Rural (%)	3.8%	4.0%	3.8%	0.912
	Urban Nonteaching (%)	10.2%	10.4%	10.3%	
	Urban Teaching (%)	86.0%	85.5%	85.9%	

Results

- Of the 6,825 inpatients identified, the majority were male (76.8%), White (69.9%), and without AUD (87.3%).
- AUD patients had higher incidences of pulmonary disorders, nutritional deficiencies, liver disease, and psychiatric comorbidities, while some metabolic conditions were less common in the AUD group.
- On multivariable analyses, AUD patients had greater length of stay number of procedures undergone, and less time until first procedure. They also had higher odds for blood transfusions, tracheostomy, mortality, respiratory failure, and bronchoscopy, tracheotomy.

Table 2: Comorbidities in Laryngeal Malignancy by Alcohol Use Disorder Status

	No Alcohol Use Disorder	Alcohol Use Disorder	Total	p-value
Hypertension	56.8%	56.6%	56.8%	0.935
Chronic Pulmonary Disease	42.4%	50.9%	43.5%	**< 0.001**
Nicotine Dependence	32.6%	65.3%	36.8%	**< 0.001**
Weight Loss	31.4%	50.9%	33.8%	**< 0.001**
Aphagia/Dysphagia	32.4%	41.6%	33.6%	**< 0.001**
Fluid and Electrolyte Disorders	27.3%	54.3%	30.7%	**< 0.001**
Lipoprotein Metabolism Disorders	28.6%	20.8%	27.6%	**< 0.001**
Metastatic Cancer	19.7%	22.5%	20.1%	0.052
Diabetes	20.5%	6.9%	18.8%	**< 0.001**
Deficiency Anemias	16.4%	25.4%	17.5%	**< 0.001**
Hypothyroidism	16.4%	9.8%	15.6%	**< 0.001**
Depression	11.2%	13.3%	11.5%	0.077
Laryngeal Diseases	11.5%	11.6%	11.5%	0.954
Solid Tumor without Metastasis	10.2%	10.4%	10.2%	0.818
Renal Failure	7.3%	1.7%	6.6%	**< 0.001**
Peripheral Vascular Disease	5.9%	2.3%	5.4%	**< 0.001**
Coagulopathy	3.1%	5.8%	3.4%	**< 0.001**
Liver Disease	2.9%	7.5%	3.4%	**< 0.001**
Drug Abuse	2.4%	4.6%	2.7%	**< 0.001**
Psychoses	2.2%	5.8%	2.6%	**< 0.001**
Rheumatoid arthritis	1.2%	0.0%	1.0%	**0.001**
Chronic Blood Loss anemia	0.7%	2.3%	0.9%	**< 0.001**

Table 3: Management, Charges, and Outcomes of Patients Diagnosed with Laryngeal Malignancy by Alcohol Abuse Status

		No Alcohol Use Disorder	Alcohol Use Disorder	Total	*p*-value
Total Charges	**Charges ($) (mean [SE])**	115,297.46 [1,570.63]	130,846.32 [4,418.80]	117,275.37 [1,482.82]	**< 0.001**
Length of Stay	**Number of Days (mean [SE])**	9.43 [0.12]	11.99 [0.386]	9.75 [0.12]	**< 0.001**
Number of Procedures	**Number of Procedures (mean [SE])**	5.27 [0.05]	5.68 [0.13]	5.33 [0.05]	**0.005**
Time Until 1st Procedure	**Number of Days (mean [SE])**	1.18 [0.04]	2.13 [0.19]	1.3 [0.41]	**< 0.001**
Tracheotomy	**Procedure (%)**	49.0%	59.0%	50.3%	**< 0.001**
Laryngoscopy	**Procedure (%)**	21.5%	20.8%	21.4%	0.655
Respiratory Failure	**Complication (%)**	16.4%	22.5%	17.2%	**< 0.001**
Bronchoscopy	**Procedure (%)**	8.1%	11.0%	8.5%	**0.005**
Acute Kidney Failure	**Complication (%)**	8.1%	5.2%	7.7%	**0.003**
Pneumonia	**Complication (%)**	7.4%	8.1%	7.5%	0.458
Respiratory Complications	**Complication (%)**	7.6%	6.4%	7.4%	0.211
Imaging	**Procedure (%)**	6.4%	6.9%	6.4%	0.530
Blood Transfusion	**Procedure (%)**	5.5%	6.9%	5.6%	0.077
Mortality	**Complication (%)**	3.0%	2.9%	4.8%	0.831
Sepsis	**Complication (%)**	3.0%	4.0%	3.2%	0.106
Skin and Subcutaneous Tissue Infections	**Complication (%)**	2.6%	4.0%	2.8%	**0.016**
Tracheostomy	**Procedure (%)**	2.5%	4.6%	2.8%	**< 0.001**
Urinary Tract Infection	**Complication (%)**	2.8%	2.3%	2.7%	0.440

Table 4: Adjusted Linear Multivariable and Logistic Regression Analyses (with Marginal Values and Odds Ratios) of Management and Outcomes of Laryngeal Malignancy by Alcohol Use Disorder Status

		Adjusted (AUD vs. reference No AUD)	95% Confidence Interval	*p*-value
Total Charges	**Charges (Marginal $)**	5,470.12	[-3,539.83 to 14,480.07]	0.234
Length of Stay	**Length of Stay (Marginal days)**	1.64	[0.92 to 2.36]	**< 0.001**
Number of Procedures	**Procedures (Marginal number)**	0.33	[0.04 to 0.62]	**0.028**
Time Until 1st Procedure	**Time (Marginal days)**	0.90	[0.65 to 1.16]	**< 0.001**
Blood Transfusions	**Procedure (OR)**	1.83	[1.35 to 2.48]	**< 0.001**
Tracheostomy	**Procedure (OR)**	1.75	[1.20 to 2.56]	**0.004**
Mortality	**Complication (OR)**	1.74	[1.10 to 2.74]	**0.017**
Sepsis	**Complication (OR)**	1.44	[0.98 to 2.13]	0.066
Respiratory Failure	**Complication (OR)**	1.43	[1.19 to 1.72]	**< 0.001**
Urinary Tract Infection	**Complication (OR)**	1.40	[0.85 to 2.30]	0.182
Skin and Subcutaneous Tissue Infections	**Complication (OR)**	1.39	[0.94 to 2.07]	0.101
Bronchoscopy	**Procedure (OR)**	1.38	[1.08 to 1.76]	**0.010**
Tracheotomy	**Procedure (OR)**	1.36	[1.17 to 1.59]	**< 0.001**
Respiratory Complications	**Complication (OR)**	1.05	[0.78 to 1.42]	0.750
Pneumonia	**Complication (OR)**	0.92	[0.70 to 1.21]	0.560
Laryngoscopy	**Procedure (OR)**	0.91	[0.76 to 1.10]	0.345
Imaging	**Procedure (OR)**	0.87	[0.64 to 1.18]	0.366
Acute Kidney Failure	**Complication (OR)**	0.80	[0.58 to 1.11]	0.190

Covariables: age, race, household income, primary payer status, hospital region, hospital location & teaching status, metastatic cancer incidence

Conclusions

- There is a significant impact of alcohol use disorder on management, outcomes, and healthcare utilization.
- Our study reveals a significant association between AUD and advanced disease burden.
- Patients with AUD experience increased rates of medical complications, longer hospital stays, and more frequent procedures even after adjusting for demographic factors and comorbidities.
- Limitations of this study include the retrospective nature of the study design and potential documentation bias due to reliance on billing codes.
- The nature of an inpatient database makes it difficult to assess severity of malnutrition or progression of disease over time.
- Prospective or natural history studies should be done in the future to investigate the direct impact of nutrition and improve targeted management strategies.

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