Social determinants of health predict the severity and prognosis of iatrogenic tracheal stenosis

Rebecca Ho, BA[1], Michael Moentmann, MD[2], Kenneth Yan, MD, PhD[2]

[1]New Jersey Medical School, Newark, NJ, 07103I [2]Department of Otolaryngology, Newark, NJ, 07103

Learning Objectives

- Investigate different sociodemographic factors associated with the severity of iatrogenic tracheal stenosis (ITS), frequency of tracheal dilations, and eventual decannulation.
- Identify and increase awareness of vulnerable populations to more severe outcomes of ITS

Setting

- Retrospective chart review at an academic institution in New Jersey

Background

- SDH are related to patient morbidity/mortality and disparities due to differing abilities to access care.
- Prolonged intubation is the most common cause of ITS
- Previous studies have measured patient outcomes solely via the status of decannulation or tracheostomy
- This study aims to measure SDH effects on patients using the metric of tracheostomy. dependence, but also severity of stenosis and frequency of tracheal dilations.

Methods

- Patients who had prolonged intubation and a diagnosis of TS between the years of 2017 and 2023 were included.
- Demographics, socioeconomic factors, stenosis severity, and treatment course were collected.
- Subjects were classified as having Cotton-Myer Grade IV (CMG IV) vs. Cotton-Myer Grade I-III (CMG I-III) and being decannulated vs. persistent tracheostomy dependence.
- Tracheal dilation frequency per year was also calculated.
- Chi-square, t-test, and ANOVA statistical analyses were performed using JASP with statistical significance of p=.05.

Results

- 52 patients met inclusion criteria - Mean age was 50.4 (range 23-85), 40.4% were female, 40.4% were former or active smokers.
- Those with CMG IV had a significantly higher BMI when compared to CMG I-III (p=.042).
- .Hispanic patients were significantly associated with more severe stenosis (Cotton-Myer Grade IV) compared to all other races (p=.003)
- Patients with public insurance were less likely to be decannulated compared to patients with all other insurances, including those privately insured and uninsured (p=.022).
- Insurance overall was significantly associated with having more frequent dilations, namely, those who are uninsured had more frequent dilations per year compared to those with public insurance (p=.032).

Cotton-Myer Grade

Table 1: Cotton-Myer Grade vs. Height and BMI

Variable	CMG IV	CMG I-III	p-value
Height (cm)	164.233 ± 8.790	168.295 ± 9.008	0.226
BMI (kg/m^2)	36.710 ± 8.693	30.585 ± 7.767	**0.042**

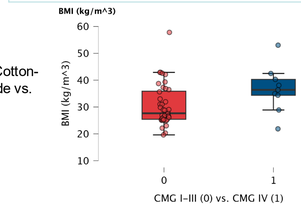


Figure 1: Cotton-Myer Grade vs. BMI

Table 2: Cotton-Myer Grade vs. Race and Insurance

Category	Variable	Cotton-Myer Grade IV n (%)	Cotton-Myer Grade I-III n (%)	Pairwise p-values
Race	White, NH	1 (10)	9 (90)	0.444
	Others	8 (20.513)	31 (79.487)	
	Black, NH	2 (11.765)	15 (88.235)	0.384
	Others	7 (21.875)	25 (78.125)	
	Hispanic	7 (41.176)	10 (58.824)	**0.003**
	Others	2 (6.250)	30 (93.750)	
	Asian	0 (0)	4 (100)	0.322
	Others	9 (20)	36 (80)	

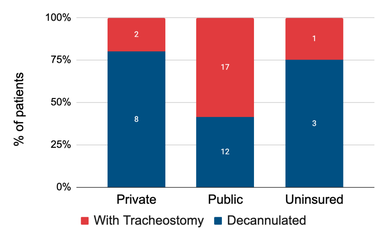
Category	Variable	Cotton-Myer Grade IV n (%)	Cotton-Meyer Grade I-III n (%)	Pairwise p-values
Insurance	Private	0 (0)	8 (100)	0.142
	Others	9 (21.951)	32 (78.049)	
	Public	7 (19.444)	29 (80.556)	0.746
	Others	2 (15.385)	11 (84.615)	
	Uninsured	2 (40)	3 (60)	0.187
	Others	7 (15.909)	37 (84.091)	

Decannulation Status

Table 3: Decannulation vs. persistent tracheostomy among race/ethnicity and insurance

Category	Variable	Decannulation	Tracheostomy	Pairwise p-values
Race	White, NH	6 (75)	2 (25)	0.176
	Others	17 (48.571)	18 (51.429)	
	Black, NH	5 (38.462)	8 (61.538)	0.193
	Others	18 (60)	12 (40)	
	Hispanic	7 (46.667)	8 (53.333)	0.512
	Others	16 (57.143)	12 (42.857)	
	Asian	1 (25)	3 (75)	0.230
	Others	22 (56.410)	17 (43.590)	

Figure 2: Decannulation status by insurance type



Frequency of Dilations

Figure 3: Average frequency of dilations per year vs. insurance type

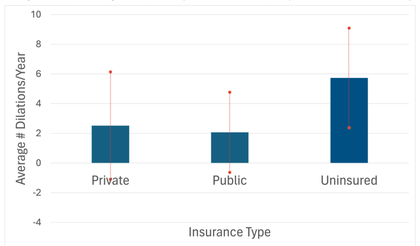


Table 4: Dilation frequency among race/ethnicity and insurance types

Category	Variable	Mean dilations/year	n	p-value
Race	White, NH	1.864 ± 2.511	10	.061
	Black, NH	1.904 ± 2.999	16	
	Hispanic	2.791 ± 2.511	18	
	Asian	6.429 ± 4.430	4	
Insurance	Private	2.520 ± 3.617	10	**.041**
	Public	2.068 ± 2.700	37	
	Uninsured	5.732 ± 3.355	5	

Discussion

- Patient with higher BMI being at increased risk of CMG IV potentially explained by higher cuff pressure requirements
- Our Hispanic patients face impediments to high-quality treatment and preventative medicine and thus have higher morbidity for tracheal stenosis.
- Uninsured patients paradoxically have more frequent dilations
  - Uninsured patients in our population are approved for the hospital's "charity care" program, not charged for services
  - Fewer barriers to surgical treatment, but barriers to outpatient care (unaffordable tracheostomy supplies, skilled nursing, or home health care)
  - Those without insurance may have less success with preventative care
- Failure of decannulation and public insurance represents the financial and social burden for those with lower socioeconomic status.

Conclusion

- Hispanic patients have more severe disease when compared to counterparts from other racial groups.
- Uninsured populations require more frequent invasive interventions, presumably because of barriers to appropriate non-surgical management.
- ITS patients with public insurance, a rough proxy for lower socioeconomic status, are more likely to be tracheostomy dependent.
- We highlight the importance of considering each patient's social and economic context when managing iatrogenic tracheal stenosis.
- Early identification and abatement of barriers to high-quality care could improve outcomes in these at-risk groups.

References

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