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Cardioversion for Atrial Fibrillation in Hypertrophic Cardiomyopathy, Insight from National Inpatient Sample

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Introduction

- Anticoagulation for stroke prevention in atrial fibrillation (AF) is indicated in all hypertrophic cardiomyopathy (HCM) patients, regardless of CHA2DS2-VASc2 score.

Guttmann OP, Rahman MS, O'Mahony C, Anastasakis A, Elliott PM. Atrial fibrillation and thromboembolism in patients with hypertrophic cardiomyopathy: systematic review. Heart. 2014;100:465–472. https://doi.org/10.1136/ heartjnl-2013-304276

Ommen SR, Mital S, Burke MA, et al. 2020 AHA/ACC guideline for the diagnosis and treatment of patients with hypertrophic cardiomyopathy: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2020;76:e159–e240. https://doi.org/10.1016/j.jacc. 2020.08.045

Introduction (cont.)

- AF is poorly tolerated in the setting of HCM, due to its impact on left ventricular filling and cardiac output. As well as risk of sudden cardiac death.
- Hence, HCM patients in AF, often undergo direct current cardioversion (DCCV), sometimes without transesophageal echocardiography (TEE) guidance.

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Cardiac Arrest in an Adolescent With Atrial Fibrillation and Hypertrophic Cardiomyopathy

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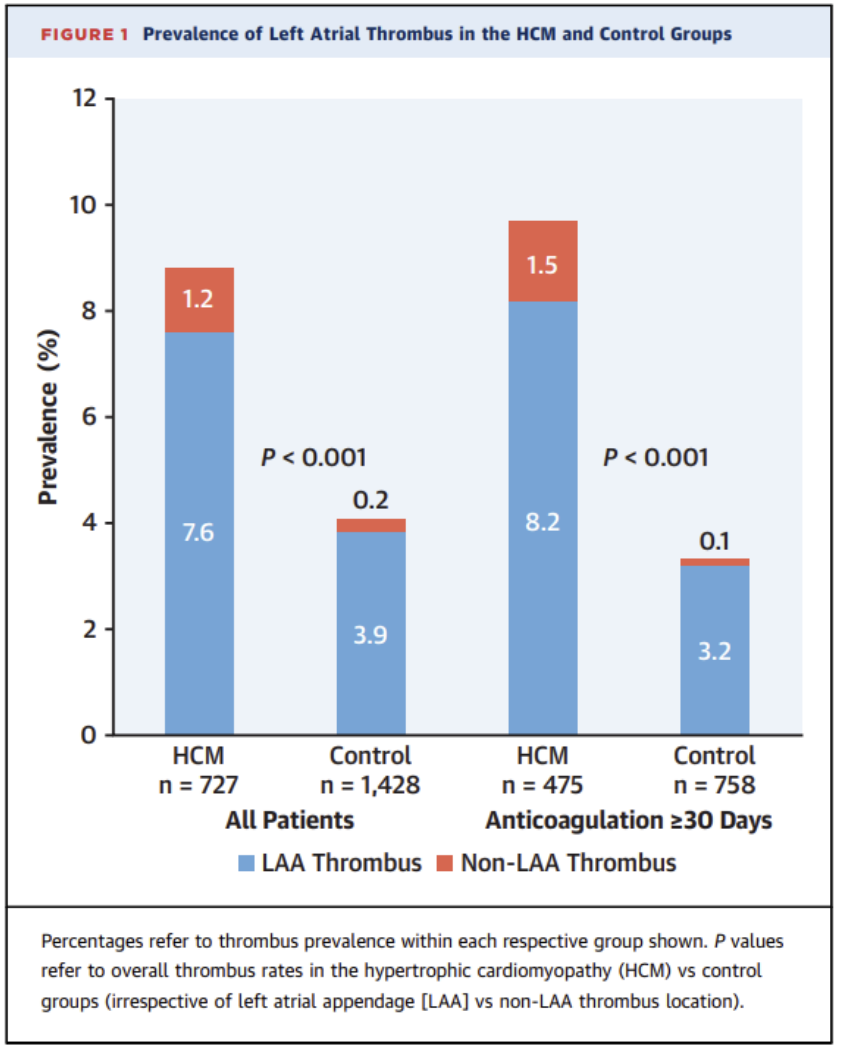
A 15 year old youth, who presented with out-of-hospital cardiac arrest due to documented ventricular fibrillation, was found to have nonobstructive hypertrophic cardiomyopathy. Electrophysiologic study demonstrated inducible sustained atrial fibrillation with a rapid ventricular response. This rhythm, associated with hypotension and evidence of myocardial ischemia, spontaneously degenerated into ventricular fibrillation. No ventricular arrhythmias were inducible by programmed ventricular stimulation. Therapy with metoprolol and verapamil slowed the ventricular rate during atrial fibrillation and maintained hemodynamic stability, both during follow-up electrophysiologic study and during a subsequent spontaneous episode.

(J Am Coll Cardiol 1986;7:701–4)

Introduction

Letters

Risk of Left Atrial Thrombus in Patients With Hypertrophic Cardiomyopathy and Atrial Fibrillation



Burczak D, Julakanti R, Kara Balla A, et al. Risk of Left Atrial Thrombus in Patients With Hypertrophic Cardiomyopathy and Atrial Fibrillation. J Am Coll Cardiol. 2023 Jul, 82 (3) 278–279. https://doi.org/10.1016/j.jacc.2023.05.021

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Persistence of left atrial thrombus in patients with hypertrophic cardiomyopathy and atrial fibrillation

Daniel R. Burczak, Christopher G. Scott, Raghav R. Julakanti, Abdalla Kara Balla, William H. Swain, Khaled Ismail, Jeffrey B. Geske, Ammar M. Killu, Abhishek J. Deshmukh, Ciorsti J. MacIntyre, Steve R. Ommen, Vuyisile T. Nkomo, Bernard J. Gersh, Peter A. Noseworthy & Konstantinos C. Siontis

Journal of Interventional Cardiac Electrophysiology (2023) | Cite this article

Burczak, D.R., Scott, C.G., Julakanti, R.R. et al. Persistence of left atrial thrombus in patients with hypertrophic cardiomyopathy and atrial fibrillation. J Interv Card Electrophysiol (2023). https://doi.org/10.1007/s10840-023-01642-5

Objective

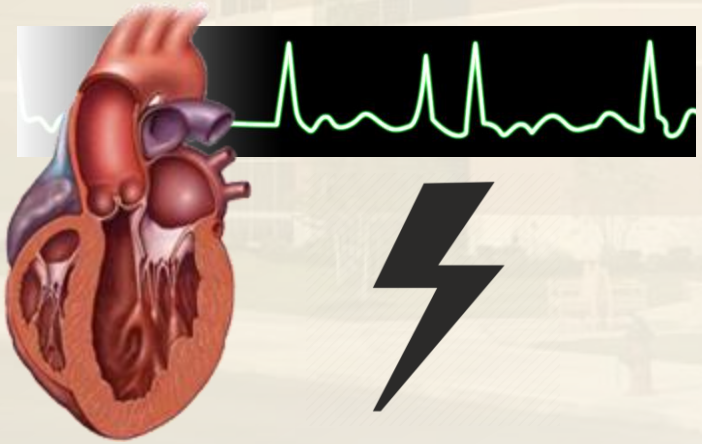
- Examine utilization of DCCV, TEE guidance and outcomes in hospitalized AF patients with and without HCM.

Methods

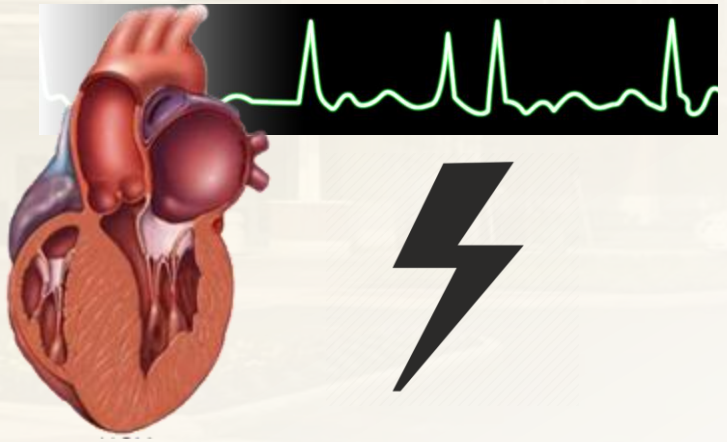
- National Inpatient Sample (NIS) database for years 2016-2018 was analyzed using STATA MP 14.
- Uni- and multivariate regression models were used to find predictors of outcome.
- Interaction analysis was carried out to delineate the effect of TEE guidance on outcome in each group (HCM vs non-HCM).

Results

# Discharges	# AF	# HCM	# DCCV	# DCCV in HCM
~21M	~1.26M	148,490	292,420	2,980



N= 289,440



N= 2,980

Outcome

We studied

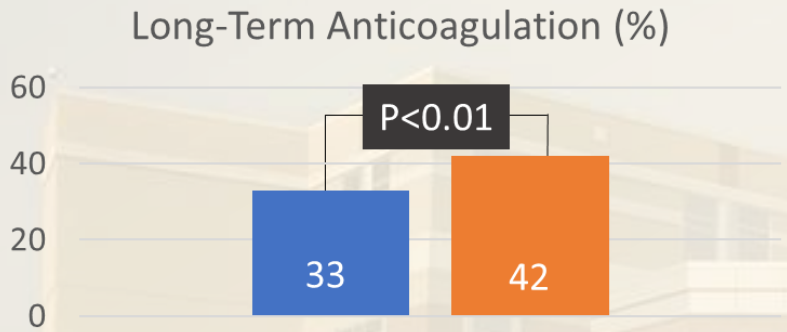
- In-hospital mortality
- Length of stay “LOS”
- Total hospital charges “TOTCH”

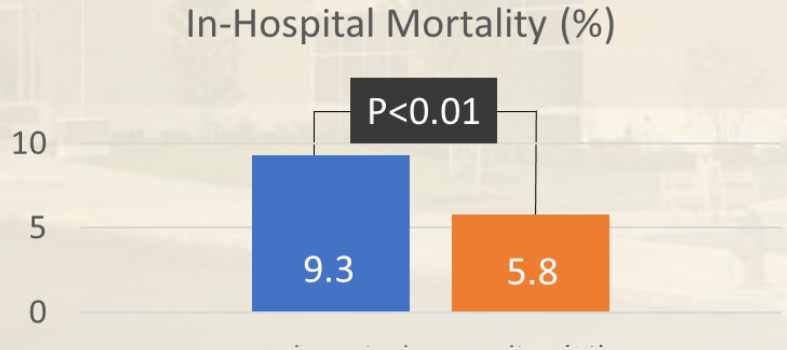
Did NOT study

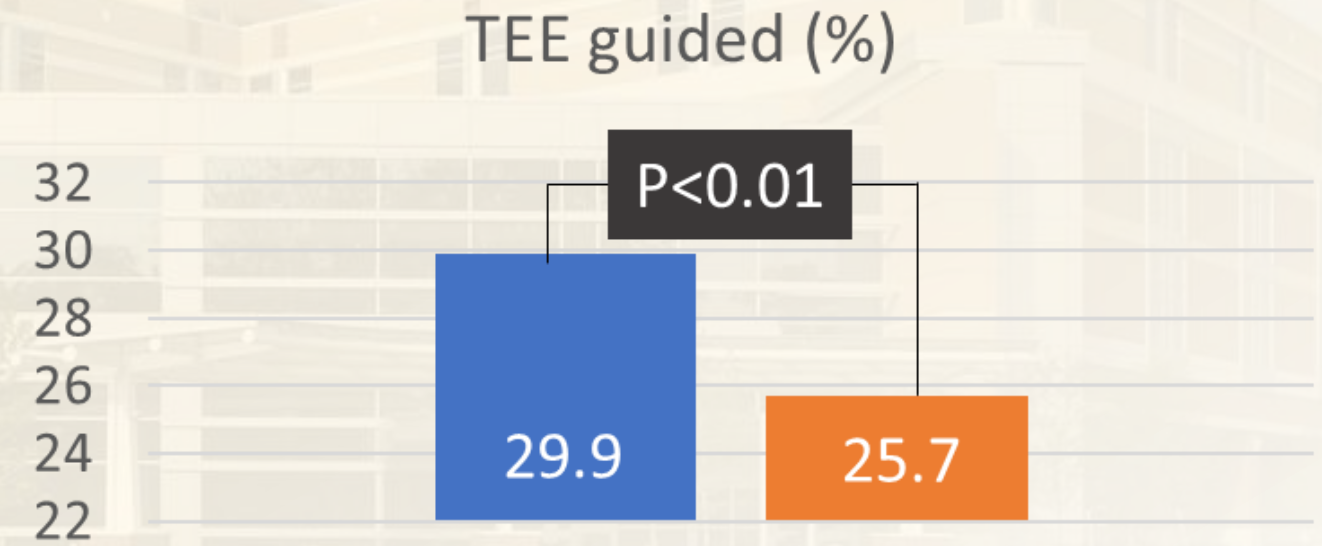
- DCCV-related stroke
- DCCV success

Table 1

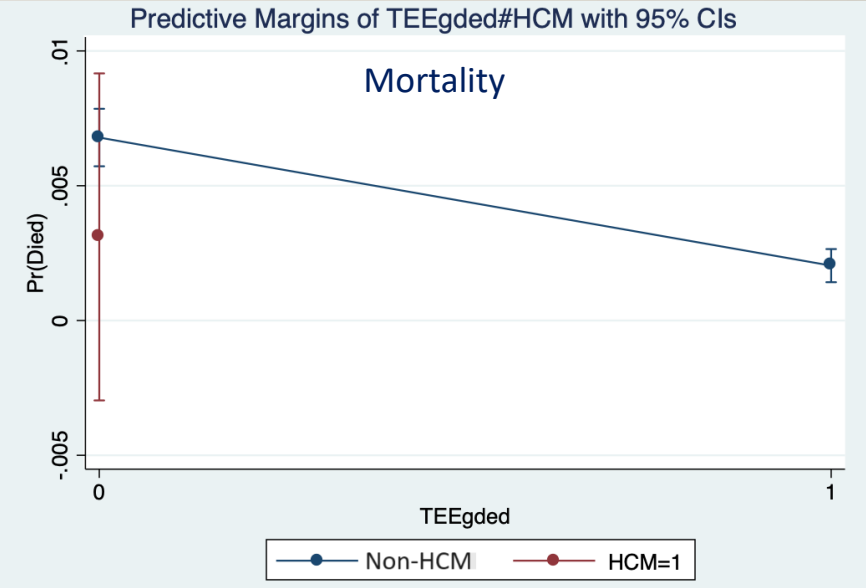
	No HCM (n=289,440)	HCM (n=2,980)	p
Age (yr)	69	64.9	<0.01
Female (%)	37.4	49.2	<0.01
In-hospital mortality (%)	9.3	5.8	<0.01
TEE guided (%)	29.9	25.7	<0.01
Long-term anticoagulation (%)	33	42	<0.01
Intracardiac thrombus (%)	0.57	0.5	0.84
Comorbid CVA (%)	0.28	0.17	0.61
Mean LOS (day)	**8**	**8.2**	**0.62**
Total Hospital Charges ($)	**124,722**	**134,937**	**0.29**
Elective admission (%)	**16.2**	**19**	**0.34**
Race (%)			
White	81.1	77.7	0.44
Black	9.5	11.5	
Hispanic	5.4	5.9	
Asian or Pacific Islander	1.7	1.9	
Native American	0.3	0.5	
Other	2	2.4	
Median household income national quartile for zip code (%)			
0-25th	26.5	18.9	<0.01
26th -50th	26.9	29.2	
51st -75th	25.4	28.9	
76th-100th	21.3	23.1	
Location/teaching status of hospital (%)			
Rural	6.1	3.9	<0.01
Urban nonteaching	20.3	14.9	
Urban Teaching	73.6	81.2	
Bed size of hospital (%)			
Small	14.9	13.8	0.1
Medium	27.3	23.8	
Large	57.8	62.4	
Region of hospital (%)			
Northeast	17.4	20.6	<0.01
Midwest	27.1	31.7	
South	39	31.9	
West	16.6	15.8	
Mean Charlson Index of Comorbidities	2.82	2.56	<0.01

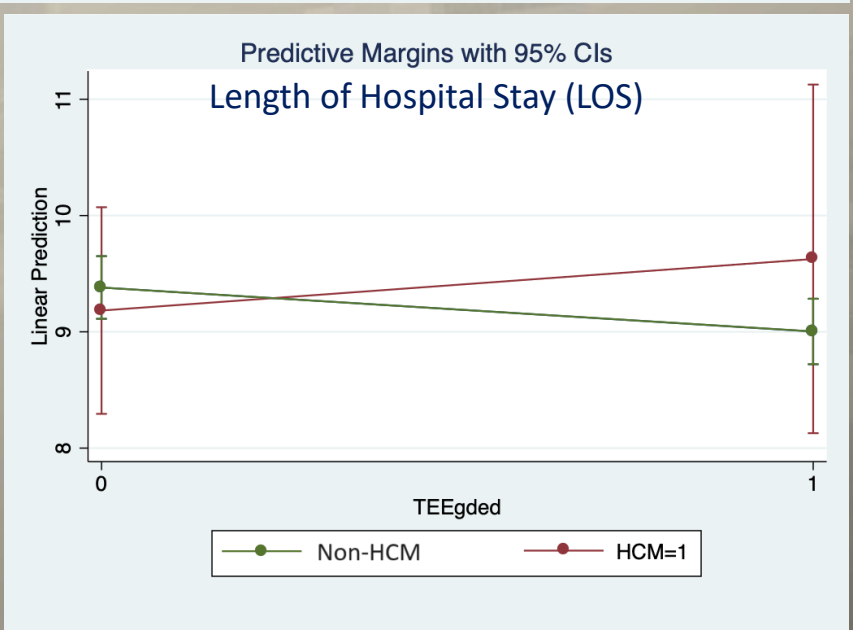

Long-Term Anticoagulation (%)
60
40
20
0
P<0.01
33
42

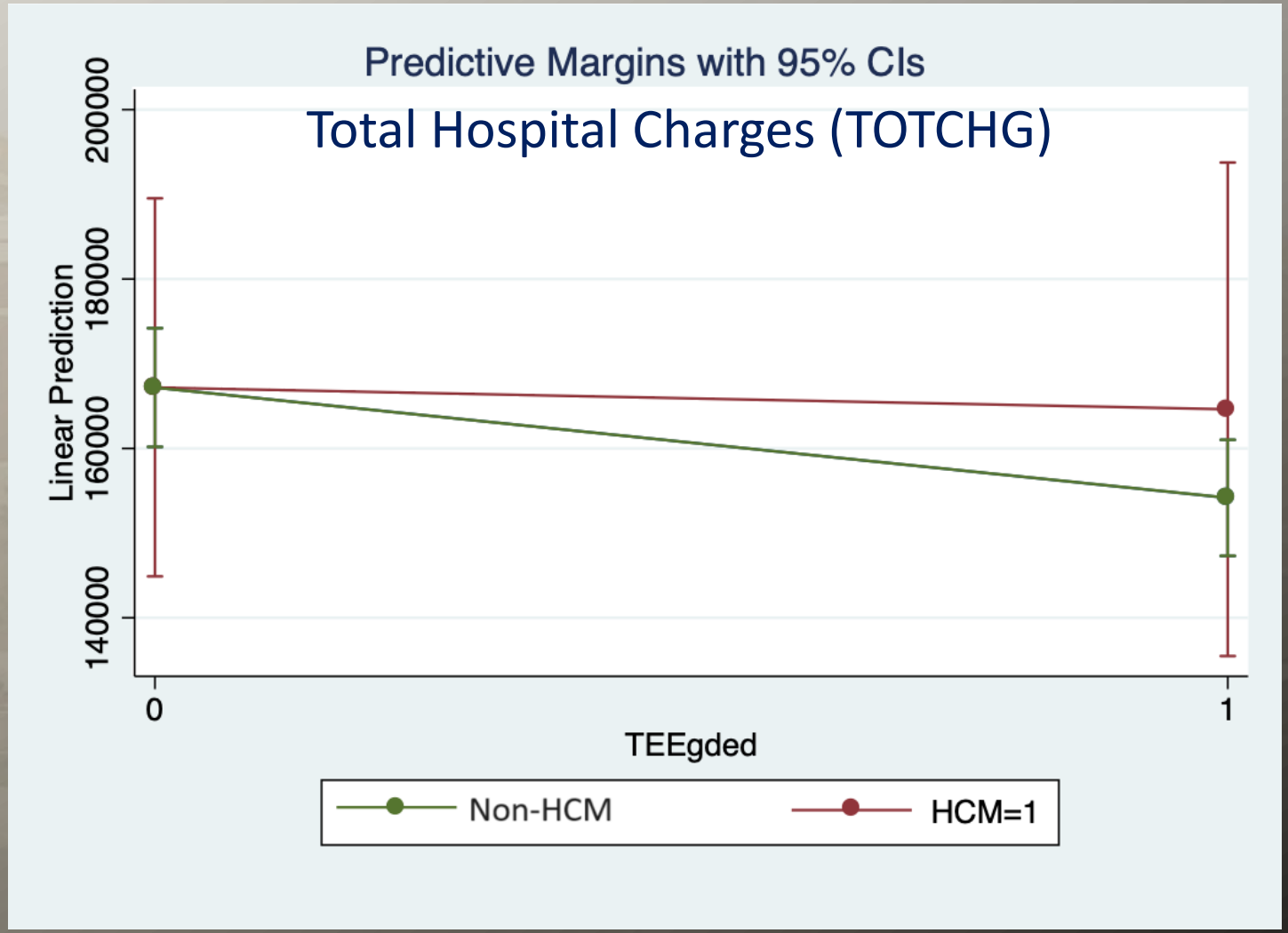

In-Hospital Mortality (%)
10
5
0
P<0.01
9.3
5.8


TEE guided (%)
32
30
28
26
24
22
P<0.01
29.9
25.7

Interaction Analysis







Discussion

- Most baseline characteristics are consistent with known epidemiology of HCM (younger, more females, fewer co-morbidities).
- The rate of ICT was similar in both groups. Among patients whose primary discharge diagnosis was AF, HCM patients had a slightly higher prevalence of ICT, but the difference was not statistically significant (0.68% vs 0.37%, p=0.22).

Discussion (cont)

- Reported long-term anticoagulation rates were less than expected in both groups. Inclusion of patients with newly diagnosed AF in the cohorts could partially explain this. Available data is limited to use or lack of LTA and does not include individual medications, likely contributing to this apparent under utilization of LTA.
- TEE guidance predicted decreased mortality and LOS in non-HCM patients. In non-HCM patients, despite use of an additional procedure, TEE guidance predicted less total hospital charges (TOTCH)
- A similar effect was not seen among HCM patients.

Limitations

- Analysis of CVA incidence after DCCV was not attempted due to lack of timestamp for diagnoses (including CVA) in NIS database.
- NIS uses hospital discharge rather than patient ID as unique identifiers and patients with AF tend to have readmissions.
- Smaller sample size of HCM patients.

Conclusion

While TEE guidance prior to DCCV for AF predicted better outcomes in Non-HCM patients, it surprisingly did not impact outcomes among HCM patients. Prospective studies on DCCV outcome in HCM patients are needed.

شكرًا Thank you

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Supplemental

	Mortality			LOS			TOTCHG		
Variable	OR	Std. Err.	p	Coef	Std. Err.	p	Coef	Std. Err.	p
Age	1.02	0.00	<0.01	-0.04	0.01	<0.01	-1088	104	<0.01
Female	1.00	0.03	0.95				-5379	1763	<0.01
Elective admission	0.50	0.03	<0.01	-0.32	0.11	0.01	44213	2876	<0.01
White race									
Black	1.67	0.09	<0.01	1.18	0.17	<0.01	13993	3693	<0.01
Hispanic	1.29	0.08	<0.01	1.13	0.24	<0.01	47599	5470	<0.01
Asian or Pacific Islander	1.82	0.17	<0.01	1.22	0.38	<0.01	54331	13947	<0.01
Native American	1.58	0.38	0.06	0.75	0.73	0.30	-11039	12187	0.37
Other	1.53	0.15	<0.01	1.39	0.40	<0.01	54408	8477	<0.01
0-25th income quartile									
26th -50th	0.84	0.04	<0.01	-0.30	0.12	0.01	-1139	2435	0.64
51st -75th	0.81	0.04	<0.01	-0.52	0.12	<0.01	-1983	2382	0.41
76th-100th	0.83	0.04	<0.01	-0.55	0.12	<0.01	8099	3216	0.01
Rural									
Urban nonteaching	1.29	0.11	<0.01	1.20	0.18	<0.01	40862	3192	<0.01
Urban Teaching	1.59	0.13	<0.01	2.75	0.19	<0.01	70266	3402	<0.01
Small bed size									
Medium	1.09	0.06	0.15	0.74	0.12	<0.01	19135	3150	<0.01
Large	1.26	0.07	<0.01	2.06	0.13	<0.01	46252	3502	<0.01
Northeast region									
Midwest	1.03	0.06	0.64	0.27	0.18	0.14	-3420	4180	0.41
South	0.98	0.05	0.75	0.20	0.14	0.18	3029	3903	0.44
West	1.25	0.07	<0.01	-0.08	0.16	0.63	66891	8117	<0.01
Long Term Anticoagulation	0.37	0.02	<0.01	-2.54	0.08	<0.01	-54356	1790	<0.01
Intracardiac thrombus	1.52	0.28	0.03	3.63	0.66	<0.01	66948	15367	<0.01
Interaction between TEE guidance and HCM									
TEEgded=0*HCM=1	0.64	0.12	0.02	-0.20	0.45	0.66	-13031	2306	<0.01
TEEgded=1*HCM=0	0.15	0.01	<0.01	-0.38	0.10	<0.01	20	11293	1.00
TEEgded=1*HCM=1	0.10	0.07	<0.01	0.25	0.76	0.75	-2567	14845	0.86

Supplemental 2