

# **Bariatric Surgery Improves Outcomes of Future Inpatient Admissions of Patients with Type 2 Diabetes Mellitus: an analysis of hospital inpatient admissions in Oklahoma**

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# Financial Disclosures

Company Name

Nature of Relationship

Fujifilm Medical  
Systems

Consultant



# Introduction

- Type 2 diabetes mellitus (T2DM) is associated with obesity and lifestyle. Social factors affecting healthcare play a role in the incidence and prevalence of T2DM.
- Oklahoma is uniquely impacted by these social determinants.
- Oklahoma has a high rate of obesity (36.4%), fourth state after West Virginia, Kentucky, and Alabama.
- Treatment of obesity can improve T2DM. Bariatric surgery as the most effective treatment of obesity is associated with remission of T2DM in 50-80% of patients.



# Purpose

- Evaluate impact of type 2 diabetes mellitus (T2DM) on hospital admission rates and utilization of inpatient services.
- Evaluate impact of prior bariatric surgery on subsequent hospital utilization.



# Methods

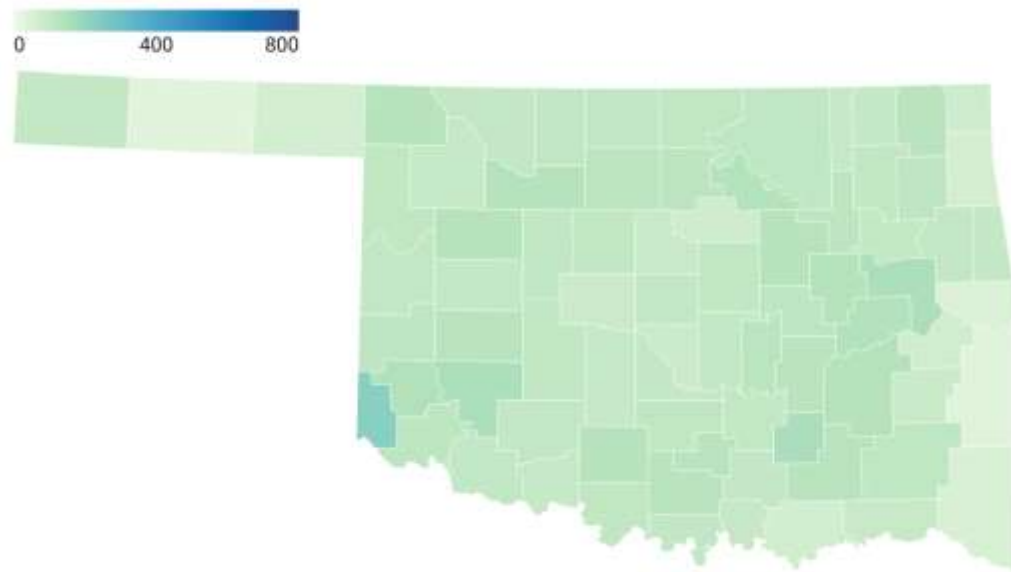
- The Oklahoma Inpatient Discharge Public Use File, managed by Oklahoma's Department of Health, reports on hospital admissions in the state from 139 out of 141 inpatient facilities.
- From 2016-19, admissions data was categorized with and without T2DM and stratified by ICD-10 diagnosis codes and CPT procedure codes.
- Patients less than or equal to 20 years of age were excluded. Patients with charges less than \$100, and invalid lengths of stay were excluded.



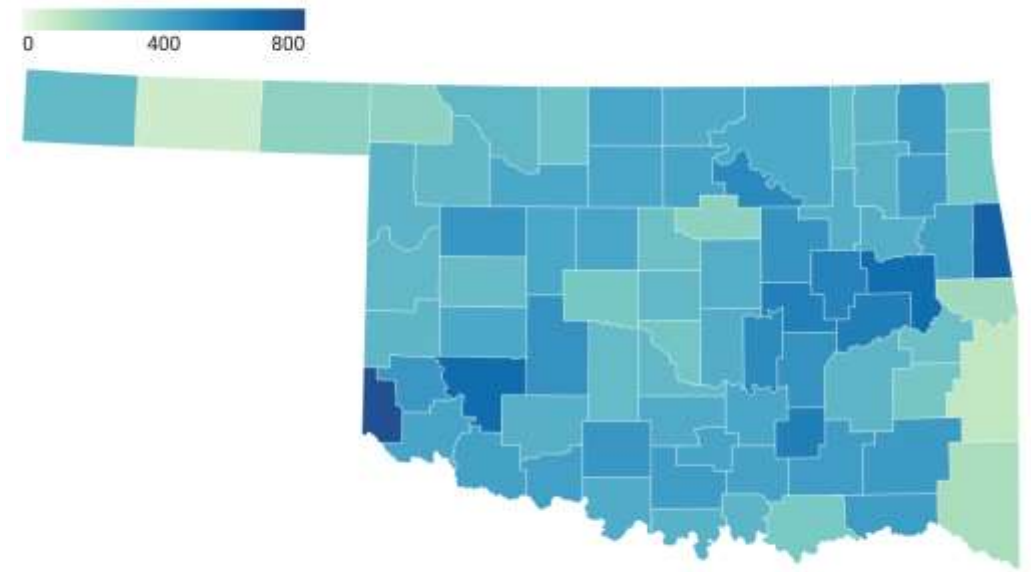
# Results

- 409,599 (27.0%) of 1,516,111 admissions were of patients with T2DM.
- The overall annual hospitalization rate for diabetic adult Oklahomans was 332 per 1000, compared to 125 per 1000 for non-diabetics.

Non-T2DM Hospitalization Rate per 1000 Non-T2DM Adults

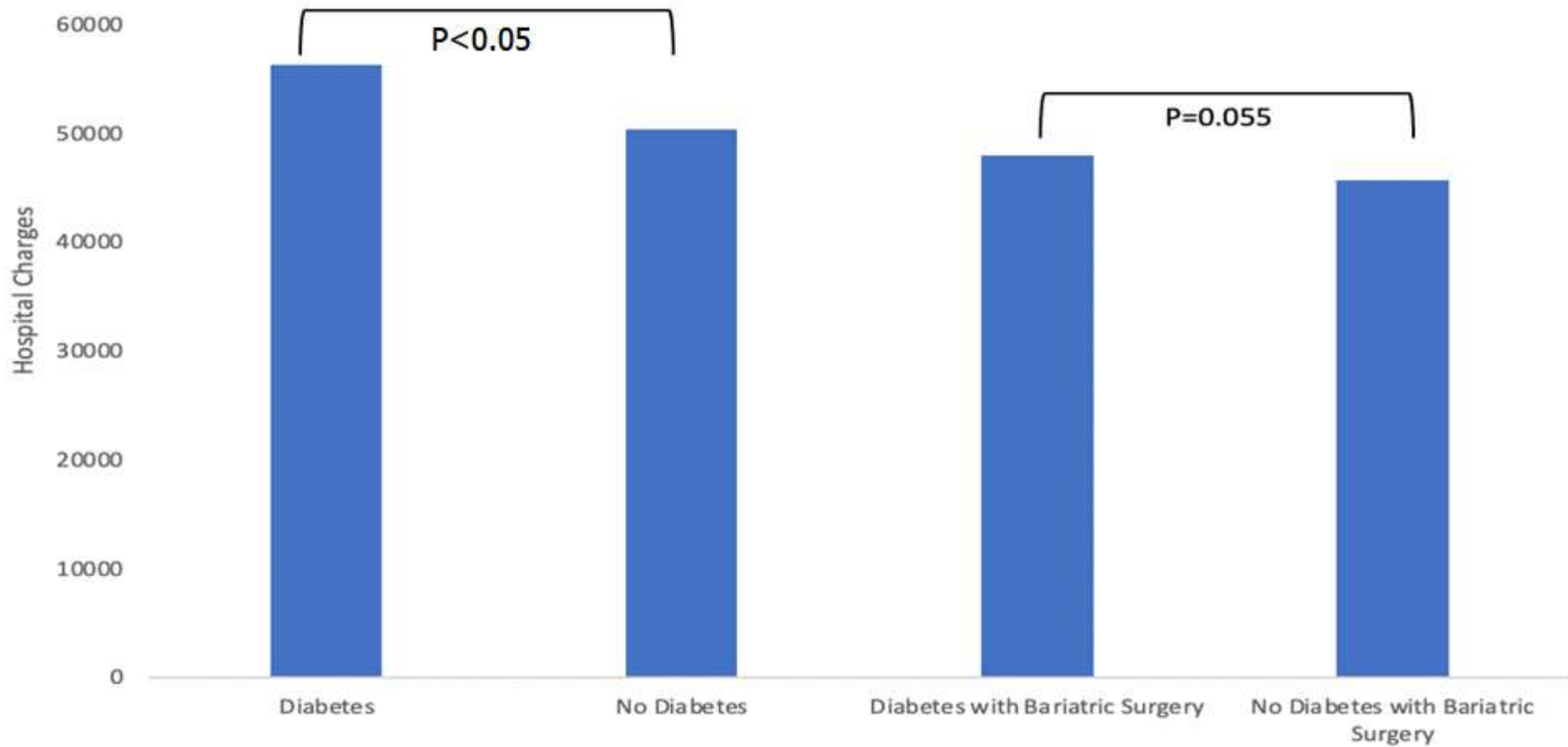


T2DM Hospitalization Rate per 1000 T2DM Oklahomans



# Results

- Patients with T2DM had a longer hospital stay of 5.8 v 4.9 days ( $P < 0.001$ ) and average charges of \$56,300 v \$50,400 ( $P < 0.001$ ) when compared to patients without T2DM.





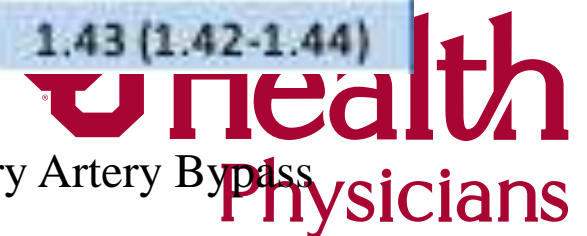
# Results

- Diabetes was associated with an increased risk of severe conditions and significant procedures during admission in Oklahoma from 2016 to 2019

Diagnosis/Procedure	Diabetic (%) N=	Non-Diabetic (%) N=	RR (95% CI)
Acquired Limb Loss	12299 (3.0%)	6632 (0.6%)	5.01 (4.98-5.04)
AKI	100537 (24.5%)	144826 (13.1%)	1.88 (1.87-1.88)
Heart Failure	125571 (30.7%)	156724 (14.2%)	2.16 (2.16-2.17)
Acute MI	23912 (5.8%)	38848 (3.5%)	1.66 (1.65-1.67)
Subsequent MI	180 (0.0%)	277 (0.0%)	1.75 (1.66-1.86)
Lower Limb Amputation	6994 (1.7%)	2336 (0.2%)	8.09 (8.04-8.14)
Upper Limb Amputation	306 (0.1%)	357 (0.0%)	2.32 (2.22-2.41)
CABG	5505 (1.3%)	6640 (0.6%)	2.24 (2.22-2.26)
Central Line	26300 (6.4%)	49605 (4.5%)	1.43 (1.42-1.44)

All data was statistically significant ( $p < 0.05$ )

AKI = Acute Kidney Injury, MI = Myocardial Infarction, CABG=Coronary Artery Bypass Graft





# Results

- Bariatric surgery was associated with reduced risk of severe conditions on and significant procedures during admission

Diagnosis/Procedure	Diabetic/Not-diabetic	Bariatric surgery(%)	No bariatric surgery(%)	RR (95% CI)
Acquired Limb Loss	diabetic	42 (1.6%)	12257 (3.0%)	0.53 (0.46-0.62)
	not diabetic	42 (0.5%)	6590 (0.6%)	0.83 (0.71-0.97)
AKI	diabetic	330 (12.6%)	100207 (24.6%)	0.51 (0.48-0.54)
	not diabetic	665 (7.9%)	144161 (13.1%)	0.60 (0.58-0.63)
Heart Failure	diabetic	392 (14.9%)	125179 (30.8%)	0.48 (0.46-0.51)
	not diabetic	651 (7.7%)	156073 (14.2%)	0.54 (0.52-0.57)
CABG	diabetic	21 (0.8%)	5482 (1.3%)	0.59 (0.48-0.74)
	not diabetic	21 (0.2%)	6619 (0.6%)	0.41 (0.33-0.52)
Central Line	diabetic	132 (5.0%)	26168 (6.4%)	0.78 (0.72-0.85)
	not diabetic	413 (4.9%)	49192 (4.5%)	1.10 (1.04-1.15)

All data was statistically significant ( $p < 0.05$ )

CABG=Coronary Artery Bypass Graft



# Results

- History of bariatric surgery decreased the risk of admission in patients with diabetes by 16% (RR 0.84, CI 0.83-0.86,  $P < 0.001$ ), and by 43% in admissions where diabetes was the primary diagnosis (RR = 0.57, CI 0.53-0.63,  $P < 0.001$ ).
- The risk of death during admission or discharge to hospice care had a RR of 0.29 (CI 0.24-0.34  $P < 0.001$ ) in diabetic patients who had prior bariatric surgery.
- Non-diabetic patients with prior bariatric surgery displayed a similar risk reduction: RR = 0.19 (CI 0.17-0.21,  $P < 0.001$ ) when compared to non-diabetic patients without a history of bariatric surgery.



# Conclusion

- T2DM is associated with increased hospital utilization, length of stay, and hospital charges.
- T2DM increases the risk of cardiovascular conditions on admission and these patients require more interventions when admitted.
- Bariatric surgery decreases need for admission, comorbidities, need for interventions, costs, and mortality in patients with T2DM.



**Thank you!**

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