



LIFESTYLE COUNSELING IN PRIMARY CARE AND CARDIOVASCULAR EVENTS IN PATIENTS WITH DIABETES

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ABSTRACT

Background

Hyperglycemia carries an increased risk of macrovascular complications. Lifestyle interventions can improve glycemic control. However, clinical outcomes of lifestyle counseling in diabetes remain uncertain.

Methods

We retrospectively studied hyperglycemic (HbA1c $\geq 7.0\%$) adults with diabetes followed at primary care practices affiliated with two academic medical centers between 2000 and 2014. Lifestyle (diet, exercise and weight loss) counseling documentation was extracted from EMR notes using previously validated natural language processing software.

Results

Among 19,412 study patients, an average of 7.3 episodes of lifestyle counseling were documented annually. Patients were followed for a mean of 1,866 days. Over this time 2,254 (11.6%) of patients had at least one cardiovascular (CV) event (myocardial infarction, stroke or hospitalization for unstable angina). In Cox multivariable analysis (adjusted for patient demographics, history of smoking, BMI, blood pressure, baseline HbA1c, kidney function, treatment with insulin, family history of coronary artery disease and stroke, Charlson Comorbidity Index, number of ED visits and hospitalizations over the preceding 12 months, frequency of primary care visits and frequency of diabetes medication intensification) frequency of lifestyle counseling was associated with lower risk of CV events in patients without baseline CV disease (HR 0.80 for one lifestyle counseling per month; $p=0.0053$) but not in patients with (HR 0.99; $p=0.86$) baseline CV disease. The association of lifestyle counseling and CV events was attenuated by adjustment for time-weighted HbA1c during the study period (HR 0.88; $p=0.097$).

Conclusions

In this large, long-term retrospective study of patients with poorly controlled diabetes, lifestyle counseling was associated with lower risk of CV events in patients without baseline CV disease. This association was at least partially mediated by changes in HbA1c levels.

BACKGROUND

- Lifestyle counseling improves short-term glycemic control in patients with diabetes
- Less is known about its effect on long-term clinical outcomes; a single large clinical trial (Look AHEAD) did not show a decrease in the cardiovascular risk
- There are also concerns that clinical trial data may not be generalizable to the routine care settings due to differences in resource availability and patient adherence

METHODS

OBJECTIVE: to investigate the relationship between lifestyle counseling in routine care settings and cardiovascular events in patients with diabetes

- Retrospective cohort study based at two academic medical centers.
- Included adults with uncontrolled (A1c $\geq 7.0\%$) diabetes treated in primary care practices between 2000 and 2014.
- Predictor variable: annual frequency of lifestyle counseling documented in EMR provider notes (ascertained using previously validated natural language processing software)
- *Primary outcome:* time to the first of a) myocardial infarction (MI), b) stroke or c) hospitalization for unstable angina

Run-in Period
12 months
Baseline characteristics

Treatment Assessment Period
24 months
Frequency of Lifestyle Counseling

Outcome Assessment Period
Time to Outcome

CONCLUSIONS

Lifestyle counseling was associated with lower rate of CV events in diabetic patients without, but not with, pre-existing CV disease.

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RESULTS

Patient Characteristics

Variable	Value
Age, years, mean (SD)	58.3 (13.9)
Female, n (%)	9,958 (51.3%)
CVD, n (%)	3,171 (16.3%)
Insulin use, n (%)	3,410 (17.6%)
HbA1c, (%), mean (SD)	8.3 (1.8)
eGFR, ml/min/1.73m ² , mean (SD)	81.3 (26.8)
Urine ACR, mg/gCr, mean (SD)	117.9 (519.7)
SBP, mmHg, mean (SD)	131.8 (17.9)
DBP, mmHg, mean (SD)	77.0 (11.2)
PCP encounter frequency, per year, mean (SD)	10.7 (9.1)
Diabetes medication intensification frequency, per year, mean (SD)	1.5 (2.2)
Documented lifestyle counseling frequency, per year, mean (SD)	7.3 (7.3)

Multivariable Analysis (no baseline CV disease)

Variable	Hazard Ratio	P-value
Female	0.827	0.0015
Ever smoker	1.221	0.0006
Insulin use	1.609	<.0001
CCI	1.047	<.0001
HbA1c	1.009	0.5638
Log(eGFR)	0.719	<.0001
Log(1+MALBCR)	1.191	<.0001
SBP	1.01	<.0001
DBP	0.993	0.0141
Monthly PCP freq	1.074	0.1827
Monthly DM medication intensification freq	0.878	0.5079
Monthly counseling frequency	0.805	0.0053

Multivariable Analysis (baseline CV disease)

Variable	Hazard Ratio	P-value
Monthly counseling freq	0.986	0.856

Multivariable Analysis (no baseline CV disease; includes A1c during the treatment assessment period)

Variable	Hazard Ratio	P-value
Time-weighted A1c (TAP)	1.178	<.0001
Monthly counseling frequency	0.880	0.0972

Average A1c over the Treatment Period by Counseling Frequency Quartile

