New York State Medicaid Prescriber Education Program

HbA_{1C} target goals and monitoring

Treating type 2 diabetes mellitus

NEW YORK state department of HEALTH

SUNY The State University of New York

Key messages

1) Metformin should be used as a first-line medication in almost every patient with type 2 diabetes.
2) DPP-4 inhibitors and GLP-1 agonists should not be used first-line in patients with type 2 diabetes because metformin, sulfonylureas, and insulin are more efficacious.
3) **HbA_{1C} goals should be individualized for each patient with type 2 diabetes: less than 7% for most patients and less than 8% for specific high-risk subgroups.**
4) **Patients with type 2 diabetes should have an HbA_{1C} test every three to six months.**

Current guideline recommendations for HbA_{1C} and plasma glucose goals

Parameter	ADA	AACE
HbA_{1C}	**<7%**	**<6.5%**
Pre-prandial glucose	70-130 mg/dL	<110 mg/dL
Postprandial glucose	<180 mg/dL	<140 mg/dL

Statement by an American Association of Clinical Endocrinologists/American College of Endocrinology consensus panel on type 2 diabetes mellitus: an algorithm for glycemic control, Endocr Pract. 2009;15(6) 540-559.
Standards of medical care in diabetes - 2011. Diabetes Care. 20011;34(S1):S11-S61.

Intensive vs. standard treatment

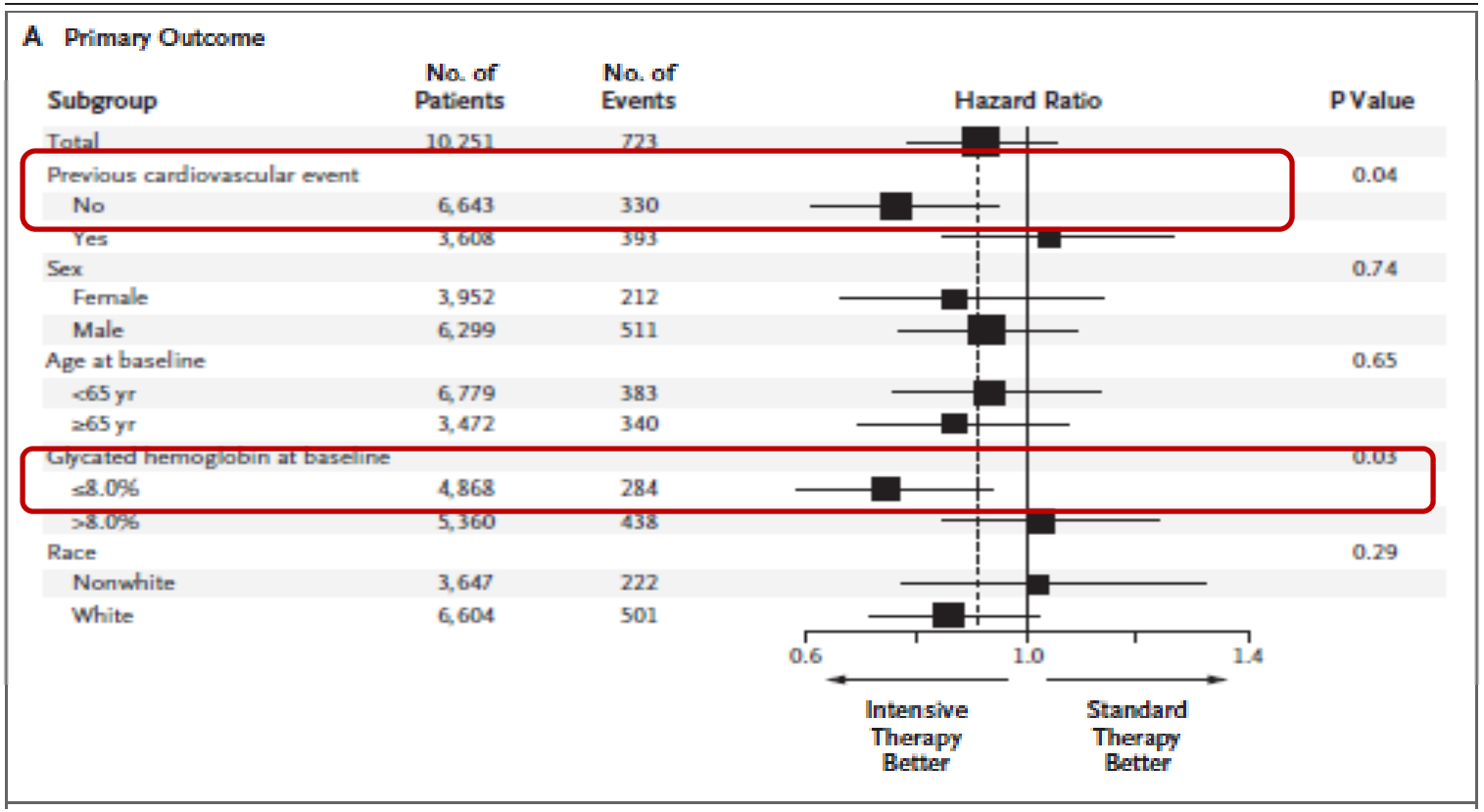
Trial	Results
ACCORD	Greater rates of cardiovascular and all-cause mortality with intensive blood glucose lowering (mean A1C 6.4%) compared to standard treatment (mean A1C 7.5%). ACCORD ended early after 3.5 yrs due to ↑ deaths in intensive-therapy group.
ADVANCE	No significant differences in major macrovascular events or all-cause mortality between intensive-treatment (mean A1C 6.5%) and standard-treatment (mean A1C 7.3%).
UKPDS 33	There was no difference in diabetes-related or all-cause mortality in the intensive-treatment group (mean A1C 7%) compared to the standard group (mean A1C 7.9%).

- No significant benefit in cardiovascular outcomes when targeting an intense A1C goal
- However, there were significant increases in adverse side effects in the intensive groups

UK Prospective Diabetes Study (UKPDS) Group. *Lancet.* Sep 12 1998;352(9131):837-53.
Effects of intensive glucose lowering in type 2 diabetes. *N Engl J Med.* Jun 12 2008;358(24):2545-59.
Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. *N Engl J Med.* Jun 12 2008;358(24):2560-72.

HbA_{1C} goal of <8% for specific high-risk subgroups

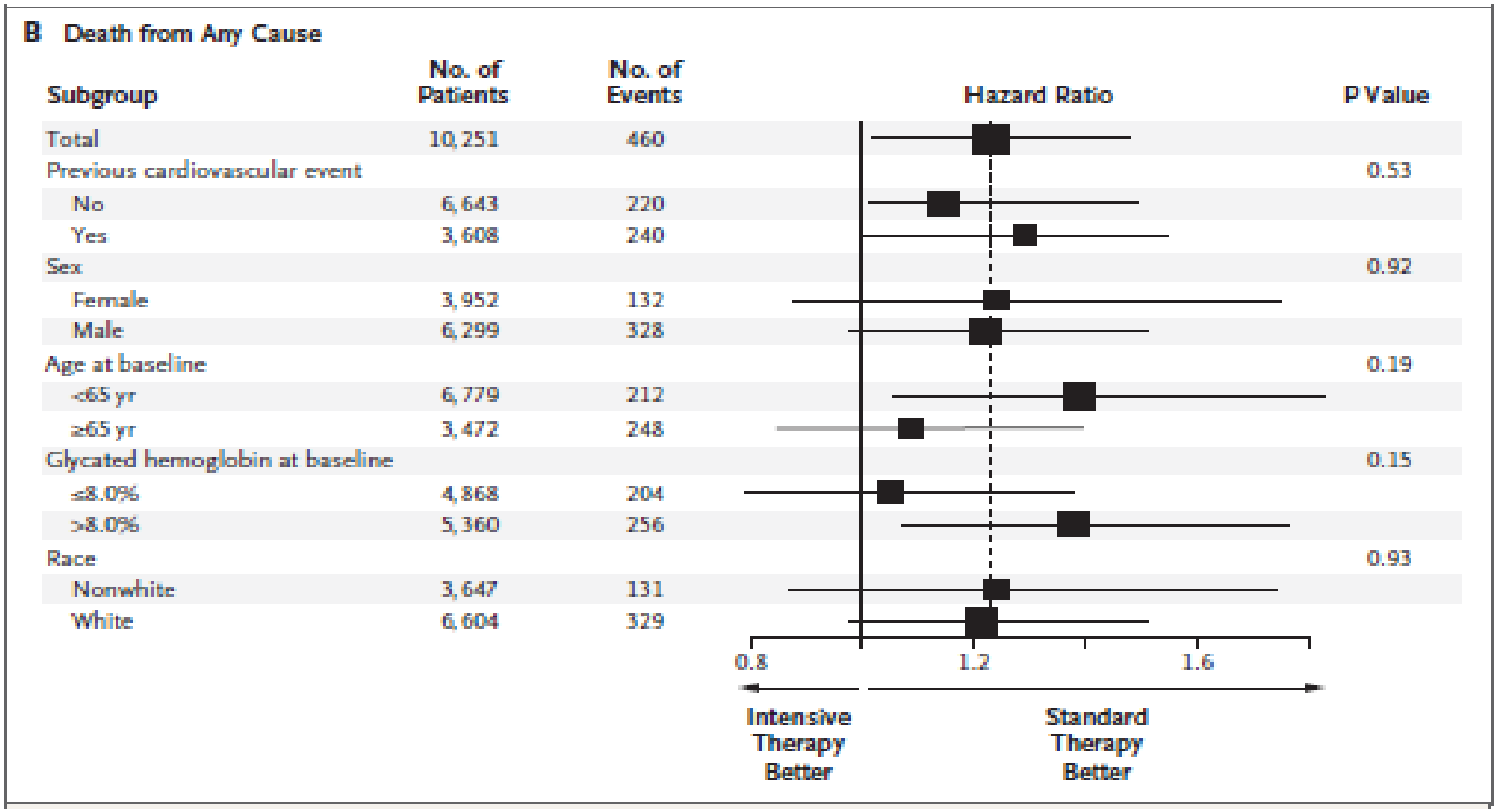
- ACCORD: Subgroup analysis (Primary Outcome)
  - No ↓ risk of cardiovascular events with intensive therapy
    - Potential benefit of intensive therapy in those with HbA_{1C} ≤8%



Effects of intensive glucose lowering in type 2 diabetes. *N Engl J Med.* Jun 12 2008;358(24):2545-59.

HbA_{1C} goal of <8% for specific high-risk subgroups

- ACCORD Subgroup analysis (Secondary Outcome)
  - Death from any cause: no benefit for intensive therapy

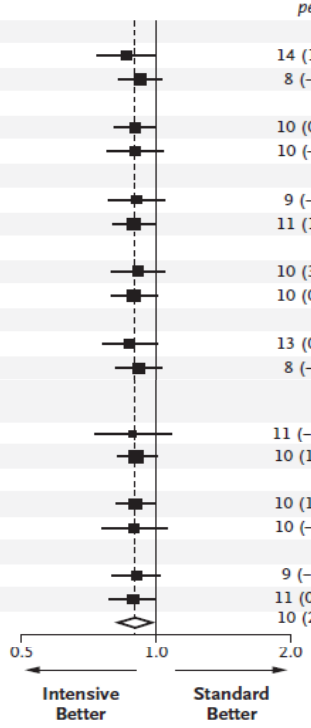


Effects of intensive glucose lowering in type 2 diabetes. *N Engl J Med.* Jun 12 2008;358(24):2545-59.

HbA_{1C} goal of <8% for specific high-risk subgroups

- ADVANCE: Subgroup Analysis:
  - No advantage of intensive glucose control: age, sex, SBP, HbA_{1C}, treatment w/BP drugs, statins, or antiplatelet agents

Characteristic	Mean Glycated Hemoglobin Reduction during Follow-up (95% CI)	Intensive Control (N=5571)	Standard Control (N=5569)	Hazard Ratio (95% CI)	Relative Risk Reduction (95% CI)
	percent	*number of patients (percent)*			*percent*
Age					
<65 yr	0.70 (0.65 to 0.75)	367 (16.1)	421 (18.7)		14 (1 to 25)
≥65 yr	0.70 (0.65 to 0.75)	642 (19.5)	695 (21.0)		8 (–3 to 17)
Sex					
Male	0.65 (0.61 to 0.69)	635 (19.9)	705 (21.9)		10 (0 to 19)
Female	0.69 (0.65 to 0.74)	374 (15.7)	411 (17.4)		10 (–3 to 22)
Systolic blood pressure					
<140 mm Hg	0.67 (0.63 to 0.72)	368 (15.7)	404 (17.1)		9 (–4 to 21)
≥140 mm Hg	0.67 (0.63 to 0.70)	641 (19.9)	712 (22.2)		11 (1 to 20)
Glycated hemoglobin					
<7.2%	0.46 (0.43 to 0.55)	387 (14.4)	430 (16.1)		10 (3 to 22)
≥7.2%	0.86 (0.81 to 0.91)	620 (21.7)	682 (23.8)		10 (0 to 20)
Blood glucose					
<7.9 mmol/liter	0.52 (0.48 to 0.55)	414 (15.2)	472 (17.3)		13 (0 to 23)
≥7.9 mmol/liter	0.81 (0.77 to 0.86)	595 (21.0)	643 (22.7)		8 (–2 to 18)
Treatment with any blood-pressure–lowering drugs					
No	0.75 (0.69 to 0.81)	199 (14.3)	222 (16.0)		11 (–7 to 27)
Yes	0.64 (0.61 to 0.67)	810 (19.4)	894 (21.4)		10 (1 to 18)
Treatment with statins					
No	0.70 (0.66 to 0.73)	746 (18.6)	815 (20.5)		10 (1 to 19)
Yes	0.60 (0.55 to 0.65)	263 (16.9)	301 (18.9)		10 (–6 to 24)
Treatment with antiplatelet drugs					
No	0.70 (0.66 to 0.74)	485 (16.4)	541 (18.1)		9 (–2 to 20)
Yes	0.63 (0.59 to 0.67)	524 (20.0)	575 (22.3)		11 (0 to 21)
Overall	0.67 (0.64 to 0.70)	1009 (18.1)	1116 (20.0)		10 (2 to 18)

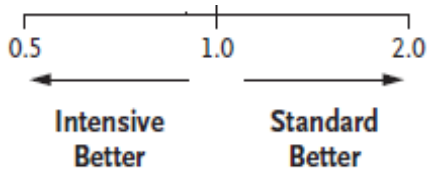


Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. *N Engl J Med.* Jun 12 2008;358(24):2560-72

HbA_{1C} goal of <8% for specific high-risk subgroups

- ADVANCE: Subgroup Analysis
  - Small advantage of intensive glucose control was seen in patients with:
    - BMI <28
    - No history of macrovascular disease
    - No history of microvascular disease

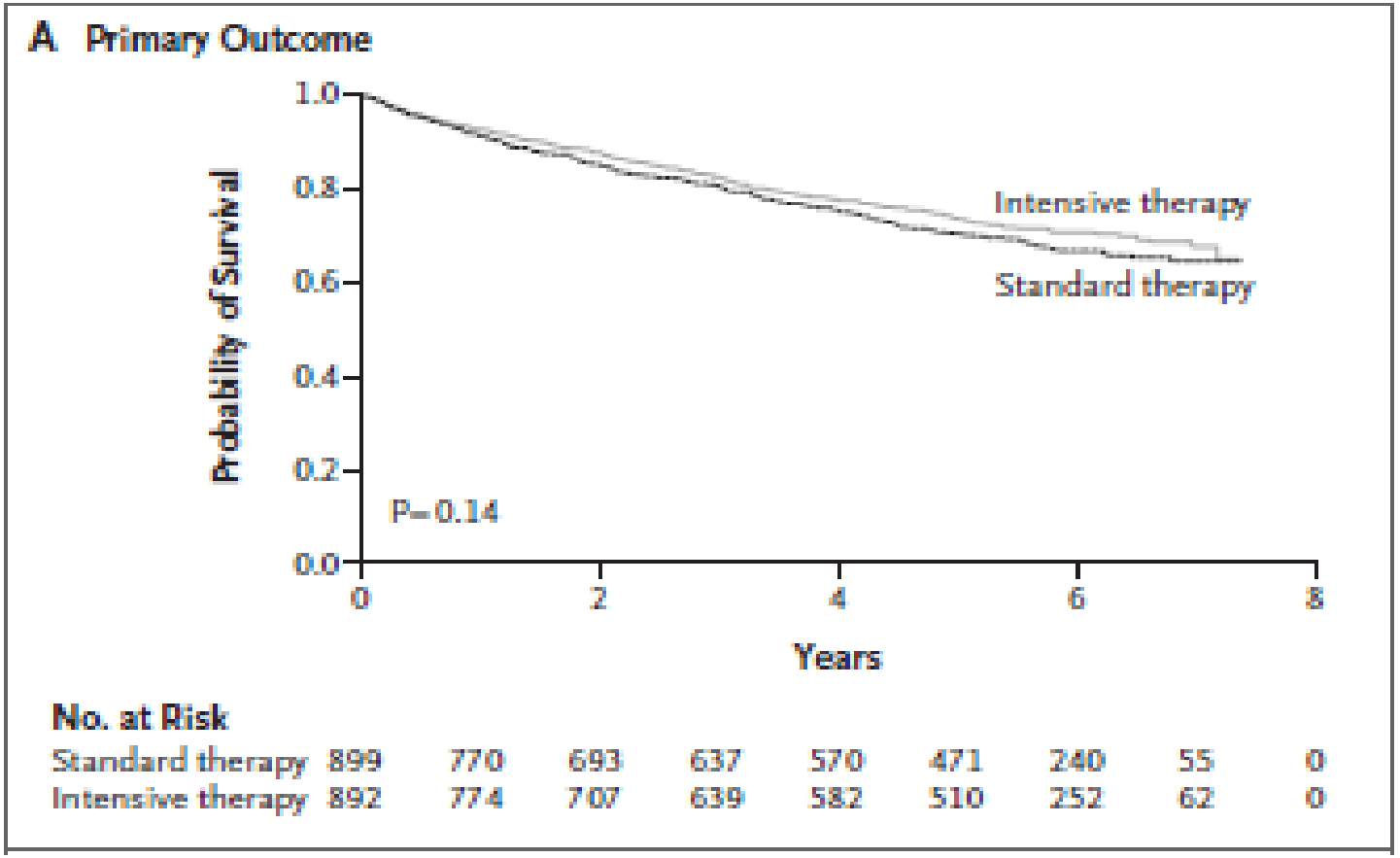
Body-mass index				
<28	0.68 (0.64 to 0.72)	558 (18.9)	663 (22.1)	15 (5 to 24)
≥28	0.65 (0.60 to 0.69)	451 (17.3)	452 (17.6)	2 (−11 to 14)
History of macrovascular disease				
No	0.67 (0.63 to 0.70)	591 (15.6)	678 (18.0)	14 (4 to 23)
Yes	0.67 (0.62 to 0.72)	418 (23.3)	438 (24.4)	4 (−10 to 16)
History of microvascular disease				
No	0.65 (0.62 to 0.68)	799 (16.0)	892 (17.9)	11 (2 to 19)
Yes	0.79 (0.69 to 0.90)	210 (36.8)	224 (38.4)	4 (−16 to 21)



Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. *N Engl J Med.* Jun 12 2008;358(24):2560-72

HbA_{1C} goal of <8% for specific high-risk subgroups

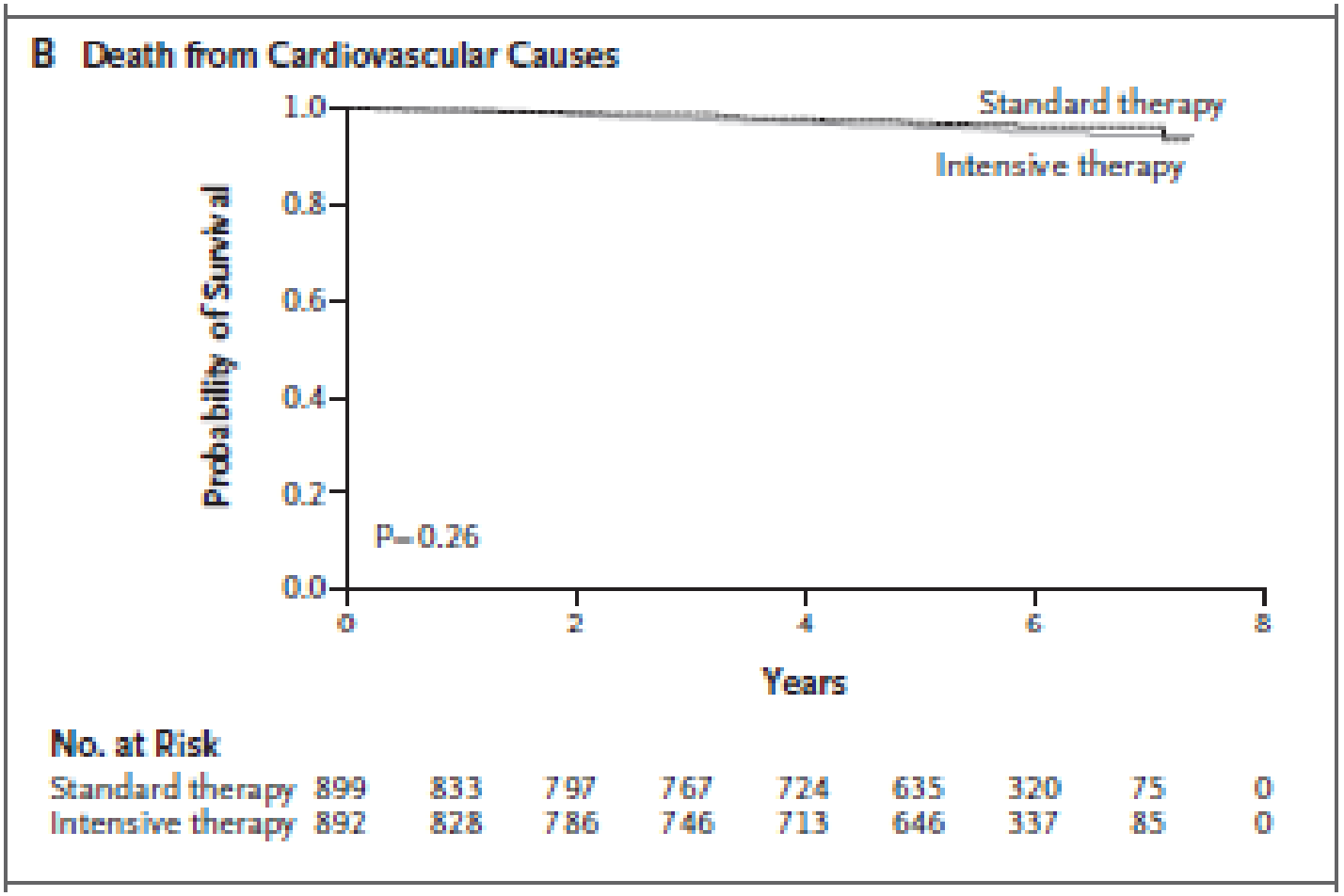
- VADT: Intensive therapy did not ↓ time to first CV event



Glucose control and vascular complications in veterans with type 2 diabetes. N Engl J Med. 2009;360:129-39.

HbA_{1C} goal of <8% for specific high-risk subgroups

- VADT: Intensive therapy did not ↓ risk of CV death



Glucose control and vascular complications in veterans with type 2 diabetes. N Engl J Med. 2009;360:129-39.

HbA_{1C} goal of <8% for specific high-risk subgroups

- Risks of intense glucose control may outweigh benefits
  - Frail, older adults
  - Limited life expectancy
  - Advanced microvascular or macrovascular disease
  - History of severe hypoglycemia
  - Extensive comorbid conditions
  - Long history of DM in whom general goal difficult to achieve

Standards of medical care in diabetes - 2011. Diabetes Care. 20011;34(S1):S11-S61.
Guidelines for improving the care of the older person with diabetes mellitus. JAGS. 2003;51:S265-S280.

HbA_{1C} monitoring

- Every 3 months
  - After any medication changes or adjustments
  - In patients not meeting glycemic goals
- Every 6 months
  - In patients meeting treatment goals
  - In patients with stable glycemic control

Standards of medical care in diabetes - 2011. Diabetes Care. 20011;34(S1):S11-S61.

Summary

- HbA_{1C} goals should be:
  - <7% for most patients
  - <8% for specific high-risk subgroups

- Patients with type 2 diabetes should have an HbA_{1C} test every three to six months
  - Based on changes to therapy and glycemic control