Park Nicollet®
International Diabetes Center
HealthPartners®

Diabetes Management: Latest Guidelines and Emerging Technological Advances

Gregg Simonson, PhD
Director, Professional Training and Consulting
International Diabetes Center;
Adjunct Assistant Professor, University of
Minnesota Department of Family Practice

International Diabetes Center…

Ensuring that every individual with diabetes or at risk for diabetes receives the best possible care

Presentation Overview

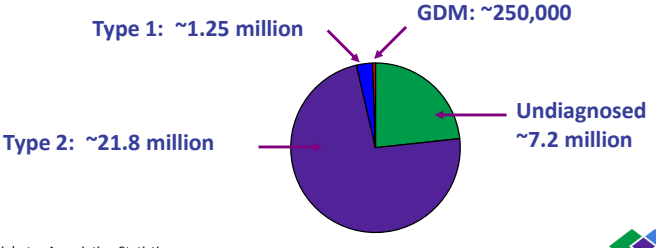
- **Latest ADA Guidelines for Diagnosis and Management**
  - **Epidemiology and diagnostic criteria**
  - **Glycemic targets**
  - **Type 2 Diabetes Guideline**
- **Weight loss and diabetes**
  - **Weight loss goals**
  - **Role of bariatric surgery**
- **Emerging Diabetes Technology**
  - **Beyond A1C**
  - **Continuous glucose monitoring**

Park Nicollet International Diabetes Center
HealthPartners

Epidemiology of Diabetes

Based on 2015 Statistics

- 30.3 million people in U.S. have diabetes
  - 9.4% of U.S. population
- 1.5 million new cases diagnosed
- 1 in 4 seniors (65+) has diabetes
- 7th leading cause of death

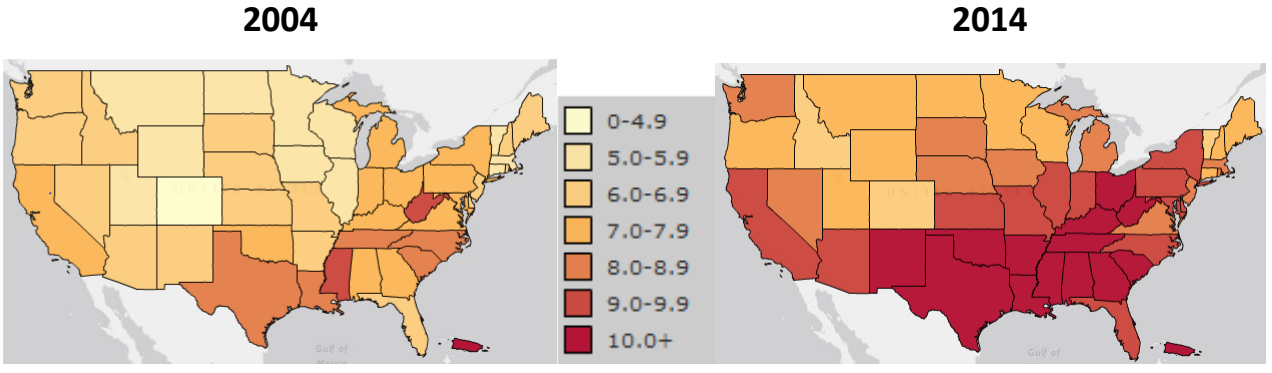


American Diabetes Association Statistics

Park Nicollet International Diabetes Center
HealthPartners

Prevalence of Diabetes by State 2004 to 2014

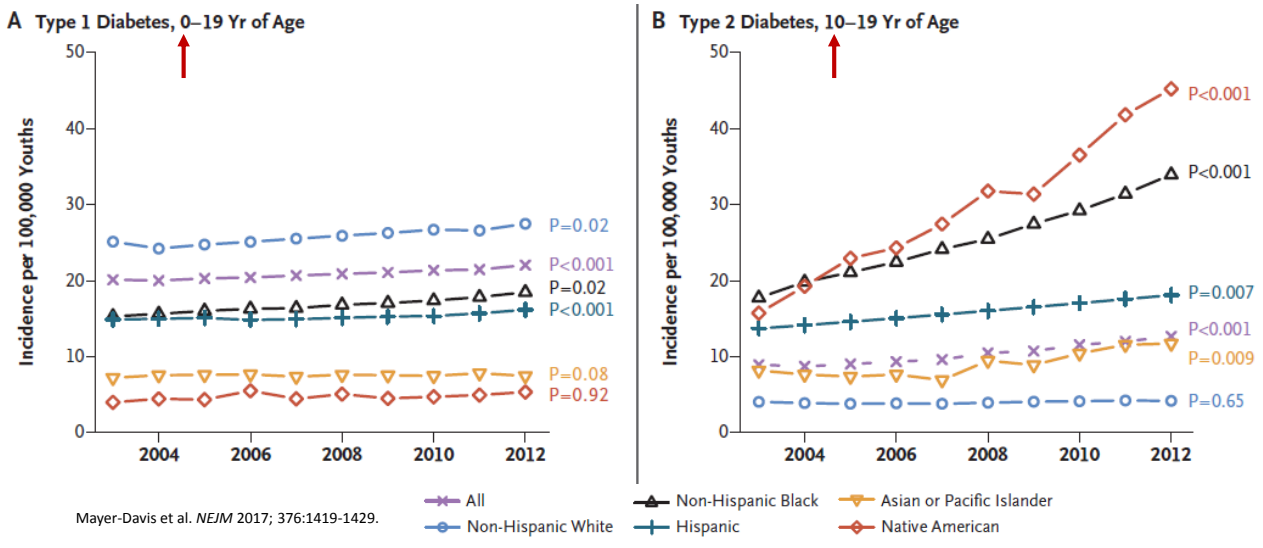
Percentage of Population



Centers for Disease Control and Prevention

Park Nicollet International Diabetes Center
HealthPartners

Incidence Trends in Type 1 and Type 2 in Children and Adolescents, 2002-2012



Mayer-Davis et al. *NEJM* 2017; 376:1419-1429.

Screening for Diabetes or Prediabetes in Asymptomatic Youth

- Type 1 Diabetes
  - Clinical testing of asymptomatic, low-risk individuals not recommended
- Type 2 Diabetes/Prediabetes
  - Overweight (BMI >85th percentile for age and gender; weight >120% of ideal for height)

  and one or more of the following risk factors:
    - Maternal history of diabetes or GDM during child's gestation
    - Family history type 2 diabetes in first or second degree relative
    - Race/ethnicity: Native American, African American, Latino, Asian American and Pacific Islander
    - Signs of insulin resistance (Acanthosis Nigricans, PCOS, HTN, Dyslipidemia, small-for-gestational age)

ADA Standards of Medical Care. Diab Care 2018; 41 Supplement 1

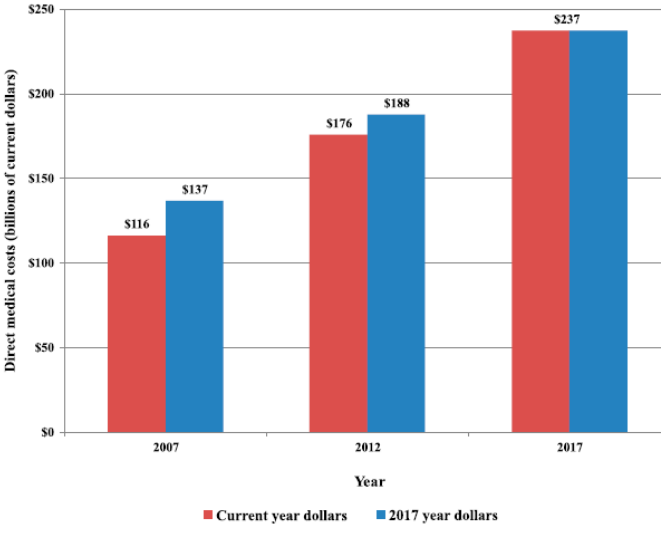
Park Nicollet International Diabetes Center
HealthPartners

Economic Costs of Diabetes in the U.S. in 2017

American Diabetes Association

Diabetes Care 2018;41:917–928 | https://doi.org/10.2337/dci18-0007

- Direct medical cost $237 billion
- 1 in 4 of all U.S. healthcare dollars for people with diabetes
- Avg. cost $16,750/year/patient total
  - $9,600/year of total for direct diabetes related expenses
- ~40% direct cost for emergency department and inpatient management



Criteria for Diagnosis of Diabetes

Fasting Plasma Glucose*	≥126 mg/dL (no caloric intake for 8 hrs)
2-hour 75 gram OGTT*	≥200 mg/dL at 2 hours
A1C (lab only)*	≥6.5 %
Random Plasma Glucose	≥200 mg/dL and classic symptoms (polyuria, polydipsia) or hyperglycemic crisis

- *Must be confirmed on subsequent day unless unequivocal symptoms of hyperglycemia
- A1C has less variability, but do not use if abnormal RBC turnover, anemia, hemoglobinopathies

Park Nicollet International Diabetes Center
HealthPartners

ADA Standards of Medical Care. Diab Care 2018; 41 Supplement 1

Glycemic Targets for Type 2 Diabetes

	ADA and IDC	AACE
A1C	**<7%***	**≤6.5% (for most)**
Fasting and Premeal	**80 - 130 mg/dL (ADA)** **70 - 130 mg/dL (IDC)**	**<110 mg/dL**
1-2 Hour Postmeal	**<180 mg/dL****	**<140 mg/dL (2 hr)**

* A1C goals should be individualized
** Note: 2 hour postmeal value should be no more than 50 mg/dL above premeal value

Park Nicollet International Diabetes Center
HealthPartners

ADA Standards of Medical Care. Diab Care 2018; 41 Supplement 1; American Association of Clinical Endocrinologist

ACP American College of Physicians℠
Leading Internal Medicine, Improving Lives

CLINICAL GUIDELINE

Hemoglobin A_{1c} Targets for Glycemic Control With Pharmacologic Therapy for Nonpregnant Adults With Type 2 Diabetes Mellitus: A Guidance Statement Update From the American College of Physicians

Amir Qaseem, MD, PhD, MHA; Timothy J. Wilt, MD, MPH; Devan Kansagara, MD, MCR; Carrie Horwitch, MD, MPH; Michael J. Barry, MD; and Mary Ann Forciea, MD; for the Clinical Guidelines Committee of the American College of Physicians*

Doctors' Group Issues Controversial Advice for Type-2 Diabetes

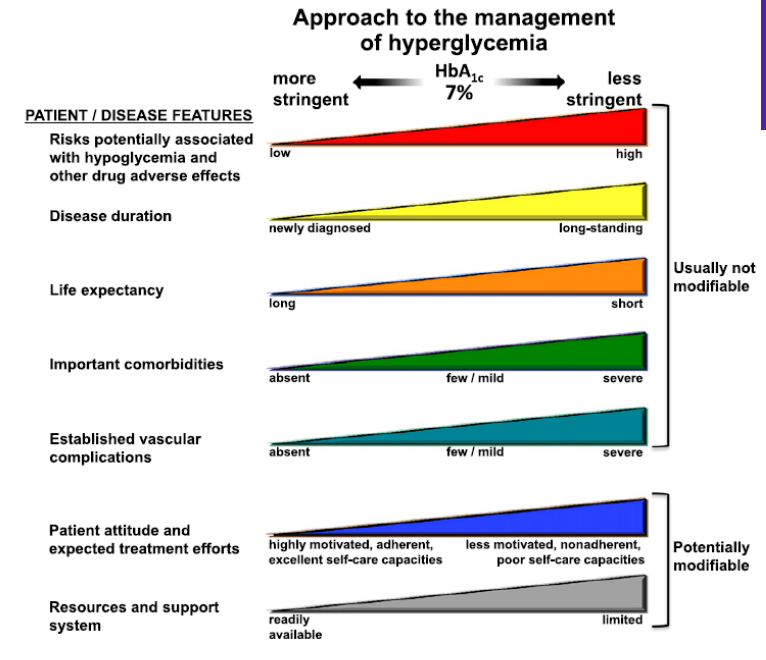
American College of Physicians ups A1c limit to 8%

TREATMENTS

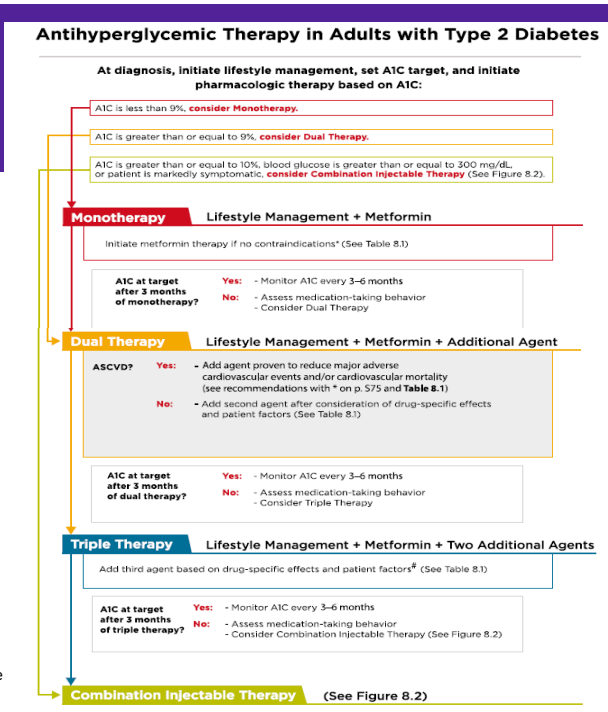
Major Medical Associations Feud Over Diabetes Guidelines

March 5, 2018 · 5:01 PM ET

Ann Intern Med. 6 March 2018



Inzucchi et al. Diad Care 2015;38:140-149



ADA Standards of Medical Care. Diab Care 2018; 41 Supplement 1

Antihyperglycemic Therapy in Adults with Type 2 Diabetes

At diagnosis, initiate lifestyle management, set A1C target, and initiate pharmacologic therapy based on A1C:

A1C is less than 9%, **consider Monotherapy.**

A1C is greater than or equal to 9%, **consider Dual Therapy.**

A1C is greater than or equal to 10%, blood glucose is greater than or equal to 300 mg/dL, or patient is markedly symptomatic, **consider Combination Injectable Therapy** (See Figure 8.2).

Monotherapy Lifestyle Management + Metformin

Initiate metformin therapy if no contraindications* (See Table 8.1)

A1C at target after 3 months of monotherapy?

Yes: - Monitor A1C every 3–6 months

No: - Assess medication-taking behavior
- Consider Dual Therapy

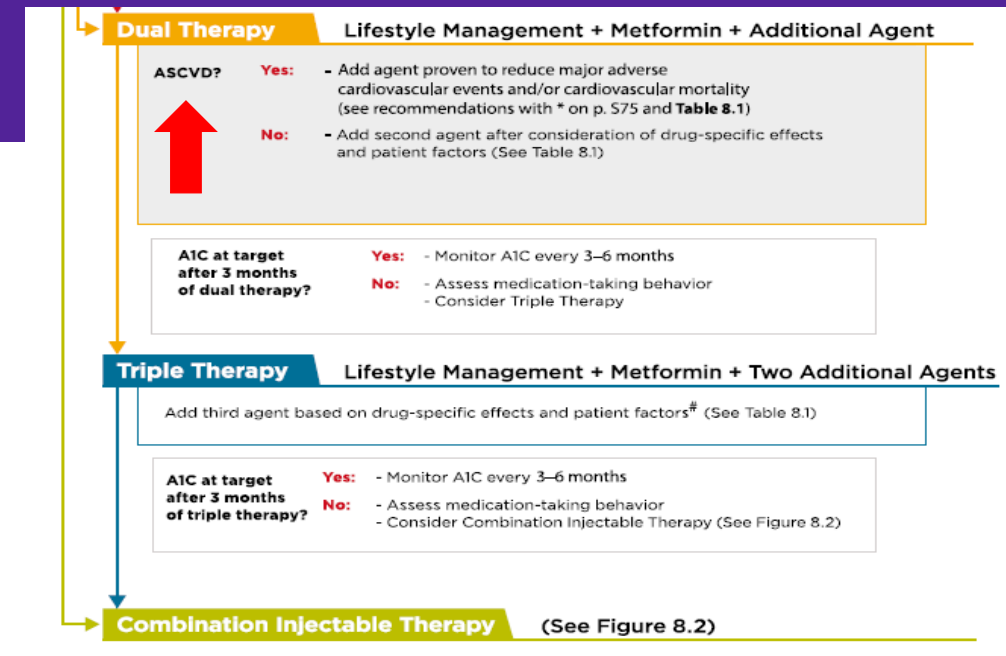
ADA Standards of Medical Care. Diab Care 2018; 41 Supplement 1

Why should metformin be the first-line therapy for type 2 diabetes?

- Efficacious and durable therapy
- Demonstrated CV event risk reduction (UKPDS)
- Weight neutral, modest improvement in lipids
- Many years of experience
- Lower cost
- Effective in combination therapy
  - Many combo tablet formulations available
- May reduce risk of cancer

Kahn et al., NEJM 2006; 355:2427-2443
UKPDS Study Group, *The Lancet* 1998; 352:854-865
Currie et al. *Diabetologia.* 2009;52:1766–1777.

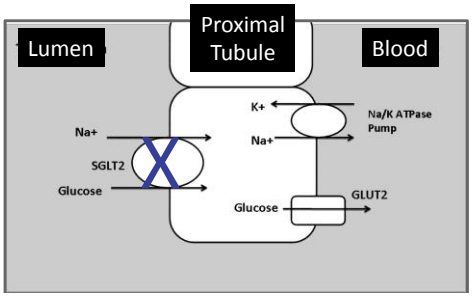
Park Nicollet International Diabetes Center
HealthPartners



ADA Standards of Medical Care. Diab Care 2018; 41 Supplement 1

Sodium-Glucose Cotransporter-2 (SGLT2) Inhibitor

- Inhibits renal re-absorption through inhibition of SGLT2
  - Selective inhibitor of SGLT2 -- acts in early proximal tubule to block reabsorption of filtered glucose
  - Normally ~180 g glucose filtered/day
- Causes about 70 g (~300 kcal) glucose excretion per day; potential for weight loss



List et al. *Diabetes Care*, 2009; 32:650-657; Neumiller et al. *Drugs*, 2010; 70:377-385
Nair S. et al. J Clin Endocrinol Metab 2010;95:34-42

Sodium-Glucose Cotransporter 2 (SGLT2)

Canagliflozin (Invokana),Dapagliflozin (Farxiga), and Empagliflozin (Jardiance), Ertugliflozin (Steglatro)

- **Clinical Indicators**
  - Modest reduction in both FPG and PPG
  - Approved as monotherapy, and in combination with metformin, SU, pioglitazone and/or insulin
  - Modest weight loss, no additional hypoglycemia
- **Precautions and contraindications**
  - Use caution with renal impairment (eGFR <45-60)
  - Symptomatic hypotension especially in elderly, renal impairment, patients treated with loop diuretics, ACE-I, and/or ARBs
  - Genital mycotic infections, especially in women or if history of mycotic infections; urinary tract infections
  - Acute kidney injury, especially with dehydration, history of CKD
  - Diabetic ketoacidosis (DKA)

Package Insert Data

Park Nicollet International Diabetes Center
HealthPartners

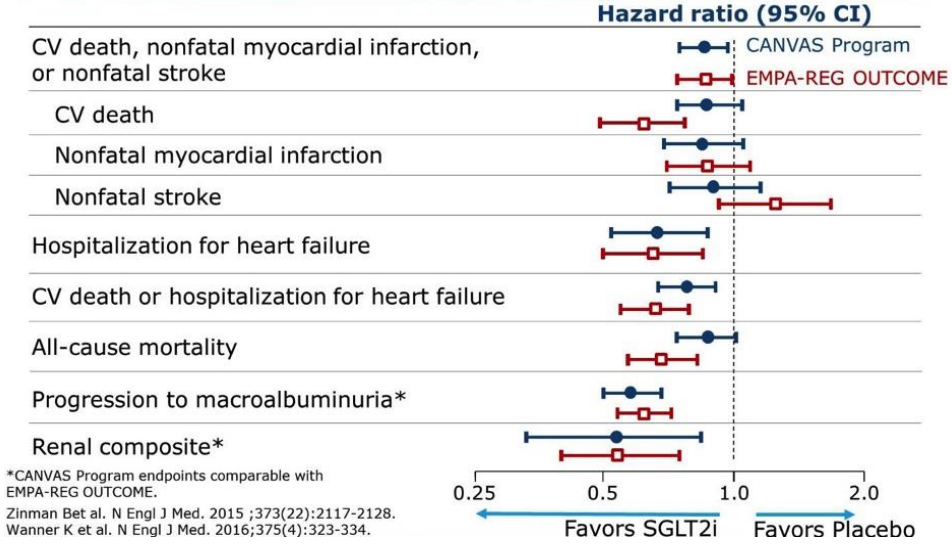
Overview of SGLT2 Inhibitors

Drug	Dose	eGFR cutoff	Comment
Canagliflozin (Invokana)	100/300 mg/day	<45; use 100 mg if eGFR 45-60	Not recommended if severe hepatic impairment; black box warning for amputation
Dapagliflozin (Farxiga)	5/10 mg/day	<60	Avoid if history of bladder cancer
Empagliflozin (Jardiance)	10/25 mg/day	<45	Increased risk of volume depletion in pts. aged 75 yrs and older
Ertugliflozin (Steglatro)	5/15 mg/day	<60	Risk of amputation (toe) may be increased, consider risk factors such as PVD, ulcers, neuropathy

Package Insert

Park Nicollet International Diabetes Center
HealthPartners

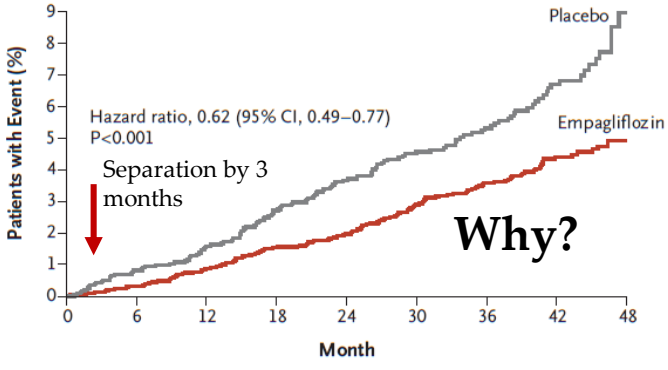
CANVAS and EMPA-REG Outcomes



*CANVAS Program endpoints comparable with EMPA-REG OUTCOME.

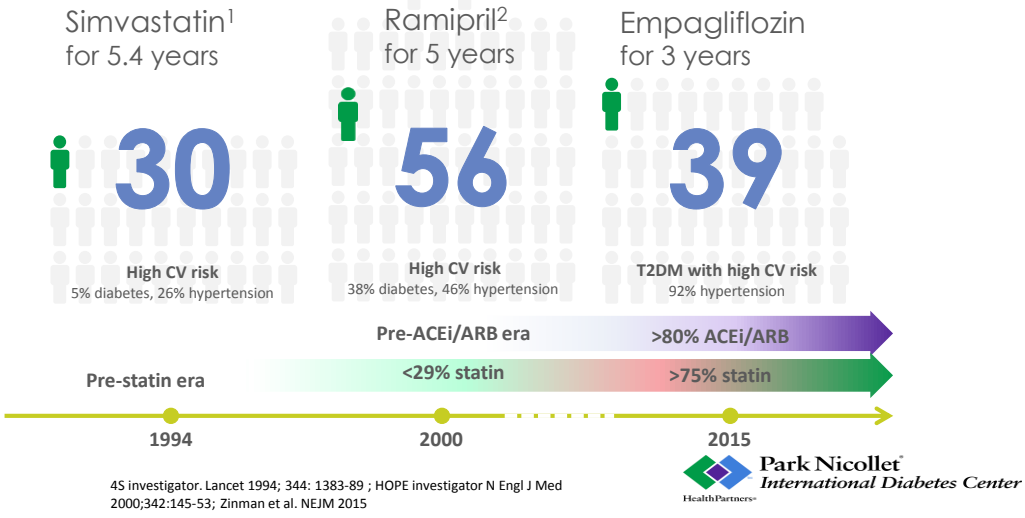
Zinman Bet al. N Engl J Med. 2015 ;373(22):2117-2128.
Wanner K et al. N Engl J Med. 2016;375(4):323-334.

EMPA- REG Outcome: Death From Cardiovascular Causes



In addition a 35% risk reduction in hospitalization for heart failure

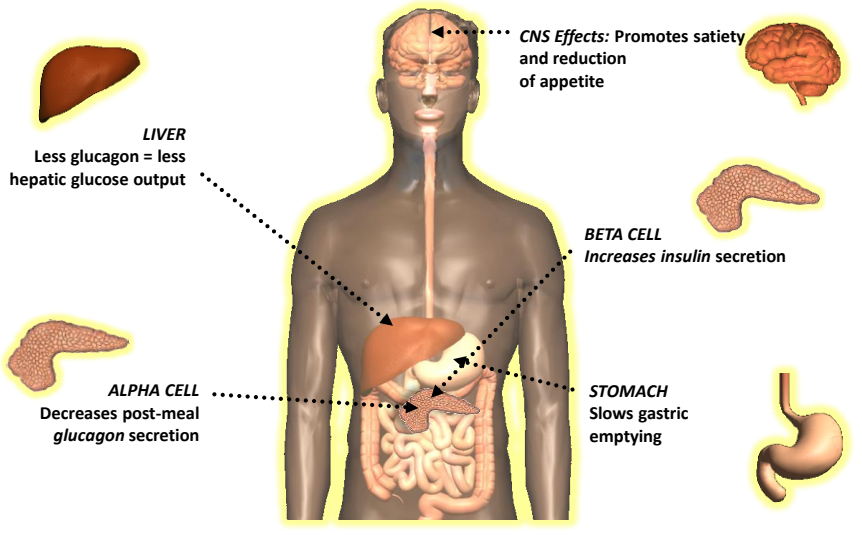
Number Needed to Treat (NNT) to Prevent one Death Across Landmark Trials in Patients with High CV Risk



4S investigator. Lancet 1994; 344: 1383-89 ; HOPE investigator N Engl J Med 2000;342:145-53; Zinman et al. NEJM 2015

Park Nicollet International Diabetes Center
HealthPartners

Glucagon Like Peptide -1 (GLP-1) Action



Ahren B Curr Diab Rep 2003; 3:365-372.
Baggio LL and Drucker DJ. Gastroenterology 2007; 132:2131-2157.

Glucagon-Like Peptide-1 (GLP-1) Receptor Agonists

Dulaglutide, Exenatide, Exenatide QW, Liraglutide, Lixisenatide, and Semaglutide

- **Action**
  - Enhances glucose-dependent insulin secretion and glucagon suppression
  - Slows gastric emptying
  - Induce satiety and reduce food intake
- **Clinical Indicators**
  - Elevated postmeal BG (exenatide), elevated postmeal and fasting BG (all others)
  - In combination with metformin, sulfonylurea, thiazolidinedione or insulin
- **Side effects**
  - Transient nausea (up to 40% patients) vomiting (~10%) and diarrhea (~10%)
  - Low risk of hypoglycemia unless used in combination with SU or insulin
  - Modest weight loss in >85% of patients
- **Precautions and Contraindications**
  - Kidney Disease (no exenatide if eGFR <30 ml/min) others use with caution
  - Gastrointestinal disease, pancreatitis (rare)
  - Pregnancy (Category C)

Park Nicollet International Diabetes Center
HealthPartners

Examples of GLP-1 Agonists

Exenatide (Byetta) 2 injections/day (32G) →

Liraglutide (Victoza) 1 injection/day (32G) →

Lixisenatide (Adlyxin) 1 injection/day (32G) →

Exenatide QW (Bydureon) 1 injection/week (23G) →

Dulaglutide (Trulicity) 1 injection/week (29G) →

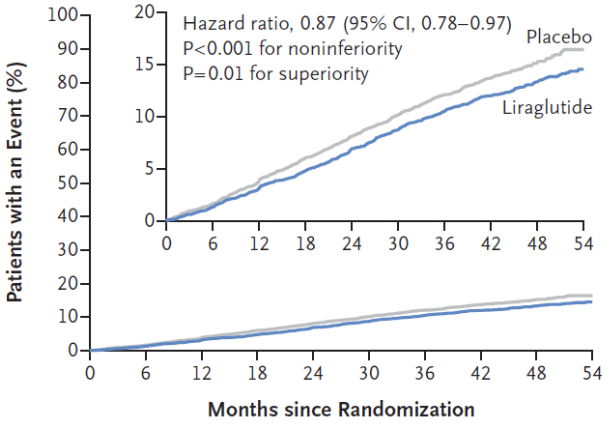
Semaglutide (Ozempic) 1 injection/week (29G) →

LEADER Trial Results

Liraglutide vs. Placebo in Patients with CVD or at Very High Risk

Primary Outcome = Non Fatal MI, Nonfatal Stroke, Death due to CV Cause

NNT to prevent one event in 3 years = 66

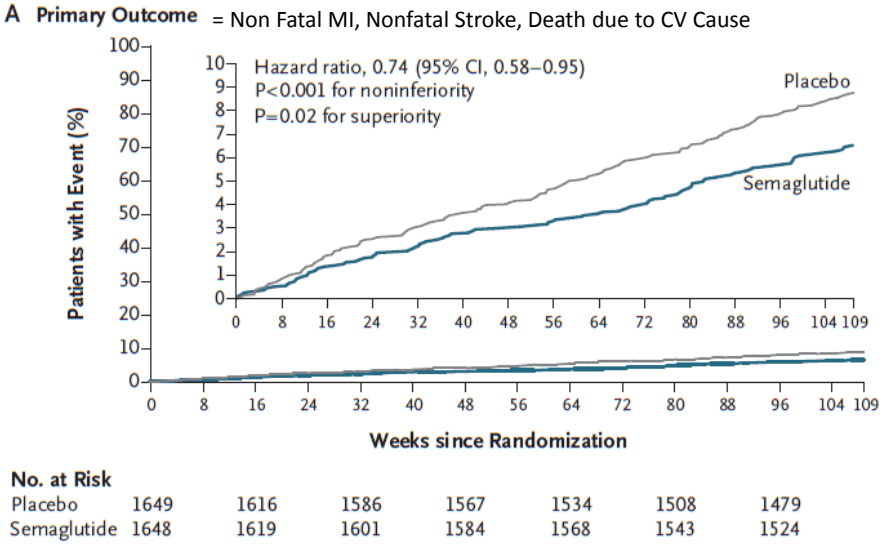


No. at Risk

Liraglutide	4668	4593	4496	4400	4280	4172	4072	3982	1562	424
Placebo	4672	4588	4473	4352	4237	4123	4010	3914	1543	407

SUSTAIN-6 Trial Results

Semaglutide vs. Placebo in Patients with CVD or at Very High Risk



Cost of Noninsulin Therapies

Medication	AWP/Month* Monthly Max Dose)
Metformin IR and 500 mg ER	~$90 ($1,000 for 1000 mg ER)
Sulfonylureas	~$50-$90
Pioglitazone	$348
DPP-4 Inhibitors	~$450
SGLT-2 Inhibitors	~$515
Exenatide/Exenatide XR	$802/$747
Liraglutide	$968
Dulaglutide	$811

* Do not account for discounts, rebates, or other price adjustments

ADA Standards of Medical Care 2018. *Diab Care* 41:Suppl 1

Presentation Overview

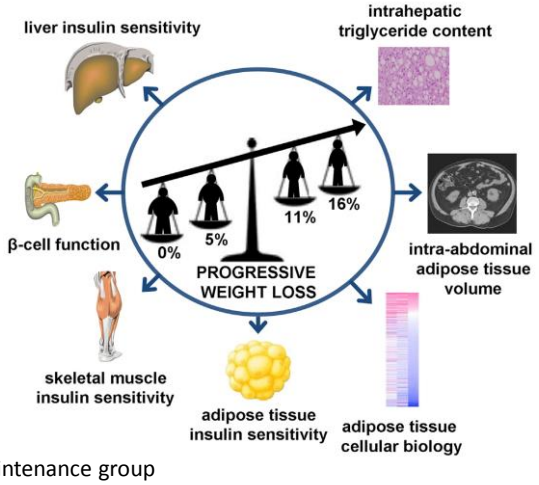
- Latest ADA Guidelines for Diagnosis and Management
  - Epidemiology and diagnostic criteria
  - Glycemic targets
  - Type 2 Diabetes Guideline
- **Weight loss and diabetes**
  - **Weight loss goals**
  - **Role of bariatric surgery**
- Emerging Diabetes Technology
  - Beyond A1C
  - Continuous glucose monitoring

Park Nicollet International Diabetes Center
HealthPartners

Weight loss and Metabolic/Adipose Changes

5%, 10% , 15% Weight Loss

5% weight Loss:
↑ multi-organ insulin sensitivity
↑ β-cell function
↓ Glucose, insulin
↓ HR, Systolic BP, TG
↓ ALT, Leptin



Linear, dose-dependent change in key adipose tissue biology and further insulin sensitivity

N = 40: BMI 37.9
N = 20 (14 completed) weight maintenance group
N = 20 (19 completed): 5% wt loss group, N= 9 continued to 11% and 16% wt loss

Park Nicollet International Diabetes Center
HealthPartners

Magkos et al. Cell Metabolism 23, 1-11, Apr 2016

Obesity Management: Diabetes Standard of Care

- Routine BMI at each patient encounter
  - Discuss results with patients
  - Advise overweight patients of increased CVD/all-cause mortality
- Assess weight loss readiness
- Jointly determine weight loss goal/strategies
  - 5% weight loss good, ≥ 7% optimal
  - Aim for lifestyle energy deficit of 500-750 kcals/day
  - Intensive management (≥ 16 sessions in 6 months)
- Comprehensive weight maintenance program
  - At least monthly contact
  - Frequent weight checks (weekly +)
  - Reduced kcals, increased activity (200-300 min/week)

Park Nicollet International Diabetes Center
HealthPartners

Diab Care 41 (supp 1) , 2018

Weight Loss Goals

- n = 60 women, Mean BMI 36.3, initial weight 99.1 kg (218 lbs)
- 15 years education, 45% married
- Hx of 4.4 ± 2.6 diets with 11.5 ± 4.8 kg loss per diet (25 lbs)

Self-Selected 4 Weight Goals

	Kg	Lbs	
Dream	61.4	135	↓ 83 lb
Happy	68.0	150	
Acceptable	74.2	158	
Disappointed	81.9	180	↓ 38 lb

TAKE-AWAY:
HELP SET REALISTIC GOALS

which is 1.5 times more than previous attempts

Weight goals:
- Reinforce health benefits of even 10-15 lbs weight loss
- Consider 2 tiered goal, 10-15 lbs short term and negotiated long term

J Consult Clin Psych 65: 79, 1997

Why Weight Loss Is Difficult

- Genetics - ~50% of variance genetics and 50% environment
- Weight tightly regulated by hormonal metabolic and neural metabolic factors
  - Hormonal adaptations (↓ leptin, peptide YY, cholecystokinin, insulin, and ↑ ghrelin, GLP-1, gastric inhibitory polypeptide, pancreatic polypeptide) promote weight gain after diet-induced weight loss; remain at least 1-yr after initial weight reduction
  - Weight loss results in adaptive thermogenesis (↓ resting metabolic rate) maintained up to 1-yr
  - Neural factors (dopamine) signal ↑ desire for fatty foods after weight loss
- Psychosocial issues

Ochner et al. *Physiol Behav* 2013;120:106; Camps et al. *Am J Cl Nutr* 2013;97:990

Park Nicollet International Diabetes Center
HealthPartners

Weight Loss: Is One Diet Better?

Park Nicollet International Diabetes Center
HealthPartners

Comparison of Named Diet Programs

Type Diet	Branded Diets*	Carb % kcal	Protein % Kcal	Fat % kcal
Low Carb	Atkins, South Beach, Zone	≤ 40	~30	30-55
Moderate Macronutrient	Biggest Loser, Jenny Craig, Nutrisystem, Volumetrics, Weight Watchers	~55-60	~15	21-≤30
Low Fat	Ornish, Rosemary Conley	~60	~10-15	≤20

- 48 RCT, 7286 individuals, mean diet duration 24 weeks (16-52)
- Significant weight ↓ observed with any low-carb/low-fat diet
- **Weight loss differences between diets minimal**

TAKE-AWAY:
"This supports the practice of recommending any diet that a patient will adhere to in order to lose weight"

BC Johnston et al JAMA 312(9) 2014
ADA Position Statement Diab Care S21, Jan 2015

Review of a current popular diet: Ketogenic Diet

- ≤ 5-10% calories from carbohydrate
  - Non-starchy vegetables, berries
- 15% calories from protein
  - Moderate portions, may be higher or lower fat
- 75-80% calories from fat
  - Majority of calories are from higher fat food sources – nuts, cheese, avocado, coconut

Park Nicollet International Diabetes Center
HealthPartners

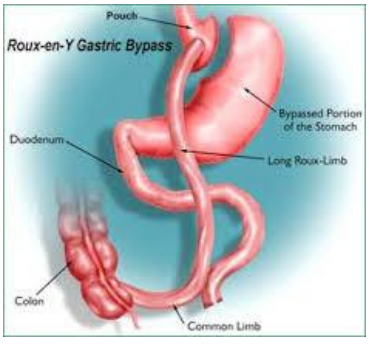
Keto diet

- Body uses different energy pathways – body burns fat for energy
- Long term medical consequences not well researched
  - Difficult to ascertain if glycemic benefits are related to weight loss or the diet
  - Side effects include constipation, headaches
- Requires cutting out many healthy foods (whole grains, fruits, veggies)
- Difficult to meet micronutrient needs (sodium, potassium, vitamin C)
- Likely hard to maintain long term
- Evidence says not necessary to manage diabetes

Park Nicollet International Diabetes Center
HealthPartners

Bariatric Surgery and Diabetes

- BMI ≥ 40 kg/m^2 no matter level of glycemic control or level of complexity of glucose-lowering regimen
- BMI ≥ 35 kg/m^2 when hyperglycemia is inadequately controlled despite lifestyle and optimal medical therapy
- Consider with BMI 30.0–34.9 kg/m2 if hyperglycemia is inadequately controlled despite optimal medical therapy
- Patients with Type 2 DM and bariatric surgery need lifelong lifestyle support



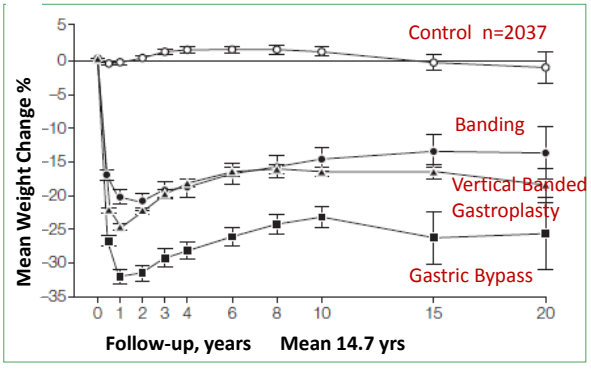
BMI ≥ 35	lbs
5’	≥ 179
5’ 4”	≥ 204
5’ 9“	≥ 236
6’	≥ 258

ADA Standards of Care Diab Care 41, Supp 1 Jan 2018

Park Nicollet International Diabetes Center
HealthPartners

Swedish Obesity Study

- 3900 patients bariatric procedures, 13% gastric bypass



Diabetes Incidence	Surgical	Control
2 yrs	1%	8%
10 yrs	7%	24%

Buchwald et al. JAMA 292:1724, 2004

Park Nicollet International Diabetes Center
HealthPartners

Bariatric Surgery and Diabetes Remission

N- 4,434 RYGB; Retrospective study, 3 sites

- Within 5 yrs complete remission rate = 68.2%.
- Within next 5 years, 35.1% experienced relapse
- More likely to experience relapse if:

Older
On insulin
A1C ≥ 6.5%
Longer diabetes duration

DE Arterburn et al . Obesity Surgery Nov 18,2012 Online

Park Nicollet International Diabetes Center
HealthPartners

Diabetes Surgery Study
RYGB vs Intensive Lifestyle-Medical Management

- Intensive Lifestyle-Medical Management vs RYGB
- Unblinded, randomized trial, n= 120 (60 per group)
- Subjects: Type 2 at least 6 months, BMI 30-39.9, A1C 8%
- Primary outcomes, A1C < 7, SBP < 130, LDL < 100

End Points	No. (%) of Patients		
	Lifestyle and Medical Management	Roux-en-Y Gastric Bypass	OR (95% CI)[a]
Meets primary outcome triple end point	11 (19)	28 (49)	4.8 (1.9-11.7)
HbA_{1c} <7.0%	18 (32)	43 (75)	6.0 (2.6 to 13.9)
LDL cholesterol <100 mg/dL	38 (70)	45 (79)	1.6 (0.7 to 3.8)
Systolic blood pressure <130 mm Hg	44 (79)	48 (84)	1.7 (0.6 to 4.6)

Ikramuddin et al JAMA 309(21):2240, 2013

Park Nicollet International Diabetes Center
HealthPartners

Presentation Overview

- Latest ADA Guidelines for Diagnosis and Management
  - Epidemiology and diagnostic criteria
  - Glycemic targets
  - Type 2 Diabetes Guideline
- Weight loss and diabetes
  - Weight loss goals
  - Role of bariatric surgery
- **Emerging Diabetes Technology**
  - **Beyond A1C**
  - **Continuous glucose monitoring**

Park Nicollet International Diabetes Center
HealthPartners

Limitations of A1C

1. Using A1C alone to guide improvement in A1C is not working
   - *52% of A1C's <7% overall*
   - *30% A1C <7% on insulin*
2. No broad agreement on A1C targets
   - *AACE ≤ 6.5%, ADA <7%, ACP <8%*
3. A1C only tells part of the story of glucose control/management

- CGM may help uncover the rest of the diabetes care story

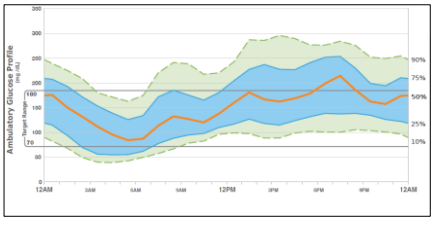
Park Nicollet International Diabetes Center
HealthPartners

THE LANCET — Comment

Continuous glucose monitoring: transforming diabetes management step by step

Richard M Bergenstal
International Diabetes Center at Park Nicollet

Published online February 16, 2018



Park Nicollet International Diabetes Center
HealthPartners

Who benefits from CGM: Current Status

AACE/ ACE Consensus Statement 2016

"Evidence supports the benefits of CGM in type 1 diabetes and that these benefits are likely to apply whenever intensive insulin therapy is used, regardless of diabetes type."

AACE/ACE Consensus Statement

CONTINUOUS GLUCOSE MONITORING: A CONSENSUS CONFERENCE OF THE AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS AND AMERICAN COLLEGE OF ENDOCRINOLOGY

Vivian A. Fonseca, MD, FACE, Co-Chair[1]; George Grunberger, MD, FACP, FACE, Co-Chair[2]; Henry Anhalt, DO, FACE[3]; Timothy S. Bailey, MD, FACE, FACP, CPI[4]; Thomas Blevins, MD, FACE, FNLA, ECNU[5]; Satish K. Garg, MD[6]; Yehuda Handelsman, MD, FACP, FNLA, FACE[7]; Irl B. Hirsch, MD[8]; Eric A. Orzeck, MD, FACP, FACE[9]; Victor Lawrence Roberts, MD, MBA, FACP, FACE[10]; William Tamborlane, MD[11], on behalf of the Consensus Conference Writing Committee

https://www.aace.com/files/guidelines/PrePrintContinuousGlucoseMonitoring.pdf

Park Nicollet International Diabetes Center HealthPartners

What's the role in T2DM?

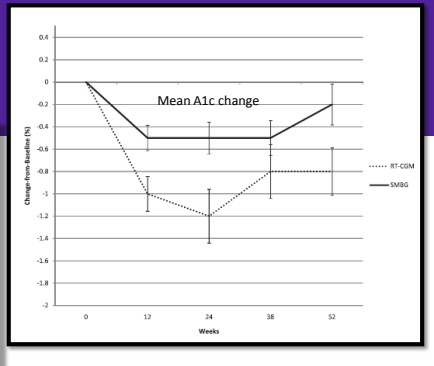
Clinical Care/Education/Nutrition/Psychosocial Research

ORIGINAL ARTICLE

Short- and Long-Term Effects of Real-Time Continuous Glucose Monitoring in Patients With Type 2 Diabetes

Robert A. Vigersky, MD[1]
Stephanie J. Fonda, PhD[1]
Mary Chellappa, MD[1]
M. Susan Walker, PhD[1]
Nicole M. Ehrhardt, MD[2]

Diabetes Care 35:32–38, 2012



T2D not on prandial insulin

- RCT- effect of RT-CGM on glycemic control (A1C)
- 50 SMBG: 50 RT-CGM for 12 wks
- Diabetes care continued with regular provider
- Followed for an additional 40 weeks (52 wks total)

- RT-CGM 1.2% improvement, then stabilized at 0.8% over 52 weeks, after 12 weeks of CGM
- Significantly better than SMBG group, who also improved

Park Nicollet International Diabetes Center HealthPartners

Continuous Glucose Monitoring (CGM)

Personal

- Patient owns device
- Can use 100% of the time
- Variable insurance /Medicare coverage
- Worn for 7-14 days
- With or without alarms

Professional

- Clinic owns device
- Used episodically, e.g. 3 to 14 days
- Can be blinded or un-blinded

Park Nicollet International Diabetes Center
HealthPartners

Dexcom G6

- 10-day sensor
- No calibrations
- Acetaminophen blocker
- Upload to DexCom Share (up to 5 others)
- Age 2 and older

Park Nicollet International Diabetes Center
HealthPartners

Medtronic Guardian Connect

- 7-day sensor
- Calibrate every 12hrs
- Predictive alerts (up to 60 minutes)
- Direct to phone app
- Sugar IQ app, IBM Watson compatible
- Data sharing to family/friends
- Age 14-75

Freestyle Libre

- 10-14 day sensor
- Factory calibrated (no fingersticks)
- No alarms
- Worn on back of arm
- Wireless transmission of data from transmitter to receiver
- Inexpensive

Park Nicollet International Diabetes Center
HealthPartners

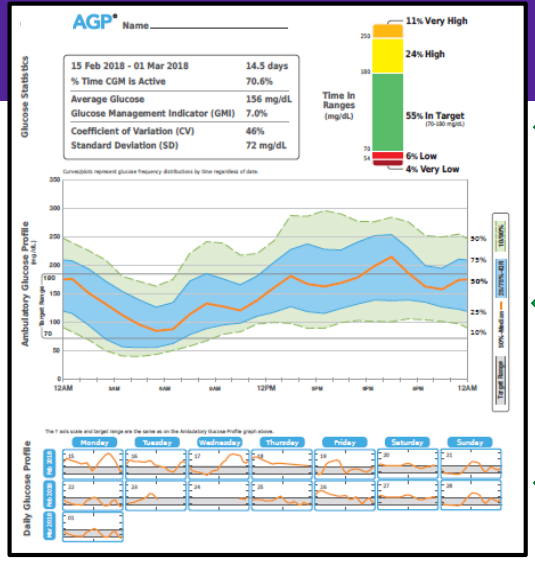
Eversense

- Eversense (Senseonics)
- Sensor is implanted under skin in upper arm, lasts 90 days
- Transmitter then can be changed easily
  - No warm up time
  - With less sensor trauma, may be less variable/less error prone
- Data sent to smartphone

Park Nicollet International Diabetes Center
HealthPartners

Kropff J, DeVries H, Diab Tech Ther, 2016

CGM *Ambulatory Glucose Profile* **(AGP)**



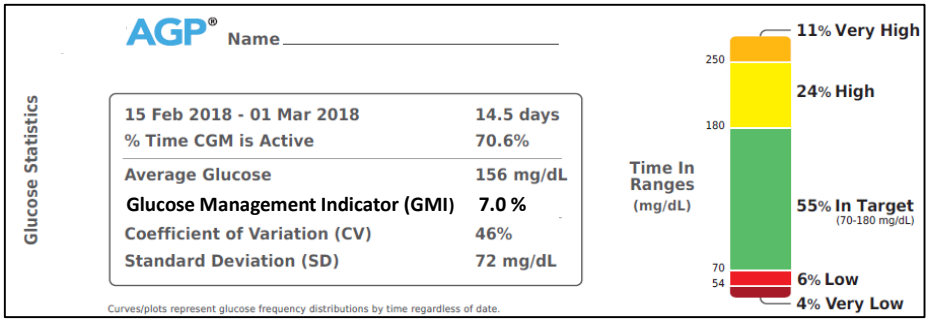
CGM Metrics

CGM Profile

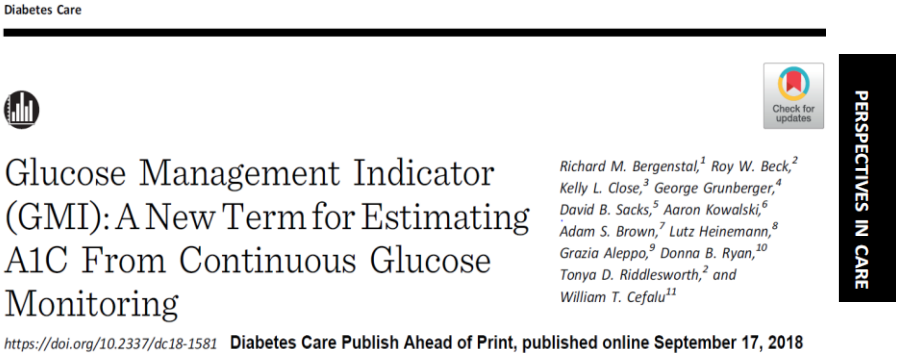
CGM Daily View

Park Nicollet International Diabetes Center
HealthPartners

Metrics



Park Nicollet International Diabetes Center
HealthPartners


Diabetes Care

PERSPECTIVES IN CARE

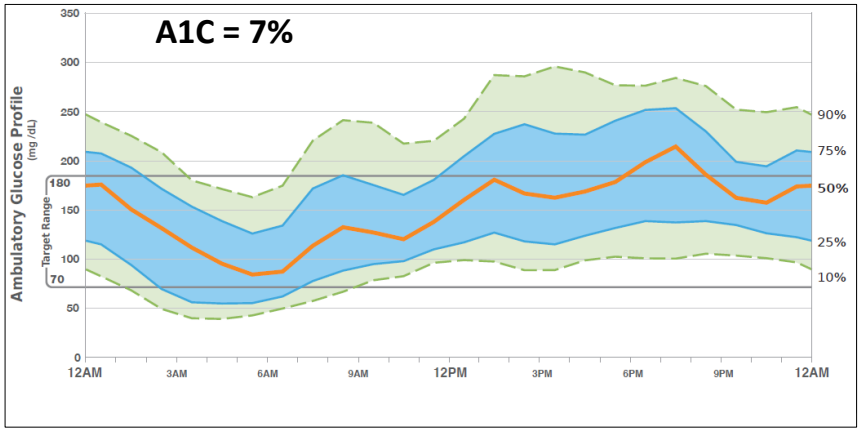
Glucose Management Indicator (GMI): A New Term for Estimating A1C From Continuous Glucose Monitoring

Richard M. Bergenstal,[1] Roy W. Beck,[2] Kelly L. Close,[3] George Grunberger,[4] David B. Sacks,[5] Aaron Kowalski,[6] Adam S. Brown,[7] Lutz Heinemann,[8] Grazia Aleppo,[9] Donna B. Ryan,[10] Tonya D. Riddlesworth,[2] and William T. Cefalu[11]

https://doi.org/10.2337/dc18-1581 Diabetes Care Publish Ahead of Print, published online September 17, 2018

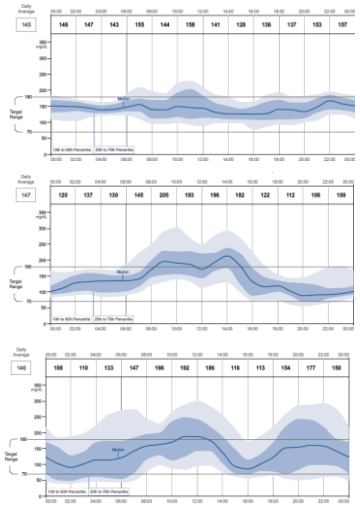
Park Nicollet International Diabetes Center
HealthPartners

CGM Profile



Target Range | 50%-Median | 25/75%-IQR | 10/90%

Park Nicollet International Diabetes Center
HealthPartners



A1C %	CV %	% Time Hypo	% TIR 70-180	Therapy
6.7	26	1	83	Artificial Pancreas
6.7	42	6	69	Pump
6.7	53	9	51	MDI

Park Nicollet International Diabetes Center
HealthPartners

Questions?

Park Nicollet International Diabetes Center
HealthPartners