Highlights
Patient Centered Approach to Managing Type 2 DM

Beverly Thomassian, RN, MPH, BC-ADM, CDE
President and Founder

DiabetesEd.net

Patient Centered Approach to Managing Type 2 DM

1. Discuss a patient centered approach to manage hyperglycemia.
2. State strategies to treat hyperglycemia from lifestyle to medications.
3. Discuss how the unique characteristics of patients determine the best approach to hyperglycemic management.

Web Clinic Details

- To hear presentation, turn on your computer speaker or
- Listen via your phone
- Questions? Please email us after program.
- If you are having technical difficulties, type them in the chat room.
- Thank you for joining us!
- No CE's for Free Webinar
- Discount rate for Online Course – save $30

Meds and Insulin Bundle – 9.0 CEs –Save $30

- **It's Easy to Earn 9.0 CE for $59.00 (save $30)**

- This fee includes 5 recorded narrated PowerPoint presentations
- Earn 9.0 CEs
- Just go to DiabetesEducationUniversity.com.
- Click left index tab "Medications and Insulin"
- Enter coupon code "patient" in the shopping cart.

Discounted rate ends April 30th! Order Today!

Management of Hyperglycemia in Type 2 Diabetes: A Patient-Centered Approach

Position Statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

American Diabetes Association.

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

EASD

American Diabetes Association. EASD

Writing Group

American Diabetes Association

Richard M. Bergenstal MD
Int'l Diabetes Center, Minneapolis, MN

John B. Buse MD, PhD
University of North Carolina, Chapel Hill, NC

Anne L. Peters MD
Univ. of Southern California, Los Angeles, CA

Richard Wender MD
Thomas Jefferson University, Philadelphia, PA

Silvio E. Inzucchi MD (co-chair)
Yale University, New Haven, CT

European Assoc. for the Study of Diabetes

Michaela Diamant MD, PhD
VU University, Amsterdam, The Netherlands

Ele Ferrannini MD
University of Pisa, Pisa, Italy

Michael Nauck MD
Diabeteszentrum, Bad Lauterberg, Germany

Apostolos Tsapas MD, PhD
Aristotle University, Thessaloniki, Greece

David R. Matthews MD, DPhil (co-chair)
Oxford University, Oxford, UK

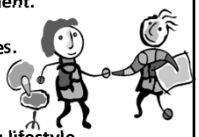
ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

EASD

1. Patient-Centered Approach

"...providing care that is respectful of and responsive to individual patient preferences, needs, and values - ensuring that patient values guide all clinical decisions."

- **Gauge patient's preferred level of involvement.**
- **Explore, where possible, therapeutic choices.**
- **Utilize decision aids.**
- **Shared decision making – final decisions re: lifestyle choices ultimately lie with the patient.**



Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

EASD

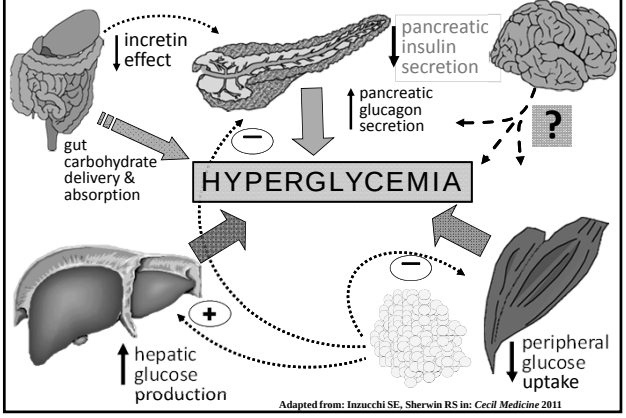
2. BACKGROUND

- **Overview of the pathogenesis of T2DM**

- **Insulin secretory dysfunction**
- **Insulin resistance (muscle, fat, liver)**
- **Increased endogenous glucose production**
- **Deranged adipocyte biology**
- **Decreased incretin effect**
- **Increased renal glucose reabsorption**

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Main Pathophysiological Defects in T2DM



Adapted from: Inzucchi SE, Sherwin RS in: *Cecil Medicine* 2011

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

3. ANTI-HYPERGLYCEMIC THERAPY

- **Glycemic targets**
  - **HbA1c < 7.0%** (mean PG ~150-160 mg/dl [8.3-8.9 mmol/l])
  - Pre-prandial PG <130 mg/dl (7.2 mmol/l)
  - Post-prandial PG <180 mg/dl (10.0 mmol/l)
  - **Individualization** is key:
    - Tighter targets (6.0 - 6.5%) - younger, healthier
    - Looser targets (7.5 - 8.0%+) - older, comorbidities, hypoglycemia prone, etc.
  - Avoidance of hypoglycemia

PG = plasma glucose

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

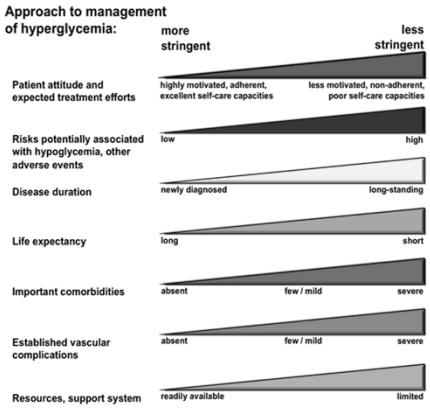


Figure 1

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596
(Adapted with permission from: Ismail-Beigi et al. *Ann Intern Med* 2011;154:554)

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

3. ANTI-HYPERGLYCEMIC THERAPY

- **Therapeutic options: Lifestyle**
  - **Weight optimization**
  - **Healthy diet**
  - **Increased activity level**

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

EASD

3. ANTI-HYPERGLYCEMIC THERAPY

- **Therapeutic options:**

Oral agents & non-insulin injectables

- Metformin
- Sulfonylureas
- Thiazolidinediones
- DPP-4 inhibitors
- GLP-1 receptor agonists
- **SGLT2 Inhibitor**
- Meglitinides
- α-glucosidase inhibitors
- Bile acid sequestrants
- Dopamine-2 agonists
- Amylin mimetics

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

SGLT2 Inhibitors

- Cangliflozin (Invokana)
- "Glucoretic" - Inhibit the reabsorption of glucose in the proximal kidney tubules
- Monitor B/P, K+ & renal function.
- If eGFR 45-60, do not exceed 100 mg day. Don't use if eGFR<45.
- Side effects: hypotension, UTI, increased urination, genital yeast infections.
- Lowers A1c 0.7%–1.0%, wt loss of 1-3 lbs.

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

EASD

3. ANTI-HYPERGLYCEMIC THERAPY

- **Implementation strategies:**
  - **Initial therapy**
  - **Advancing to dual combination therapy**
  - **Advancing to triple combination therapy**
  - **Transitions to & titrations of insulin**

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Oral Diabetes Medications

Diabetes Education Services — 15 years

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides *Decrease hepatic glucose output. American Diabetes Association recommends start at diagnosis of type 2.*	metformin (Glucophage)	500–2550 mg *(usually BID w/meal)*	Take caution if creat>1.4 women, >1.5 men, CHF on meds, >80 yrs, binge drinker, liver disease, during IV dye study, illness. Eliminated via kidney. Side effects include nausea, B12 deficiency, bloating, diarrhea. Take w/ meals. Lowers A1c 1.0% – 2.0%.
	Extended Release-XR (Glucophage XR) (Glumetza) (Fortamet)	*(1x daily w/dinner)* 500–2000 mg 500–2000 mg 500–2500 mg	
Sulfonylureas *Stimulates sustained insulin release.*	glyburide: (Micronase, Diabeta) (Glynase)	1.25–20 mg 0.75–12 mg	Can take once or twice daily. Side effects include hypoglycemia and weight gain. Eliminated via kidney. *Take Glucotrol on an empty stomach. Take Glucotrol XL with first meal. Lowers A1c 1.0%–2.0%.
	glipizide: (Glucotrol®) (Glucotrol XL)	2.5–40 mg 2.5–20 mg	
	glimepiride (Amaryl)	1.0–8 mg	
DPP – 4 Inhibitors *"Incretin Enhancers" Prolongs action of gut hormones = increased insulin secretion, delayed gastric emptying.*	sitagliptin (Januvia)	100 mg daily *(eliminated via kidney*)*	*If creatinine elevated, see pkg insert for dosing info. No wt gain or hypoglycemia. Side effects include nasopharyngitis, headache and upper-respiratory tract infection. Report signs of pancreatitis (abdominal pain, nausea, vomiting). Lowers A1c 0.6%–0.8%.
	saxagliptin (Onglyza)	Up to 5 mg daily *(eliminated via kidney*, feces)*	
	linagliptin (Tradjenta)	5 mg daily *(eliminated via feces)*	
	alogliptin (Nesina)	25 mg once daily *(eliminated via kidney)*	

More medications on back. Note: These meds are for people with Type 2 diabetes and should not be used during pregnancy. Content is for educational purposes only; please consult prescribing information for details.

REV 04/2013 ©2013

A Diabetes PocketCard® from Diabetes Education Services

Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors *Decrease glucose reabsorption in kidneys "glucoretic."*	Canagliflozin (Invokana)	100 to 300 mg once daily before first meal	Monitor B/P, K+ & renal function. If eGFR 45-60, do not exceed 100 mg day. Don't use if eGFR<45. Side effects: hypotension, UTI, increased urination, genital yeast infections. Lowers A1c 0.7%–1.0%, wt loss of 1-3 lbs.
Thiazolidinediones "TZDs" *Increase insulin sensitivity.*	pioglitazone (Actos)	15–45 mg daily	**Black Box Warning:** TZDs may cause or worsen CHF. Monitor for edema and weight gain. Increased peripheral fracture risk. **No new pts to be started on Avandia as single or combo med. Actos may increase risk of bladder cancer.** Lowers A1c 0.5%–1.0%.
	rosiglitazone (Avandia) ***restricted access****	4–8 mg daily	
Dopamine Receptor Agonists *Resets circadian rhythm.*	bromocriptine mesylate— Quick Release "QR" (Cycloset)	1.6 to 4.8 mg a day (each tab 0.8 mg)	Take within 2 hrs of waking. Start at one tab daily, increase 0.8 mg each wk as tolerated. Side effects: nausea, headache, fatigue, hypotension, syncope, somnolence. Lowers A1c 0.6%–0.9%.
Glucosidase Inhibitors *Delay carb absorption.*	acarbose (Precose) miglitol (Glyset)	25–100 mg w/meals; 300 mg max daily dose	Start with low dose, increase at 4-8 wk intervals to decrease GI effects. Caution with liver or kidney problems. Lowers A1c 0.5%–1.0%.
Meglitinides *Stimulates rapid insulin "burst."*	repaglinide (Prandin)	0.5–4 mg w/meals (metabolized in liver)	Take before meals. Side effects may include hypoglycemia and weight gain. Lowers A1c 1.0%–2.0%.
	nateglinide (Starlix)	60–120 mg w/meals (eliminated via kidney)	

Diabetes Education Services — Advancing Your Career in Diabetes Education — Visit DiabetesEd.net

Diabetes Education Services
(530) 893-8635
Beverly Dyck Thomassian
RN, MPH, BC-ADM, CDE

Injectables That Lower Glucose

A Diabetes PocketCard® from Diabetes Education Services

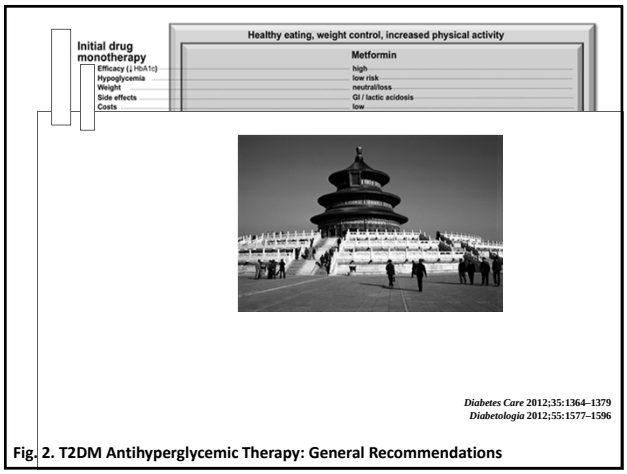
Class/Main Action	Name	Dose Range	Considerations
Incretin Mimetic – *Stimulates glucose dependent insulin release, slows gastric emptying, suppresses glucagon, promotes satiety, leading to wt loss over time. For Type 2s only. Lowers A1c 0.5 – 1.6%.*	exenatide (Byetta)	5 - 10 mcg BID (renally excreted)	**Exenatide:** SQ injection given within 60 minutes before breakfast and dinner. **Exenatide XR:** SQ injection once/week. **Liraglutide:** SQ injection once/day. **Side effects for all:** Nausea, vomiting, weight loss. Reports signs of acute pancreatitis (severe abdominal pain, vomiting), stop med. **Black box liraglutide/exenatide XR:** thyroid C-cell tumor warning (avoid if family history of medullary thyroid cancer, notify MD of hoarseness, throat lump).
	exenatide (XR) extended release (Bydureon)	2mg Once a week (renally excreted)	
	liraglutide (Victoza)	0.6 mg daily for 1 wk 1.2 mg daily for 1 wk then 1.8 mg daily (max dose)	
Amylin Mimetic *Slows gastric emptying, supresses glucagon release, promotes satiety. Lowers A1c 0.5 – 1%.*	pramlintide (Symlin)	Type 1: 15 - 60 mcg; Type 2: 60 - 120 mcg immediately before major meals	For Type 1 or 2 on insulin. Prevent hypoglycemia, decrease insulin dose when starting pramlintide. **Black box** warning: severe hypoglycemic risk 3 hrs post injection. Side effects: nausea, wt loss.

The information listed here are general guidelines only; please consult prescribing information for details.

Diabetes Education Services — Advancing Your Career in Diabetes Education

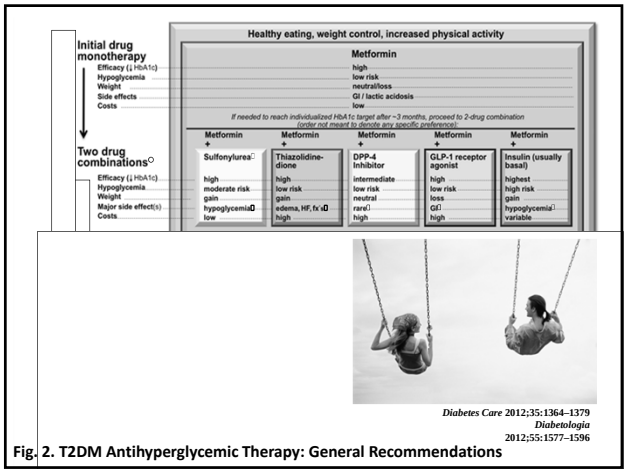
Diabetes Education Services
(530) 893-8635
Beverly Dyck Thomassian
RN, MPH, BC-ADM, CDE

Visit DiabetesEd.net



Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Fig. 2. T2DM Antihyperglycemic Therapy: General Recommendations



Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Fig. 2. T2DM Antihyperglycemic Therapy: General Recommendations

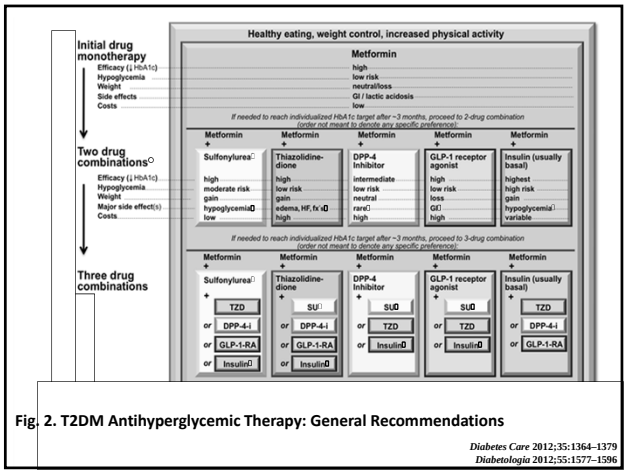
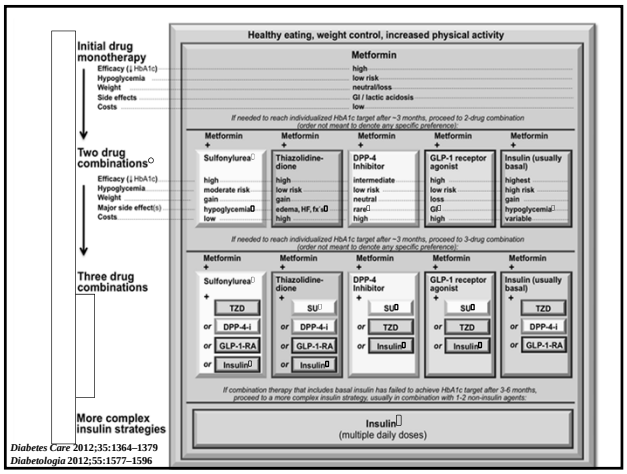


Fig. 2. T2DM Antihyperglycemic Therapy: General Recommendations

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596



Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

American Diabetes Association. ADA-EASD Position Statement: Management of Hyperglycemia in T2DM EASD

3. ANTI-HYPERGLYCEMIC THERAPY

- **Therapeutic options: Insulin**

- **Human Neutral protamine Hagedorn (NPH)**
- **Human Regular**
- **Basal analogues (glargine, detemir)**
- **Rapid analogues (lispro, aspart, glulisine)**
- **Pre-mixed varieties**

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Insulin PocketCard™ Diabetes Education Services 15 years

Action		Insulin Name	Onset	Peak	Effective Duration	Considerations
Bolus	Rapid Acting Analogs	Aspart (Novolog)	5 - 15 min	30 - 90 min	< 5 hrs	**Bolus** insulin lowers after-meal glucose. Efficacy reflected in post-meal BG. **Basal** insulin controls BG between meals and HS. Efficacy reflected in fasting BG. **Side effects:** hypoglycemia, weight gain. **Typical dosing range:** 0.5–1.0 units/kg body wt/day. Discard opened insulin vials after 28 days.
		Lispro (Humalog)				
		Glulisine (Apidra)				
	Short Acting	Regular	30 - 60 min	2 - 3 hrs	5 - 8 hrs	
Basal	Intermediate	NPH	2 - 4 hrs	4 - 10 hrs	10 - 16 hrs	
	Long Acting	Detemir (Levemir)	3 - 8 hrs	No peak	6 - 24 hrs	
		Glargine (Lantus)	2 - 4 hrs	No peak	20 - 24 hrs	
Bolus + Basal	Intermediate + rapid	Novolog® Mix 70/30 70/30 = 70% NPA + 30% aspart	5 - 15 min	Dual peaks	10 - 16 hrs	
		Humalog® Mix 75/25 = 75% NPL + 25% lispro 50/50 = 50% NPL + 50% lispro				
	Intermediate + short	Combo of NPH + Reg 70/30 = 70% NPH + 30% Reg 50/50 = 50% NPH + 50% Reg	30 - 60 min	Dual peaks	10 - 16 hrs	

Adapted from American Association of Clinical Endocrinologists Guidelines 2007. Because insulin action times can vary with each injection, time periods listed here are general guidelines only; please consult prescribing information for details.

REV 03/2013 ©2013

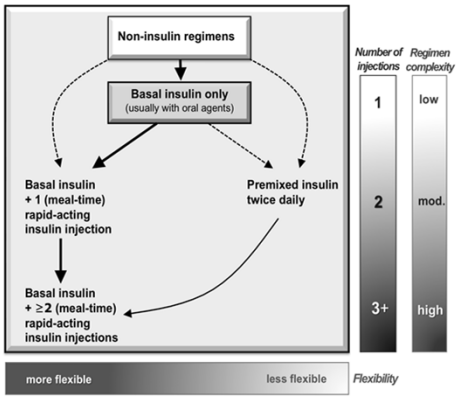


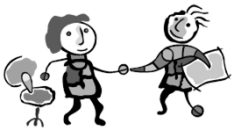
Fig. 3. Sequential Insulin Strategies in T2DM

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

American Diabetes Association. ADA-EASD Position Statement: Management of Hyperglycemia in T2DM EASD

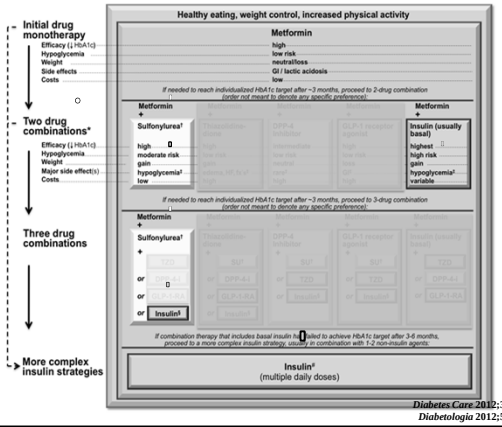
4. OTHER CONSIDERATIONS

- **Cost**
- **Hypoglycemia**
- **Age**
- **Weight**
- **Comorbidities**
  - **Coronary artery disease**
  - **Heart Failure**
  - **Chronic kidney disease**
  - **Liver dysfunction**
  - **Hypoglycemia**



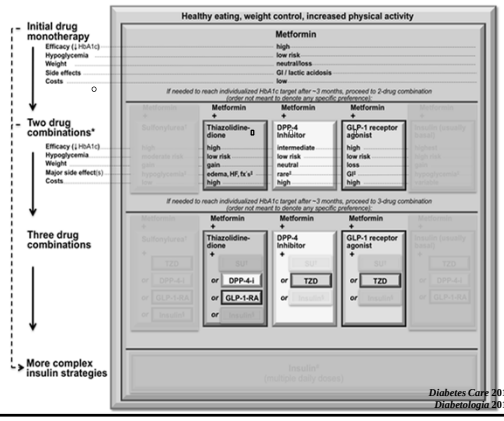
Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Adapted Recommendations: When Goal is to Minimize Costs



Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Adapted Recommendations: When Goal is to Avoid Hypoglycemia



Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

American Diabetes Association. ADA-EASD Position Statement: Management of Hyperglycemia in T2DM EASD

4. OTHER CONSIDERATIONS

- **Age: Older adults**
  - Reduced life expectancy
  - Higher CVD burden
  - Reduced GFR
  - At risk for adverse events from polypharmacy
  - More likely to be compromised from hypoglycemia

➡ **✓Less ambitious targets**
✓HbA1c <7.5–8.0% if tighter targets not easily achieved
✓Focus on drug safety

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

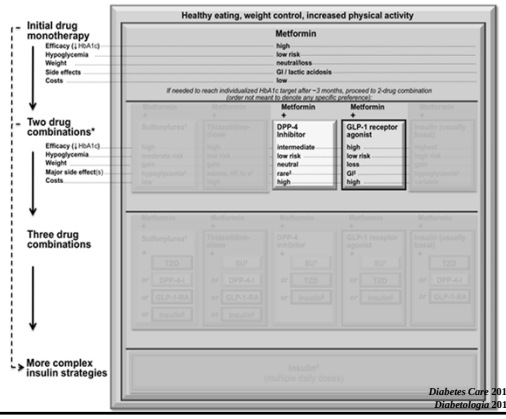
American Diabetes Association. ADA-EASD Position Statement: Management of Hyperglycemia in T2DM EASD

4. OTHER CONSIDERATIONS

- **Weight**
  - Majority of T2DM patients overweight / obese
  - Intensive lifestyle program
  - Metformin
  - GLP-1 receptor agonists
  - ? Bariatric surgery
  - Consider LADA in lean patients

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

Adapted Recommendations: When Goal is to Avoid Weight Gain



Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

American Diabetes Association. ADA-EASD Position Statement: Management of Hyperglycemia in T2DM EASD

4. OTHER CONSIDERATIONS

- **Comorbidities**
  - **Coronary Disease** ----->
  - **Heart Failure**
  - **Renal disease**
  - **Liver dysfunction**
  - **Hypoglycemia**

➢ Metformin: CVD benefit (UKPDS)
➢ Avoid hypoglycemia
➢ ? Sulfonylureas may increase cardiac ischemic preconditioning
➢ ? Pioglitazone & ↓ CVD events

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

American Diabetes Association. ADA-EASD Position Statement: Management of Hyperglycemia in T2DM EASD

4. OTHER CONSIDERATIONS

- **Comorbidities**
  - **Coronary Disease**
  - **Heart Failure** ------->
  - **Renal disease**
  - **Liver dysfunction**
  - **Hypoglycemia**

➢ Metformin: May use unless condition is unstable or severe
➢ Avoid Actos/Avandia

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

4. OTHER CONSIDERATIONS

- **Comorbidities**
  - **Coronary Disease**
  - **Heart Failure**
  - **Renal disease** -->
  - **Liver dysfunction**
  - **Hypoglycemia**

→
- Increased risk of hypoglycemia
- Metformin & lactic acidosis
  - US: stop @SCr ≥ 1.5 (1.4 women)
  - UK: half-dose @GFR < 45 & stop @GFR < 30
- Caution with SUs (esp. glyburide)
- DPP-4-i's – dose adjust for most
- Avoid exenatide/SGLT2 if GFR < 30

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

4. FUTURE DIRECTIONS / RESEARCH NEEDS

- **Comparative effectiveness research**
  - Focus on <u>important</u> clinical outcomes
- **Contributions of genomic research**
- **Perpetual need for clinical judgment!**

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

KEY POINTS

- Glycemic targets & BG-lowering therapies must be <u>individualized</u>.
- <u>Diet, exercise, & education</u>: foundation of any T2DM therapy program
- Unless contraindicated, <u>metformin</u> = optimal 1st-line drug.
- After metformin, data are limited. <u>Combination therapy</u> with 1-2 other oral / injectable agents is reasonable; minimize side effects.
- Ultimately, many patients will require <u>insulin</u> therapy alone / in combination with other agents to maintain BG control.
- All treatment decisions should be made in conjunction <u>with the patient</u> (focus on preferences, needs & values.)
- Comprehensive <u>CV risk reduction</u> - a major focus of therapy.

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596

ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

Invited Reviewers

James Best, *The University of Melbourne, Australia*
Henk Bilo, *Isala Clinics, Zwolle, Netherlands*
John Boltri, *Wayne State University, Detroit, MI*
Thomas Buchanan, *Univ of So California, LA, CA*
Paul Callaway, *University of Kansas,Wichita, KS*
Bernard Charbonnel, *University of Nantes, France*
Stephen Colagiuri, *The University of Sydney, Australia*
Samuel Dagogo-Jack, *Univ of Tenn, Memphis, TN*
Margo Farber, *Detroit Medical Center, Detroit, MI*
Cynthia Fritschi, *University of Illinois, Chicago, IL*
Rowan Hillson, *Hillingdon Hospital, Uxbridge, U.K.*
Faramarz Ismail-Beigi, *CWR Univ, Cleveland, OH*
Devan Kansagara, *Oregon H&S Univ, Portland, OR*
Ilias Migdalis, NIMTS Hospital, *Athens, Greece*
Donna Miller, *Univ of So California, LA, CA*
Robert Ratner, *MedStar/Georgetown Univ, DC*
Julio Rosenstock, *Dallas Diab/Endo Ctr, Dallas, TX*
Guntram Schernthaner, *Rudolfstiftung Hosp, Vienna, Aus*
Robert Sherwin, *Yale University, New Haven, CT*
Jay Skyler, *University of Miami, Miami, FL*
Geralyn Spollett, *Yale University, New Haven, CT*
Ellie Strock, *Int'l Diabetes Center, Minneapolis, MN*
Agathocles Tsatsoulis, *University of Ioannina, Greece*
Andrew Wolf, *Univ of Virginia Charlottesville, VA*
Bernard Zinman, *University of Toronto, Ontario, Canad*

Professional Practice Committee, American Diabetes Association
Panel for Overseeing Guidelines and Statements, European Association for the Study of Diabetes
American Association of Diabetes Educators
The Endocrine Society
American College of Physicians

Meds and Insulin Bundle – 9.0 CEs –Save $30

- **It's Easy to Earn 9.0 CE for $59.00 (save $30)**
  - This fee includes 5 recorded narrated PowerPoint presentations
  - Earn 9.0 CEs
  - Just go to DiabetesEducationUniversity.com.
  - Click left index tab "Medications and Insulin"
  - Enter coupon code "patient" in the shopping cart.

Discounted rate ends April 30th! Order Today!

Diabetes Education SERVICES 15 years

Live Courses by the Experts

Level 2 – Diabetes Educator Courses

- Sept 18-20, 2013 San Diego CA
- April 9-11, 2014 Modesto, CA
- Earn 21 CE's – qualifies toward CDE
- Plus 6.0 CEs FREE Online Courses

Course Faculty: Left to Right: Diane Pearson, Dana Armstrong, Beverly Thomassian and Lonnie Vaughn

DiabetesEd.net

AADE – The Art and Science of Diabetes Self Management Education – 2nd Ed

Art and Science

Our Price: $229.00

Both Books for $279

www.DiabetesEd.net

Diabetes Education SERVICES

Diabetes Educational Services

Join us on Facebook.com/Diabetes Educational Services

Let us know how we can best serve you on your journey

Download FREE Medication PocketCards