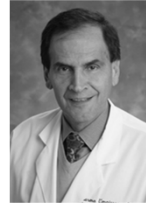


**A Novel Strategy for the Management
Inpatient Hyperglycemia in Patients
with Type 2 Diabetes**



**Guillermo E. Umpierrez,
MD, FACP, FACE**

Professor of Medicine
Director, Clinical Research Diabetes &
Metabolism Center
Emory University School of Medicine
Director, Diabetes & Endocrinology Section
Grady Health System

Dr. Guillermo Umpierrez,

Personal/Professional Financial Relationships with Industry

External Industry Relationships *	Company Name(s)	Role
Equity, stock, or options in biomedical industry companies or publishers	BMJ Open Diabetes Research & Care Endocrine Society AACE	Editor-in-Chief Council At Large Board of Directors
Industry funds to Emory University for my research	Merck, Sanofi, Novo Nordisk Boehringer Ingelheim Astra Zeneca	Investigator-Initiated Research Projects
Industry Advisory/Consultant activities		

Objectives

- Outline current recommendations for the treatment of hyperglycemia in patients hospitalized with type 2 diabetes
- Discuss the appropriate times to stop and start diabetes meds for patients undergoing surgery
- Assess the effect of hypoglycemia on clinical outcomes and the importance of avoiding it in hospitalized patients with type 2 diabetes
- Review the rationale and current data for the use of with insulin and non-insulin agents in hospitalized patients with type 2 diabetes

Pre-Test Question 1

- Which of the following statements regarding inpatient hypoglycemia in diabetes patients is correct?
 1. Inpatient hypoglycemia is not currently listed by CMS as a "never event"
 2. Associated with increased length-of-stay (LOS) but not increased mortality
 3. Associated with increased LOS and increased mortality
 4. Unsure

Pre-Test Question 2

- Please rate your knowledge of the safety and efficacy of DPP-4 inhibitor regimens for hospitalized patients with T2DM?
 1. Poor
 2. Fair
 3. Good
 4. Excellent

Pre-Test Question 3

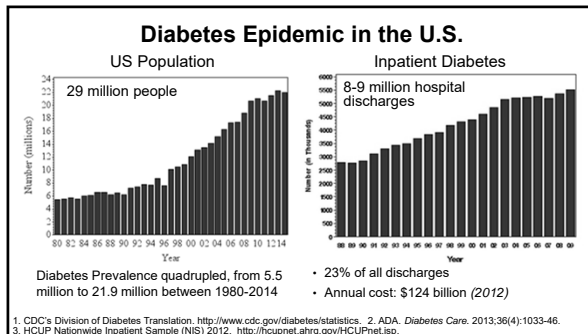
- Which of the following is NOT a guideline recommendation for treatment of hospitalized T2DM patients in the non-ICU setting?
 1. OADs are generally not recommended
 2. Sliding scale insulin is not recommended
 3. Glucose target of 140-180 mg/dL is recommended for most patients with T2DM
 4. Therapy should be reassessed if BG < 140 mg/dL to avoid hypoglycemia

Case Presentation:

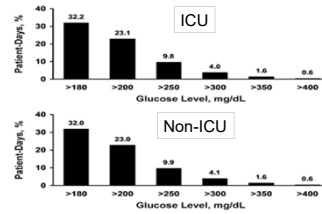
- TJ is a 68 y/o male with an 8 yr history of T2DM admitted with SOB and CHF on chest x-ray. Treated with metformin 1 gram b.i.d. and sitagliptin 100 mg/d.
- JP is a 42 y/o male with an 10 yr history of T2DM with diabetic foot infection and osteomyelitis left toe. Treated with metformin 1 g b.i.d. and glipizide 10 mg/d.
- Lab: BG 172 mg/dL, A1c: 8.0%; serum creatinine 1.3 mg/dL, eGFR: 45 ml/min
- Lab: BG 294 mg/dL, A1c: 9.2%; serum creatinine 1.4 mg/dL, eGFR: 60 ml/min

What is the best treatment option for glycemic control?
Should both patients be treated with insulin and to the same glucose target?

T2DM = type 2 diabetes; bid = twice daily; eGFR = estimated glomerular filtration rate.



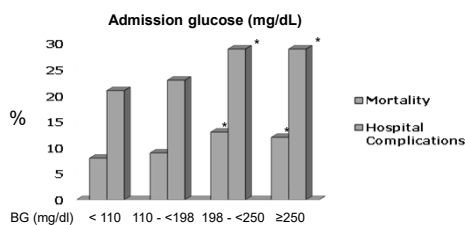
Distribution of Patient-Day-Weighted Mean POC-BG Values for ICU



Data from ~12 million BG readings from 653,359 ICU patients - mean POC-BG: 167 mg/dL
POC = point of care.

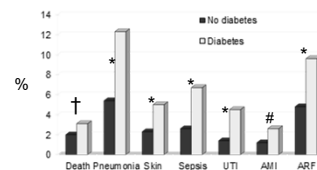
Swanson CM, et al. *Endocr Pract*. 2011;17(6):853-61.

Hyperglycemia and Pneumonia Outcomes



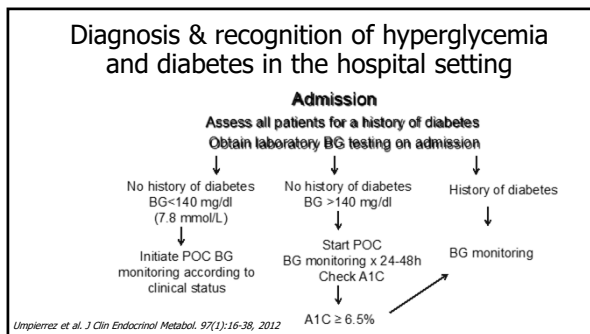
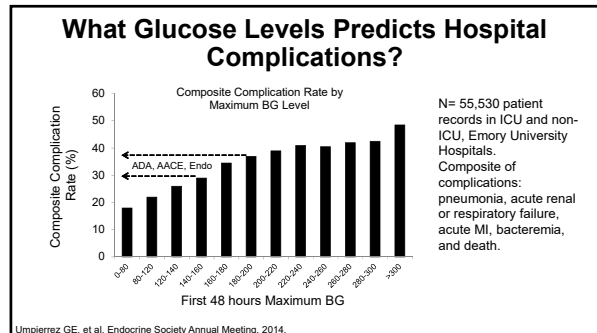
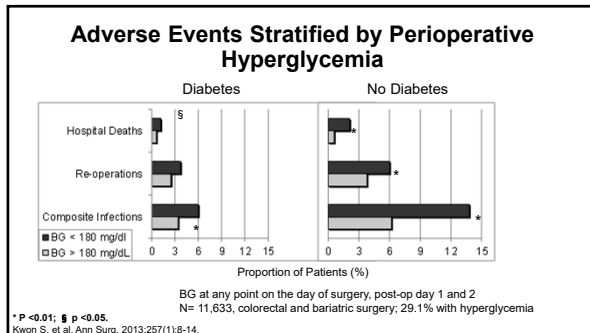
McAlister FA, et al. *Diabetes Care*. 2005;28(4):810-5.

Thirty Day Mortality and In-Hospital Complications in Diabetic and Non-Diabetic Subjects Undergoing Non-Cardiac Surgery



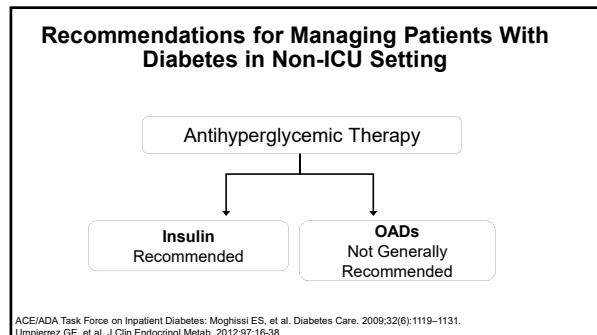
3,184 non-cardiac surgery patients consecutively admitted to Emory University Hospital between 1/2007 and 6/2007.

†p = 0.1; * p < 0.001; #p = 0.017.
Frisch A, Umplierrez GE, et al. *Diabetes Care*. 2010;33(8):1783-8.



- ### A1C for Diagnosis and Management of Hyperglycemia in the Hospital
- Measure HbA1c in non-DM subjects with persistent BG >140 mg/dl and in DM subjects if not done within 2-3 mo.
 - Implementation of A1C testing can be useful:
 - assess glycemc control prior to admission
 - assist with differentiation of newly diagnosed diabetes from stress hyperglycemia
 - Predicts inpatient glycemc control and hypoglycemia
 - design an optimal regimen at hospital discharge
- Umplierrez et al, J Clin Endocrinol Metabol, February 2012

- ### Guideline Recommendations for Glycemic Targets in Non-Critical Care Setting
1. Premeal BG target of <140 mg/dL and random BG <180 mg/dL for the majority of patients
 2. 2016 American Diabetes Association – glucose target 140-180 mg/dL for most patients with T2DM
 3. Glycemic targets be modified according to clinical status.
 - Patients with terminal illness <180-200 mg/dL
 4. For avoidance of hypoglycemia, therapy should be reassessed when BG <100 mg/dL
- ADA/AACE Guidelines and Endocrine Society Guidelines: Moghissi ES, et al. Endocrine Pract. 2009;15:353-369. Umplierrez GE, et al. J Clin Endocrinol Metab. 2012;97:16-38. American Diabetes Association. Diabetes Care. 2016;39(Suppl 1):S99-S104.

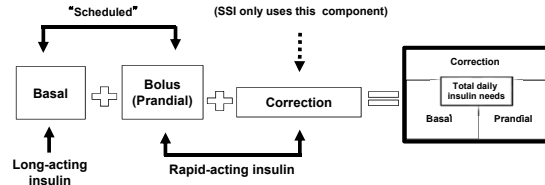


Management of Patients With Diabetes in Non-ICU Settings

- Discontinue oral antidiabetic agents
- Insulin naïve: starting total daily dose (TDD):
 - 0.3 U/kg to 0.5 U/kg
 - Lower doses in the elderly and renal insufficiency
- Previous insulin therapy: reduce outpatient insulin dose by 20-25%
- Basal bolus regimen: Half of TDD as basal and half as rapid-acting insulin before meals

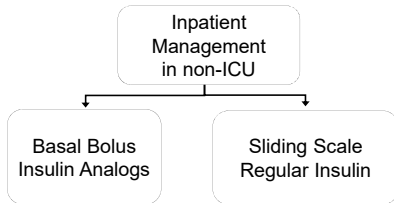
Umplierrez GE, et al. Diabetes Care. 2007;30:2181-2186. Baldwin D, et al. Diabetes Care. 2012;35(10):1970-1974. Rubin DJ, et al. Diabetes Care. 2011;34:1723-8. Umplierrez GE, et al. J Clin Endocrinol Metabol. 2012;97(1):16-38.

SC Insulin Administration



SSI = sliding scale insulin
Moghissi ES, et al; American Association of Clinical Endocrinologists and American Diabetes Association consensus statement on inpatient glycemic control. *Endocr Pract* 2009;15(4):353-369. Umplierrez et al. Endocrine Society Guidelines. *J Clin Endocrinol Metabol*. 97(1):16-38, 2012.

Basal Bolus with Insulin Analogs vs. Sliding Scale Regular Insulin for the Management of Non-ICU Patients With Type 2 Diabetes



Randomized Basal Bolus versus Sliding Scale Regular Insulin in Patients with T2DM (RABBIT-2 Trial)

- D/C oral antidiabetic drugs on admission
- Starting total daily dose (TDD):
 - 0.4 U/kg/d x BG between 140-200 mg/dL
 - 0.5 U/kg/d x BG between 201-400 mg/dL
- Half of TDD as basal insulin and half as rapid-acting insulin
 - Insulin glargine - once daily, at the same time/day.
 - Glulisine- three equally divided doses (AC)

Umplierrez GE, et al. Diabetes Care. 2007;30:2181-2186.

Sliding Scale Insulin Regimen

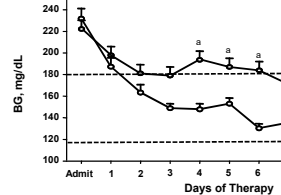
• Before meal: Supplemental Sliding Scale Insulin (number of units)

• Add to scheduled insulin dose

Blood Glucose (mg/dL)	Insulin Sensitive	Usual	Insulin Resistant
>141-180	2	4	6
181-220	4	6	8
221-260	6	8	10
261-300	8	10	12
301-350	10	12	14
351-400	12	14	16
>400	14	16	18

Umplierrez GE, et al. Diabetes Care. 2007;30:2181-2186.

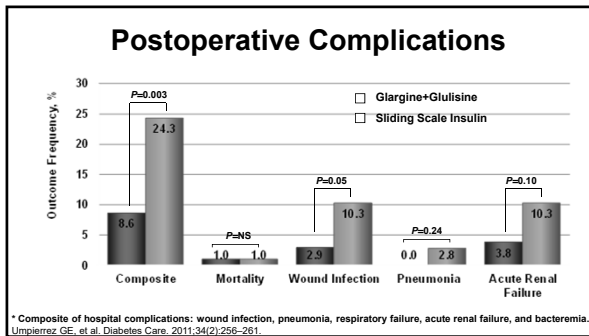
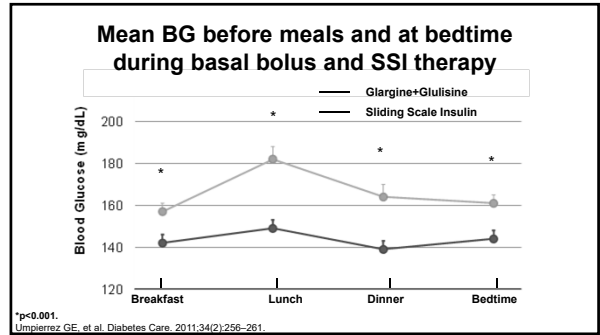
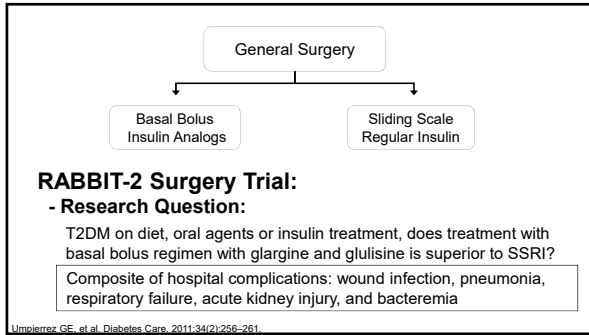
Rabbit 2 Trial: Changes in Glucose Levels With Basal-Bolus vs. Sliding Scale Insulin



Hypoglycemia rate:

- Basal Bolus Group:
 - BG < 60 mg/dL: 3%
 - BG < 40 mg/dL: none
- SSRI:
 - BG < 60 mg/dL: 3%
 - BG < 40 mg/dL: none

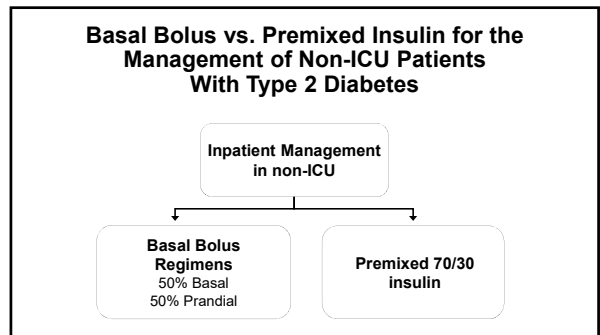
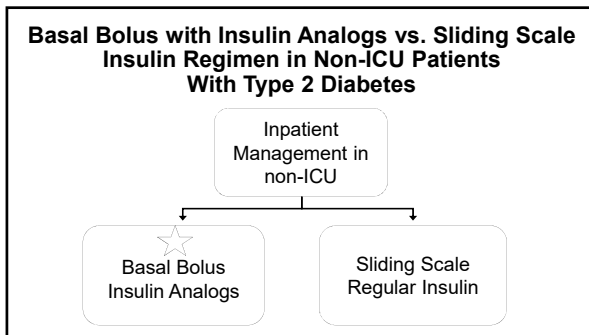
*P<.05; †P<.05.
Umplierrez GE, et al. Diabetes Care. 2007;30(9):2181-2186.



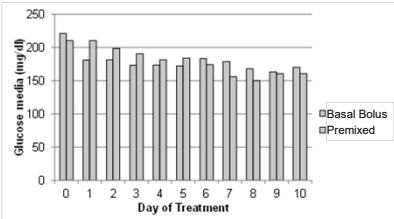
Hospitalization Outcomes and Costs

	All (n= 180)	Basal Bolus (n= 88)	SSI (n= 92)	p value
Length of hospital stay, days	7.9 ± 5.5	7.3 ± 5.1	8.5 ± 5.9	0.15
Patients with complications, n (%)*	28 (16%)	6 (7%)	22 (24%)	0.002
Postsurgical ICU admission, n (%)	23 (13%)	10 (11%)	13 (14%)	0.66
Total hospitalization costs, USD	24457 ± 18359	23226 ± 18745	25641 ± 17991	0.09
Inpatient cost per day	4541 ± 18359	3907 ± 6606	3724 ± 4020	

Treatment with BB compared with SSI reduced average total inpatient costs per day by \$US751 (14%; 95% confidence interval 20-4); Data presented as mean ± SD.
 *Wound infections, pneumonia, acute respiratory failure, acute renal failure, bacteremia
 Phillips VL, et al. Pharmacoeconom Open. 2017;1(2):108-115.



Mean Daily Blood Glucose During Treatment with Basal Bolus and Premixed 30/70 Insulin



Bellido V, Umpleirez GE, et al. Diabetes Care. 2015;38(12):2211-6.

Hypoglycemia During Treatment with Basal Bolus and Premixed 30/70 Insulin

Hypoglycemic Events in Patients Treated with Basal Bolus and Premixed insulin

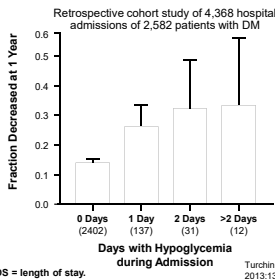
	Basal Bolus	Premixed	P-Value
Any time of the day, n (%)	8 (24.2)	25 (64.1)	<0.001
Fasting or pre-breakfast, n (%)	1 (3)	5 (12.8)	0.13
Morning or pre-lunch, n (%)	1 (3)	12 (30.8)	0.002
Afternoon or pre-dinner, n (%)	5 (15.2)	8 (20.5)	0.55
Evening or after dinner or mid-night, n (%)	4 (12.1)	8 (20.5)	0.34

n: number of patients with at one or more episodes of hypoglycemia

Basal-bolus insulin represents a safer regimen than premixed human. Despite the simplicity, premixed human insulin regimen is associated with greatly elevated rates of hypoglycemia and should be used with caution in patients with T2DM.

Bellido V, Umpleirez GE, et al. Diabetes Care. 2015;38(12):2211-6.

Impact of Inpatient Hypoglycemia



Hypoglycemia (50 mg/dL)

- Each additional day of hypo was associated with a 85.3% in the odds of inpatient death (p=0.009), 65.8% odds of death within 1 yr from discharge
- LOS ↑ 2.5 days per day with hypo (p<0.0001)

Inpatient Hypoglycemia

- Preventable
- Centers for Medicare and Medicaid Services (CMS) "never events"

LOS = length of stay.

Turchin A, et al. Diabetes Care. 2009;32:1153-1157. Pasala S, et al. Ochsner J. 2013;13(3):407-12. Weisler DJ, et al. Diabetes Care. 2007;30(2):367-9.

Inpatient Management in non-ICU Setting

Basal Bolus Insulin Regimen

NPH and Regular Insulin

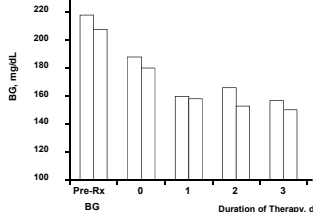
DEAN TRIAL:

- Research Question:

In patients with T2DM on diet, oral agents or insulin treatment, does treatment with basal bolus regimen with detemir once daily and aspart before meals is superior to NPH and Regular split-mixed insulin regimen?

Umpleirez GE, et al. J Clin Endocrinol Metab. 2009;94:564-569.

DEAN Trial: Changes in Mean Daily Blood Glucose Concentration



DEAN Trial: Hypoglycemia

> NPH/Regular

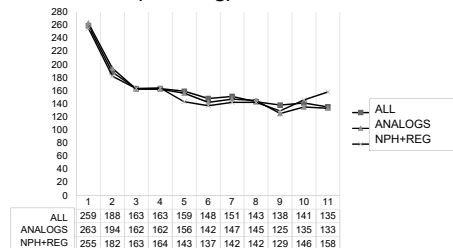
- BG < 40 mg/dl: 1.6%
- BG < 60 mg/dl: 25.4%

> Detemir/Aspart

- BG < 40 mg/dl: 4.5%
- BG < 40 mg/dl: 32.8%

Data are means ±SEM. Basal-bolus regimen: detemir was given once daily; aspart was given before meals; NPH/regular regimen: NPH and regular insulin were given twice daily, two thirds in AM, one third in PM. Umpleirez GE, et al. J Clin Endocrinol Metab. 2009;94(2):564-569.

Basal Bolus with Insulin Analogs (glar+glu) vs. Human (NPH+reg) Insulin



Bueno E, et al. Endocr Pract. 2015;21(7):807-13.

Prevalence of Hypoglycemia in Patients Treated with Human and Analogs

	ALL N=134	Analogs N=66	Human n=68	p-value
Mild Hypoglycemia	37	35	38	p=0.68
Severe hypoglycemia	16	7.6	25	p=0.08
Patients withn ≥2 episodes, n (%)	19	10	16	p= 0.2

Bueno E, et al. Endocr Pract. 2015;21(7):807-13.

Management of Patients With Diabetes in the Non-ICU Setting

Insulin Recommended

↓

1. Basal Bolus preferred over SSI
2. Basal Bolus is preferred over premixed insulin formulations

Limitations:

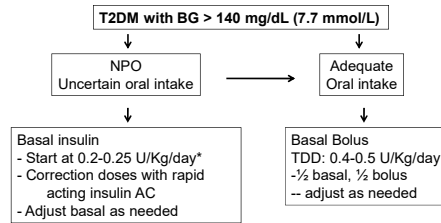
- Hypoglycemia Risk
- Regimen - Multiple injections
 - Over-treatment in many patients

nic control but less cemia compared to n

Alternatives to Basal Bolus Insulin Regimen in Non-ICU Settings

- Basal Plus (basal + correction)
- DPP4-inhibitors

Insulin Treatment in in Non-ICU Setting



Umpleirez GE, et al. J Clin Endocrinol Metabol. 2012;97(1):16-38. American Diabetes Association. Standard of Medical Care in Diabetes. Diabetes Care. 2017;40 (Supplement 1):S1-S135.

Basal Plus Trial Basal + Correction vs. Basal Bolus

Basal plus Correction

- Start glargine: 0.25 U/kg once daily
- Correction for BG >140 mg/dL per sliding scale

Basal Bolus Regimen

- Start TDD: 0.5 U/kg
- Glargine: 0.25 U/kg
- Glulisine: 0.25 U/kg (AC)
- Correction for BG >140 mg/dL per sliding scale

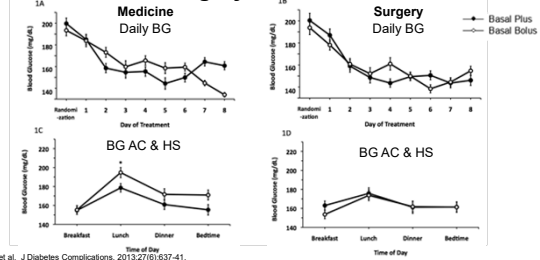
* Reduce TDD to 0.15 U/kg in patients ≥70 yrs and/or serum creatinine ≥ 2.0 mg/dL

* Reduce TDD to 0.3 U/kg in patients ≥70 yrs and/or serum creatinine ≥ 2.0 mg/dL

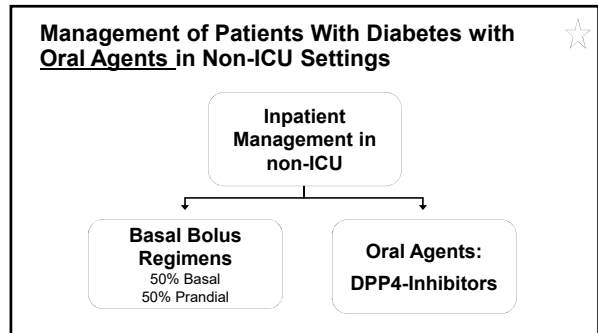
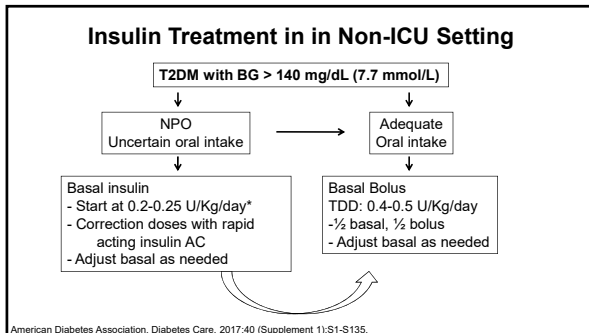
Patients treated with diet, oral agents or with low-dose insulin ≤ 0.4 U/Kg/Day

Umpleirez GE, et al. Diabetes Care. 2013;36(8):2169-74.

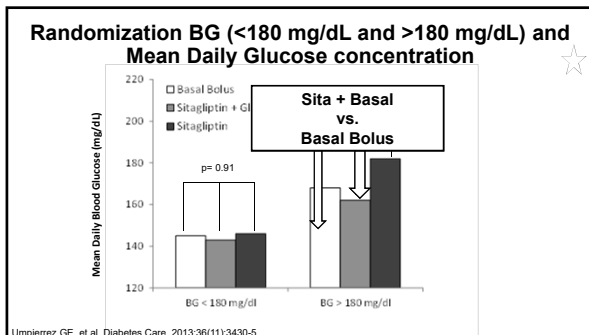
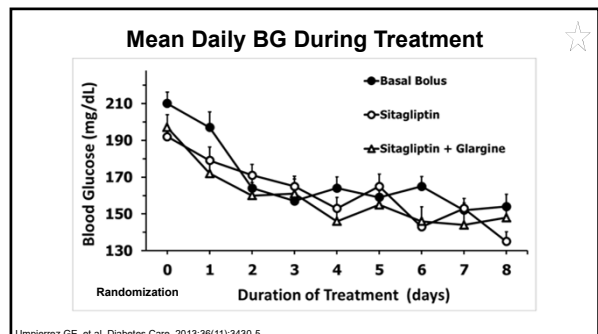
Basal-PLUS vs Basal Bolus: Medicine and Surgery Patients



Smiley D, et al. J Diabetes Complications. 2013;27(6):637-41.

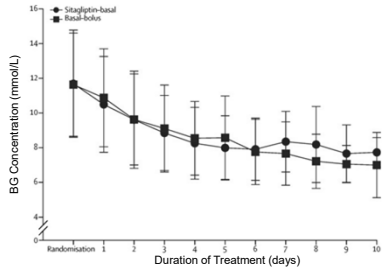


- ### DPP-4 Therapy in Hospitalized Patients
- Study Type:** Multicenter, prospective, open-label randomized clinical trial
 - Patient Population:** Patients with T2DM admitted to general medicine and surgery services at 3 hospitals: Emory University, Grady, and University of Michigan
 - Treatment Groups***
 - Group 1. Sitagliptin once daily (n=30)
 - Group 2. Sitagliptin plus glargine insulin once daily (n=30)
 - Group 3. Basal bolus regimen with glargine once daily and lispro before meals (n=30)
- * All groups received supplemental doses of lispro for BG > 140 mg/dL before meals
- Umplierrez GE, et al. Diabetes Care. 2013;36(11):3430-5.



- ### Sitagliptin Hospital Trial Research Design and Methods
- Study Type:** Multicenter, prospective, open-label randomized clinical trial
 - Patient Population:** Patients with T2DM admitted with BG between 140-400 mg/dL, treated with diet, OADs and insulin at TDD < 0.6 Unit/kg
 - Treatment Groups***
 - Group 1. Sitagliptin plus glargine once daily (n=140)
 - Group 2. Basal bolus regimen with glargine once daily and rapid-acting insulin before meals (n=140)
- * Both groups received supplemental (correction) doses of rapid-actin insulin for BG > 140 mg/dL before meals
- Pasquel FJ, et al. Lancet Diabetes Endocrinol. 2017;5(2):125-133.

Sita-Hospital Trial: Mean Daily BG During Treatment



Pasquel FJ, et al. Lancet Diabetes Endocrinol. 2017;5(2):125-133.

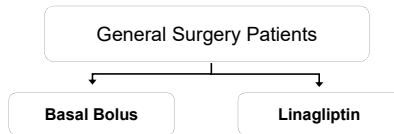
Insulin Dose and # Injections/day

	Sitagliptin + Basal	Basal Bolus	P-value
Total daily dose, U/kg/day	0.2 ± 0.1	0.3 ± 0.2	< 0.001
Total daily dose, U/day	24.1 ± 16.2	34.0 ± 20.1	< 0.001
Basal- Glargine, U/day	17.9 ± 12.5	16.8 ± 10.4	0.94
Prandial- aspart/lispro, U/day		11.7 ± 7.9	<0.001
Supplements- U/day*	5.8 ± 5.7	5.5 ± 4.7	0.91
Number of Injections			
# injections/day (Hospital stay)	2.2 ± 1.0	2.9 ± 0.9	< 0.001
# injections/ day (Day 2-10)	2.1 ± 1.4	2.9 ± 1.1	< 0.001

Pasquel FJ, Umplierrez GE, et al. Lancet Diabetes Endocrinol. 2017;5(2):125-133.

Linagliptin Surgery Trial

A Randomized Controlled Trial on the Safety and Efficacy of Linagliptin Therapy for the Inpatient Management of General Surgery Patients with Type 2 Diabetes



General surgery (non-cardiac) patients with T2DM admitted with BG between 140-400 mg/dL, treated with diet, OADs and insulin at TDD < 0.5 Unit/kg

Vellanki & Umplierrez et al. ADA 2017 Scientific Meeting.

Linagliptin Surgery Trial

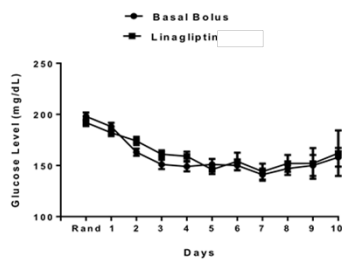
A Randomized Controlled Trial on the Safety and Efficacy of Linagliptin Therapy for the Inpatient Management of General Surgery Patients with Type 2 Diabetes

- Linagliptin*:**
 - Linagliptin : 5 mg/day
- Basal Bolus Regimen*:**
 - Total daily insulin dose: 0.4 unit/kg/day for BG between 140-200 mg/dL and 0.5 unit/kg/day for BG between 201-400 mg/dL
 - Half of total daily dose (TDD) given as glargine once daily
 - Half of TDD given as lispro in three equal doses before meals

* Supplemental (correction) doses of rapid-acting insulin analog per sliding scale given as needed before meals for BG > 140 mg/dL or bedtime > 200 mg/dL.

Vellanki & Umplierrez et al. ADA 2017 Scientific Meeting.

Linagliptin Surgery Trial: Daily Glucose Levels



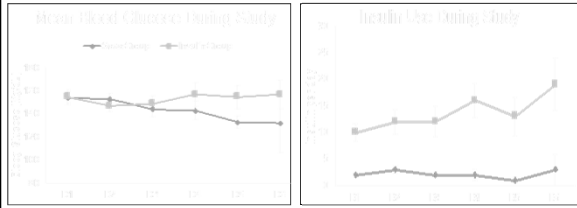
Vellanki & Umplierrez et al. ADA 2017 Scientific Meeting.

Lina Surgery Trial: Daily Glucose Levels

	Linagliptin	Basal Bolus	P-value
Inpatient BG, days 2-10			
- All patients, mg/dL	160 ± 41	171 ± 46	0.04
- Randomization BG <200 mg/dL	156 ± 41	160 ± 41	0.43
- Randomization BG ≥200 mg/dL	165 ± 40	196 ± 47	0.001
Hypoglycemia			
- BG <70 mg/dL, n (%)	14 (11)	2 (1.6)	0.001
- BG <40 mg/dL, n (%)	0 (0)	1 (0.8)	>0.99
Treatment failures, n (%)	10 (8.2)	19 (15)	0.12
Composite complications, n (%)	11 (9)	14 (11)	0.63

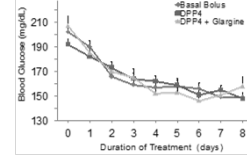
Vellanki & Umplierrez et al. ADA 2017 Scientific Meeting.

Saxagliptin in Non-Critically Ill Hospitalized Patients with T2DM and Mild Hyperglycemia



Garg R, et al. *BMJ Open Diabetes Res Care*. 2017;5(1):e000394.

DPP4-inhibitors for the Inpatient Management of General Medicine and Surgery Patients with T2DM

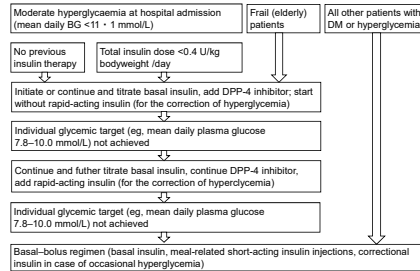


640 med-Surg patients, BG between 140 and 400 mg/dL treated with diet, OADs or total insulin dose ≤ 0.5 unit/kg/day received DPP4-I alone (n=164), DPP4-I plus basal (n=167) or basal bolus (n=309). All groups received correction doses with rapid-acting insulin for BG > 140 mg/dL.

	DPP4-I	DPP4-I + Basal	Basal Bolus	P-Value
# patients	164	167	309	
Duration DM, yrs	6.0 (3.0, 11.0)	9.0 (4.0, 14.0)	8.0 (4.0, 14.0)	0.09
HbA1c, %	7.6 ± 1.9	8.6 ± 2.4	8.3 ± 2.1	<0.01
Random BG, mg/dl	192 ± 40	208 ± 54	202 ± 49	0.05
Hosp BG, days 1-10	172 ± 37	171 ± 41	170 ± 39	0.71
BG < 70 mg/dL, n (%)	3 (2)	16 (10)	39 (13)	<0.01

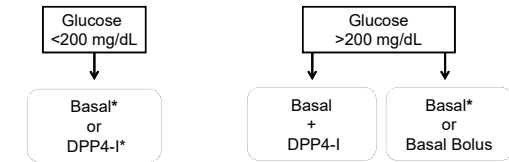
Reyes-Umpierrez et al. *ADA Scientific Meeting* 2017.

Approach to the Glycaemic Management of General Medical and Surgical Patients in Hospital



Nauck MA, Meier JJ. *Lancet Diabetes Endocrinol*. 2017;5(2):83-95.

Management of General Medicine Patients With T2DM



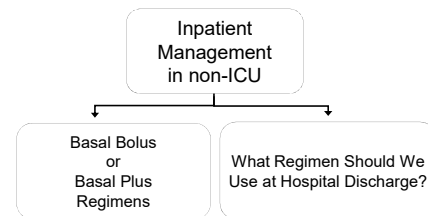
Basal*: Basal insulin (glargine, detemir, degludec) once daily at 0.2-0.25 U/kg PLUS correction per sliding scale
 DPP4-I*: Sitagliptin or linagliptin PLUS correction per sliding scale

Preoperative Management of Diabetes Patients

- No established consensus on preoperative management
- Goal is to minimize hypoglycemia risk and hyperglycemia exposure
- Evening before surgery
 - Continue usual meal plan, insulin, and OADs
 - If NPO after midnight, reduce bedtime basal insulin dose by 50% for NPH or 25% for glargine or detemir
- Day of surgery
 - Discontinue OADs, GLP-1 receptor agonists, and pramlintide
 - If morning BG > 180 mg/dL, give correction doses of insulin
 - Check BGs every 2 hours

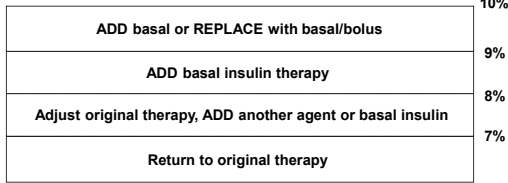
<http://emedicine.medscape.com/article/284451-overview#aw2aab6b5>. Accessed January 29, 2015. Joslin Diabetes Center and Joslin Clinic. Guideline for Inpatient Management of Surgical and ICU patients with Diabetes, 2009. Clement S, et al. *Diabetes Care*. 2004;27(2):553-91.

Management of Patients With Diabetes After Hospital Discharge



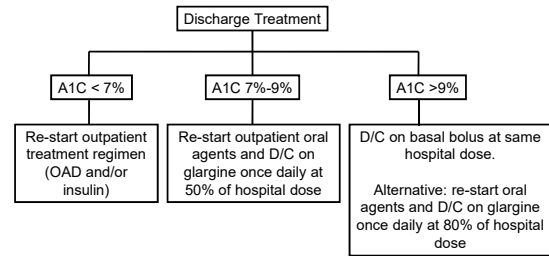
Recommendations for Managing Patients With Diabetes After Hospital Discharge

Use admission A1C to adjust therapy at discharge



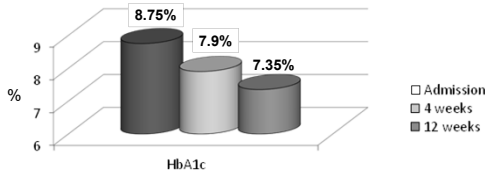
Umplierrez GE, et al. J Clin Endocrinol Metabol. 2012;97(1):16-38.

Discharge Insulin Algorithm



Umplierrez GE, et al. Diabetes Care. 2014;37(11):2934-9.

Hospital Discharge Algorithm Based on Admission HbA1C for the Management of Patients with T2DM



Umplierrez GE, et al. Diabetes Care. 2014;37(11):2934-9.

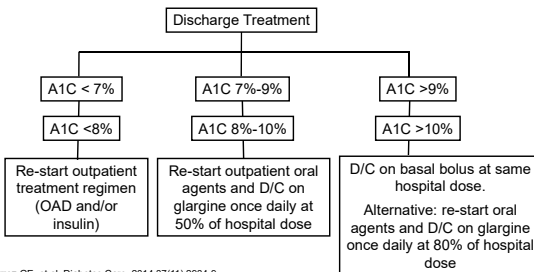
Hospital Discharge Algorithm Based on Admission HbA1C for the Management of Patients with T2DM

Primary outcome:
- change in A1C at 4 wks and 12 wks after discharge

	All Patients	OAD	OAD + Glargine	Glargine+ Glulisine	Glargine
# patients, n (%)	224	81 (36)	61 (27)	54 (24)	20 (9)
A1C Admission, %	8.7±2.5	6.9±1.5	9.2±1.9	11.1±2.3	8.2±2.2
A1C 4 Wks F/U, %	7.9±1.7*	7.0±1.4	8.0±1.4 ^ψ	8.8±1.8 ^ψ	7.7±1.7
A1C 12 Wks F/U, %	7.3±1.5*	6.6±1.1	7.5±1.6*	8.0±1.6*	6.7±0.8*
Hypoglycaemia					
BG < 70 mg/dl, n (%)	62 (29)	17 (22)	17 (30)	23 (44)	5 (25)
BG < 40 mg/dl, n (%)	7 (3)	3 (4)	0 (0)	3 (6)	0 (0)

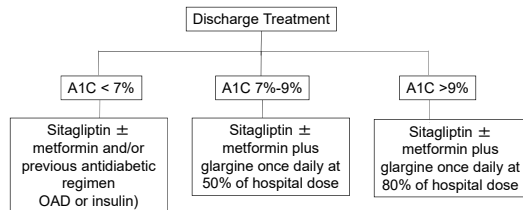
Umplierrez GE, et al. ADA Scientific Sessions, 2012. * p < 0.001 vs. Admission A1C; ^ψ p = 0.08

Revised Discharge Insulin Algorithm

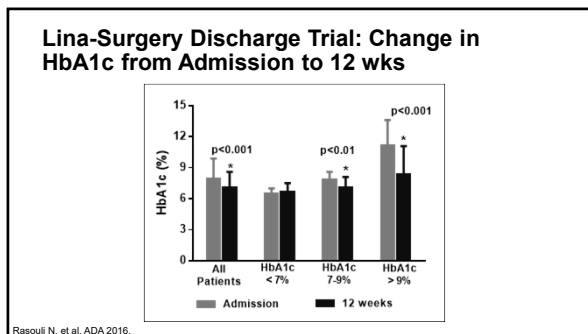
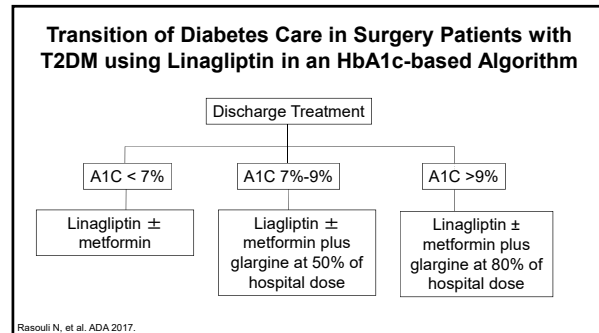
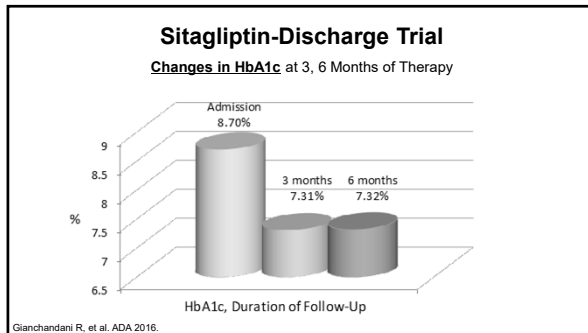


Umplierrez GE, et al. Diabetes Care. 2014;37(11):2934-9.

Sitagliptin-Discharge Trial



Gianchandani R, et al. ADA 2016.



Management of diabetes in non-critical care setting

So... What really have we learned?

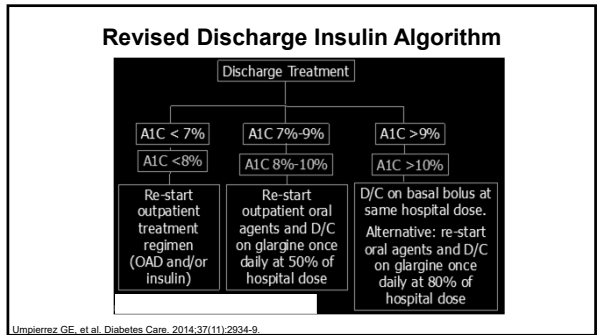
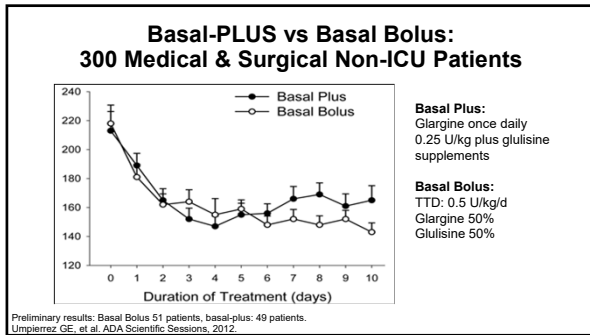
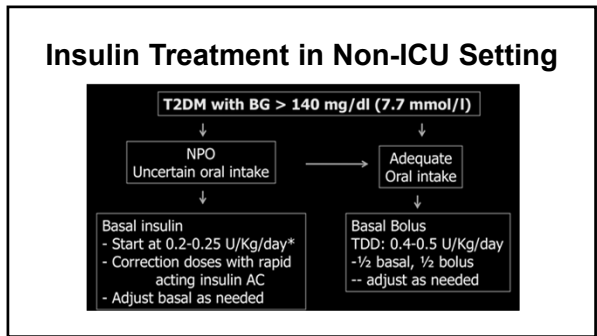
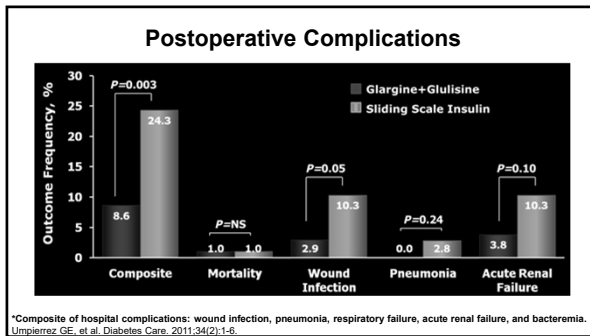
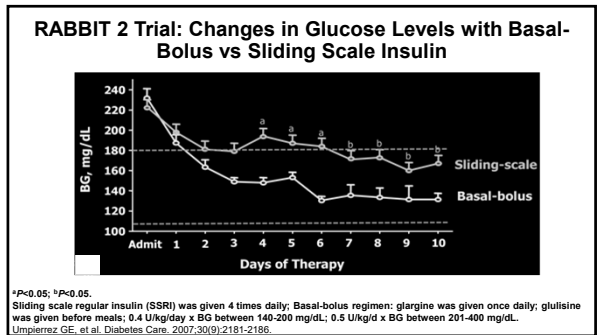
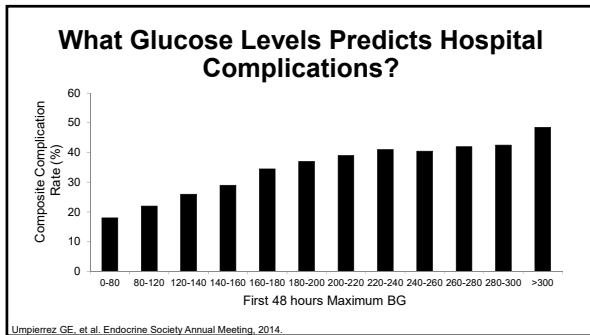
Case Presentation:

- TJ is a 68 y/o male with an 8 yr history of DM admitted with SOB and CHF on chest x-ray. Previously treated with metformin 1 gram b.i.d. and sitagliptin 100 mg/day.
- Lab: BG 172 mg/dL, A1c: 8.0%; serum creatinine 1.3 mg/dL, eGFR: 45 ml/min
- JP is a 42 y/o male with an 10 yr history of DM with diabetic foot infection and osteomyelitis left toe. Treated with metformin 1 g b.i.d. and glipizide XL 10 mg/day.
- Lab: BG 294 mg/dL, A1c: 9.2%; serum creatinine 1.4 mg/dL, eGFR: 60 ml/min

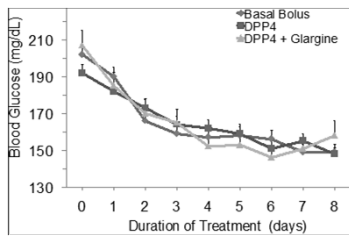
Individualization of care is needed for the management of hyperglycemia and diabetes in the hospital

Case Presentation: Antihyperglycemic Therapy

- TJ is a 68 y/o male with an 8 yr history of DM admitted with SOB and CHF on chest x-ray.
- Treatment regimen
 - Continue DPP4-i
 - Hold metformin due to heart failure
- JP is a 42 y/o male with an 10 yr history of DM with diabetic foot infection and osteomyelitis left toe.
- Treatment regimen
 - Basal insulin or basal bolus regimen
 - Alternative: basal + DPP4-i



DPP4-Inhibitors for the Inpatient Management of General Medicine and Surgery Patients with T2DM



• 640 med-surg patients, BG 140-400 mg/dL treated with diet, OADs or total insulin dose ≤ 0.5 U/kg/day received DPP4-I alone (n=164), DPP4-I plus basal (n=167) or basal bolus (n=309). All groups received correction doses with rapid-acting insulin for BG > 140 mg/dL.

Umpierrez R, et al. ADA Scientific Meeting 2017.

Post-Test Question 1

- Which of the following statements regarding inpatient hypoglycemia in diabetes patients is correct?
 1. Inpatient hypoglycemia is not currently listed by CMS as a "never event"
 2. Associated with increased length-of-stay (LOS) but not increased mortality
 3. Associated with increased LOS and increased mortality
 4. Unsure

Post-Test Question 2

- Please rate your knowledge of the safety and efficacy of DPP-4 inhibitor regimens for hospitalized patients with T2DM?
 1. Poor
 2. Fair
 3. Good
 4. Excellent

Post-Test Question 3

- Which of the following is NOT a guideline recommendation for treatment of hospitalized T2DM patients in the non-ICU setting?
 1. OADs are generally not recommended
 2. Sliding scale insulin is not recommended
 3. Glucose target of 140-180 mg/dL is recommended for most patients with T2DM
 4. Therapy should be reassessed if BG < 140 mg/dL to avoid hypoglycemia

Thank you!

geumpie@emory.edu

