

Inpatient Management of Diabetes

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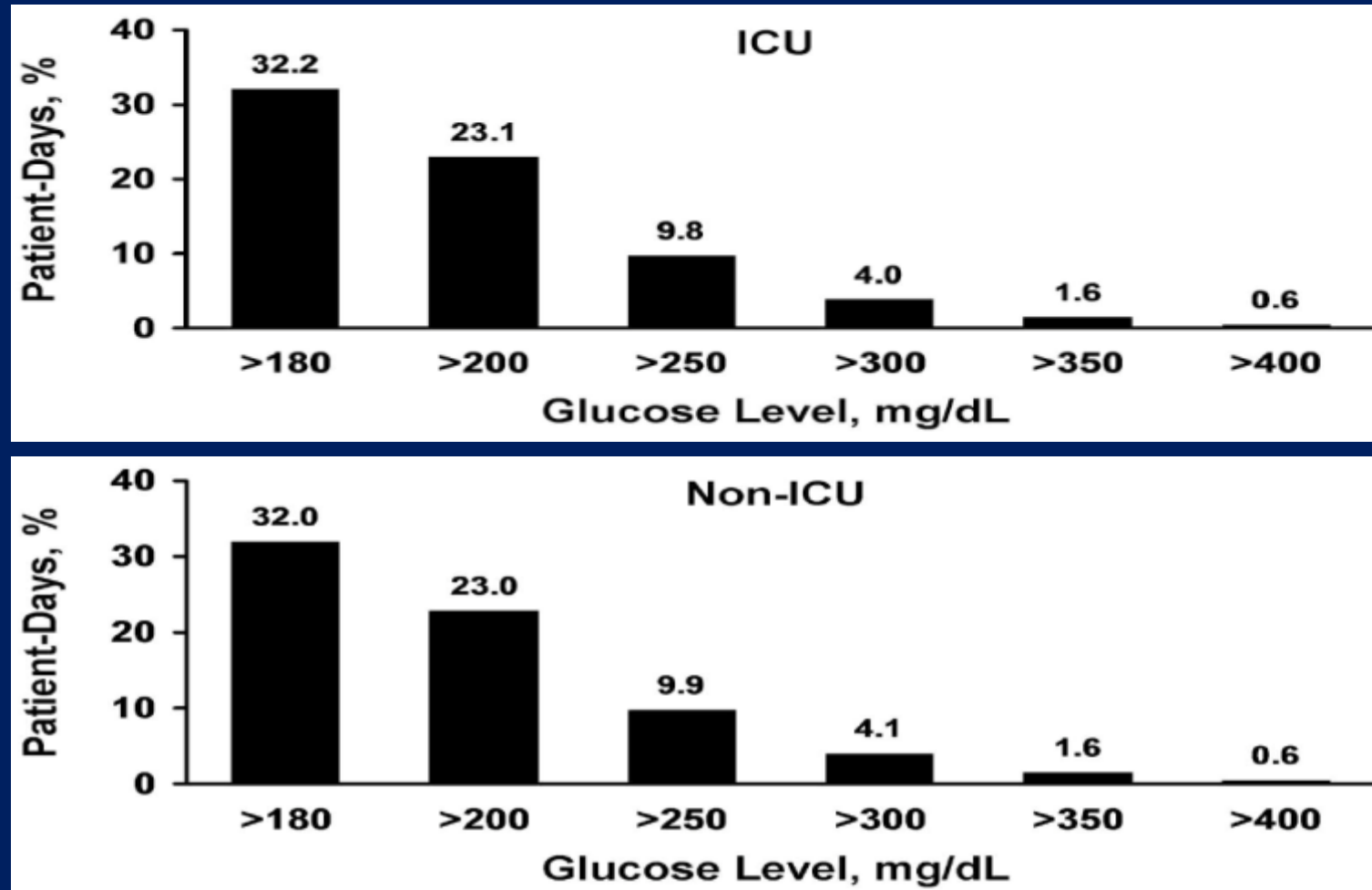
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Objectives

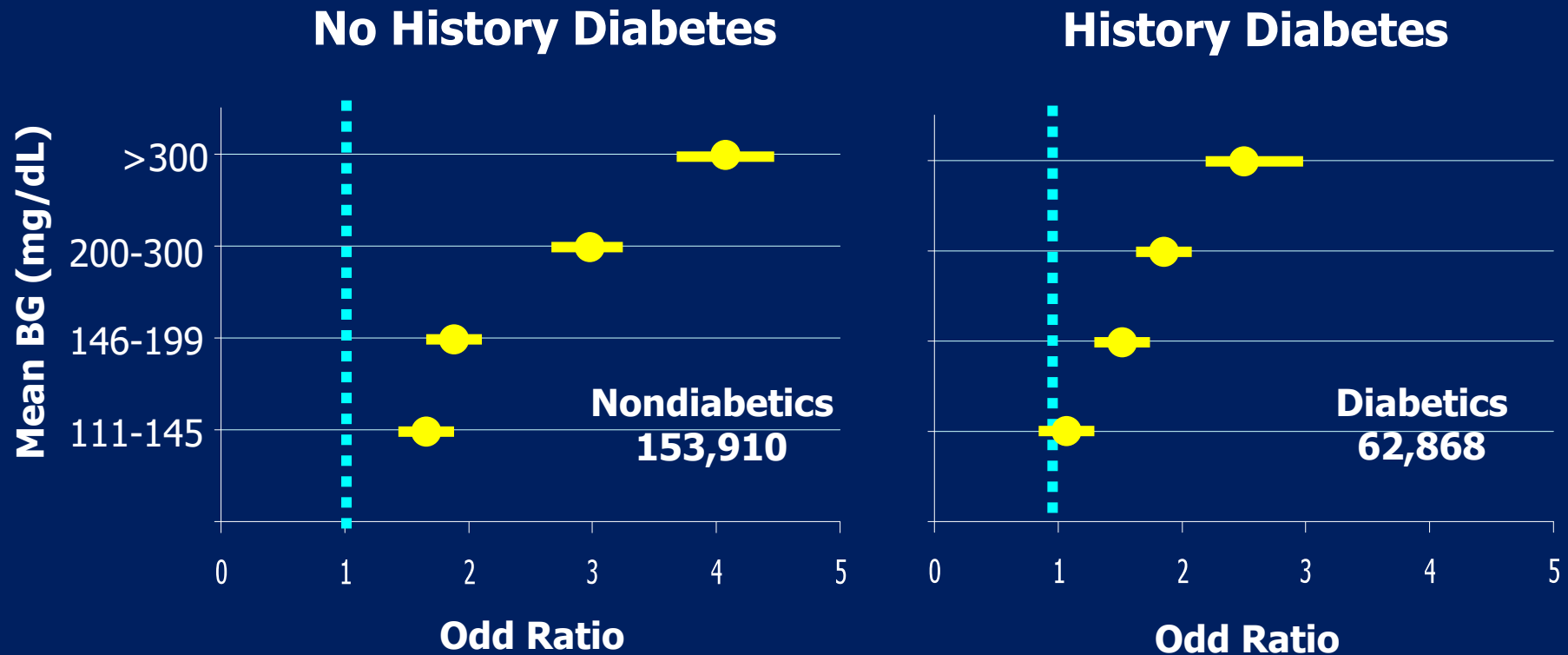
- 1) To discuss the relevance of inpatient diabetes care and current treatment recommendations
- 2) To discuss novel inpatient management approaches (non-insulin agents) and the use of diabetes technology in the hospital

Distribution of patient-day-weighted mean POC-BG values for ICU



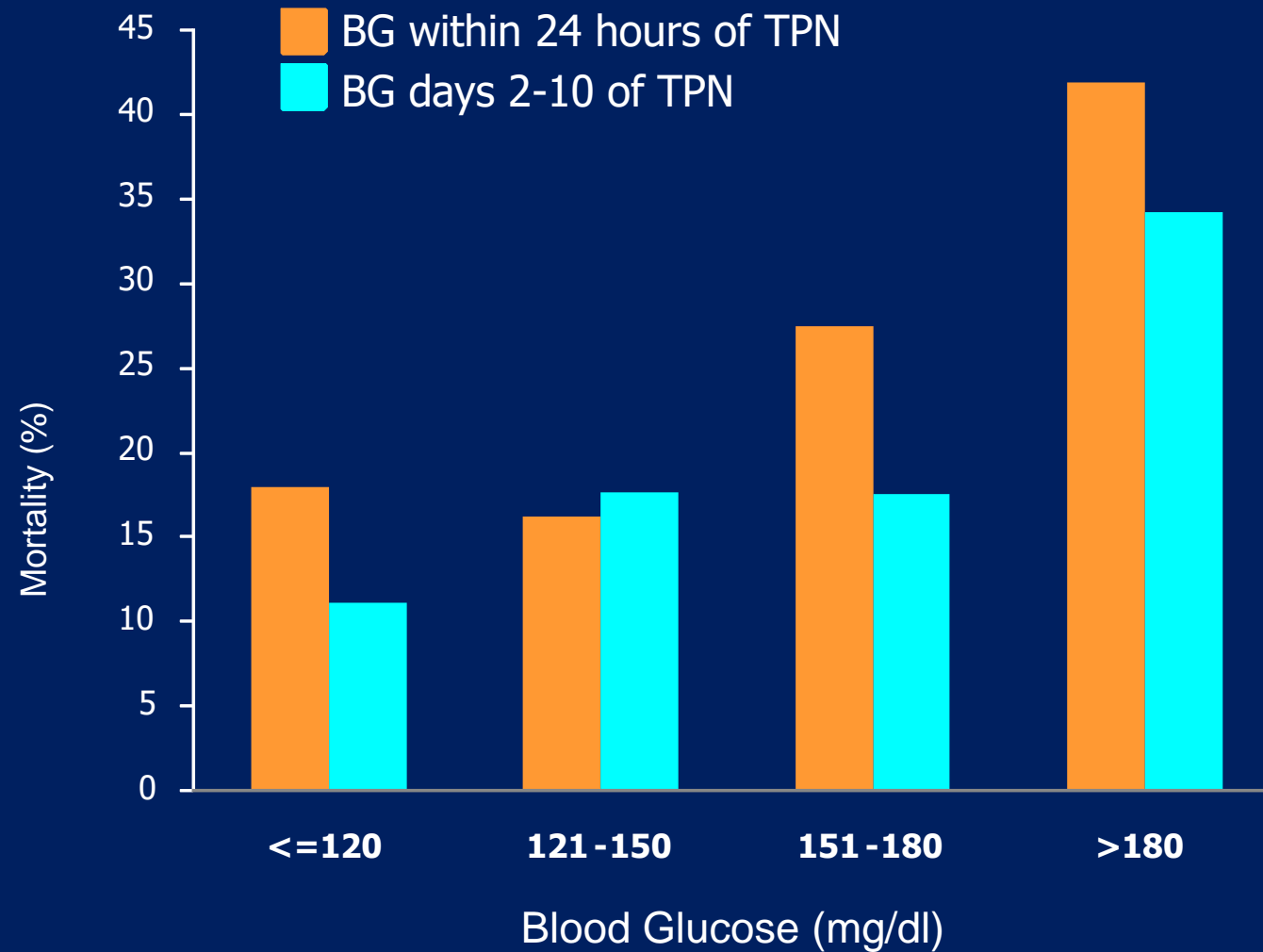
Data from ~12 million BG readings from 653,359 ICU patients - mean POC-BG: 167 mg/dL

Mortality Risk Greater in Hyperglycemic Patients without History of Diabetes

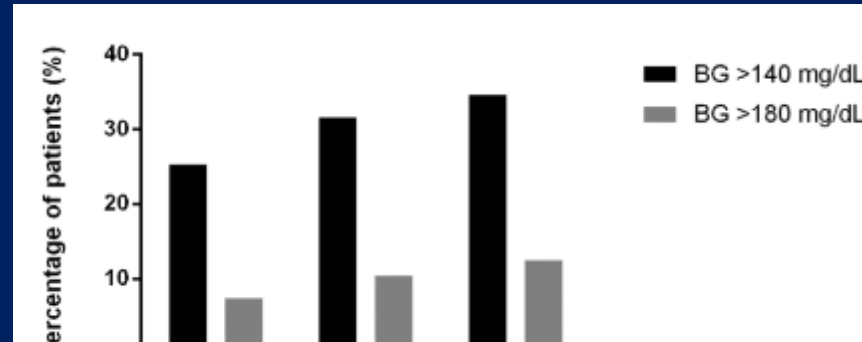


216,775 consecutive first admission
177 surgical, medical, cardiac ICUs
73 geographically diverse VAMC

Hyperglycemia during TPN and Hospital Mortality



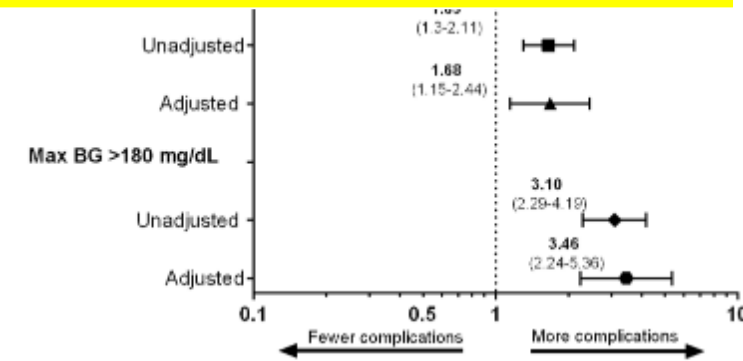
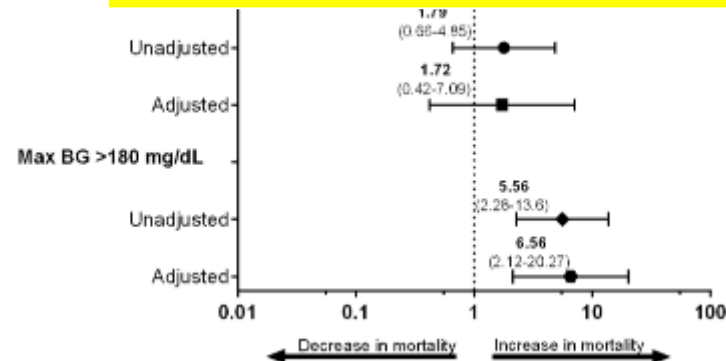
Prevalence of perioperative hyperglycemia



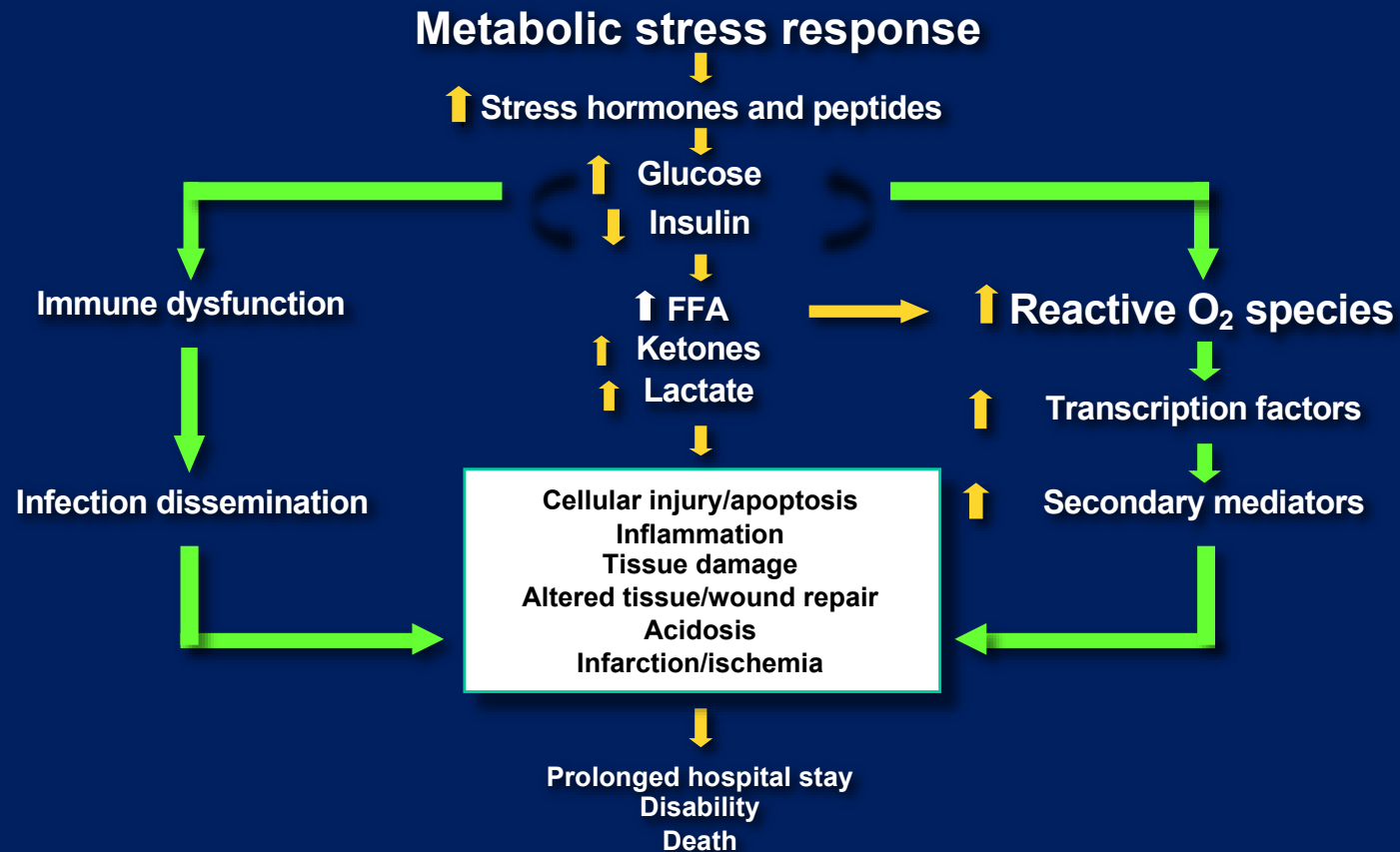
**Definition of Stress Hyperglycemia:
>140 mg/dl or >180 mg/dl?**

Hosp

Max BG 140-



Link Between High Blood Glucose and Poor Outcomes: Potential Mechanisms

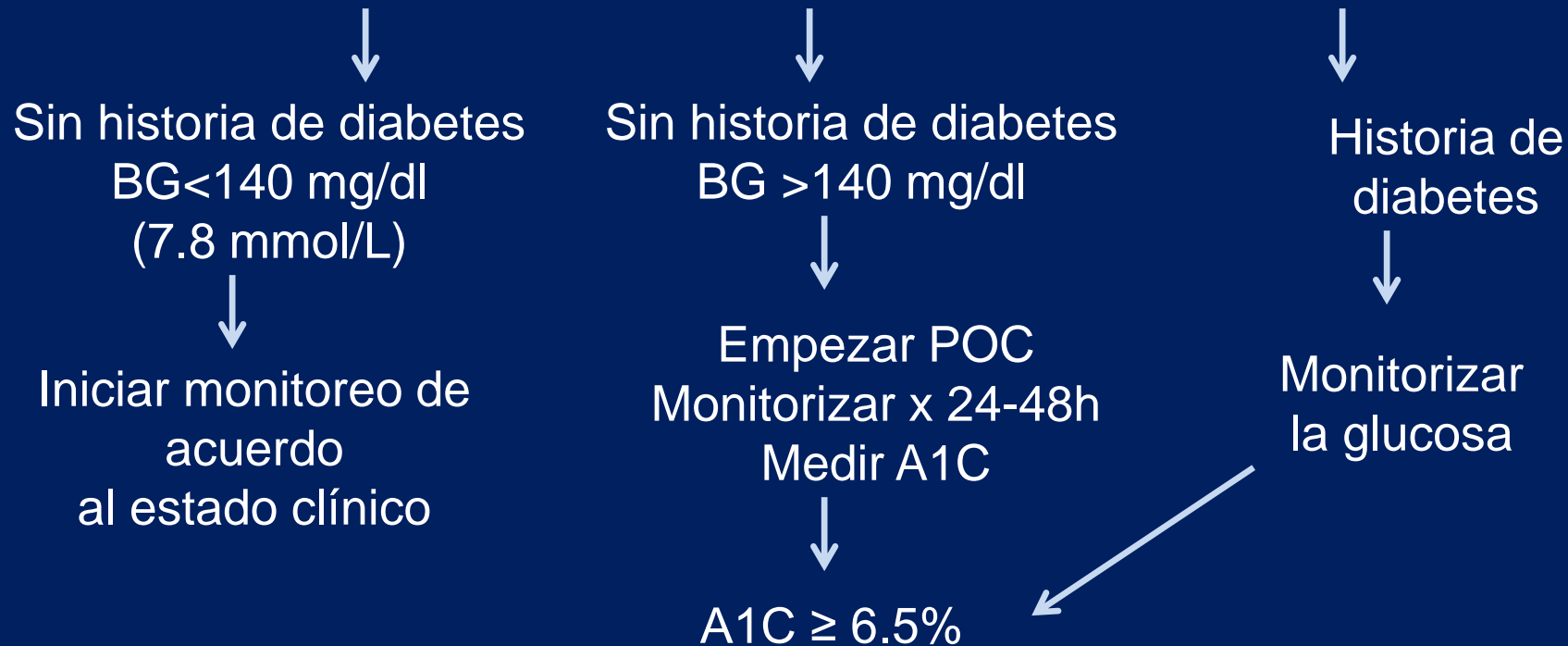


Diagnóstico de la hiperglucemia y la diabetes en el hospital

Admisión

Evaluar a todos los pacientes con historia de diabetes

Obtener glucosa a la admisión



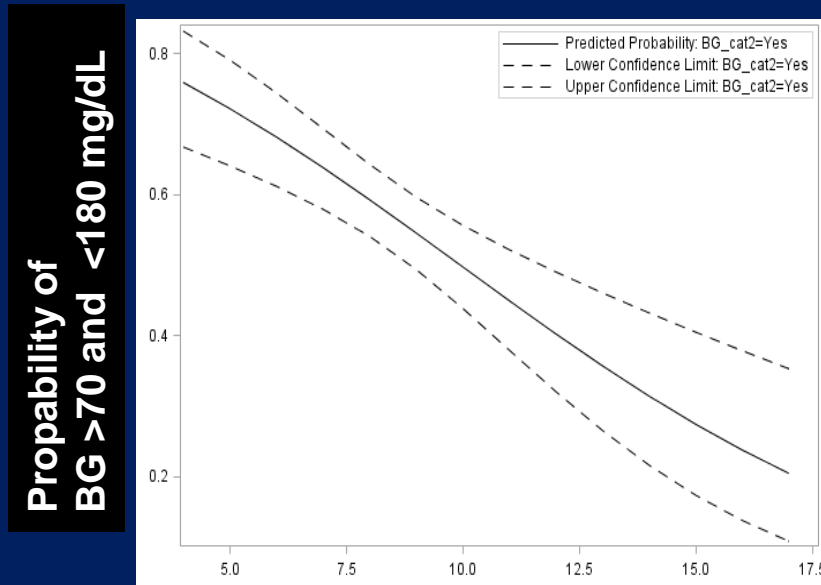
POC BG: glicemia capilar

A1C en el Hospital

- Medición de A1C puede ser útil:
 - Diferenciación de nuevos casos de diabetes de la hiperglucemia de estrés
 - Control glucémico antes de la admisión
 - Predecir control glucémico e hipoglucemia
 - Diseñar el régimen óptimo al momento del alta hospitalaria

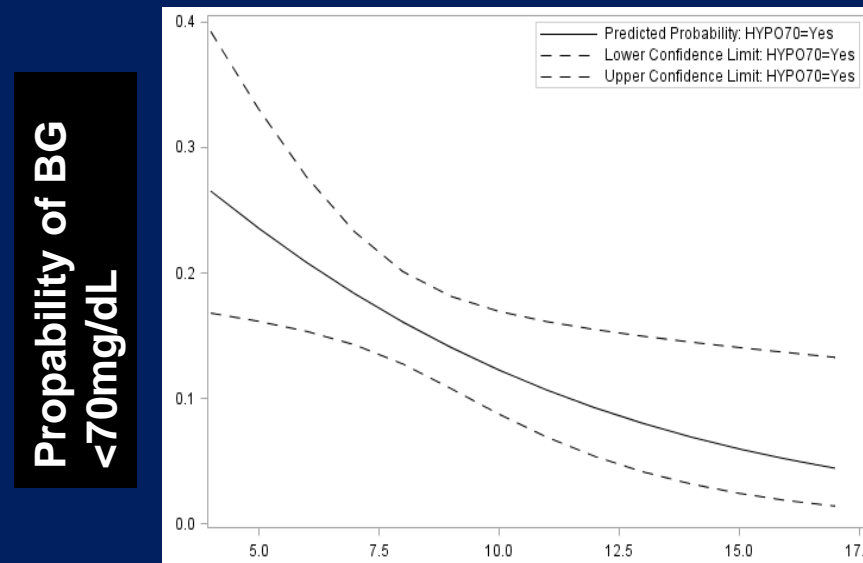
Probabilidad de buen control glucémico y de hipoglucemia de acuerdo a Hemoglobina A1c

Probability of good glycemic control



Hemoglobin A1C (%)

Probability of hypoglycemia



Hemoglobin A1C (%)

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. 2018 American Diabetes Association – glucose target 140-180 mg/dl for most patients with T2D

3. Glycemic targets be modified according to clinical status.

4. For average BG <180 mg/dl

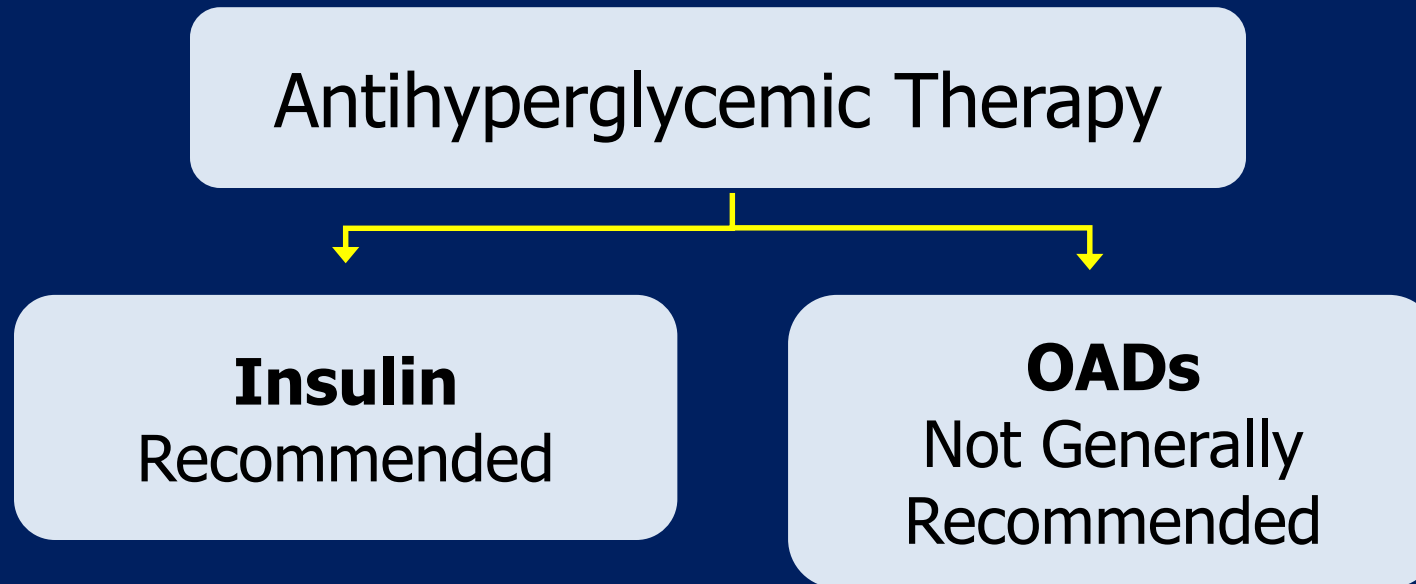
**2020 Recommendation:
Keep BG <180 mg/dl!**

ADA/AACE Guidelines, Diabetes Care 2009;
Endocrine Society. J Clin Endocrinol Metabol, 2012; Under Revision 2018
2018 Standard of Diabetes Care, # 14, Hospital Management of Diabetes, Diabetes Care 2018

How should we treat non-critically ill patients?

Is there a role for non-insulin agents?

Recommendations for Managing Patients With Diabetes in the Hospital Setting



Metformina y Acidosis Láctica

Impaired Metformin Clearance

Acute and chronic kidney failure



Metformin
Associated
Lactic Acidosis



Impaired Tissue Oxygenation

Severe sepsis and septic shock

Hypovolemia, shock (e.g. surgery)

Decompensated heart failure



Impaired Lactate Metabolism

Alcohol abuse

Liver failure

Nucleoside reverse transcriptase inhibitors

Insulin Therapy in patients with T2D

- D/C oral antidiabetic drugs on admission
- **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

Inpatient Management in non-ICU Setting

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graph TD; A[Inpatient Management in non-ICU Setting] --> B[Sliding Scale Regular Insulin]; A --> C[Basal Bolus Insulin Regimen];
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**Sliding Scale
Regular Insulin**

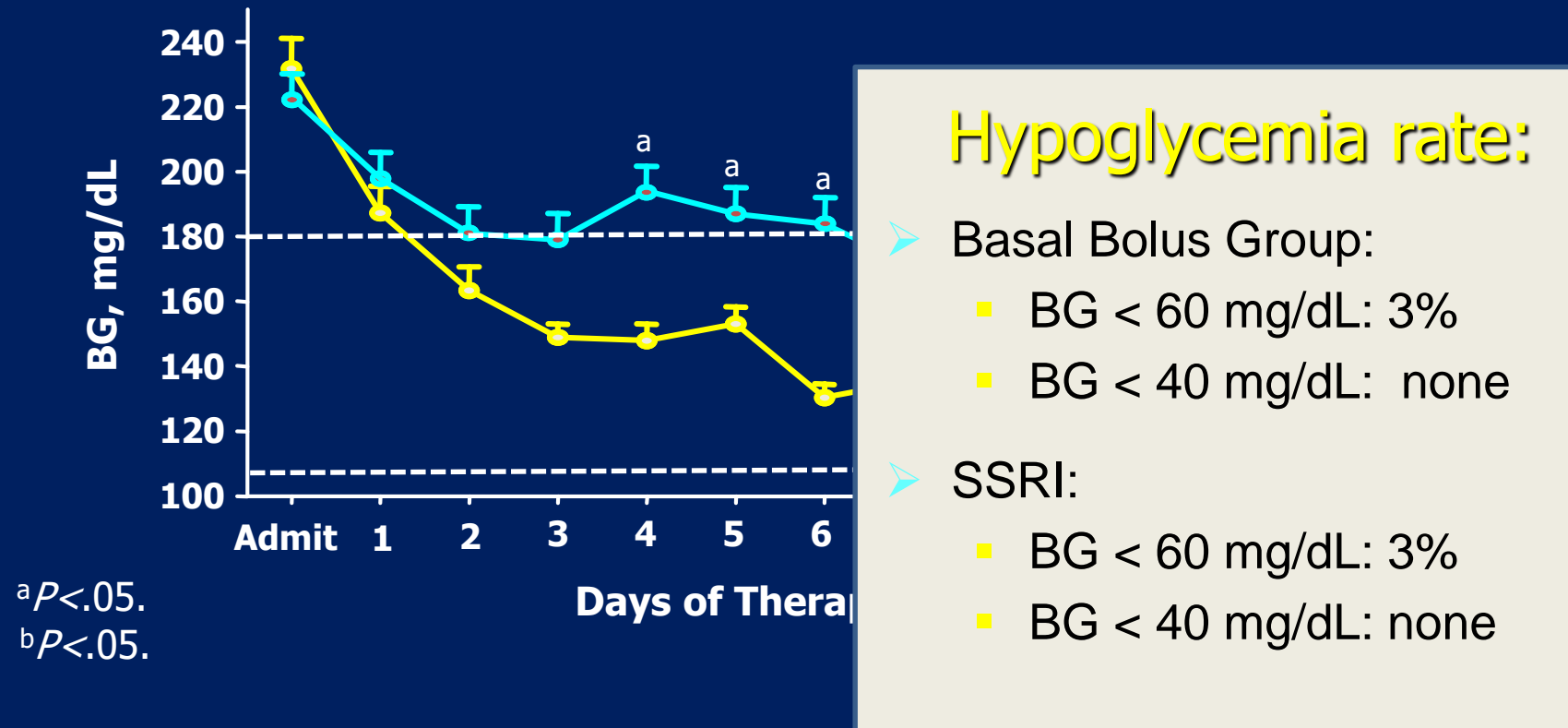
**Basal Bolus
Insulin Regimen**

RABBIT-2D TRIAL:

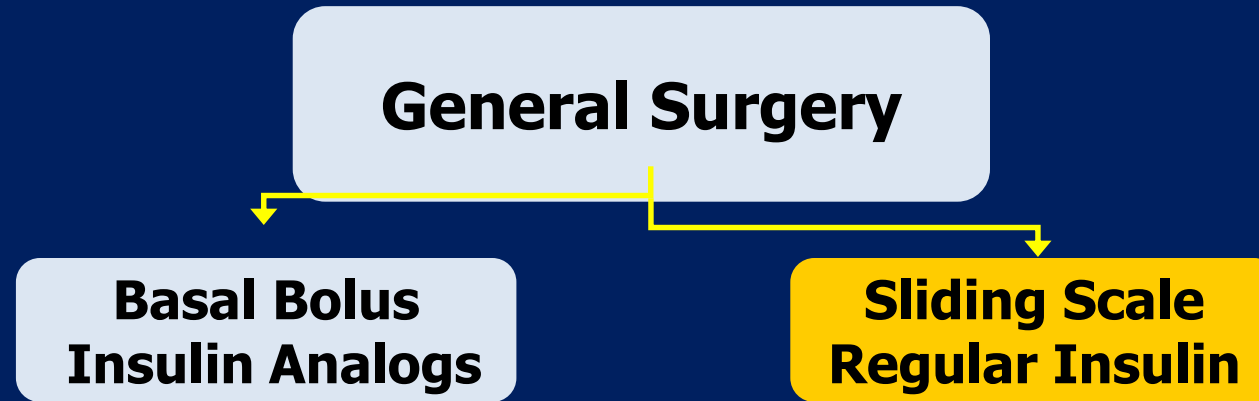
- Research Question:

In insulin naïve patients with T2DM, does treatment with basal bolus regimen with glargine once daily and glulisine before meals is superior to sliding scale regular insulin?

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



- Sliding scale regular insulin (SSRI) was given 4 times daily
- Basal-bolus regimen: glargine was given once daily; glulisine was given before meals.
0.4 U/kg/d x BG between 140-200 mg/dL
0.5 U/kg/d x BG between 201-400 mg/dL



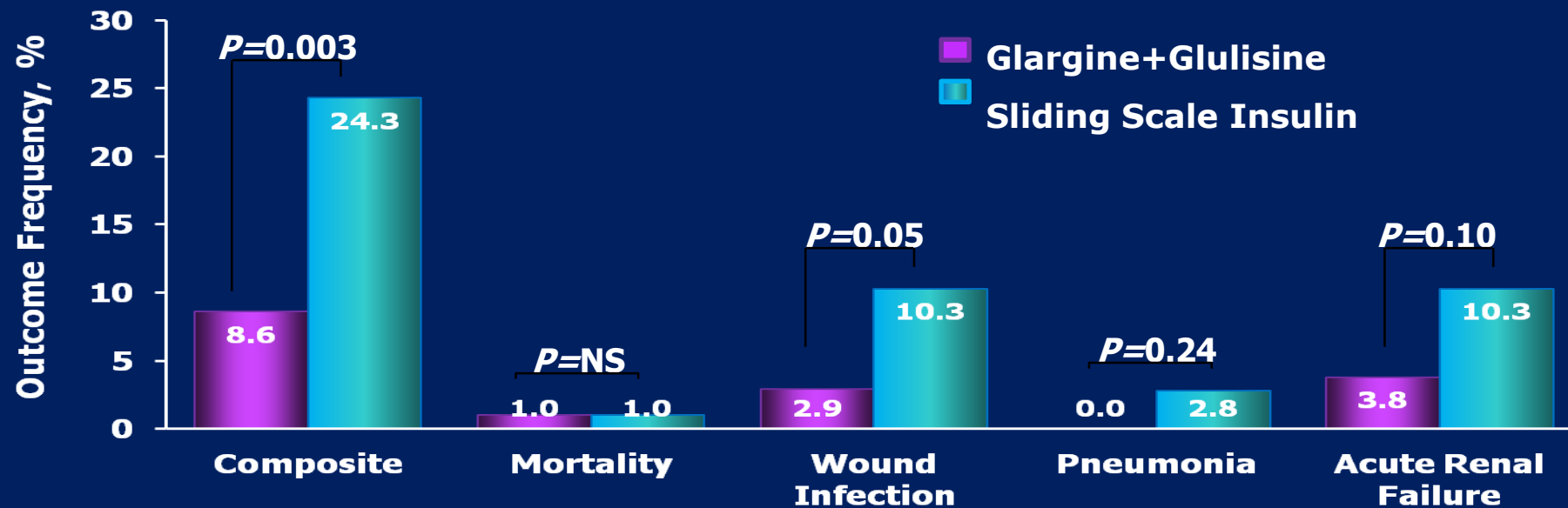
RABBIT-2 Surgery Trial:

- Research Question:

T2DM on diet, oral agents or insulin treatment, does treatment with basal bolus regimen with glargine and glulisine is superior to SSRI?

Composite of hospital complications: wound infection, pneumonia, respiratory failure, acute kidney injury, and bacteremia

Postoperative Complications



* Composite of hospital complications: wound infection, pneumonia, respiratory failure, acute renal failure, and bacteremia.

Umpierrez et al, Diabetes Care 34 (2):1–6, 2011

Inpatient Management in non-ICU Setting

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graph TD; A[Inpatient Management in non-ICU Setting] --> B[Basal Bolus Insulin Regimen]; A --> C[NPH and Regular Insulin-Split-Mixed Regimen];
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**Basal Bolus
Insulin Regimen**

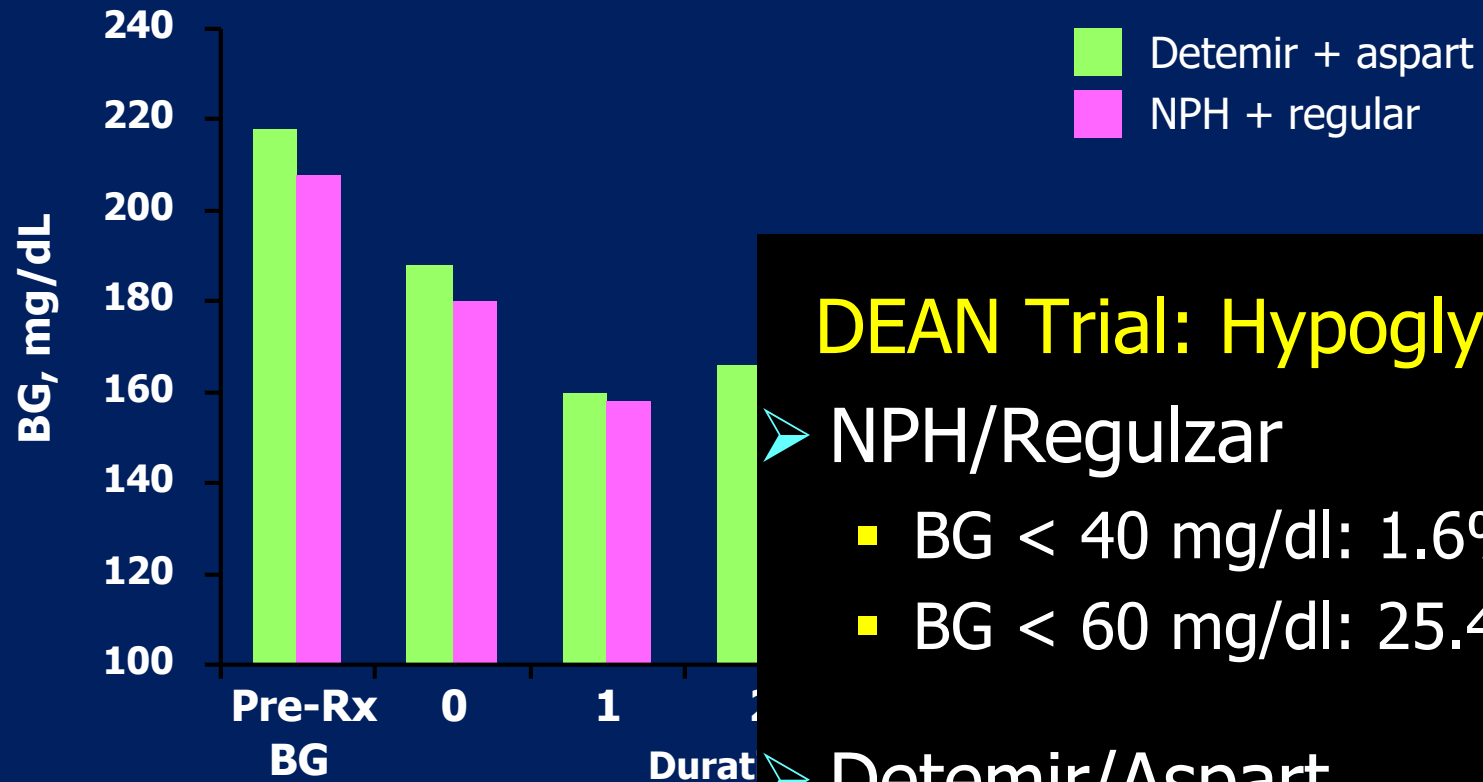
**NPH and Regular
Insulin-Split-
Mixed Regimen**

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?

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 \pm SEM.

Basal-bolus regimen: detemir was given once daily
NPH/regular regimen: NPH and regular insulin were given

Umpierrez GE, et al. *J Clin Endocrinol Metab.* 2009;

Basal Plus Trial: Basal + Correction vs. Basal Bolus

Basal plus supplements

- Starting glargine*: 0.25 units/kg
- Correction with glulisine for BG >140 mg/dl per sliding scale

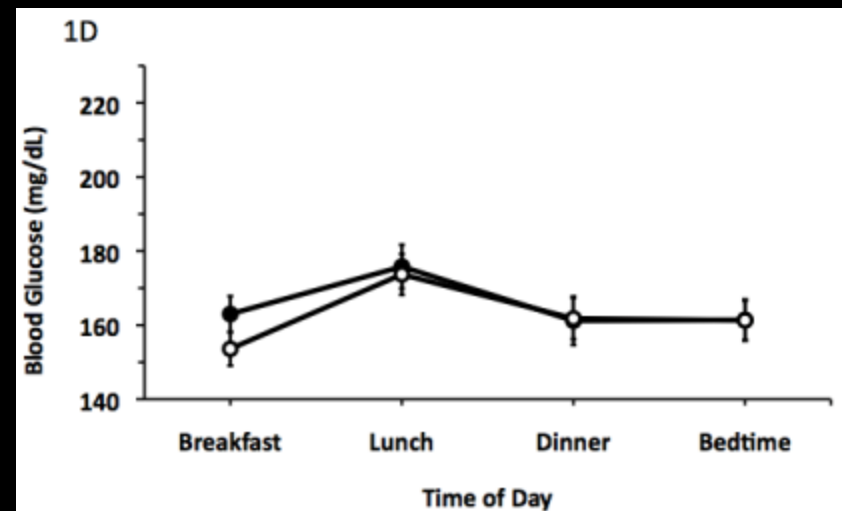
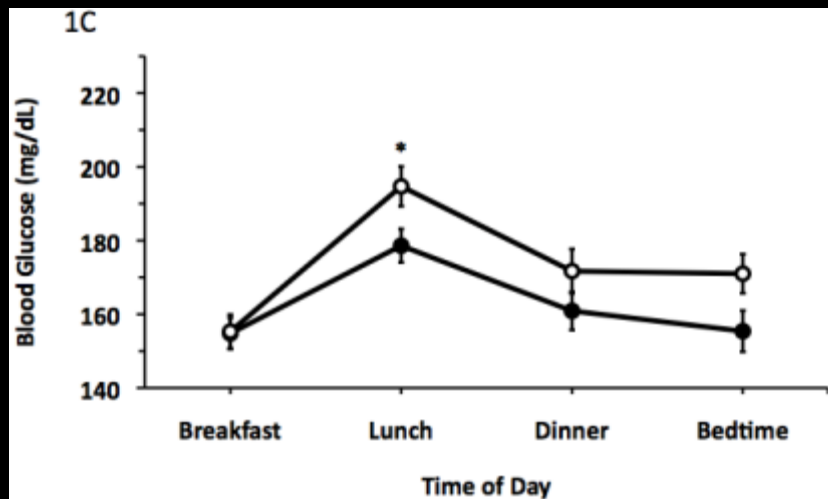
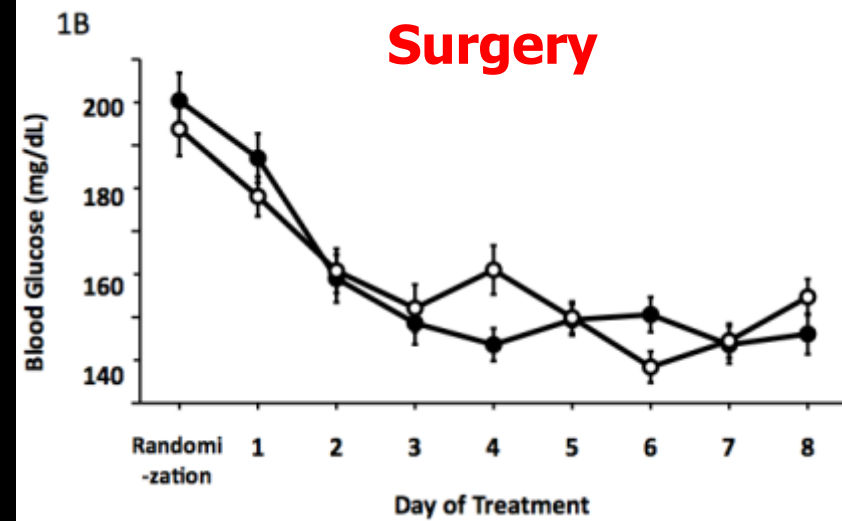
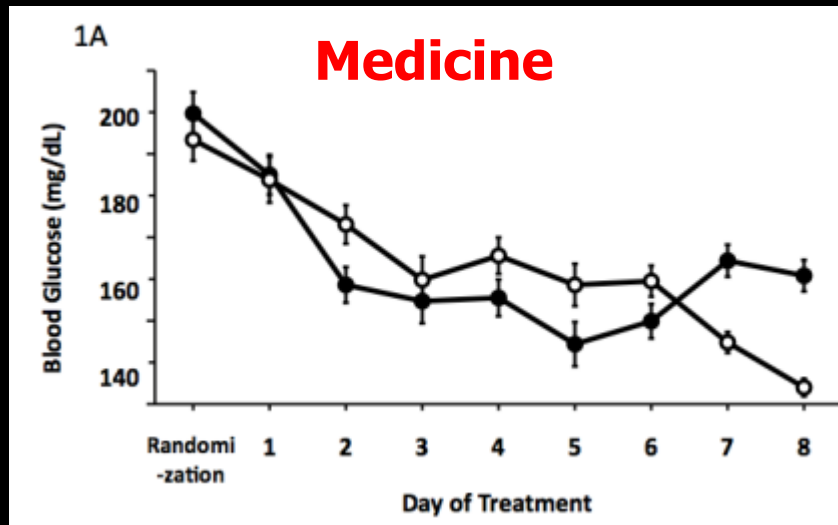
* Reduce TDD to 0.15 U/kg in patients ≥70 yrs and/or serum creatinine ≥ 2.0 mg/dL

Basal Bolus Regimen

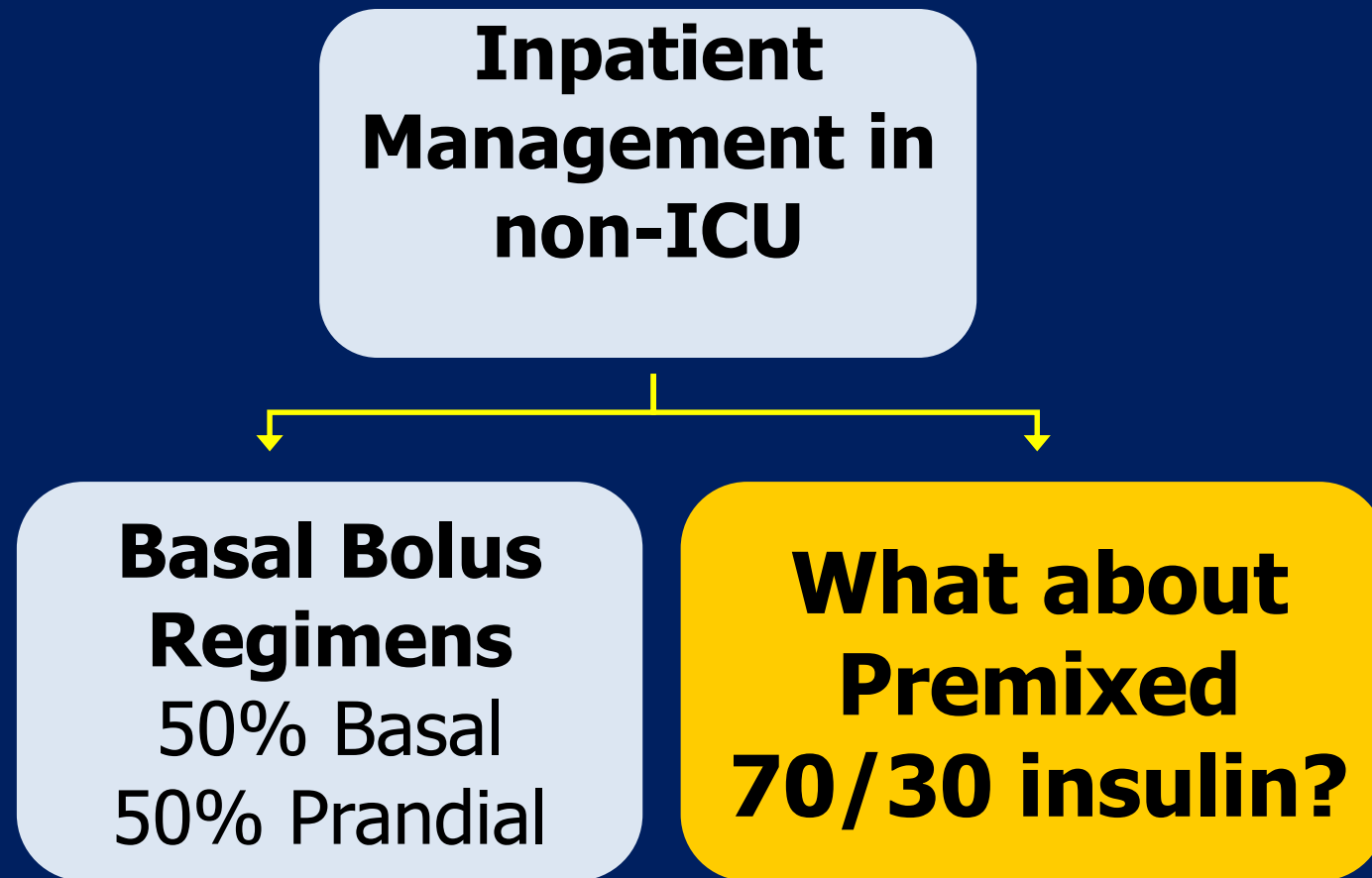
- Starting TDD*: 0.5 U/kg
 - Glargine: 0.25 U/kg
 - Glulisine: 0.25 U/kg in three equally divided doses (AC)
 - Correction with glulisine for BG >140 mg/dl per sliding scale

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

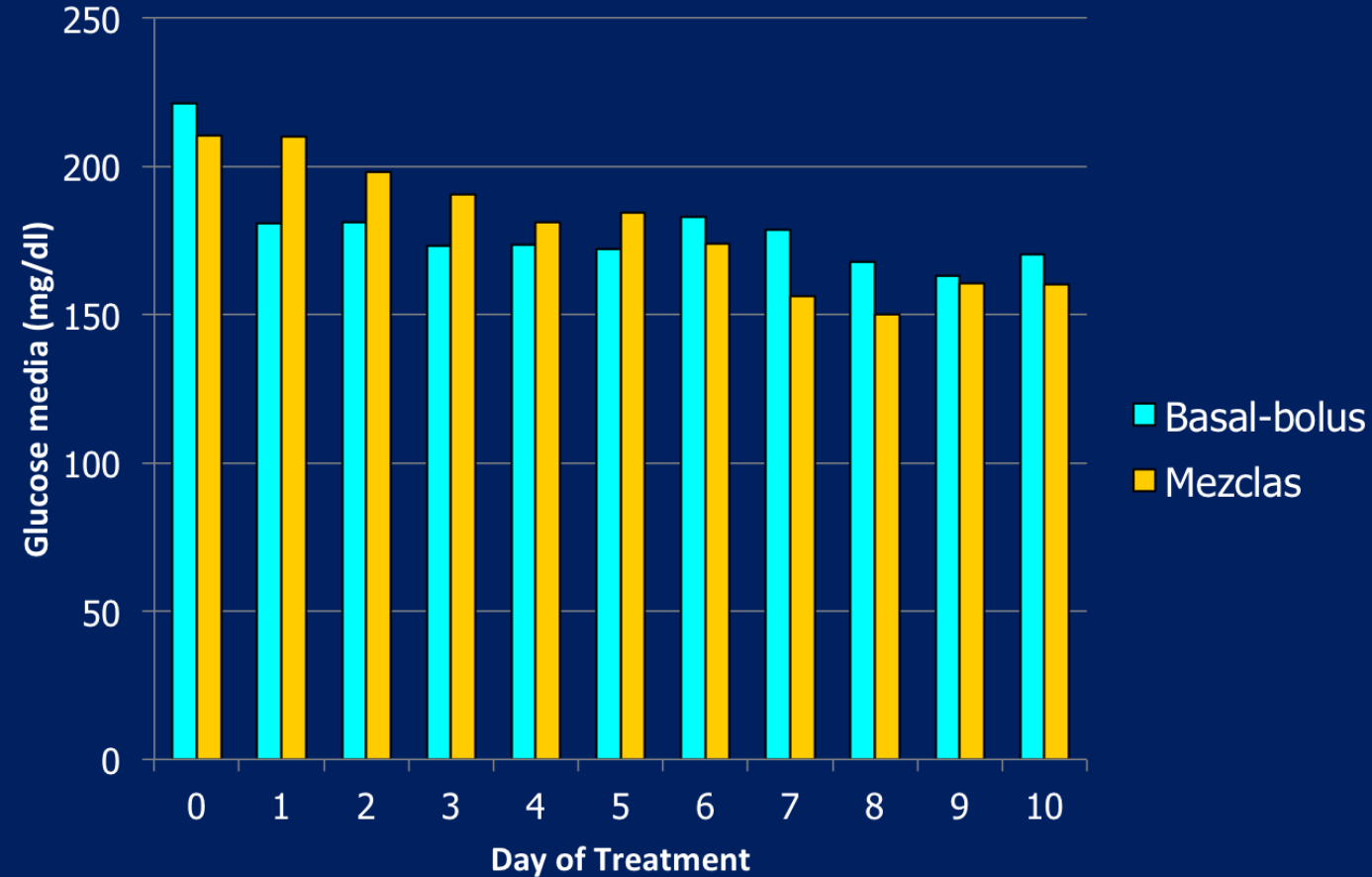
Basal-PLUS vs Basal Bolus: Medicine and Surgery Patients



Basal Bolus is the Preferred Insulin Regimen for the Management of Non-ICU Patients With Type 2 Diabetes



Mean Daily Blood Glucose during Treatment with Basal Bolus and Premixed 30/70 insulin



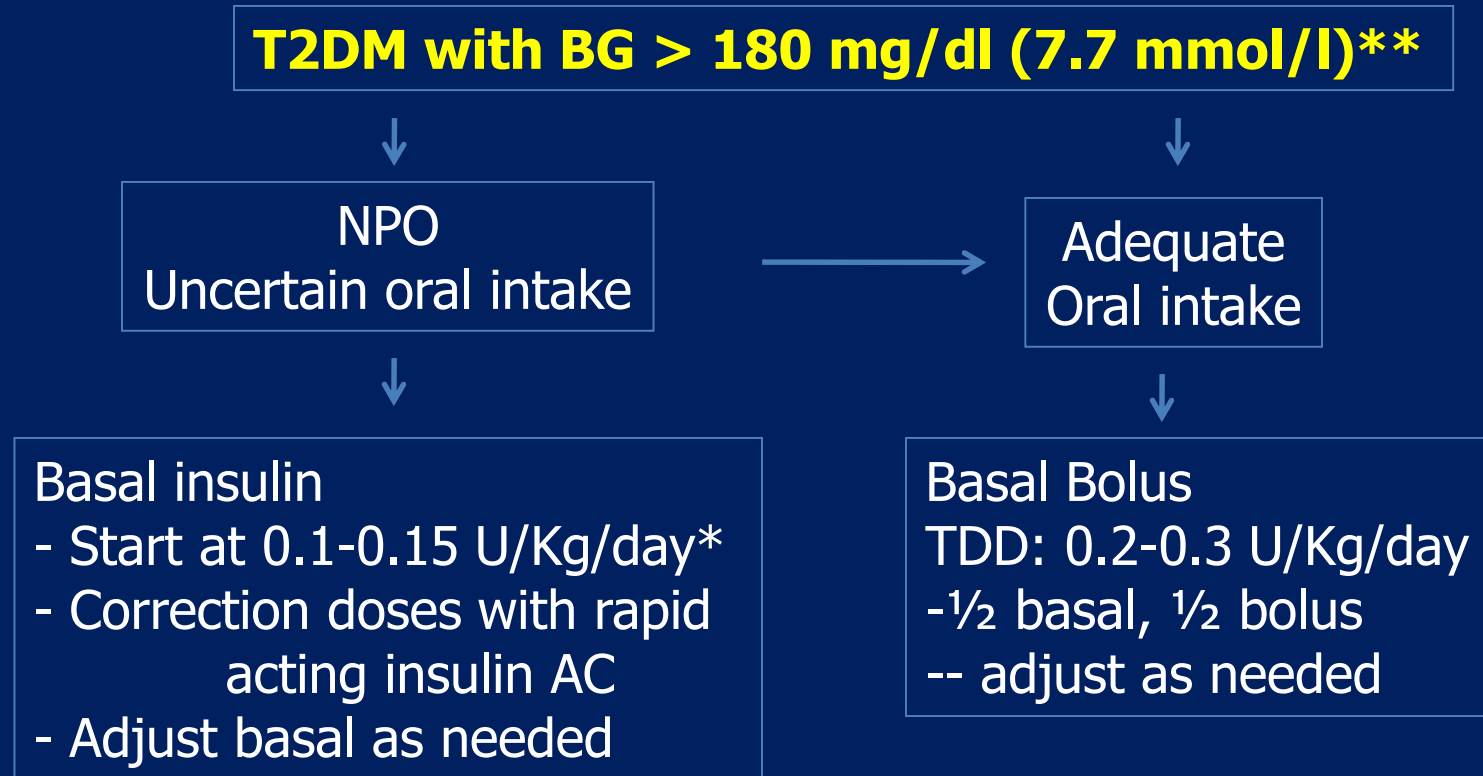
Hypoglycemia during Treatment with Basal Bolus and Premixed 30/70 insulin

	Basal-bolus regimen	Premixed regimen	P value
Hypoglycemic events (BG concentration <70 mg/dL)			
BG tests per patient/day	5.7 ± 0.8	5.6 ± 0.8	0.716
Overall, patients with hypoglycemia	8 (24.2)	25 (64.1)	0.001
Events, <i>n</i>	20	65	
BG readings, %	1.4	3.2	
Fasting or prebreakfast hypoglycemia	1 (3.0)	5 (12.8)	0.134
Events, <i>n</i>			
Morning or prelunch			
Events, <i>n</i>			
Afternoon or predinner			
Events, <i>n</i>			
Evening, after dinner to midnight			
Events, <i>n</i>			
Night, midnight to 6:00 A.M.			
Events, <i>n</i>			

Hypoglycemia and Trial Suspension

Following a planned interim safety analysis after the enrollment of half of the patients, the trial was terminated early owing to an increased frequency of

Management of diabetes in hospitalized older adults



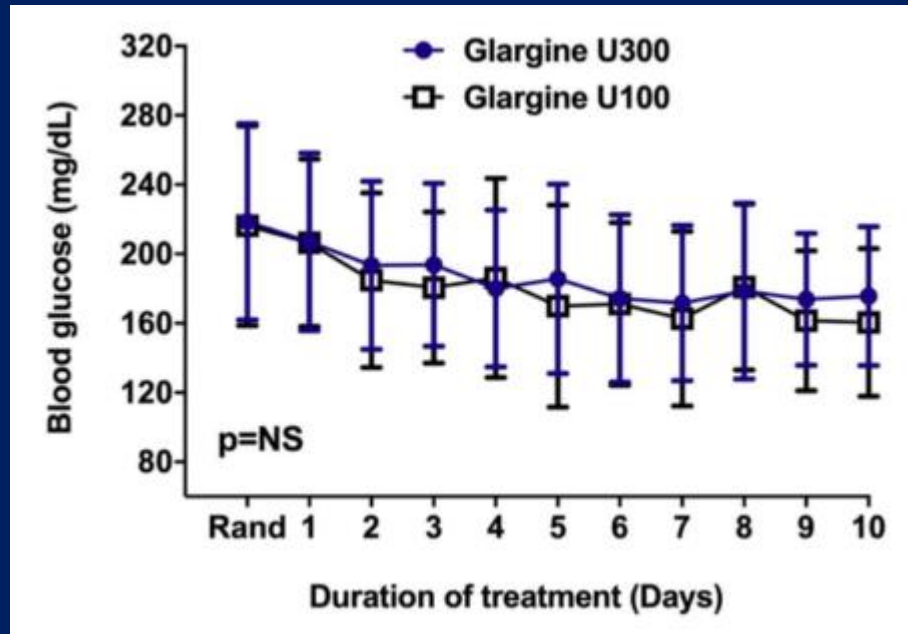
**The use of DPP-4 inhibitors alone or in combination with basal insulin may represent an alternative to basal-bolus regimens in elderly patients

New long acting insulin in the hospital?

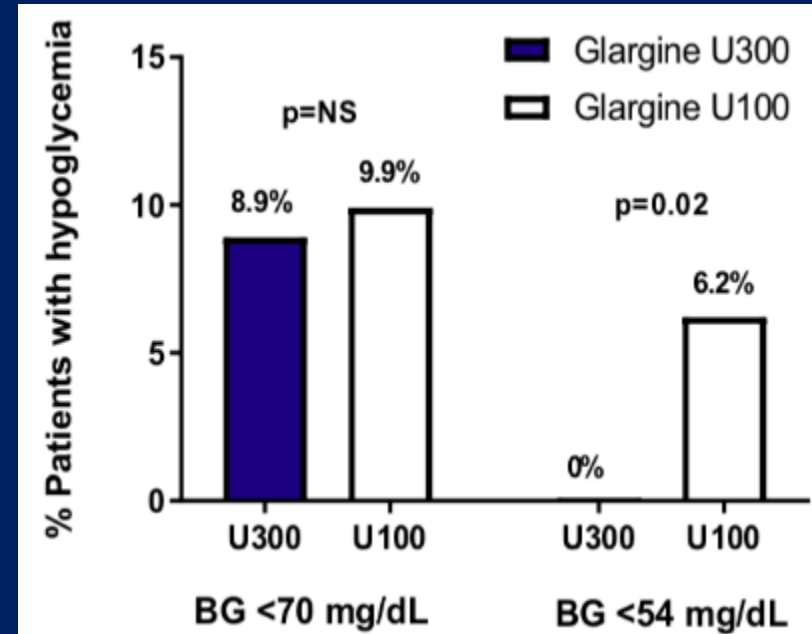
Glargine U300 vs U100 in non-ICU Setting

This prospective, open-label, randomized clinical trial included 176 poorly controlled patients with T2D (HbA1c: $9.5 \pm 2.2\%$), treated with oral agents or insulin prior to admission. Patients were treated with a basal bolus regimen with glargine U300 (n=92) or glargine U100 (n=84) and glulisine before meals.

GLYCEMIC CONTROL

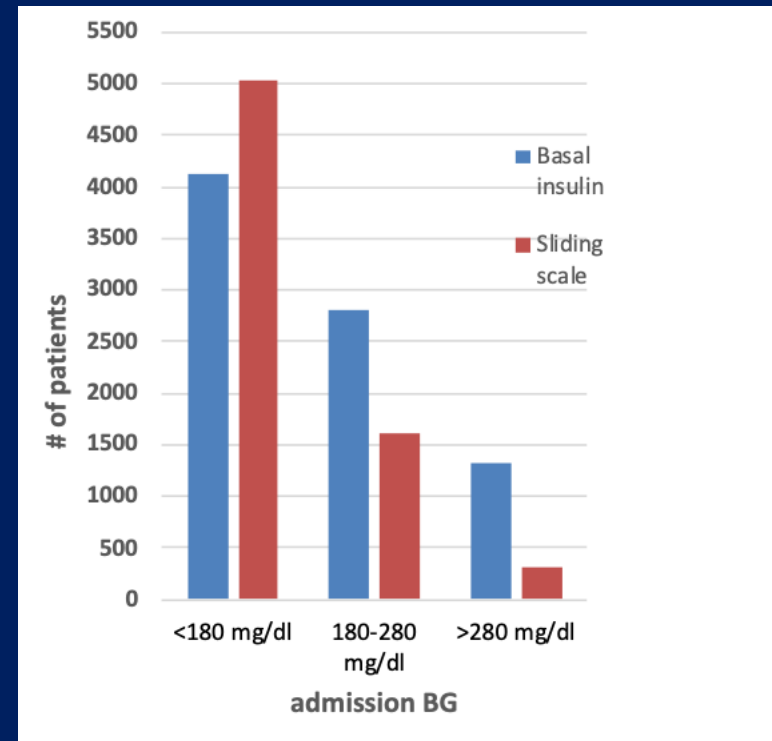


HYPOGLYCEMIA



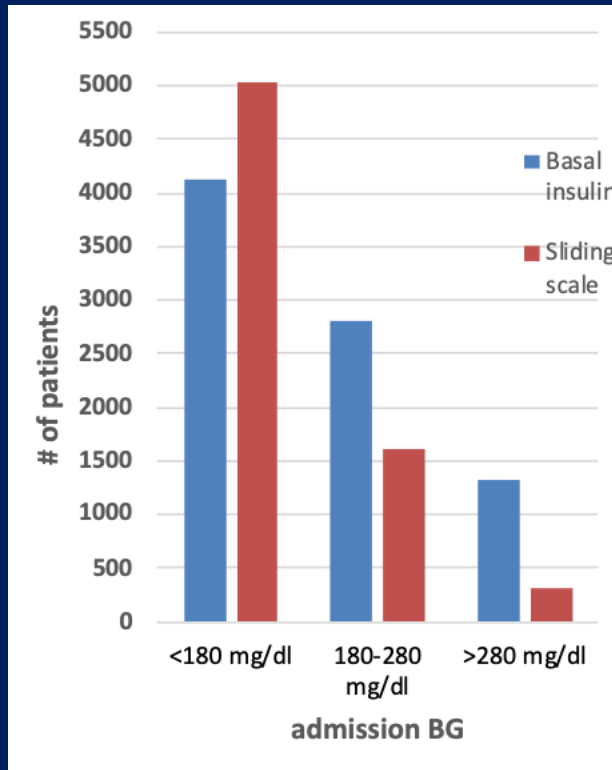
Sliding Scale Insulin Use in Non-Critical Care Settings: Who Can Slide?

- Retrospective cohort
- Population: 15,348 hospitalized patients with T2DM at Emory University Hospitals between 6/1/2010-6/30/2018
- Treated with SSI: 7052 (45%)
- Admission BG 155 mg/dl (vs. 192 mg/dl on basal insulin)



Migdal et al. ADA Meeting, 2019

Sliding Scale Insulin Use in Non-Critical Care Settings: Who Can Slide?

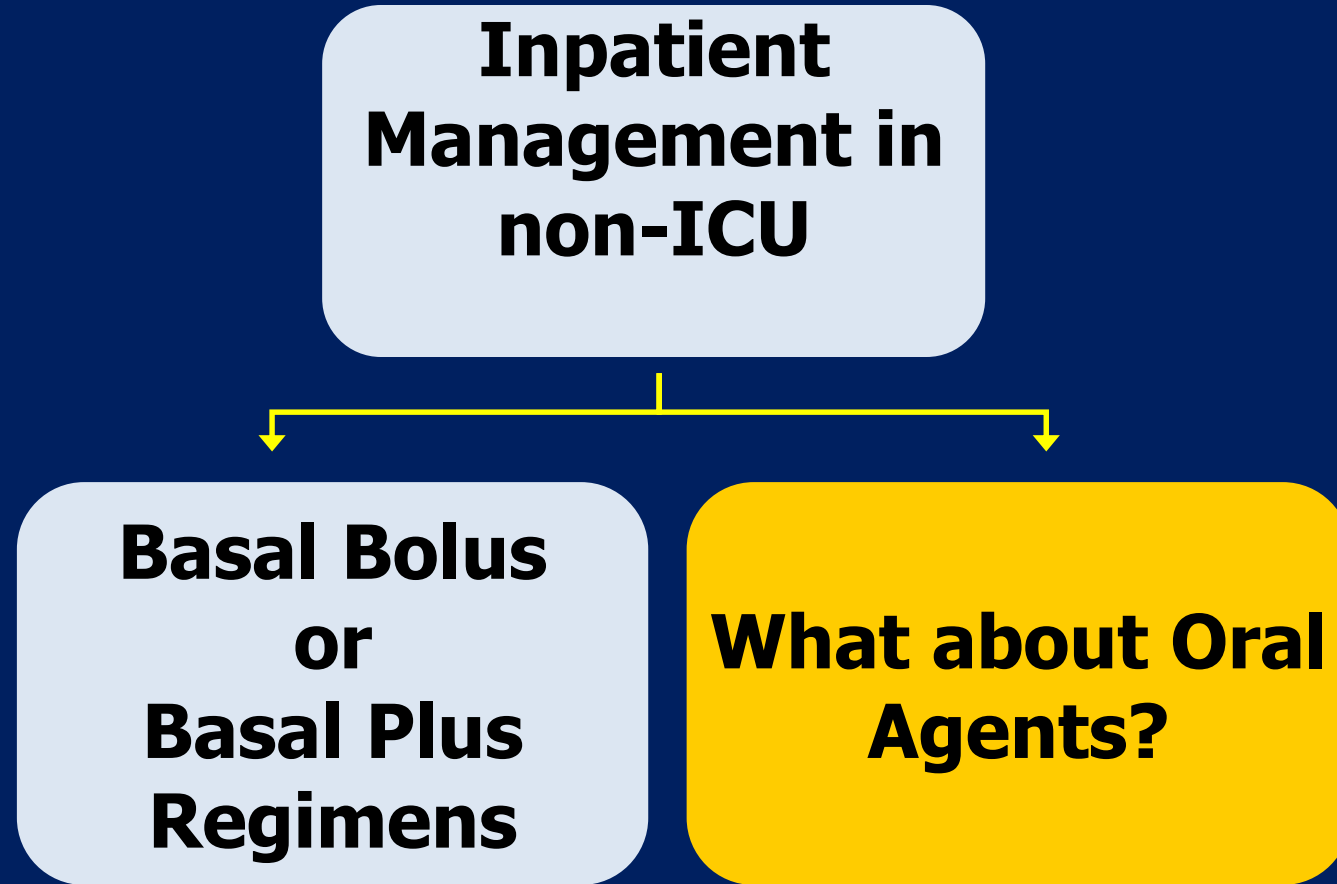


Inpatient outcomes by Treatment Group			
	Basal insulin	Sliding scale	p-value
Charlson score	4.2 ± 2.4	4.0 ± 2.5	<0.001
Mean hospital BG, mg/dl	176 ± 54	150 ± 42	<0.001
BG <70mg/dl, n (%)	1115 (14)	477 (6.9)	<0.001
BG <54 mg/dl, n (%)	98 (1.2)	39 (0.56)	<0.001

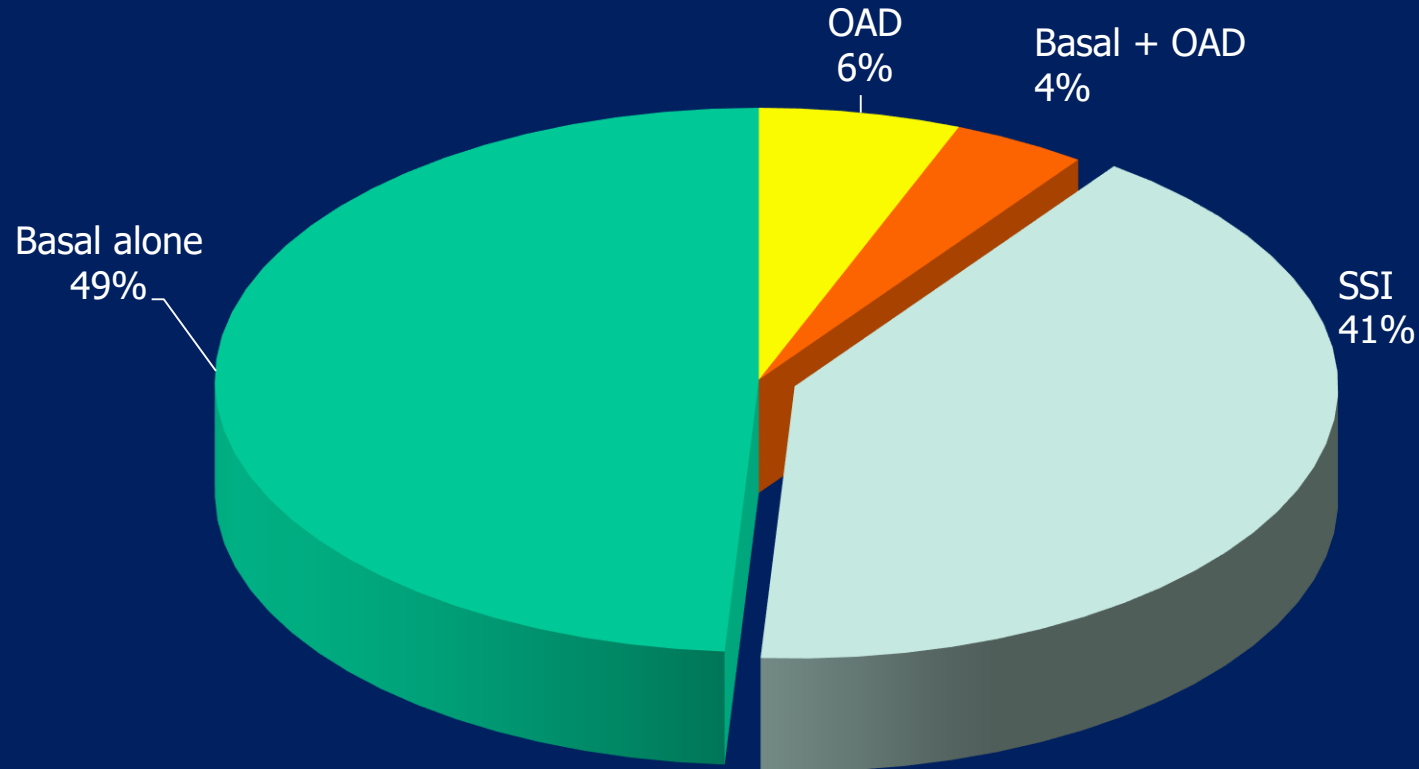
Percentage (%) of patient achieving good glycemic control on SSI by admission BG		
	Adequate control	Inadequate control
Admit BG <180 mg/dl, n (%)	4684 (93%)	353 (7%)
Admit BG 180-280 mg/dl, n (%)	825 (51%)	788 (49%)
Admit BG >280 mg/dl, n (%)	47 (15%)	266 (85%)

Migdal et al. ADA Meeting, 2019

Can you treat patients with oral agents in the hospital?



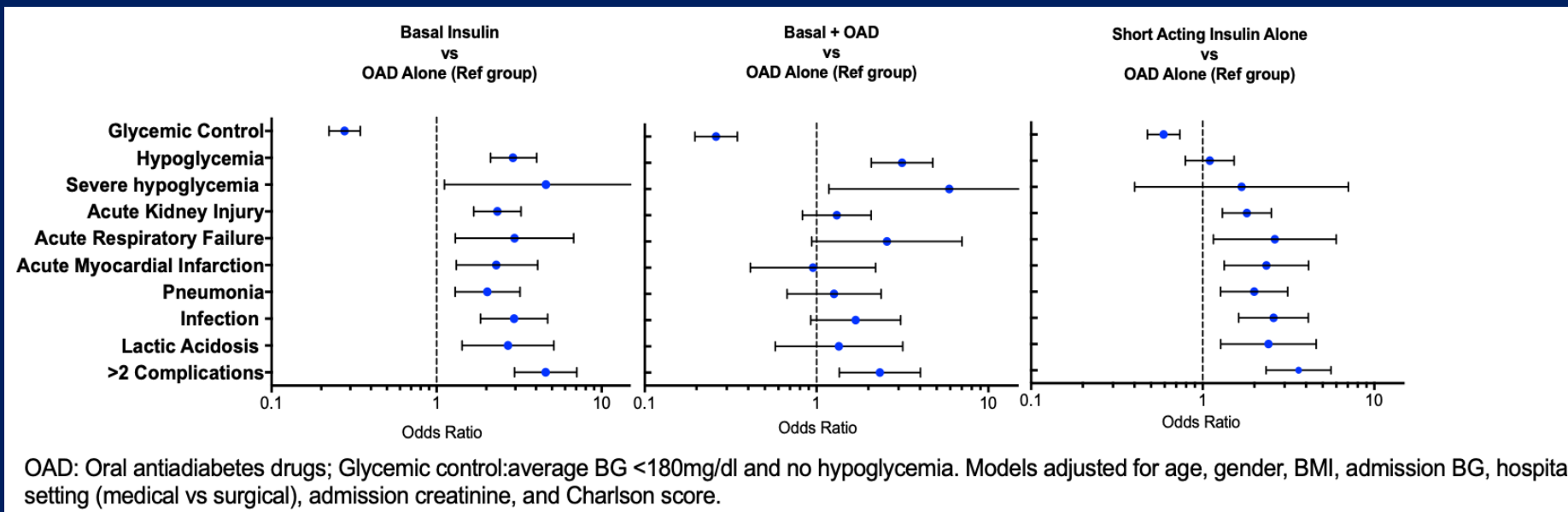
Distribution of OAD use in hospitalized patients



*Data includes patients exposed to OAD or basal insulin for ≥ 48 hrs, or complete hospital stay (if <48 hrs)

OADs in the Hospital

Adjusted Odds Ratios^a for the Association of Complications with insulin or Oral Antidiabetes Drugs in the Hospital



Safety and Efficacy of Sitagliptin Therapy for the Inpatient Management of General Medicine and Surgery Patients With Type 2 Diabetes

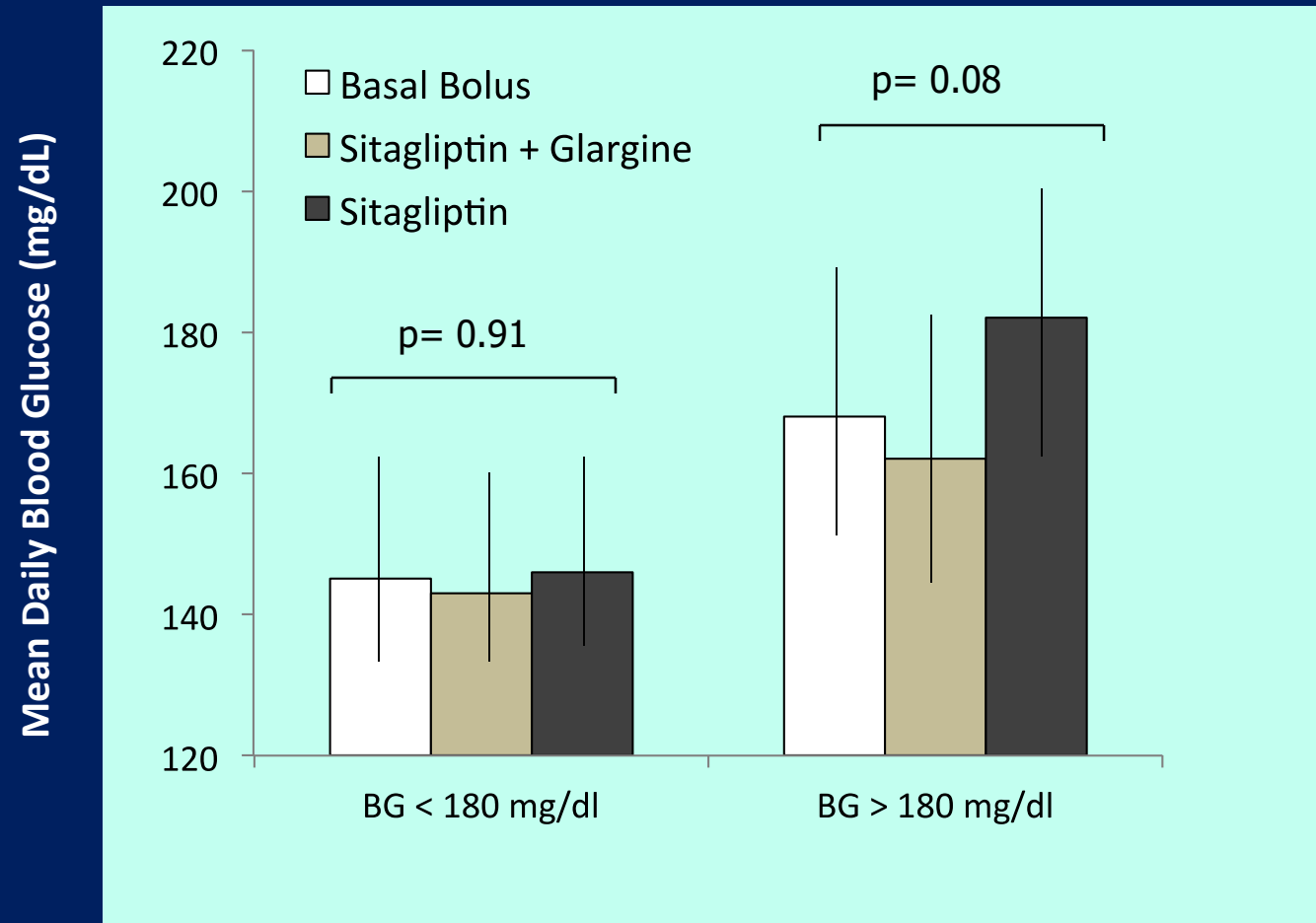
A pilot, randomized, controlled study

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ROMA GIANCHANDANI, MD²
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SOL JACOBS, MD¹
DAVID H. WESORICK, MD
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FRANCISCO PASQUEL, MD¹

acting insulin preparations in combination with short- (regular) or rapid-acting insulin analogs has been proven to be safe and effective for glycemic management in patients with diabetes or hyperglycemia (10–12). Recent studies in general medi-

Randomization Blood Glucose (<180 mg/dl and >180 mg/dl) and Mean Daily Glucose concentration

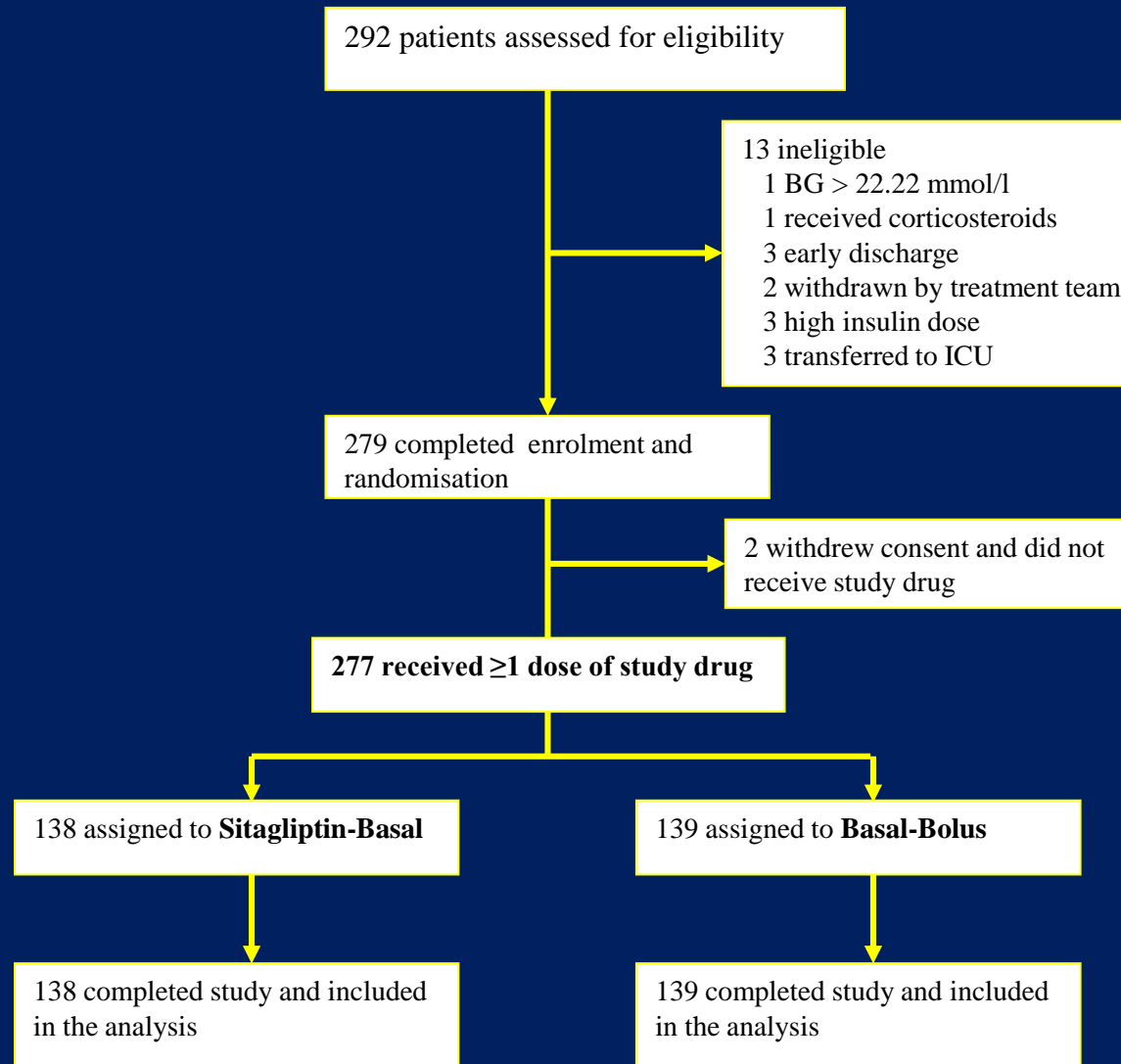


Efficacy of sitagliptin for the hospital management of general medicine and surgery patients with type 2 diabetes (Sita-Hospital): a multicentre, prospective, open-label, non-inferiority randomised trial

Francisco J Pasquel, Roma Gianchandani, Daniel J Rubin, Kathleen M Dungan, Isabel Anzola, Patricia C Gomez, Limin Peng, Israel Hodish, Tim Bodnar, David Wesorick, Vijay Balakrishnan, Kwame Osei, Guillermo E Umpierrez

- **Desenlace primario:** no-inferioridad en las diferencias de promedio de glucosa entre los grupos
- **Desenlaces secundarios:** hipoglucemia, hiperglucemia no-controlada que condujo al fracaso del tratamiento, complicaciones

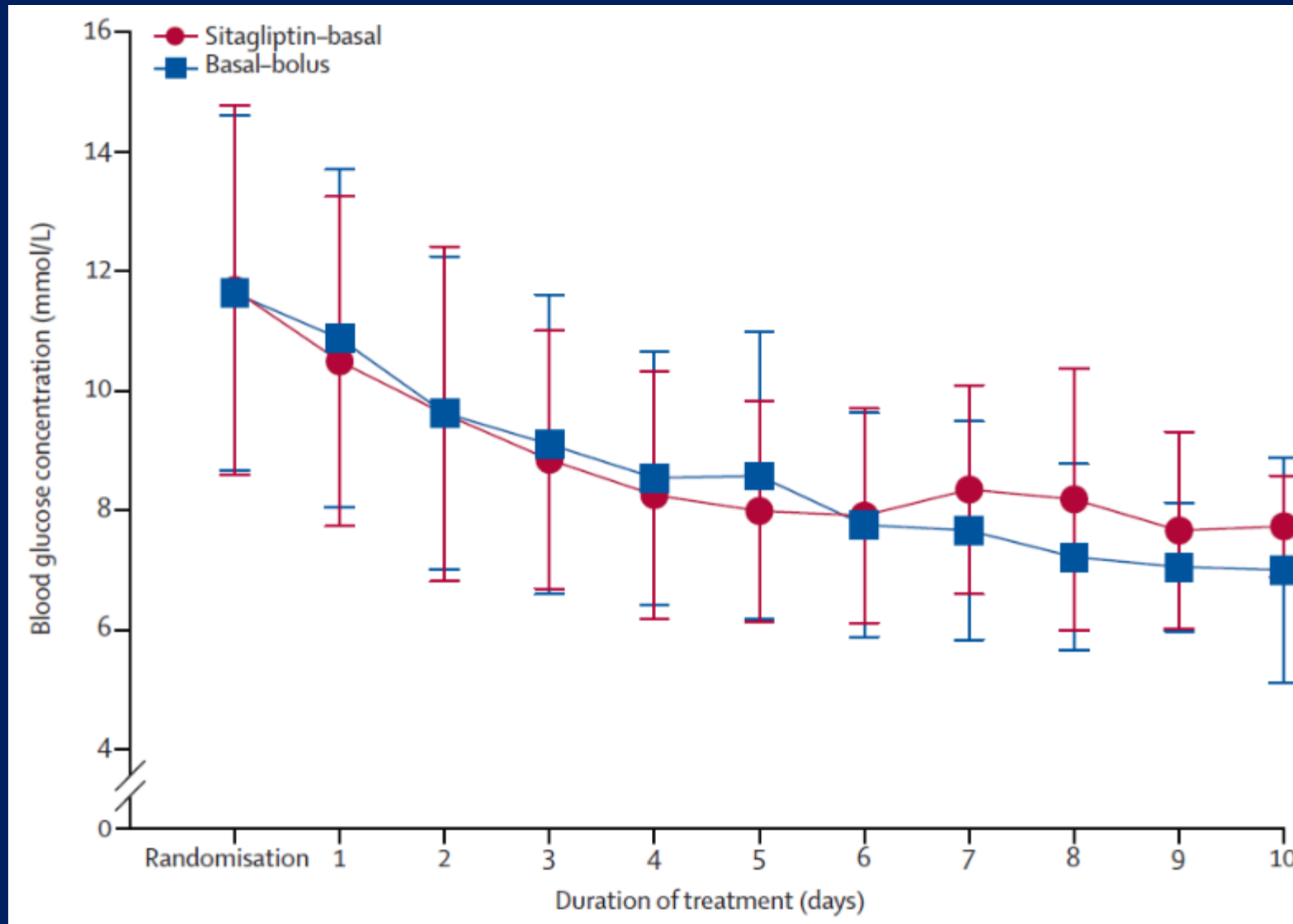
Study profile



Características Basales de la Población de Estudio

	All (n=277)	Sitagliptin-basal	Basal-bolus
Admission diabetes therapy (n=275)			
Diet alone	33 (12%)	15 (11%)	18 (13%)
Oral drugs	116 (42%)	57 (41%)	59 (42%)
Insulin alone	66 (24%)	34 (25%)	32 (23%)
Insulin plus oral drugs	60 (22%)	31 (22%)	29 (21%)
Glycaemic control at baseline			
*HbA _{1c} (% [SD])	8.7% (2.3)	8.7% (2.4)	8.6% (2.1)
*HbA _{1c} <7%	72 (26%)	42 (30%)	30 (22%)
*HbA _{1c} 7%–≤9%	110 (40%)	52 (38%)	58 (42%)
*HbA _{1c} >9%	92 (33%)	44 (32%)	48 (35%)
Admission random blood glucose concentration (mmol/L)	12.0 (6.0)	11.9 (6.1)	12.1 (5.9)
Randomisation blood glucose concentration (mmol/L)	11.7 (3.0)	11.8 (3.1)	11.6 (2.9)
Randomisation blood glucose concentration ≤10 mmol/L	105 (38%)	54 (39%)	51 (37%)
Randomisation blood glucose concentration >10 mmol/L	172 (62%)	84 (61%)	88 (63%)

Concentraciones Promedio de Glucosa en el Hospital



Hipoglucemia

	Sitagliptin + Basal	Basal bolus	P-value
# patients BG <70 mg/dl, n (%)	13 (9%)	17 (12%)	0.45
# patients BG <40 mg/dl, n (%)	0 (0%)	0 (0%)	> 0.99

Dosis de insulina & # Inyecciones/día

	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

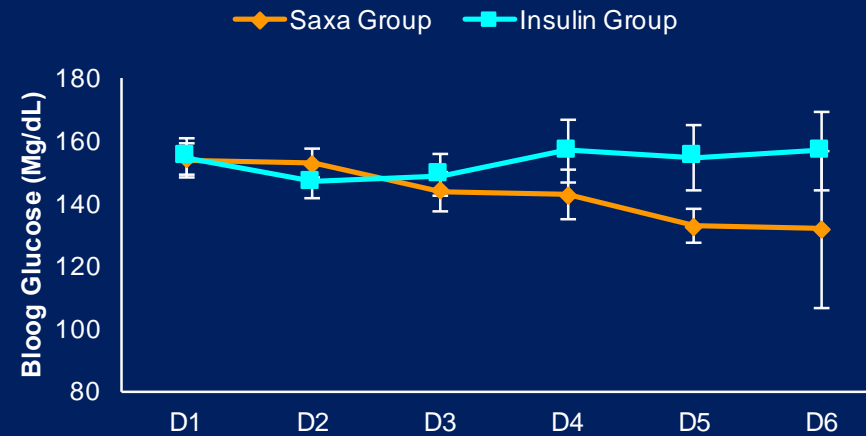
Complicaciones Hospitalarias

Complications	Sitagliptin + Basal	Basal Bolus	P Value
Total # of patients with complications, n (%)	13 (9)	10 (7)	0.52
Total # of complications, n			
AKI, n (%)	7 (5)	6 (4)	0.79
Infections, n (%)	2 (1)	2 (1)	>0.99
Stroke, n (%)	1 (1)	1 (1)	>0.99
AMI, n (%)	0 (0)	1 (1)	>0.99
Respiratory failure, n (%)	2 (1)	1 (1)	0.62
Surgical re-intervention, n (%)	1 (1)	1 (1)	>0.99
Pneumonia, n (%)	0 (0)	0 (0)	>0.99

AKI: acute kidney injury; AMI: acute myocardial infarction

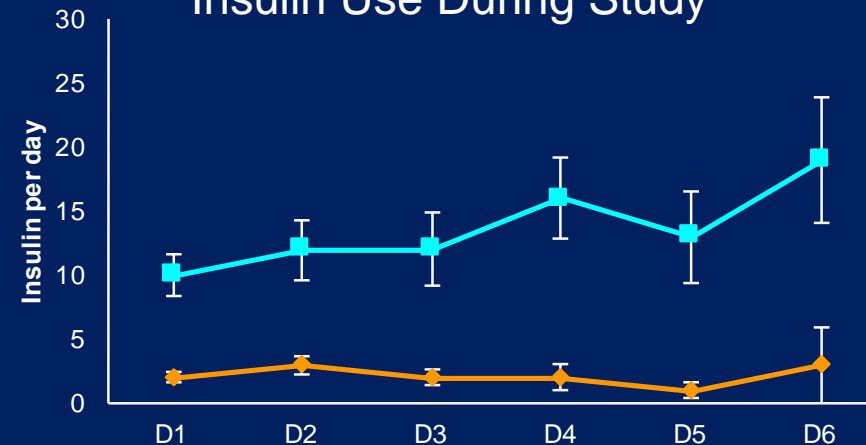
Saxagliptin in Non-Critically ill Hospitalized Patients with T2D and Mild Hyperglycemia

Mean Blood Glucose During Study



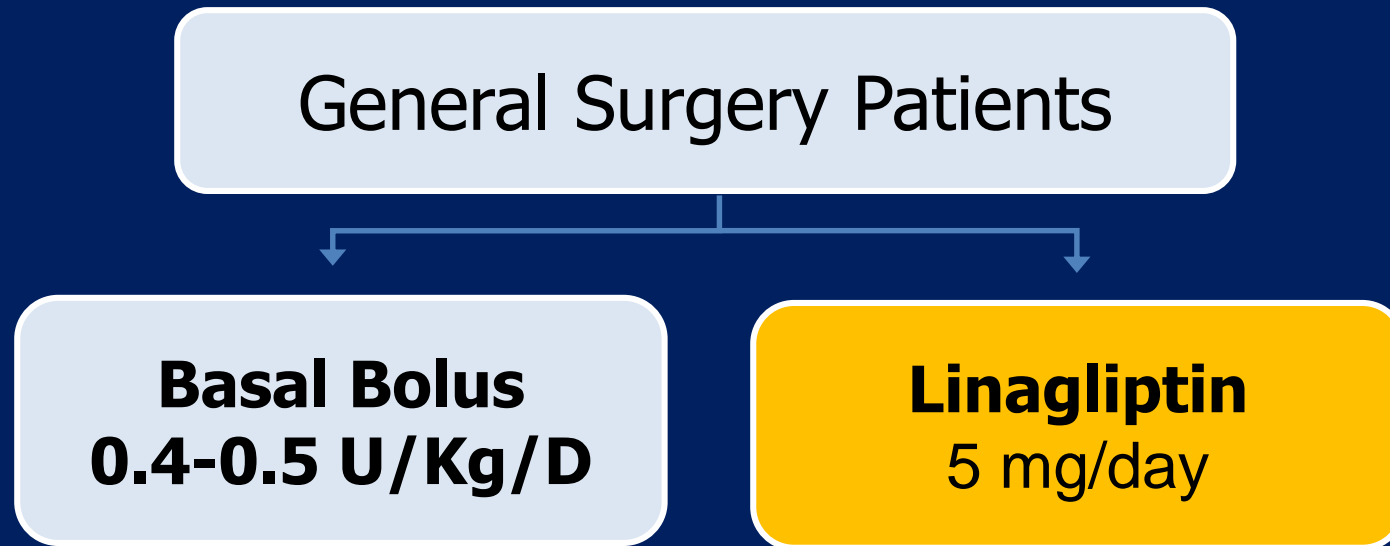
N= 62
Mean A1c: 6.6%
Random BG: 158 mg/dl

Insulin Use During Study



Linagliptin Surgery Trial

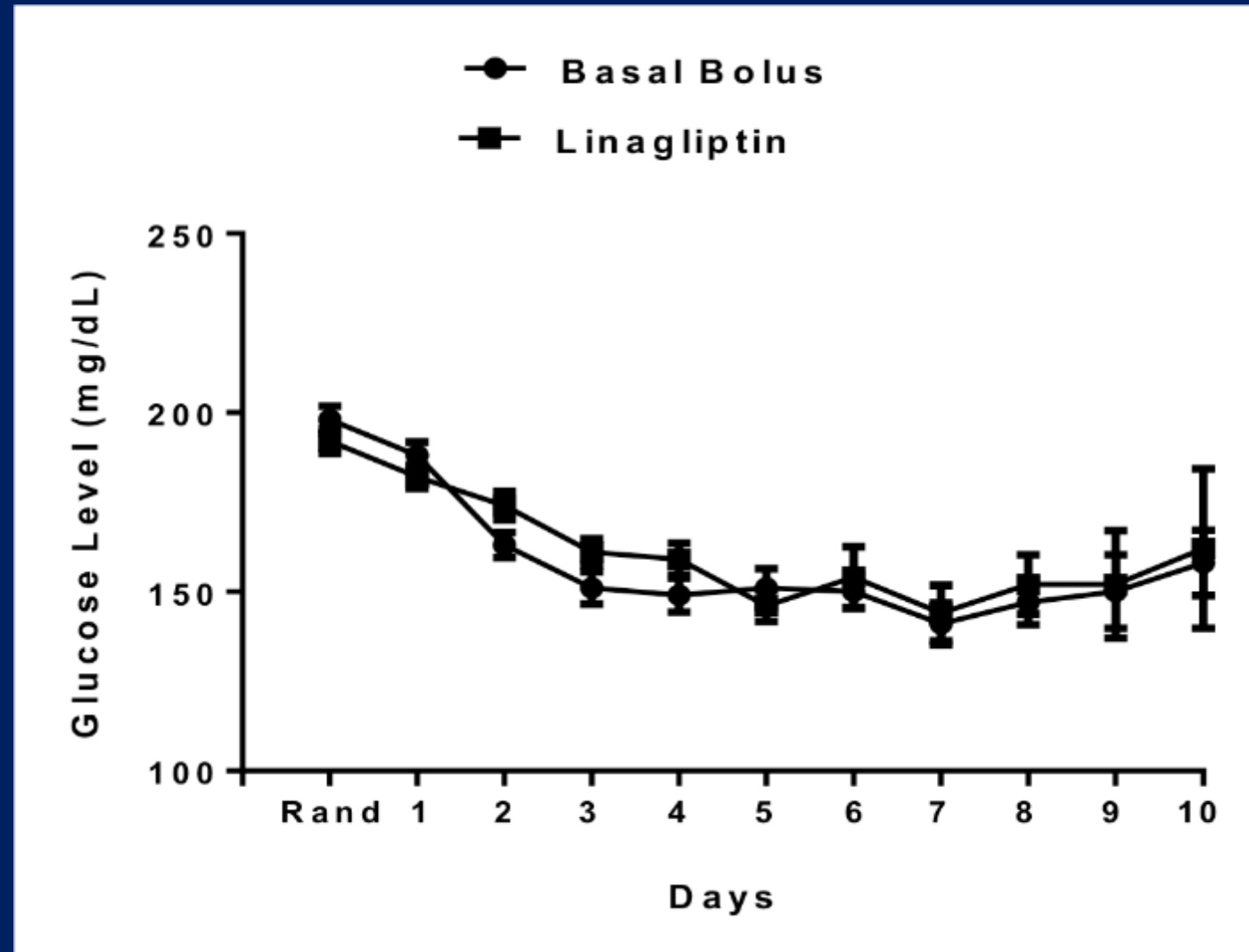
A Randomized Controlled Trial on the Safety and Efficacy of Linagliptin Therapy for the Inpatient Management of General Surgery Patients with Type 2 Diabetes



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

* **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

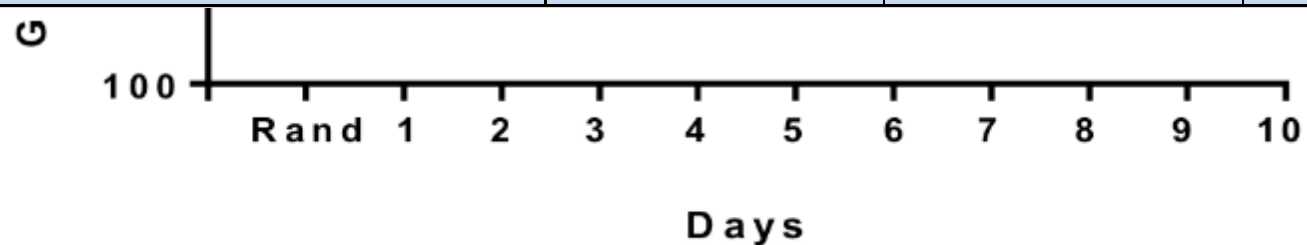
Lina Surgery Trial: Daily Glucose Levels



Lina Surgery Trial: Daily Glucose Levels

<div> <div>● Basal Bolus</div> <div>■ Linagliptin + SS1</div> </div>				
Inpatient BG, days 2-10		Basal Bolus	Linagliptin	
- 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

63%



SGLT-2i en el hospital

The screenshot shows the ClinicalTrials.gov website. At the top, the NIH U.S. National Library of Medicine logo is on the left, and navigation links for 'Find Studies', 'About Studies', 'Submit Studies', 'Resources', and 'About Site' are on the right. Below the logo, the 'ClinicalTrials.gov' name is displayed. A breadcrumb trail shows 'Home > Search Results > Study Record Detail'. A 'Save this study' checkbox is on the right. The study title is 'Effects of Empagliflozin on Clinical Outcomes in Patients With Acute Decompensated Heart Failure (EMPA-RESPONSE)'. Below the title, a disclaimer states: 'The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. Know the risks and potential benefits of clinical studies and talk to your health care provider before participating. Read our disclaimer for details.' To the right of the disclaimer, the ClinicalTrials.gov Identifier is NCT03200860. Below this, a green box contains the following information: 'Recruitment Status' (Recruiting), 'First Posted' (June 27, 2017), 'Last Update Posted' (January 1, 2019), and a link to 'See Contacts and Locations'.

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Home > Search Results > Study Record Detail Save this study

Effects of Empagliflozin on Clinical Outcomes in Patients With Acute Decompensated Heart Failure (EMPA-RESPONSE)

ClinicalTrials.gov Identifier: NCT03200860

The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. [Know the risks and potential benefits](#) of clinical studies and talk to your health care provider before participating. Read our [disclaimer](#) for details.

Recruitment Status ⓘ : Recruiting
First Posted ⓘ : June 27, 2017
Last Update Posted ⓘ : January 1, 2019
[See Contacts and Locations](#)

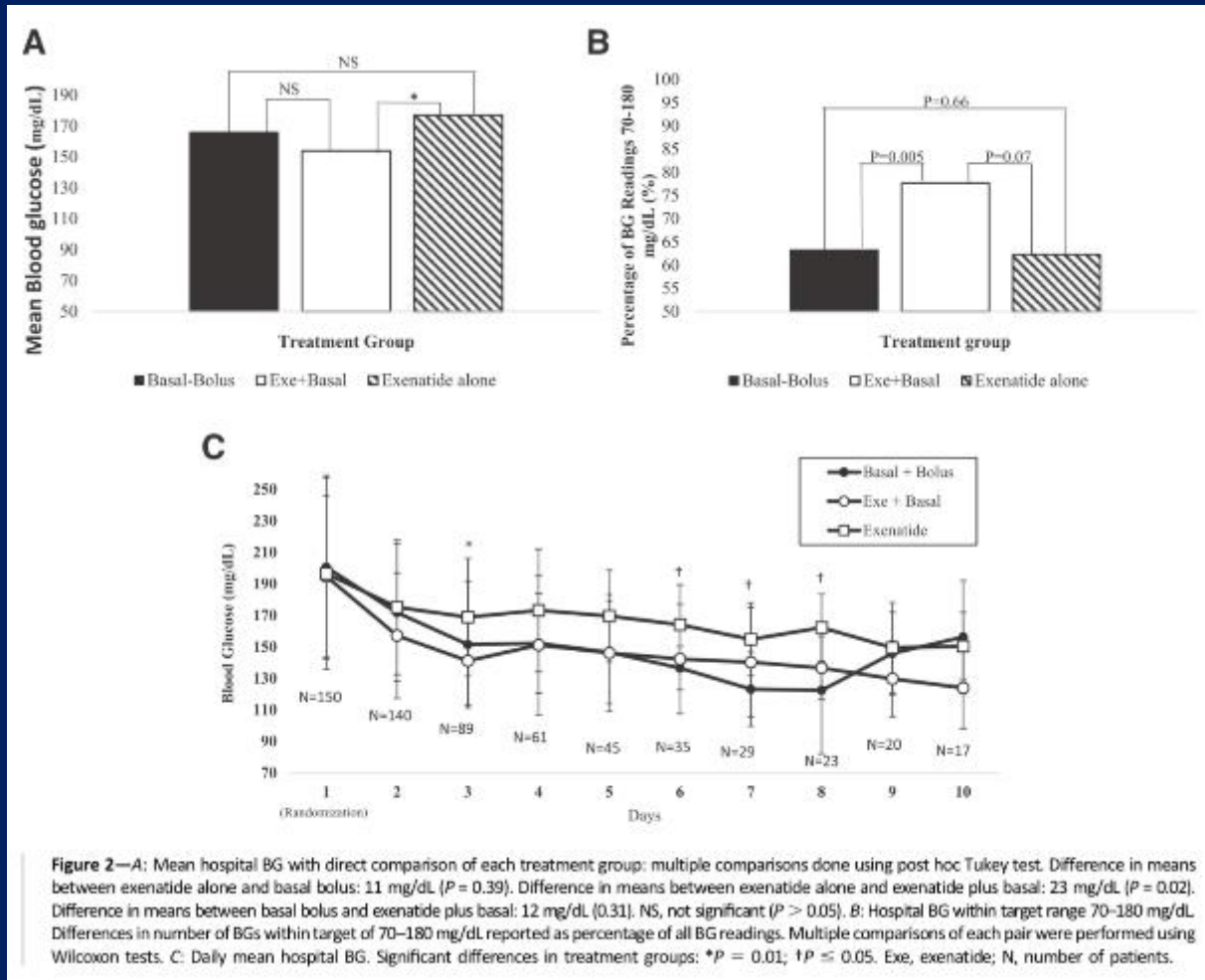
Dyspnea [baseline to Day 4]Change in Dyspnea on VAS analogue scale (AUC)

Diuretic Response [Total weight change from baseline to Day 4] Weight change from baseline per 40 mg of Furosemide equivalent

Length of Stay [within 60 days]Hospital stay of Index admission

Plasma NTproBNP [From baseline to Day 4]Change in NTproBNP

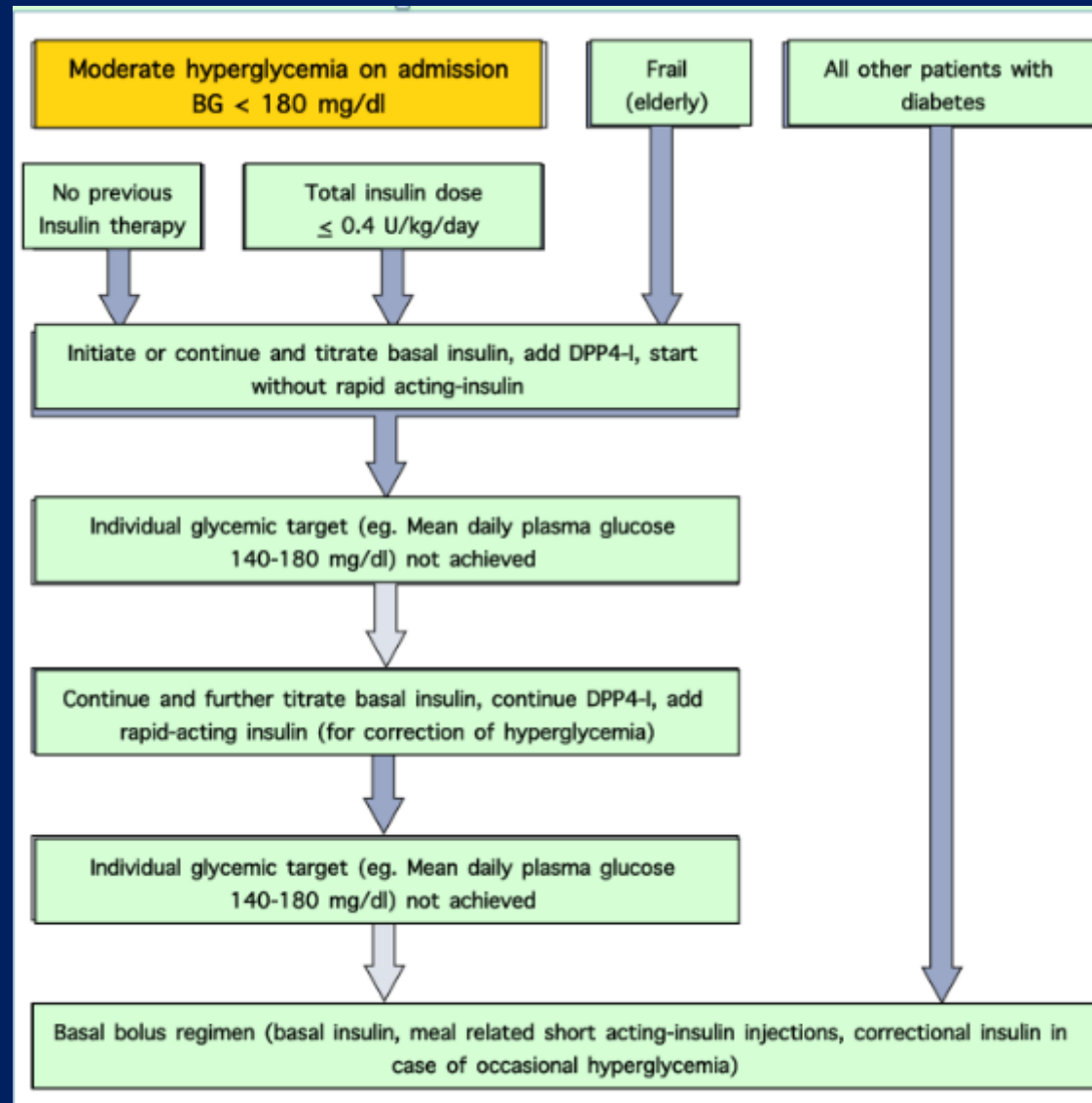
GLP-1 RA in the Hospital



Agentes no-insulinicos en el hospital y al alta

	MTF	SU	TZD	DPP4 -i	SGLT2 -i	GLP1- RA
Eficacia	++	++	++	+	++	+++
<div><div>Ambulatorio (uso prolongado)</div></div>						

Approach to the glycaemic management of general medical and surgical patients in hospital



Management of Patients With Diabetes a After Hospital Discharge

**Inpatient
Management in
non-ICU**

**Basal Bolus
or
Basal Plus
Regimens**

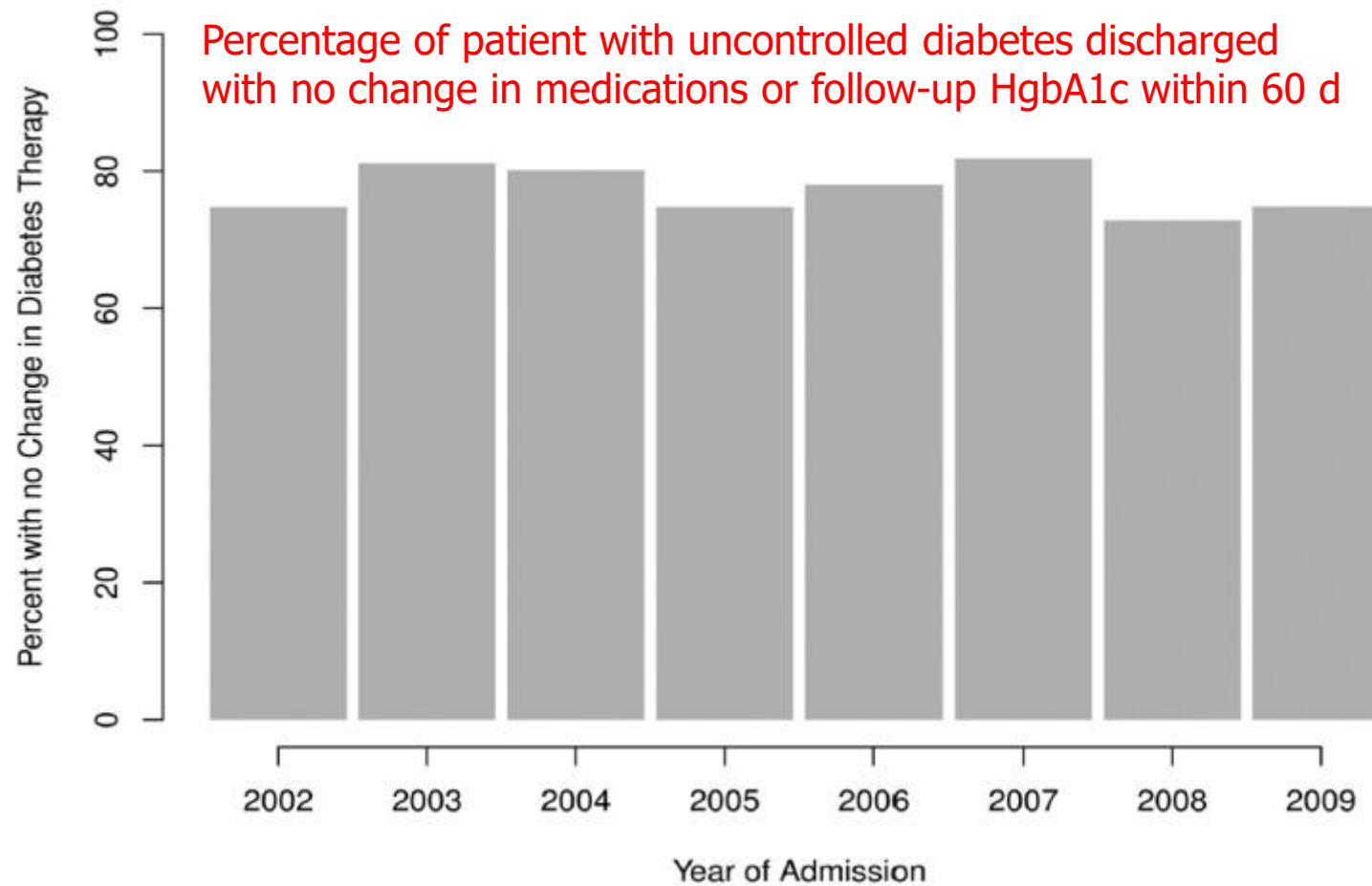
**What Regimen
Should We Use at
Hospital
Discharge?**

Clinical Inertia on Discharge Planning

ORIGINAL ARTICLE

Endocrine Care

Clinical Inertia of Discharge Planning among Patients with Poorly Controlled Diabetes Mellitus





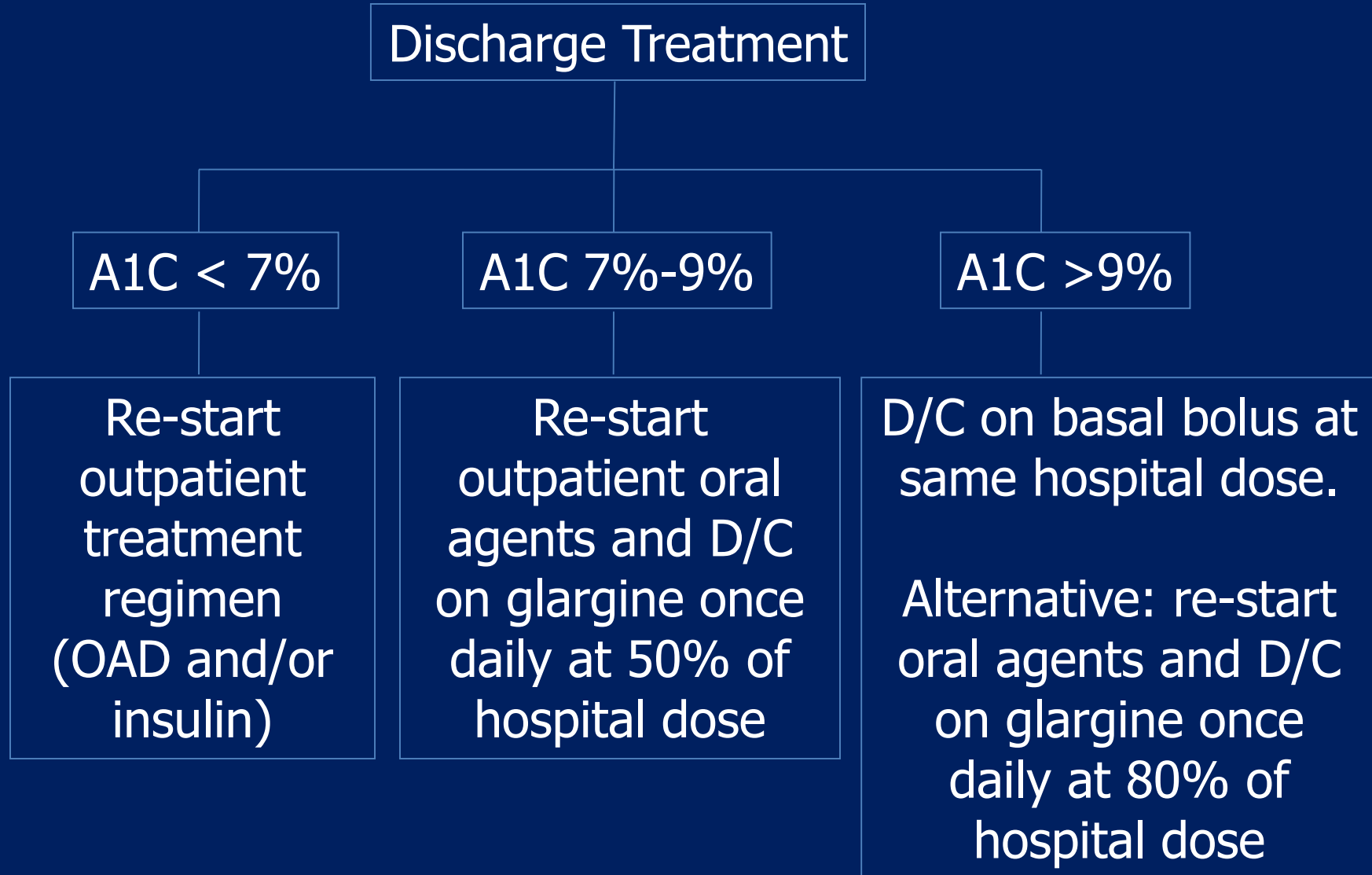
Hospital Discharge Algorithm Based on Admission HbA_{1c} for the Management of Patients With Type 2 Diabetes

*Guillermo E. Umpierrez,¹ David Reyes,¹
Dawn Smiley,¹ Kathie Hermayer,²
Amna Khan,³ Darin E. Olson,^{1,4}
Francisco Pasquel,¹ Sol Jacobs,¹
Christopher Newton,¹ Limin Peng,⁵
and Vivian Fonseca³*

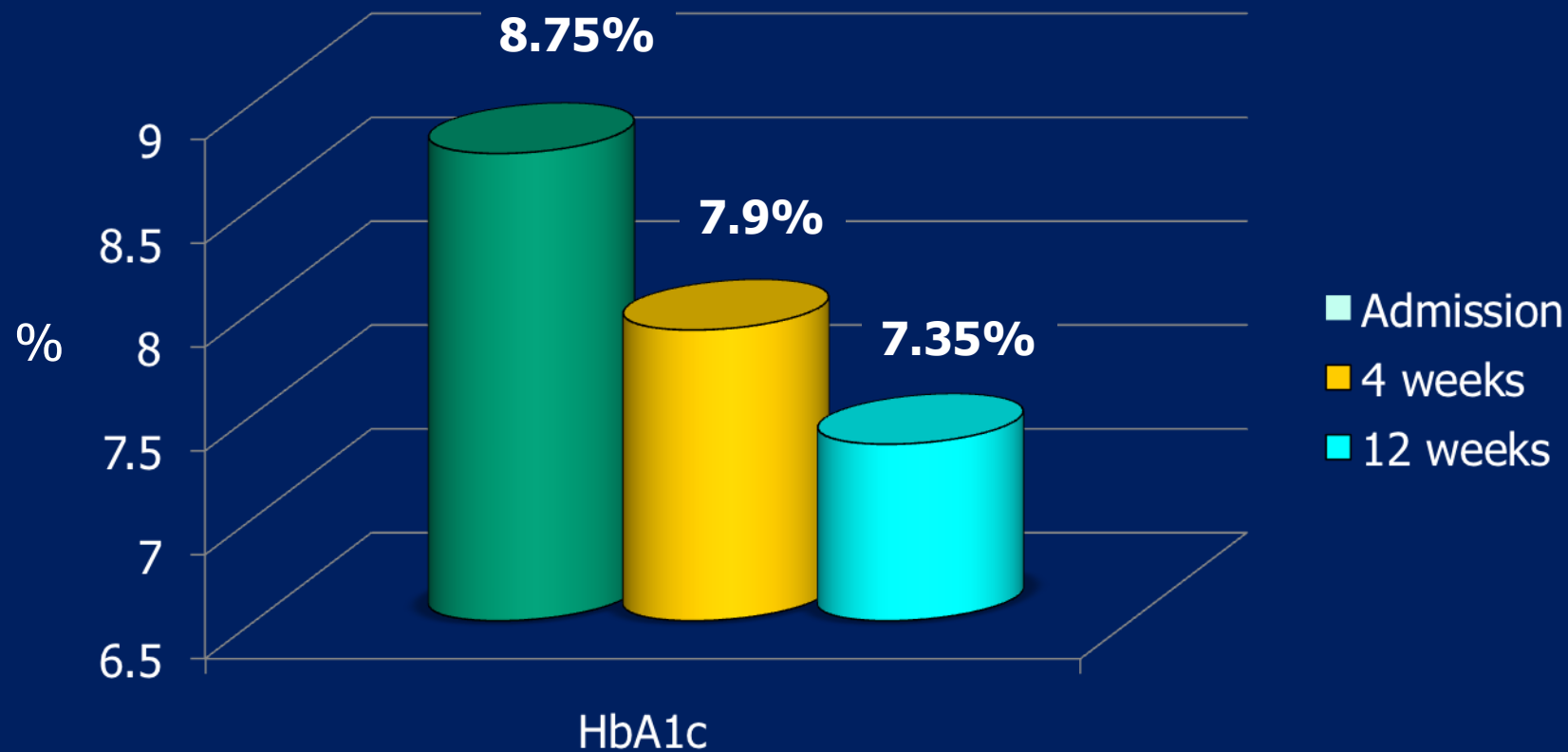
Methods:

Prospective, multicenter open-label study aimed to determine the safety and efficacy of a hospital discharge algorithm based on admission HbA_{1c}.

Discharge Insulin Algorithm



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



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*
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)

* $p < 0.001$ vs. Admission A1C; $\psi p = 0.08$

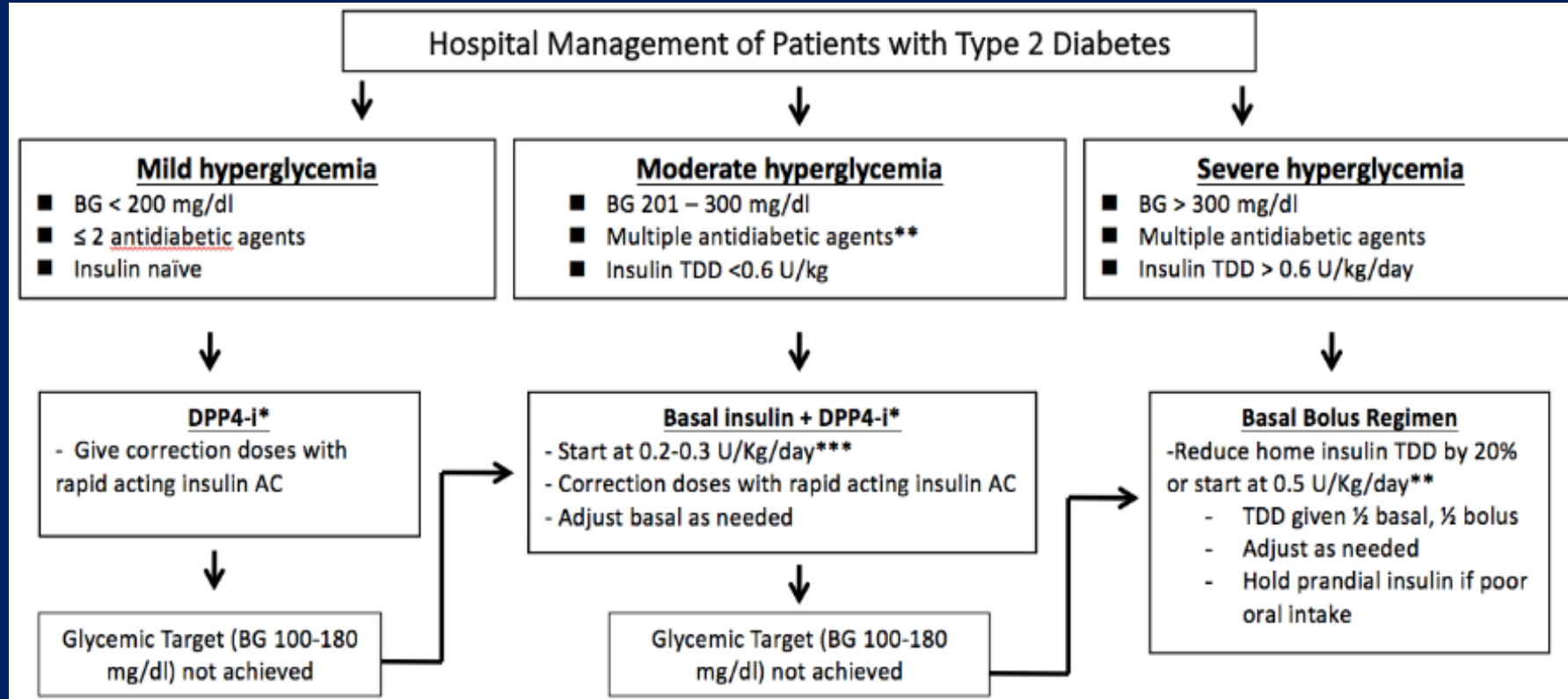
GLP-1 RA at Discharge

The screenshot shows the ClinicalTrials.gov website. At the top, the NIH U.S. National Library of Medicine logo is on the left, and navigation links for 'Find Studies', 'About Studies', 'Submit Studies', 'Resources', and 'About Site' are on the right. Below the header, a breadcrumb trail reads 'Home > Search Results > Study Record Detail'. A 'Save this study' checkbox is on the right. The main title of the study is 'Liraglutide Hospital Discharge Trial'. A disclaimer box on the left states: 'The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. [Know the risks and potential benefits](#) of clinical studies and talk to your health care provider before participating. Read our [disclaimer](#) for details.' On the right, the 'ClinicalTrials.gov Identifier: NCT01919489' is listed. Below this, a green box contains the following information: 'Recruitment Status ⓘ : Recruiting', 'First Posted ⓘ : August 9, 2013', 'Last Update Posted ⓘ : January 23, 2019', and a link to 'See [Contacts and Locations](#)'.

- Similar change in HbA1c compared to glargine.
- Liraglutide treatment resulted in less hypoglycemia,
- Greater weight reduction
- Expected increased gastrointestinal adverse events.

Preliminary results

Change in the paradigm of diabetes management in the hospital



Suggested algorithm to start anti-hyperglycemic therapy in hospitalized patients with type 2 diabetes based on randomized controlled trials. AC: before meals, **BG:** blood glucose, **TDD:** total daily dose.

* Adjust dose according to eGFR (sitagliptin or saxagliptin), no adjustment is needed with linagliptin.

** Antidiabetic agents: oral agents and GLP1-RA

*** In patients with hypoglycemia risk (frail, elderly, acute kidney injury) reduce starting dose to 0.15 U/Kg/day (basal alone) or TDD 0.3 U/Kg/day (basal bolus).

No prospective studies have determined the efficacy of other oral antidiabetic drugs in the hospital setting.

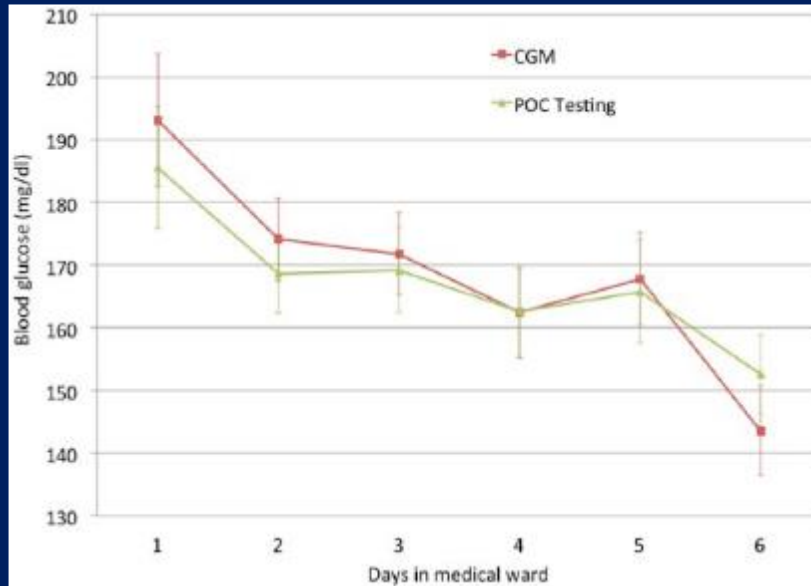
Nueva Tecnología en el Hospital?

CGM



CGM in Non-ICU Insulin-Treated Patients with T2D

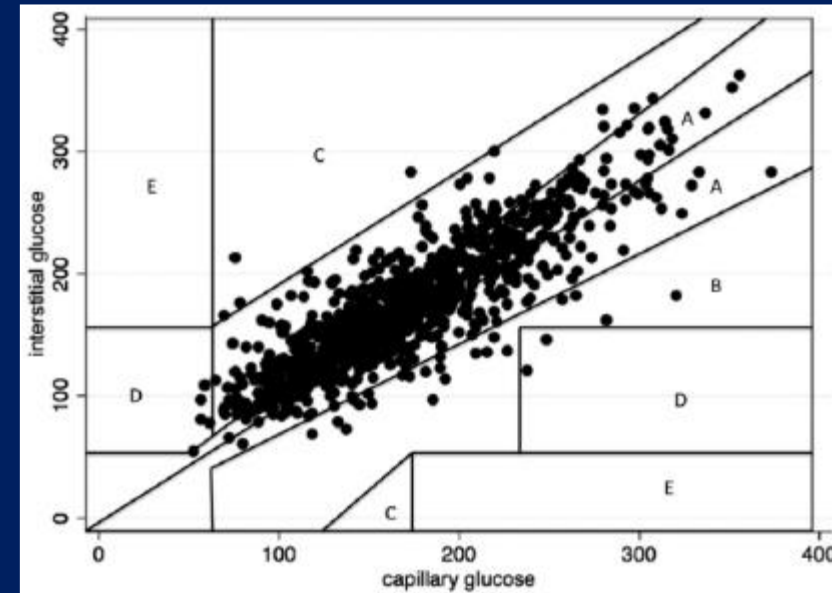
Average daily BG measured by CGM and POC



No differences in daily BG between CGM and POC. Higher # of hypoglycemia detected by CGM than POC (55 vs 12, $P < .01$).

Gomez et al. J Diabetes Science & Technology 2016

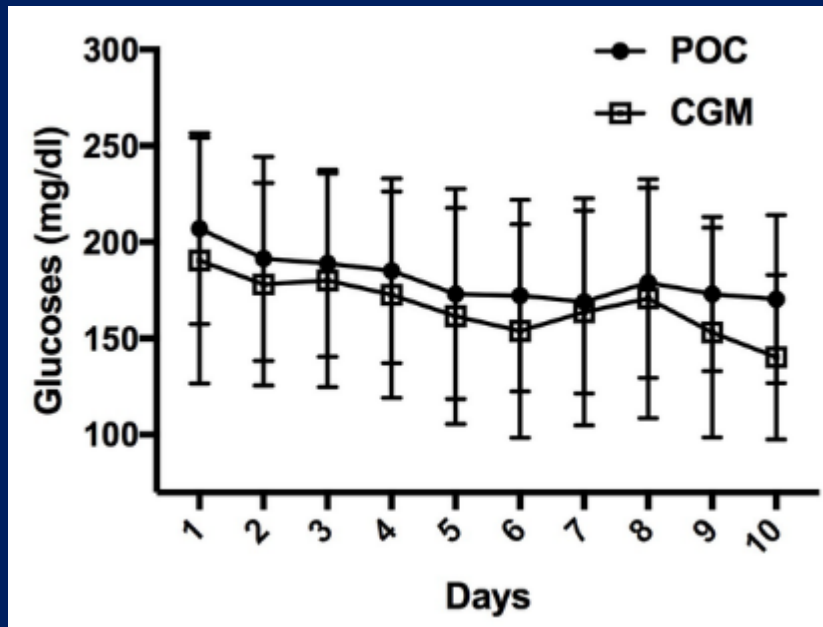
Clinical accuracy BG levels measured by CGM



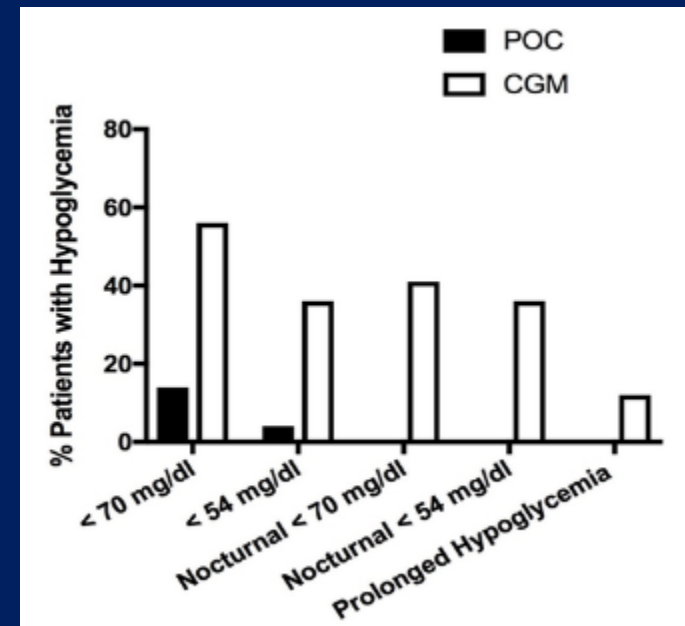
Glucose measurements were clinically valid, with 91.9% of patients falling within the Clarke error grid A and B zones.

Freestyle Libre Pro Flash CGMS vs. POC Capillary Glucose Testing in Hospitalized Patients with T2D

Mean Hospital Daily Glucose



Hypoglycemia by POC and CGM



The Effect of Continuous Glucose Monitoring in Preventing Inpatient Hypoglycemia in General Wards: The Glucose Telemetry System

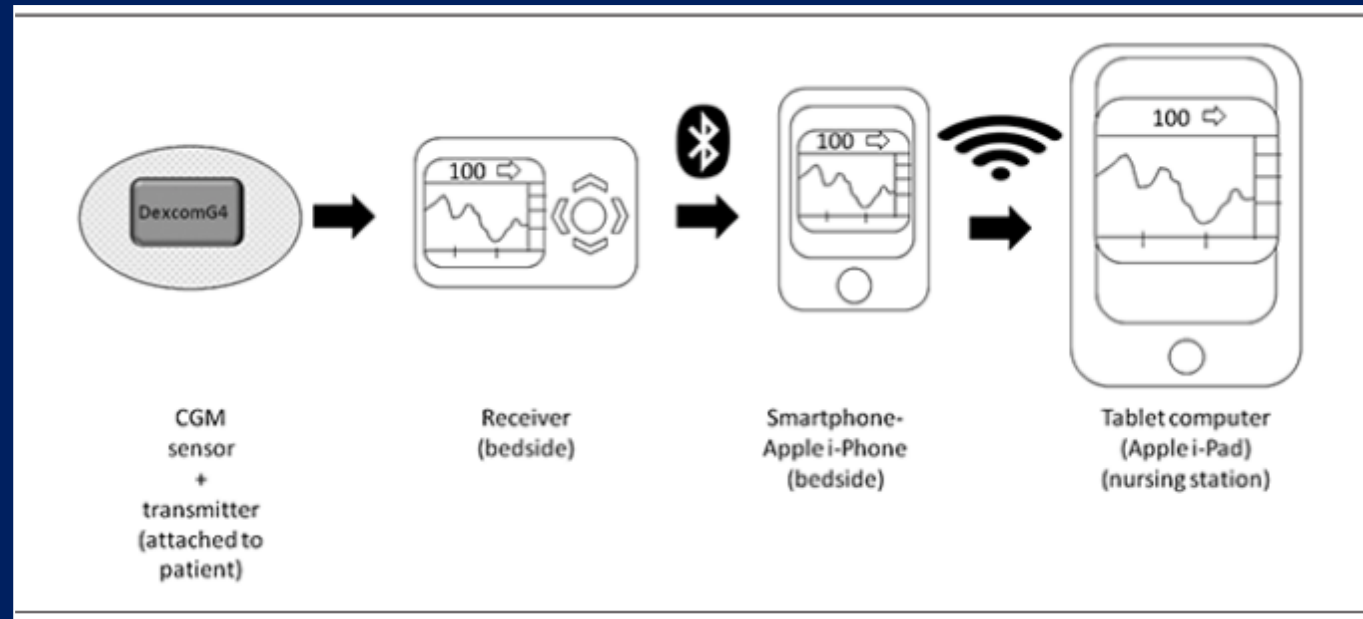
Journal of Diabetes Science and Technology
1-6

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Spanakis et al.
Baltimore VAMC, University
of Maryland

Pilot study.
BG results < 85 mg/dl
were transmitted to
nursing station
allowing early
intervention to
prevent
hypoglycemia.

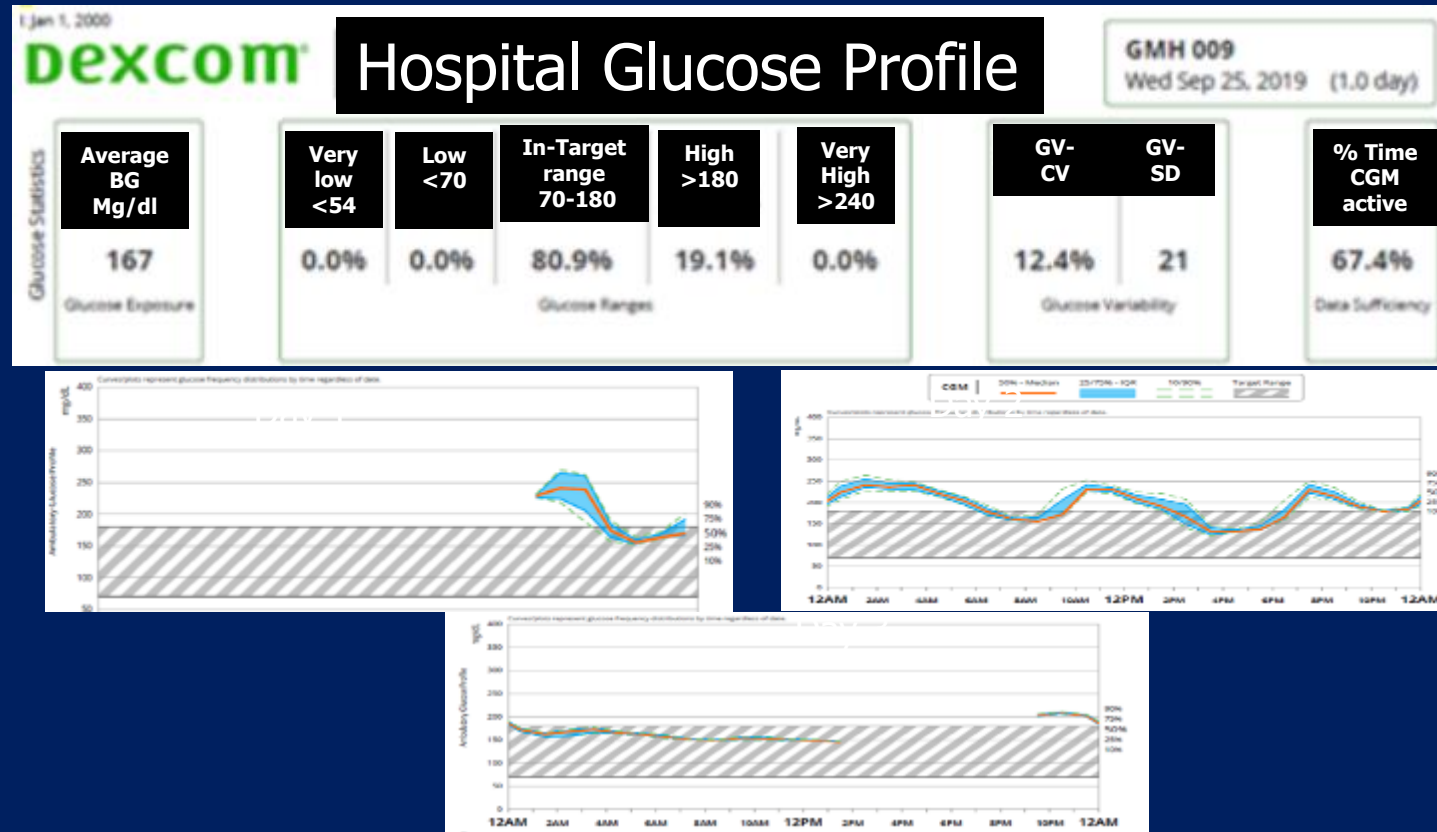
[NCT02904512](#)



CGM Hospital Use

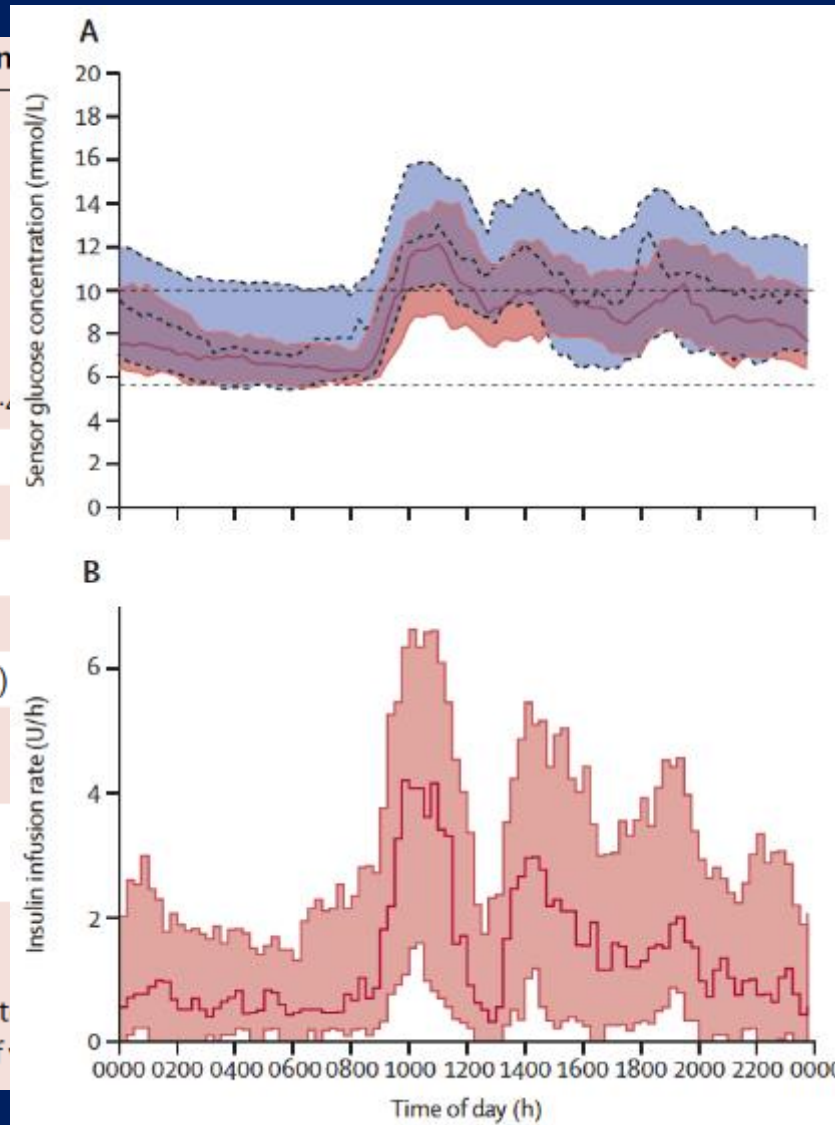


CGM Hospital Use: Intervention Study



Closed Loop in the Hospital: Overall glucose control based on sensor glucose measurements

Closed-loop (n)		
Time spent at glucose concentration (%)		
5.6–10.0 mmol/L *	100 - 180	59.8% (18.7)
>10.0 mmol/L	> 180	30.1% (20.4)
>20.0 mmol/L	> 360	0.6% (1.8)
<5.6 mmol/L	< 100	10.1% (13.0)
<3.5 mmol/L	< 63	0.0% (0.0–0.0)
Mean glucose (mmol/L)	8.9 (1.7)	
SD of glucose (mmol/L)	2.5 (0.9)	
CV of glucose (%)	27.9% (8.2)	
Between-day CV of glucose (%)	24.9% (39.0)	
AUC _{day} <3.5mmol/L (mmol/L×min)	0.0 (0.0–4.1)	
Number of events with capillary glucose >20 mmol/L	0	
Number of events with capillary glucose <2.8 mmol/L	1	
Total daily insulin dose (U)	62.6 (36.3)	
Data are mean (SD), or median (IQR), unless otherwise stated. CV=coefficient of variation.		



In Summary

- Diabetes management in the hospital is evolving
 - Consideration of non-insulin agents (OAD use is common)
 - Discharge considerations
- New technology in the hospital
 - CGM to guide therapy
 - Closed loop

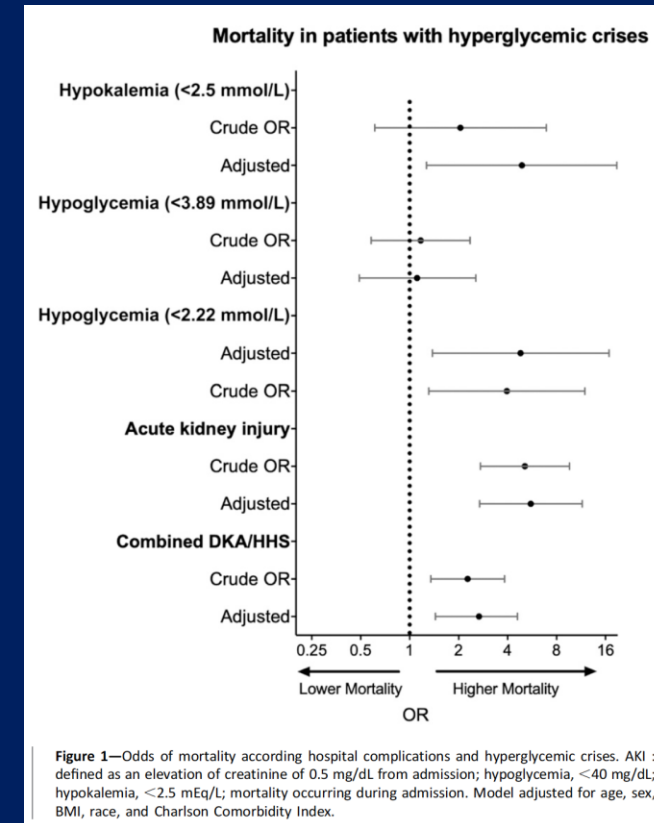
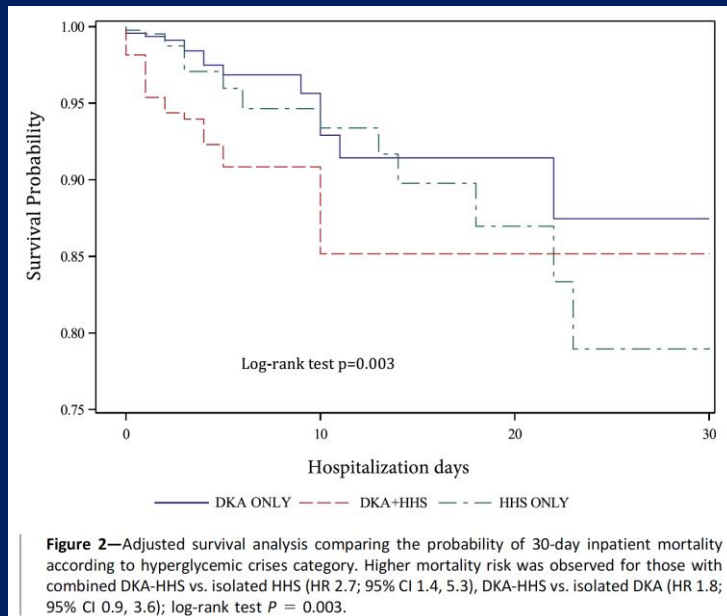
Gracias!

fpasque@emory.edu
[@DiabetesRC](#)



EMORY
UNIVERSITY

Pacientes con crisis hiperglucémicas (DKA/HHS combo)



Pasquel et al. Diabetes Care 2019, ahead of print