



Tips and Tricks for Glycemic Management

RHONDA ROEDLER BSC. PHARM, ACPR, PHARM D, CDE

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Presenter Disclosure

- Presenter's Name: Rhonda Roedler
- I have no current or past relationships with commercial entities
- Speaking Fees for current program:
 - I have received no speaker's fee for this learning activity

Commercial Support Disclosure



- This program has received no financial or in-kind support from any commercial or other organization

Outline

- ▶ Overview of insulins available
- ▶ Review of BBIT
 - ▶ Dosing insulin for tube feeds
 - ▶ Insulin Degludec
- ▶ Update to Diabetes Canada Diabetes Guidelines for Pharmacotherapy
- ▶ Tools for glycemic management for outpatients

Available insulins

Types of insulin ¹

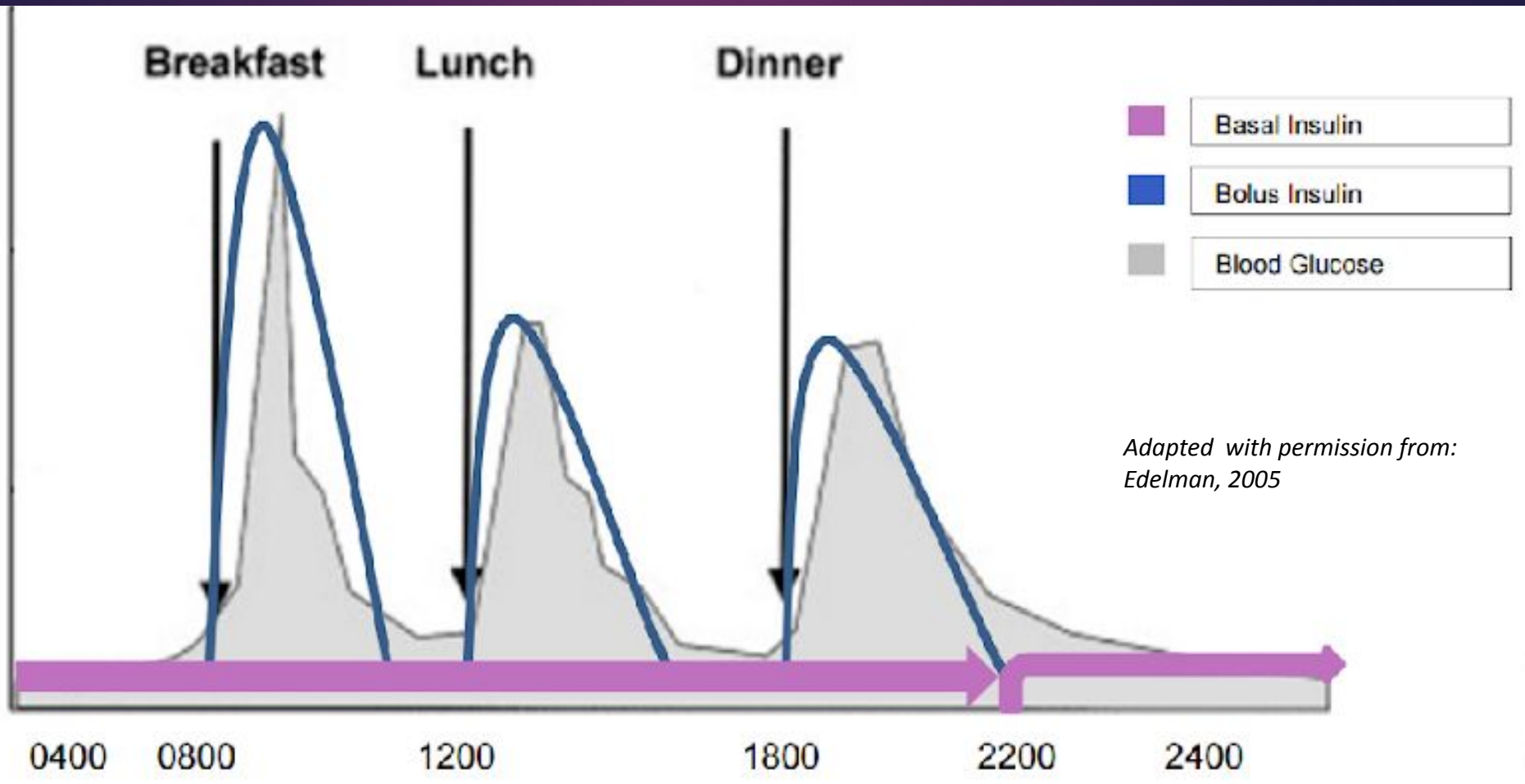
Insulin type	Onset	Peak	Duration
BOLUS (prandial or mealtime) insulins			
Rapid-acting insulin analogues <ul style="list-style-type: none"> •Insulin aspart •Insulin glulisine •Insulin lispro •Faster-acting insulin aspart 	9–20min 10–15min 10–15min 4min	1–1.5h 1–1.5h 1–2h 0.5-1.5h	3–5h 3.5–5h 3–4.75h 3-5h
Short-acting insulins <ul style="list-style-type: none"> •Insulin regular •Insulin regular U-500 	30min 15min	2–3h 4-8h	6.5h 17-24h
BASAL insulins			
Intermediate-acting Insulin neutral protamine Hagedorn	1–3h	5–8h	Up to 18h
Long-acting insulin (clear) <ul style="list-style-type: none"> •Insulin detemir •Insulin glargine U-100 •Insulin glargine U-300 •Insulin glargine biosimilar •Insulin degludec 	90min	Not applicable	U-100 glargine 24h, detemir 16–24h U-300 glargine >30h degludec 42h
PREMIXED insulins			
Premixed regular insulin –NPH (cloudy) <ul style="list-style-type: none"> •Humulin® 30/70 •Novolin® ge 30/70, 40/60, 50/50 	A single vial or cartridge contains a fixed ratio of insulin (% of rapid-acting or short-acting insulin to % of intermediate-acting insulin)		
Premixed insulin analogues (cloudy) <ul style="list-style-type: none"> •Biphasic insulin aspart (NovoMix® 30) •Insulin lispro/lispro protamine (Humalog® Mix25 and Mix50) 			

Basal Bolus Insulin Therapy

Poll Question

- ▶ I have seen Basal Bolus Insulin Therapy:
 - ▶ Used a majority of the time in my practice
 - ▶ Used in less than half of patients with diabetes
 - ▶ Never used - I only see sliding scale insulin used
 - ▶ I have never heard of Basal Bolus Insulin Therapy

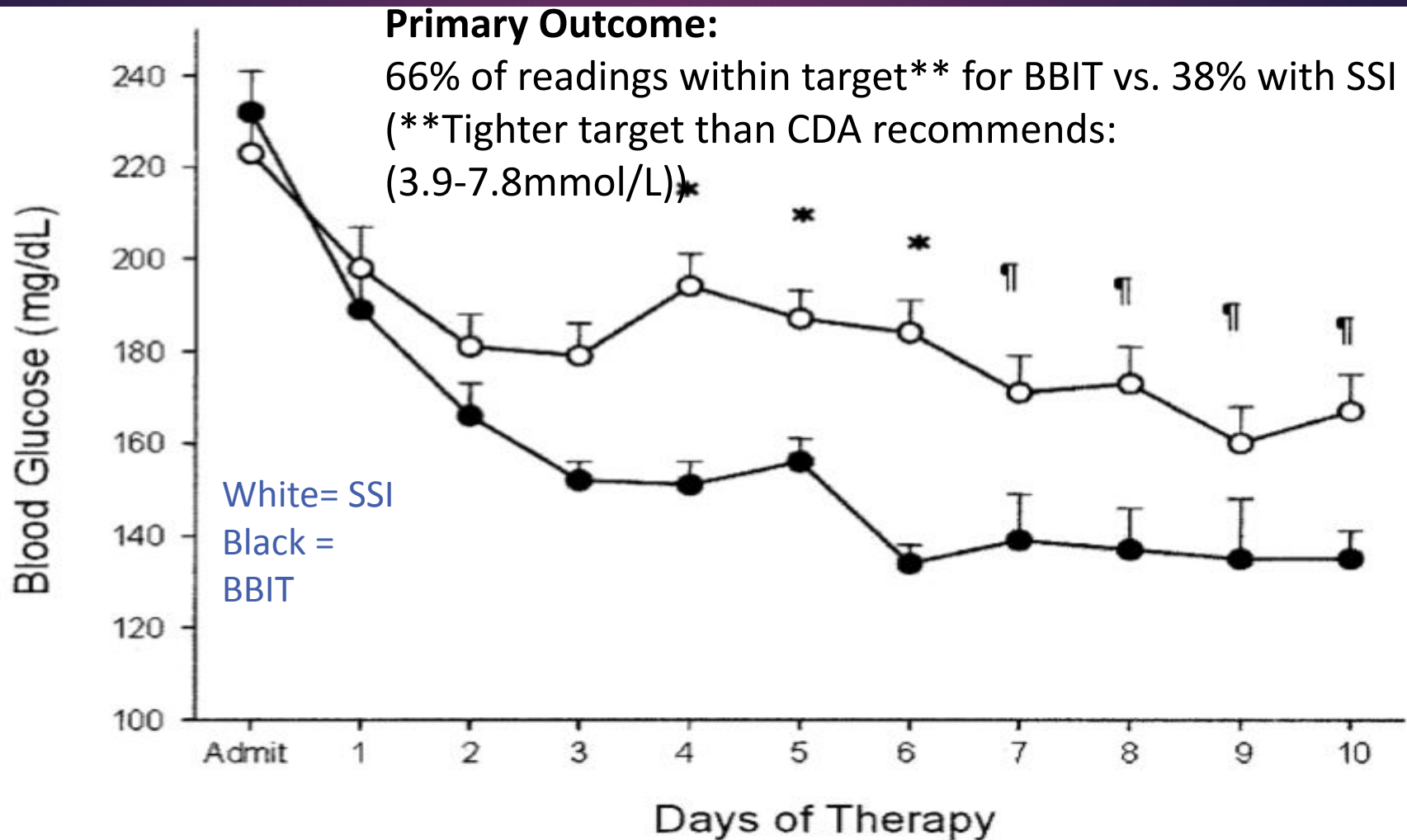
What is BBIT?



SSI vs BBIT: What is the Evidence²

- ▶ Multi-centre, open label, RCT
- ▶ 130 DM2 inpatients
 - ▶ 18-80 y.o., admitted to **medical** inpatient service
 - ▶ ≥3 month history of DM +insulin naïve, BG 7.8-22.2mmol/L
 - ▶ Excluded: DKA, ICU or surgical pt, corticosteroid rx, liver/renal dysfunction, pregnant, mental condition, unable to consent
- ▶ **Outcomes:**
 - ▶ Primary: mean daily BG
 - ▶ Secondary: hypoglycemic events, severe hypoglycemia, LOS, mortality rate

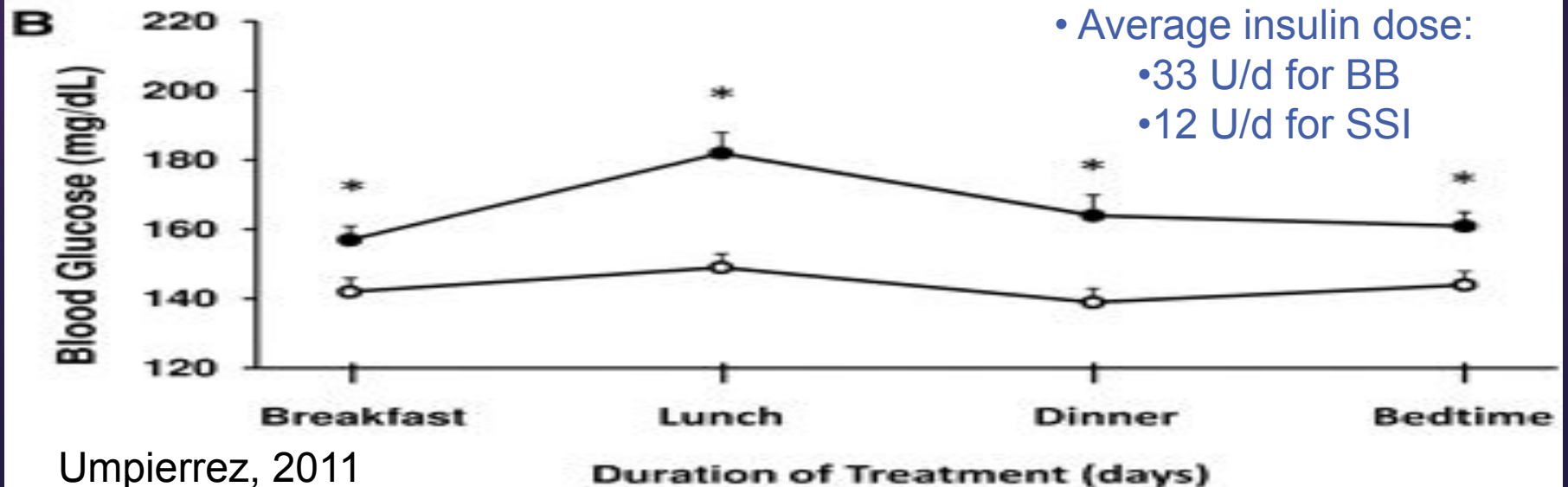
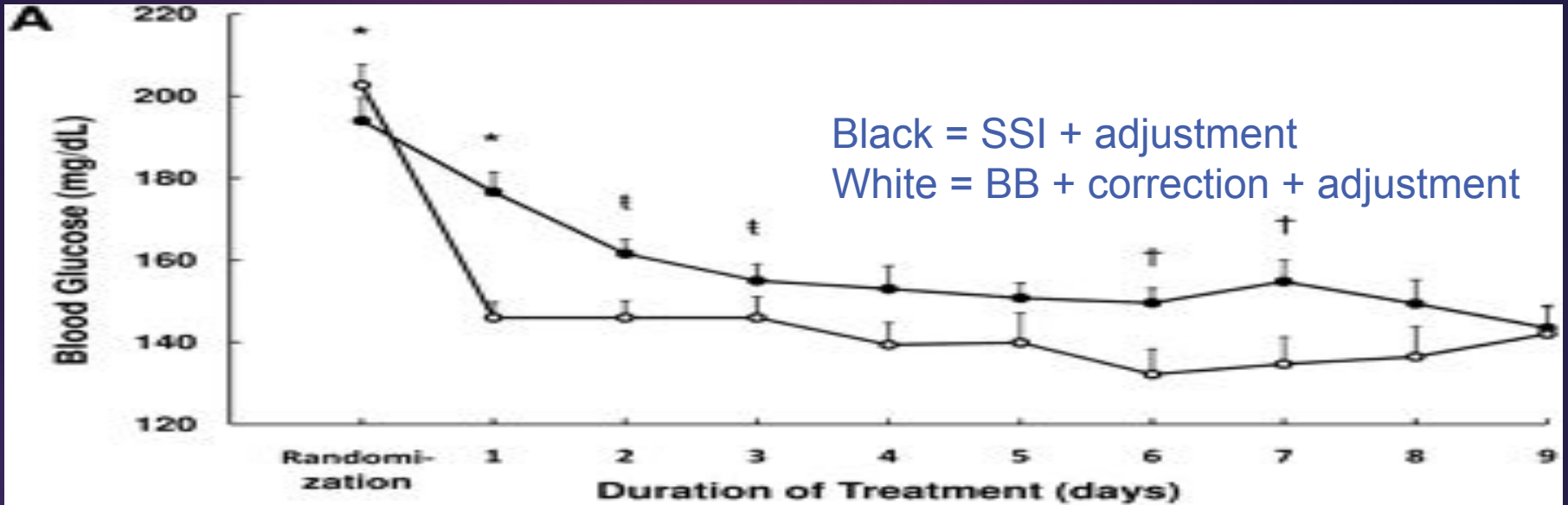
Medical Patients: SSI vs. BBIT²



SSI vs BBIT: What is the Evidence³

- Multi-centre, open label, RCT
- 211 DM2 inpatients
 - ▶ 18-80 y.o., admitted **for elective or emergent surgery**
 - ▶ ≥ 3 mo DM2 (diet/orals/insulin), BG 7.8-22.2mmol/L
 - ▶ Excluded: DKA, CV surgery, liver/ renal dysfunction, pregnant, unable to consent
- ▶ **Outcomes:**
 - ▶ Primary: Mean BG, composite of postop complications (wound infection, pneumonia, bacteremia, resp failure, ARF)
 - ▶ Secondary: hypoglycemia, LOS, each surgical complication, ICU admit, death

Surgical Patients: SSI vs. BBIT³



Basal Bolus Insulin Therapy Worksheet *(for prescribers; to support ordering and titration of insulin)*

Patient Name: _____ Patient Weight: _____ A1C: _____

Calculating Total Daily Dose (TDD) Options:

1. Home Insulin Dose:

Total Basal: [glargine (Lantus® OR Basalgar®), detemir (Levemir®), insulin NPH (HumuLIN®N), or Other _____]

	<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/> <small>Breakfast (units)</small>	+	<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/> <small>Bedtime (units)</small>	=	<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/> <small>Total Basal (units)</small>
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Total Bolus: [lispro (HumaLOG®), aspart (Novorapid®), insulin regular (HumuLIN®R), or Other _____]

	<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/> <small>meal + correction (units)</small>	+ Lunch	<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/> <small>meal + correction (units)</small>	+ Supper	<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/> <small>meal + correction (units)</small>	=	<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/> <small>Total Bolus (units)</small>
--	--	---------	--	----------	--	---	--

+

=

Total Basal + Total Bolus per day = Total Daily Dose of insulin at home

<input style="width: 100%; height: 40px; border: 1px solid black;" type="text"/>
--

2. New Start in Hospital:

a. Type 1 OR slim Type 2 OR over age 70 OR renal dysfunction

$$\text{Total Daily Dose (TDD)} = \text{weight (kg)} \times 0.3\text{-}0.5 \text{ units/kg/day} = \text{units per day}$$

b. Insulin resistance or steroid treatment or overweight Type 2

$$\text{Total Daily Dose (TDD)} = \text{weight (kg)} \times 0.5\text{-}1 \text{ units/kg/day} = \text{units per day}$$

2. New Start in Hospital:

a. Type 1 OR slim Type 2 OR over age 70 OR renal dysfunction

$$\text{Total Daily Dose (TDD)} = \text{weight (kg)} \quad \boxed{80} \quad \times 0.3\text{-}0.5 \text{ units/kg/day} = \boxed{24}$$

units per day

b. Insulin resistance or steroid treatment or overweight Type 2

$$\text{Total Daily Dose (TDD)} = \text{weight (kg)} \quad \boxed{} \quad \times 0.5\text{-}1 \text{ units/kg/day} = \boxed{}$$

units per day

How to Divide Total Daily Dose (TDD) into Scheduled Basal, Bolus and Correction Insulin Orders:

1. Determining Basal Insulin:

[glargine (Lantus[®] OR Basalgar[®]), detemir (Levemir[®]), insulin NPH (HumuLIN[®]N), or Other _____]:

If Well Controlled, use Home Dose:

units once daily

OR

units at breakfast

AND

units at bedtime

Otherwise, estimate Basal Insulin as follows:

glargine (Lantus[®] OR Basalgar[®]):
TDD x 0.5 =

units

Once
Daily

OR

glargine (Lantus[®] OR Basalgar[®]), detemir (Levemir[®]), insulin NPH (HumuLIN[®]N), or Other:
TDD X 0.5/2 =

units

Breakfast and
bedtime

How to Divide Total Daily Dose (TDD) into Scheduled Basal, Bolus and Correction Insulin Orders:

1. Determining Basal Insulin:

[glargine (Lantus[®] OR Basalgar[®]), detemir (Levemir[®]), insulin NPH (Humulin[®]N), or Other _____]:

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TDD x 0.5 =

units

Once
Daily

OR

glargine (Lantus[®] OR Basalgar[®]), detemir (Levemir[®]), insulin NPH (Humulin[®]N), or Other:
TDD X 0.5/2 =

units

Breakfast and
bedtime

2. Determining Bolus Insulin

[lispro (HumaLOG®), aspart (Novorapid®), insulin regular (HumuLIN®R), or Other _____]:

- If NPO: **NO** bolus
- If Reliable Diet, Well Controlled: Continue Home Dose:

Breakfast (units)	Lunch (units)	Supper (units)

- If unreliable diet, Well Controlled: Reduce Home Dose by 25-50%:

Breakfast (units)	Lunch (units)	Supper (units)

- If Poor Control, New Start, or Unknown Home Dose estimate Bolus Insulin:

Total bolus = TDD x 0.5/3 =

Breakfast (units)	Lunch (units)	Supper (units)

2. Determining Bolus Insulin

[lispro (HumaLOG®), aspart (Novorapid®), insulin regular (HumuLIN®R), or Other_____]:

- If NPO: **NO** bolus
- If Reliable Diet, Well Controlled: Continue Home Dose:

<input type="text"/>	<input type="text"/>	<input type="text"/>
Breakfast (units)	Lunch (units)	Supper (units)

- If unreliable diet, Well Controlled: Reduce Home Dose by 25-50%:

<input type="text"/>	<input type="text"/>	<input type="text"/>
Breakfast (units)	Lunch (units)	Supper (units)

- If Poor Control, New Start, or Unknown Home Dose estimate Bolus Insulin:

Total bolus = TDD x 0.5/3 =

<input type="text" value="4"/>	<input type="text" value="4"/>	<input type="text" value="4"/>
Breakfast (units)	Lunch (units)	Supper (units)

3. Determine Insulin Correction *(use same insulin as bolus insulin)*

Choose one based on current TDD.

May be combined with the scheduled bolus insulin dose and administered as a single subcutaneous injection.

If **NPO**, correction dose to be administered at scheduled meal/feed time, in coordination with blood glucose testing. **Use of bedtime Correction dose is not routinely recommended**

<input type="checkbox"/> TDD 15-30 units		<input type="checkbox"/> TDD 31-50 units		<input type="checkbox"/> TDD 51-80 units		<input type="checkbox"/> TDD 81 units or more		<input type="checkbox"/> Custom	
BG	Units	BG	Units	BG	Units	BG	Units	BG	Units
4.1-10	+0	4.1-9	+0	4.1-10	+0	4.1-9	+0		
10.1-14	+1	9.1-12	+1	10.1-12	+2	9.1-11	+2		
14.1-18	+2	12.1-15	+2	12.1-14	+3	11.1-13	+4		
		15.1-18	+3	14.1-16	+4	13.1-15	+6		
				16.1-18	+5	15.1-17	+8		
						17.1-18	+10		

3. Determine Insulin Correction *(use same insulin as bolus insulin)*

Choose one based on current TDD.

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BG	Units	BG	Units	BG	Units	BG	Units	BG	Units
4.1-10	+0	4.1-9	+0	4.1-10	+0	4.1-9	+0		
10.1-14	+1	9.1-12	+1	10.1-12	+2	9.1-11	+2		
14.1-18	+2	12.1-15	+2	12.1-14	+3	11.1-13	+4		
		15.1-18	+3	14.1-16	+4	13.1-15	+6		
				16.1-18	+5	15.1-17	+8		
						17.1-18	+10		

Titration of Insulin Dose Table

The above doses are conservative starting doses; and insulin doses will need titration every 24-72 hours

If Breakfast BG is:		If Lunch BG is:		If Supper BG is:		If Bedtime BG is:		If Overnight BG is:
LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)
Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease
Bedtime BASAL		Breakfast BOLUS		Lunch BOLUS or Breakfast BASAL		Supper BOLUS		Bedtime BASAL
If ALL BG are HIGH (greater than 10.0 mmol/L), Calculate TDD from last 24 hours, Increase TDD by 10-20% and Recalculate all Basal, Bolus and Correction Doses								
<ul style="list-style-type: none"> If HYPERGLYCEMIA OR HYPOGLYCEMIA: Discuss with patient to determine if change in activity or oral intake was the cause. If yes, monitor carefully. If otherwise unexplained, increase or decrease doses by 10-20% as per Titration Table above. 								

Case 1

- ▶ 76 yo female, Type 2 diabetes, past history of COPD, wt 70 kg
 - ▶ Metformin 500 mg po bid, A1C 8.2%, does no home monitoring as she “never has a problem with her blood sugars”
 - ▶ Admitted with pneumonia, treated with antibiotics
 - ▶ What to do?

Poll Question

- ▶ What would you do with this patient?
 - ▶ Continue with home dose of metformin
 - ▶ Begin BBIT in hospital
 - ▶ Use basal insulin with correction dose

Let's say we chose BBIT

- ▶ 70 kg x 0.5 units/kg = 35 units
- ▶ ½ TDD as basal = 17 units
- ▶ ½ TDD as bolus = 6 units tid with meals
- ▶ Correction – based on TDD 35

3. Determine Insulin Correction *(use same insulin as bolus insulin)*

Choose one based on current TDD.

May be combined with the scheduled bolus insulin dose and administered as a single subcutaneous injection.

If **NPO**, correction dose to be administered at scheduled meal/feed time, in coordination with blood glucose testing. **Use of bedtime Correction dose is not routinely recommended**

<input type="checkbox"/> TDD 15-30 units		<input type="checkbox"/> TDD 31-50 units		<input type="checkbox"/> TDD 51-80 units		<input type="checkbox"/> TDD 81 units or more		<input type="checkbox"/> Custom	
BG	Units	BG	Units	BG	Units	BG	Units	BG	Units
4.1-10	+0	4.1-9	+0	4.1-10	+0	4.1-9	+0		
10.1-14	+1	9.1-12	+1	10.1-12	+2	9.1-11	+2		
14.1-18	+2	12.1-15	+2	12.1-14	+3	11.1-13	+4		
		15.1-18	+3	14.1-16	+4	13.1-15	+6		
				16.1-18	+5	15.1-17	+8		
						17.1-18	+10		

Titration

- ▶ After 24 hours, her Blood glucose is:

ac Breakfast	ac Lunch	ac Supper	hs
9.6	12.4	13.6	11.2
10.1			

Titration of Insulin Dose Table

The above doses are conservative starting doses; and insulin doses will need titration every 24-72 hours

If Breakfast BG is:		If Lunch BG is:		If Supper BG is:		If Bedtime BG is:		If Overnight BG is:
LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)	HIGH (above 10.0 mmol/L)	LOW (below 5.0 mmol/L)
Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease
Bedtime BASAL		Breakfast BOLUS		Lunch BOLUS or Breakfast BASAL		Supper BOLUS		Bedtime BASAL
If ALL BG are HIGH (greater than 10.0 mmol/L), Calculate TDD from last 24 hours, Increase TDD by 10-20% and Recalculate all Basal, Bolus and Correction Doses								
<ul style="list-style-type: none"> • If HYPERGLYCEMIA OR HYPOGLYCEMIA: Discuss with patient to determine if change in activity or oral intake was the cause. If yes, monitor carefully. If otherwise unexplained, increase or decrease doses by 10-20% as per Titration Table above. 								

Poll Question

- ▶ Based on the blood glucose levels what would you do?
 - ▶ Increase the basal insulin dose by 10% to 19 units
 - ▶ Increase each dose of bolus insulin by 10% to 7 units
 - ▶ Increase the initial total daily dose of insulin by 10-20% (TDD 38-42 units) and recalculate each dose

Case 1b: Steroid treatment

- ▶ Same patient, Day 3 post-admission, now put on Prednisone 50 mg po daily for COPD exacerbation
- ▶ What do we expect to happen to BG?
- ▶ What do we do?

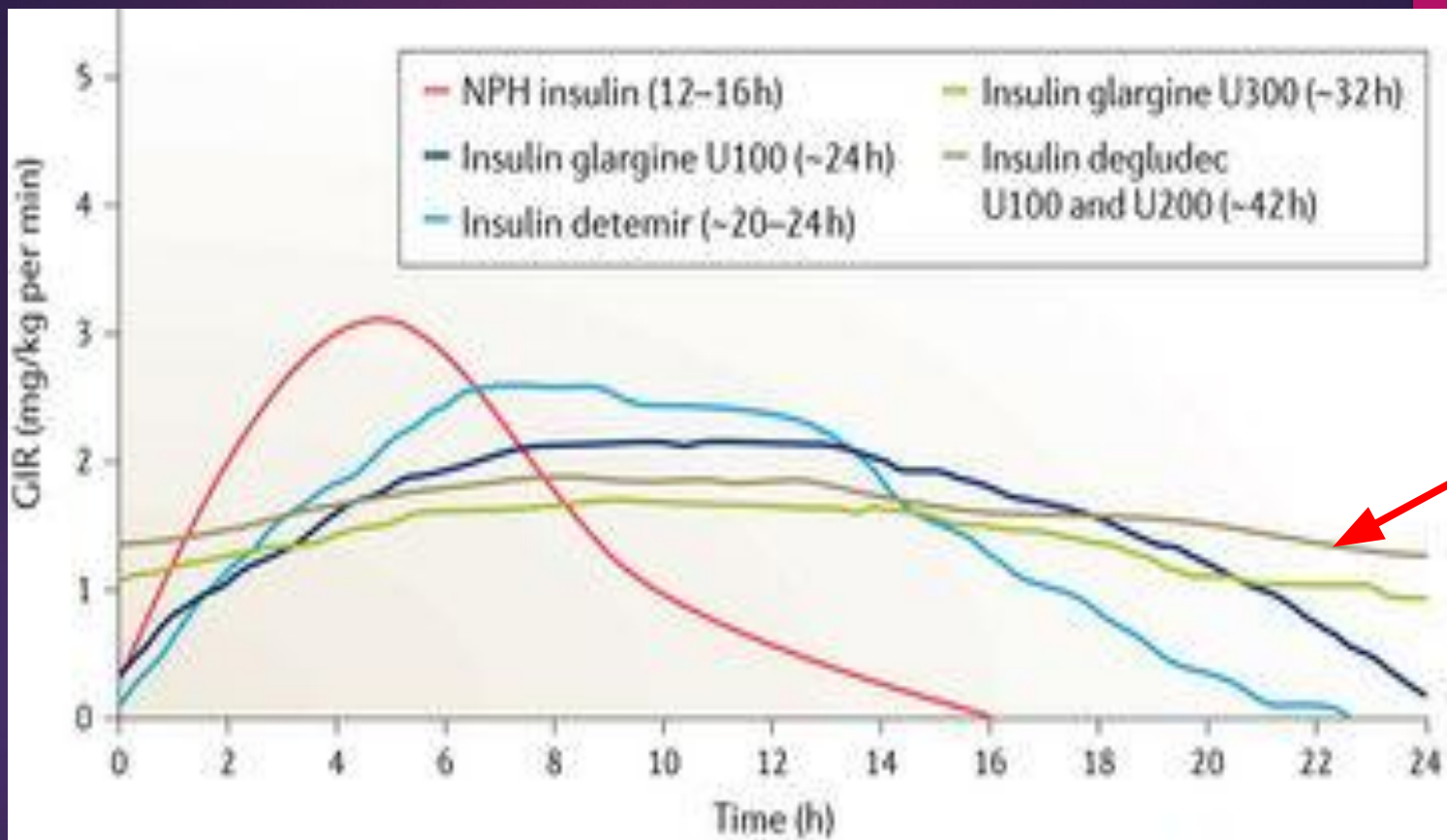
Steroid treatment

- ▶ Requires aggressive dose adjustment due to increased insulin resistance
- ▶ Often Blood Glucose best in morning, worsens through day, improves again overnight
- ▶ Focus on increasing the bolus
 - ▶ Often not a 50/50 split of basal and bolus
 - ▶ Adjust the correction scale accordingly!

ac Breakfast	ac lunch	ac Supper	Bedtime
9	16	21	12
8			

Insulin Degludec ^{4,5,6}

- ▶ Ultra long acting insulin
- ▶ Once daily dosing, with a flat profile
- ▶ Can be used for both Type 1 and Type 2 diabetes



Administration^{7,8,9,10}

- ▶ Should be administered once daily, at same time each day
- ▶ Flexibility allowed in timing of dose
 - ▶ Must have at least 8 hours between injections
- ▶ Dose titrations should be done approximately once - twice per week not daily
 - ▶ Effect of titrations will take 2-3 days to be evident

Degludec^{7,8,9,10}

Ideal for

- ▶ Hypoglycemia
- ▶ Travel frequently
- ▶ Work shiftwork
- ▶ Variable schedules
- ▶ Wanting a once daily insulin
- ▶ Dependent on others for administration
- ▶ Current basal not providing adequate coverage

Not ideal for

- ▶ Acutely ill patients within hospital or community
- ▶ Patients that will only be on insulin a short time while in hospital

Switching to/from insulins¹¹

From degludec

To once daily insulin:

1:1 okay, but can reduce dose up to 20%

To twice daily insulin:

Reduce dose by 20% and divide dose evenly

Start new basal insulin 48 hours after last dose of degludec

To degludec

From once daily insulin:

1:1 okay, but can reduce dose up to 20%

From twice daily insulin:

Reduce dose by 20%

Can start degludec when dose of other basal was due

Enteral Nutrition

Pathogenesis of Hyperglycemia¹²

- ▶ Occurs from:
 - ▶ Absolute or relative insulin deficiency
 - ▶ Delayed insulin release
 - ▶ Lack of glucagon suppression
 - ▶ Postprandial hepatic/muscle insulin resistance

In those with Type 2 DM, one or combination of these conditions leads to inability of cells to use glucose, overproduction of insulin and exacerbation of insulin resistance

Pathogenesis of Hyperglycemia¹²

- ▶ Regulation of glucose involves insulin, glucagon, counterregulatory hormones
 - ▶ Insulin: transport of glucose into cells by stimulating glucose transporters, glycogenesis, and fatty acid synthesis
 - ▶ Glucagon: stimulates glucose production from the liver; stimulates lipolysis and production of ketones
 - ▶ Epinephrine and norepinephrine: release of glucose from muscle glycogen

Hyperglycemia in Enteral Nutrition^{12,13}

- ▶ Prevalence of hyperglycemia is higher in patients receiving enteral nutrition
- ▶ Complicated by:
 - ▶ Stress of hospitalization
 - ▶ Acute illness, surgery, trauma
 - ▶ Peripheral insulin resistance
 - ▶ Bedrest
 - ▶ Delivery of glucose and gluconeogenic substrates through via enteral feeding

Options for Hyperglycemia in Enteral Feeding¹⁴

- ▶ BBIT (basal, bolus and correction)
 - ▶ Order using TDD (half dose with basal insulin, half given as short acting insulin every 6 hours with a correction based on TDD)
- ▶ BBIT (basal and correction alone)
 - ▶ Use entire TDD as basal insulin and use corresponding correction insulin dose
- ▶ Non-insulin deficient patients
 - ▶ Use TDD divided into four doses of short acting insulin with the corresponding correction dose

Continuous Feeds

80 kg patient starting on continuous feeds

Use BBIT:

Calculate TDD = $0.3 \text{ units/kg/day} \times 80 \text{ kg} = 24 \text{ units}$

Give basal: $\text{TDD}/2 = 12 \text{ units}$ (preferably dosed twice daily)

Give bolus: $\text{TDD}/2 = 12 \text{ units}$ as HumuLIN R, divided into 4 equally divided doses, given qid or q6h (3 units qid or q6h)

Give correction based on TDD (24 units)

Basal and correction alone:

Calculate TDD as above

Give entire TDD as basal insulin (preferably dosed twice daily)

Order correction based on TDD

Bolus feeds

- ▶ If bolus feeds:
 - ▶ treat the same as BBIT for patient eating po (ie. Basal + bolus + correction)

Patient is feeling better and will transition to po diet

▶ Current doses on enteral feeds:

	0800	1200	1700	2200
BG	8.9	9.4	11.2	6.5
Basal	7	-	-	7
Bolus	3	3	3	3
Correction	0	1	1	0

▶ Current TDD = basal (7+7) + bolus (3+3+3+3) + correction (1+1) = 28

- ▶ Basal = $TDD/2 = 14$ units (once or 7 units bid)
- ▶ Bolus = $TDD/2 = 14$ units – given in three equal doses of 4 units, with each meal
- ▶ Correction based on TDD 28



Update to Clinical Practice Guidelines

Update to Pharmacotherapy Guidelines¹⁵

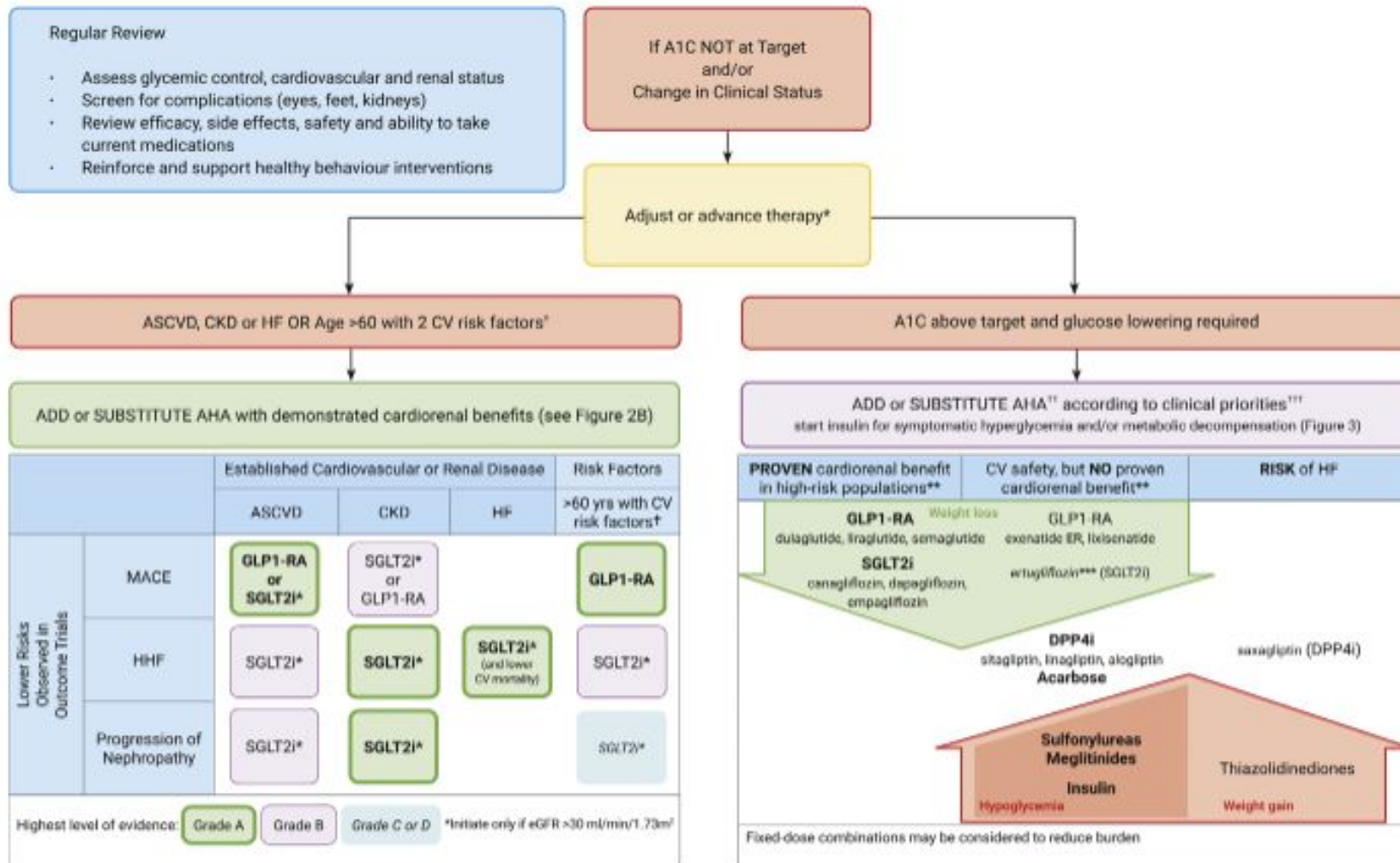
- ▶ Same factors still apply when choosing medications
 - ▶ Degree of hyperglycemia
 - ▶ Efficacy of agents for reducing complications and blood glucose levels
 - ▶ Effect on hypoglycemia, body weight, concomitant medications and other side effects
 - ▶ Adherence
 - ▶ Affordability of medications
 - ▶ Patient values and preferences

Update to Pharmacotherapy Guidelines ¹⁵

- ▶ New indications for the newer therapies on the market warranted an update to the 2018 guidelines
 - ▶ Agents have been shown to have CV benefits in those with T2DM
 - ▶ CV benefits also shown in those that only have CV risk factors
 - ▶ SGLT2 reduce risk for hospitalization for heart failure and progression of chronic kidney disease
 - ▶ SGLT2 and GLP-1 show greater weight loss in comparison to other agents

Figure 2A

Reviewing, adjusting or advancing therapy in type 2 diabetes.



* Changes in clinical status may necessitate adjustment of glycemic targets and/or deprescribing.

† Tobacco use; dyslipidemia (use of lipid-modifying therapy or a documented untreated low-density lipoprotein (LDL) ≥3.4 mmol/L, or high-density lipoprotein-cholesterol (HDL-C) <1.0 mmol/L for men and <1.3 mmol/L for women, or triglycerides ≥2.3 mmol/L); or hypertension (use of blood pressure drug or untreated systolic blood pressure [SBP] ≥140 mmHg or diastolic blood pressure [DBP] ≥95 mmHg).

†† All antihyperglycemic agents (AHAs) have Grade A evidence for effectiveness to reduce blood glucose levels.

††† Consider degree of hyperglycemia, costs and coverage, renal function, comorbidity, side effect profile and potential for pregnancy.

** In CV outcome trials performed in people with atherosclerotic cardiovascular disease (ASCVD), chronic kidney disease (CKD), heart failure (HF) or at high cardiovascular (CV) risk.

*** VERTIS (CV outcome trial for ertugliflozin) presented at American Diabetes Association (ADA) June 2020 showed noninferiority for major adverse CV events (MACE). Manuscript not published at time of writing.

ATC, glycated hemoglobin; DPP4i, dipeptidyl peptidase-4 inhibitors; eGFR, estimated glomerular filtration rate; GLP1-RA, glucagon-like peptide-1 receptor agonists; exenatide ER, exenatide extended-release; HHF, hospitalization for heart failure; SGLT2i, sodium-glucose cotransporter 2 inhibitors; yrs, years.

Semaglutide oral^{16,17}

- ▶ Initial dose: 3 mg po daily, can increase after 30 days to 7 mg po daily
- ▶ Maximum dose: 14 mg po daily
- ▶ Semaglutide is paired with an absorption enhancer called 'SNAC'
- ▶ Dosing instructions: Take tablets 30 minutes before eating and with no more than 120 mL of water
- ▶ Food or excess water may overwhelm the SNAC and therefore will decrease the amount of semaglutide absorbed
- ▶ Do not have patients double up number of pills to take higher dosage

Case

IB is a 66 year old male presenting to ER with syncope

Past medical history:

CAD (stent in 2014)

Seizure disorder

Type 2 diabetes

Recurrent DVTs (unprovoked)

Case

Underwent cardiac catheterization procedure

Found in stent restenosis

2 drug eluting stents placed

Current labs:

Lab Value	Result	Normal Range
A1c	10.6%	$\leq 6.4\%$
SCr	128	50-120 $\mu\text{mol/L}$
eGFR	50	≥ 60 mL/min
ACR	13.48	≤ 2.99 mg/mmol
Cholesterol	4.69	
HDL	1.17	
LDL	2.53 mmol/L	0-3.4 mmol/L
Triglycerides	2.17	0-1.7 mmol/L

Case

Current medications:

Degludec 32 units daily

Diabetes

Aspart 4 units tid

Diabetes

Gabapentin 1200 mg tid

Neuropathic pain

Bisoprolol 1.25 mg daily

CVD

Rosuvastatin 20 mg daily

CVD

Clopidogrel 75 mg daily

CVD

Pantoprazole 40 mg daily

Stomach

Levetiracetam 750 mg bid

Seizure disorder

Apixaban 5 mg bid

DVTs

Case

Current Blood Glucose Levels:

Breakfast	Lunch	Supper	Bedtime
9.6		18.9	
14.2		14.8	
9.5		5.3	
9.2		13.0	3.4
12.0	8.4	7.8	
9.6	33.1	9.8	
6.4		23.2	
5.0			

Poll Question

- ▶ Based on his current blood glucose levels and comorbidities, what would you do?
 - ▶ Increase basal insulin
 - ▶ Increase bolus insulin
 - ▶ Add metformin
 - ▶ Add empagliflozin
 - ▶ Add semaglutide

What actually happened



Empagliflozin 10 mg daily
Metformin 500 mg bid

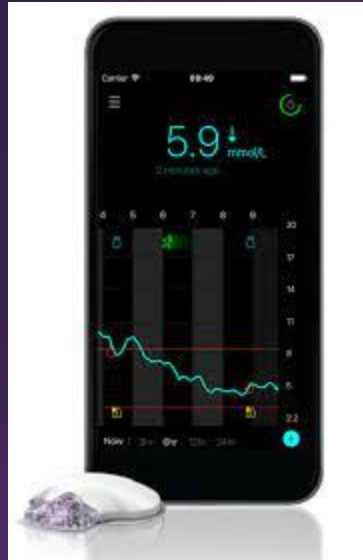


Tools for glycemic management in Outpatients

Glucose Monitoring¹⁸

Testing Method	Pros	Cons
A1c	Widely used, familiar Standardized Easy lab test	Approximation of glycemia over Does not look at glucose excursions Other comorbidities affect outcome
Point of Care Testing (Self monitoring of blood glucose)	Measure of capillary glucose Easy to train patients Widely used, familiar	Possible user error or misrecorded data Requires training Limited data at a single point in time Need to test multiple times daily Need to ensure quality of test strips
Continuous Glucose Monitoring (CGM)	Comprehensive picture of variations in glucose levels No missed readings Wide range of metrics provided Easy to use Systems are now pre-calibrated	+++ expensive Complex to understand, does require training Sensor is always on the body Measure of interstitial glucose

Available CGM¹⁹



Medtronic
Guardian ®



Dexcom G6 ®



Freestyle Libre ®

CGM¹⁹

Advantages

- ▶ Reduction in A1c
- ▶ Can be used with all ages
- ▶ Reduces risk of hypoglycemia by 33-50%
- ▶ Allows user to see patterns of blood glucose throughout the day
- ▶ Could be used for short term

Disadvantages

- ▶ Cost
- ▶ Some systems need to be calibrated or results confirmed
- ▶ Issues with adhesive on sensor

Available Pumps²⁰



Omnipod ®



Medtronic ®



Tandem T Slim ®



Ypsomed ®

Insulin Pumps²⁰

Advantages

- ▶ Reduction in hypoglycemia
- ▶ Reduced blood glucose levels
- ▶ Reduced A1c
- ▶ Reductions in glucose variations
- ▶ Improves quality of life
- ▶ Resemble physiologic delivery of insulin

Disadvantages

- ▶ Infusion sets
 - ▶ May detach
 - ▶ May leak
 - ▶ May cause skin irritation
- ▶ More patient involvement and compliance
- ▶ Require training, patient education and motivation
- ▶ Expensive

Good Resources

▶ Diabetes Canada

▶ www.diabetes.ca

▶ Diabetes Educators Calgary

▶ www.diabeteseducatorscalgary.ca

▶ BBIT

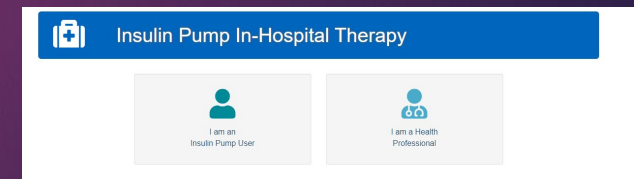
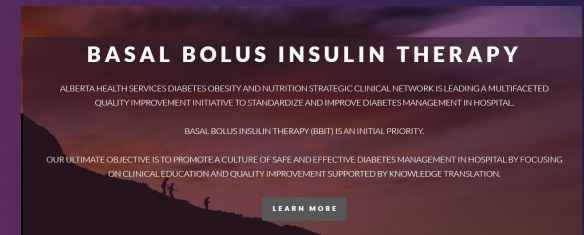
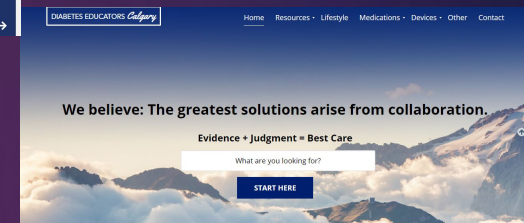
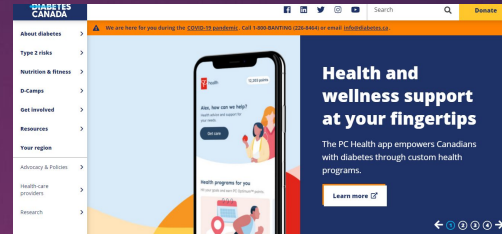
▶ www.bbitt.ca

▶ iPumpit

▶ www.ipumpit.ca

▶ KT Toolkit

▶ www.kttoolkit.ca



Final Poll Question

- ▶ What was the one thing that you were told to take away from this presentation?
 - ▶ Never, ever, ever, hold the basal insulin in a patient with Type 1 diabetes

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