

Workshop: Starting Insulin in Your Office

Jean-François Yale, MD, FRCPC
McGill University Health Centre,
Montreal, Canada
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Disclosures

Jean-François Yale

- **Advisory Boards**

- Sanofi, Merck, Eli Lilly, Bayer, Novo-Nordisk, Astra Zeneca, Boehringer-Ingelheim, Janssen, Takeda, Medtronic, Abbott

- **Lectures**

- Sanofi, Merck, Eli Lilly, Bayer, Novo-Nordisk, Astra Zeneca, Boehringer-Ingelheim, Janssen, Takeda, Medtronic, Abbott

- **Research Funds**

- Merck, Astra Zeneca, Eli Lilly, Boehringer-Ingelheim, Sanofi, Janssen, Mylan, Medtronic, Bayer

LEARNING OBJECTIVES

As a result of attending this session, participants will be able to:

- Individualize, initiate and titrate insulin therapy in selected patients with type 2 diabetes
- Choose the appropriate basal insulin for a given patient, considering the patient characteristics and coverage

PATIENT VIGNETTE:

Robert



- 58-year-old male with type 2 diabetes x 11 years
- History of CAD with MI x 2
- Non-smoker
- No private insurance
- **Medications:**
 - Metformin/sitagliptin 850/50 BID
 - Empagliflozin 10 mg AM
 - Gliclazide MR 120 mg AM
 - Statin
 - ACE inhibitor
 - ASA

Physical:

- BP 126/75
- BMI: 30.2 kg/m²

Labs and Analyses:

- A1C: 8.0 %
- LDL-C: 1.9 mmol/L
- ACR: 1.9
- eGFR: 74 mL/min/1.73m²

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Labs and Analyses:

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- ACR: 1.9
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What would be your next step ?

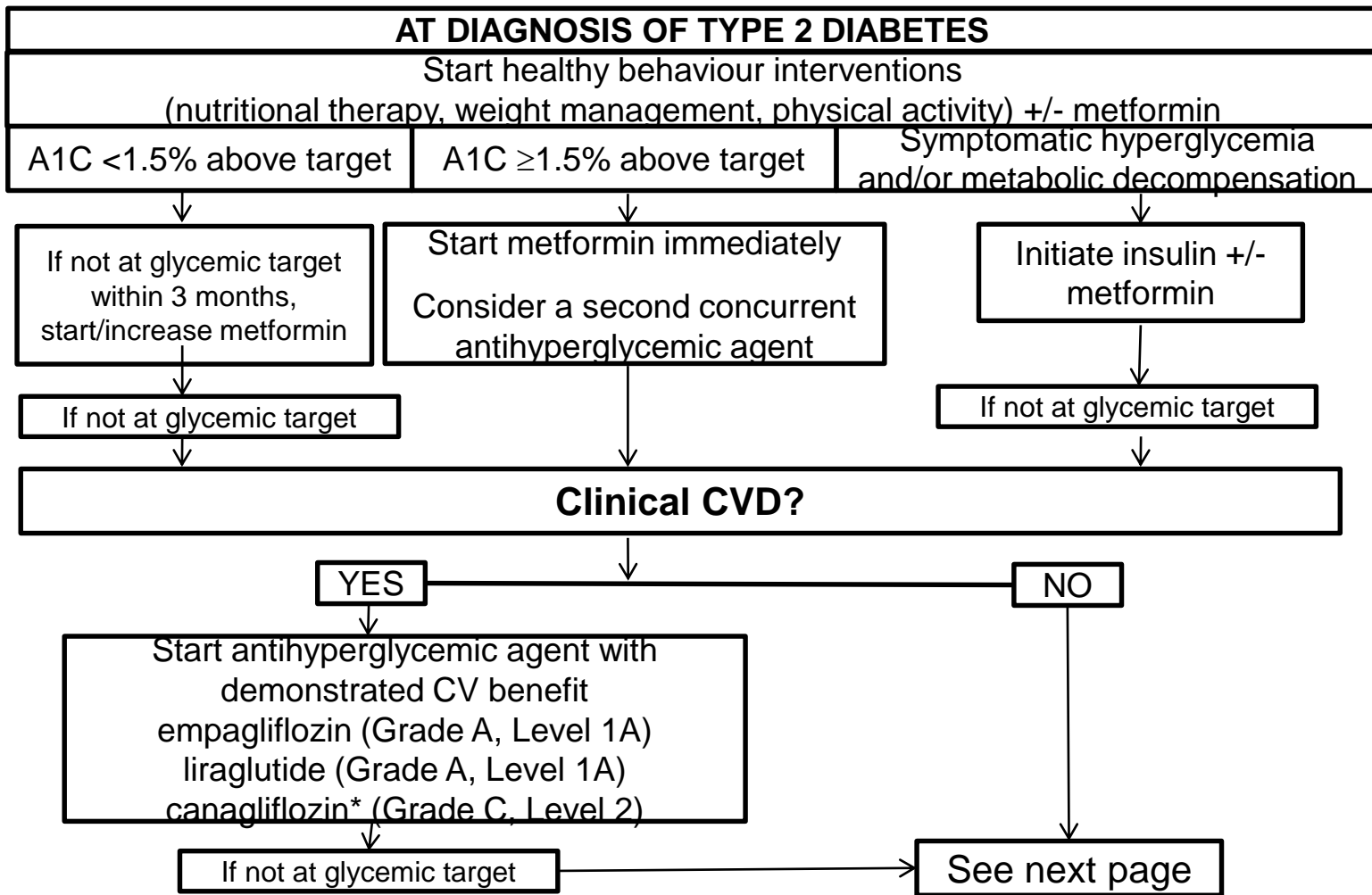
WHEN IS THE IDEAL TIME TO TRANSITION TO INSULIN THERAPY?

1. Insulin can be started any time after metformin. In presence of symptomatic hyperglycemia with metabolic decompensation, insulin may be used immediately. However, in most patients, other agents that do not cause hypoglycemia and weight gain (SGLT2 inhibitors, incretin agents [DPP-4 inhibitors or GLP-1RAs]) should be preferred.
2. **In patients with clinical CVD, agents with proven CV benefit (empagliflozin, canagliflozin and liraglutide) should be used before considering basal insulin.**
3. The patient has to be ready to initiate insulin. Most patients manifest some reluctance to initiate insulin therapy. It is important to question the patient about his/her fears.

Add additional antihyperglycemic agent best suited to the individual by prioritizing patient characteristics *(agents listed in alphabetical order by CV outcome data):*

Class	Effect on CVD Outcomes	Hypo-glycemia	Weight	Relative A1C Lowering when added to metformin	Other therapeutic considerations	Cost
GLP-1R agonists	lira: Superiority in T2DM with clinical CVD exenatide LAR & lixi: Neutral	Rare	↓↓	↓↓ to ↓↓↓	GI side-effects, Gallstone disease Contraindicated with personal / family history of medullary thyroid cancer or MEN 2 Requires subcutaneous injection	\$\$\$\$
SGLT2 inhibitors	Cana & empa: Superiority in T2DM patients with clinical CVD	Rare	↓↓	↓↓ to ↓↓↓	Genital infections, UTI, hypotension, dose-related changes in LDL-C. Caution with renal dysfunction, loop diuretics, in the elderly. Dapagliflozin not to be used if bladder cancer. Rare diabetic ketoacidosis (may occur with no hyperglycemia). Increased risk of fractures and amputations with canagliflozin. Reduced progression of nephropathy & CHF hospitalizations with empagliflozin and canagliflozin in those with clinical CVD	\$\$\$
DPP-4 Inhibitors	alo, saxa, sita: Neutral	Rare	Neutral	↓↓	Caution with saxagliptin in heart failure Rare joint pain	\$\$\$
Insulin	glar: Neutral degludec: noninferior to glar	Yes	↑↑	↓↓↓↓	No dose ceiling, flexible regimens Requires subcutaneous injection	\$- \$\$\$\$
Thiazolidinediones	Neutral	Rare	↑↑	↓↓	CHF, edema, fractures, rare bladder cancer (pioglitazone), cardiovascular controversy (rosiglitazone), 6-12 weeks for maximal effect	\$\$
α-glucosidase inhibitor (acarbose)		Rare	Neutral	↓	GI side-effects common Requires 3 times daily dosing	\$\$
Insulin secretagogue: Meglitinide		Yes	↑	↓↓	More rapid BG-lowering response Reduced postprandial glycemia with meglitinides but usually requires 3 to 4 times daily dosing.	\$\$
Sulfonylurea		Yes	↑	↓↓	Glizalide and glimepiride associated with less hypoglycemia than glyburide. Poor durability	\$
Weight loss agent (orlistat)		None	↓	↓	GI side effects Requires 3 times daily dosing	\$\$\$

HEALTHY BEHAVIOUR INTERVENTIONS



Clinical CVD ?

YES

Start antihyperglycemic agent with demonstrated CV benefit

**Empagliflozin (Grade A, level 1A)
Liraglutide (Grade A, level 1A),
Canagliflozin (Grade C, level 2)**

Antihyperglycemic Coverage by RAMQ

Class	Medication	\$/day at max dose	MONO if SU and MET NT or CI	+ MET if SU CI,NT or INEFF	+ SU if Met CI, NT or INEFF	IF CVD + A1c>7	+ MET if DPP4i INEFF, NT or CI and BMI > 30 and high A1c	If other SU NT or INEFF
Biguanides	Metformin (Glucophage)	0.18						
α-Glucosidase Inhibitors	Acarbose (Glucobay)	1.03						
DPP-4 Inhibitors	Alogliptin (Nesina)	2.10	EN167	EN148 (EN150 Kazano)	EN149			
	Linagliptin (Trajenta)	2.25	EN167	EN148 (EN150Jentaduetto)				
	Saxagliptin (Onglyza)	2.30		EN148 (EN150 Komboglyze)	EN149			
	Sitagliptin (Januvia)	2.62	EN167	EN148 (EN150 Janumet et XR)				
SGLT2 Inhibitors	Canagliflozin (Invokana)	2.62	EN167	EN148	EN149			
	Dapagliflozin (Forxiga)	2.45		EN148 (EN199 Xigduo)	EN149			
	Empagliflozin (Jardiance)	2.62	EN167	EN148 (EN199 Synjardy)		EN179		
GLP-1R Agonists	Liraglutide (Victoza)	6.85					Form	
	Exenatide (Byetta)	2.49						
	Exenatide QW (Bydureon)	6.85						
	Dulaglutide (Trulicity)	6.85					Form	
	Semaglutide (Ozempic)	6.85						
Thiazolidine-diones	Pioglitazone (Actos)	1.05	EN121	EN118	EN119			
	Rosiglitazone (Avandia)	2.87	EN121	EN118 (EN81 Avandamet)	EN119			
Insulin Secretagogues	Gliclazide (Diamicon)	0.50						
	Glimepiride (Amaryl)	0.77						EN23
	Glyburide (Diabeta)	0.23						
	Repaglinide (GlucoNorm)	0.84						

Green = on general list: no code or form required Orange = Médicament d'exception: code or form required

NT=Not tolerated INEFF=Inefficacious CI=Contraindicated SU=Sulfonylurea MET=Metformin Mono=Monotherapy Form=Médicament d'exception form required

EN199 requires 3 month stability of each component x 3 months

JF Yale october 2018



When is the ideal time to transition to insulin therapy?

- Insulin can be started any time after metformin
 - In presence of symptomatic hyperglycemia with metabolic decompensation, insulin may be used immediately
 - However, in most patients, other agents that do not cause hypoglycemia and weight gain (SGLT2 inhibitors, incretin agents [DPP-4 inhibitors or GLP-1RAs]) should be preferred
 - In patients with clinical CVD, agents with proven CV benefit (empagliflozin, liraglutide and canagliflozin) should be used before considering basal insulin
- Robert has CAD and a 15-year history of type 2 diabetes
 - His A1C is above target despite being on a metformin/DPP-4 inhibitor FDC and an agent with demonstrated CV benefits (empagliflozin) → **Robert is a candidate for insulin, but may benefit of first starting a GLP-1R agonist in place of his DPP-4 inhibitor.**

PATIENT VIGNETTE:

Robert



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- Non-smoker
- No private insurance : RAMQ

Medications:

- Metformin/sitagliptin 850/50 BID
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- Gliclazide MR 120 mg AM
- Statin
- ACE inhibitor
- ASA

- **Patient is reluctant when insulin is mentioned. He says injections will be too painful, and he remembers his father falling unconscious after taking insulin shots.**

- **He promises to be much more careful with diet and exercise instead**

Physical:

- BP 126/75
- BMI: ~~30.2~~ **28.4** kg/m²

Labs and Analyses:

- A1C: 8.0 %
- LDL-C: 1.9 mmol/L
- ACR: 1.9
- eGFR: 74 mL/min/1.73m²

You decide to start insulin.

How do you convince him ?

PATIENT VIGNETTE:

Robert



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Labs and Analyses:

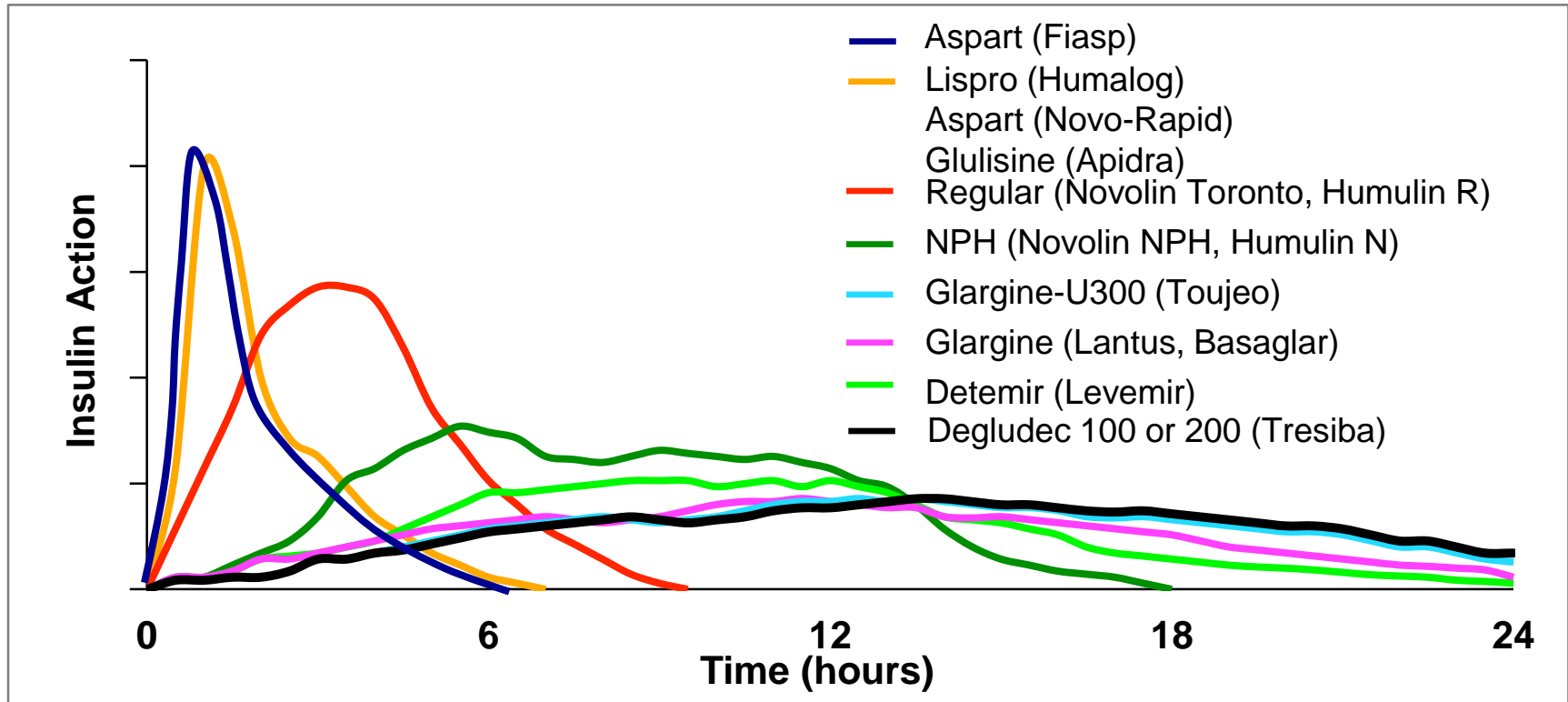
- A1C: 8.0 %
- LDL-C: 1.9 mmol/L
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You decide to start insulin.

What prescription do you write ?

What about the oral agents ?

ACTION PROFILES OF INSULINS



The images of the effects of insulin are theoretical representations and are not taken from clinical study data.

BASAL INSULINS OPTIONS

	NPH	Detemir	Glargine U100	Glargine U100	Glargine U300	Degludec 100 or 200
Commercial names	Humulin N Novolin NPH	Levemir	Lantus	Basaglar	Toujeo	Tresiba
Duration of action	16 h	20 h	24 h	24 h	> 24 h	42h
Potency to reduce A1C (%)	> 0.9 %	> 0.9 %	> 0.9%	> 0.9%	> 0.9 %	> 0.9%
Nocturnal hypoglycemia risk (RR)	1	0.6	0.6	0.6	0.4	0.4
Effects on body weight	↑	↔ or ↑	↑	↑	↑	↑
Long-term CV safety	UKPDS		ORIGIN			DEVOTE
Monthly cost (50 units/day)*	~\$49.50	~\$112.50	~\$100.50	~\$85.50	~\$96.00	~\$112.50
Covered by RAMQ ?	YES	IF severe or frequent hypos with NPH	NO (Those already approved can continue)	IF severe or frequent hypos with NPH	NO	IF severe or frequent hypos with NPH

BASAL INSULIN OPTIONS

	Brand name	Total units per pen (units)	Maximum dose for injection (units)	Pen type
NPH	Novolin® ge NPH 100 U/mL	300	60	Cartridge
	Humulin® N 100 U/mL	300	60	Cartridge or KwikPen®
Insulin detemir	Levemir® 100 U/mL	300	80	Cartridge or FlexTouch®
Insulin glargine	Lantus® 100 U/mL	300	80	Cartridge or SoloSTAR®
	Basaglar™ 100 U/mL	300	60	Cartridge or KwikPen®
	Toujeo™ 300 U/mL	450	80	SoloSTAR®
Insulin degludec	Tresiba® 100 U/mL	300	80	FlexTouch®
	Tresiba® 200 U/mL	600	160	FlexTouch®

EXAMPLE BASAL INSULIN PRESCRIPTION

Rx

Humulin NPH Kwikpen or Novolin NPH cartridges

Start at 10 units once daily

Titrate **once a day** to reach a fasting glucose of 4-7 mmol/L

If above FPG target, + 1 unit

If below FPG target, - 1 unit

Insulin pen needles 32g 4 mm

What Do You Do with Background Antihyperglycemic Agents When a Patient is Started on Insulin?

Class	Kept?	Why?
Metformin	YES	Studies have shown efficacy of these agents in presence of insulin, with less hypoglycemia and weight gain vs. insulin alone.
DPP-4 inhibitors	YES	
GLP-1RAs	YES	
SGLT2 inhibitors	YES	
Acarbose	YES	
Insulin secretagogues	+/-	May be associated with more hypoglycemia and weight gain, but also reduced insulin dosing and less need for > 1 injection of insulin per day. Consider reducing the dose of insulin secretagogues when initiating insulin.
Thiazolidinediones	NO	Cause water retention and edema. These side effects have been shown to be more frequent in presence of insulin, with an increase in the risk of heart failure.

Note: When continuing non-insulin agents with insulin, the costs should be considered in addition to the benefits.

SGLT2: sodium-glucose cotransporter 2; DPP-4: dipeptidyl peptidase-4; GLP-1RAs: glucagon-like peptide-1 receptor agonists

Adapted from: CDA Clinical Practice Guidelines Expert Committee. *Can J Diabetes* 2013;37:S61-68;

Swinnen SG, et al. ADA 2010. Abstract 0037-OR.

BACK TO THE VIGNETTE:

Robert



What do you do with the background antihyperglycemic agents when a patient is started on insulin?

Medications:

Metformin/sitagliptin 850/50 BID

OK to continue unchanged

Empagliflozin 10 mg AM

OK to continue unchanged

Gliclazide MR 120 mg AM

Optional

PATIENT VIGNETTE:

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You decide to start insulin.

What elements do you need to teach?



Start Basal Insulin Checklist – Robert



1. **Explain** why insulin is needed



2. **Demonstrate** the pen



3. **Explain** how to start and adjust



4. **Educate** the patient on low blood sugar



5. **Book** a follow-up appointment

For additional insights, refer
to
guidelines.diabetes.ca/insulin



Basal Insulin – Robert

1. **Explain** why insulin is needed

Over time, the pancreas produces less insulin, causing elevated blood sugar and possibly complications. It is the normal evolution of diabetes.

It is not a punishment !

2. **Explain** what insulin does

Insulin tells the cells to store glucose.
More insulin means less glucose in the blood.
Less insulin means more glucose in the blood.

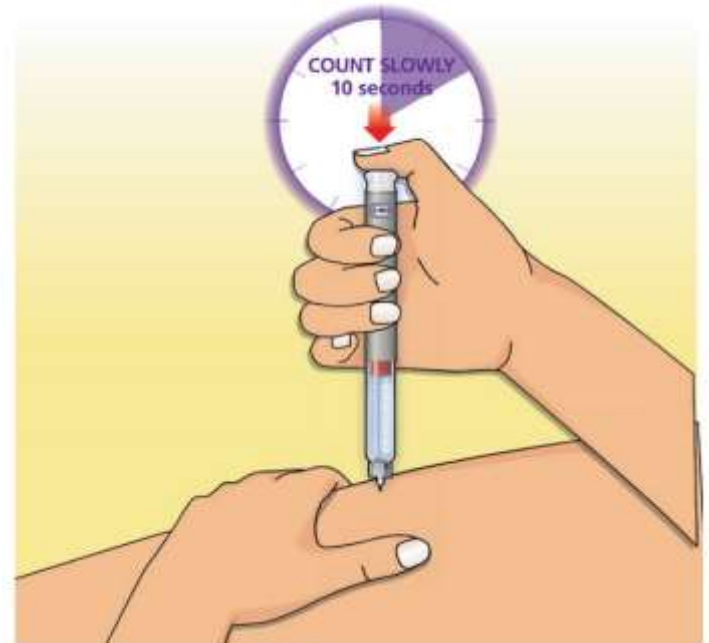
Basal Insulin – Robert



Demonstrate the pen

Show a sample injection
or
give the 1st injection in office

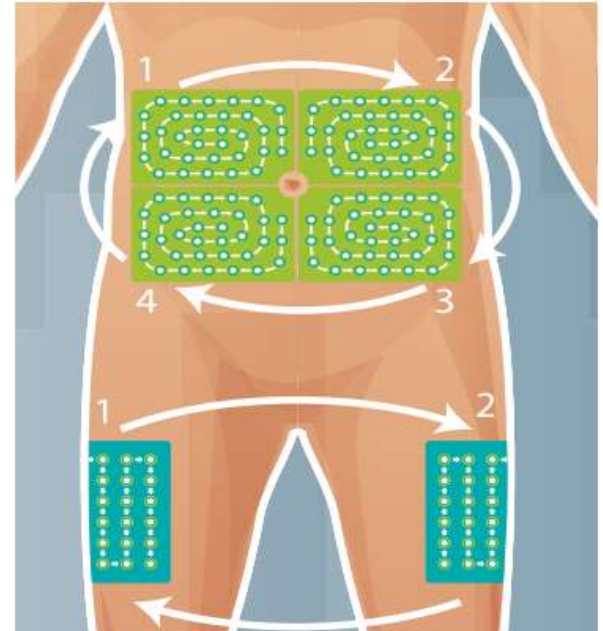
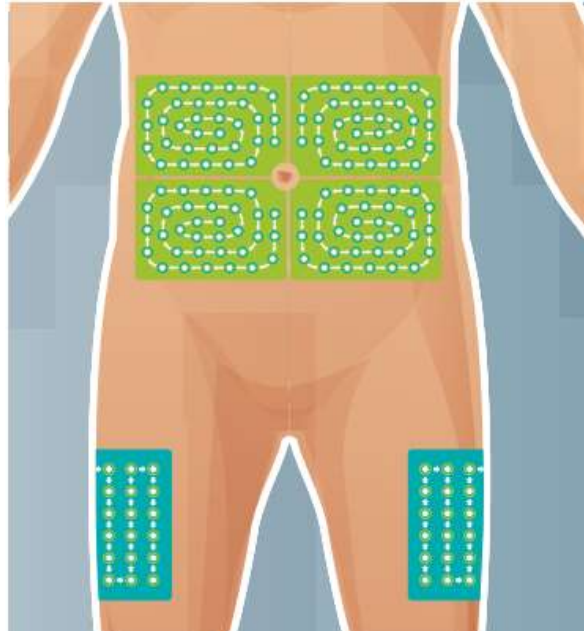
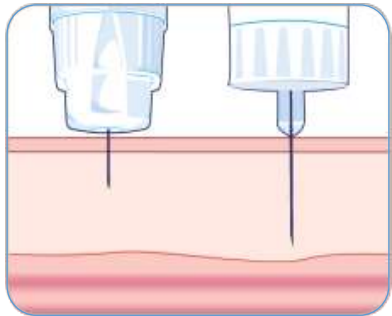
Arrange step-by-step, hands-on training with allied health team



Basal Insulin – Robert



Educate on injection technique and site rotation

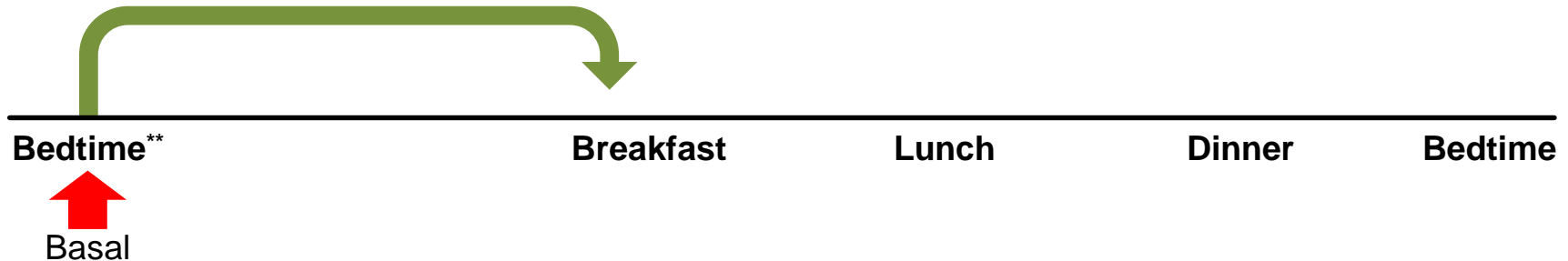


ADJUSTING BASAL INSULIN

Basal Insulin

Start with 10 units and increase the dose progressively until morning FPG ≤ 7.0 mmol/L*

NOTE: The adjustments can be done everyday (NPH, detemir, glargine) or every week (all basal insulins)



*Optional target FPG ≤ 5.5 mmol/L (as per the Implementing New Strategies with Insulin Glargine for Hyperglycaemia Treatment [INSIGHT] Study)

**NPH, detemir and glargine U-100 are typically used at bedtime; glargine 300 U/mL and degludec can be given at any time of day

FPG: fasting plasma glucose

Adapted from: Diabetes Québec. *Easy Insulin User Guide*.

Available at: <http://www.diabete.qc.ca/en/understand-diabetes/resources/mobile-tools/guide-des-insulines>

Apple and Android apps available.

Gerstein HC, et al. *Diabet Med* 2006;23:736-42.

Titration Protocols with Basal Insulins

	Intermediate and Basal Analogue Insulins (NPH, glargine 100, glargine 300, detemir)	Longer-acting Basal Insulins (glargine 300, degludec)
Start with	10 units, once a day at bedtime	
Titrate	Every day	Once a week
Based on	Fasting blood glucose level	
Increase or reduce by	1 unit	4 units
Until	Reaching the target (5.5 or 7)	

Signs and Symptoms of Hypoglycemia

Autonomic Symptoms (if absent: impaired hypoglycemia awareness)

Mild



Sweating



Tremor



Palpitations



Hunger



Anxiety

Neuroglycopenic Symptoms

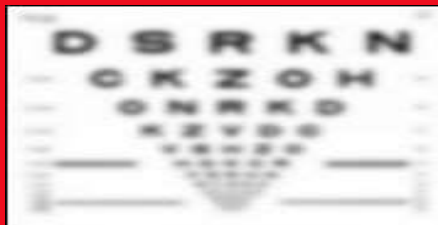
Severe



Difficulty
concentrating



Confusion



Vision changes



Loss of consciousness

Treatment of Hypoglycemia: Acute Phase

Conscious Patient

- Oral carbohydrate
 - 15 g if not severe
 - 20 g if severe (needs assistance)
- Retest after 15 minutes
- Repeat 15 g carbohydrate if blood glucose is <4.0 mmol/L



4x



Unconscious Patient

- Glucagon 1 mg SC or IM



Treatment of Hypoglycemia: Preventing Immediate Recurrence

To prevent repeated hypoglycemia, once the hypoglycemia has been reversed, the person should have the **usual meal or snack that is due at that time of the day.**

If a meal is >1 hour away, a **snack (including 15 g of carbohydrate and a protein source)** should be consumed



Basal Insulin – Robert

Driving recommendations for patients treated with insulin

(non-commercial drivers)



- 1. Measure SMBG** immediately before and **at least every 4 hours**
- 2. Have SMBG equipment** and **fast-acting carbohydrate** within easy reach
- 3. Stop driving, test and treat** as soon as hypoglycemia and/or impaired driving are suspected
- 4. Do not drive when BG level is <4.0 mmol/L**
If BG is <4.0 mmol/L, persons should not drive until at least 45 minutes after ingestion of carbohydrate and **BG is at least 5.0 mmol/L**

Patient Vignette:

Robert



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- Non-smoker
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 - ACE inhibitor
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Physical:

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- BMI: 28.4 kg/m²

Labs and Analyses:

- A1C: 8.0 %
- LDL-C: 1.9 mmol/L
- ACR: 1.9
- eGFR: 74 mL/min/1.73m²

**When do you
want to see
him again ?**

Patient Vignette:

Robert



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- History of CAD with MI x 2
- No private insurance : RAMQ
- **Medications:**
 - Metformin/sitagliptin 850/50 BID
 - Empagliflozin 10 mg AM
 - Gliclazide MR 120 mg AM
 - **Humulin N 34 units at bedtime**
 - Statin
 - ACE inhibitor
 - ASA

Physical:

- BP 130/68
- **BMI: 29.0 kg/m²**

Labs and Analyses:

- **A1C: 7.2 %**
- LDL-C: 1.9 mmol/L
- ACR: 1.9
- eGFR: 74 mL/min/1.73m²

**What do you
need to ask
him?**



Basal Insulin– Robert

Ask about hypoglycemia at every visit

Symptoms



- How often did they experience symptoms?

BG <4 mmol/L



- How many times was BG <4 mmol/L?

Factors



- Time of day, type of meal, activity & exercise?

Review



- Review prevention & management

Patient Vignette:

Robert



- 58-year-old male with type 2 diabetes x 11 years
- History of CAD with MI x 2
- No private insurance : RAMQ
- **He complains of having had hypoglycemic reactions over 3-4 nights since starting insulin.**
- **Medications:**
 - Metformin/sitagliptin 850/50 BID
 - Empagliflozin 10 mg AM
 - Gliclazide MR 120 mg AM
 - **Humulin N 34 units at bedtime**
 - Statin
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Physical:

- BP 130/68
- BMI: 29.0 kg/m²

Labs and Analyses:

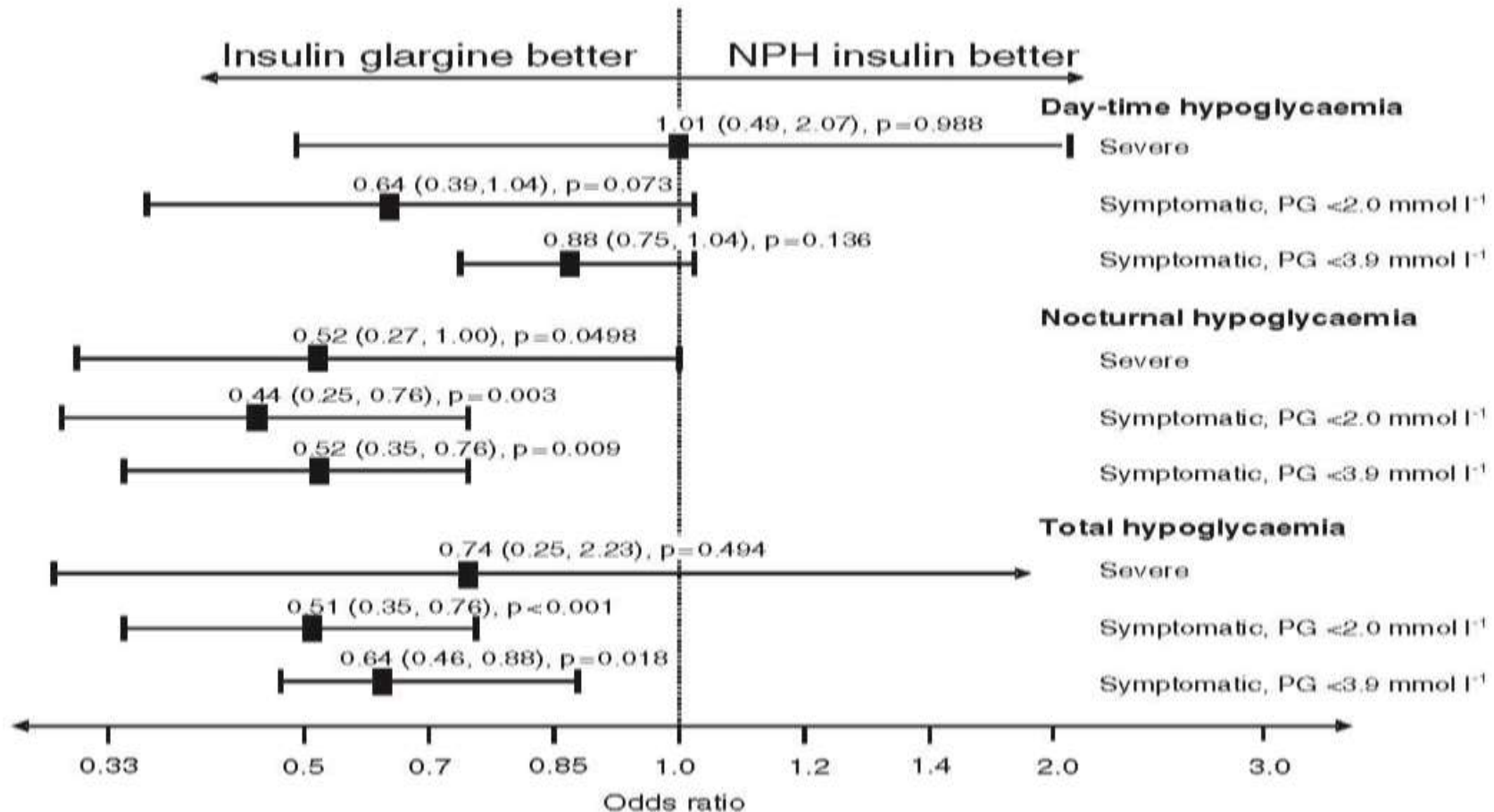
- A1C: 7.2 %
- LDL-C: 1.9 mmol/L
- ACR: 1.9
- eGFR: 74 mL/min/1.73m²

**What do you
want to do
now ?**

BASAL INSULINS OPTIONS

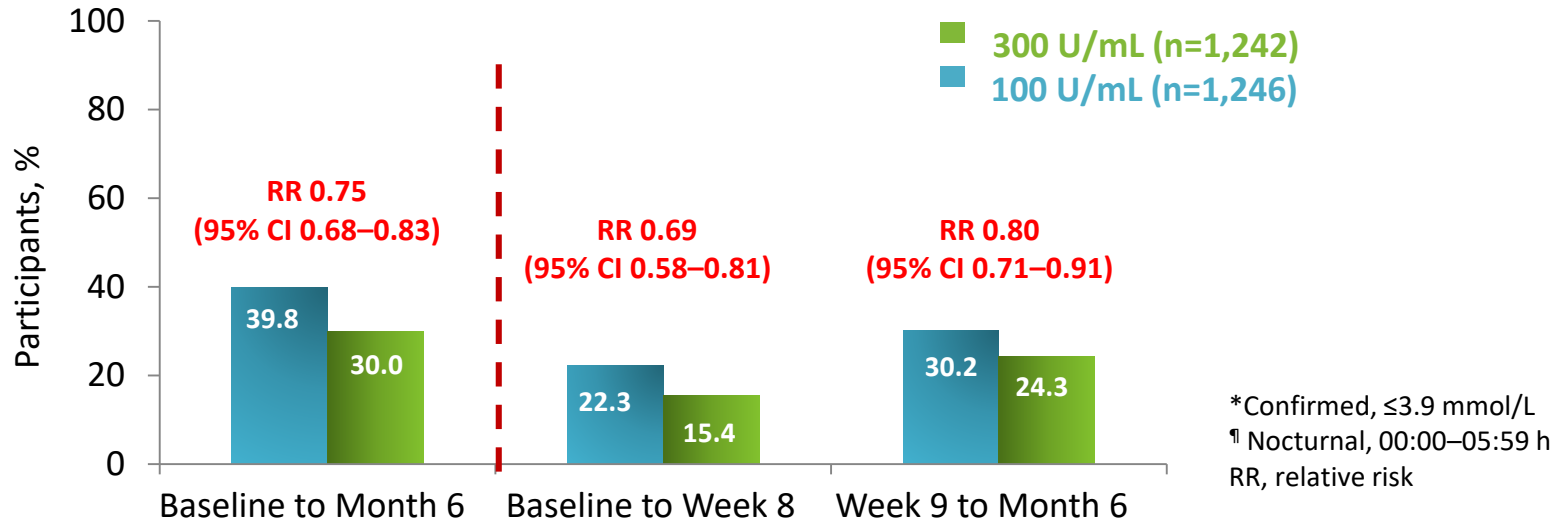
	NPH	Detemir	Glargine U100	Glargine U100	Glargine U300	Degludec 100 or 200
Commercial names	Humulin N Novolin NPH	Levemir	Lantus	Basaglar	Toujeo	Tresiba
Duration of action	16 h	20 h	24 h	24 h	> 24 h	42h
Potency to reduce A1C (%)	> 0.9 %	> 0.9 %	> 0.9%	> 0.9%	> 0.9 %	> 0.9%
Nocturnal hypoglycemia risk (RR)	1	0.6	0.6	0.6	0.4	0.4
Effects on body weight	↑	↔ or ↑	↑	↑	↑	↑
Long-term CV safety	UKPDS		ORIGIN			DEVOTE
Monthly cost (50 units/day)*	~\$49.50	~\$112.50	~\$100.50	~\$85.50	~\$96.00	~\$112.50
Covered by RAMQ ?	YES	IF severe or frequent hypos with NPH	NO (Those already approved can continue)	IF severe or frequent hypos with NPH	NO	IF severe or frequent hypos with NPH

Hypoglycemia: Glargine 100 u/ml vs NPH



PERCENTAGE OF PARTICIPANTS REPORTING ≥ 1 HYPOGLYCEMIC EVENT NOCTURNAL \uparrow HYPOGLYCEMIA

Participants with ≥ 1 confirmed* or severe hypoglycemia, %



Clinical Implications

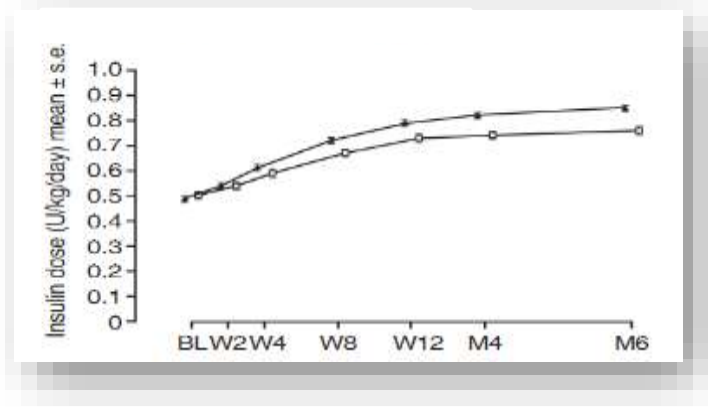
From pooled T2D population across **entire treatment period**:

- For every **10 subjects** initiated and treated with glargine 300 U/mL instead of glargine 100 U/mL, 1 less patient will have **nocturnal** confirmed or severe hypoglycemia

Insulin Glargine 300 U/ml

There was a 12% higher dose requirement with insulin glargine 300 units/mL vs 100 units/mL.

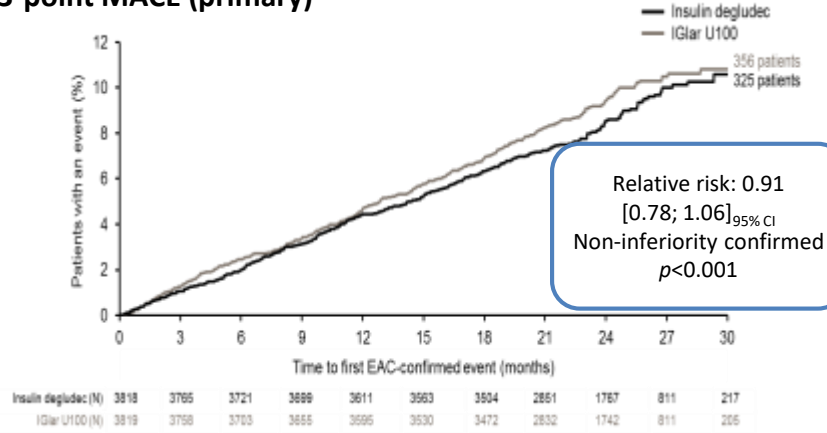
Changeover Protocol in T1D & T2D



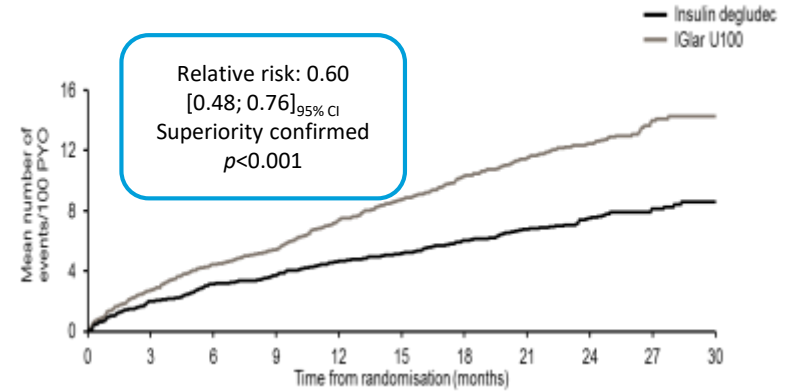
	From insulin glargine 100 U/mL (Lantus®)	From other basal insulins OD	From other basal insulins BID
Insulin glargine 300 units/mL once daily	<p>✓ Change unit-to-unit (same dose)</p> <p>A higher daily insulin glargine 300 U/mL dose may be needed to achieve target ranges for plasma glucose level.</p>	<p>✓ Change unit-to-unit (same dose)</p>	<p>✓ The recommended initial dose is 80% of the total daily dose of basal insulin that is being discontinued</p>

DEVOTE (Degludec vs Glargine 100 u/ml) : Summary

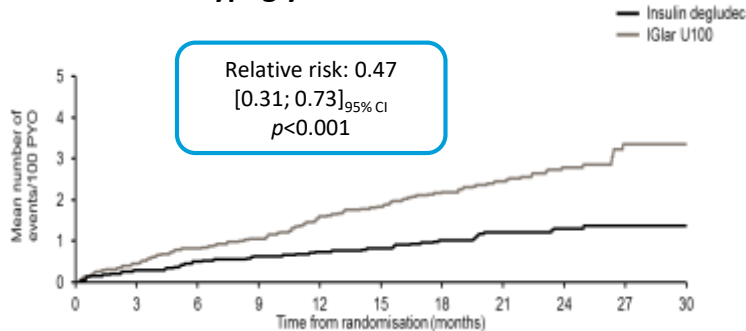
3-point MACE (primary)



Severe hypoglycemia

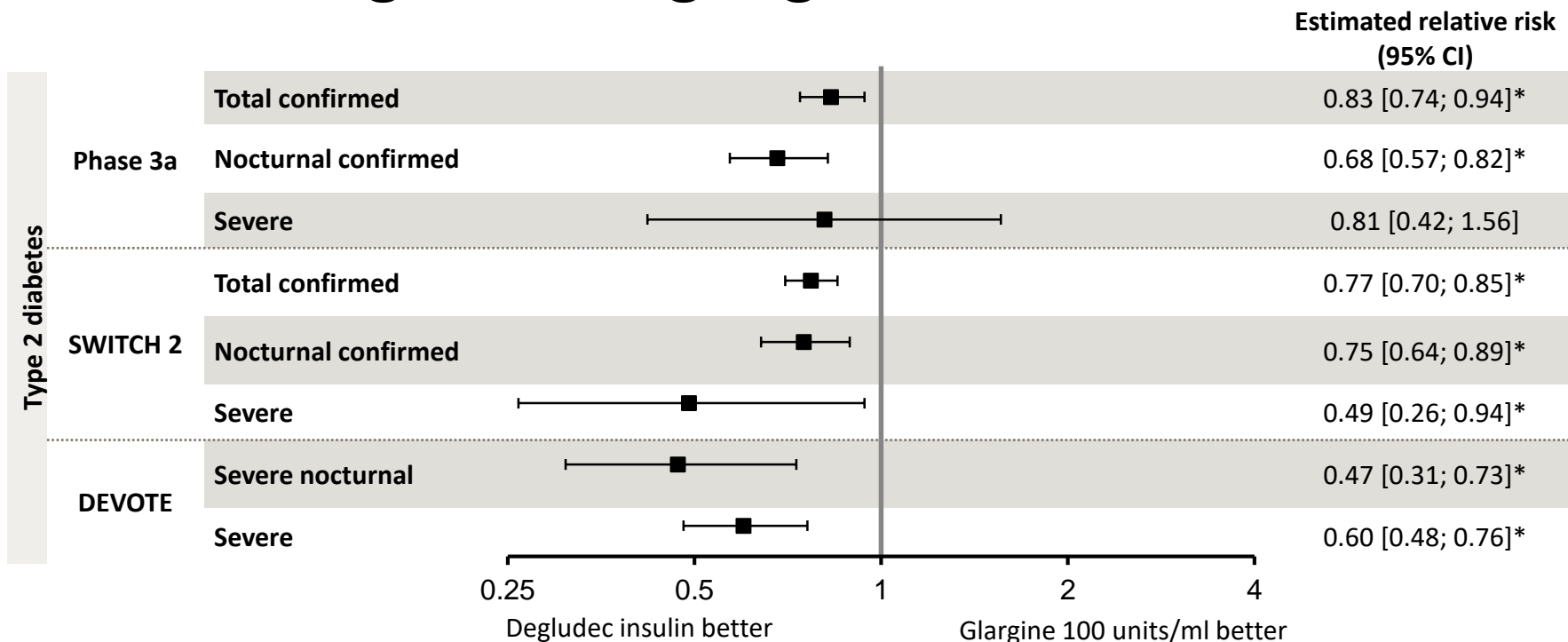


Severe nocturnal hypoglycemia



- DEVOTE reported 752 severe hypoglycemic events, adjudicated, in a double-blind trial.
- 40% reduction in severe hypoglycemia despite similar A1c.
- 53% reduction in nocturnal severe hypoglycemia despite a lower fasting glucose.

Rates of Hypoglycemia in degludec vs glargine 100 U/ml trials



WHICH ONE TO CHOOSE?

- **NPH insulin (Humulin N; Novolin NPH) least expensive**
 - Covered by all provincial formularies
 - Must be re-suspended
 - More variability and more hypoglycemia
 - Lasts only 16 hours: must often be injected BID (50%)
- **Glargine 100 (Lantus; Basaglar) and detemir (Levemir)**
 - Less hypoglycemia, longer duration of action
 - BID less often required: glargine (15%) and detemir (25%), mostly in type 1 patients
- **Glargine 300 (Toujeo)**
 - Not covered by provincial formularies
 - Least hypoglycemia
 - Can be given in AM or PM without affecting the glycemic profile
 - Hour of administration can be varied by ± 3 hours from day to day
 - Smallest injection volume
- **Degludec 100 or 200 (Tresiba)**
 - Least hypoglycemia and longest duration of action
 - Can be given at any time of day without affecting the glycemic profile
 - Hours of administration can be varied by ± 16 hours from day to day

BACK TO THE VIGNETTE:

Robert



What are the new basal insulins available in Canada and what are their advantages/disadvantages for Robert vs. older insulin formulations?

- Choosing the right basal insulin for Robert requires that various patient/agent characteristics be considered:
 - Cost/coverage
 - Patient lifestyle/preferences
 - Risk of hypoglycemia
 - Onset, peak and duration of action of the basal insulin
- **Robert is changed from Humulin N 34 units at bedtime to degludec (Tresiba) at the same dose and instructed to titrate by 4 unit per week until the target zone of 4-7 mmol/L is reached.**

PATIENT VIGNETTE:

Robert



- Robert is a **62**-year-old male with CAD and a **15**-year history of type 2 diabetes.
- His current antihyperglycemic regimen includes a metformin, a GLP-1R agonist, a SGLT2 inhibitor (empagliflozin), an ACE inhibitor and basal insulin.

Robert is Sick!

- Robert has gastroenteritis and is unable to eat because of nausea. He also has diarrhea.
- He calls your office asking what to do with his insulin.
- He recalls having been taught by the nurse, but does not remember clearly what to do.

How do we adjust insulin on sick days?

SICK DAY MANAGEMENT: MAKE A PLAN IN ADVANCE!

Sugar Testing:

- Glucose levels should be tested every 2–4 hours. Glucose levels can often be allowed to increase above the usual targets, for example to levels of 8–12 mmol/L

Insulin Dosages:

- Insulin should NEVER BE STOPPED. The dosages required are difficult to predict. Not eating can reduce the need for insulin, but stress increases it — so the net result is difficult to predict. In general, basal insulin should be continued. Prandial insulin should be given when eating according to amount eaten. Every 4 hours, corrective insulin dosages based on the correction factor should be taken.

Carbohydrates and Fluids:

- Intake should be kept as close to normal as possible, making sure not to become dehydrated. If unable to keep fluids, should consult in ER.

Ketone testing (particularly for all type 1 or type 2 on SGLT2 inhibitors):

- If unable to eat normally, or if hyperglycemia occurs during sickness, blood (ideally) or urine ketones should be tested. If present, should go to ER.

COUNSEL ALL PATIENTS ABOUT SICK DAYS

Sick Days Medication List

- S** sulfonylureas (2)
- A** ACE inhibitors (1,6)
- D** diuretics (1,6), direct renin inhibitors (5,6)
- M** metformin (3)
- A** angiotensin receptor blockers (1)
- N** non-steroidal anti-inflammatory drugs (1)
- S** SGLT2 inhibitors (4,5)

- 1: Stopped because if dehydration occurs, these meds can harm the kidney
- 2: Stopped because if pre-renal failure occurs, these meds can cause hypoglycemia
- 3: Stopped because if pre-renal failure occurs, these meds can cause lactic acidosis
- 4: Stopped because if pre-renal failure occurs, these meds can cause ketosis
- 5: Stopped because these drugs can worsen dehydration
- 6: Stopped because of risk of hypotension

Adapted from CDA Clinical Practice Guidelines. *Appendix 7 (2015): Sick Days Medication List.*

Available at: http://guidelines.diabetes.ca/browse/appendices/appendix7_2015

BACK TO THE VIGNETTE:

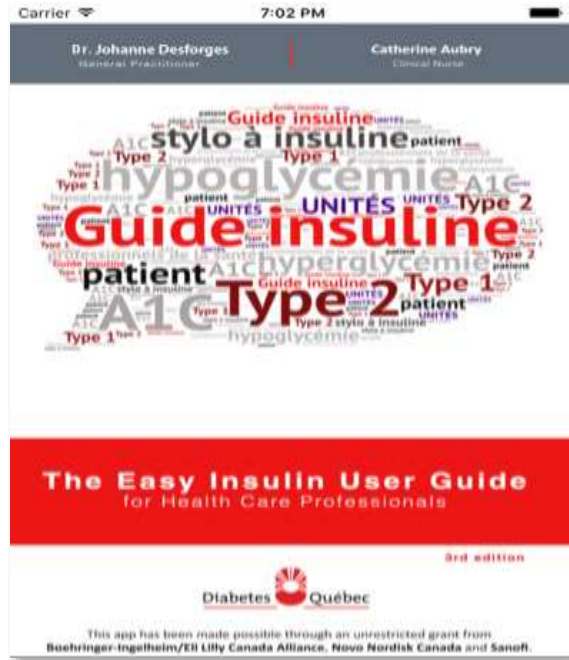
Robert



How do we adjust insulin on sick days?

- Insulin should NEVER BE STOPPED when a patient is sick
 - In general, basal insulin should be continued
 - Glucose levels should be tested every 2-4 hours
- Robert is also on a SGLT2 inhibitor, metformin, and an ACE-inhibitor, and these agents will need to be withheld while he is sick
 - SGLT2 inhibitor can worsen dehydration and increase the risk of hypotension
 - Metformin can cause lactic acidosis if pre-renal failure occurs
 - The ACE inhibitor can cause acute kidney injury in presence of dehydration

A GUIDE ON THE USE OF INSULINS



Downloadable Application

- Developed by Dr. Johanne Desforges, family physician, and Catherine Aubry, clinical nurse, this insulin guide is designed for healthcare professionals who initiate treatment with insulin or need to adjust insulin therapy in patients with type 2 diabetes
- Provides a standardized approach to treatment and provides information to patients living with diabetes
- Available in English and French

Information and link to obtain the app is available at: <http://www.diabete.qc.ca/en/understand-diabetes/resources/mobile-tools/guide-des-insulines> or on iTunes store at: <https://itunes.apple.com/ca/app/guide-des-insulines/id1110509857?mt=8>