Everything about Diabetes in 45 minutes or less

BIKRAM SIDHU, MSC MD MHPE FRCPC
ADULT ENDOCRINOLOGY AND METABOLISM
QUEEN'S UNIVERSITY, KINGSTON ON

Objectives

- To review the complete diabetes visit
- To provide an evidence based approach to all aspects of diabetes management
- To answer some frequently asked questions about diabetes

Caveat

Everything I speak about today relates to Type 2 Diabetes. Some of it is similar, and much is different for Type 1 Diabetes.

Comprehensive Diabetes Visit

- Important to have a *complete* approach

- Not every visit will be a comprehensive visit

- Choose priorities with the patient

- Keep track of what you addressed, and what you didn't address

Complete Diabetes Visit

1. Lifestyle
2. Glycemic Management
3. Vascular Risk Factors
4. Vascular Complications
5. Special Considerations


Lifestyle

Lifestyle

- Physical Activity Goals:

  150 minutes per week, moderate to vigorous physical activity
  Resistance activity 2-3x per week
  Reduce sedentary time.

Any activity is better than no activity.
Work with the patient.

Lifestyle

- Diet Goals:

  There is no quick fix diet. Target reduction in calories, less simple carbohydrates, increase fiber. Avoid fad diets.

  Can reduce A1c by up to 2% on its own.

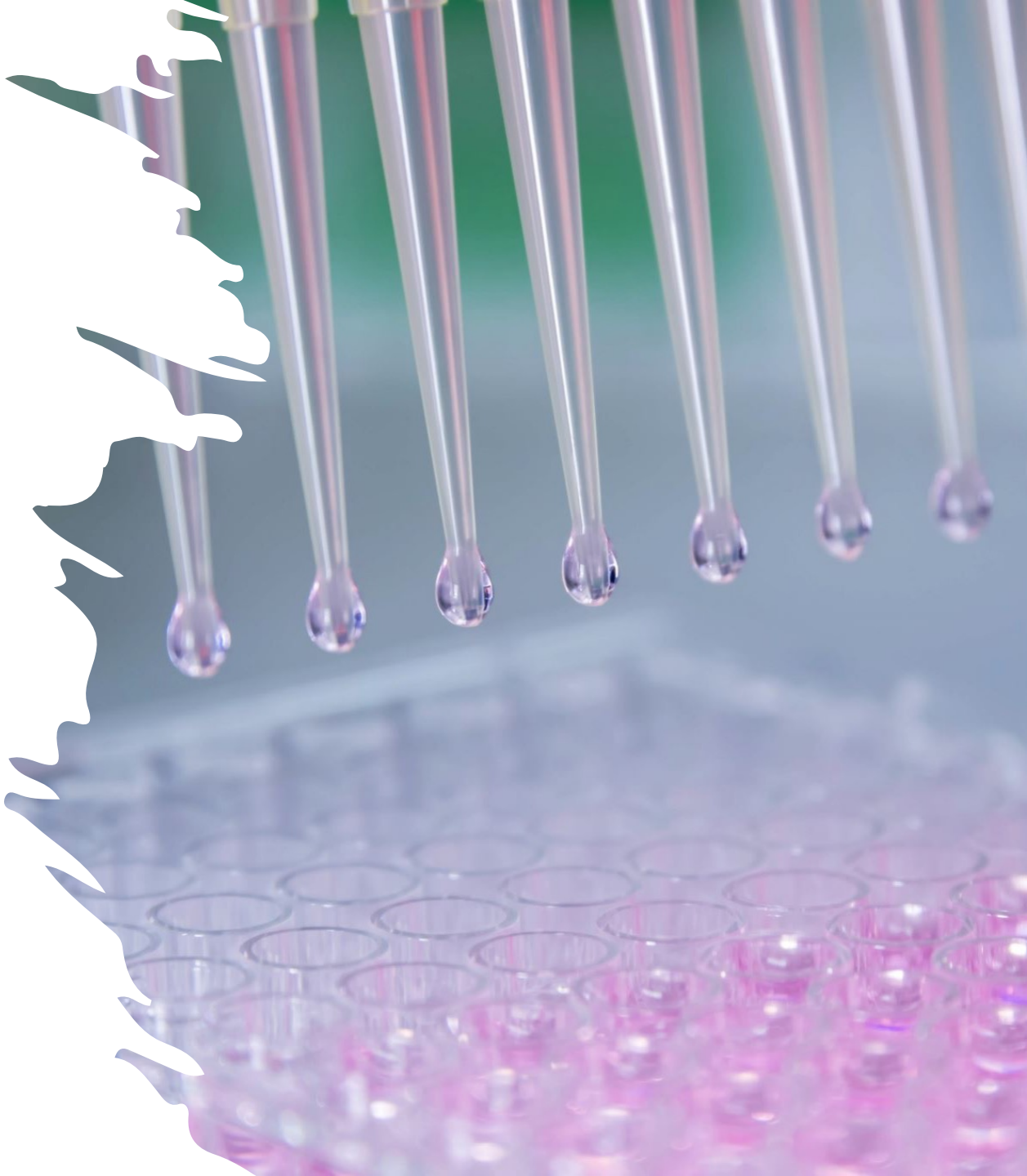
  Access a dietitian whenever possible.

Lifestyle

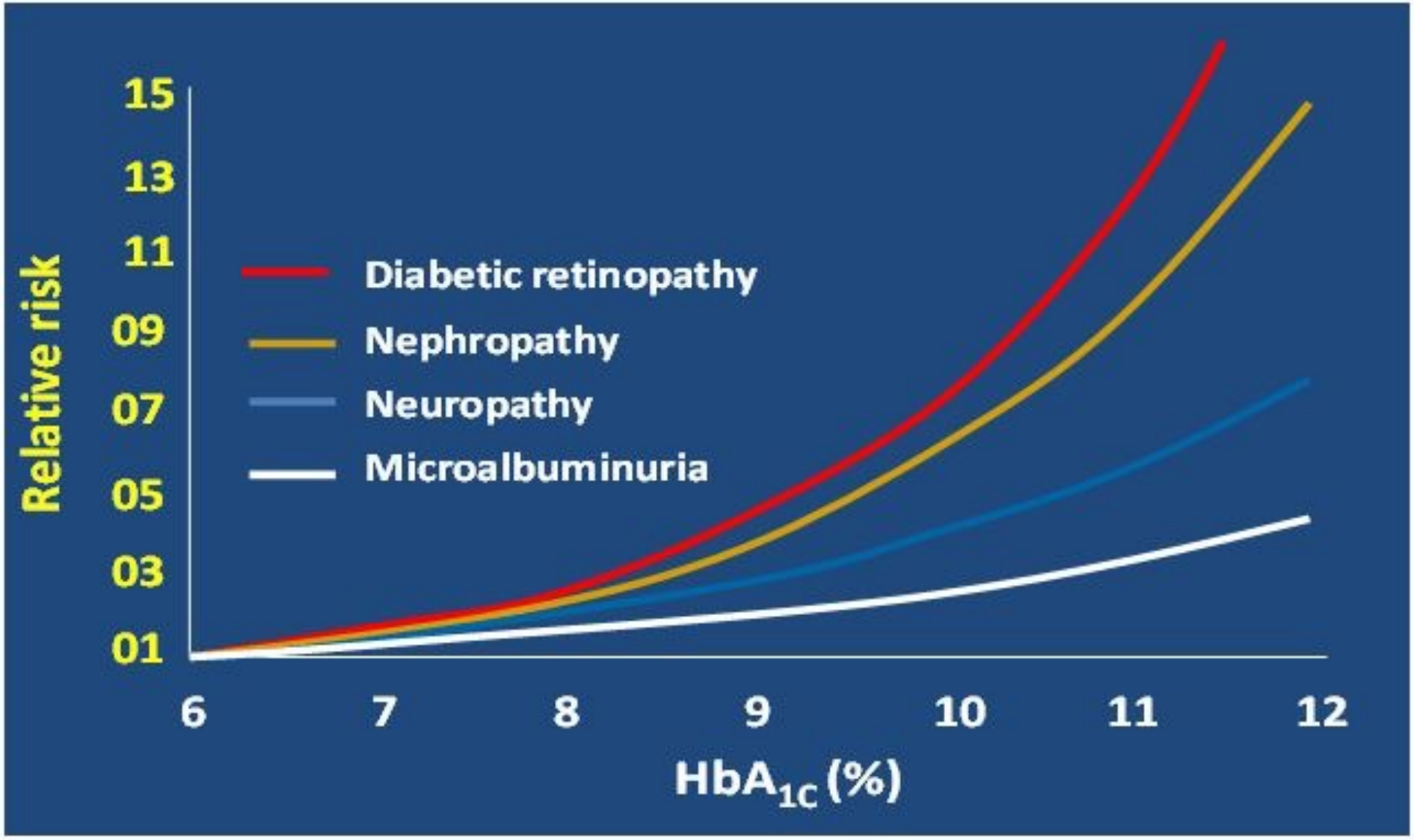
- Weight loss – target 5% loss

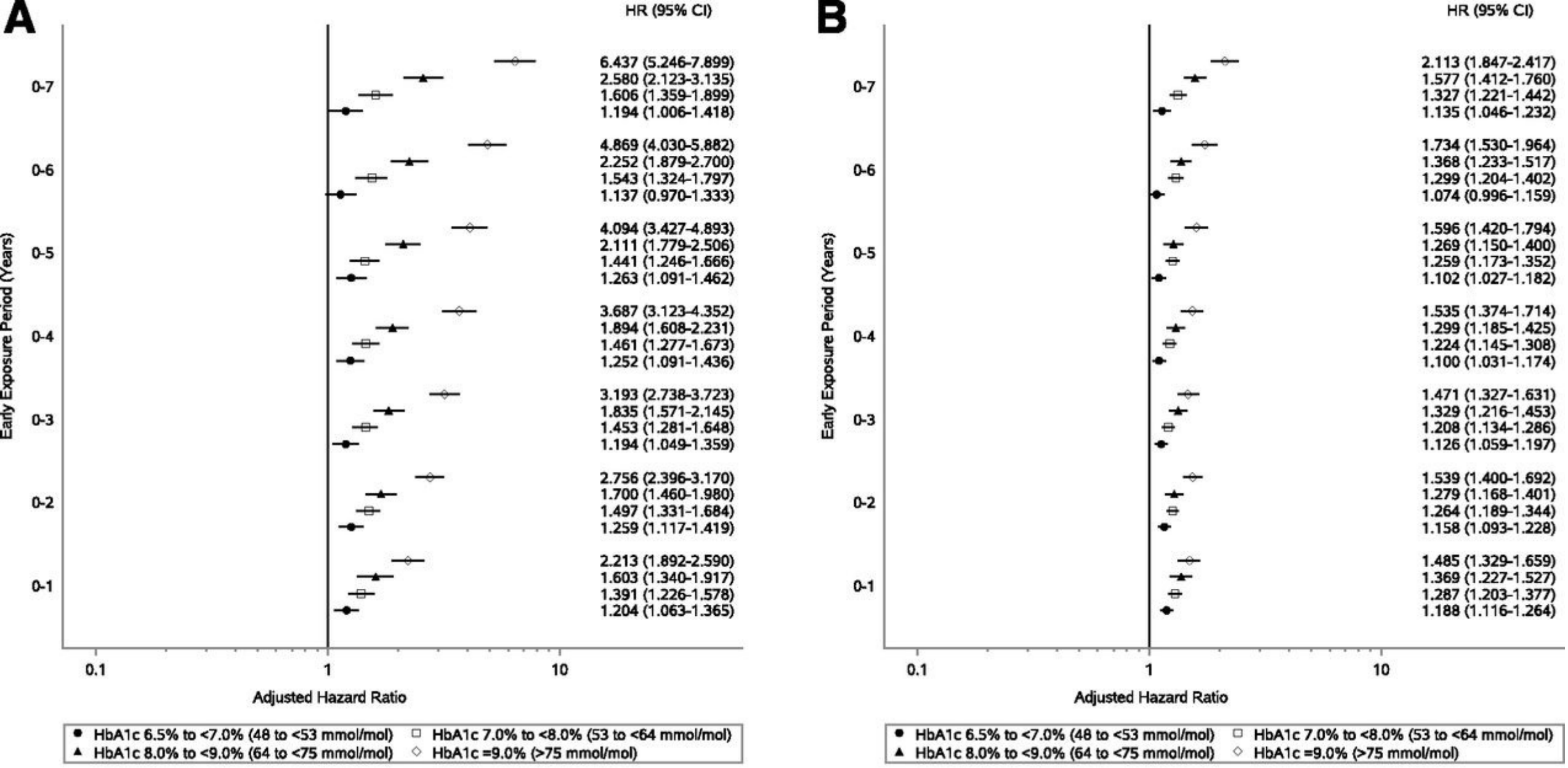
- Smoking – strong independent risk factor for vascular complications

Glycemic Control: How much does it matter?

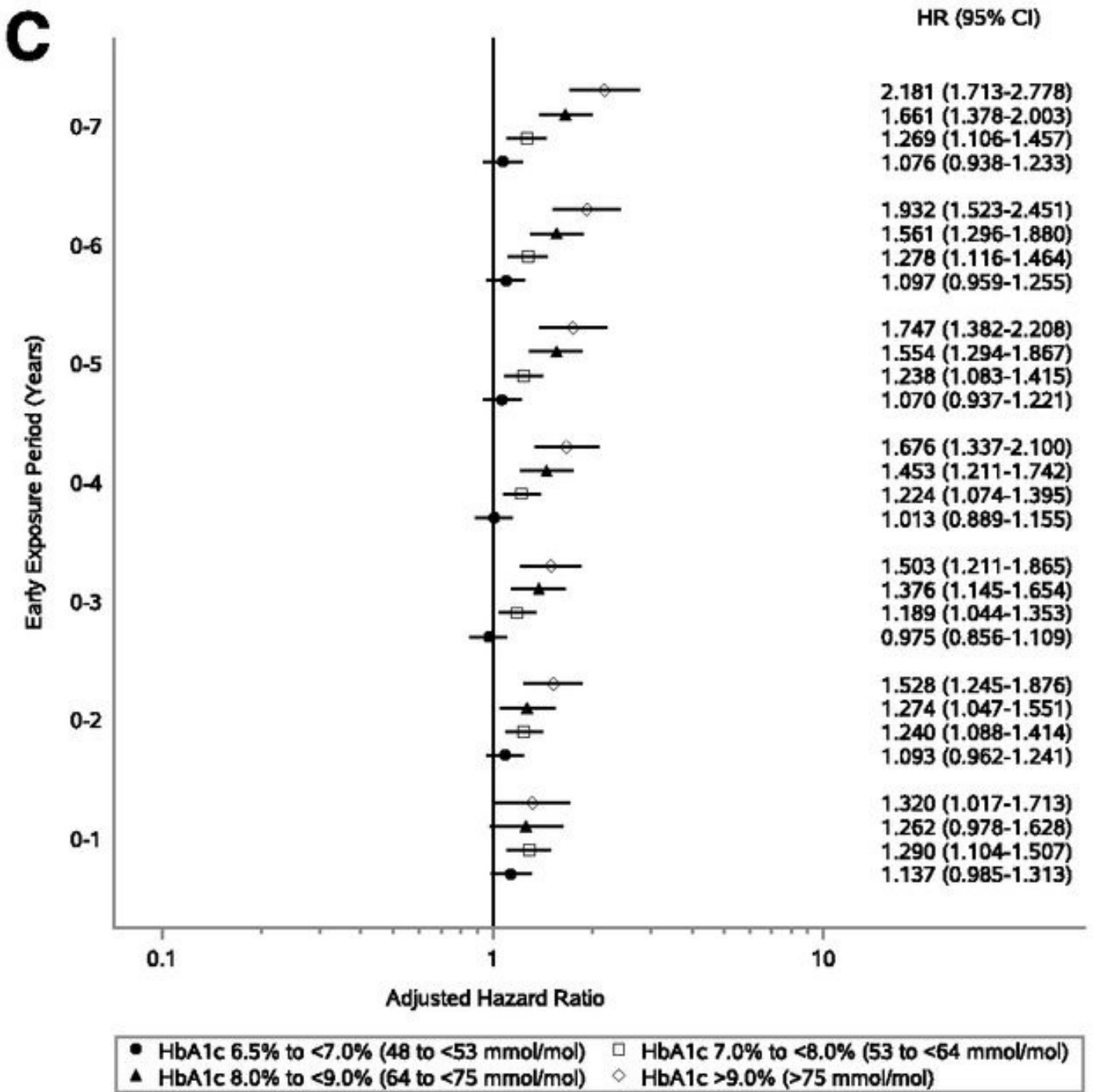


Glucose Targets





Microvascular Complications (A), Macrovascular Complications (B) and A1c exposure
Laiteerapong et al., Diabetes Care, 2019.



How fast should
I get to the target?

Mortality and A1c exposure
Laiteerapong et al., Diabetes Care, 2019.

A1C%	Targets for Glycemic Control
≤ 6.5	Adults with type 2 diabetes to reduce the risk of CKD and retinopathy if at low risk of hypoglycemia*
≤ 7.0	**MOST ADULTS WITH TYPE 1 OR TYPE 2 DIABETES**
7.1 ↓ 8.5	Functionally dependent*: **7.1-8.0%** Recurrent severe hypoglycemia and/or hypoglycemia unawareness: **7.1-8.5%** Limited life expectancy: **7.1-8.5%** Frail elderly and/or with dementia†: **7.1-8.5%**
	Avoid higher A1C to minimize risk of symptomatic hyperglycemia and acute and chronic complications

End of life: A1C measurement not recommended. Avoid symptomatic hyperglycemia and any hypoglycemia.
* based on class of antihyperglycemic medication(s) utilized and the person's characteristics
† see Diabetes in Older People chapter, p. S283

Anti-hyperglycemic Agents - Overview

- Individual considerations:
  - Cost and coverage
  - Side effects
  - Renal function
  - Weight effects
  - Injection versus oral
  - Other complications

Antihyperglycemic Agents - Overview

- 6 Classes
  - Metformin
  - Secretagogues = Sulfonylureas and Meglitinides
  - DPP4 inhibitors
  - SGLT2 inhibitors
  - GLP1-R agonists
  - Insulins – Long acting and Rapid

Metformin

- 1st choice for almost everyone
- **Cheap**: $2.80 per month
- **Dosing**: Target 1000 mg po bid
- **Renal function**: eGFR <45: 500mg po bid
  eGFR <30: stop
- **Glycemic Benefit**: Strong!!! (1-3%+ A1c reduction)
- **Side effects:** Predominantly GI
- **Other** Safe in pregnancy

Sulfonylureas

- Used to be 2nd choice; now usually not used
- **Cheap:** $3 per month
- **Dosing:** Gliclazide MR 60 - 120 once daily
- **Renal Function:** eGFR <30: use with caution
- **Glycemic benefit:** Strong (1-2%) early in disease
  Weak (0-0.5%) later in disease
- **Side effects:** Hypoglycemia, weight gain

DPP4 – inhibitors = ___gliptin

- Very few side effects. Very well tolerated. Great if no compelling indication for a GLP1RA.
- **Expensive:** $85.00 per month
- **Dosing:** Sitagliptin 100 mg daily; Lina 5 mg
- **Renal Function:** Linagliptin with no dose adjustment. Sitagliptin adjusted as GFR declines.
- **Glycemic Benefit:** Weak (0.5-0.8%)
- **Side effects:** Almost none.

SGLT2 inhibitors - ____gliflozin

- Excellent vascular protection. Often side effects
- **Expensive:** $85.00 per month
- **Dosing:** Cana 100, Dapa 10, Empa 10 mg daily
- **Renal Function:** Start if eGFR >30, continue to dialysis
- **Glycemic benefit:** Weak for most (0.5-0.8%), weaker if eGFR decreased
- **Side effects:** Yeast infections, hypotension
- **Other benefits:** Weight loss, blood pressure improves

SGLT2 inhibitors: vascular protection

- Robust clinical trial evidence for people at high risk for cardiac disease, heart failure, CKD
- Consistently showing benefit regardless of agent, although slight differences in agent and population for each trial

- Eg. 35% reduction in risk of CV death with empagliflozin
- Eg. 30% reduced risk of HF hospitalization with dapagliflozin
- Eg. 32% reduced risk of ESKD with canagliflozin

SGLT2 inhibitors: How to choose one?

- Different clinical trials for each and therefore different choices if patient has heart failure or kidney disease or heart disease as primary issues.

HEART FAILURE, Reduced EF		DAPAGLIFLOZIN	EMPAGLIFLOZIN
KIDNEY DISEASE eGFR >30, ACr >50	CANAGLIFLOZIN	DAPAGLIFLOZIN	
CARDIOVASCULAR DISEASE	CANAGLIFLOZIN		EMPAGLIFLOZIN

SGLT2 inhibitors: FAQs

1. What about amputations?

2. Should I be concerned about euglycemic DKA?

GLP1 receptor agonists

- Strong. Vascular protection. Expensive. ++ Side effects
- **Cost:** $200 per month
- **Dosing:** Semaglutide 0.5 or 1.0 mg sc weekly
- **Renal function:** Can use if eGFR >15-30
- **Glycemic benefit:** Strong (1-2.5%)
- **Side effects:** Nausea 1-2 days after injection, fades with time, slow escalation in dose.
  Increased heart rate
- **Other benefits:** Weight loss, blood pressure.

GLP1 receptor agonists: How to choose?

- Different clinical trials had different results for vascular protection. Cost and coverage is also very different.

- Vascular benefit: dulaglutide, liraglutide, **semaglutide**
- Ontario drug formulary: **semaglutide**
- NIHB formulary: **semaglutide**

Semaglutide dosing

- 0.25 mg sc qweekly
- Expect some nausea for 1-2 days after injection
- It will recur for the first 1-3 weeks, usually 2nd week is worst
- After 4th week, 0.5mg weekly; side effects will likely recur.
- If not adequate, can increase to 1.0 mg weekly (same cost and coverage)

GLP1R agonists: FAQs

1. What about pancreatitis and pancreatic cancer?
2. Is there a risk if patient has retinopathy?
3. Is thyroid cancer a concern?

Insulin

- Usually try to avoid insulin at all costs.
- **Cost:** $80 mo for 50U glargine
- **Dosing:** Once daily insulin
- **Renal function:** Slower titration if eGFR <20
- **Glycemic benefit:** Infinite
- **Side effects:** Weight gain++, hypoglycemia ++

Insulin

- Generally use only Toujeo (glargine U300) or Tresiba (degludec) as they have less hypoglycemia than others
- Use Basaglar (glargine) if cost is a concern

- Start with a dose and titrate by 1-2 units every couple of days to target fasting glucose in 5-8 mmol/L to start.
- Engage patients in their own self-titration.

Not one size fits all, but…

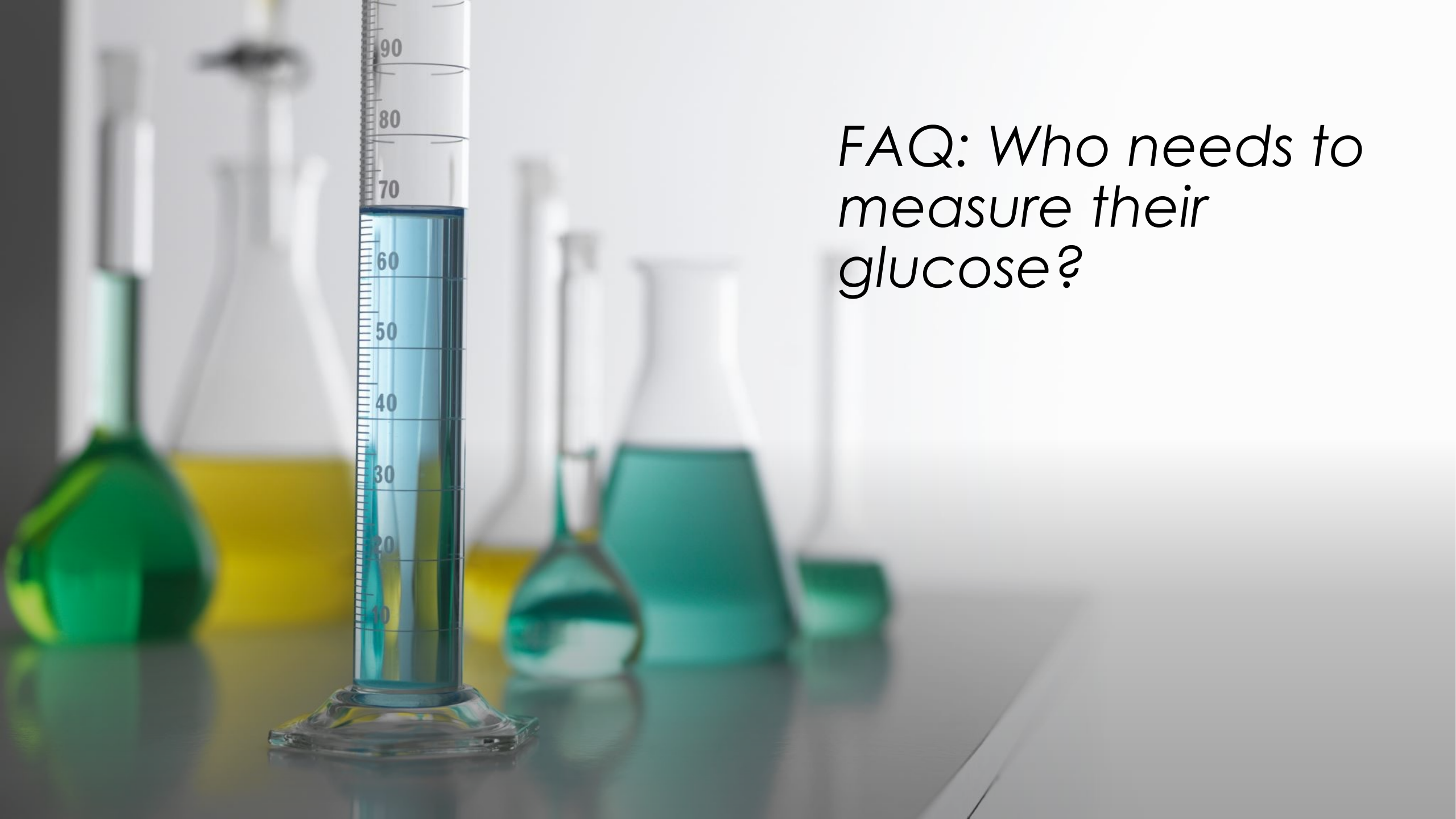
Metformin

+

SGLT2i/GLP1RA

then, Gliclazide MR

then, Basal insulin



FAQ: Who needs to measure their glucose?

Vascular Risk

1 – STATINS

2 – ACEI / ARB

3 – ANTI PLATELETS

Who Should Receive Statins?

(regardless of baseline LDL-C)

- Cardiovascular disease *or*
- **Age ≥40 yrs** *or*
- Microvascular complications *or*
- DM >15 yrs duration and age >30 yr *or*
- Warrants therapy based on the *2016 Canadian Cardiovascular Society Guidelines for the Diagnosis and Treatment of Dyslipidemia*

Among women with childbearing potential, statins should only be used in the presence of proper preconception counselling & reliable contraception. Stop statins prior to conception.

Who Should Receive ACEi or ARB Therapy?

- **Clinical CVD**
- **Age >55 years with an additional CV risk factor or end organ damage** (albuminuria, retinopathy, left ventricular hypertrophy)
- **Microvascular complications**
- **High blood pressure (>130/>80)**

At doses that have shown vascular protection
[perindopril 8 mg daily (EUROPA), ramipril 10 mg daily (HOPE), telmisartan 80 mg daily (ONTARGET)]

Among women with childbearing potential, ACEi or ARB should only be used in the presence of proper preconception counselling & reliable contraception. Stop ACEi or ARB either prior to conception or immediately upon detection of pregnancy.

EUROPA Investigators, Lancet 2003;362(9386):782-788.
HOPE study investigators. *Lancet*. 2000;355:253-59.
ONTARGET study investigators. *NEJM*. 2008:358:1547-59

FAQ: What to use 2nd for blood pressure?

- ACEi and ARB are the preferred first choice for blood pressure management in diabetes
- Calcium channel blocker such as amlodipine is the preferred second choice before a thiazide
- Calcium channel blockers come in NIHB covered combinations with statin (amlodipine/atorvastatin) and ARB (amlodipine/telmisartan)

***ACEi/ARB, then calcium channel blocker, then thiazide**

Who should receive ASA?

- In people with established CVD, low-dose ASA therapy (81-162 mg) should be used to prevent CV events [Grade B, Level 2]

- ASA should not be used routinely for the primary prevention of CVD in people with diabetes [Grade A, Level 1A]. ASA may be used in the presence of additional CV risk factors [Grade D, Consensus]

Complications – Diabetic Feet

- Make sure to examine feet once per year
- Check for ulcers, pulses, sensation
- If high risk – check more often or involve foot care
- Make sure to give advice around self-care at home
  - Wear shoes, wear white socks
  - Examine your feet weekly, shoes daily
  - Make sure feet are clean and dry, apply moisturizer and wipe dry

Complications - Retinopathy

- Encourage retinopathy screening annually to all patients
- Remote retinopathy screening is available in many places

- Remember:

Retinopathy may have no symptoms until it causes irreversible blindness, but is preventable with screening.

Keeping it all together

Type of diabetes: ☐ Type 1 ☐ Type 2 ☐ Other **Date Diagnosed:**

Patient Name:

Comorbidities:
☐ Hypertension ☐ Coronary artery disease ☐ Stroke/TIA
☐ Dyslipidemia ☐ Peripheral arterial disease ☐ Depression/Anxiety
☐ CKD - stage _____ ☐ Other(s):

Date of Birth:

		Date:	Date:	Date:
Healthy behaviour interventions	**Weight** (kg) **Height** (cm) **BMI** **Waist circumference** (cm)	Wt _____ Ht _____ BMI _____ WC _____	Wt _____ Ht _____ BMI _____ WC _____	Wt _____ Ht _____ BMI _____ WC _____
	Nutrition			
	Physical Activity (Aerobic 150 mins/week, Resistance 2-3x/week)			
	Smoking Status	☐ Non-smoker ☐ Ex-smoker ☐ Smoker	☐ Non-smoker ☐ Ex-smoker ☐ Smoker	☐ Non-smoker ☐ Ex-smoker ☐ Smoker
Glycemic control	**A1C** (target: ≤7% or _____ %) (Individualize based on patient characteristics and antihyperglycemic medication(s) – see CPG) (q3 months. If at target and stable - q6 months)	Test Date: Result:	Test Date: Result:	Test Date: Result:
	Antihyperglycemic Medication(s) **Drug Name(s)/Dose(s):**			
	Therapy Adherence/Concerns			
	BG Record (targets: premeal: 4-7 mmol/L or _____ mmol/L; 2hr postmeal: 5-10 mmol/L or _____ mmol/L) (Individualize based on ability to achieve A1C target + risk of hypoglycemia) (Annual fasting glucose meter/lab comparison)	Meter/Lab	Meter/Lab	Meter/Lab
	Hypoglycemic Episodes (frequency/pattern/driving risk)			
	BP (target <130/80 mmHg, 3 readings recommended) **Pulse**			
	Antihypertensive(s) **Drug Name(s)/Dose(s):**			
	CVD Symptoms	☐ None	☐ None	☐ None

		Date:	Date:	Date:
	Antihyperglycemic Agent with Demonstrated CV Outcome Benefit **Drug Name(s)/Dose(s):** (If type 2 DM with clinical CVD not at glycemic target - empagliflozin, liraglutide, canagliflozin)	☐ Continue ☐ Start ☐ No – reason:	☐ Continue ☐ Start ☐ No – reason:	☐ Continue ☐ Start ☐ No – reason:
	Antiplatelet Agent(s) **Drug Name(s)/Dose(s):** (If established CVD; consider if additional CV risk factors)	☐ Not indicated ☐ Yes	☐ Not indicated ☐ Yes	☐ Not indicated ☐ Yes
CKD	**Urine ACR** (normal <2 mg/mmol)	Test Date: Result:	Test Date: Result:	Test Date: Result:
	Serum Creatinine/eGFR	Test Date: Result:	Test Date: Result:	Test Date: Result:
	CKD	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Retinopathy	**Dilated Eye Exam** (type 1 – annually; type 2 – q1-2 years or as recommended by vision care professional)	☐ Date of last visit: ☐ Reminded	☐ Date of last visit: ☐ Reminded	☐ Date of last visit: ☐ Reminded
	Retinopathy	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	Severity/Therapies			
Neuropathy	**Neuropathy Symptoms** (e.g. pain, paresthesia, GI symptoms, sexual dysfunction)	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	Diabetic Foot Exam (includes 10 g monofilament or 128 Hz tuning fork, structural abnormalities, skin changes, pulses) (annually for screening; every visit if diabetic foot complications) See Appendices 11A, 11B and 12	Sensation _____ Pulses _____ Skin _____ Other _____	Sensation _____ Pulses _____ Skin _____ Other _____	Sensation _____ Pulses _____ Skin _____ Other _____
	Neuropathy	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Mental Health	**Screen for Depression, Anxiety, Other Stressors** (consider use of PHQ-9, GAD-7)	Concerns:	Concerns:	Concerns:
Vaccination	**Influenza** (annual)	☐ No ☐ Yes Reason: Date:	☐ No ☐ Yes Reason: Date:	☐ No ☐ Yes Reason: Date:
	Pneumococcal (once; repeat if >65 yrs)	☐ Yes Date:	☐ No Reason:	
Management Plans	**Patient Goals** **Barriers to Self-management** (e.g. coverage, accessibility, competing demands)			
	Women Contraception/preconception planning			
	Driving Guidelines Reviewed			
	Sick-Day Management (advise holding metformin, SGLT2i, SU, ACEi/ARB, diuretic, NSAIDs if inadequate fluid intake and ill			

Diabetes Visit Checklist for Pharmacotherapy

1. What is the glycemic target?
2. Do they have drug coverage?
3. Is there heart failure? Kidney disease? Heart disease?
4. Should they be on a statin? What is LDL?
5. Should they be on an ACE inhibitor / ARB?
6. Is blood pressure at target?
7. Should they take an anti-platelet?

Questions?