

Welcome to UVM ECHO: Treatment of Diabetes Mellitus Type II

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“Introduction” to ZOOM

- Please mute microphone when not speaking
- Please use camera as much as possible
- Test both audio & video before joining
- Communicate clearly during clinic:
 - Can use “raise hand” feature to comment
 - Speak clearly
 - Use chat function for technical issues
- We are recording the didactic section



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Disclosures: None or have been resolved

Planners:

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Treating Diabetes in Special Populations

Elderly

Pregnant Woman

Dr. Muriel H. Nathan, Endocrinology

Aims

- To discuss the changes with aging that impact on manifestations of DM in the elderly.
- To review which medications are best for those with co-morbidities
- To review why pregnancy is “diabetogenic.”
- Goals for pregnant women in pregnancy
- Use of insulin pumps versus multiple daily shots.

Incidence of DM complications by age

(Incidence/1000 by survey 2009)

	Amputation	ESRD	Hypoglycemia (ER visit)	Stroke	Ischemic Heart Disease	CHF	
Age 20-44	2	3	18	1	6	4	
Age 45-64	2	4	15	1	14	4	
Age 65-74	4	4	14	12	28	18	
Age 75 and older	4	4	30	20	35	38	

Reasons for DM in older adults

- Lifestyle and genetics lead to obesity
- Co-morbid conditions and aging lead to irregular diets and decreased activity
- Increased resistance to metabolic effects of insulin
 - Prediabetes with A1c 5.7-6.4% (FBS 100-125)
 - Diabetes 2 with A1c 6.5% or higher (FBS 126 or greater or random glucose 200 or higher)
- Decreased pancreatic beta cell mass and function
 - Impaired adaption to insulin resistance
 - “Balding of islet cells” can lead to insulin deficiency

General Health Assessment

- Functional status, ADLs, cognition, depression, fall risk, WT, BP, Tobacco and ETOH use. Medication review, cancer screening, Hearing, visual acuity, frailty, co-morbidities.
- General Health tests
 - EKG, lipids, bone density, AAA U/SD, diabetes screening
- Diabetes-specific health
 - Retinopathy
 - Nephropathy
 - Neuropathy
 - Medical nutrition
 - Diabetes treatment
 - Diabetes self-management training

Goals of therapy

Overall Health	Good	Intermediate	Poor
Patient Characteristics	No co-morbidities or 1-2 chronic non-DM illnesses No ADL impairment or just 1	3 or more non-DM chronic illnesses Mild cognitive impairment or early dementia 1-2 ADL impairments	End-stage medical condition Moderate-severe dementia >2 ADL impairments Resides in NH
SU (Glipizide, Glyburide, Glimepiride) or insulin	No-FBS 90-130 Bedtime 90-150 A1c < 7.5%	FBS 90-150 Bedtime 100-180 A1c <8%	FBS 100-180 Bedtime 110-200 A1c < 8.5%
	Yes-FBS 90-150 Bedtime 100-180 A1c 7-7.5%	FBS 100-150 Bedtime 150-180 A1c 7.5-8%	FBS 100-180 Bedtime 150-250 A1c 8-8.5%

Drugs that do not cause Hypoglycemia

Medication	Older Adults	CKD 3-5	CAD
Metformin	Diarrhea, GI, B12 lower	Reduce dosage if GFR < 45 Stop if GFR < 30?	Beneficial May avoid in severe CHF
TZDs (Pioglitazone)	Increase fluid retention Increase fracture risk	No dose change needed	Reduces CV mortality Can increase CHF
Alpha-glucosidase (Precose)	GI side effects-gas, bloating	Avoid if Cr > 2	
DPP4 (Sitagliptin)		Decrease dose if GFR <50 to 50 mg and decrease to 25 mg if < 30 Linagliptin needs no dose change	May increase risk for CHF
SGLT2 (Empagliflozin)	Volume depletion	Avoid use if GFR < 45	Cardio-protective Reno-protective
GLP-1 (Liraglutide)	GI side effects	No dose change needed	Reduce CVD events

Drugs that cause Hypoglycemia

Medication	Older Adults	CKD 3-5	CAD
SUs (Glimepiride, Glyburide, Glipizide)	Can cause wt gain Avoid glyburide ! Low glucoses	Glimepiride-stop if GFR<30 Glipizide-no dose change needed but use caution if GFR < 30 Glyburide should not be used if GFR < 60	No benefit Potential lows can cause arrhythmias, stroke, falls
Glinides (Nateglinide, Repaglinide)	Low glucoses	Nateglinide-stop if GFR <60 but can use on dialysis Repaglinide use with caution if GFR < 30	Same as SUs, just shorter acting
Insulin	Low glucoses	Dose can be adjusted to avoid lows	Same as SUs

Why pregnancy is diabetogenic

Physiology

- Placenta makes hormones that stimulate growth that cause insulin resistance as does the wt gain in pregnancy.
- Hyperglycemia can lead to pre-eclampsia (OR 3.4), congenital defects (OR 2-4), pre-term delivery (OR 3.4), macrosomia (OR 1.9) and stillbirth (OR 3.5). Neonatal hypoglycemia often seen (OR 26), while respiratory distress is not that common (OR 2).
- Fetal exposure can lead to cognitive defects with worse school performance later, increased ADHD, higher rates of obesity and DM as adults.

Pattern of Requirement

Stages of pregnancy	Insulin requirements
0-9 wks	Increase
9-14 wks	Decrease
14-16 wks	Low
16-37 wks	At least double
37-40 wks	May decrease
Immediate Postpartum	50% pre-preg needs.

Multiparous women may need 15-35% more.

DKA in pregnancy

Pregnant women are predisposed to DKA, 1s>2s, since pregnancy promotes insulin resistance, accelerated lipolysis and surplus free fatty acids (which can be shunted to ketone bodies).

hcG levels that are high can lead to nausea and vomiting.

Check for ketones if glucose > 250 or nausea/vomiting or inability to eat/drink.

Pregnancy goals

Monitor FS fasting, pre-prandial and 1-2 hrs prandial

Timing	Target
Preconception	
A1c	<6.5%
During pregnancy	
A1c	< 6%
Fasting glucose	< 96
1 hr / 2hrs after meals	< 141/ < 121

Glucose outside goals

- Hyperglycemia
 - Rule out infections, esp. UTI and use of steroids
 - Insulin requirements increase week 18-24
- Nocturnal hypoglycemia
 - Rule out fetal death, hypothyroidism, adrenal insufficiency (rare primary, hypophysitis can occur) and hepatic or renal failure
 - Give high protein, complex carbohydrate snack at bedtime

Insulin delivery in pregnancy

MDI (multiple daily shots, basal and mealtime insulin)

- Detemir and N are preferred, but Glargine is also fine.
- Mealtime-Regular, Humalog and Novolog.
- Usually need requirement increased each few weeks after 18-36

CSII-Continuous SQ Insulin Infusion (insulin pumps)

- Pumps are ideal for managing IDDM, but there is an increased risk for DKA if site lost due to no basal insulin on board. Less lows.
- Smart pumps-670 G, Tandem and Omnipod use algorithm to keep FS <150, may not be tight enough for pregnancy but Tandem does shut off if glucose is low (<70). And patients on smart pumps have to give insulin for meals main cause of hyperglycemia so can use more insulin/gm carb ratios to keep glucoses in range.

	24	3A	6A		8A				12		14		16		18		20		22					
	Started pump at 1600																		168			106		
					138		106		125		84				84				67					
	109				123				202		40	151			58		199	241						
	161	99	138		161		210		164		83		152				71		114					

Basal rate is 0.475, CHO ratio is 1:20, correction is $1/60 > 110$

What would you change ????

Non-insulin medications and pregnancy if DM2

- Controversy if Metformin is safe.
 - ADA advises stopping
 - Some with PCOS continue Metformin through the first trimester
 - Glyburide (chosen as least likely to cross placenta among SUs) has been used by some practices and seemed non-inferior to insulin for macrosomia, neonatal hypoglycemia and hyperbilirubinemia, but data is lacking for safety and can lead to wt gain.
- Do not recommend DPP4, GLP-1 or SGLT2
 - GLP-1 Exenatide does not seem to cross the placenta-future role???

Delivery Plan

- Increased fetal monitoring, with anatomy scan at 18-20 weeks.
- Non-stress test starting at 32 weeks, 1-2x/week.
- Delivery at 39 weeks, slightly longer if well controlled and no DM complications
 - Often use IV insulin in labor
 - After delivery insulin is cut 50% of pre-pregnancy needs for 48 hrs or so.

References

- D. LeRoith et al “Treatment of Diabetes in Older Adults: An Endocrine Society Clinical Practice Guideline,” J Clin Endocrinol Metab 104: 15230-1574, 2019.
- A. Alexopoulos et al, “Management of pre-existing diabetes in Pregnancy: A review,” JAMA 321(18): 1811-19, 2019.

Cases/HIPAA

→ stop recording

- Names
- Address
- DOB
- Phone/Fax #
- Email address
- Social Security #
- Medical Record #



THANKS TO EVERYONE!!!

- Please complete evaluation forms
 - CME will be processed once session evaluation form is received
- UVM Project ECHO materials available at www.vtahec.org
- Please contact us with any questions/suggestions
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