

Medical Complications of Pregnancy

Ellen W. Seely, M.D

Director of Clinical Research

Endocrinology, Diabetes & Hypertension
Division

Department of Medicine

Brigham and Women's Hospital

Professor of Medicine

Harvard Medical School

Ellen Seely, MD



- Columbia University College of Physicians and Surgeons
- Medicine Residency, BWH
- Endocrinology Fellowship, BWH
- Professor of Medicine, HMS
 - ▣ Research focus: Long term sequelae of GDM and preeclampsia
 - ▣ Clinical focus: Endocrine and hypertensive complications of pregnancy



Disclosures:

None



Objectives

- To understand the implications of common medical conditions on pregnancy
- To be able to appropriately change medical management of patients prior to pregnancy
- To understand differences in disease management goals in pregnancy



Common Complicating Medical Conditions that Precede Pregnancy

- Hypertension ~5-10%
- Diabetes Mellitus ~1-2%
- Hypothyroidism ~2-3%
- Leading causes of hospitalization during pregnancy:
 - Preterm labor
 - Hypertension
 - Diabetes Mellitus
 - Bleeding



Why Is it Important for Medical Caregivers to Know about these?

- Pre-pregnancy Planning and Counseling Key to Successful Pregnancy Outcome
- Approximately 40% pregnancies are unplanned in US.





The American College of
Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

ACOG PRACTICE BULLETIN

Clinical Management Guidelines for Obstetrician–Gynecologists

NUMBER 203 2019

Committee on Practice Bulletins—Obstetrics. This Practice Bulletin was developed by the American College of Obstetricians and Gynecologists' Committee on Practice Bulletins—Obstetrics in collaboration with Alex Vidaeff, MD, MPH; Jimmy Espinoza, MD, MSc; Hyagriv Simhan, MD; and Christian M. Pettker, MD.

Chronic Hypertension in Pregnancy

Circulation

Volume 151, Issue 7, 18 February 2025; Pages 490–507
<https://doi.org/10.1161/CIRCULATIONAHA.124.073302>



IN DEPTH

Hypertension in Pregnancy and Postpartum: Current Standards and Opportunities to Improve Care



Hypertensive Disorders in Pregnancy

Chronic Hypertension:

Hypertension prepregnancy or < 20 weeks gestation; or hypertension diagnosed for the 1st time in pregnancy & does not resolve postpartum

Preeclampsia:

SBP ≥ 140 , or DBP ≥ 90 mm Hg, or both on 2 occasions ≥ 4 hrs apart, > 20 weeks gestation and prior normal BP or severe range hypertension, with proteinuria or other end organ manifestations

Gestational Hypertension:

SBP ≥ 140 , or DBP ≥ 90 mm Hg, or both on 2 occasions ≥ 4 hours apart, *after* 20 weeks gestation with previously normal BP

Superimposed Preeclampsia:

Preeclampsia in a woman with hypertension before pregnancy or < 20 weeks gestation



Risks of Hypertension in Pregnancy

- Fetus/Neonate

- Low birth weight
- Prematurity (induced)

- Mother

- Exacerbation of hypertension and risk of stroke, MI, renal failure
- Superimposed preeclampsia



ASA for Preeclampsia Prevention

- USPSTF recommends low dose ASA for women with chronic hypertension starting at 12 wks
- Risk reduction ~15%

US Preventive Services Task Force. Aspirin Use to Prevent Preeclampsia and Related Morbidity and Mortality: US Preventive Services Task Force Recommendation Statement. *JAMA*. 2021;326(12):1186–1191. doi:10.1001/jama.2021.14781



Preexisting Hypertension in Pregnancy

- Pregnancies do well unless superimposed preeclampsia develops
- Treat or titrate antihypertensive therapy at **BP $\geq 140/90$ mm Hg***
- Antihypertensives generally can be tapered during pregnancy to lower fetal exposure

* ACOG. Clinical Guidance for the Integration of the Findings of the Chronic Hypertension and Pregnancy (CHAP) Study. ACOG Practice Advisory. 2022.



Chronic Hypertension and Pregnancy (CHAP) Trial Consortium 2022

- ❑ Open-label, randomized trial of **2,408 pregnant patients** with mild chronic HTN and singleton pregnancies **<23 weeks**
- ❑ Active treatment with pregnancy-safe antihypertensives targeting **BP <140/90** VS no treatment unless severe HTN developed **BP $\geq$ 160/105** mmHg)
- ❑ Active treatment reduced the primary composite outcome: **30.2% vs 37.0%**; adjusted RR 0.82, $P < 0.001$
 - ▣ Primary composite outcome: preeclampsia with severe features, medically indicated preterm birth <35 wks, placental abruption, or fetal/neonatal death.
 - ▣ Targeting blood pressure **$\leq$ 140/90** was associated with lower risk of one or more primary outcome events

Tita AT et al. Chronic Hypertension and Pregnancy (CHAP) Trial Consortium. Treatment for Mild Chronic Hypertension during Pregnancy. N Engl J Med. 2022.



Clinical Guidance for the Integration of the Findings of the Chronic Hypertension and Pregnancy (CHAP) Study

Practice Advisory ⓘ | April 2022 Reaffirmed 2025

- Recommends starting or adjusting antihypertensive medication for pregnant patients with **chronic hypertension at blood pressure $\geq 140/90$ mm Hg**
- Patients already on antihypertensives may generally **continue therapy**
- New severe or persistent BP elevations after mid-pregnancy require evaluation and observation for possible superimposed preeclampsia



Antihypertensive Rx for Preexisting Hypertension in Pregnancy

1st line

- Alpha-Beta blocker
 - ▣ labetalol
- Calcium channel blocker
 - ▣ nifedipine long acting alternative first line

2nd line

- Methyldopa
 - ▣ used since 1960s
 - ▣ infant F/U to 7½ yrs (*Cockburn J et al. Lancet 1982;1(8273):647*)
 - ▣ Less favored now due to side effects/efficacy
- Diuretics
 - ▣ concern of dehydration



Antihypertensive Rx for Preexisting Hypertension in Pregnancy

- ❑  ACEIs and ARBs prior to conception
 - ❑ fetal anuria and oligohydramnios (2nd & 3rd trimester)
 - ❑ neonatal renal failure (2nd & 3rd trimester)
 - ❑ birth defects controversial (1st trimester Cooper et al. N Engl J Med, 354: 2443-51 2006 versus Li DK et al. BMJ. 2011 Oct 18;343:d5931; Bateman et al, Am J Ob Gyn 2015)
 - ❑ MR blockers spironolactone- no, eplerenone-don't know
- ❑ Not recommended: atenolol-Concern for growth restriction



Hypertension Management Postpartum

- 40–50% women with pregnancy-associated hypertension have persistently elevated blood pressures at 6 weeks postpartum.
- 40% women with severe preeclampsia have hypertension 1 year postpartum.
- Pregnancy care team should facilitate transition to long-term follow-up.
- **A clinician** should be identified for long-term BP monitoring, follow-up, and preventative care.
- Consider breastfeeding: nifedipine, amlodipine, enalapril, and labetalol

Centers for Disease Control and Prevention. *Hypertension in Pregnancy Change Package*. Atlanta, GA: CDC, U.S. Department of Health and Human Services; 2024.



Summary Hypertension and Pregnancy

- ❑ Family planning at every visit.
- ❑ Remember to adjust antihypertensives prior to pregnancy.
- ❑ Goal BP during pregnancy < 140/90 mmHg.
- ❑ Start low dose ASA at 12 wks pp.
- ❑ Some patients will have new chronic hypertension after delivery; follow and adjust drugs for breastfeeding; counsel for future pregnancy



Diabetes Care[®]

Article Navigation

STANDARDS OF CARE | DECEMBER 08 2025

15. Management of Diabetes in Pregnancy: Standards of Care in Diabetes—2026 **FREE**

American Diabetes Association Professional Practice Committee for Diabetes*



Check for updates

Diabetes Care 2026;49(Supplement_1):S321–S338

<https://doi.org/10.2337/dc26-S015>

PubMed:41358885



Risks of Diabetes Mellitus in Pregnancy

□ Fetus/Neonate

- ▣ Birth defects
- ▣ Macrosomia
- ▣ Prematurity (induced)
- ▣ Birth Trauma
- ▣ Neonatal Hypoglycemia

□ Mother

- ▣ Progression of diabetic complications: retinopathy, nephropathy
- ▣ Preeclampsia (start ASA after 12 wks per ACOG)
- ▣ Increased chance for C-section



Diabetes Mellitus and Birth Defects

- Birth defect risk rises related to level of HbA_{1c} at conception- as high as 20%
- Preconception glucose control can reduce birth defects to ~1% over general population



Prepregnancy Planning for Women with Diabetes

- Discuss family planning at least yearly and stress the importance of prepregnancy glucose control
- If HbA_{1c} not in normal range, plan with patient 6 months to achieve glucose control prior to conception
- Counseling re risks
- Prepregnancy determination of retinopathy, nephropathy and other complications (i.e. gastroparesis)
- Adjustment of diabetes medications (*including* BP meds)



Optimal Diabetes Control for Conception

American Diabetes Association control goal for conception:

- As close to HbA_{1c} < 6.5% as safely possible to reduce risks of
 - ▣ Congenital anomalies
 - ▣ Preeclampsia
 - ▣ Macrosomia
 - ▣ Preterm birth
 - ▣ Other complications



Preeclampsia Prophylaxis

- Women with type 1 or type 2 DM should be prescribed low-dose aspirin 100–150 mg/day starting at 12 -16 weeks gestation to lower risk of preeclampsia.
- Dosage 162 mg/day may be acceptable; in U.S., low-dose aspirin available in 81-mg tabs.



Management of Diabetes Mellitus

Preconception and During Pregnancy

- Preconception counseling should begin at puberty ADA
- Diet and home glucose monitoring are the mainstay of management
- Insulin is the preferred agent for preexisting diabetes in pregnancy.
- For Type 2 DM on oral/other agents, change to insulin
- Discontinue GLP-1RA/GIP 1-2 months before planned pregnancy
- Assess DM complications: retinopathy, neuropathy etc prior to pregnancy



Insulin in Management of Diabetes Mellitus

Preconception and During Pregnancy

- long experience with NPH and regular
- Lispro and aspart most commonly used short acting
- Longer acting:
 - ▣ Glargine- was controversial due to increased IGF-1-receptor affinity/mitogenic potency in human osteosarcoma cell-culture model; not reported in humans and is widely used
- MDI or pumps can be used (Cochrane systematic review)
- No data to recommend any specific insulin regimen over another (Cochrane systematic review)

O'Neill SM, et al. *Different insulin types and regimens for pregnant women with preexisting diabetes. Cochrane Database Syst Rev* 2017;2:CD011880

Farrar D et al *Continuous subcutaneous insulin infusion versus multiple daily injections of insulin for pregnant women with diabetes. Cochrane Database Syst Rev* 2016;6:CD005542



Insulin resistance during pregnancy

- Insulin resistance increases as pregnancy progresses
- Insulin requirements typically increase in pregnancy but may decrease just before delivery; therefore, doses need to be adjusted throughout pregnancy

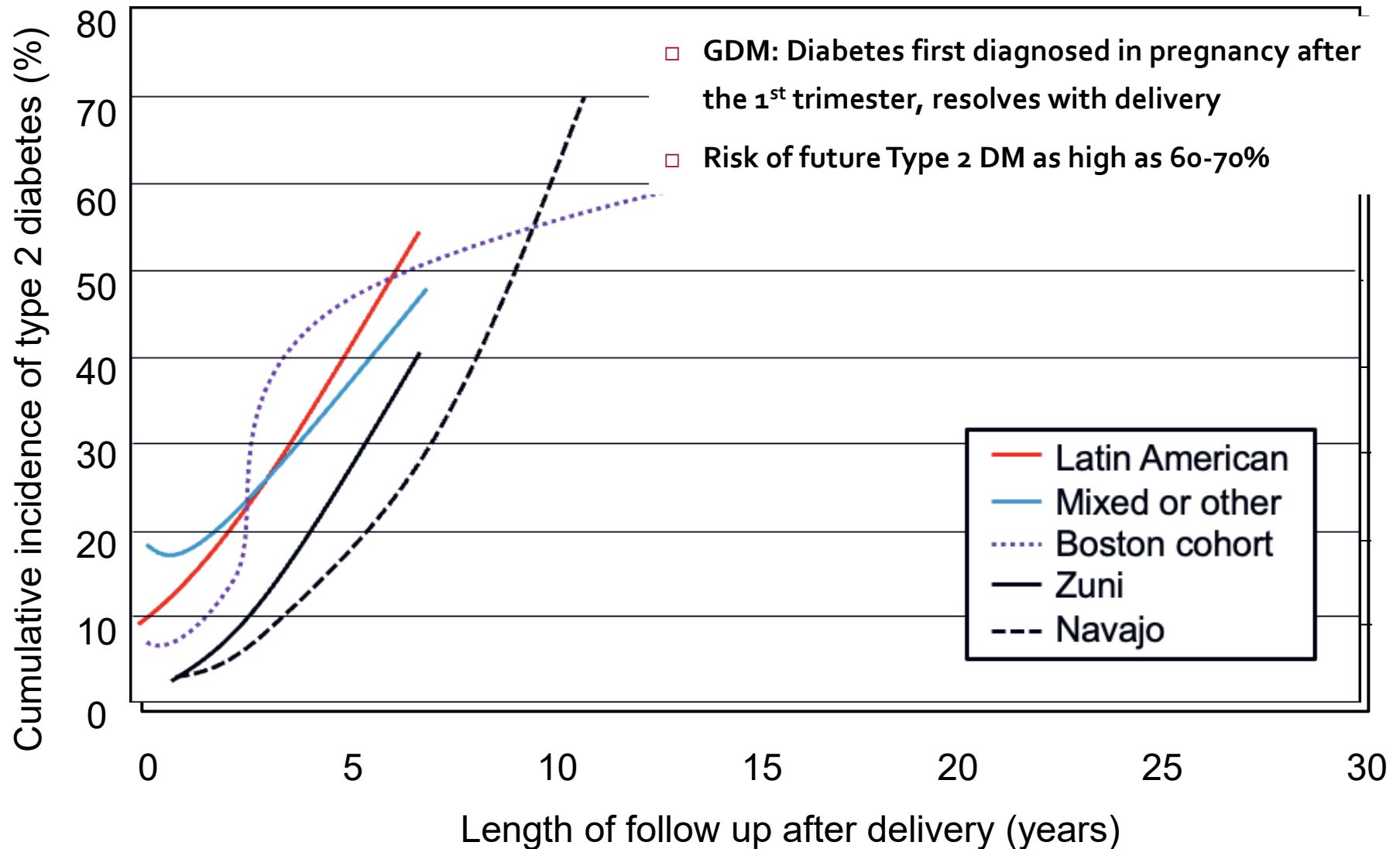


Glucose goals during pregnancy

- FBS <95 mg/dl
 - Post meals
 - ▣ 1 hr <140 mg/dl
 - ▣ 2 hr <120 mg/dl
- Whether by FS or CGMS.
- HbA_{1c} <6% (if achievable without too much hypoglycemia)

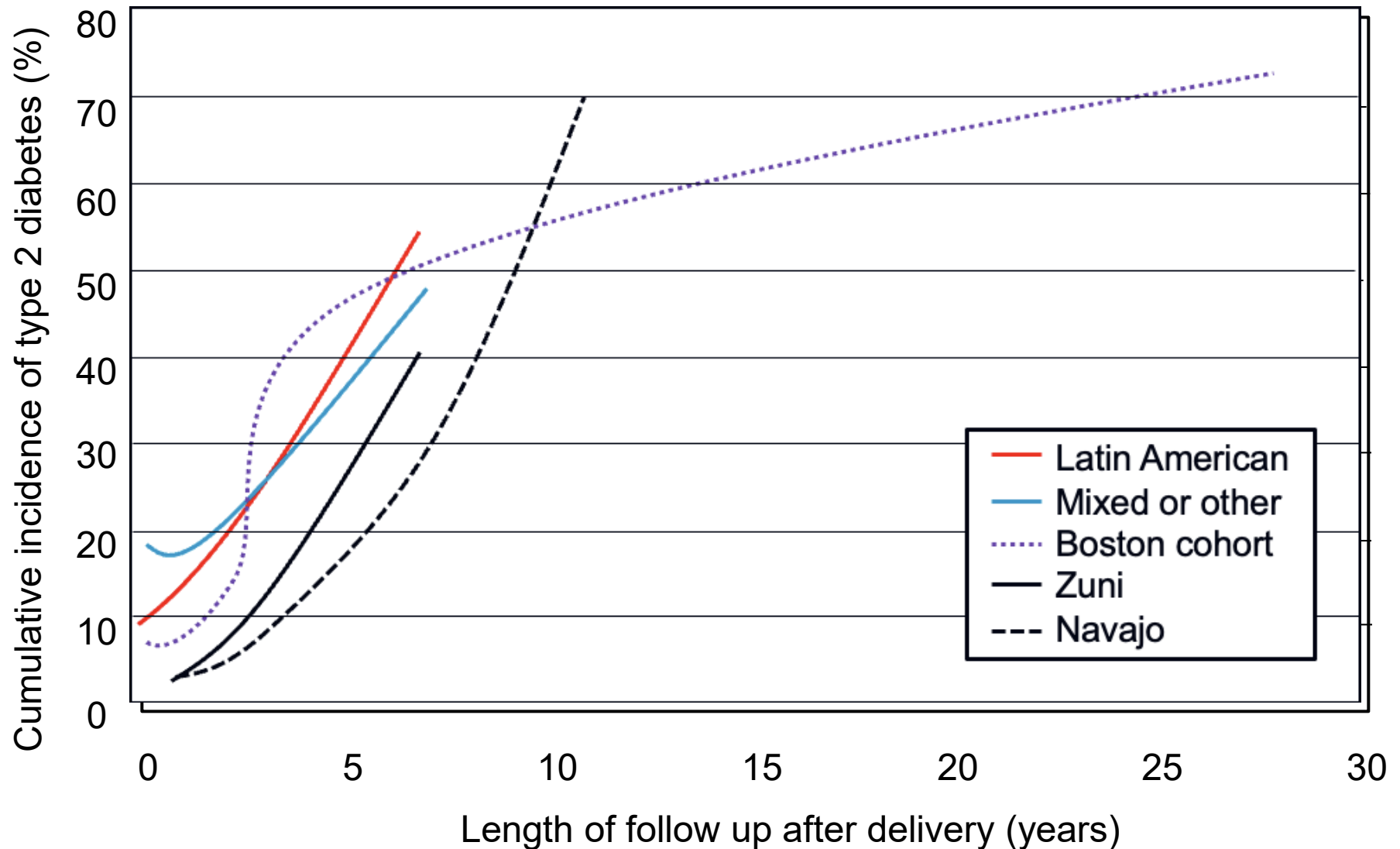


Gestational diabetes and the incidence of type 2 diabetes



Adapted from Kim C et al. *Diabetes Care*. 2002 Oct;25(10):1862-8.

Gestational diabetes and the incidence of type 2 diabetes



Adapted from Kim C et al. *Diabetes Care*. 2002 Oct;25(10):1862-8.



Recommendations for PP screening of women with a hx GDM for diabetes detection

	4-12 Weeks Postpartum	Subsequent
ADA 2026	Fasting glucose or 75 gm 2h-OGTT	Reassess at a minimum of <u>every 3 years</u> if normal glucose tolerance with HbA ₁ C/FBG/OGTT. Reassess <u>annually</u> if IFG or IGT is detected.

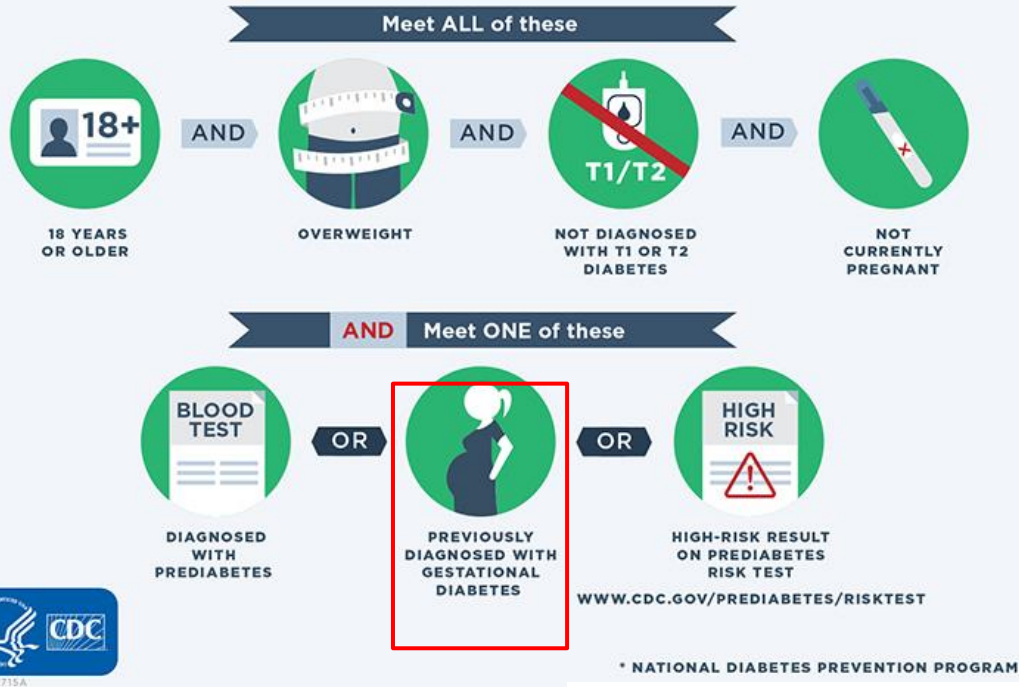
- Only 50% or less women receive early PP testing
- Only 50% receive long-term testing

Zera CA, Obstet Gynecol. 2015



CDC National DPP Lifestyle Change Program

TO JOIN CDC'S NATIONAL DPP* LIFESTYLE CHANGE PROGRAM:



- A diagnosis of GDM → high risk on the CDC Diabetes Risk Test
- Prior GDM can serve as eligibility criteria for entering a NDPP
- The CDC recommends finding and joining an NDPP after a GDM pregnancy

Online: Find a Program Tool
<https://www.cdc.gov/diabetes/prevention/find-a-program.html>

Lifestyle Change Program

A key part of the National DPP is a **lifestyle change program** that provides:



Summary: DM and Pregnancy

- ❑ Need for pregnancy planning to normalize HbA_{1c} ideally HbA_{1c} < 6.5%
- ❑ Insulin remains preferred agent
- ❑ Start ASA 12 wks
- ❑ May need to switch antihypertensive medications before conception
- ❑ Stop GLP1a 1-2 months prior to pregnancy and nutrition counseling for weight rebound
- ❑ Women with a history of GDM should receive regular screening for Type 2 DM and preventative care



Question 1

You see a 34 yo woman with Type 2 diabetes and hypertension who has recently stopped using contraception. She is taking dapagliflozin and lisinopril. Her last HbA_{1c} was 9%.

Your recommendations include all of the following except:

- a) Change to insulin
- b) D/C lisinopril and substitute labetalol before she tries to become pregnant
- c) D/C lisinopril and substitute an angiotensin 2 receptor blocker (ARB) to help protect her kidneys during pregnancy
- d) aim for HbA_{1c} <6.5%.



Question 1-Answer

Your recommendations include all of the following except: Answer C

- a) Change to insulin *Insulin preferred per ADA for pregnancy. Insufficient pregnancy data on dapagliflozin.*
- b) D/C lisinopril and substitute labetalol before she tries to become pregnant. *Lisinopril is contraindicated in pregnancy and labetalol is a 1st line medication.*
- c) D/C lisinopril and substitute an angiotensin 2 receptor blocker (ARB) to help protect her kidneys during pregnancy. *Both ACEIs and ARBs cause fetal renal damage.*
- d) Aim for HbA_{1c} <6.5%. *This is a correct goal for conception per ADA.*



Hypothyroidism

American Thyroid Association 2026 Guidelines for Thyroid Disease in Preconception, Pregnancy, and Postpartum

Practice Guideline

> Thyroid

2026 May;36(5):481-544. doi: 10.1177/10507256261445624.

Epub 2026 May 31.

ACOG PRACTICE BULLETIN

Clinical Management Guidelines for Obstetrician–Gynecologists

NUMBER 223

(Replaces Practice Bulletin Number 148, April 2015)

Committee on Practice Bulletins—Obstetrics. This Practice Bulletin was developed by the Committee on Practice Bulletins—Obstetrics with the assistance of Brian M. Casey, MD and Torri D. Metz, MD, MS in collaboration with American Academy of Family Physicians liaison Jeff Quinlan, MD.

June 2020

Thyroid Disease in Pregnancy



Hypothyroidism: Diagnosis In Pregnancy

- ❑ Affects 2-5% of pregnancies
- ❑ Universal screening **not** recommended by ATA, ACOG, the Endocrine Society, or American Association of Clinical Endocrinologists
- ❑ Risk-based screening is preferred
- ❑ Diagnosis made by elevated TSH
- ❑ Symptoms:
 - ▣ weight gain (typical of normal pregnancy)
 - ▣ constipation (typical of normal pregnancy)
 - ▣ cold intolerance (not typical of pregnancy)



Screen women with

- ❑ Personal or family history of thyroid disease
- ❑ Type 1 diabetes mellitus
- ❑ Clinical suspicion of thyroid disease- sx or signs on physical exam

- ❑ Do not perform universal testing

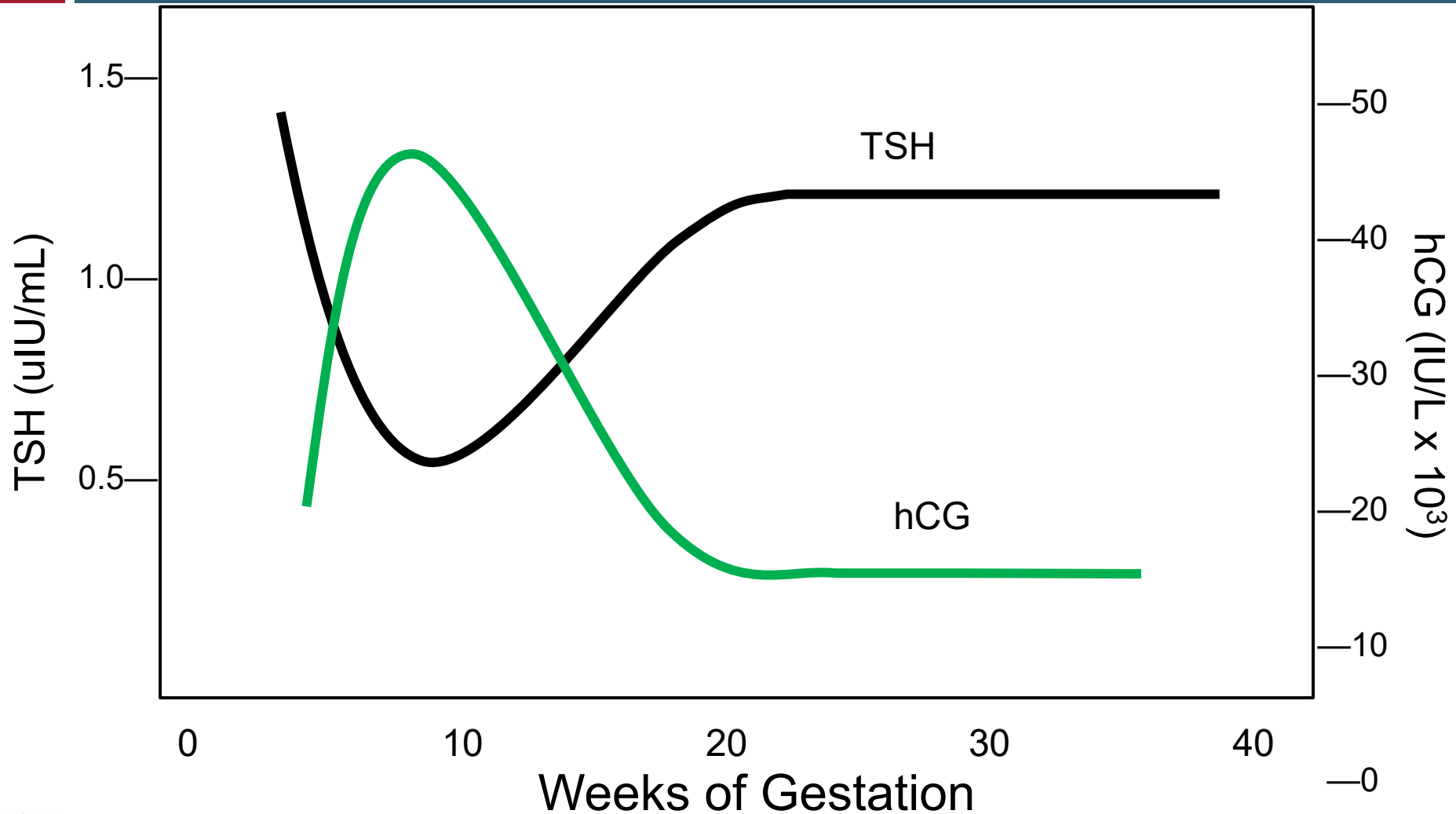


Thyroid Hormone Changes in Pregnancy

- ❑ Diagnosis often complicated by the changes in thyroid function that take place in normal pregnancy.
- ❑ Early pregnancy, rise in HCG (has thyroid stimulatory activity), leads to compensatory fall in TSH.
- ❑ TSH concentration is usually within the normal range; in some women falls



Relationship between TSH and hCG



Adapted from Glinoer et al. JCEM 1990; 71(2):282



Hypothyroidism: Risks to Pregnancy

□ Fetal/Infant

- ▣ Preterm Birth
- ▣ Pregnancy loss
- ▣ Stillbirth
- ▣ Impaired neuropsychologic development

□ Maternal

- ▣ Increases risk for preeclampsia, placental abruption (preterm delivery)



Hypothyroidism on Levothyroxine Prior to and During Pregnancy

- Aim for TSH <2.5 mIU/L at conception for pts on levothyroxine
- Check TSH as soon as pregnancy test positive
- Requirement for thyroid hormone characteristically increases in pregnancy and returns to prepregnancy requirement postpartum
- Titrate thyroid hormone dose to maintain TSH <2.5
- Reduce thyroid hormone dose to prepregnancy dose at delivery and check TSH at 6 wk pp visit

New Recommendation: Retesting for Mild Increase TSH

- For pts not on levothyroxine if TSH ≥ 6 mIU/L start treatment
- Repeat testing/confirmation because many mild abnormalities normalize, especially if TSH is < 6 mIU/L

Korevaar TIM, et al American Thyroid Association 2026 Guidelines for Thyroid Disease in Preconception, Pregnancy, and Postpartum. *Thyroid*. 2026 May;36(5):481-544. doi: 10.1177/10507256261445624. Epub 2026 May 31. PMID: 42219800.



Summary Hypothyroidism and Pregnancy

- HCG may lead to low TSH in first trimester
- Thyroid hormone dose may need up titration
- In pts on levothyroxine
 - ▣ Aim for TSH <2.5 mIU/L at conception
 - ▣ Check TSH as soon as pregnancy test positive
- No universal screening recommended



Question 2

A 24 yo woman reports a home positive pregnancy test and having missed her period. Because of fatigue, another clinician ordered a TSH to rule out hypothyroidism and which returned at 7.0 mIU/L. She has no other symptoms.

You:

- a) Recommend recheck of TSH in 4 wks.
- b) Explain that TSH values may increase over the course of normal pregnancy due to the rise in HCG.
- c) Start T4 with a goal TSH < 4.5 mIU/L
- d) Start T4 with a goal TSH < 2.5 mIU/L



Question 2 Answer

You: Answer **D**

- a) Recommend recheck of TSH in 4 wks. *Incorrect: Already has TSH >6 mIU/L so start rx; T₄ requirement rises over course of pregnancy.*
- b) Explain that TSH values usually increase in 1st trimester of normal pregnancy due to rise in HCG. *Incorrect: TSH levels typically fall in the 1st trimester due to rise in HCG.*
- c) Start T₄ with a goal TSH < 4.5. *Incorrect: TSH goals are lower in pregnancy. Do not use non pregnant nl range.*
- d) Start T₄ with a goal TSH < 2.5. *Correct: TSH goals are lower in pregnancy.*

Summary Hypothyroidism and Pregnancy

- TSH values vary through pregnancy and may be suppressed in first trimester due to rise in HCG
- TSH levels run lower in pregnancy so aim for T₄ replacement is a lower TSH.



Overall Summary

- ❑ Women with medical problems should receive regular family planning counseling.
- ❑ Adjustment of medications is often necessary prior to and during pregnancy.
- ❑ Goals for treatment of medical problems may differ during pregnancy.
- ❑ Primary care can be the bridge in and out of pregnancy



Key References

- ACOG Practice Bulletin No. 203: Chronic Hypertension in Pregnancy. Obstet Gynecol. 2019.
- Garovic VD, et al. Hypertension in Pregnancy: A Scientific Statement From the American Heart Association. Hypertension. 2022.
- ACOG. Clinical Guidance for the Integration of the Findings of the CHAP Study. Practice Advisory. 2022.
- Tita AT, et al. Treatment for Mild Chronic Hypertension during Pregnancy. N Engl J Med. 2022.
- USPSTF. Aspirin Use to Prevent Preeclampsia and Related Morbidity and Mortality. JAMA. 2021.
- American Diabetes Association Professional Practice Committee. Management of Diabetes in Pregnancy: Standards of Care in Diabetes—2026. Diabetes Care. 2026.
- ACOG Practice Bulletin No. 223: Thyroid Disease in Pregnancy. Obstet Gynecol. 2020.
- Korevaar TIM, Leung AM, Alexander EK, et al. American Thyroid Association 2026 Guidelines for Thyroid Disease in Preconception, Pregnancy, and Postpartum. Thyroid. 2026.

