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# POSTPARTUM HYPERTENSION CLINIC DEVELOPMENT TOOLKIT

# CONTENTS

Part I

# How to start a postpartum hypertension clinic for individuals with hypertensive disorders of pregnancy

## 1. Conceptualizing a postpartum hypertension clinic

This toolkit will serve to help clinicians, health care teams, and health systems develop postpartum hypertension care programs for individuals with a recent hypertensive disorder of pregnancy – chronic hypertension, gestational hypertension, preeclampsia, eclampsia, and postpartum hypertension. This toolkit outlines different successful clinic models and postpartum remote blood pressure monitoring programs used to care for individuals with hypertensive disorders of pregnancy after delivery, during the fourth trimester, which can be adapted to fit a variety of systems of care. The toolkit also includes sample documents including clinic note templates and dot phrases, patient-focused information, letters to referring providers, and additional resources outlining how to establish remote blood pressure monitoring programs.

There is a critical need to improve cardiovascular care for individuals with a history of hypertensive disorders of pregnancy not only to reduce maternal morbidity and mortality but also to reduce future cardiovascular risk. The postpartum period, or the "4$^{th}$ trimester", extends up to 1 year postpartum and gives us a unique window of opportunity to focus on cardiometabolic prevention. Postpartum hypertension clinics offer multiple advantages in this space: (1) to provide ongoing monitoring and management of blood pressure with timely, active titration of antihypertensive medications, (2) to allow time for discussion and education of optimal cardiovascular lifestyle behaviors and modifications to prompt behavior change, (3) to initiate screening and management of cardiovascular risk factors (dyslipidemia, diabetes, obesity), (4) to serve as a bridge to longitudinal care.

Postpartum hypertension clinics can be run by a single specialty (family medicine, internal medicine, obstetrics, cardiology, nephrology) or as a multidisciplinary program. In determining which

specialty or specialties will interface with patients in the postpartum hypertension clinics, it is paramount to include clinicians who are knowledgeable about key cardio-obstetric areas. These topics include debriefing of the delivery and immediate post-partum period (to address residual questions and emotional trauma), an explanation of hypertensive disorder diagnoses and their implications for short- and long-term cardiovascular and obstetric health, contraception, mood disorders, blood pressure measurement and management of hypertension, and cardiovascular risk stratification and prevention. Ideally, clinicians should also understand and implement guideline-directed surveillance and management of all cardiovascular risk factors (in addition to hypertension) and be comfortable ordering cardiovascular imaging and stress testing when appropriate.

To start, it is generally helpful to discuss the clinic and inception in planning meeting(s) to achieve support from departmental leadership. Next, additional meetings with key stakeholders, including operational leadership, (as detailed above) should establish:

1) the target population (subtypes of hypertensive disorders of pregnancy),
2) timing (days per month, number of patient visit slots),
3) structure (joint or single clinician visit, virtual or in-person),
4) administrative logistics of the clinic (department, coding and billing), and
5) clinical workflows to ensure appropriate referral patterns.

In conceptualizing the clinic, it is helpful to perform a "needs assessment" for care of the postpartum population within the healthcare organization, specifically identifying what are the barriers and needs of postpartum individuals.

To ensure success and sustainability, the clinic referral process should be integrated into a healthcare system's standard peripartum care workflow. To inform key clinicians who provide postpartum care about clinic implementation and to encourage referrals, consider hosting departmental Grand Rounds and/or educational sessions with the Departments of Obstetrics, Cardiology, Internal Medicine, Pediatrics, Family Medicine and Emergency Medicine. In addition to physicians, these sessions should include key stakeholders such as advanced practice providers, resident physicians, midwives, nursing staff, and pharmacists. Concurrently, it is helpful to utilize institutional marketing teams to develop

patient-facing educational materials, including brochures, educational videos, and website materials describing the relationship of hypertensive disorders of pregnancy to future cardiovascular disease as well as to provide information introducing the postpartum programs (see examples in Part 6: *Patient education*).

In addition, the incorporation of remote blood pressure monitoring programs can provide blood pressure data that guides blood pressure management at a postpartum hypertension clinic. In the immediate post discharge period, remote blood pressure monitoring can serve as a bridge to a postpartum visit when there is a high risk of persistent, uncontrolled hypertension. Postpartum remote monitoring of blood pressure can identify patients who remain hypertensive and have the highest need to be seen in a postpartum hypertension clinic. The recent POP-HT trial showed better postpartum blood pressure control among individuals enrolled in a remote blood pressure monitoring program. Creating a postpartum remote blood pressure monitoring program requires the following key items: (1) patients must receive a validated blood pressure device (https://www.validatebp.org/) with an appropriate-sized cuff and instruction on how to accurately perform self-monitored blood pressure, (2) a way to transfer home blood pressures into the electronic medical record via smart phone application, text, website, or through a patient portal, (3) a care model focused on managing postpartum hypertension, (4) education on severe hypertension and symptoms. See additional details in Part 4: Postpartum blood pressure management.

**Example timeline for 1-year development of a postpartum hypertension clinic**

| | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| Stakeholder meetings every other week | ■ | ■ | ■ | ■ |
| Develop clinic protocols | ■ | ■ | ■ | |
| Schedule clinic dates | ■ | ■ | | |
| Create/adapt/identify educational materials | ■ | ■ | | |
| Train clinic staff | | ■ | | |
| Begin patient visits | | | ■ | ■ |
| Collect/analyze data on clinic objectives | | | | ■ |

## 2. Identifying and engaging key stakeholders

Key stakeholders should be identified prior to clinic inception and may include the following (figure):

# 3. Leveraging successful clinic examples to obtain funding

## a. Understanding the value of postpartum hypertension clinics

Postpartum hypertension clinics aimed at blood pressure management, optimization of cardiovascular risk factors, and primary prevention of cardiovascular disease have the potential to improve health at the individual level by reducing maternal morbidity and mortality, provide immense benefit to the community, and reduce long-term health care costs.

Cardiovascular disease is the leading cause of death for women, yet cardiovascular disease mortality rates among young women remain alarmingly stagnant.[1,2] Pregnancy induced hypertensive disorders, preeclampsia and gestational hypertension, provide a sex-specific window to susceptibility for cardiovascular disease with a strong association with later life cardiovascular disease demonstrated across diverse populations.[3–6] Individuals with pregnancy-induced hypertension and other adverse pregnancy outcomes have excess cardiometabolic risk and progress to overt cardiovascular disease at younger ages compared with individuals with uncomplicated pregnancies. The American Heart Association and the American College of Obstetricians and Gynecologists (ACOG) have identified hypertensive disorders of pregnancy as a risk factor for cardiovascular disease with a magnitude of risk on par with smoking and diabetes. As such, they have recommended that individuals with hypertensive disorders of pregnancy have close follow-up with a cardiologist or primary care physician for screening and management.[7,8] The translation of these recommendations into clinical practice has not occurred within most hospital systems, representing a missed opportunity to improve cardiovascular disease awareness, prevention, and reduce care inequities for women.

While some clinicians are acutely aware of this risk, there are many barriers beyond clinicians' knowledge base which may impede patient education about their future cardiovascular risk. Identifying the appropriate timing and venue for counseling is challenging. Much of this counseling occurs immediately after delivery in the hospital, which is often a busy and emotional period for birthing individuals. Amidst the delivery of a newborn with many physical changes, pain, and sleep deprivation, it is not surprising that birthing individuals do not retain all of the information that the care team communicates to them at the time of delivery.[9] In addition, the implementation of recommended testing and interventions for cardiovascular risk reduction are often delayed or neglected. Fragmented postpartum care contributes to the frequent absence of a cohesive transition from the obstetrician to an internist or

cardiologist as is recommended by ACOG.[10] Thus, all too often, birthing individuals are unaware of the association between hypertensive disorders of pregnancy and future cardiovascular risk, highlighting the need for a dedicated time and space to discuss this risk outside of the delivery hospitalization.[11]

In the early postpartum period, individuals with hypertensive disorders of pregnancy have increased risk of cardiovascular morbidity (heart failure, myocardial infarction, stroke) and contribute to the rising rates of maternal mortality in the United States. Individuals with hypertensive disorders of pregnancy also have higher rates of health care utilization in the first year postpartum with more frequent emergency room visits and hospitalizations than individuals with normal blood pressure. Adverse pregnancy outcomes are often overlooked during those interactions with the healthcare system and identify a missed opportunity to reduce postpartum morbidity and mortality.

In addition to short term increases in morbidity and mortality related to pregnancy-induced hypertension, many birthing individuals have an increased risk for developing sustained hypertension in the fourth trimester. Prior studies have found that over 40% of individuals with a history of severe preeclampsia still had significant hypertension one year after delivery and those who were on antihypertensive therapy did not have optimal control.[12] In a single center study, 60% of overweight and obese birthing individuals developed chronic hypertension by one year postpartum.[13] There are also differences in postpartum blood pressure by race, where Black individuals have been found to have higher postpartum blood pressures.[14] It is important for hypertension management and cardiovascular risk counseling to be reinforced at the 6-week obstetrician visit. However, historically up to 40% of postpartum individuals do not attend a postpartum visit within 6 weeks, affording an important opportunity to address barriers to postpartum follow-up and have additional follow-up mechanisms in postpartum hypertension clinics. In addition, beyond the typical follow-up period of 6 weeks postpartum, there is an ongoing need for blood pressure monitoring and management for individuals with pregnancy-induced hypertension.

Pregnancy provides a critical window to identify individuals at high risk of developing future cardiovascular disease and represents a time when individuals seek health care and are engaged with the health care system. Postpartum clinics for individuals with hypertensive disorders of pregnancy help support parents caring for their newborns, keep birthing individuals engaged with

care, identify cardiovascular risk factors, and implement screening and intervention strategies to improve long-term health.[15]

### b. Benefits to health care systems

In addition to improving care for postpartum individuals with hypertensive disorders of pregnancy, postpartum hypertension clinics and remote monitoring programs have financial advantages for health care systems. First, more patients are retained in the healthcare system in the postpartum period. Not only are these patients seen for visits in the postpartum hypertension clinic, but they are also more likely to develop relationships and then follow longitudinally with a subspecialist or primary care provider[15] for themselves as well as to bring family members into the system. Second, postpartum hypertension clinics have the potential to reduce emergency room visits and thus unnecessary postpartum hospital admissions, as has been seen in remote blood pressure monitoring programs[16]. Though it is important to note that in some cases, acute severe hypertension in the postpartum period is a medical emergency that warrants admission for treatment and evaluation of postpartum preeclampsia. In tandem, postpartum remote monitoring programs and postpartum hypertension clinics can provide a safe, expert, and timely mechanism for postpartum blood pressure management without healthcare over-utilization. Third, patients seen in postpartum hypertension clinics can be billed at a high level that reflects the intensity and complexity of services provided. Lastly, the cardiovascular disease prevention that occurs as part of a postpartum hypertension clinic may reduce long term health care costs associated with cardiovascular morbidity.

### c. Funding mechanisms

Small local or hospital-based grants ($10,00-$50,000) can be helpful in launching a postpartum hypertension clinic. These funds can be used to support the following:

- pilot testing of remote blood pressure monitoring programs, including developing infrastructure and care models needed to support such programs
- purchase of blood pressures cuffs (including extra-large size)
- clinic staff (nurses, coordinators, medical assistants, pharmacists, social workers)
- patient transportation
- medication and medication delivery
- development of educational and advertising materials

## 4. Overview of administrative logistics/coding

Patients should generally be scheduled as a new patient visit. It is important to incorporate synchronous and asynchronous telemedicine into the clinic model, as virtual visits are often more convenient for new parents and can help to reduce cancellation and no-show rates[17]. Virtual visits require patients to have a home blood pressure cuff to provide blood pressure measures for management discussion during the clinic visit and typically need to reside in the same state as the clinic. For multidisciplinary clinics (e.g., maternal fetal medicine and cardiology or nephrology), all patients can be seen by both clinicians. The visit can be billed as a single subspecialist or two separate subspecialist visits, coded to reflect the complexity and intensity of the visits. Each clinician documents an individual note for the patient following the visit (single encounter or two encounters) and a joint consult letter (if single encounter) can be sent to each patient's obstetrician, primary care clinician, and all other key members of their care team. See additional details in Part 2. *Clinic models / framework*.

## 5. Checklist

| Postpartum Hypertension Clinic Development Checklist | |
|---|---|
| ✓ | **Checklist Items** |
| | Identify key clinicians, stakeholders, and administrative support staff |
| | Schedule regular meetings with stakeholders and administrators |
| | Develop clinic framework, protocols, workflow, schedule, and coding structure |
| | Develop blood pressure monitoring protocols and decide blood pressure goals across the 4th trimester in collaboration with key stakeholders |
| | Create clinic materials: dot phrases, note templates, letters, patient education documents |
| | Train clinic staff |
| | Promote clinic to referral base |
| | Incorporate remote blood pressure monitoring programs |
| | Monitor clinic volume and outcomes |

Part II

# Clinic models/framework

## 1. Clinical models/operations

**Clinic referral**

**Automated**

All patients meeting criteria

Opt-in or opt-out

Visit scheduled prior to hospital discharge

**Clinician-initiated**

High-risk patients referred from inpatient or outpatient

OB, MFM, primary care, or sub-specialist

EHR order set

**Patient-initiated**

All patients given info about clinic and can call to schedule

Printed info at discharge, website

**Clinic models**

*Consider telemedicine and HBPM to improve access*

**Combined obstetrics & specialty model**

Co-located clinic.

Encounters can be shared or separate.

**Primary care or subspecialty model**

Specific postpartum visit type can help maintain timely access.

**Obstetrics or family medicine model**

Scheduled in addition to postpartum visit to focus on CV prevention

### a. Clinic models (Figure)

**Combined clinic model:** Cardiology/Primary Care/Nephrology PLUS Obstetrics/Maternal Fetal Medicine (MFM)

- Typically, a cardio-obstetrics clinic or dedicated postpartum hypertension clinic
- Patient is scheduled for 40-minute slot and is seen by both (1) cardiology (or primary care or other subspecialist) and (2) obstetrics/MFM, with 20 minutes for each clinician. Can also consider shorter time slots, particularly if planning follow-up visits.
- Each clinician can document a separate note under one encounter or under separate encounters for separate coding
- Can typically accommodate between 8 to 14 new patients per half clinic day, depending on the schedule timing.
- If under one encounter, a joint consult letter is sent to the referring clinician, primary care clinician, and obstetrician. If each subspecialist provider is under their own encounter (two separate encounters), two letters are sent.

**Single specialty postpartum clinic model:** Obstetrics/MFM

- Patient is scheduled into a dedicated postpartum clinic located in the obstetrics clinic, for a 20 to 40 minute visit. Can also consider shorter time slots, particularly if planning follow-up visits.
- In some models, the patient is seen by both a nurse (history data collection) and clinician.

**Single specialty postpartum clinic model:** Cardiology, Primary Care, or Nephrology

- Patient is scheduled into a general cardiology, nephrology, or primary care template with a specific postpartum hypertension visit type.
- To facilitate clinic slots to accommodate postpartum patients, these visit slots are reserved for patients who meet specific criteria, including hypertensive disorder of pregnancy diagnosis.

### Staffing

Several staffing models exist and can be individualized to different practice settings. Different staffing models may require a nuanced approach at individual institutions.

- A physician performs the initial new patient visit.
- An advanced practice provider, typically trained in women's health or cardio-obstetrics, may perform the initial new patient visit or follow-up visits. This model may work better for clinics with limited physician access due to staffing issues or remote locations.

- A dedicated nurse or clinical pharmacist can provide additional support to see all patients and collect medical history and demographic information. These data can also be obtained digitally via questionnaires ahead of visits to reduce administrative burdens.
- Pharmacist services can support with medications education, access, monitoring, and dose adjustment

### b. Types of visits

Clinics offer in-person and virtual visits.

**Virtual visits** are desirable and convenient for postpartum patients.

- Patient may be scheduled for a virtual visit if they request it or if the patient faces barriers to making in-person visits due to financial restraints, geographical distance, transportation or childcare hurdles.
- Patients scheduled for a virtual visit should have a home blood pressure cuff and should be asked to check blood pressure at home prior to the day of the appointment (ideally have 2 weeks of at least daily blood pressure measurements based on current ACC/AHA blood pressure guideline recommendations once stable).

**Home visits** have not been well studied in the postpartum hypertension space, however they may offer an opportunity to optimize convenience for patients.

**Shared medical appointments (SMA):** Patient is scheduled for a group visit (8-10 patients simultaneously) in a postpartum heart/cardiometabolic clinic between 2-6 weeks postpartum

- SMA visits are 90mins in length, which includes individual patient encounters and a group educational program on future cardiovascular risk related to adverse pregnancy outcomes (APOs) and counseling on lifestyle behaviors to mitigate CV risk.


- The SMA model requires a conference/meeting room with areas for individual exams OR clinic space with several exam rooms available to accommodate simultaneous appointments and a common conference/meeting room for group education. Alternatively, SMAs could be conducted virtually with separate 'breakout rooms' for individualized management.
- The SMA requires a standardized privacy form to maintain HIPAA compliance. Patients must agree to not share the personal information of other group members.

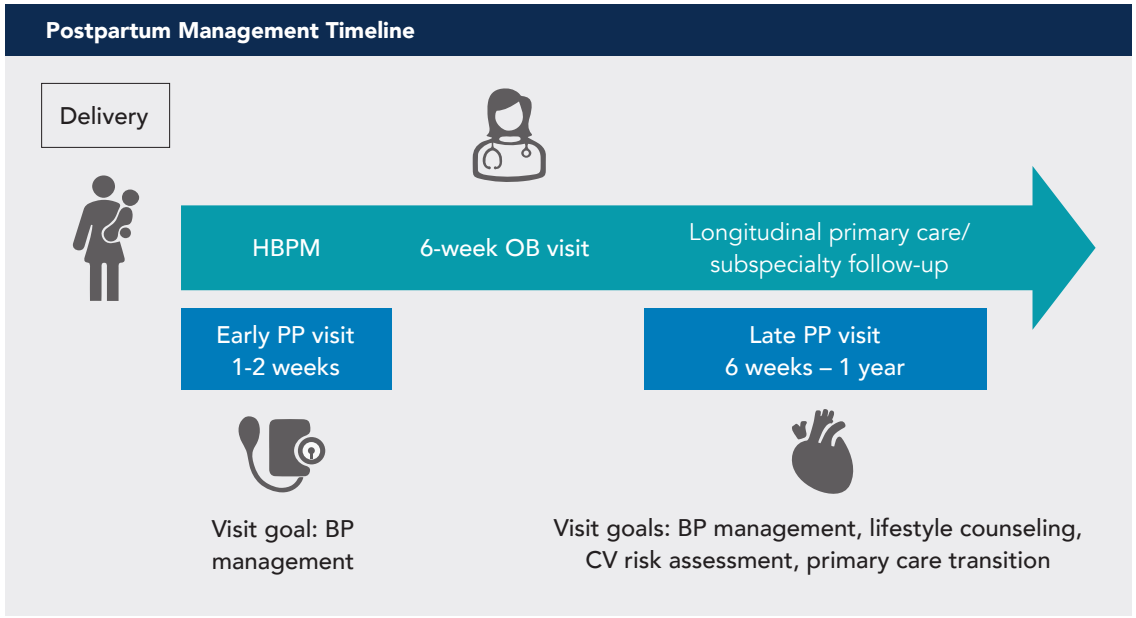
- During individual exams, anti-hypertensive medications are adjusted, cardiac imaging is reviewed/ordered, and risk-stratification labs are requested.
- During group education, HDP association with cardiovascular risk is reviewed in-depth with a focus on risk-reduction strategies through lifestyle and behavior modifications. Visual presentation components and open questions and answers can enhance the educational content and promote active participation in learning. This also reduces repetition for the primary provider/facilitator, as the content is delivered just once to all participants simultaneously.
- The Primary Provider can bill for each patient they personally perform a history and physical examination on, coded to reflect the complexity of the visit. They may also bill for supervision of individual exams by advanced practice providers serving as facilitators.
- SMA sessions can provide a sense of community for participants who may be experiencing mood or adjustment disorders following a complicated delivery.

### c. Timing of visit

Optimal visit timing will depend on the goals of the clinic, staffing model, and patient needs and preferences. Referrals are accepted at any point postpartum in most programs (figure).

**Early postpartum visits** (within 2 weeks) focus on early blood pressure management and medication titration.

Patients being discharged on an anti-hypertensive medication or with severe hypertension should be scheduled for a visit within 72 hours of discharge (typically with a member of the obstetrics care team, can be virtual)



ACOG recommends a blood pressure check and visit within 7 to 10 days of delivery for high-risk individuals

**Later postpartum visits** (2 weeks to 1 year postpartum) focus on blood pressure management, lifestyle optimization, cardiovascular risk assessment, and transition to primary care.

Patients living in states without Medicaid expansion beyond the typical 6-week postpartum time period may benefit from visits scheduled within 6 weeks of delivery.

For list of resources on Medicaid expansion by state please see the following:

ACOG: https://www.acog.org/advocacy/policy-priorities/extend-postpartum-medicaid-coverage

KFF: https://www.kff.org/medicaid/issue-brief/medicaid-postpartum-coverage-extension-tracker/

## d. Follow-up visits

Follow-up visits at postpartum hypertension clinics or with subspecialty clinicians depend heavily on local capacity, i.e., clinician availability and patient acuity. Patients with hypertensive disorders of pregnancy should follow longitudinally with a primary care provider who has been provided a copy of the discharge summary and postpartum clinic consult notes. For patients without an established primary care provider, facilitation with warm hand offs to a new primary care provider may improve transition of care

Example follow-up options:

- Follow-up recommended with primary care clinician, unless they have another indication for subspecialty follow-up.
- Follow-up recommended with specialty clinic (cardiologist, nephrologist, and/or obstetrician). These follow-up visits can also occur with an advanced practice provider.
- Follow-up recommended within specialty clinic, depending on indication of initial visit. Patients may continue to receive care in the postpartum hypertension clinic for ongoing blood pressure management, evaluation of cardiac symptoms or findings, or ongoing cardiac risk prevention as needed.

## e. Referrals

### General Guidelines

*It is important to incorporate shared decision making to determine the best way to engage and schedule a patient (timing, virtual/in-person)*

- Some programs refer all patients with a hypertensive disorder of pregnancy (including gestational hypertension, chronic hypertension, preeclampsia, and eclampsia),

whereas other refer only the highest-risk patients, such as those with preeclampsia with severe features or those discharged on at least one antihypertensive medication.

- Having medical staff discuss the clinic with the patient prior to discharge may help improve attendance.
- Discharge summaries should be completed within 24 hours of discharge to allow for effective postpartum follow-up care and interdisciplinary communication.
- Postpartum navigators (doula, nurse, community health worker) can be advantageous for helping patients navigate postpartum systems including scheduling appointments and initiating in postpartum remote monitoring programs.

### Types of referrals

**Automated/default referral** at the time of discharge from delivery hospitalization (*preferred*)

- Patients may be scheduled prior to hospital discharge:

  This can be facilitated by an electronic health record order that automatically goes to a scheduler and provides a time back to the ordering team for incorporation into discharge paperwork

- Some clinics give patients the option to opt-out of the clinic by signing the bottom of the referral form prior to discharge (https://www.themothersprogram.ca/for-care-providers/the-postpartum-maternal-health-clinic-handbookc).
- Eligible patients may also be identified through systematic chart review (example: for those who remain on antihypertensive medication) and may be contacted after discharge to schedule an appointment. This may be more feasible for clinics embedded into an established remote blood pressure monitoring or research program.

**Clinician referral**

- Obstetrics, primary care, or cardiology teams can refer from hospital or post-partum visit as needed.
- Electronic medical record order – specific postpartum hypertension clinic
- Contact postpartum hypertension clinic staff for scheduling

**Patient self-referral**

- Patients are given information about the clinic with instructions on how to self-schedule a visit. Patient outreach consists of a brochure that can be given during their hospitalization, or a text message delivered as part of a remote BP monitoring program, which may also include a link to a brief video that provides education and clinic information.
- Patients may find information online (through institution websites or advertisements about the clinic) and self-refer

## 2. Clinic activities

- Blood pressure measurement
- Weight and waist circumference measurement (may be sensitive to postpartum individuals)
- Assess obstetric history, contraception, and breastfeeding status
- Assess mental health using validated screening tools (PHQ-9, GAD-7)
- Assess social determinants of health
- Blood testing
    - Lipid profile to be performed after 12 weeks postpartum, if not performed in the year prior to pregnancy
    - Diabetes screening: oral glucose tolerance test (within 12 weeks of delivery), fasting glucose, or HbA1c if seen later in postpartum period, if not performed in early prenatal period
    - Some clinics routinely order HbA1c, lipid profile, high sensitivity CRP, creatinine and a urinalysis (microalbumin creatinine ratio)
    - Patients who do not complete recommended blood work within 8 weeks of their appointment can be sent reminders
- Cardiac testing (echocardiogram, cardiac CT, coronary artery calcium score, stress test) should be ordered on an as-needed basis
- Referrals should be generated as needed and can be considered for:
    - Dietician
    - Weight loss center
    - Nephrology
    - Endocrinology
    - Mental and Behavioral health
    - Lactation
    - Social work
- Estimate of 10-year (if over age 40), 30-year, or lifetime risk of cardiovascular disease
- Assessment of cardiovascular risk factors
- Blood pressure and other preventive medication management
- Review medication safety
- Counseling
    - Education about best practices in home blood pressure monitoring
    - Symptoms of heart failure, stroke, myocardial infarction, and postpartum preeclampsia
    - Heart healthy lifestyle counseling using ACC's Heart Healthy or AHA Life's Essential 8 framework

# 3. Coding and billing

## Coding options based on Clinic structure:

### Multidisciplinary clinic model, combined coding

Cardiology/primary care/nephrology and obstetrics/maternal fetal medicine at same visit

- Patient is seen by both an internal medicine specialist or subspecialist and obstetrician/maternal fetal medicine
- Coding is for a single subspecialist visit, billed to reflect time and intensity of the visit.
- One subspecialist department bill for each patient. Every other patient is scheduled on either the internal medicine subspecialists OR obstetrician department, such that each department would bill for 4 or 5 patients per clinic session (half of the 8-10 scheduled patients).
- Each subspecialist documents separate note, but within the same encounter and one combined consult letter is sent to PCP, obstetrician, and referring provider.

### Multidisciplinary clinic model, separate coding

Cardiology/primary care/nephrology and obstetrics/maternal fetal medicine at same visit or separate visit dates

- The patient is scheduled and seen separately by internal medicine specialist or subspecialist and obstetrician.
- For the internal medicine specialist/subspecialist, coding is often time-based to reflect the intensity of the visit or can use medical decision-making-based codes.
- For the obstetrician, coding and billing may be wrapped into a postpartum bundle or, if seen beyond 6 weeks postpartum, should be reflective of time and intensity of the visit.

### Specialized postpartum clinic, located within Obstetric clinic

- Patients is scheduled into a dedicated postpartum clinic located in the obstetrics clinic
- Coding and billing may be wrapped into a postpartum bundle or is time-based to reflect the intensity of the visit or can use medical decision-making-based codes.

### Cardiology clinic, located within Cardiology/Primary Care/Nephrology clinic space

- Patients are scheduled into a general cardiology template.
- Coding is often time-based to reflect the intensity of the visit or can use medical decision-making based codes.

**Billing Codes:**

## Clinic billing

- Professional fees are billed to the patient's insurance.
- Relevant ICD-10 codes

| | |
|---|---|
| I10.0 | Essential hypertension |
| I11 | Hypertensive heart disease |
| I10.11 | Malignant essential hypertension |
| I15 | Secondary hypertension |
| E11.0 | Diabetes with hypertension |
| I12 | Hypertension and CKD |
| O11.9 | Chronic HTN with superimposed preeclampsia |
| 013.3 | Gestational hypertension |
| Z87.59 | History of gestational hypertension |
| 014* | Preeclampsia (with multiple specific codes related to the timing of gestation, and complications such as HELLP) |
| 014.90 | Unspecified preeclampsia, unspecified trimester |
| O14.94 | Unspecified preeclampsia, complicating childbirth |
| O15* | Eclampsia |
| R03.0 | Elevated BP without a diagnosis of hypertension |
| Z13.6 | Encounter for screening for cardiovascular disorders |
| Z30.09 | Encounter for counseling regarding contraception |
| Z31.69 | Encounter for preconception consultation |
| Z39.2 | Postpartum state |
| Z71.89 | Cardiac risk counseling |

For further information regarding ICD-10 Billing codes: https://www.cms.gov/Medicare/Coding/ICD10

## Coding and billing for remote blood pressure monitoring

- Self-Measured Blood Pressure (SMBP) Codes and Description:

  For clinics with remote blood pressure monitoring or blood pressure texting programs, additional billing via a telemedicine visit can be submitted. Note that these billing codes may not be applicable for individuals insured by Medicaid in certain states.

  **Code 99473** SMBP using a device validated for clinical accuracy; patient education/training and device calibration. This code may be used when a patient receives education and training (facilitated by clinical staff) on the set-up and use, and can only be reported once per device.

  **Code 99474** This code may be used for data collection and interpretation in the following scenarios:

  - Patient submits 12 blood pressure readings (separate self-measurements of two readings one minute apart, twice daily over a 30-day period (minimum of 12 Readings), or

- Based on these documented blood pressure readings the physician or other qualified health care professional creates or modifies the treatment plan. The treatment plan must be documented in the medical record and communicated back to the patient, either directly or through clinical staff.

## Remote physiologic monitoring codes and descriptions

- These are other digitally stored data/remote physiologic monitoring CPT codes that can be used for SMBP. Remote physiologic monitoring (RPM) codes are for collecting and interpreting physiologic data that is digitally stored and/or transmitted by the patient and/or caregiver to the physician or qualified healthcare professional.

- Code Description

  **Code 99453** Remote monitoring of physiologic parameter(s) (e.g., weight, blood pressure, pulse oximetry, respiratory flow rate), initial; set-up and patient education on use of equipment

  **Code 99454** Device(s) supply with daily recording(s) or programmed alert(s) transmission, each 30 days

  **Code 99457** Remote physiologic monitoring treatment management services, 20 minutes or more of clinical staff/physician/other qualified healthcare professional time in a calendar month requiring interactive communication with the patient/caregiver during the month

  **Code 99458** Remote physiologic monitoring treatment management services, clinical staff/physician/other qualified health care professional time in a calendar month requiring interactive communication with the patient/caregiver during the month; additional 20 minutes

  **Code 99091** Collection and interpretation of physiologic data (e.g. ECG, blood pressure, glucose monitoring) digitally stored and/or transmitted by the patient and/or caregiver to the physician or other qualified healthcare professional, qualified by education, training, licensure/regulation (when applicable) requiring a minimum of 30 minutes of time, each 30 days

For more information, please refer to this handout from the AMA:

https://www.ama-assn.org/delivering-care/hypertension/7-step-smbp-quick-guide-coding#:~:text=CPT%20code%2099474%20can%20be,readings%20required%20each%20billing%20period.

Part III

# Obstetric considerations after hypertensive disorders of pregnancy

## 1. Contraception

Provision of effective contraception is strongly recommended for all pregnancy capable patients being prescribed teratogenic medications which include an angiotensin-converting-enzyme (ACE) inhibitor, angiotensin receptor blocker (ARB), or mineralocorticoid receptor antagonist. Because of their excellent safety and efficacy, long-acting reversible contraceptives are strongly recommended in appropriate candidates. Specifically, intrauterine devices and progesterone subdermal implants are not contraindicated in patients with hypertension. Contraceptive methods are organized into three tiers based on their failure rates with typical use:

**Tier I:* Failure rate <1%**

Long-acting reversible contraceptives:

- Copper Intrauterine Device (IUD)
- Etonogestrel subdermal Implant
- Levonorgestrel Intrauterine Device (IUD)

Permanent sterilization:

- Male sterilization
- Tubal Ligation

**Tier II: Failure Rate 6-12%**

Combined Hormonal Contraceptive (CHC) Pill**

Depot Medroxyprogesterone Injection*

Diaphragm*

Progestin Only Pill*

Transdermal Patch**

Vaginal Ring**

**Tier III:* Failure Rate 18-28%**

Barrier methods

Fertility awareness method / natural family planning

Spermicide

Withdrawal

*No contraindications in hypertension

** Absolute contraindication in those with uncontrolled HTN (BP ³ 160/10 mmHg). Caution should be exercised when using CHCs in persons with hypertension with a BP > 140/90 mmHg. Increased risk of thromboembolism among CHC users, transdermal patch, and vaginal ring among those with hypertension, tobacco use, and age >35.

For additional information, please see our contraception Appendix or any of the following resources.

**Resources on contraception options:**

Lindley KJ, Bairey Merz CN, Davis MB, Madden T, Park K, Bello NA; American College of Cardiology Cardiovascular Disease in Women Committee and the Cardio-Obstetrics Work Group. Contraception and Reproductive Planning for Women With Cardiovascular Disease: JACC Focus Seminar 5/5. J Am Coll Cardiol. 2021 Apr 13;77(14):1823-1834. doi: 10.1016/j.jacc.2021.02.025. PMID: 33832608; PMCID: PMC8041063.

https://www.cdc.gov/reproductivehealth/contraception/pdf/summary-chart-us-medical-eligibility-criteria_508tagged.pdf

Cameron N, Blyler CA, Bello NA. Oral Contraceptive Pills and Hypertension: A Review of Current Evidence and Recommendations. Hypertension. Online ahead of print February 2023.

http://www.reproductiveaccess.org/wp-content/uploads/2014/06/2020-09-contra-choices.pdf

## 2. Pregnancy and delivery debriefing

Patients with hypertensive disorders of pregnancy often deliver preterm and have traumatic birthing experiences. The postpartum hypertension clinic can provide a space to debrief some of the complications related to having had a hypertensive disorder of pregnancy. Often patients may need referral to behavioral health specialists, particularly in the setting of fetal complications which can include neonatal ICU admission and fetal demise.

Clinicians should be sensitive to the possibility of fetal/neonatal demise and when appropriate inquire about the health of patients' babies and provide compassionate care during the vulnerable postpartum period. If the baby is still in the neonatal ICU, appointments in the early postpartum setting are often more convenient for patients who are often visiting the medical center on a daily basis.

## 3. Screening for depression

Screening for depression and anxiety in all individuals in the postpartum period is critical to ensure appropriate diagnosis and referral for treatment. Screening can be done using the Edinburgh Postnatal Depression Scale (https://perinatology.com/calculators/Edinburgh%20Depression%20Scale.htm), which is available in over 50 languages and is easy to score. Individuals who have a positive screen should be referred to behavioral health for further management.

## 4. Risk of recurrence

The risk of recurrence for any hypertensive disorder of pregnancy is around 21%. Concomitant HELLP syndrome or small for gestational age infant increase that risk. For individuals with a history of a hypertensive disorder of pregnancy, low dose aspirin should be given in subsequent pregnancies starting at 12 weeks to reduce the risk of preterm preeclampsia.

Source:

van Oostwaard MF, Langenveld J, Schuit E, et al. Recurrence of hypertensive disorders of pregnancy: an individual patient data metaanalysis. Am J Obstet Gynecol. 2015 May;212(5):624.e1-17. doi: 10.1016/j.ajog.2015.01.009. Epub 2015 Jan 9. Erratum in: Am J Obstet Gynecol. 2015 Sep;213(3):400. PMID: 25582098.

# Postpartum blood pressure management

## 1. Postpartum Hypertension: Medication Titration

### Approach to Initiation

Postpartum patients who were on antihypertensive agents PRIOR to pregnancy:

- Restart their home regimen prior to discharge, provided they are in line with patient's breastfeeding and contraception plans (i.e. potential teratogenicity of ACE inhibitor and angiotensin receptor blocker (ARB) should be discussed and patients on these medications should ideally have reliable forms of contraception)

Postpartum patients NOT on antihypertensive therapy:

- If SBP ≥ 140mmHg and or DBP ≥ 90mmHg on 2+ occasions* (or alternative threshold per institution) → START THERAPY

*In the first 2 weeks postpartum, elevated BP should be confirmed with at least 2 measurements > 4 hours apart

**Selecting Antihypertensive Medications:** (see table)

First-line agents, regardless of breastfeeding status:

**1)** Nifedipine 30mg XL daily or amlodipine 5mg daily

- Better adherence with once daily dosing regimen
- In line with ACC/AHA recommendation that a calcium channel blocker should be one of the first line agents for hypertension management
- Contraindications: known hypersensitivity reaction, heart failure with reduced ejection fraction, unstable angina

**2)** Enalapril 5mg daily (especially for those with pregestational diabetes)

- In line with ACC/AHA's recommendations that ACE inhibitor should be considered as first line therapy in diabetic patients with hypertension
- Can increase to BID dosing if needed
- Contraindications: history of angioedema with ACE inhibitor, pregnancy (counsel patients on contraception and document plan)
- Increased risk of hyperkalemia, consider checking basic metabolic panel after initiation if patient at high risk for hyperkalemia

- Avoid initiation in patients with evidence of acute kidney injury. Although there is no creatinine at which ACE inhibitor is absolutely contraindicated, the risk of hyperkalemia may outweigh the potential benefits of the agent.

**3)** Labetalol 100mg two or three times daily

- Commonly used during pregnancy and postpartum with good safety data
- Requires at least BID dosing, more typically TID or QID
- Disadvantage of more challenging dosing regimen

Second-line agents:

**If breastfeeding:** hydrochlorothiazide, carvedilol, spironolactone, furosemide

**If not breastfeeding:** Chlorthalidone, ACE inhibitor (besides enalapril), ARB

### Important caveats when initiating antihypertensives:

Provision of effective contraception is strongly recommended for all patients prescribed an ACE inhibitor, ARB, angiotensin receptor blocker neprilysin inhibitor (ARNI), or mineralocorticoid receptor antagonist (MRA) who are capable of pregnancy.

When starting ACE inhibitor/ARB – ensure they have received counseling on ACE inhibitor and contraindication to pregnancy and have a documented birth control plan.

While enalapril is considered safe with lactation, caution should be exercised in mothers who are breastfeeding premature infants with underdeveloped nephrons given the risk of renal toxicity. This is particularly important in mothers requiring higher doses of enalapril.

While hydrochlorothiazide and furosemide are safe with lactation, diuretics may decrease breastmilk production in a dose-dependent fashion. Hydrochlorothiazide is unlikely to decrease breastmilk production at doses of 25mg or less per day while furosemide is unlikely to decrease breastmilk production at doses of 20mg or less per day.

In the early postpartum period, the patient's obstetric team may manage hypertension. It is appropriate to transition to cardiology or primary care management of blood pressure at any point between 0 and 12 weeks postpartum. Typically, this transition occurs sometime between weeks 2-6, depending on the institution.

**If blood pressure is sustained >= 160/110 mmHg or >=160/110mmHg with associated symptoms** In the postpartum period (<6 weeks after delivery), patients should be triaged to be seen in an obstetrics maternal evaluation unit or emergency room to reduce the risk of stroke or other significant morbidity or mortality. In the immediate postpartum period, evaluation for postpartum preeclampsia should be urgently undertaken.

## Medication Therapy Options

| Drug Name and Class | Starting Dose | Maximum Dose | Titration Interval in Stable Patients | Lactation Safety |
|---|---|---|---|---|
| **First-line agents** | | | | |
| Nifedipine XL (CCB) | 30mg daily | 120mg/day or 60 mg BID | Q5-7 days | SAFE RID 2.3-3.4% |
| Enalapril (ACEi) | 5mg daily | 40mg/day or 20mg BID | Q5-7 days | SAFE RID 1.1% |
| Amlodipine (CCB) | 5mg daily | 10mg/day | Q5-7 days | SAFE RID 1.7-4.3% |
| Labetalol (beta blocker) | 200mg TID | 2400mg/day | Q2-3 days | SAFE RID 3.6% |
| **Alternative agents** | | | | |
| Hydrochlorothiazide (thiazide diuretic) | 12.5mg daily | 50mg/day | Q3-5 days | SAFE RID 0.6-1.2%<br>May decrease breastmilk production (dose >25mg/day) |
| Furosemide (loop diuretic) | 10mg daily | 160mg per day (can be BID, TID dosing) | Q3-5 days | SAFE May decrease breastmilk production (dose >20 mg/day) |
| Hydralazine (direct vasodilator) | 10mg QID | 200mg/day | Q2-3 days | SAFE RID 0.77-3% |
| Spironolactone (MRA) | 12.5mg daily | N/A | Q14-30 days | SAFE RID 2-4.3% |
| Verapamil (CCB) | 80mg daily | 360mg daily | Q5-7 days | SAFE RID <1% |
| Carvedilol (beta blocker) | 6.25 mg BID | 25mg BID (or 50mg BID if weight >100kg) | Q2-3 days | Limited safety data, likely low risk |
| Metoprolol tartrate (beta blocker) | 12.5mg BID | 200mg BID | Q2-3days | Limited safety data, likely low risk |
| Bisoprolol (beta blocker) | 2.5mg daily | 20mg/day | Q5-7 days | Limited safety data |
| Chlorthalidone (thiazide diuretic) | 12.5 mg daily | 100mg/day | Q7-14 days | RID 1.9-18.1% Present in breast milk, may decrease breastmilk production |
| Eplerenone (MRA) | 25mg daily | N/A | Q14-30 days | RID 0.01-3.39% Limited safety data |
| Lisinopril (ACEi) | 2.5mg daily | 40mg/day | Q5-7 days | Limited safety data |
| Losartan (ARB) | 25mg daily | 100mg/day | Q5-7 days | Limited safety data |
| Valsartan (ARB) | 20mg daily | 320mg/day | Q5-7 days | Limited safety data |
| Clonidine (alpha antagonist) | 0.1mg BID, or 0.1mg patch weekly | 2.4mg PO total daily, or two 0.3mg patch/24hrs | Q7 days | RID 0.9-7.1% Limited safety data, present in breastmilk and likely negatively affects lactation |

* RID stands for the relative infant dose and indicates lactational safety. RID levels < 10% are considered safe. Hale's Medications & Mothers' Milk Online Consultant was used to extrapolate RID%. This resource provides RID calculations which are based on studies that consist of larger data (+/- AUC) and is weight-normalized (when weight provided). If maternal weights were not published, 70kg average body weight was used in calculations and daily milk intake of 150mL/kg/day by infant.

## Approach to Medication Titration

**Goal blood pressure:** average < 140/90 mmHg early postpartum, then < 130/80 mmHg longitudinally*

Monitor BP 1-2x/day in the first 2 weeks postpartum
If well controlled, space out measurements to 2-3x/week

| If average SBP ≤ 110-120 mmHg and DBP ≤ 60-70 mmHg | If average SBP < 140 mmHg and DBP < 90 mmHg but > 120/70 mmHg | If average SBP ≥ 140 mmHg or DBP ≥ 90 mmHg, and SBP ≤ 160 or DBP 110 mmHg | If SBP ≥ 160 mmHg or DBP ≥ 110 mmHg on 2 separate readings, sustained over 15 minutes AND/OR if patient develops persistent headache, severe abdominal pain, shortness of breath, or vision changes – |
|---|---|---|---|
| ↓ | ↓ | ↓ | ***Patient should CONTACT physician and undergo urgent assessment*** |
| Start decreasing antihypertensive medications in reverse order of up titration | Continue current antihypertensive medications | Initiate/Increase antihypertensive medications | |

*Approach to medication titration and blood pressure goals should be discussed with obstetrician and maternal fetal medicine colleagues at your institution. Optimal blood pressure goals throughout the 4th trimester is currently an evidence-free space and different guidelines may depend on clinic and remote blood pressure monitoring models b institution.

## Recommended approach to increasing medications in stable patients

**Initial dose: Nifedipine XL 30mg daily**

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, increase to 60mg daily

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, increase to 90mg daily

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, add second antihypertensive agent

OR

Increase to max dose 120mg daily or 60mg twice daily

**Initial dose: Enalapril 5mg daily or 2.5mg twice daily**

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, can double dose to 10mg daily or 5mg twice daily

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, can double dose to 20mg daily or 10mg twice daily

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, consider addition of second antihypertensive agent

OR

Increase to max dose 40mg daily or 20mg twice daily

**Initial dose: Amlodipine 5mg daily**

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, increase to 10mg daily

If BP SBP remains ≥ 140 or DBP ≥ 90 after 5-7 days, add second antihypertensive agent

OR

**Initial dose: Labetalol 100mg or 200mg three times daily**

If BP SBP remains ≥ 140 or DBP ≥ 90 after 2-3 days, increase to 200mg or 300mg three times daily

If BP SBP remains ≥ 140 or DBP ≥ 90 after 2-3 days, increase to 400mg three times daily

If BP SBP remains ≥ 140 or DBP ≥ 90 after 2-3 days, consider addition of second antihypertensive agent

OR

Increase dose in increments of 100mg three times daily (max 2400mg/day). If patient reports symptoms suggesting intolerance (i.e., headache, fatigue, hypotension) further titration should be limited

## Recommended approach to decreasing medications

If average BP < 110-120/60-70 mmHg:

If on **nifedipine**, decrease by 30mg and if on 30mg HOLD and monitor for 1 week and call with status.

OR

If on **labetalol**, decrease by 100 or 200mg BID-TID (depending on desired BP change)

OR

If on **both nifedipine and labetalol**, start with decrease in nifedipine if dose >90mg; otherwise start with decrease in labetalol as above

OR

If on **carvedilol**, decrease dose by half (i.e. decrease 12.5mg BID to 6.25mg BID) or hold if on 3.125mg

OR

If on **enalapril** daily or BID, decrease dose by half

OR

If on **amlodipine**, decrease dose by half

## 2. Remote Blood Pressure Monitoring Programs

There is robust evidence demonstrating the use of home blood pressure monitoring, or self-measured blood pressure monitoring (SMBP), with clinical support can significantly lower blood pressure. The recently published POP-HT trial showed the benefit of remote blood pressure monitoring in reducing postpartum blood pressure.[18] The use of these programs alongside a postpartum hypertension clinic can help identify hypertensive patients and make blood pressure control more convenient and accessible for patients.

**What is SMBP?** One complete cycle of SMBP includes a minimum of 12 total blood pressure readings (separate measurements of two readings performed one minute apart, twice daily) over a 30-day period. The average systolic and diastolic blood pressure is then calculated from these data points and utilized as a diagnostic tool to drive treatment decisions. This cycle has been defined according to billing standards (ICD codes), but they may not be applicable for individuals insured by Medicaid in certain states.

**Key elements:**

- Validated blood pressure device with appropriate-sized cuff (https://www.validatebp.org/)
- Patient centered training on when and how to accurately measure blood pressure (https://www.cardiosmart.org/topics/high-blood-pressure/assets/fact-sheet/how-to-take-your-blood-pressure-at-home)
- Patient-facing application to log and transmit data to the electronic medical record (texting, smart phone application, website, manual entry into patient portal)
- Clinical support team to review data and adjust medications as needed
- Algorithm to determine the frequency of data review and treatment titration

### Interface with the electronic medical record

Many different data management solutions/technology partners are available to review patient-generated health data. There are some home blood pressure measurement devices which are capable of digital data storage and can transfer data through a cellular or internet network either to the patient's smart device or to a secure cloud-based portal for use by the care team. There are other software vendors which may offer a variety of integration capabilities with the electronic health record. Selection of specific software options should be based on the desired requirements of each clinic. Patients can also enter home blood pressures into health system patient portals.

## Oversight team

The remote blood pressure monitoring oversight team typically includes a clinical support team (nurse, pharmacist, nurse practitioner) who can follow specific protocols for blood pressure management in the postpartum period. Physician oversight can be performed by obstetricians, cardiologists, or primary care clinicians.

## Frequency of monitoring

In the early postpartum period, <2 weeks after delivery, most programs will recommend checking at least daily blood pressures, often twice daily. After 2 weeks postpartum, can decrease frequency to once daily or a few times per week. Once established a steady state with stable blood pressure measurements, most programs will space out measurements to 2-3 times per week.

## Length of program

Many programs have remote blood pressure monitoring for 2-6 weeks postpartum. Other programs extend up to 1 year postpartum. The duration of postpartum remote blood pressure monitoring is unique based on medical system factors and typically chosen based on available resources to support the oversight team and planned follow-up time period. Often, remote blood pressure monitoring programs are supported by hospitals or health care systems.

Part V

# Clinic example documents, dot phrases, and other materials

## 1. Clinic notes

**The following templates are formatted for Epic systems.

**Postpartum Clinic New Visit**

### Postpartum Cardiovascular Clinic

**Provider:**

**Patient Name:** @NAME@
**DOB:** @DOB@
**Date of Service:** @ED@
**Primary OB/GYN:** ***

**PROBLEM LIST**

{1:1::"Hypertension","Chronic Hypertension with Superimposed Preeclampsia","Preeclampsia","Preeclampsia with Severe Features","HELLP Syndrome","Eclampsia","Gestational Hypertension"}

***

Today I had the pleasure of seeing @NAME@ at the *** Postpartum Cardiovascular Clinic for follow up after her recent delivery complicated by {1:1::"Hypertension","Chronic Hypertension with Superimposed Preeclampsia","Preeclampsia","Preeclampsia with Severe Features","HELLP Syndrome","Eclampsia","Gestational Hypertension"}. She is now postpartum day # *** from a {1:1::"NSVD","operative vaginal delivery","Cesarean delivery"}. Delivery complications included:

{1:1::"***","None"}.

Baby {1:1::"has","has not"} been in the neonatal ICU.

Discharge antihypertensive medications included: ***
The following changes have been made to her medication regimen since discharge: {1:1::"none","***"}
Medication Adherence: # of missed doses per week – {1:1::"<1 dose","1-3 doses",">3 doses","Not taking any of her prescribed medications","N/A, no antihypertensive medications are prescribed"}
Barriers to adherence include: ***

She {1:1::"has","has not"} been enrolled in remote blood pressure monitoring. {1:1::"Home blood pressures have been ranging from ***.","She has not been checking her blood pressure at home."}

She {1:1::"has","has not"} been readmitted to the hospital since delivery. Reason for hospital readmission was: {1:1::"hypertension","heart failure","stroke/TIA","arrhythmia","seizure","hemorrhage","infection","N/A","***"}

She reports the following cardiac symptoms since discharge.:
Chest pain/pressure: {1:1::"yes","no"}
Shortness of breath/DOE: {1:1::"yes","no"}
PND: {1:1::"yes","no"}
Orthopnea: {1:1::"yes","no"}
Lower extremity edema: {1:1::"yes","no"}
Cough: {1:1::"yes","no"}
Headache: {1:1::"yes","no"}
Visual changes: {1:1::"yes","no"}

She {1:1::"is","is not"} breastfeeding.
She has chosen the following for contraception: ***

## PAST MEDICAL HISTORY

Thyroid Disorder: {1:1::"yes","no"}
Depression/Anxiety/Mental Illness: {1:1::"yes","no"}
Diabetes: {1:1::"yes","no"}
DVT/PE: {1:1::"yes","no"}
Hypertension: {1:1::"yes","no"}
Autoimmune Disorder: {1:1::"yes","no"}
Hyperlipidemia: {1:1::"yes","no"}
Lupus/SLE: {1:1::"yes","no"}
CKD: {1:1::"yes","no"}
Asthma: {1:1::"yes","no"}
Infectious Disease (HIV, Hep B, Hep C):{1:1::"yes","no"}
Arrhythmia: {1:1::"yes","no"}
Seizure Disorder: {1:1::"yes","no"}
Cancer: {1:1::"yes","no"}
Sickle Cell Disease:{1:1::"yes","no"}
Obesity: {1:1::"yes","no"}
Migraines: {1:1::"yes","no"}
OSA:{1:1::"yes","no"}
CAD/MI: {1:1::"yes","no"}
CHF: {1:1::"yes","no"}
Other: {1:1::"yes","no"}
Stroke: {1:1::"yes","no"}

## PAST OBSTETRIC HISTORY

G***P***

Prior Preeclampsia: {1:1::"yes","no"}
Prior Gestational Hypertension: {1:1::"yes","no"}
Prior Gestational Diabetes: {1:1::"yes","no"}
Preterm Birth: {1:1::"yes","no"}
Fetal growth restriction or small for gestational age: {1:1::"yes","no"}
Large for gestational age: {1:1::"yes","no"}
Miscarriage/spontaneous abortion: {1:1::"yes","no"}
Stillbirth/Intrauterine fetal demise: {1:1::"yes","no"}
Placental abruption: {1:1::"yes","no"}

## MEDICATIONS

@ENCMED@

## ALLERGY

@ALG@

## SOCIAL HISTORY

Education: ***
Occupation: ***
Marital Status: ***
Activity Level: {1:1::"Sedentary","Moderately Active","Active"}
Tobacco: {1:1::"Current - *** PPD","Former","Never"}
Drugs: {1:1::"Current","Former","Never"}
    If yes, Type: {1:1::"***","N/A"}
Alcohol: {1:1::"Current","Former","Never"}

## FAMILY HISTORY

Sudden death:{1:1::"yes","no"}
CAD: {1:1::"yes","no"}
Stroke: {1:1::"yes","no"}
MI: {1:1::"yes","no"}
CHF: {1:1::"yes","no"}
DM:{1:1::"yes","no"}
HTN: {1:1::"yes","no"}
PVD: {1:1::"yes","no"}
Dyslipidemia:{1:1::"yes","no"}
Arrhythmia: {1:1::"yes","no"}

## REVIEW OF SYSTEMS

{x:19197::"Review of systems per HPI and otherwise all other review of systems negative.","Unable to obtain due to ***"}

## PHYSICAL EXAM

@VS@

**Edinburgh Depression Score: ***

Vital signs, weight, and intake/output reviewed.

Gen: well developed, well nourished, no acute distress

HEENT: moist mucus membranes, no jugular venous distension, no carotid bruits

Chest: Lungs clear to auscultation bilaterally

Cardiac: Regular rate and rhythm, no murmurs/gallops/rubs

Abdomen: Positive bowel sounds, soft, nontender, nondistended, no hepatosplenomegaly

Extremities: Warm and well-perfused, positive pulses, no cyanosis, clubbing, or edema

Skin: No rashes

Neurologic: nonfocal exam

Psychiatric: alert and oriented

## DIAGNOSTIC DATA

@RESULAST(sodium:1,kplasma:1,potassium:1,creatinine:3)@

@RESULAST(hgb:2)@

@RESULAST(tsh:1)@

@RESULAST(chol:1,trig:1,hdl:1,ldlcalc:1)@

@RESULAST(ntprobnp:1)@

@RESULAST(hba1c:1)@

EKG: ***

TTE: ***

**ASSESSMENT & PLAN**

1) History of {1:1::"Hypertension","Chronic Hypertension with Superimposed Preeclampsia","Preeclampsia","Preeclampsia with Severe Features","HELLP Syndrome","Eclampsia","Gestational Hypertension"} – Blood pressure today is {1:1::"at goal","above goal","low"}. Goal blood pressure <130/80 mmHg. The following medication adjustments were made:
   - {1:1::"none","***"}.
   - If BP trends down (average < 130/80), will plan to decrease medications starting with__
   - She was counseled to check home blood pressures daily and call with any symptoms of headache, visual changes, dyspnea, pnd, orthopnea, worsening edema, chest pain, lightheadedness/syncope, or palpitations.
   - She was counseled to call with any blood pressure >160/100 or <100 systolic.
   - Encouraged low sodium, DASH diet (provided information)

2) Future cardiovascular risk with history of preeclampsia/ hypertensive disorder of pregnancy: A history of preeclampsia is associated with an increased risk of hypertension and future cardiovascular disease including hypertension, coronary artery disease, heart failure, and stroke. Severe preeclampsia caries an even greater risk, with about 50% of patients developing stage I hypertension at one year after delivery. We discussed these risks today and recommend the following for aggressive cardiovascular risk factor screening and modification. We discussed the importance of lifelong annual blood pressure monitoring.
   - Blood pressure management as above
   - Cholesterol and diabetes screening (FBG at 6 weeks and lipid screening 12 weeks after delivery.)
   - Encouraged diet and exercise to achieve a BMI less than 25
   - Advised regular exercise regimen - at least 30 minutes of moderate activity 5 times a week

3) Pregnancy Planning – The benefits of LARC have been discussed. She has chosen the following for contraception: *** and is/is not interested in future pregnancies. We discussed that she is at risk for preeclampsia in future pregnancies and we would recommend ASA for preeclampsia prophylaxis should she become pregnant again in the future.

I have spent more than *** minutes caring for pt today of which 50% of time was spent in counseling.

Thank you very much for letting me participate in the care of this patient. I will plan to see her back at the Postpartum Cardiovascular Clinic in follow up in ***. Please feel free to call with any questions or concerns.

Sincerely,

@SIGENC@

## New Postpartum Telehealth Visit

### Postpartum Cardiovascular Clinic

**Provider:**

**Patient Name:** @NAME@
**DOB:** @DOB@
**Date of Service:** @ED@
**Primary OB/GYN: ***

This was a telemedicine visit with @NAME@ which took place via {AMB METHOD OF COMMUNICATION:39852}. During the visit, I was located at { ***"remote office via secure VPN"} and the patient was located {1:1::"at home", "at work"} in {1:1::"TN, "MO", "IL", "KY"}. The session started at *** and ended at ***.

The patient has been informed that the visit may not be secure and acknowledged the information.

After being given an opportunity to ask questions about and discuss this type of visit, the patient verbally consented to proceeding with the telephone / video visit. The patient understands that this service replaces an office visit and they may be billed and/or responsible for any applicable copayments.

**PROBLEM LIST**

{1:1::"Hypertension","Chronic Hypertension with Superimposed Preeclampsia","Preeclampsia","Preeclampsia with Severe Features","HELLP Syndrome","Eclampsia","Gestational Hypertension"}

***

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Hypertension"}. She is now postpartum day # *** from a {1:1::"NSVD","operative vaginal delivery","Cesarean delivery"}. Delivery complications included: {1:1::"***","None"}.

Discharge antihypertensive medications included: ***
The following changes have been made to her medication regimen since discharge: {1:1::"none","***"}
Medication Adherence: # of missed doses per week – {1:1::"<1 dose","1-3 doses",">3 doses","Not taking any of her prescribed medications","N/A, no antihypertensive medications are prescribed"}
Barriers to adherence include: ***

She {1:1::"has","has not"} been enrolled in remote blood pressure monitoring. {1:1::"Home blood pressures have been ranging from ***.","She has not been checking her blood pressure at home."}

She {1:1::"has","has not"} been readmitted to the hospital since delivery. Reason for hospital readmission was: {1:1::"hypertension","heart failure","stroke/TIA","arrhythmia","seizure","hemorrhage","infection","N/A","***"}

She reports the following cardiac symptoms since discharge.:
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Shortness of breath/DOE: {1:1::"yes","no"}
PND: {1:1::"yes","no"}
Orthopnea: {1:1::"yes","no"}
Lower extremity edema: {1:1::"yes","no"}
Cough:{1:1::"yes","no"}
Headache: {1:1::"yes","no"}
Visual changes: {1:1::"yes","no"}

She {1:1::"is","is not"} breastfeeding.
She has chosen the following for contraception: ***

## PAST MEDICAL HISTORY

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Depression/Anxiety/Mental Illness: {1:1::"yes","no"}
Diabetes: {1:1::"yes","no"}
DVT/PE: {1:1::"yes","no"}
Hypertension: {1:1::"yes","no"}
Autoimmune Disorder: {1:1::"yes","no"}
Hyperlipidemia: {1:1::"yes","no"}
Lupus/SLE: {1:1::"yes","no"}
CKD: {1:1::"yes","no"}
Asthma: {1:1::"yes","no"}
Infectious Disease (HIV, Hep B, Hep C):{1:1::"yes","no"}
Arrhythmia: {1:1::"yes","no"}
Seizure Disorder: {1:1::"yes","no"}
Cancer: {1:1::"yes","no"}
Sickle Cell Disease:{1:1::"yes","no"}
Obesity: {1:1::"yes","no"}
Migraines: {1:1::"yes","no"}
OSA:{1:1::"yes","no"}
CAD/MI: {1:1::"yes","no"}
CHF: {1:1::"yes","no"}
Other: {1:1::"yes","no"}
Stroke: {1:1::"yes","no"}

## PAST OBSTETRIC HISTORY

G***P***

Prior Preeclampsia: {1:1::"yes","no"}
Prior Gestational Diabetes: {1:1::"yes","no"}
Preterm Birth: {1:1::"yes","no"}
IUGR/SGA: {1:1::"yes","no"}

## MEDICATIONS

@ENCMED@

## ALLERGY

@ALG@

## SOCIAL HISTORY

Education: ***
Occupation: ***
Marital Status: ***
Activity Level: {1:1::"Sedentary","Moderately Active","Active"}
Tobacco: {1:1::"Current - *** PPD","Former","Never"}
Drugs: {1:1::"Current","Former","Never"}
    If yes, Type: {1:1::"***","N/A"}
Alcohol: {1:1::"Current","Former","Never"}

## FAMILY HISTORY

Sudden death: {1:1::"yes","no"}
CAD: {1:1::"yes","no"}
Stroke: {1:1::"yes","no"}
MI: {1:1::"yes","no"}
CHF: {1:1::"yes","no"}
DM:{1:1::"yes","no"}
HTN: {1:1::"yes","no"}
PVD: {1:1::"yes","no"}
Dyslipidemia:{1:1::"yes","no"}
Arrhythmia: {1:1::"yes","no"}

## REVIEW OF SYSTEMS

{x:19197::"Review of systems per HPI and otherwise all other review of systems negative.","Unable to obtain due to ***"}

## PHYSICAL EXAM

This was a telehealth visit.
{1:1::"@VS@","Patient unable to obtain vital signs."}

## DIAGNOSTIC DATA

@RESULAST(sodium:1,kplasma:1,potassium:1,creatinine:3)@
@RESULAST(hgb:2)@
@RESULAST(tsh:1)@
@RESULAST(chol:1,trig:1,hdl:1,ldlcalc:1)@
@RESULAST(ntprobnp:1)@
@RESULAST(hba1c:1)@

EKG: ***

TTE: ***

## ASSESSMENT & PLAN

4) History of {1:1::"Hypertension","Chronic Hypertension with Superimposed Preeclampsia", "Preeclampsia","Preeclampsia with Severe Features","HELLP Syndrome","Eclampsia","Gestational Hypertension"} – Blood pressure today is {1:1::"at goal","above goal","low"}. Goal blood pressure <130/80 mmHg. The following medication adjustments were made:
   - {1:1::"none","***"}.
   - If BP trends down (average < 130/80), will plan to decrease medications starting with__
   - She was counseled to check home blood pressures daily and call with any symptoms of headache, visual changes, dyspnea, pnd, orthopnea, worsening edema, chest pain, lightheadedness/syncope, or palpitations.
   - She was counseled to call with any blood pressure >160/100 or <100 systolic.
   - Encouraged low sodium, DASH diet (provided information)

5) Future cardiovascular risk with history of preeclampsia/hypertensive disorder of pregnancy: A history of preeclampsia is associated with an increased risk of hypertension and future cardiovascular disease including hypertension, coronary artery disease, heart failure, and stroke. Severe preeclampsia caries an even greater risk, with about 50% of patients developing stage I hypertension at one year after delivery. We discussed these risks today and recommend the following for aggressive cardiovascular risk factor screening and modification. We discussed the importance of lifelong annual blood pressure monitoring.

   - Blood pressure management as above
   - Cholesterol and diabetes screening (FBG at 6 weeks and lipid screening 12 weeks after delivery.)
   - Encouraged diet and exercise to achieve a BMI less than 25
   - Advised regular exercise regimen - at least 30 minutes of moderate activity 5 times a week

6) Pregnancy Planning – The benefits of LARC have been discussed. She has chosen the following for contraception: *** and is/is not interested in future pregnancies. We discussed that she is at risk for preeclampsia in future pregnancies and we would recommend ASA for preeclampsia prophylaxis should she become pregnant again in the future.

Thank you very much for letting me participate in the care of this patient. I will plan to see her back at the Postpartum Cardiovascular Clinic in follow up in ***. Please feel free to call with any questions or concerns.

Sincerely,

@SIGENC@

## Preeclampsia long term cardiovascular counseling

Due to her prior history of ***, she is at increased risk for future cardiovascular events including coronary artery disease, stroke, hypertension, and heart failure. I recommend annual blood pressure assessment and routine lipid and diabetes screening per national guidelines. I recommend lifestyle modifications including diet and exercise to reduce modifiable risk factors for future cardiovascular events. Per the 2018 ACC/AHA lipid guidelines, it is reasonable to consider initiation of statin therapy in individuals >40 years of age when their calculated 10-year ASCVD (atherosclerotic cardiovascular disease) risk rises above 5% or if they have an additional indication for statin therapy including elevated LDL or concomitant dyslipidemia and diabetes.

## BP Counseling instructions

Check blood pressure *** daily

Call for {x:19197::"multiple blood pressures over 140 or any blood pressure over 160","***"}

Call for any headache, vision changes, chest pain, or difficulty breathing

Send in blood pressure log ***

## Order Favorites

Lipid battery

Hemoglobin A1C

Basic metabolic panel

Transthoracic echocardiogram

Nutrition consult

Pulmonary consult

Bariatric surgery consult

Cardiac rehab consult

## SmartPhrase for Letter to Primary Care and Referring Physicians

Dear ***,

It was a pleasure to meet with your patient, @name@, at the Postpartum Hypertension Clinic, a multi-disciplinary clinic dedicated to the care of individuals with hypertensive disorders of pregnancy. This letter is in follow-up to your patient's recent visit following a pregnancy complicated by a hypertensive disorder. We know that the development of a hypertensive disorder of pregnancy is considered a pregnancy-related cardiovascular risk enhancer and helps to identify individuals who are at future risk of developing cardiovascular disease such as heart attack, heart failure, or stroke.

At the time your patient was seen, we recommended obtaining lab work including a lipid panel and hemoglobin A1C. We provide details on any additional cardiovascular risk factors that we identified in our attached notes.

We discussed making lifestyle modifications to improve their cardiovascular risk. Specifically, we talked about increasing baseline activity level and developing a regular exercise regimen. The American Heart Association (AHA) recommends at least 30 minutes of moderate intensity physical activity 5 days a week. We also discussed maintenance of a healthy weight with a BMI of less than 25. We recommended a heart healthy diet. We strongly encouraged complete cessation of all tobacco products.

Please find the details of our discussion and recommendations in the attached copy of our visit note.

If you would like more information related to pregnancy, the postpartum and future health, you can explore the following website https://www.preeclampsia.org/care-providers.

Yours sincerely,

Provider

Part VI

# Patient education

## Postpartum Hypertension: Patient Education Resources

### What is preeclampsia?

Both during and after pregnancy a person's heart goes through many changes as more blood is needed to reach the baby and placenta. Many individuals develop issues with blood pressure related to these changes that can start during pregnancy or up to six months after delivery. These blood pressure issues range from gestational hypertension, which is typically a mild elevation in blood pressure, to preeclampsia or eclampsia, which can result in more severe elevations in blood pressure. Preeclampsia and eclampsia are life threatening conditions which can lead to seizures, stroke, multi-organ failure, or death of the mother and/or baby. It is important to know how to identify preeclampsia and the spectrum of hypertensive disorders of pregnancy.

- What is Preeclampsia?
- Preeclampsia warning signs
- Video: Postpartum Preeclampsia

### Hypertensive disorders of pregnancy and long-term cardiovascular risk

Individuals who develop a hypertensive disorder of pregnancy are at an increased risk of developing high blood pressure and future heart disease, which includes heart attack, stroke, and death from cardiovascular causes. It is important to be aware of these risks and take preventative steps to avoid the development of such disorders.

- Preeclampsia and heart disease – Fact Sheet
- Preeclampsia Foundation: Heart disease and stroke: Tips for lowering risks
- Preeclampsia Foundation: Long term health patient worksheet
- Blogpost about the risk of heart disease and stroke

## How to measure and log blood pressure

It is important to consistently and accurately check your blood pressure in order to diagnose and manage a hypertensive disorder of pregnancy. Checking your blood pressure requires that you have a working blood pressure cuff that has been validated (setup to have accurate readings). The following resources include information and guidance on blood pressure, how to measure blood pressure, as well as a variety of blood pressure logs to track your blood pressure at home:

ACC Blood Pressure Factsheet

CDC - Blood pressure Factsheet

How to measure your Blood Pressure

Blood Pressure Log - English version 1

Blood Pressure Log - English version 2

Blood Pressure Log - Spanish

Videos: Here are some helpful videos that highlight how to use a blood pressure cuff and specific details on how to measure blood pressure:

How to use your blood pressure cuff

How to measure your blood pressure

## Lifestyle approaches to managing blood pressure

For patients who are interested in lifestyle changes to improve their blood pressure postpartum, there are several online resources on diet and exercise.

The National Institute of Health (NIH) has a detailed guide on lowering blood pressure with the DASH (Diet Approaches to Stop Hypertension) diet that includes tips for gradual change, serving size guidelines, a meal and physical activity tracker, and a sample meal plan.

National Institutes of Health (NIH): Your Guide to Lowering Your Blood Pressure with DASH

The American College of Obstetricians and Gynecologists (ACOG) provides a frequently asked questions page with guidelines on how to exercise in the postpartum period.

American College of Obstetricians and Gynecologists (ACOG): Exercise After Pregnancy Frequently Asked Questions

The Centers for Disease Control and Prevention (CDC) also has brief guidelines on exercise during pregnancy and the postpartum period.

CDC: Physical Activity Recommendations for Pregnant and Postpartum Women - patient handout

CDC: Physical Activity Recommendations for Pregnant and Postpartum Women - website

The ACC and the American Heart Association (AHA) both provide general guidelines on how exercise can improve blood pressure. Although these resources are not specific to hypertensive disorders of pregnancy, they include general guidance about the recommended amount of exercise, practical tips for increasing physical activity, and the estimated impact on blood pressure.

ACC's Move More

AHA's Getting Active to Control High Blood Pressure

The ACC and AHA have handouts with tips on lifestyle changes related to diet, physical activity, blood pressure, weight, cholesterol, blood sugar, sleep, and tobacco (Life's Essential 8). There are also a few resources listed below about weight loss and safely getting back to a healthy weight in the postpartum period.

ACC's Healthy Living

AHA's Life's Essential 8

Postpartum weight loss

Postpartum nutrition after preeclampsia

## Miscellaneous visit resources

Resources for clinic visits include tools for clinicians providing education to patients during the visit, as well as resources that patients can use to engage their providers in a discussion about their blood pressure management.

The California Maternal Quality Care Collaborative's Hypertensive Disorders of Pregnancy Quality Improvement Toolkit includes several patient education checklists to assist clinicians in providing patients with education about hypertensive disorders of pregnancy, including a discharge education checklist and several checklists for the postpartum period.

California Maternal Quality Care Collaborative's (CMQCC) Patient Education Checklists

The Preeclampsia Foundation provides a patient worksheet on making a plan for health beyond pregnancy. This worksheet allows patients to track information about their pregnancy and delivery, blood pressure, weight and BMI, cholesterol, and A1c.

Preeclampsia Foundation: Long term health patient worksheet

The Centers for Disease Control and Prevention (CDC) has several handouts for patients to use during their visit to engage their clinicians with questions about managing their blood pressure. The handouts are available in both English and Spanish. Although these resources are not specific to hypertensive disorders of pregnancy, the questions and checklists are relevant for individuals with postpartum hypertension.

CDC's My first Blood Pressure Visit - patient handout (English)

CDC's My first Blood Pressure Visit - patient handout (Spanish)

CDC's Managing My Blood Pressure - patient handout (English)

CDC's Managing My Blood Pressure - patient handout (Spanish)

## Social media and research engagement

The Preeclampsia Foundation offers resources for individuals and families to get involved, find support, and join research studies about preeclampsia.

https://www.preeclampsia.org/get-involved

https://www.preeclampsia.org/get-support

https://www.preeclampsia.org/research

There are Facebook groups and other online communities for individuals who have experienced preeclampsia and other hypertensive disorders of pregnancy. (Posted links do not reflect affiliation or endorsement)

https://www.facebook.com/groups/preeclampsia/

https://www.facebook.com/groups/15287593571/

https://www.facebook.com/groups/1532613527040433/

Part VII

# Appendices and References

## 1. Acknowledgements

**Funding:**

The development of this toolkit was supported by an American College of Cardiology Chapter-Section Grant.

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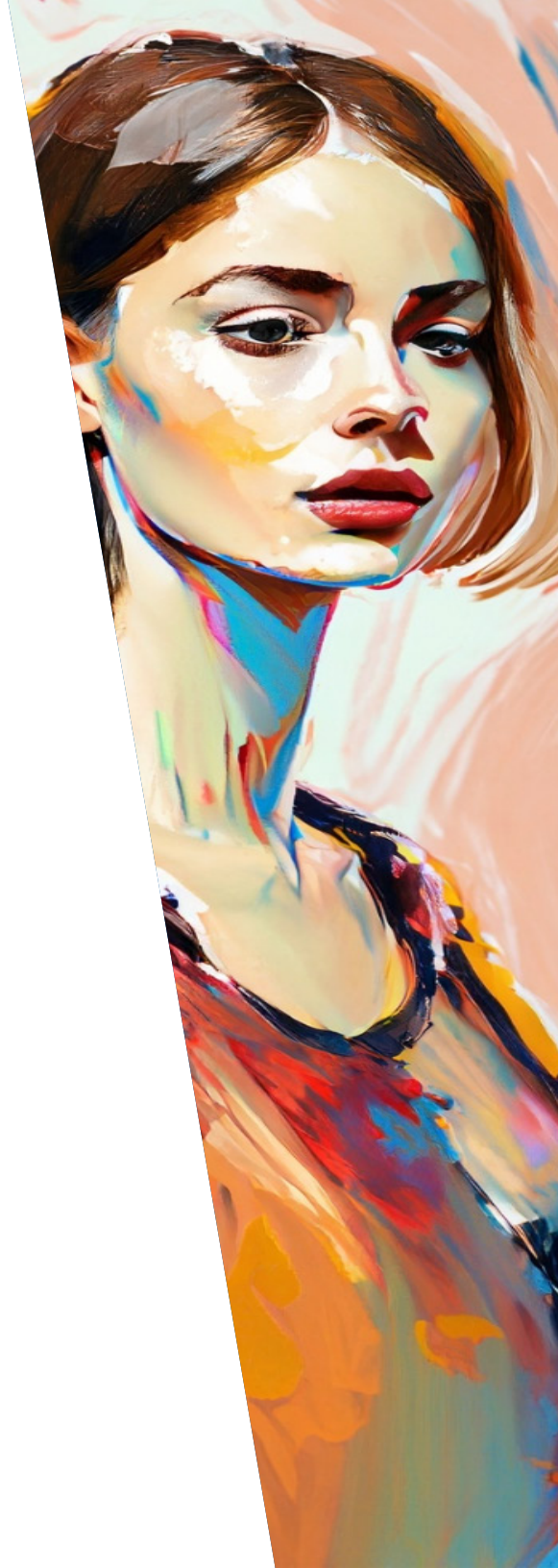

# 2. Contraception Appendix

### Tier I:

**Copper Intrauterine Device:** The copper IUD is a small non-hormonal device in the shape of a "T" which is placed inside the uterus to prevent pregnancy. It can stay in the uterus for up to 10 years and has a failure rate of 0.8%. The major side effect related to the copper IUD is menstrual cramping, spotting and irregular bleeding which often improves over time.

**Etonogestrel subdermal Implant:** This is a thin rod inserted under the skin in the upper arm. The rod releases a hormone called progestin that is released over the course of three years before it requires removal. The typical failure rate is 0.1%. The most common side effect is irregular bleeding, and less commonly, weight gain and acne.

**Levonorgestrel Intrauterine Device:** This device is shaped like a 'T" that is placed inside your uterus by your doctor. It will release a small amount of a hormone, progestin, each day to significantly reduce the chance of getting pregnant. The device can stay in your uterus for up to 12 years, depending on the specific device. The failure rate is very low, typically 0.1-0.4%. Common side effects include irregular spotting and bleeding which will often improve over time. While there is a risk of uterine perforation or IUD expulsion with IUD, these rates are very low (perforation 0.1%, expulsion 3-11%).

**Sterilization:** This is a permanent form of birth control whereby either a female undergoes a surgical procedure, most often a tubal ligation, or the male partner can undergo a vasectomy. This is associated with less than 1% failure rate. This is considered a permanent form of birth control and is not intended to be reversible.

### Tier II:

**Combined Hormonal Contraceptive Pill:** This pill contains estrogen and progestin. The medication is taken at the same time every day to prevent pregnancy. The typical failure rate is 7%. Rare side effects include blood clots, stroke, hypertension, and migraines. Estrogen-containing contraceptive devices can raise blood pressure and thus are typically avoided in patients with hypertensive disorders.

**Depot Medroxyprogesterone Injection:** This is an injection of a hormone called progestin which is given every three months. The typical failure rate is 4%. Common side effects include irregular bleeding or light spotting and weight gain.

**Diaphragm/cervical cap:** This is a type of barrier method where a shallow cup is placed inside the vagina to block sperm. Diaphragms come in several different sizes and a doctor should recommend the right size for a proper fit. The typical failure rate is 17%.

**Progestin Only Pill:** This is a daily pill, similar to the combined pill, but only contains a single hormone, progestin. It is often called the "mini-pill." It can be an option for women who cannot take estrogen. This treatment requires strict adherence and the pill must be taken at the same time every day. The typical failure rate is 7%.

**Transdermal Patch:** This is a small skin patch that can be worn on the abdomen, buttocks, or upper body. It releases both progestin and estrogen into the body. The patch is replaced once a week for three weeks, and on the fourth week no patch is applied in order to have a menstrual period. The typical failure rate is 7%. Common side effects include headaches, nausea, skin irritation or breast tenderness.

**Vaginal Ring:** This is a flexible ring that is placed inside the vagina. The ring releases progestin and estrogen. At the end of three weeks, the ring is removed for the week you have a period, and then the ring is replaced. The typical failure rate is 7%. Side effects may include headaches, nausea, vaginal discharge, or breast tenderness.

### Tier III:

**Fertility awareness method:** Fertility pattern refers to the number of days a month when you are most likely to get pregnant. If you have a regular menstrual cycle there are nine or more fertile days a month. The fertility awareness method is understanding when these fertile days occur and avoiding sexual intercourse on those days. It is important to remember that while getting pregnant outside of this fertile window may be less likely, it is still possible. Failure rate is 2-23%.

**Spermicide:** This a product that works by killing sperm to prevent pregnancy after sexual intercourse. Spermicide comes in many different forms, as a foam, gel, cream, film, suppository, or tablet. They are inserted into the vagina prior to intercourse and left in place for 6-8hrs after intercourse. Typical failure rate is 21%.

### Resources on contraception options:

Lindley KJ, Bairey Merz CN, Davis MB, Madden T, Park K, Bello NA; American College of Cardiology Cardiovascular Disease in Women Committee and the Cardio-Obstetrics Work Group. Contraception and Reproductive Planning for Women With Cardiovascular Disease: JACC Focus Seminar 5/5. J Am Coll Cardiol. 2021 Apr 13;77(14):1823-1834. doi: 10.1016/j.jacc.2021.02.025. PMID: 33832608; PMCID: PMC8041063.

https://www.cdc.gov/reproductivehealth/contraception/pdf/summary-chart-us-medical-eligibility-criteria_508tagged.pdf

Cameron N, Blyler CA, Bello NA. Oral Contraceptive Pills and Hypertension: A Review of Current Evidence and Recommendations. Hypertension. Online ahead of print February 2023.

http://www.reproductiveaccess.org/wp-content/uploads/2014/06/2020-09-contra-choices.pdf

# 3. Adverse Pregnancy Outcome Definition Appendix

Hypertensive disorders of pregnancy and other adverse pregnancy outcomes (APOs) increase the risk of developing cardiovascular risk factors and cardiovascular disease. APOs such as preeclampsia are considered cardiovascular risk enhancers in the updated 2018 cholesterol guidelines, and an understanding of APOs can inform patient-physician discussions about cardiovascular risk and lifestyle modifications. Therefore, it is critical for providers in specialties such as cardiology, primary care, and family medicine to elicit a history of APOs from their female patients. Below we list the definitions of key APOs that have been shown to be associated with long-term cardiovascular risk.

### Adverse Pregnancy Outcomes Associated with Cardiovascular Disease:

**Preeclampsia:** Blood pressure elevation ≥140/90 mmHg after 20 weeks gestation, measured four hours apart on two occasions, and new onset proteinuria (defined as 0.3 g or more of protein in a 24 hr urine collection, single voided urine protein/creatinine ratio ≥ 0.3, or dipstick reading of 2+) OR, in the absence of proteinuria, new onset hypertension with new onset of any of the following: thrombocytopenia (platelets < 100x109/L), renal insufficiency (serum creatinine >1.1mg/dl or doubling of serum creatinine), impaired liver enzymes (transaminases elevated to twice the normal concentration), pulmonary edema, or neurologic symptoms (including new onset headache unresponsive to medications or visual symptoms).

**Severe preeclampsia:** Preeclampsia as above, along with any of the following: severe hypertension (blood pressure elevation ≥160/110 mmHg on two occasions at least four hours apart after 20 weeks gestation), thrombocytopenia (platelets < 100x109/L), renal insufficiency (serum creatinine >1.1mg/dl or doubling of serum creatinine), impaired liver enzymes (transaminases elevated to twice the normal concentration) or severe persistent right upper quadrant pain, pulmonary edema, or neurologic symptoms including new onset headache unresponsive to medications or visual symptoms).

**HELLP syndrome:** Hemolysis, elevated liver enzymes, thrombocytopenia (<100/109/L), with or without high blood pressure, considered a variant of severe preeclampsia.

**Eclampsia:** New onset seizures in a patient meeting preeclampsia diagnosis as above.

**Gestational hypertension:** Blood pressure elevation ≥140 mmHg systolic or 90 mmHg diastolic after 20 weeks gestation measured on two separate occasions at least four hours apart when pre-pregnancy blood pressure was normal.

**Gestational diabetes:** Glucose intolerance of variable degree with the onset or first recognition during pregnancy. Typically, a screening oral glucose tolerance test is performed between 24-28 weeks of gestation and an abnormal response is defined as a fasting glucose >92mg/dl, followed by 1 hour post 75g oral glucose load >180mg/dl, or 2hr post 75g oral glucose load >153mg/dl.

**Preterm birth:** Delivery before 37 weeks gestation

**Low birth weight:** Weight at birth of less than 2500 g (5 lb 8 oz)

**Small for gestational age:** Neonate weight below the 10th percentile for the gestational age

**Large for gestational age:** Neonate whose weight is above the 90th percentile for the gestational age

**Fetal growth restriction (formerly intrauterine growth restriction):** Fetus whose estimated weight is less than the 10th percentile for gestational age

**Stillbirth/Intrauterine fetal demise:** Fetal demise after the 20th week of gestation

**Miscarriage/spontaneous abortion:** Spontaneous pregnancy loss before 20 weeks of gestation

**Placental abruption:** Premature separation of the placenta from the uterus before delivery

## Additional Adverse Pregnancy Outcomes:

**Macrosomia:** A larger than average newborn, weighing more than 4000 g (8 lb 13 oz) regardless of gestational age

**Postpartum hemorrhage:** Cumulative blood loss of greater than or equal to 1,000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours after the birth process

**Premature rupture of membranes (PROM):** Rupture of the amniotic sac prior to the onset of labor

**Preterm premature rupture of membranes (PPROM):** Rupture of the amniotic sac prior to the 37th week of pregnancy

**Uterine rupture:** Spontaneous, complete division of all three layers of the uterus. Associated with high rates of fetal and maternal morbidity.

**Puerperal sepsis:** Infection of the genital tract occurring at any time between the onset of the rupture of membranes or labor and the 42nd day postpartum

**Oligohydramnios:** Disorder of amniotic fluid resulting in decreased amniotic fluid for gestational age

**Polyhydramnios:** Excessive amniotic fluid in the uterus during pregnancy

**Early neonatal death:** Neonatal death occurring during the first 7 days of life

Sources:

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