



## Patient education: Preeclampsia (Beyond the Basics)

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### INTRODUCTION

There are four major causes of hypertension (high blood pressure) during pregnancy:

- **Preeclampsia** – Most women with preeclampsia gradually develop hypertension and excess protein in the urine (proteinuria). Some women develop hypertension and other signs of the disease (eg, low platelet count) without developing proteinuria. Signs of preeclampsia can appear anytime during the last half of pregnancy (after 20 weeks of pregnancy), or in the first few days postpartum, and typically resolve within several days after delivery.
- **Chronic hypertension** – Chronic hypertension is defined as a blood pressure  $\geq 140/90$  mmHg diagnosed before pregnancy or before the 20<sup>th</sup> week of pregnancy.
- **Preeclampsia superimposed upon chronic hypertension** – This term describes a woman with chronic hypertension who develops signs of preeclampsia after the 20<sup>th</sup> week of pregnancy.
- **Gestational hypertension (also called transient hypertension)** – Women with gestational hypertension have all of the following:
  - Blood pressure  $\geq 140/90$  mmHg
  - No protein in the urine (no proteinuria)
  - Pregnancy of at least 20 weeks duration
  - No previous history of high blood pressure

Over time, some pregnant women with gestational hypertension will develop proteinuria or other signs of preeclampsia and be considered preeclamptic, while others will be diagnosed with chronic hypertension because of persistently high blood pressure three months after delivery.

This topic will review high blood pressure related to preeclampsia, the treatment of preeclampsia, and the possible complications of preeclampsia.

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### WHAT IS PREECLAMPSIA?

Preeclampsia is characterized by the new onset of hypertension and proteinuria after 20 weeks of gestation. Some patients have new-onset hypertension with end-organ dysfunction (ie, preeclampsia affecting the liver, kidney, platelets, lungs, brain), with or without proteinuria ([table 1](#)).

Preeclampsia is sometimes called by other names, including toxemia, pregnancy-induced hypertension, and preeclamptic toxemia. A woman is said to have eclampsia if she has one or more seizures and has no other conditions that could have caused the seizure.

In the United States, preeclampsia occurs in 3 to 4 percent of pregnancies. Ninety percent of these cases occur after 34 weeks of gestation, and mostly at term (after 37 weeks of gestation).

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### WHO IS AT RISK FOR PREECLAMPSIA?

Women with one or more of the following characteristics are at increased risk for developing preeclampsia:

- First pregnancy (excluding miscarriages and abortions)
- Chronic hypertension, kidney disease, lupus, or diabetes prior to pregnancy
- Gestational diabetes
- Multiple gestation (eg, twins or triplets)
- A family history of preeclampsia in a sister or mother
- A previous history of preeclampsia
- Age under 20 years and possibly age over 35 to 40 years
- Obesity

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## WHAT CAUSES PREECLAMPSIA?

Abnormalities in the development of blood vessels of the uterus and placenta very early in pregnancy appear to initiate a cascade of events that eventually cause preeclampsia. Signs and symptoms of preeclampsia occur, in part, due to changes inside the small arteries that decrease blood flow to major maternal organs such as the kidney, brain, and liver, as well as the placenta. Why this happens to some women and not others is not completely understood.

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## WHAT ARE THE SIGNS AND SYMPTOMS OF PREECLAMPSIA?

Many women with preeclampsia have no symptoms of the disease. For this reason, prenatal visits to check for high blood pressure are scheduled frequently in the last half of pregnancy.

**Maternal** — Most women with preeclampsia have mildly high blood pressure and a small amount of excess protein in the urine and do not experience any symptoms of the disease. Most of these women never develop more serious features of the disease; however, preeclampsia can worsen. This usually occurs over several days to weeks, but may occur more quickly. Severe features of preeclampsia consist of one or more of the following signs or symptoms. The symptoms may be subtle, so patients should not hesitate to mention any concerns about possible symptoms of preeclampsia to their healthcare provider.

Symptoms that preeclampsia has progressed to the severe stage of the disease:

- Persistent severe headache
- Visual problems (blurred or double vision, blind spots, flashes of light or squiggly lines, loss of vision)
- New shortness of breath (due to fluid in the lungs)
- Pain in the mid- or right-epigastrium (similar to heartburn)

Signs that preeclampsia has progressed to the severe stage of the disease:

- Blood pressure  $\geq 160/110$  mmHg. Women with blood pressures in this range have an increased risk of stroke.
- Abnormal kidney tests (eg, serum creatinine  $>1.1$  mg/dL)
- Low platelet count ( $<100,000$ )
- Liver abnormalities (detected by blood tests)
- Pulmonary edema (fluid in the lungs)

**Fetal** — Preeclampsia can impair the ability of the placenta to provide adequate nutrition and oxygen to the baby, which can have the following effects:

- Abnormal nonstress test or biophysical profile score
- Slowed growth of the baby, usually noted by an ultrasound examination

- Decreased amount of amniotic fluid around the baby, usually noted by an ultrasound examination
- Decreased blood flow through the umbilical cord, noted on Doppler tests (performed during ultrasound examination)

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## CAN PREECLAMPSIA BE PREVENTED?

There are no tests that reliably predict who will get preeclampsia, and there is no way to completely prevent it. Doctors may recommend that women who have risk factors that place them at high or moderate risk for developing preeclampsia take low-dose aspirin to reduce this risk [1]. Low-dose aspirin is usually started in the late first trimester and continued into the third trimester of pregnancy.

Both the American College of Obstetricians and Gynecologists and the United States Preventive Services Task Force have published guidelines for selecting women at high for developing preeclampsia who may benefit from taking low-dose aspirin during pregnancy [2,3]. Women at high risk include those with:

- Previous pregnancy with preeclampsia, especially early onset and with an adverse outcome
- Multifetal gestation
- Chronic hypertension
- Type 1 or 2 diabetes mellitus
- Renal disease
- Autoimmune disease (antiphospholipid syndrome, systemic lupus erythematosus)

Women who have multiple less prominent risk for preeclampsia may also be considered at high risk.

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## HOW IS PREECLAMPSIA TREATED?

The only cure for preeclampsia is delivery of the baby and placenta. Bedrest and medication can lower blood pressure and thus reduce the risk of stroke, but these treatments do not improve the underlying abnormalities in the mother's blood vessels and thus do not prevent progression of the disease.

The management of pregnancies complicated by preeclampsia depends on the gestational age and whether severe features of the disease are present. The method of delivery (vaginal or cesarean birth) depends upon a number of factors, such as the position of the baby, the dilation and effacement (thinning) of the cervix, and the baby's condition. In most situations, vaginal delivery is possible.

Oxytocin (Pitocin) is given intravenously to induce labor (stimulate the uterus to contract). If labor does not progress, or if complications develop that require the baby to be delivered quickly, a cesarean birth is usually performed. (See "Patient education: C-section (cesarean delivery) (Beyond the Basics)".)

**At term** — Pregnancies complicated by preeclampsia at  $\geq 37$  weeks (ie, term) are delivered to initiate resolution of the disease and minimize the risk of harm to the woman or her baby from worsening preeclampsia. Babies at or near term are not at high risk of complications from prematurity and usually will not need to spend time in a special care nursery.

**Before term** — If preeclampsia develops before term and there are no severe features of the disease, it may be possible to delay delivery to allow the baby more time to grow and mature. However, if severe features of preeclampsia develop, delivery is often necessary to prevent complications in the woman or her baby. The most common reasons for delivery in women with preeclampsia are listed in the table (table 2).

While delivery is being delayed, the woman and baby are closely monitored and steroids may be given:

- **Maternal monitoring** – When delivery is delayed, the mother and baby will be monitored. The woman may be admitted to the hospital or may be allowed to stay at home and have frequent office visits. Maternal monitoring usually includes frequent blood pressure measurements and blood tests to check liver and kidney function, and platelet counts.

Women who are monitored at home should call their healthcare provider immediately if any symptoms of severe disease develop. (See 'Maternal' above.)

- **Fetal monitoring** – Fetal monitoring includes a combination of nonstress tests and ultrasound examination.

Non-stress testing is performed to monitor the baby's condition. It is done by measuring the baby's heart rate with a small device that is placed on the mother's abdomen. The device uses sound waves (ultrasound) to measure the baby's heart rate over time, usually for 15 to 30 minutes. Normally, the baby's baseline heart rate should be between 120 and 160 beats per minute. Normally, an increased rate should occur periodically; the increase should be at least 15 beats per minute above the baseline heart rate for 15 seconds. The test is considered reassuring (reactive) if two or more fetal heart rate increases are seen within a 20 minute period. Further testing may be needed if these increases are not observed after monitoring for 40 minutes. In general, outpatients undergo fetal testing twice per week, while inpatient testing is often performed daily.

Ultrasound is used to monitor the baby's growth, assess its well-being, and evaluate blood flow through the umbilical cord (called a Doppler test). A biophysical profile assesses well-being by using ultrasound to evaluate the baby's movements, breathing activity, movement of the arms and legs, and amniotic fluid volume.

- **Steroids** – Babies delivered prematurely are at risk for breathing problems because their lungs may not be fully developed. Women who are likely to require preterm delivery (at or before 34 weeks of pregnancy) are usually given two steroid injections (eg, betamethasone) to speed fetal lung development. The steroids also decrease other potential complications of preterm birth, such as intraventricular hemorrhage (bleeding into the brain). The two injections are given 24 hours apart, and the full benefit of the treatment occurs 48 hours after the first injection.

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## WHAT HAPPENS DURING LABOR?

Because women with preeclampsia can develop eclampsia (seizures), most patients are treated with intravenous (IV) magnesium during labor and usually for 24 hours after delivery to prevent seizures. IV magnesium is safe for the baby.

Severe hypertension is treated with one or more IV high blood pressure medications to reduce the risk of a maternal stroke.

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## WHAT HAPPENS AFTER DELIVERY?

High blood pressure and protein in the urine resolve after delivery, usually within a few days. Mildly elevated blood pressure over a few weeks or months is not usually harmful. However, even after preeclampsia resolves, women who had preeclampsia are at higher risk for developing cardiovascular disease later in life than women who did not have preeclampsia. Severe hypertension should be treated, and some women will require a high blood pressure medication after being discharged from the hospital. This can be discontinued when the blood pressure returns to normal levels, usually within six weeks. Your provider may recommend monitoring blood pressure after discharge from the hospital either at his/her office or at home, and again in about 10 to 14 days to confirm resolution of hypertension.

Avoiding nonsteroidal antiinflammatory drugs (NSAIDs) for pain relief may help control persistent hypertension, as these drugs may increase blood pressure and adversely affect kidney function.

Blood pressure that continues to be elevated beyond 12 weeks after delivery is unlikely to be related to preeclampsia and may require long-term treatment. (See "Patient education: High blood pressure treatment in adults (Beyond the Basics)".)

Women who have preeclampsia appear to be at increased risk of cardiovascular disease later in life, including during the premenopausal period. They should discuss this risk with their health care provider. Lifestyle modifications (healthy diet, avoiding obesity and smoking) and management of lipid disorders, diabetes, and hypertension (if these disorders develop) can help to reduce the risk of cardiovascular problems.

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## WILL PREECLAMPSIA HAPPEN AGAIN IN FUTURE PREGNANCIES? Page: 5 of 7

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Women who do not develop preeclampsia in their first pregnancy are at low risk of developing it in a subsequent pregnancy.

Women with preeclampsia without severe features of the disease near term have only a 5 percent chance of developing it again. However, women who developed severe features of preeclampsia and were delivered before 30 weeks gestation have a high risk (up to 70 percent) of preeclampsia in future pregnancies.

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### SUMMARY

- Women with preeclampsia develop high blood pressure (greater than 140/90 mmHg) and generally have protein in their urine, although some women develop other features of the disease without proteinuria. This can occur anytime during the last half of pregnancy (after 20 weeks of gestation) or in the first few days after delivery.
- Preeclampsia occurs in 3 to 4 percent of pregnancies in the United States. It is not known why some women develop preeclampsia while others do not. Currently, there are no tests that can reliably predict who will get the disease, and there is no way to completely prevent it. Taking low-dose aspirin in the late first trimester through the third trimester appears to lower the risk of developing preeclampsia in women at high risk of developing the disease.
- The majority of women with preeclampsia have no symptoms. The disease can worsen and develop severe features characterized by the following signs and symptoms ([table 3](#)).
- A pregnant woman should immediately call her healthcare provider if any of the signs or symptoms of severe disease develop, or if she has decreased fetal activity, vaginal bleeding, abdominal pain, or frequent uterine contractions.
- The only cure for preeclampsia is delivery of the baby and placenta. Reduced physical activity, but not strict bed rest, and taking high blood pressure medication can lower the blood pressure but will not stop preeclampsia from worsening or reduce the risk of its complications.
- If tests monitoring the mother's or baby's condition show concerning results, the healthcare provider may recommend delivery. A vaginal delivery is often possible.
- Because women with preeclampsia can develop seizures (called eclampsia), most women are treated with an anticonvulsant medication. Magnesium sulfate is the drug most commonly used to prevent seizures. It is safe for both mother and baby. It is given intravenously to the mother during labor and usually for 24 hours after delivery.
- High blood pressure and protein in the urine resolve after delivery, usually within a few days. However, some women require medication to reduce high blood pressure after being discharged from the hospital.
- Most women who experience preeclampsia without severe features will not have it again in a future pregnancy. The risk of recurrence is higher in women with severe features of preeclampsia, especially when they occur in the second trimester.
- Women who develop preeclampsia appear to be at increased risk of developing cardiovascular disease later in life, so regular health care may be particularly important in this group of patients.

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### WHERE TO GET MORE INFORMATION

Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site ([www.uptodate.com/patients](http://www.uptodate.com/patients)). Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed



below.

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**Patient level information** — UpToDate offers two types of patient education materials.

**The Basics** — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

Patient education: Preeclampsia (The Basics)

Patient education: Swelling (The Basics)

Patient education: High blood pressure and pregnancy (The Basics)

Patient education: HELLP syndrome (The Basics)

Patient education: Having twins (The Basics)

Patient education: Prenatal care (The Basics)

**Beyond the Basics** — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

Patient education: C-section (cesarean delivery) (Beyond the Basics)

Patient education: High blood pressure treatment in adults (Beyond the Basics)

**Professional level information** — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

Acute kidney injury (acute renal failure) in pregnancy

Preeclampsia: Clinical features and diagnosis

Critical illness during pregnancy and the peripartum period

Eclampsia

Expectant management of preeclampsia with severe features

Gestational hypertension

Headache in pregnant and postpartum women

HELLP syndrome

Maternal adaptations to pregnancy: Hematologic changes

Management of hypertension in pregnant and postpartum women

Preeclampsia: Management and prognosis

Preeclampsia: Pathogenesis

Early pregnancy prediction of preeclampsia

Preeclampsia: Prevention

Short-term complications of the preterm infant

The following organizations also provide reliable health information.

- National Library of Medicine

([www.nlm.nih.gov/medlineplus/healthtopics.html](http://www.nlm.nih.gov/medlineplus/healthtopics.html))

- The Mayo Clinic

([www.mayoclinic.com](http://www.mayoclinic.com))

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**Literature review current through:** Jul 2017. | **This topic last updated:** Jul 31, 2017.

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## References

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