KING'S College LONDON

ACTION ON PRE-ECLAMPSIA
PROMOTING SAFER PREGNANCY

NIHR | Collaboration for Leadership in Applied Health Research and Care South London

High blood pressure in pregnancy decision aid

This information booklet aims to support pregnant women with high blood pressure, their families, carers and to aid healthcare professionals to discuss treatment options versus 'watch and wait'.

What is high blood pressure in pregnancy?

High blood pressure is a reading of 140/90mmHg or more. 10 in 100 pregnant women have high blood pressure during pregnancy. 2 of these 10 women will already have high blood pressure at the start of pregnancy (pre-existing high blood pressure), whilst the rest (8 out of the 10) have high blood pressure that starts after 20 weeks of pregnancy (gestational high blood pressure)[1].

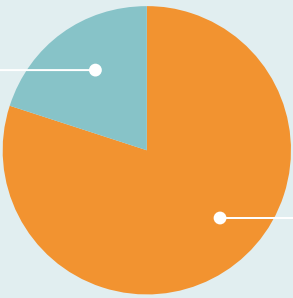
Having high blood pressure in pregnancy means blood pressure is more likely to become very high (severely high blood pressure)[1]

How many women have high blood pressure in pregnancy?

1:10

women have high blood pressure in pregnancy

of these



80%

will develop high blood pressure for the first time in pregnancy

20%

will be pre-existing high blood pressure

- High blood pressure 140/90mmHg or higher
- Severely high blood pressure 160/110mmHg or higher
- The top number is the systolic and the bottom number the diastolic
- *Only one of the numbers (systolic or diastolic) needs to be high, not both, for blood pressure to be considered high

Women with **severely high blood pressure**, and their babies, are more likely to have complications, for example, admission to neonatal unit after birth, than women with high or normal blood pressure.

- The chance of some women getting **severely high blood pressure** can be lowered by taking medication when blood pressure is high.
- Taking blood pressure medication may prevent pregnancy complications in some women and babies. However, there is no direct research that has shown this.
- Most pregnant women with high blood pressure take medication to lower their blood pressure.
- Some women prefer not to take blood pressure medicines in pregnancy. They choose to 'watch and wait' to see if their blood pressure becomes severely high before starting blood pressure medication.
- Some women will get severely high blood pressure, even if they take blood pressure lowering medication.

The choice of medication depends on the woman's medical history and takes into account the possible side-effects of each medication for her and her baby. As each woman responds differently to medication, it is important to discuss the treatment options with the doctor and choose an individualised treatment plan that's right for each woman.

Some women with high blood pressure can also get a condition called pre-eclampsia. This decision-aid also applies to treating high blood pressure as part of pre-eclampsia, for example, using the common medications. Some women with pre-eclampsia may need different or additional care such as admission to hospital or early delivery. More information about pre-eclampsia can be found in the 'other things to think about' section at the end of the aid.

What are the treatment options for ALL pregnant women with high blood pressure?

- No treatment (i.e. 'watch and wait' to see if your blood pressure becomes severely high before taking the blood pressure medicine)
- Treatment (taking medicines when your blood pressure is first high to stop severely high blood pressure developing)
  - Treatment choices in pregnancy are usually:
    - Labetalol
    - Nifedipine
    - Methyldopa
    - These medicines are known as anti-hypertensives.

What do the national NICE guidelines recommend the doctor and pregnant woman do?

For pregnant women with PRE-EXISTING high blood pressure:

- Stop taking angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) once pregnant because there is a higher chance of development problems in unborn babies if these medicines are taken during pregnancy.
  - ACE inhibitor examples: enalapril, lisinopril and ramipril
  - ARB examples: candesartan, losartan and valsartan

For ALL pregnant women with high blood pressure:

- Act to reduce the blood pressure if it is severely high (160/110mmHg)
- Offer treatment if the blood pressure is sustained above 140/90mmHg
  - **Labetalol**
  - **Nifedipine**
  - **Methyldopa**
- If on medication for high blood pressure, aim for a blood pressure of 135/85mmHg
- Review the medication if the blood pressure stays below 110/70mmHg

National guideline[1]

Can my blood pressure be too high?

Severely high blood pressure - seek medical help straight away if your blood pressure is above

160/110mmHg

When is it recommended that treatment is started?

When your blood pressure is sustained above

140/90mmHg

What blood pressure should I be aiming for?

If on medication aim for a blood pressure of

135/85mmHg

Can my blood pressure be too low?

A doctor should check your blood pressure tablets if your blood pressure is commonly below

110/70mmHg

What can you choose?

- No treatment ('watching and waiting' to see if your blood pressure becomes severely high before taking the blood pressure medicine)
- Treatment (taking medicines when your blood pressure first becomes high to try to stop severely high blood pressure happening)
  - Most women can choose between the following treatments:
    - **Labetalol**
    - **Nifedipine**
    - **Methyldopa**

The following tables will now explain the advantages and disadvantages of choosing to watch and wait or choosing to take blood pressure medicines, and the pros and cons of the three common blood pressure medicines. You may want to think about these questions and discuss them with your doctor:

- How important is it to me to prevent severely high blood pressure during my pregnancy?
- How important is it to me to avoid taking medicines during my pregnancy?
- How important is it to me to be involved in the choice of which medicine to take?
- Is there anything else important to consider for this decision (for example, stage of pregnancy and previous medication)?

If you have been prescribed a medicine that is not discussed in this decision aid, then talk to your doctor about your medicine. You could ask:

- What are the potential benefits to me and my baby?
- What (if any) are the potential harms or side-effects to me and my baby?
- Are there any alternative treatment options?

It is not possible to know for sure what will happen to you or your baby.

Table 1. **What are the pros and cons of treatment versus no treatment of high blood pressure in pregnancy?**

	No treatment or 'watchful waiting' up to 159/109mmHg	**Treatment from 140/90mmHg**
What is it?	No treatment can mean not taking blood pressure medicines at all during pregnancy but more commonly it means '**watching and waiting**' to see if blood pressure becomes severely high before starting on treatment.	Treatment usually means **starting medicine** if your blood pressure is commonly above **140/90mmHg**. Women will usually start on the lowest dose possible.
What does the treatment option involve?	Although a woman may decide not to take medicine for high blood pressure, she would still be offered regular blood pressure checks A woman can change her mind at any time and start medicine to treat high blood pressure.	Women are usually asked to take the medicine between two and four times a day. Medication does not need to be taken with food. Once a woman starts on treatment she will usually remain on it until after the birth unless the blood pressure stays below 110/70mmHg.
How likely is it that this option will prevent severely high blood pressure?	On average, in every 100 women with high blood pressure who chose 'watchful waiting'[2] 80 women **will not** get severely high blood pressure 20 women **will get** severely high blood pressure. See image on **page 9**.	On average, in every 100 women with high blood pressure who start treatment[2] 90 women **will not** get severely high blood pressure 10 women **will get** severely high blood pressure. See image on **page 9**.

	No treatment or 'watchful waiting' up to 159/109mmHg	Treatment from 140/90mmHg
What are the possible side-effects of treatment or no treatment for women?	By not taking blood pressure medicines women will not get any medication side-effects.	Common side-effects of taking blood pressure medicine include feeling tired or weak, dizzy or light-headed, having a headache and feeling sick (nausea).[3] Common side-effects happen to between 1 and 10 women in every 100. Individual medication side-effects can be found in **table 4**.
What are the possible side-effects of treatment or no treatment for babies and children?	Women may not take any blood pressure lowering medication or may take less during pregnancy. As some of this medication may get through to the baby in the womb, this chance will be reduced. This may be important because the long-term effect to the child of some of the blood pressure medicines used in pregnancy have not been studied well enough.[4] There are one or two small research papers that suggest the medicines may affect some of your child's development. More recent research finds no evidence that the medicines that are commonly used cause any harm to children, but this has not yet been studied in big enough numbers.[5]	Women will probably take more blood pressure-lowering medication during pregnancy than if she had chosen no treatment or 'watchful waiting'. Some of this medication may get through to the baby in the womb. The long-term effects to the child of some of the blood pressure medicines used in pregnancy have not been studied well enough.[4] There are one or two small research papers that suggest the medicines may affect some of your child's development. More recent research finds no evidence that the medicines that are commonly used cause any harm to children, but this has not yet been studied in big enough numbers.[5]

Severely high blood pressure

On average, in every 100 women with high blood pressure who chose 'watchful waiting'

80

women will not get severely high blood pressure

20

women will get severely high blood pressure

On average, in every 100 women with high blood pressure who start treatment

90

women will not get severely high blood pressure

10

women will get severely high blood pressure

Table 2. **How could severely high blood pressure compared to high blood pressure only affect you and your baby?**

	Women with severely high blood pressure	Women with high blood pressure only
How likely are babies to be born with complications?	On average, in every 100 women with severely high blood pressure (compared to high blood pressure only)[6] ■ 53 babies **will not** go to the neonatal unit ■ 47 babies **will go** to the neonatal unit. See image on **page 11**. Common reasons for needing to go to the neonatal unit are being born prematurely and having breathing problems. On average, in every 100 women with severely high blood pressure (compared to high blood pressure only)[6] ■ 76 babies will be born a normal weight ■ 24 babies will be born low birth weight. See image on **page 12**. Common reasons for being born low birth weight are being born prematurely and not growing enough in the womb.	On average, in every 100 women with high blood pressure (but not severely high)[6] ■ 77 babies **will not** go to the neonatal unit ■ 23 babies **will go** to the neonatal unit. See image on **page 11**. Common reasons for needing to go to the neonatal unit are being born prematurely and having breathing problems. On average, in every 100 women with high blood pressure (but not severely high)[6] ■ 85 babies will be born a normal weight ■ 15 babies will be born low birth weight. See image on **page 12**. Common reasons for being born low birth weight are being born prematurely and not growing enough in the womb.
How likely are women to have serious complications?	Very rarely, pregnant women with high blood pressure can have a stroke. This happens to about 15 women in 1 million (so 999,985 don't have a stroke).[7] On average, in every 100 pregnant women who do have a stroke[8] ■ 96 women **will** have had severely high blood pressure ■ 4 women **will not** have had severely high blood pressure. See image on **page 13**. Experts think that by not taking blood pressure medication in pregnancy a small number more strokes in pregnant women will happen. This may be important as a stroke can be life changing.	

Complications of severely high blood pressure – admission to neonatal unit

On average, in every 100 women with severely high blood pressure

53 babies will not go to the neonatal unit

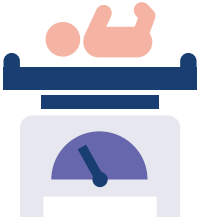
47 babies will go to the neonatal unit

On average, in every 100 women with high blood pressure

77 babies will not go to the neonatal unit

23 babies will go to the neonatal unit

Complications of severely high blood pressure – low birth weight



On average, in every 100 women with severely high blood pressure

76

babies will be born a normal weight

24

babies will be born low birth weight

On average, in every 100 women with high blood pressure

85

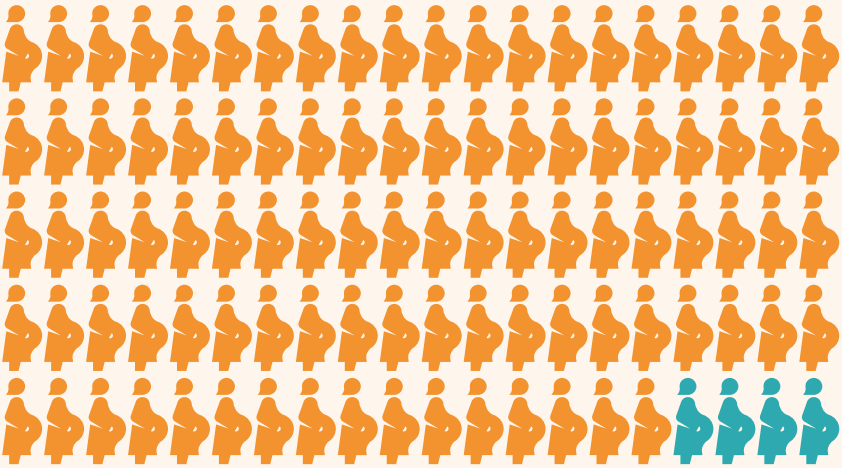
babies will be born a normal weight

15

babies will be born low birth weight

Severely high blood pressure in women who have a stroke

On average, in every 100 pregnant women who do have a stroke



96

women will have had severely high blood pressure

4

women will not have had severely high blood pressure

Table 3. **Can the chance of getting severely high blood pressure be lowered further?**

	Aiming for 150/100mmHg	Aiming for 135/85mmHg
Is there anything else that can be done to lower the chance of getting severely high blood pressure?	On average, in every 100 women with high blood pressure who aim for a blood pressure of **150/100mmHg**, compared with reducing it further to 135/85mmHg[9] ■ 59 women **will not** get severely high blood pressure ■ 41 women **will get** severely high blood pressure. See image on **page 15**. Aiming for a blood pressure of 150/100mmHg usually means taking less blood pressure lowering medication during pregnancy.	On average, in every 100 women with high blood pressure who aim for a blood pressure of **135/85mmHg**, compared to less of a reduction, 150/100mmHg[9] ■ 72 women **will not** get severely high blood pressure ■ 28 women **will** get severely high blood pressure. See image on **page 15**. Aiming for a blood pressure of 135/85mmHg usually means taking more blood pressure lowering medication during pregnancy.

Blood pressure targets to reduce the chance of severely high blood pressure

On average, in every 100 women with high blood pressure who aim for a blood pressure of 150/100mmHg

59 women will not get severely high blood pressure

41 women will get severely high blood pressure

On average, in every 100 women with high blood pressure who aim for a blood pressure of 135/85mmHg

72 women will not get severely high blood pressure

28 women will get severely high blood pressure

It is not possible to know for sure what will happen to you or your baby.

Table 4. **Choosing the best blood pressure lowering medication for you during pregnancy**

	Labetalol (beta blocker)	**Nifedipine** (calcium channel blocker)	**Methyldopa** (central acting agent)
What does the treatment option involve?	Labetalol is the only blood pressure medication which has a licence to be used in pregnancy. It is prescribed to be taken two to four times a day (often three times). This means taking a lunchtime dose. The minimum total dose is usually 200mg a day and the maximum total dose is 2400mg a day.	The manufacturers of nifedipine have not applied for a licence to use nifedipine for blood pressure treatment in pregnancy, although nifedipine does have a licence for treating preterm labour contractions. Many medicines used in pregnancy do not have a licence. Nifedipine has been used for many years to treat high blood pressure in pregnancy. It is usually prescribed to be taken twice a day (morning and evening). The minimum total dose is usually 20mg a day and the maximum total dose is 80mg a day.	The manufacturers of methyldopa have not applied for a licence to use methyldopa for blood pressure treatment in pregnancy. This is very common, and many medicines used in pregnancy do not have a licence. Methyldopa has been used for many years to treat high blood pressure in pregnancy. It is prescribed to be taken two to three times a day (usually three times). This means taking a lunchtime dose. The minimum total dose is usually 500mg a day and the maximum total dose is 3000mg a day.

	Labetalol (beta blocker)	**Nifedipine** (calcium channel blocker)	**Methyldopa** (central acting agent)
Which medicine is better at preventing severely high blood pressure in pregnancy?	All three medicines can stop you getting severely high blood pressure.[2] There is some evidence that labetalol and nifedipine work best, and methyldopa is less good than labetalol or nifedipine, but this isn't known for sure.[2] It is also possible that nifedipine would work better in women of African or Caribbean family history, but this has not been studied in big enough numbers in pregnancy to be sure. If one medicine doesn't work so well, another one can be tried, or a combination of two (or three) together can be tried.		
What are the common side-effects of all three medications for women?	Side-effects of taking blood pressure medicine include feeling tired or weak, dizzy or light-headed, having a headache and feeling sick (nausea).[3] There is not enough research to tell us if these side effects are very common (happens to more than 10 in 100 women) or common (happens to between 1 and 10 women in every 100).		
What are the side-effects of each medication for women?	Women can get headaches, shortness of breath/ wheezing; stomach upset; cold hands and feet.[3,10] There is not enough research to tell us if these side-effects are very common or common. Labetalol is not recommended in women with asthma.[3]	Women can get headaches; flushing skin and mild rash; heart palpitations and swelling of the hands and feet.[3,10] There is not enough research to tell us if these side-effects are very common or common.	Women can get a low mood or depression; extreme tiredness; a stuffy nose and a drop-in blood pressure when standing up.[3] There is not enough research to tell us how often these side-effects happen. Methyldopa is not recommended to women with a history of depression. It is also not recommended for use after women have had a baby, as it is more common for women to feel low after birth.[3]

	Labetalol (beta blocker)	**Nifedipine** (calcium channel blocker)	**Methyldopa** (central acting agent)
What are the possible side-effects of the medication on babies?	Labetalol may cause low blood sugars in babies immediately after birth.[11] Some hospitals will do at least two heel prick blood tests to check this. If the baby has low blood sugar, feeding with more milk or small amounts of sugar solution will usually raise the blood sugar level.	No known side-effects	No known side-effects
Which medicine is better at preventing complications in babies?	There is no evidence that one medication is better at preventing complications than another.[2] Without more research, we cannot be certain if one type of medicine is better than the other for babies.		

Other things to think about:

Pregnancy:

Know your target blood pressure (and your ranges) – for most women on treatment this is a blood pressure of 135/85mmHg.

Get help from your midwife, doctor or assessment unit if you have side-effects from your medicine that make you want to stop taking them.

You don't need to monitor your blood pressure yourself at home but if you chose to, check that the device you have is suitable for pregnancy (validated). There is a list of validated devices here:

http://www.dableducational.org/sphygmomanometers/devices_1_clinical.html#ClinTable

If you have been prescribed aspirin it is recommended you take it throughout the pregnancy as it has been shown to reduce the likelihood of developing pre-eclampsia.

https://action-on-pre-eclampsia.org.uk/public-area/pre-eclampsia-information/fact-sheet1-low-dose-aspirin-for-high-risk-pregnancy

Contact your midwife, doctor or local assessment unit immediately if you develop signs of pre-eclampsia. These include severe headache, pain under the ribs, vision problems such as blurring or flashing lights and swollen face or hands.

https://action-on-pre-eclampsia.org.uk/public-area/pre-eclampsia-information/fact-sheet-3-eclampsia

Healthy pregnancy:

Reduce the salt in your diet– ask your midwife about eating a healthy diet in pregnancy.

https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/pi-healthy-eating-and-vitamin-supplements-in-pregnancy.pdf

Take regular exercise– ask your midwife about safe exercise in pregnancy.

https://www.rcog.org.uk/en/patients/patient-leaflets/physical-activity-pregnancy

Postnatal:

Talk to your doctor during pregnancy about what medication and follow up you may need after birth.

How do you feel?

Having read the information in the decision aid it is a good idea to think about how you feel about treating high blood pressure in pregnancy. You can take this with you to your appointment and discuss it with your doctor or midwife. You can also talk this through with your birth partner.

How do you feel?

Issue	Very important	Important	Not important	Not important at all
How important is it to me to prevent severely high blood pressure during pregnancy?				
How important is it to me to avoid medicines during pregnancy?				
How important is it to me to be involved in the choice of which medicine to take?				

What are my current thoughts about taking blood pressure medication in pregnancy?

You will discuss your options with your doctor before choosing whether you wish to take medicines for your blood pressure or not but having read this booklet your current choices are:

Treatment ☐ or **No** (or delayed) treatment ☐

If treatment then:

- **Labetalol** Yes ☐ No ☐
- **Nifedipine** Yes ☐ No ☐
- **Methyldopa** Yes ☐ No ☐

This is because:

I know I can change my mind at any time ☐

References

1. NG133 Hypertension in pregnancy: diagnosis and management (2019).

2. Abalos E, Duley L, Steyn DW. Antihypertensive drug therapy for mild to moderate hypertension during pregnancy. Cochrane Database Syst Rev. 2018.

3. Joint Formulary Committee (2018) British National Formulary. Available at: http://www.medicinescomplete.com (Accessed: 26.06.2019)

4. Fitton CA, Steiner MFC, Aucott L, et al. In-utero exposure to antihypertensive medication and neonatal and child health outcomes: a systematic review. J Hypertens. 2017;35(11):2123–2137.

5. Chan, W. S., G. Koren, M. Barrera, M. Rezvani, D. Knittel-Keren and I. Nulman (2010). "Neurocognitive Development of Children Following In-Utero Exposure to Labetalol for Maternal Hypertension: A Cohort Study Using a Prospectively Collected Database." Hypertension in Pregnancy 29(3): 271-283.

6. Magee LA, von Dadelszen P, Singer J, et al. The CHIPS Randomized Controlled Trial (Control of Hypertension in Pregnancy Study): Is Severe Hypertension Just an Elevated Blood Pressure? Hypertension. 2016;68(5):1153-1159.

7. Scott CA, Bewley S, Rudd A, Spark P, Kurinczuk JJ, Brocklehurst P, Knight M. Incidence, risk factors, management, and outcomes of stroke in pregnancy. Obstet Gynecol. 2012;120(2 Pt 1):318-24.

8. Judy, A. E., C. L. McCain, E. S. Lawton, C. H. Morton, E. K. Main and M. L. Druzin (2019). "Systolic Hypertension, Preeclampsia-Related Mortality, and Stroke in California." Obstet Gynecol. 133(6):1151–1159, JUN 2019.

9. Magee LA, von Dadelszen P, Rey E, Ross S, Asztalos E, Murphy KE, et al. Less-Tight versus Tight Control of Hypertension in Pregnancy. New England Journal of Medicine. 2015;372(5):407-17.

10. Webster LM, Myers JE, Nelson-Piercy C, Harding K, Cruickshank JK, Watt-Coote I, Khalil A, Wiesender C, Seed PT, Chappell LC. Labetalol Versus Nifedipine as Antihypertensive Treatment for Chronic Hypertension in Pregnancy: A Randomized Controlled Trial. Hypertension 2017:HYPERTENSIONAHA-117.

11. Bateman BT, Patorno E, Desai RJ, et al. Late Pregnancy, Blocker Exposure and Risks of Neonatal Hypoglycemia and Bradycardia. Pediatrics. 2016; 138(3).

Acknowledgements

This guide was produced by Rebecca Whybrow, Lucy Chappell, Jane Sandall and Louise Webster, King's College London. Lucy Chappell and Rebecca Whybrow are supported by a Research Professorship (RP-2014-05-019) funded by the National Institute for Health Research. Professors Chappell and Sandall are supported by the National Institute for Health Research (NIHR), including the Collaboration for Leadership in Applied Health Research and Care South London (NIHR CLAHRC South London) at King's College Hospital NHS Foundation Trust. The views expressed in this aid are those of the author and do not necessarily reflect those of the NIHR, NHS or the Department of Health and Social Care.

This work was undertaken with support from the following partners: Department of Women & Children's Health, King's College London; Guy's and St Thomas' NHS Foundation Trust (Women's Services), Chelsea and Westminster NHS Foundation Trust and Brighton and Sussex University Trust.

The King's College London copyright material may be reproduced but may not be amended. If you wish to use the booklet for commercial purposes please contact the College to request a license by visiting the following web page: www.kcl.ac.uk/innovation/business/support/ipandlicensing/index.aspx

Public engagement: The images and text used in this guide have been developed in collaboration with women and partners using maternity services, colleagues at Action on Pre-ecalmpsia (APEC) and NHS staff. Thank you to Health Innovation Network and Ten Fathoms who designed this booklet. ©2019 King's College London

Rebecca Whybrow
Rebecca.whybrow@kcl.ac.uk
School of Life Course Sciences
Faculty of Life Sciences & Medicine
King's College London
London SE1 7EH
©2019 King's College London

KING'S College LONDON

ACTION ON PRE-ECLAMPSIA
PROMOTING SAFER PREGNANCY

NIHR | Collaboration for Leadership in Applied Health Research and Care South London