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Recommendations for hypertensive disorders of pregnancy

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WHO recommendations for pregnancy and postpartum care should include hypertensive disorders of pregnancy

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The World Health Organization's (WHO) recommendations for antenatal and postpartum care are based on a rigorous development process offering evidence of high-quality essential care and inform relevant health-care policies and clinical protocols globally. The recent *Toolkit for adaptation of the WHO recommendations for a positive pregnancy and postnatal experience* offers useful guidance.¹ We recognize that this toolkit provides a valuable response to the need to close the persistent gap between knowledge and action for health, also known as the know-do gap, which causes suboptimal implementation of available evidence. Poor implementation of evidence-based guidelines contributes to continuing high levels of maternal and perinatal mortality and morbidity, especially in low-resource settings.² In this article, we question, however, if the prioritization within these guidelines or toolkits themselves, or lack thereof, sometimes creates

implementation challenges and can negatively affect maternal and fetal health outcomes. For example, we question why recommendations for detection, prevention and care for women with hypertensive disorders of pregnancy, including pre-eclampsia, are missing in the WHO recommendation for antenatal and postnatal care and related toolkit.

We are concerned that the chosen toolkit approach, with an emphasis on universal applicability of globally developed indicators and evidence, does not adequately consider implementation challenges and contextual needs. This consideration is important, as insufficiently contextualized guidelines may be poorly aligned with existing local priorities, which partially explains why available global recommendations and guidelines do not necessarily lead to improvements in clinical practice and outcomes.³ Adoption, adaptation and implementation of such potentially unfit guidelines might lead to the unintended consequence of suboptimal implementation, poor prioritization and selective uptake. Moreover, unattainable care standards can also demoralize health workers and may inadvertently cause harm.⁴ National policy-makers rely on global recommendations because they often lack resources to develop their own, and local adaptation is further complicated by the absence of formal guideline development procedures.⁵ Procurement or stock-out challenges and lack of accountability and transparency mechanisms further hinder effective implementation.⁶ In addition to these challenges, many stakeholders also consider WHO recommendations to be unclear, overwhelming, technically challenging and not always reflecting the needs of health workers and communities.⁷

Where is pre-eclampsia?

In this toolkit, we discern that more consistent integration of evidence across relevant guidelines and regular updates can be strengthened. We illustrate our argument by pointing out the missing attention for hypertensive disorders of pregnancy, including pre-eclampsia, in both the 2016 *WHO recommendations on antenatal care for a positive pregnancy experience*⁸ and the 2025 toolkit.¹ These disorders are estimated to affect up to 10% of pregnancies and are among the leading causes of maternal mortality and adverse perinatal outcomes worldwide.^{9,10} Therefore, the absence of reference in the 2025 toolkit to updated evidence-based guidance for risk screening, prevention and management for pre-eclampsia is concerning. Moreover, this lack may be reflective of a larger guideline

gap: the WHO recommendation for pre-eclampsia prevention and treatment is about 15 years old,¹⁰ despite the recent scientific advancements in screening, prevention, diagnosis and management of hypertensive disorders of pregnancy. Meanwhile, the WHO recommendations on antiplatelet agents for the prevention of pre-eclampsia was released in 2021.¹¹ This recommendation explicitly offers a suggestion to identify risk factors during antenatal care, as well as women eligible for receiving aspirin prophylaxis. The *WHO recommendations on antenatal care for a positive pregnancy experience*¹¹ advise adapting or complementing the list of risk factors (Box 1) based on the local epidemiology of pre-eclampsia, yet there is no reference to this need in the recently published toolkit.

The observation that this omission is not incidental, but persistent, is strengthened by our conclusion that the 2016 *WHO recommendations on antenatal care for a positive pregnancy experience* do not include a recommendation for pre-eclampsia within the interventions for maternal and fetal assessment (Category B).⁸ The guideline instead generally states that antenatal screening for pre-eclampsia is an essential part of good antenatal care, which is routinely performed by measuring maternal blood pressure and checking for proteinuria at each antenatal care contact and upon detection of pre-eclampsia, in addition to nutritional intervention for calcium supplements. This notion is repeated in the 2025 toolkit but offers little guidance for health workers regarding how to manage women with hypertensive disorders of pregnancy including pre-eclampsia. In addition, earlier versions of WHO maternal and newborn guidelines offer limited information on these disorders for routine care management, prioritizing instead emergency situations. As a potential consequence, excluding these conditions from the main categories of interventions for maternal and fetal assessments might signal to national governments and providers that blood pressure measurement and checking urine for proteinuria are of lesser importance. Several publications in the past decades have indeed shown that blood pressure measurement and urine analysis during antenatal care are insufficiently done both in terms of quality and frequency, irrespective of the antenatal care model.¹² Therefore, we question why is blood pressure measurement recommended during antenatal care, but antihypertensives are not part of essential medicines listed, as is the case with iron tablets? Why is magnesium sulfate listed but

antihypertensive medication is not, rather than both recommended given their distinct and complementary indications? What should health workers do in the absence of blood pressure measurement equipment or urine dipsticks? What should health workers do if blood pressure is high? What should women do if they cannot afford antihypertensive medication?

The toolkit would have offered a good opportunity to re-emphasize the importance of antenatal care to detect and timely manage hypertensive disorders of pregnancy including pre-eclampsia, even in the absence of one uniform updated WHO recommendation for detection, prevention and management of these conditions. More specifically, with reference to the 2016 WHO antenatal care recommendations,⁸ three key-messages could have been considered when the toolkit was developed.

First, maternal and fetal assessment. Country teams should be encouraged to prioritize recommendations according to the burden of maternal and newborn care in the given context. In settings with high maternal and perinatal mortality due to hypertensive disorders of pregnancy including pre-eclampsia, country teams should explicitly prioritize the assessment of risk screening for pre-eclampsia, provision of prophylaxis and regular measurement of blood pressure and urine analysis.

Second, preventative measures. In addition to calcium supplementation, in contexts where low dietary calcium uptake is prevalent, the toolkit could have referred to the 2021 WHO antiplatelet guideline to recommend screening for risk factors for pre-eclampsia and women's eligibility for prophylaxis of low-dose aspirin.¹¹ In addition to aspirin, all essential antihypertensive medications could have been added to the medicines listed in the toolkit's supplementary materials.

Third, management. Upon diagnosis of hypertensive disorders of pregnancy including pre-eclampsia, and with consideration for the level of care and available resources and skills, adequate management of high blood pressure is recommended. The toolkit could have referred to the 2011 WHO guideline for prevention and treatment of pre-eclampsia in terms of choices of medication, preferably with information on doses, route of administration, frequency and recommended follow-up.¹⁰ In addition, the toolkit

could have mentioned a birth plan ensuring timely referral and consideration of induction of labour.

These additions would have given valuable support to countries with high pre-eclampsia-related maternal and perinatal deaths, offering some guidance to health workers on how to ensure that women with such high-risk pregnancies are offered quality care by health workers who are skilled and able to deal with hypertensive disorders of pregnancy including pre-eclampsia.

Considering the complexities of hypertensive disorders of pregnancy diagnosis and the changing definitions of pre-eclampsia over the years, updating WHO guidelines on these disorders would send a clear signal to policy-makers and health workers on their importance for maternal and fetal assessment. While many maternal conditions mentioned in the 2016 recommendations⁸ are of course important, none of these contribute as much to maternal and perinatal mortality, as hypertensive disorders of pregnancy including pre-eclampsia do. For example, human immunodeficiency virus, tuberculosis, tobacco and substance use, for which the main recommendations for interventions were listed in the 2016 recommendations and repeated in the 2025 toolkit.¹ While we recognize that care during pregnancy and birth should encompass more than only promoting survival, and focus on the well-being of mother and child, not including hypertensive disorders of pregnancy including pre-eclampsia in the toolkit is a missed opportunity that neglects the high burden of these conditions worldwide, particularly in low- and middle-income settings.

Competing interests:

None declared.

References

1. Toolkit for adaptation of the WHO recommendations for a positive pregnancy and postnatal experience. Geneva: World Health Organization; 2025. Available from: <https://www.who.int/publications/i/item/9789240105164> [cited 2025 Nov 18].
2. Amouzou A, Barros AJD, Requejo J, Faye C, Akseer N, Bendavid E, et al. The 2025 report of the Lancet Countdown to 2030 for women's, children's, and adolescents' health: tracking progress on health and nutrition. *Lancet*. 2025 Apr 26;405(10488):1505–54. [https://doi.org/10.1016/S0140-6736\(25\)00151-5](https://doi.org/10.1016/S0140-6736(25)00151-5) PMID:40222381
3. Guerra-Farfan E, Garcia-Sanchez Y, Jornet-Gibert M, Nuñez JH, Balaguer-Castro M, Madden K. Clinical practice guidelines: the good, the bad, and the ugly. *Injury*. 2023 May;54 Suppl 3:S26–9. <https://doi.org/10.1016/j.injury.2022.01.047> PMID:35135686
4. Maaløe N, Ørtved AMR, Sørensen JB, Sequeira Dmello B, van den Akker T, Kujabi ML, et al. The injustice of unfit clinical practice guidelines in low-resource realities. *Lancet Glob Health*. 2021 Jun;9(6):e875–9. [https://doi.org/10.1016/S2214-109X\(21\)00059-0](https://doi.org/10.1016/S2214-109X(21)00059-0) PMID:33765437
5. Olayemi E, Asare EV, Benneh-Akwasi Kuma AA. Guidelines in lower-middle income countries. *Br J Haematol*. 2017 Jun;177(6):846–54. <https://doi.org/10.1111/bjh.14583> PMID:28295193
6. Saluja K, Reddy KS, Wang Q, Zhu Y, Li Y, Chu X, et al. Improving WHO's understanding of WHO guideline uptake and use in Member States: a scoping review. *Health Res Policy Syst*. 2022 Sep 7;20(1):98. <https://doi.org/10.1186/s12961-022-00899-y> PMID:36071468
7. Chang KT, Hossain P, Sarker M, Montagu D, Chakraborty NM, Sprockett A. Translating international guidelines for use in routine maternal and neonatal healthcare quality measurement. *Glob Health Action*. 2020 Dec 31;13(1):1783956. <https://doi.org/10.1080/16549716.2020.1783956> PMID:32657252
8. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: World Health Organization; 2016. Available from: <https://www.who.int/publications/i/item/9789241549912> [cited 2025 Nov 18].
9. Cresswell JA, Alexander M, Chong MYC, Link HM, Pejchinovska M, Gazeley U, et al. Global and regional causes of maternal deaths 2009-20: a WHO systematic analysis. *Lancet Glob Health*. 2025 Apr;13(4):e626–34. [https://doi.org/10.1016/S2214-109X\(24\)00560-6](https://doi.org/10.1016/S2214-109X(24)00560-6) PMID:40064189
10. WHO recommendation for prevention and treatment of preeclampsia and eclampsia. Geneva: World Health Organization; 2011. Available from: <https://www.who.int/publications/i/item/9789241548335> [cited 2025 Nov 18].

11. WHO recommendations on antiplatelet agents for the prevention of pre-eclampsia. Geneva: World Health Organization; 2021. Available from: <https://www.who.int/publications/i/item/9789240037540> [cited 2025 Nov 18].
12. Mchenga M, Burger R, von Fintel D. Examining the impact of WHO's focused antenatal care policy on early access, underutilisation and quality of antenatal care services in Malawi: a retrospective study. *BMC Health Serv Res.* 2019 May 8;19(1):295. <https://doi.org/10.1186/s12913-019-4130-1> PMID:31068183

Box 1. Pre-eclampsia risk factors

Moderate risk factors

- Primiparity
- family history of pre-eclampsia
- older than 40 years
- Multiple pregnancy

High risk factors

- Diabetes
- Chronic or gestational hypertension
- Renal disease
- Autoimmune disease
- Positive uterine artery Doppler
- Previous history of pre-eclampsia
- Previous fetal or neonatal death associated with pre-eclampsia

Source: WHO, 2021.¹¹