Opportunities for improving hypertensive disorders of pregnancy (HDP) management in primary care settings: A review of international published guidelines in the context of pregnancy care in Indonesia

Fitriana Murriya Ekawati\textsuperscript{a,b,}\textsuperscript{*}, Ova Emilia\textsuperscript{c}, Shaun Brennecke\textsuperscript{d,e}, Jane Gunn\textsuperscript{b}, Sharon Licurish\textsuperscript{f}, Phyllis Lau\textsuperscript{b}

\textsuperscript{a} Department of Family and Community Medicine, Universitas Gadjah Mada, Yogakarta, Indonesia
\textsuperscript{b} Department of General Practice, University of Melbourne, Victoria, Australia
\textsuperscript{c} Department of Obstetrics and Gynaecology, Universitas Gadjah Mada/Sardjito Hospital, Yogakarta, Indonesia
\textsuperscript{d} Department of Obstetrics and Gynaecology, University of Melbourne/Royal Women’s Hospital, Parkville, Victoria, Australia
\textsuperscript{e} Pregnancy Research Centre, Department of Maternal-Neonatal Medicine, Royal Women’s Hospital, Parkville, Victoria, Australia
\textsuperscript{f} School of Nursing and Midwifery, Monash University, Victoria, Australia

\section{1. Background}

Hypertensive disorders of pregnancy (HDP) affect up to ten percent of all pregnancies and are the second-highest cause of maternal mortality \cite{1}. According to World Health Organization (WHO) estimation, up to 14\% of global maternal deaths are caused by HDP and almost all of them occur in LMIC \cite{2}. In Indonesia, HDP cause around 30\% maternal deaths or around a thousand cases annually \cite{3}. As well, HDP are associated with increased numbers of infant morbidity and mortality as HDP women are at a higher risk of delivering their babies prematurely.

Primary care providers, such as general practitioners, midwives, and nurses, play essential roles for HDP management. They provide antenatal care services and screen for morbidities among pregnant women. In Indonesia, the providers commonly attend births, particularly in communities with poor access to hospitals \cite{4}. They also provide ongoing care including postpartum care and contraception consultations for women, as well as vaccination services for babies after delivery \cite{5}.

While evidence for HDP management has been published extensively, limited guidance is available for Indonesian primary care where women usually present late in pregnancy and so often receive delayed care including referral to hospital \cite{6}. In the example of Indonesian guidelines, current HDP guidance mainly covers blood pressure measurement, dipstick proteinuria test for preeclampsia diagnosis, and magnesium sulphate injection for women with eclampsia \cite{7,8}. These practices are less adequate compared to clinical practice standard.

\textsuperscript{*} Corresponding author at: Department of General Practice, University of Melbourne, 780 Elizabeth St, Melbourne, Victoria 3010, Australia.
\textit{E-mail addresses: ekawati@unimelb.edu.au, fitriana.murriya@ugm.ac.id} (F.M. Ekawati).

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for HDP management in high income countries with availability of specialist care and services; for example, sophisticated biochemical testing and availability of immediate treatment and referral to hospital if the woman’s systolic blood pressure is greater than 160 mmHg [9]. On the other hand, women in Indonesia also have certain beliefs regarding pregnancy complications or referral procedures that often result in delayed transfer to the hospitals [10]. With this cultural complexity in mind, Indonesian primary care providers require exclusive care pathways for HDP, particularly if referral management to secondary care can not be made immediately.

Currently, research is underway to develop HDP guidelines that reflect international standards and are suitable for Indonesian primary care [11]. This review examines international published recommendations in the form of clinical practice guidelines (CPG) or similar, to identify any potential recommendations that could be adopted by Indonesian primary care providers including screening, early intervention, and long-term follow-up for women with HDP.

2. Methods

In June 2018, a systematic literature searching was performed in six databases: EMBASE, CINAHL, Web of Science, Medline with Full Text, Google Scholar, Cochrane Review databases for guidelines or clinical practice guideline or consensus published between 17 July 2007 to 17 June 2018 including a snowballing approach for other guidelines that were mentioned in the articles. MeSH terms and phrases of ‘guideline’ and ‘primary care’ and ‘hypertensive disorders of pregnancy’ were used in the literature search (Table 1).

Title, abstract, and full-text screening was conducted against our inclusion and exclusion criteria. The inclusion criteria were (i) published within 2007–2018, (ii) included pharmacological and non-pharmacological management of HDP, (iii) included recommendations for HDP during pregnancy or postpartum periods or both, and (iv) written in English. The exclusion criteria were (i) old guidelines that had been revised and the new edition had been available, (ii) non-peer-reviewed papers, (iii) opinion articles, (iii) systematic reviews of guidelines.

2.1. Comparison between international and local Indonesian practice guidelines and regulatory documents

Contents of international HDP guidelines in this review were compared with ten Indonesian HDP guidelines and antenatal care regulations to identify similarities, differences and gaps of practices. The Indonesian guidelines used as comparison in this review were: (i) The Yogyakarta province referral manual for pregnancy complications [8] that informed similar manuals in other provinces, such as in (ii) Papua [12] and (iii) East Kalimantan Province and were available for use in primary care practice [13]; (iv) WHO-SEARO Buku Saku Pelayanan Kesehatan Ibu di Fasilitas Dasar dan Rujukan (handbook for maternal health in primary and secondary care) [7] and (v) Preeclampsia guideline from the Indonesian Obstetricians Association (POGI) that provided guidance specifically for HDP management at national level [14]. Whereas, Indonesian regulations used to provide practice context were: (vi) Indonesian Ministry of Health regulation number 97 year 2014 about antenatal care program in public primary care (Puskesmas) [15], (vii) Indonesian maternal and child health record [16], (viii) Indonesian Ministry of Health regulation number 659 year 2017 about national medicine formulations [17], (ix) Indonesian Ministry of Health regulation number 28 year 2017 about midwifery practice [18], and (x) Indonesian Ministry of Health regulation number 32 year 2012 about laboratory examination in Puskesmas [19].

2.2. Quality appraisal

The guidelines’ quality were assessed using Appraisal of Guidelines for Research & Evaluation (AGREE) II instrument [20,21]. AGREE II is a tool that evaluates guidelines against six domains: scope and purposes, stakeholder involvement, rigour of development, clarity of presentation, applicability, editorial independence, and overall guideline assessment. The first author and another independent appraiser who had familiarity with Indonesian maternal health context appraised the reviewed guidelines independently against six AGREE II domains. Each guideline was also rated on its applicability in Indonesian primary care settings. The appraisers would rate the guideline as ‘Yes’ if it was likely applicable for the settings, ‘Yes with modification’ if the quality and rigour of the guideline were scored well, but its applicability in Indonesian setting was undetermined. ‘No’ if a guideline’s quality was scored low and was likely impossible to be implemented in Indonesia. Any disagreement was discussed and consulted with all co-authors in a series of meetings for a final decision. The final assessment of the guidelines appraisal was also made by mutual agreement.

2.3. Data extraction and analysis

The guidelines’ contents were synthesised using thematic analysis with these following steps [22]: (i) Recommendations from the guidelines were uploaded into Nvivo 11–12 software. (ii) All of the guidelines were read for their content and were compared to the Indonesian guidelines. (iii) Initial coding for any procedures that were potentially applicable to LMIC were then performed in Nvivo. Advanced procedures that were potentially difficult for implementation in the settings (such as alpha-fetoprotein and tyrosine kinase tests) were not included. (iv) The codes were then grouped into themes based on patterns and similarities. Similar themes were then grouped into overarching themes. (v) The codes were also collectively reviewed and discussed with all co-authors until consensus was achieved.

3. Results

A total of 537 records were identified; 533 from database searches and four from snowballing searches. A total of 193 articles were excluded due to language (non-English) and non-peer reviewed papers.

Table 1

<table>
<thead>
<tr>
<th>Keywords</th>
<th>‘guideline’</th>
<th>‘hypertensive disorders of pregnancy’</th>
<th>‘pregnancy’</th>
<th>‘primary care providers’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term used at the literature search</td>
<td>standard guidelines protocol practice guideline clinical practice guideline</td>
<td>hypertension hypertensive high blood pressure pregnancy induced hypertension preeclampsia eclampsia toxemia HELLP syndrome hypertensive disease in pregnancy gestational hypertension</td>
<td>pregnancy pregnant prenatal antenatal perinatal maternal</td>
<td>nurse midwives primary care primary health care community general practitioner doctor family doctor family physician</td>
</tr>
</tbody>
</table>
No paper in Bahasa Indonesia was identified from our literature searches. Three hundred twenty-six titles and abstracts were then reviewed, and finally, 16 full-text papers met the inclusion criteria for this review (see Fig. 1).

The 16 papers described 16 different practice guidelines or sets of HDP practice recommendation or consensus. Most of them were from developed countries settings, such as United Kingdom (UK) [9,23,24], Australia and New Zealand [25,26], United States of America (USA) [27,28], Canada [29,30] Netherlands [31], France [32], and a European consensus [33]. The other four guidelines were considered more applicable globally, for instance, the World Health Organisation (WHO) recommendation on preeclampsia and eclampsia [34]; preeclampsia section of the WHO Pregnancy, childbirth, postpartum and newborn guide for essential practice [35]; hypertension section in the WHO Guideline for managing complication in pregnancy [36], and the International Society for Study of Hypertensive Disorder of Pregnancy (ISSHP) Classification, diagnosis & management recommendations for international practice [37].

Most of the guidelines did not specify their target audience, instead, they referred to common maternal healthcare teams [9,25–27,29,31,32,34,37–39]. Four guidelines were designed specifically for primary care providers (GPs and midwives) [24,30,35,38], and midwives at the intermediate care in hospital [24]. Roles of primary care providers in LMIC were highlighted in the ISSHP recommendation [37]. Details of guideline origins and their expected audiences are presented in Table 2.

3.1. AGREE II scores

The guidelines’ quality scores were varied. NICE and WHO guideline for preeclampsia had the highest score for their comprehensiveness against AGREE II domains. PRECOG I, ACOG, ESC, SOGC, and AOM guidelines also had higher score compared to the other guidelines. There were guidelines that could potentially be adopted in Indonesia, however, most were graded with ‘yes with modification’ for Indonesian primary care because of potential contextual differences, in terms of epidemiology, facilities, local policies, the provider’s and the provider’s scope of practice. The guidelines’ AGREE II scores are presented in Table 3.

3.2. Qualitative results

Almost all of the reviewed guidelines provided recommendations about managing HDP in pregnancy from early detection up to postpartum monitoring [9,25–27,29,31,32,34,37–39]. Some guidelines focused on specific aspects of HDP, for example, the PRECOG I guideline focused on the early detection of preeclampsia [38], PRECOG II focused on intermediate care by midwives at the hospital [24], and the Dutch Multidisciplinary Guideline focused on postpartum follow up for women with a history of HDP [31]. Whereas, HDP management was only part of the pregnancy complication guides in two WHO guidelines [35,36].

Our qualitative analysis identified three overarching themes regarding potential practices for HDP management in primary care.
The first theme was about HDP clinical management, including definition, risk factors, prevention, antenatal and postpartum monitoring. The second theme was about care planning for women with HDP, where usually less advanced facilities were available than in developed countries, and the third was professional communication of HDP management in primary care. Detailed recommendation extraction for each guideline is presented in Table 4.

3.3. Clinical management

3.3.1. Definition
Definition was a standard entry point of the guidelines to screen mothers with HDP and/or preeclampsia. The definition of HDP was relatively framed and mentioned in all guidelines which were based on blood pressure measurement of SBP ≥ 140 and or DBP ≥ 90 mmHg on the fifth Korotkoff sound [30,32,38] or when women’s blood pressure was increased significantly (≥ 30 mmHg systolic or ≥ 15 mmHg diastolic) compared to their first antenatal visit or preconception measurement [25]. Categories of HDP were also mentioned, commonly consisting of gestational hypertension, chronic hypertension, preeclampsia, and white coat hypertension. While in some guidelines, HDP classification was extended to include masked and transient hypertension due to their contribution to preeclampsia. Disagreement of using ‘mild versus severe’ preeclampsia was also recommended in some guidelines because of its rapid progressivity and potential treatment confusion [29,37]. White coat hypertension, masked hypertension and transient hypertension were not discussed in the Indonesian WHO-SEARO Buku Saku Pelayanan Kesahatan Ibu dan Anak Basa dan Rujukan [7] and Yogyakarta referral manual for pregnancy complications [8].

3.3.2. Risk factors
Risk factors and early detection were also covered in almost all of the guidelines. Common risk factors for preeclampsia were mentioned in 13 out of 16 guidelines and included chronic hypertension, previous history of preeclampsia, obesity, autoimmune disease, and previous history of diabetes [9,25-27,29,30,32-38]. Different with other guidelines that did not stratified the risks into high and moderate risks, in NICE, first pregnancy, maternal age >40 years, body mass index >35, family history of preeclampsia, multiple pregnancy and pregnancy interval >10 years were included as moderate risk factors for preeclampsia [9]. In SOMANZ and Queensland guidelines, in addition to the risks above, increased BP to systolic >130 mmHg or diastolic >80 mmHg before 20 weeks of pregnancy were also included as risk factors for preeclampsia [25,26]. Meanwhile, according to Indonesian POGI guidelines, almost all of the risk factors above were mentioned and have been stratified similarly to NICE guideline [14].

3.3.3. Prevention
Fourteen out of sixteen guidelines recommended that aspirin should be prescribed for preeclampsia prevention for high-risk women [9,25-27,29,30,32-39], or those with a minimum of two moderate risk factors, in the dose of 75-150 mg per day, starting from the 12 to 37 weeks of pregnancy or until delivery according to NICE [9]. However, barriers to its adoption in Indonesia included absence of this recommendation in the local primary care guideline and the providers’ practice authority [8], despite being mentioned in the SEARO-WHO handbook and POGI guideline [7,14], and the medicine also being available in primary care [17]. It was unsure whether aspirin could routinely be prescribed in primary care as midwives had limited prescribing rights without doctors’ supervision [18].

Women in LMIC such as Indonesia were prone to low dietary calcium intake. Thus, calcium supplementation in the dose of 1.2–2.5 g/day in addition to aspirin was recommended [34,37]. This supplement was available and accessible in Indonesian primary care practice but to maximise its absorption, timing of calcium supplementation should be separate from other minerals supplementation. For
instance, calcium supplementation should be taken in the evening as the
women usually also consumed morning iron supplementation
[35,37]. There was limited evidence for preeclampsia prevention other
than the two treatments above. Healthy lifestyle changes before further
pregnancy were recommended to improve cardiovascular health and
reduce the risk of another HDP episode [32,33], but vitamin E and salt
restriction were unproven to have benefits for women with the risk of
HDP [29,40].

3.3.4. Antenatal monitoring

Almost all of the guidelines also recommended a comprehensive
physical and laboratory examination for pregnant women to detect
preeclampsia as early as possible. Blood pressure (BP) measurement and
assessment of signs and symptoms of preeclampsia should be
conducted at each antenatal visit [38]. Patients with elevated BP and
carrying a small-for-gestational-age baby should be closely monitored
for the development of preeclampsia, as the disease can cause disrup-
tion to uteroplacental blood flow which may be a cause of fetal growth
restriction [37]. Urine dipstick test could be performed as an initial
screening for preeclampsia. However, this test alone has low sensitivity
[25,29,41]. Therefore, women with pregnancy hypertension or those
with high risks of preeclampsia were recommended to undertake ad-
nitional periodic laboratory examinations such as kidney, liver func-
tion, complete blood counts, and Doppler ultrasound. These tests are
essential to monitor progressivity of preeclampsia because of its un-
predictable and rapid progress in pregnant women [9,25–27,29,32,34,38,39].

There are limited laboratory examination facilities in Indonesian
primary care. Dipstick proteinuria test is routine during antenatal care
in primary care and kidney and liver function tests are also available
[15,19]. However, serum alpha fetoprotein or umbilical Doppler ul-
trasound are not commonly available outside of tertiary hospitals [37].

3.3.5. Postpartum monitoring

Eleven guidelines recommended monitoring for at least six week
postnatally for women with HDP history [9,25–27,29,32,35–37,39,42].
If hypertension persists, antihypertensive medications were re-
commended during the postnatal period, including for breastfeeding
women [29,30]. Some guidelines also acknowledged that, as women
with HDP had an elevated risk of postnatal anxiety and/or depression,
therefore, postnatal care should include appropriate psychological
follow up [25,29]. Recommendations about healthy lifestyle and con-
traception were also recommended using health promotion strategies to
minimise risks of future cardiovascular diseases [25,26,29]. In
Indonesian guidelines, routine postpartum monitoring limitedly ad-
dressed care for HDP women [7,15].

3.4. Care planning

This theme refers to potential care collaboration of HDP manage-
ment between primary and secondary care in LMIC. It contains sug-
gestions for referral timing and procedures that could be conducted in
primary care in the event where referral could not be undertaken im-
mmediately.

In all reviewed guidelines, women should be referred for an ob-
stetrician consultation once diagnosed with HDP, and their baby
delivery must also be assisted by an obstetrician. However, only a few
guidelines addressed primary care management of women with HDP
[9,26,37]. The PRECOG I guideline advised a woman to be initially
referred for specialist consultation once being identified as having any
preeclampsia risks. She could later be managed by specialists, GPs,
midwives or shared care depends on the patient’s individual needs [38].
The NICE guideline recommended women with severe hypertension
(> 160/110 mmHg) to be referred to hospital and immediately pre-
scribed antihypertensive medication. There were opportunities to treat
women in primary care if their blood pressure ranged from 140–159/
90–109 mmHg. However, they should be still followed up with periodic
blood pressure monitoring, including proteinuria and other pre-
eclampsia blood indicators. If a woman’s blood pressure was con-
sistently above 140/90 mmHg, then antihypertensive medication
should be considered [9]. Due to the required close monitoring, women
with HDP ideally should be observed in hospital. But if the women were
stable and could be relied on to report their problems, they could be
managed as outpatients. However, still, they required twice-weekly
monitoring of their blood pressure, laboratory examinations, including
periodic fetal monitoring using Doppler ultrasound [26,37].

The ISSHP guideline stated that Doppler ultrasound might not al-
ways be available in LMIC and therefore, in the case of reduced sym-
physial fundal height (which could be an indication of fetal growth
restriction due to placental insufficiency), specialist referral for further
investigation was indicated [37]. The guideline also recommended the
women to relocate closer to the hospital if necessary to allow mon-
itoring (i.e., moving to relatives’ house or temporary stay at the waiting
houses) [37]. Cases of preeclampsia should also be referred for delivery
planning at least at the 34th week of pregnancy or based on the dis-
cussion with experienced obstetricians [27]. It was also recommended
that, in an emergency situation, primary care practitioners in LMIC had to
be prepared to administer intravenous magnesium sulphate (MgSO4) as
prophylaxis for eclamptic seizures for HDP women who had severe
hypertension and proteinuria, or hypertension with neurological in-
stability that might present unexpectedly or in the case of delayed re-
ferral [37].

Regarding these care planning procedures, nifedipine as an anti-
hypertensive medication, including magnesium sulphate and its anti-
dotes (calcium gluconate) are available in Indonesian primary care
practice according to the national formularies and therefore, such
managements can potentially be added to primary care practice [17].
Other examinations, such as kidney and liver function tests, thrombo-
cyte count and uric acid were also available based on the Ministry
regulation number 37 year 2012 [19].

3.5. Professional communication

Communication between women and all healthcare professionals is
essential to warrant the success of HDP management. The ACOG
guideline emphasised that information related to preeclampsia signs,
symptoms, and key managements should be notified to the women. It
was recommended to speak slowly and carefully, and use plain lan-
guage to ensure that women were understanding about preeclampsia
and the importance of regularly visiting health care providers [27]. It
was also essential to explain the safety of antihypertension during
pregnancy, including discussing antihypertensive alternatives for
women with hypertension who were planning to pregnant. For in-
stance, these included risks of congenital abnormalities if women con-
sumed Angiotensin Converting Enzymes (ACE) inhibitors or Angio-
tensin II Receptor Blockers (ARB) during pregnancy [9].

Some guidelines suggested women to have a hand-held maternal
care book to facilitate communication and education about the wo-
man’s condition, follow up, care plan and postpartum care [9,32]. In
addition, it was suggested that HDP guideline for nurses and midwives
should be made available in primary care settings [37]. In Indonesia,
the ‘pink book’ has been widely used as a hand-held record for pregnant
women. The ‘pink book’ provides warning symptoms of preeclampsia
and space for health care providers to write additional educational
information for pregnant women [16].

4. Discussion

General practitioners and midwives in primary care are usually the
first healthcare provider that pregnant women visit. They also provide
continuous care for women and their families throughout pregnancy
and after birth [32]. GPs and midwives in Indonesia or other LMIC
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<tbody>
<tr>
<td>Queensland</td>
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<td>61</td>
<td>82</td>
<td>94</td>
<td>54</td>
<td>63</td>
<td>75</td>
<td>Yes, with modification</td>
<td>Potential practices were identified, such as preeclampsia prophylaxis using aspirin and calcium supplementation; and criteria for outpatient management. Advanced examination, such as Doppler ultrasound was rarely available in Indonesian practices. Whether primary care providers were comfortable to prescribe the medication was also unsure. Similar as the above comment for Queensland guideline.</td>
</tr>
<tr>
<td>SOMANZ</td>
<td>11</td>
<td>19</td>
<td>64</td>
<td>64</td>
<td>63</td>
<td>63</td>
<td>58</td>
<td>Yes, with modification</td>
<td>Referral to specialist for women with identified preeclampsia risk factors at the first booking could potentially be adopted to Indonesian settings. However, midwives in public primary care were usually had their practice together with GPs.</td>
</tr>
<tr>
<td>PRECOG I</td>
<td>89</td>
<td>78</td>
<td>74</td>
<td>81</td>
<td>67</td>
<td>92</td>
<td>83</td>
<td>Yes, with modification</td>
<td>PRECOG II was designed for midwives at day care unit/hospital. In this level of care in Indonesia, the cases were usually managed by emergency/specialist doctors.</td>
</tr>
<tr>
<td>PRECOG II</td>
<td>78</td>
<td>78</td>
<td>51</td>
<td>86</td>
<td>60</td>
<td>92</td>
<td>75</td>
<td>Yes, with modification</td>
<td>Some recommendations, including preeclampsia prophylaxis, antihypertensive medication and indication for referral could potentially be adopted. However, whether GPs were comfortable to prescribe the medication and available facilities for preeclampsia blood test were unsure. Preeclampsia risk factors stratification would help primary care to initiate aspirin as preeclampsia prophylaxis.</td>
</tr>
<tr>
<td>NICE</td>
<td>100</td>
<td>94</td>
<td>98</td>
<td>97</td>
<td>79</td>
<td>75</td>
<td>100</td>
<td>Yes, with modification</td>
<td>Recommendations, including preeclampsia prophylaxis, antihypertensive medication and indication for referral could potentially be adopted. However, whether primary care providers were comfortable to prescribe the medication was unsure.</td>
</tr>
<tr>
<td>FSH</td>
<td>89</td>
<td>64</td>
<td>79</td>
<td>92</td>
<td>63</td>
<td>83</td>
<td>75</td>
<td>Yes, with modification</td>
<td>Potential practices were identified, such as preeclampsia prophylaxis using aspirin and calcium supplementation and antihypertensive medication. Adoption of further advanced examination, such as kidney-liver function tests was unsure. Recommendations for HDP care could potentially be applied for midwifery practice in primary care.</td>
</tr>
<tr>
<td>ESC</td>
<td>86</td>
<td>69</td>
<td>73</td>
<td>86</td>
<td>65</td>
<td>92</td>
<td>83</td>
<td>Yes, with modification</td>
<td>Similar as the above comment for FSH guideline. Potential practices were identified, such as preeclampsia prophylaxis using aspirin and calcium supplementation, and antihypertensive medication. Adoption of further advanced examination, such as Doppler ultrasound or other alternative examinations were unsure.</td>
</tr>
<tr>
<td>SOGC</td>
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<td>86</td>
<td>69</td>
<td>67</td>
<td>83</td>
<td>Yes, with modification</td>
<td>Potential practices were identified, such as preeclampsia prophylaxis using aspirin and calcium supplementation and antihypertensive medication. Adoption of further advanced examination, such as Doppler ultrasound or other alternative examinations were unsure.</td>
</tr>
<tr>
<td>AOM</td>
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<td>67</td>
<td>46</td>
<td>83</td>
<td>Yes</td>
<td>Recommendations for HDP care could potentially be applied for midwifery practice in primary care.</td>
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<td>89</td>
<td>80</td>
<td>91</td>
<td>63</td>
<td>75</td>
<td>92</td>
<td>Yes, with modification</td>
<td>Similar as the above comment for ACOG. Recommendations for postpartum monitoring could potentially be adopted. However, possibility of longterm follow up in primary care (such as annual cardiovascular medical examination) was unsure.</td>
</tr>
<tr>
<td>ASH</td>
<td>58</td>
<td>28</td>
<td>52</td>
<td>58</td>
<td>31</td>
<td>33</td>
<td>42</td>
<td>Yes, with modification</td>
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<tr>
<td>Dutch multidisciplinary guideline for postpartum care</td>
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<td>39</td>
<td>73</td>
<td>86</td>
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<td>92</td>
<td>67</td>
<td>Yes, with modification</td>
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<td>ISSHP 2018</td>
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<td>79</td>
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<td>69</td>
<td>67</td>
<td>83</td>
<td>Yes, with modification</td>
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</table>
therefore have an important role in HDP prevention, detection and management.

The guidelines scores appraised from this review are similar to the results of guidelines reviews by Bazzano, Green [43] and Gillion, Pels [44] where NICE, SOGC and WHO recommendation for preeclampsia are scored highest among other guidelines. However, some guidelines in this review have not been appraised by those two reviews, such as the Cardiovascular risk management after reproductive and pregnancy-related disorders: A Dutch multidisciplinary evidence-based guideline [31]; WHO pregnancy, childbirth, postpartum and newborn care: A guide for essential practice [35]; WHO Managing complication in pregnancy and childbirth [36]; and the newest edition of ISSHP classification, diagnosis & management recommendations for international practice [37] that involves more suggestions for LMIC than is included in other guidelines. This review has also been completed and compared with current regulations related to maternal care in Indonesian primary care practice that increases the recommendation credibility and potential applicability in practice settings.

This review has identified potential recommendations for HDP management, including care planning, referral, communication and postpartum management for Indonesian primary care providers (Table 4). Existing Indonesian guidelines could be expanded to include more procedures in primary care, as the providers are in a prime position to implement preventive measures, detect and initially manage women with HDP, make appropriate referrals to specialist care and provide postpartum follow up. They are also able to monitor for hypertension, prescribe medications and supplements to prevent preeclampsia in high risk women, perform preeclampsia tests and prescribe antihypertensive medication if necessary. Hand-held records could also be used in primary care, to improve communication and educators about the danger signs of preeclampsia [45,46].

There are implications for further research arising from this review. Risk factor identification as an entry point for additional management for primary care providers has been discussed in all guidelines, including Indonesian guidelines such as POGI and WHO-SEARO handbook [7,14]. POGI in this section has a similar recommendation with NICE to differentiate preeclampsia risk factors into high and moderate risks. However, the appropriateness of the identified risk factors compared to the current Indonesian epidemiology is less clear. POGI itself extracted those risks based on some international literature such as that of LeFevre [47], Milne, Redman [38] and Perez-Cuevas, Fraser [48]. Meanwhile, there are also some studies mentioning anemia as another preeclampsia risk factor in developing countries and anemia in Indonesia is also prevalent [50,51], however, this was not discussed in detail at any guidelines identified in this review.

Each guideline's potential adoption or implementation challenges in Indonesian settings are also mentioned. These usually depend on the available facilities and practice authority. Even though low dose aspirin has also been mentioned in almost all of the guidelines for its potential benefits and GPs are able to prescribe it for women with increased risks for preeclampsia, barriers in Indonesian settings include that midwives cannot prescribe aspirin without the doctors' supervision [17,18]. Medication for pregnancy hypertension such as methyldopa is also not available in public primary care as it is only assigned at the hospitals according to the Indonesian National Medicine Formularies schedule. However, nifedipine is available and is an appropriate substitute in primary care [17]. Therefore, recommendations identified in this review would need to be further contextualized to fit in the Indonesian setting, in terms of local practices, policy and resources [51–53].

5. Limitations of study

This review only included HDP guidelines published in the academic literature in English and used some identified Indonesian guidelines and regulations as comparison. The authors were aware of contextual practice differences in HDP management within Indonesian
### Table 4
Summary of international recommendations on HDP management.

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<tr>
<th>Details</th>
<th>Queensland</th>
<th>SOMANZ</th>
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<th>ACOG</th>
<th>ASH</th>
<th>Dutch Multidisciplinary Guideline</th>
<th>ISHHP 2018</th>
<th>WHO</th>
<th>Prevention and treatment of preeclampsia</th>
<th>Managing complication in pregnancy</th>
<th>Pregnancy, childbirth, postpartum and newborn guide</th>
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<td>Clinical management</td>
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<td>Calcium supplementation</td>
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<td>Low dose aspirin prescription for preeclampsia prevention.</td>
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<td>Investigation of sign and symptoms of HDP and or preeclampsia (clinical and laboratory examination).</td>
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<td>Follow up on hypertension treatment and preeclampsia, including counseling of cardiovascular disease.</td>
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<td>Breastfeeding counseling related to hypertension treatment.</td>
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<td>Preconception counselling includes contraception recommendation.</td>
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<td>Referral to an obstetrician for further assessment for future pregnancy.</td>
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<td>Referral and delivery plan</td>
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<td>Hypertension treatment-consult with specialist</td>
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<td>Management of emergency, such as severe hypertension and eclampsia seizure.</td>
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+: available in the guidelines.
-: not/very limitedly mentioned in the guidelines.
provinces, or other LMIC settings. We also found very limited sup-
porting evidence regarding HDP risk factors and their exact manage-
ment, including any pre-referral procedures in Indonesian primary care
[54]. Therefore, we acknowledge that any recommendations from this
review should be considered within the appropriate context.

6. Suggestions for further research

Recommendation from HDP guidelines from developed countries in
their existing forms may not be applicable in a developing country such as
Indonesia because of differences in facilities, diagnostic capabilities
or policies associated with health care practices. There are obvious
knowledge gaps regarding the feasibility and viability of implementing
HDP recommendations identified in this review in Indonesian primary
care. We are currently undertaking a mixed method study to adapt and
contextualise the findings from this review to develop and pilot a
guideline for HDP management in Indonesian settings [11]. Further
epidemiological studies are necessary to explore the etiology of pre-
 eclampsia, and clinical trials testing interventions to prevent, detect,
monitor and manage HDP are required to reduce maternal mortality from
preeclampsia in Indonesian and other LMIC settings.

7. Availability of data

N/A.

8. Ethics

Ethics approval is not needed for this review.

Author contributions

All authors contributed to the design of this review and provided
feedback on the manuscript. FE performed literature searching, analysis
and provided the first paper draft. SL, JG and PL were involved in the
review design and data analysis. SB and OE provided feedback related to
HDP clinical management and context in Indonesian settings. All
authors read and approved the manuscript’s final version.

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Indonesia.

Declaration of Competing Interest

The authors declare that they have no known competing financial
interests or personal relationships that could have appeared to
influence the work reported in this paper.

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her kind assistance to appraise the reviewed guidelines using the
AGREE II instrument.

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