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Diet, lifestyle and place of care

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SYNOPSIS

Non-pharmacological management of women with the hypertensive disorders of pregnancy involves consideration of dietary interventions, lifestyle and place of care. There is scant literature on the role of dietary interventions or lifestyle change (including bed rest and stress reduction) for women with established hypertensive disorders of pregnancy; the limited literature has focused on these practices as preventative measures against pre-eclampsia (discussed in Chapter 5). As such, the bulk of this chapter focuses on place of care, including transport from community to facility. There is enormous potential benefit of addressing delays in transport to facility in LMICs, where more than 99% of hypertensive disorders of pregnancy-related maternal deaths occur. Communities have a critical role to play in ensuring that women and their families are prepared for birth and hypertensive disorder of pregnancy-related or any other emergencies that may arise.

DIET

Hydration

It is recognised that in LMICs, women may intentionally dehydrate themselves during the work day when toileting facilities are not readily available. There is some concern that this may lead to erroneous proteinuria. There is no relevant literature in pregnancy, although there is some supporting evidence from high-performance athletics. This exercise literature has associated dehydration with an increase in proteinuria in proportion to the intensity of that exercise^{1,2}.

Dietary change

There are no specific guidelines for diet during pregnancy for women with pre-eclampsia.

Dietary modifications that effectively lower blood pressure among non-pregnant individuals are weight loss, reduced salt intake, increased potassium

intake, moderation of alcohol consumption and an overall healthy dietary pattern³. Many of these interventions have been evaluated as preventative therapy among women at increased risk for pre-eclampsia, and this approach is discussed in Chapter 6.

Calorie restriction among overweight or obese hypertensive women

Dietary interventions have been studied to curb weight gain in pregnancy, primarily among overweight and obese women^{4,5}. (Table 7.1 shows the 2009 Institute of Medicine guidelines that recommend a total weight gain of 15–25 lb (6.8–11.3 kg) for overweight women and 11–20 lb (5.0–9.1 kg) for obese women⁶.) The dietary interventions studied reduced maternal weight gain and the incidence of pre-eclampsia. However, the objective was to *prevent* pre-eclampsia or other pregnancy complications rather than treat women

Table 7.1 Recommendations for total and rate of weight gain during pregnancy, by pre-pregnancy BMI⁶

<i>Pre-pregnancy BMI</i>	<i>BMI (kg/m²) (WHO)</i>	<i>Total weight gain range (lbs)</i>	<i>Rate of weight gain in 2nd and 3rd trimesters (mean range in lbs/week)</i>
Underweight	<18.5	28–40	1 (1–1.3)
Normal weight	18.5–24.9	25–35	1 (0.8–0.1)
Overweight	25.0–29.9	15–25	0.6 (0.5–0.7)
Obese	≥30.0	11–20	0.5 (0.4–0.6)

who had a hypertensive disorder of pregnancy. We were unable to identify randomised controlled trials of weight loss among overweight or obese pregnant women who were already hypertensive and they are the focus of this chapter. A Cochrane systematic review for search of randomised controlled trials, quasi randomised trials and cluster randomised trials was unable to identify relevant trials in any overweight or obese pregnant women⁷. Actual weight loss is not recommended during pregnancy because of the potential adverse effects of catabolism and ketosis on fetal brain development.

Salt intake

Salt in the diet comes from added table salt, as well as that added to foods as a preservative. The recommended level of salt intake is 140 mmol/d (~3200 mg/day), equivalent to just under one and a half teaspoons of table salt per day from any source. In a trial of sodium reduction and the DASH diet (i.e., Dietary Approaches to Stop Hypertension), both were shown to decrease blood pressure⁸. The DASH diet was a modification of the North American diet, and involved a reduction in red meat and sugar, and an increase in whole grains, low-fat dairy products, fruits, vegetables, fish, nuts and poultry. The levels of salt intake studied were high (~150 mmol/d, consistent with a usual North American diet), intermediate (~100 mmol/d), or low (~50 mmol/d). Among non-pregnant subjects of whom 59% were women, the DASH diet lowered blood pressure in all subjects, particularly those who were already hypertensive, and the blood pressure reduction occurred regardless of pre-trial salt intake (that was high, intermediate, or low). Reducing the sodium intake from the high to the intermediate level reduced the sBP by 2.1 mmHg ($p < 0.001$) during the control diet and by 1.3 mmHg ($p = 0.03$) during the DASH diet. Reducing the sodium intake from the intermediate

to the low level caused additional reductions of 4.6 mmHg during the control diet ($p < 0.001$) and 1.7 mmHg during the DASH diet ($p < 0.01$). A reduction in salt intake and the DASH diet were independently effective in lowering blood pressure, and the effects of both were greater than the effects of either intervention alone.

We were unable to identify trials of salt restriction or dietary change among already hypertensive pregnant women. This was true of ongoing salt restriction among women with chronic hypertension and new, severe salt restriction among women with any hypertensive disorder of pregnancy.

LIFESTYLE

Physical activity

We were unable to identify studies of the impact of exercise on outcomes in any hypertensive disorder of pregnancy. However, pre-eclampsia is considered by some authorities to be a contraindication to vigorous exercise⁹.

It is common practice to recommend workload reduction or cessation, or stress management (e.g. meditation) when non-severe elevations in blood pressure are found in association with chronic or gestational hypertension, or pre-eclampsia and outpatient care is continued. There are no randomised controlled trial data to support this practice, although it may be practical, facilitating maternal and fetal monitoring. Outside pregnancy, stress management by relaxation techniques may be useful to improve blood pressure control if stress appears to be exacerbating hypertension¹⁰. Although blood pressure may be improved by workload reduction/cessation or stress management in women with any hypertensive disorder of pregnancy, there is currently no evidence that these lifestyle changes improve pregnancy outcomes.

Since its introduction in 1952¹¹, bed rest has become standard therapy for women with a hypertensive disorder of pregnancy, as either primary or adjunctive therapy¹². How bed rest is defined has varied widely, and compliance with recommendations has been questioned. However, bed rest should be determined to be clearly beneficial before it can be recommended, in hospital or at home, because it may have harmful physical, psychosocial and financial effects¹³. There is limited randomised controlled trial evidence to consider.

For women with gestational hypertension (without evidence of pre-eclampsia), routine activity at home (compared with at least some bed rest in hospital) is associated with more severe hypertension (RR 1.72, 95% CI 1.12–2.63) and preterm birth (RR 1.89, 95% CI 1.01–3.45; 2 trials, 304 women). It is unclear whether the beneficial effect of bed rest in hospital is derived from the bed rest or the hospitalisation. It is clear, however, that women prefer routine activity at home^{14,15}.

We found no studies on the cost-effectiveness of dietary and lifestyle changes for the treatment of any hypertensive disorder of pregnancy.

PLACE OF CARE

Organising out-of-hospital care for women with pre-eclampsia must follow a full assessment of maternal and fetal well-being. Ideally, this assessment would be performed in hospital. Women eligible for out-of-hospital care must not have severe disease, as classified by the Canadian HDP Working Group (see Chapter 3). Of note, published outpatient studies have excluded women with severe hypertension or severe pre-eclampsia (by multiple definitions that are less serious than the Canadian definition) from evaluation of alternatives to inpatient care.

Options for outpatient care include obstetric day units and antepartum home care that is delivered through structured antepartum home care programmes. A woman's eligibility is dependent on the proximity of the hospital to her residence, a home environment that allows the home care team to provide the necessary maternal and fetal surveillance, a woman's likelihood of compliance, the lability of a woman's blood pressure, the absence of comorbid conditions, and no evidence of active progression of pre-eclampsia.

Hospital day units

Many women are not eligible for care in day units. Eligibility has varied from 30% to 60% of women assessed^{16,17}. The target group in these studies has been women with gestational hypertension, and care in hospital day units has been compared with inpatient care (2 trials, 449 women)^{17,18}. The likelihood of re-admission to hospital and actual days in hospital were reduced by care in day units and maternal and perinatal outcomes were similar, but so were costs^{19,20}. However, women preferred out-of-hospital care when asked in the context of trials¹⁷ or in previous observational studies²¹.

Home care

Most women are not eligible for formal home care programmes. Although eligibility criteria have varied, published estimates suggest that no more than 25% of women assessed can be cared for in this way²². Women can accurately measure blood pressure at home using an automated device²³. Although blood pressure at home is not consistently different from that in hospital, values for individual women vary widely, particularly for those on antihypertensive therapy²⁴.

In observational studies, the definition of home care has varied with regards to prescriptions for bed rest; proportion of assessments that are done by the women versus those done by a nurse or midwife; and communication in person, by telephone, or electronically^{25,26}. However, all involved some component of daily contact with the woman and, in most cases, a weekly outpatient visit to the hospital or office^{22,25,26}.

In observational studies of antepartum home care compared with care in hospital, hospital admission²⁶ and re-admission rates²² were quite high (i.e., 25% and 44%, respectively). However, home care resulted in similar maternal and perinatal outcomes among women with mild pre-eclampsia (321 women)²² or gestational hypertension (592 women)²⁷ and at lower cost²⁶. Women were satisfied with home care²⁸.

No randomised controlled trials have compared care at home through formal antepartum home care programme with care in hospital. All of these programmes include some component of bed rest. The potential beneficial effect of bed rest associated with hospitalisation, and uncertainty about which component is important, are discussed above.

Community-based care

In under-resourced settings, particularly LMICs, maternal and newborn care services have been increasingly delivered through community-based packages delivered by outreach workers – residents trained to provide basic maternal and newborn health services. A 2015 Cochrane review of 26 cluster-randomised and quasi-randomised trials provided encouraging evidence that these community-based interventions may improve outcomes for mothers and babies²⁹. Packages of community care had a possible decrease in maternal mortality (RR 0.80, 95% CI 0.64–1.00; 11 studies, 167,311 women), and a definite decrease in maternal morbidity overall (RR 0.75, 95% CI 0.61–0.92; 4 studies, 138,290 women); the reduction was driven by decreases in some morbidities (such as postpartum haemorrhage, RR 0.63, 95% CI 0.52–0.76; 1 study, 19,525 women) but not others (such as puerperal sepsis, RR 0.84, 95% CI 0.65–1.08; 1 study, 19,525 women). The interventions were not focused on hypertensive pregnancy, but there was no reduction in eclampsia (RR 0.74, 95% CI 0.43–1.27; 1 study, 19,525 women). Community-based packages of care reduced perinatal mortality overall and stillbirth and neonatal death specifically, although all pooled estimates showed more between-study difference than could be expected by chance alone. The authors concluded that there is sufficient evidence to scale up community-based care through packages that are delivered by community-based workers.

Drugs and therapeutics that could be used at the community-level for management of hypertension or other hypertensive disorder of pregnancy-related complications are discussed in Chapter 8.

TRANSPORT TO FACILITY

Care in the community is predicated on the assumption that ill women and babies can be transported to facility in a timely and safe manner.

In well-resourced settings, eligibility for antepartum home care programmes is based on an individualised assessment of transport plans and their safety. Formal guidelines are published to guide transport from community facilities to higher-level care³⁰.

In under-resourced settings, women and their families spend a considerable time waiting for transportation and travelling to the health facility,

and this contributes to maternal and perinatal death and illness; this delay in transport has been described in a ‘three-delay model’ along with delays in triage and treatment³¹. As such, reliable, suitable and affordable transport has the potential to play a key role in enabling expectant mothers and newborn children to receive necessary care at local health centres, district hospitals, or regional referral centres.

“Those places are too remote for them to say they want to quickly rush the pregnant woman to a hospital . . . even if the health care worker writes a referral note for the pregnant woman . . . how would they transport the pregnant woman? . . . maybe there’s no road network . . . or maybe there’s no vehicle or even a motorcycle . . . the pregnant woman might die while they are scrambling around”.

Community Director, Ogun, Nigeria
(from the CLIP Feasibility Study)³²

Barriers to timely transportation are mediated by several factors, such as permission to seek transport, access, risk perceptions and choice, financial costs, excessive travel time and distance, adequate road infrastructure and inadequate neonatal care in the transport system^{31,33}. Barriers vary in their importance depending on the individual settings. For example, access to road infrastructure is poorest in Sub-Saharan Africa where, overall, only 30% of the rural population has adequate access to transport³³. Ultimately, the impact that these barriers may have on outcome depends on a woman’s individual circumstances. For example, it has been estimated that the time interval from the onset of antepartum haemorrhage to death can be 12 hours, while the interval from postpartum haemorrhage to death can be as short as 2 hours³⁴.

Many of these barriers must be addressed by the health care system (e.g., ambulance services) or government (e.g., road infrastructure) in order to improve outcomes. In rural Niger, prior to the introduction of the ambulance, the only way for a woman with obstructed labour to reach the hospital was to walk 75 km or go by camel³⁵, but after introduction of the radio-ambulance system, the number of emergency transports from the periphery or health centre to the district hospital increased by 20-fold³⁵ and in 14% of cases, the obstetric or medical problems could be dealt with by the ambulance team without evacuating the patient to the district hospital. This highlights the importance

of integrating communication channels along with transport services.

The woman and her community can address some of the barriers to transport and care-seeking.

Community engagement

Community engagement involves the collective action of individuals, families, religious leaders, policy makers, health care providers and community members toward the creation of meaningful and sustainable change. Studies indicate that successful health behaviour change occurs when interventions create positive social, individual and environmental conditions. Community-based interventions that include women's and men's support groups, education, counselling, home visits, emergency transport initiatives and fundraising activities, have shown significant improvements in maternal and perinatal morbidity and mortality³⁶⁻⁴⁰.

Within the hypertensive disorders of pregnancy specifically, the CLIP (Community Level Interventions in Pre-eclampsia) trial (ClinicalTrials.gov Identifier: NCT01911494) is evaluating a package of care of which community engagement is a critical component. The strategy involves participation of local stakeholders and community members in ways that are culturally and contextually appropriate, meaningful and sustainable. The latter

is a key aspect of the strategy; for example, in CLIP, communities are being encouraged and supported to raise their own funds for transport (and facility health care), as providing financial aid is only ever a temporary measure.

In the CLIP trial, mapping was undertaken of both (1) past and current activities related to community engagement around maternal health, and (2) the available maternal health facilities from primary health centre to tertiary care facilities³³. Table 7.2 provides the tool used for community engagement mapping, as an example of how this may be done. Then, a community-specific engagement strategy was developed, with direct input from community members, for the purpose of creating awareness and action around pre-eclampsia/eclampsia and the prevention of the associated maternal and perinatal morbidity and mortality. Topics of key importance to be covered were chosen, as follows:

1. *Warning symptoms and signs of pregnancy complications, particularly pre-eclampsia and eclampsia*, with specific focus on:
 - a. Relating the association of danger symptoms/signs with the occurrence of pre-eclampsia/eclampsia, using the warning symptoms of pre-eclampsia and eclampsia pictograms;

Table 7.2 Tool for current community engagement mapping

<i>Activities related to</i>	<i>Do current activities exist targeting this objective? (yes/no)</i>			
	<i>No</i>	<i>Yes → describe*</i>	<i>Contact person</i>	<i>Source of information</i>
Pregnancy-related complications				
General maternal health				
Household decision-making around pregnancy and childbirth (e.g. husband's and mother in-law's permission to go to hospital when necessary)				
Transportation initiatives				
Fundraising, insurance schemes or other initiatives related to reducing the barrier of cost of transport and treatment				
Other activities at the individual, household or community level related to maternal health				

*What type of activities, for whom, how often, where and who leads them

- b. Identifying the need for referral when danger symptoms/signs associated with pre-eclampsia/eclampsia occur; and
 - c. Considering discussion of PPH, a 'visible' cause of maternal death, as a segue into discussion of pre-eclampsia/eclampsia as a 'silent' killer of pregnant and postpartum women.
2. *Permission for women to seek care*
 - a. Recognising the need for decision-making power and/or prior permissions in the event of obstetric emergencies; and
 - b. Discussion of how women can obtain prior permission to seek that care
 3. Identification of a *skilled birth attendant*
 4. Identification of a *facility for delivery*
 5. Identification of *transport and treatment funds*
 - a. Recognising the need to develop plans for financial resources when required in emergency conditions associated with pre-eclampsia/eclampsia. Funds may be personal or from the community. The community engager should facilitate the individual communities to form their own plan for raising transport and treatment funds for women in their communities;
 - b. Encouraging the identification of existing community resources (if applicable) and the development of community funds for seeking emergency care. In CLIP, the community is told that the trial will *supplement* any existing funds, but fundraising activities must build on those funds to make this sustainable; and
 - c. Identifying available and appropriate modes of transport, their associated costs, and the means by which these modes can be accessed in emergencies.
6. *Feedback mechanisms about adverse outcomes and 'great saves'*
 - a. In CLIP, the team requests that families of sufferers share their experiences with the community.
- The CLIP trial will complete recruitment in 2017, and findings should be available in 2018.

BEST PRACTICE POINTS

(Please see Appendix 7.1 for the evaluation of the strength of the recommendation and the quality of the evidence on which they are based.)

1. There is insufficient evidence to make a recommendation about the usefulness of the following: ongoing salt restriction among women with pre-existing hypertension, new severe dietary salt restriction for women with any hypertensive disorder of pregnancy, and a heart-healthy diet or calorie restriction for obese women specifically.
2. There is insufficient evidence to make a recommendation about the usefulness of exercise, workload reduction, or stress reduction.
3. For women with gestational hypertension (without pre-eclampsia), some bed rest in hospital (compared with unrestricted activity at home) may be useful to decrease severe hypertension and preterm birth.
4. For women with pre-eclampsia who are hospitalised, strict bed rest is not recommended.
5. For all other women with hypertensive disorders of pregnancy, the evidence is insufficient to make a recommendation about the usefulness of some bed rest, which may nevertheless, be advised based on practical considerations.
6. Inpatient care should be provided for women with severe hypertension or severe pre-eclampsia, however, defined.
7. A component of care through hospital day units or home care can be considered for women with non-severe pre-eclampsia or non-severe (pre-existing or gestational) hypertension.
8. In under-resourced settings, transport from community to facility must be considered a responsibility of women, their families, their communities, civil society and their care providers.

PRIORITIES FOR UNDER-RESOURCED SETTINGS

Table 7.3 outlines priorities for care for women in under-resourced settings. Key issues relate to place of care given the high proportion of women who deliver at home without a skilled birth attendant or plans for transport to facility should complications arise.

Communities should play a key role in birth preparedness and complication-readiness, including how to arrange for transport to the primary health centre or higher-level facility; obtaining prior permission for transport should an emergency arise between antenatal visits; saving money for obstetric care; identifying a skilled birth attendant; and identifying a facility for delivery.

Those facilitating community engagement should consider covering broader issues in maternity care, including appropriate timing of pregnancy in order to avoid hypertensive disorder of pregnancy-related (and other) pregnancy complications. Avoidance of teen pregnancy (discussed in Chapter 5) and food security for

adolescent girls (related to malnutrition, a risk factor for pregnancy complications in general) must be addressed by communities as culturally appropriate priorities.

WHAT INTERNATIONAL GUIDELINES SAY (APPENDIX 7.2)⁴¹

Abbreviations for Clinical Practice Guidelines: ACOG (American College of Obstetricians and Gynecologists)⁴², NICE (National Institutes of Clinical Excellence)⁴³, PRECOG (Pre-eclampsia Community Guideline)⁴⁴, QLD (Queensland, Australia)^{45,46}, SOGC (Society of Obstetricians and Gynaecologists of Canada)⁴⁷, SOMANZ (Society of Obstetric Medicine of Australia and New Zealand)⁴⁸, WHO (World Health Organization)⁴⁹.

There is little agreement, and a lack of detail, about diet, lifestyle change and place of care in international guidelines. In a review of guidelines that cited recommendations that were either based on high-quality evidence leading to a strong recommendation, or were cited by at least included

Table 7.3 Priorities for non-pharmacological management of women with a hypertensive disorder of pregnancy (HDP) by level of health care system at which care is delivered

	<i>Antepartum & postpartum</i>	
	<i>Initial priority</i>	<i>Ultimate goal</i>
<i>Community</i>		
Primary health care centre (detect, stabilise and refer)	Clear communication with referral unit regarding transport to appropriate place of care Clear transport plan to secondary or tertiary-level facilities	Clear communication with referral unit regarding transport to appropriate place of care Clear transport service to secondary or tertiary-level facilities Community engagement about maternal health*
<i>Facility</i>		
Secondary-level facility (detect, manage and refer if necessary)	Clear transport service to tertiary-level facility Hospitalisation of women with severe hypertension or severe pre-eclampsia [†]	Clear transport service to tertiary-level facility Hospitalisation of women with severe hypertension or severe pre-eclampsia [†]
Tertiary-level (referral) facility (detect and manage definitively)	Hospitalisation of women with severe hypertension or severe pre-eclampsia [†]	Hospitalisation of women with severe hypertension or severe pre-eclampsia [†] Outreach to communities for women with HDP managed in the outpatient setting

* Community engagement should cover topics about timing of pregnancy, prior permissions to seek care, birth preparedness and transport to facility

[†] 'Severe' pre-eclampsia is defined according to the definition by the Canadian HDP Working Group – pre-eclampsia with one/more serious complications. For details, see the Chapter 3

guidelines (of 13 included), only bed rest and indications for hospital admission were discussed.

Recommendations against bed rest were made by four guidelines, although no high-quality or consistent recommendations were made (NICE, WHO, ACOG, SOGC). Two exceptions were made by type of hypertensive disorder of pregnancy: (1) women with gestational hypertension may benefit from bed rest in hospital (SOGC), and (2) women with severe pre-eclampsia were excluded from the ACOG bed rest recommendations.

For place of care, the only indication for hospital admission that was consistently recommended was severe hypertension (QLD, NICE, PRECOG, SOGC, SOMANZ).

PRIORITIES FOR FUTURE RESEARCH

In well-resourced settings, research must address the role, if any, of bed rest for women who are at home with hypertensive disorders of pregnancy and those who are in hospital, as well as the safety of antepartum home care for women with hypertensive disorders of pregnancy.

In under-resourced settings, where more than 99% of women with hypertensive disorders of pregnancy die, lives lost from pre-eclampsia and eclampsia result from delays in triage, transport and treatment. Previous research in the field of hypertensive disorders of pregnancy has focused on institutional-level interventions, such as MgSO₄ for eclampsia prevention and treatment, or antihypertensive therapy for severe hypertension. However, if we are to address the tragedies of women dying prior to reaching facility or arriving there moribund, or women being irreversibly affected by pre-eclampsia by suffering complications prior to arriving at facility, we need to address care in the community and transportation issues.

There is now sufficient evidence of the effectiveness of community-based care packages in maternal and newborn care that research is required specifically for the hypertensive disorders of pregnancy. The CLIP trial is a singular step towards addressing the excess maternal and perinatal mortality that derive from the failure to identify and rapidly manage pre-eclampsia and eclampsia at the community level in LMICs. The intervention is a combination of community engagement and community-based triage, transport and treatment by community-based workers.

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