Assessment of Cardiovascular Disease after Hypertensive Pregnancy Disorders

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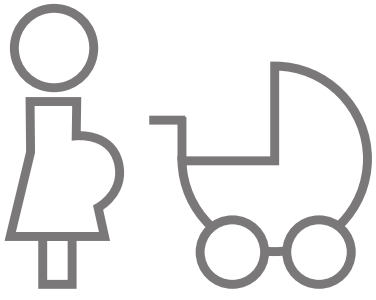

CHAPTER 8

Comparative analysis of recommendations in local Dutch guidelines on 'hypertension and pregnancy'

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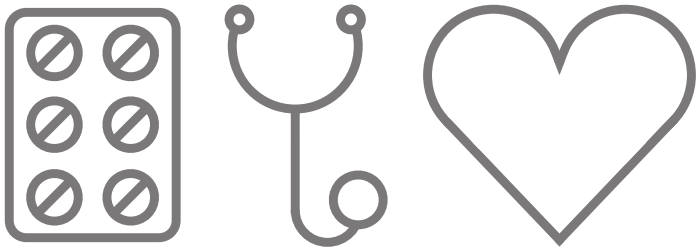
Pregnancy Hypertension 2011



ABSTRACT

Objective: Hypertensive disorders in pregnancy remain the most prevalent cause of maternal and fetal morbidity and mortality. We hypothesise that incompleteness of local protocols 'Hypertension during pregnancy' might be associated with adverse obstetric outcome. Therefore, we analyzed the contents of the local Dutch protocols.

Study Design: We analyzed local Dutch protocols on 'Hypertension during pregnancy' using qualitative methods to score the completeness using the national guideline as standard. Indicators were designed using key recommendation from the national Dutch guideline 'Hypertension during pregnancy' (n=83 indicators), 22 of these indicators were classified as crucial indicators. Deficiencies in the local Dutch protocols, differences between the protocols and differences between the protocols of academically affiliated hospitals, teaching non academic hospitals and non teaching hospitals were analyzed using ANOVA test.

Results: The median total score of the local protocols is 32.5 (max 83, range from 2-55). 13 indicators were described in less than 10% of the local protocols. We found more indicators lacking in the non teaching hospitals protocols compared to academically affiliated hospitals and teaching non academically hospitals protocols. (Six of the crucial indicators were described in less than 50% of the local protocols).

Conclusions: The data from this review imply incompleteness of the local Dutch protocols. Improvement of the protocols can result in improvement of implementation and subsequent improvement of quality care for pregnant women with hypertension finally resulting in better outcome of mother and child.

INTRODUCTION

Hypertensive disorders in pregnancy remain the most important cause of maternal mortality in the Netherlands [1–5]. Maternal mortality is used as an indicator for quality of obstetric care and within the Millennium Development Goals. The Goal is defined as a 75% decrease in the Maternal Mortality Rate (MMR; deaths per 100 000 live births) in 2015 compared to 1990. However, the maternal mortality rate has not decreased over the last decades in the Netherlands [1].

In addition, the MMR due to hypertensive disorders is more prevalent in the Netherlands compared to other western countries (MMR of 4,0-4,4 in the Netherlands vs. 0,7 in the UK) [1,3]. In order to improve the maternal outcome the Dutch Society of Obstetrics and Gynaecology (NVOG) established a Maternal Mortality Committee (MMC) to achieve a more reliable classification of underlying causes of the high MMR, and to investigate improvement of outcome [2]. One of the main conclusions was that women with hypertensive disorders often had substandard care. By upgrading education of the pregnant women, skills training of the midwifes and obstetricians [3] and knowledge of the guideline of NVOG, this care could be improved [1].

In general, the national guidelines are transformed into local protocols for use in obstetric departments of Dutch hospitals. The national guideline describes the main recommendations based on the available evidence from literature whereas local protocols are typically more practical guidance for clinical use in a local setting. For example, local protocols include kind and dose of the medication, adverse effects, local logistics etc. A key issue for the development of local protocols is the implementation. Even though scarce data are available indicating that non-adherence finally influences maternal mortality, it might be at least expected.

In this study we evaluated the local protocols of Dutch hospitals on hypertensive disorders in pregnancy in order to examine differences in recommendations and completeness. The golden standard in this review is the national guideline 'Hypertensive disorders in pregnancy' developed by the NVOG [6].

METHODS

Collecting the local protocols

We approached all 98 hospitals with an obstetric ward by a letter to send their local protocol. A reminder was send by e-mail. If there was still no response, the gynaecologist was approached by phone.

Developing the indicators to review the differences between the local protocols

Recently a Dutch study was preformed regarding the implementation of guidelines from the NVOG, the BOS/hypertension study [7]. This study described several indicators in this review for the guideline Hypertension and pregnancy that we used as indicators in this study.

In the abovementioned study 39 key recommendations from the NVOG guideline 'Hypertensive disorders in pregnancy' were extracted. By adjusting these 39 extracted recommendations, 83

indicators were formulated to view the difference between the local protocols. Several recommendations held more than one subject. These recommendations were adjusted so that they held only one subject per indicator in order to analyze each subject separately for this review. (For example a recommendation from the BOS/hypertension study was in patients with proteinuria the following blood tests should be performed; Hb, creatinine and uric acid, ALAT trombocyte activation and adhesion and LDH. For this review that recommendation is translated into 5 indicators; The blood test of patients with pre-eclampsia should consist testing on Hb, The blood test of patients with pre-eclampsia should consist testing on creatinine and uric acid, The blood test of patients with pre-eclampsia should consist testing on ALAT, The blood test of patients with pre-eclampsia should consist testing on trombocyte activation and adhesion, The blood test of patients with pre-eclampsia should consist testing on LDH.) The 83 indicators are described in **table 1**. Of these recommendations 22 crucial indicators are extracted. This selection was based on the quality indicators described in the BOS/hypertension study. The 22 crucial indicators are described in bold in **table 1**.

The 83 indicators for this review include 22 about history and examination, 47 about policy, 5 about advice and referral, 9 about policy during partum, post partum, retesting and preconceptional advice.

The local protocols were scored by administering 1 point when the indicator was described in the protocol and 0 points when the indicator was not described. Total scores were the sum of all indicators with a maximum total score of 83; maximum score of history and examination was 22, policy 47, advice and referral 5 and in the subject policy during partum, post partum, retesting and preconceptional advice 9 points.

The local protocols are independently scored by 3 authors (J.M. L., C.J.M. G, V.S. V.). The results of these scoring was compared and discussed, finally consensus was reached the scoring.

Statistics

By analyzing al the scores of the local protocols in SPSS, the total and median scores were determined. For comparing of the different kinds of hospitals the one-way ANOVA statistic test is used.

RESULTS

Received protocols

A total of 86 protocols from the 98 hospitals were received that were included in the study (response rate 88%).

The hospitals were divided into three groups. The first group contents the 8 academically hospitals and the 2 teaching hospitals with neonatal intensive care facilities, this group is further mentioned as academically hospitals. The other two groups are the teaching non academically hospitals, in this review the teaching hospitals, and the non teaching hospitals. From the 10 academically hospitals, all sent their local protocol (response rate 100%). A total of 34 local protocols were received from the 37 teaching hospitals (response rate 92%). From the 51 non teaching

hospitals, 42 protocols were received (response rate 82%).

The hospitals that did not send their protocols had a significantly ($\alpha<0.5$) smaller staff concerning obstetrics and gynecology (5.5), compared with the hospitals that did send in their protocols (8.3).

Completeness of the local protocols

The median total score of all the local protocols was 32.5 with a range from 2-55.
The appearance of the indicators in the local protocols is shown in figure 1.
The indicators poorly described, these are the ones mentioned in less than 10% of all the local protocols, are being mentioned below.

History and examination
The median score of all the local protocols under the heading history and examination is 11.0, with a range from 0-20. Two indicators are mentioned in less than 10% of the local protocols. These indicators are 1) the proteinuria measurement at the beginning of every pregnancy (indicator 9 in **table 1**); 2) the blood pressure measurement every check up in patients who might have pregnancy induced hypertension (indicator 3 in **table 1**).

Policy
The median score of all the local protocols under the heading policy is 17.0 with a range from 2-33. Nine indicators are mentioned in less than 10% of the local protocols mainly concerning kidney complications. These indicators are 1) in patients with pre-eclampsia oliguria should be treated following guidelines (indicator 37 in **table 1**) ; 2) in patients with pre-eclampsia and oliguria the fluid balance should be checked (indicator 38 in **table 1**); 3) in patients with pre-eclampsia and kidney failure the fluid balance should be checked (indicator 39 in **table 1**); 4) In patients with pre-eclampsia and oliguria the electrolytes should be checked (indicator 40 in **table 1**); 5) In patients with pre-eclampsia and kidney failure the electrolytes should be checked (indicator 41 in **table 1**); 6) the test on fibrinogen in patients with eclampsia (indicator 49 in **table 1**); 7) the interactions of the antihypertensive medication (indicator 58 in **table 1**); 8) when there are problems of coagulation, the patient shouldn't receive intramuscular injections (indicator 68 in **table 1**); 9) in case of section, bleeding or DIS, there should be contact with a doctor specialised in coagulation (indicator 69 in **table 1**).

Advice and referral
The median score of all the local protocols under the heading advice and referral is 0.0 with a range 0-4. There were no indicators mentioned in less than 10% of the local protocols.

Policy during partum, post partum, retesting and preconceptional advice
The median score of all the local protocols under the heading policy during partum, post partum, retesting and preconceptional advice is 1.0 with a range 0-7. Two indicators are mentioned in less than 10% of the local protocols. These indicators are 1) that in patients with symptoms of overfulling disease postpartum diuretic can be administrated (indicator 80 in **table 1**); 2) the prohibiting of ACE-inhibitors as a preconceptional advice (indicator 83 in **table 1**).

Differences between academically affiliated hospitals, teaching hospitals and non teaching hospitals.
By comparing the different kinds of hospitals on the total of 83 indicators, the median total score

of the academically affiliated hospitals is 31.5 (range 19-43), the median score of the teaching hospitals is 35.5 (range 7-55) and the median score of the non teaching hospitals is 30.0 (range 2-54). There is no significant difference found between the total scores of the different kinds of hospitals.

In the next chapters the eleven indicators are described that have a significantly different appear rate in the protocols of the different kinds of hospitals. ($\propto$<0.05).

History and examination
Under the heading advice and referral the median score of the academically affiliated hospitals is 12.5 (range 6-18), the median score of non academically hospitals is 11.5 (range 0-20), the median score of non teaching hospitals is 11.0 (range 0-19). There is no significant difference found between the scores on the subject history and examination between the different kinds of hospitals.

Policy
The median score under the heading policy of the teaching hospitals (18.0 (range 2-33)) is significant higher than the median score of the non teaching hospital (14.5 (range 2-32)). On the appearance in the protocols of eight indicators in the subject of policy there is found a significant difference between the different kinds of hospitals.

These indicators are 1) the frequent policlinic controls or controls in a home-monitoring system for patients with pregnancy induced hypertension is described significantly more often in the protocols of teaching hospitals than in the protocols of non teaching hospitals (indicator 25 in **table 1**. $\propto$ = 0.019); 2) the dose of magnesiumsulphate for preventing eclampsia is described significantly more often more in the protocols of teaching hospitals than in the protocols of non teaching hospitals (indicator 36 in **table 1**. $\propto$ = 0.029); 3) the warning of an anaesthetist or internist in case of an eclamptic insult is described significantly more often more in the protocols of teaching hospitals than in the protocols of non teaching hospitals (indicator 44 in **table 1**. $\propto$ = 0.039); 4) the checking of haemostasis after an eclamptic insult is described significantly more often more in the protocols of teaching hospitals than in the protocols of non teaching hospitals (indicator 48 in **table 1**. $\propto$ = 0.016); 5) the checking of haemostasis in patients with HELLP is mentioned significant less in protocols of non teaching hospitals comparing with the protocols of teaching hospitals (indicators 50 in **table 1**. $\propto$ = 0.021); 6) the checking of fibrinogen in patients with HELLP is mentioned significant less in protocols of non teaching hospitals comparing with the protocols of teaching hospitals (indicators 51 in **table 1**. $\propto$ = 0.044); 7) a second choice of antihypertensive medication in the protocol is mentioned significantly more in the protocols of academically hospitals then in the protocols of the non teaching hospitals (indicator 55 in **table 1.** $\propto$ = 0.016); 8) the use of diazepam in patients with eclampsia when magnesiumsulphate is not available is described significantly more often more in the protocols of teaching hospitals than in the protocols of non teaching hospitals (indicator 65 in **table 1**. $\propto$ = 0.025).

Advice and referral
Under the heading advice and referral the median score of academically affiliated hospitals is 0.0 (range 0-3), the median score of the teaching hospitals is 0.0 (range 0-4) and the median score of the non teaching hospitals is 1.0 (range 0-4). There is no significant difference found between the

scores on the subject advice and referral between the different kinds of hospitals.

Policy during partum, post partum, retesting and preconceptional advice
Under the heading policy during partum, post partum, retesting and preconceptional advice the median score of academically affiliated hospitals is 3.0 (range 0-6), the median score of the teaching hospitals is 1.0 (range 0-7) and the median score of the non teaching hospitals is 0.0 (range 0-6). On the appearance in the protocols of three indicators in the subject of policy during partum, post partum, retesting and preconceptional advice there is found a significant difference between the different kinds of hospitals idem.

These indicators are 1) the target blood pressure post partum described as lower after delivery is described significantly more in the protocols of non teaching hospitals then in the protocols of teaching hospitals (indicator 78 in **table 1**. $\propto = 0.015$); 2) preconceptional advice is cited significantly more in the protocols of teaching hospitals then in the protocols of the academically hospitals (indicator 81 in **table 1**. $\propto = 0.037$); 3) the preconceptional advice mentioning the use of low dose aspirin to prevent a relapse of pre-eclampsia is stated significantly more in the protocols of academically hospitals then in the protocols of non teaching hospitals (indicator 82 in **table 1**. $\propto = 0.047$).

Lacks on the crucial indicators
From the 22 crucial indicators, most are mentioned in more then 50% of the local protocols; the six indicators mentioned in less then 50% of the local protocols are being described below. These indicators are in the subject policy and advice and referral.

Policy
In the subject policy, the following indicators are mentioned in less then 50% of the local protocols 1) the guidelines for termination of the pregnancy in patients with hypertension during pregnancy are described (indicator 23 in **table 1**); 2) patients with pregnancy induced hypertension should be informed about the possibility of acute worsening of there situation (indicator 26 in **table 1**); 3) patients with pregnancy induced hypertension should be aware of the necessity of connecting their doctor in case of an acute worsening of there situation (indicator 17 in **table 1**); 4) the indications for hospitalization for patients with hypertension in pregnancy (indicator 52 in **table 1**).

Advice and referral
In the subject advice and referral, the following indicators are mentioned in less then 50% of the local protocols 1) the referral of patients with severe pre-eclampsia before 32 weeks pregnancy to a perinatological clinic (indicator 73 in **table 1**); 2) the referral of patients with severe pre-eclampsia with a foetal weight less then 1200 gram to a perinatological clinic (indicator 74 in **table 1**).

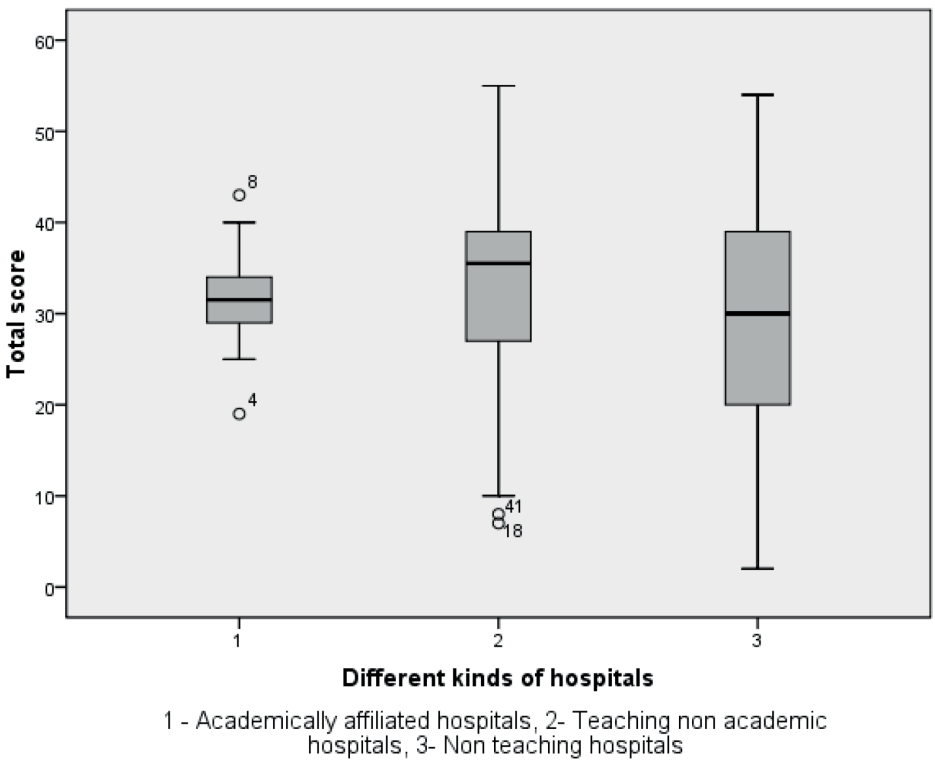


Figure 1. Appearance of indicators in local protocols

DISCUSSION

We found that local protocols on hypertensive disorders in pregnancy from the Dutch hospitals overall are incomplete. For this conclusion we reviewed the protocols using 83 indicators from the national guideline of the Dutch association for Obstetrics and Gynecology 'Hypertensive disorders during pregnancy' as golden standard. The local protocols scored a total range of 2 - 55 from a maximum score of 83.

Of the 83 indicators, 13 were described in less than 10% of the local protocols including the proteinuria measurement at the beginning of every pregnancy, the management of oliguria and kidney failure in patients with pre-eclampsia and the discontinuation of ACE-inhibitors as a preconceptional advice. We found more indicators lacking in the non teaching hospitals protocols compared to the academically affiliated hospital protocols and the teaching hospitals protocols. From 22 crucial indicators, 6 indicators are mentioned in less than 50% of the local protocols including items about termination of the pregnancy, knowledge of acute worsening of the disease and necessity of consulting their physician, indications for hospitalization.

These data imply incompleteness of the local protocols. Since the outcome of pregnancies com-

plicated by hypertensive disorders is associated with high maternal and fetal morbidity and mortality in the Netherlands, improvement of the local protocols can result in improvement of implementation and subsequent improvement of quality care for pregnant women with hypertension finally resulting in better the outcome of mother and child. Recently, a conducted review and synthesis of qualitative studies [8] identified six themes of barriers to the implementation of guidelines among Dutch general practitioners: 1. the content of the guidelines, 2. the format of the guidelines, 3. Dutch general practitioners individual experience, 4. preserving the doctor-patient relationship, 5. professional responsibility, and 6. practical issues. In a recent study [9] they described that general practitioners often disagreed with recommendations because they argued the underlying evidence provided or felt that it was not clear why they should apply them. Data from our study are analyzed using the national guideline as golden standard. The national guideline 'Hypertensive disorders in pregnancy' has been written based on available evidence and has been approved by all members of the Society in 2005 [6]. In addition, data from the BOS/Hypertension study were selected by an expert panel of 12 obstetricians and therefore we assume that the dedicated quality indicators from this study were supported by the target group [7]. Another abovementioned barrier, the format of the guideline, is for the national guideline a 19 pages electronic web-based version. Although key recommendations are described a short summary of the guideline is lacking. Further, the practical issues particularly organizational constraints referred to logistic problems within the own practice could play a role e.g. information about the possibility of acute worsening of the disease and the necessity of connecting their doctor. Improving of informing patients by (national) flyers about complaints, phone numbers and necessity to contact their obstetrics might improve this practical issue. In addition, lack of collaboration with other types of healthcare professionals including the academic hospitals could be an issue for organizational improvement e.g. information about termination of the pregnancy. Finally, the differences in lacking indicators in local protocols between non teaching hospitals protocols compared to academically affiliated hospitals and teaching hospitals protocols may be explained by the number of staff members; less in non teaching hospitals protocols compared to academically affiliated hospitals and teaching hospitals protocols and therefore possibly less differentiated and less dedicated to obstetrical care.

In general the Dutch obstetrics are aware of the high maternal morbidity and mortality due to hypertensive disorders in pregnancy. This has resulted in a strong focus on postgraduate training and continuing medical education [10]. Improvement of the quality of the local guidelines is a fundamental part of standardization of processes and procedures, and inter-professional agreements on treatment of women with pregnancy complications. Regional protocols rather than local protocols might improve the disagreement of the indicators of the guidelines and may help to overcome organizational constraints by improving collaboration based on shared decision-making for a diverse group of health professionals (academically, academically affiliated hospitals and teaching). In addition, the professional responsibility can be improved by interactive education with active involvement and participation. This will also have a long-term affect on the quality of obstetric care: better obstetricians' residency programs decrease maternal pregnancy complication rates [11].

One of the strengths of our study is that we examined a large set of indicators including indicators selected from an expert panel comparing local protocols with the national guideline. The Dutch Obstetric and Gynecology Society has a longstanding obstetric guideline program but little attention has been paid to the implementation of the guideline. In this study we focus on the differences of indicators in the local protocols. Missing indicators might result in lack of information and inadequate treatment. Secondly, we focused on differences of indicators in local guidelines of different kinds of hospitals. This information can be used by professional groups or organizations, regionally and nationally, to develop multifaceted interventions, tailored to the regional guidelines. Finally, the findings from our study may be useful for guideline developers in the process of updating the guidelines to raise the acceptance and implement ability of the guideline recommendations.

Several limitations should be considered in interpreting our findings. Some indicators in local protocols might be described in other protocols. For example 'blood pressure measurement during first prenatal appointment (indicator 1) might be described in another guideline named 'Basic perinatal care'. However, these indicators should be mentioned also in the protocol hypertension and pregnancy or linked to it.

Secondly, 10% appearance of an indicator in local protocols, is translated as poorly labelled, but is chosen arbitrarily. Data on the acceptable percentage of these indicators and its importance is lacking. Finally, in this study we are unable to compare the effect of quality of local protocols and lack of indicators with the outcome of pregnancy complicated by hypertension. We expect that a higher frequency of lacking indicators in local protocols is associated with more maternal pregnancy complications.

CONCLUSIONS

The local Dutch protocols on 'Hypertension during pregnancy' inadequately reflect the content of national guideline of the Dutch association for Obstetrics and Gynecology in this subject. The importance of the local guidelines is underscored and by improvement of the content and its implementation the clinical outcome should improve. Regional protocols instead of local protocol might lead to diminishment of the disagreement between the local protocols, the disagreement between the local protocols and the national guideline and thereby lead to improvement of organizational constraints based on shared decision-making for a diverse group of health professionals.

Table 1. Indicators for the review of Local Protocols 'Hypertension during Pregnancy'

		Appearance of indicator in local protocols	Appearance of indicator in local protocols of academically hospitals	Appearance of indicator in local protocols of teaching hospitals	Appearance of indicator in local protocols of non teaching hospitals
	Total	86	10	34	41
		n (%)	n (%)	n (%)	n (%)
	Indicators on History and Examination:				
1	At the beginning of every pregnancy there should be a one time check on proteinurie.	2 (2)	0 (0)	2 (6)	0 (0)
2	The blood pressure of patients, who might have pregnancy induced hypertension, should be measured by hand.	50 (58)	4 (40)	18 (53)	28 (67)
3	The blood pressure of patients, who might have pregnancy induced hypertension, should be measured at every check on.	8 (9)	1 (10)	4 (12)	3 (7)
4	When hypertension is measured, the doctor should ask if there are clinical signs of pre-eclampsia	33 (38)	6 (60)	12 (35)	15 (36)
5	A clinical sign of pre-eclampsia is headache.	54 (63)	7 (70)	20 (59)	27 (64)
6	A clinical sign of pre-eclampsia is visual disturbance.	44 (51)	6 (60)	18 (53)	20 (48)
7	A clinical sign of pre-eclampsia is pain in the epigastria.	51 (59)	6 (60)	19 (56)	26 (62)
8	A clinical sign of pre-eclampsia is malaise.	21 (24)	4 (40)	8 (24)	9 (21)
9	A clinical sign of pre-eclampsia is nausea.	31 (36)	5 (50)	13 (38)	13 (31)
10	A clinical sign of pre-eclampsia is vomiting.	28 (33)	5 (50)	11 (32)	12 (29)
11	A clinical sign of pre-eclampsia is a tingling feeling.	30 (35)	4 (40)	11 (32)	15 (36)
12	A clinical sign of pre-eclampsia is oedema.	34 (40)	5 (50)	12 (35)	17 (40)
13	**Patients with pregnancy induced pregnancy should be tested on protein in the urine.**	53 (62)	6 (60)	22 (65)	25 (60)

Table 1. Continued

14	The foetal condition in patient with pregnancy induced pregnancy should be monitored with a CTG.	53 (62)	5 (50)	22 (65)	26 (62)
15	The foetal condition in patient with pregnancy induced pregnancy should be monitored with an ultrasound scan.	47 (55)	5 (50)	22 (65)	20 (48)
16	**The blood test of patients with pre-eclampsia should consist testing on Hb.**	66 (77)	8 (80)	27 (79)	31 (74)
17	**The blood test of patients with pre-eclampsia should consist testing on creatinine and uric acid.**	66 (77)	8 (80)	27 (79)	31 (74)
18	**The blood test of patients with pre-eclampsia should consist testing on ALAT.**	65 (76)	8 (80)	27 (79)	30 (71)
19	**The blood test of patients with pre-eclampsia should consist testing on trombocyte activation and adhesion.**	64 (74)	7 (70)	26 (76)	31 (74)
20	**The blood test of patients with pre-eclampsia should consist testing on LDH.**	59 (69)	5 (50)	25 (74)	29 (69)
21	The foetal condition in patient with pre-eclampsia should be monitored with a CTG.	74 (86)	7 (70)	28 (82)	39 (93)
22	The foetal condition in patient with pre-eclampsia should be monitored with an ultrasound scan.	67 (78)	8 (80)	27 (79)	32 (76)
	Indicators on Policy:				
23	***In the protocol are guidelines on when to terminate the pregnancy.***	29 (34)	6 (60)	9 (26)	14 (33)
24	Patients with hypertension during pregnancy can be given morphine, paracetamol or codeine for painkilling.	24 (28)	1 (10)	11 (32)	12 (29)

Table 1. Continued

25	In patients with pregnancy induced hypertension the controls clinical, frequent policlinic or in a home-monitoring system.	46 (53)	7 (70)	23 (68)	16 (38)
26	**Patients with mild pregnancy induced hypertension should be informed about the possibility of acute worsening of there situation.**	11 (13)	2 (20)	7 (21)	2 (5)
27	**Patients with mild pregnancy induced hypertension should be informed about the necessity of connecting there doctor when there is an acute worsening of there situation.**	14 (16)	2 (20)	8 (24)	4 (10)
28	**Patients with pregnancy induced hypertension with a diastolic blood pressure >110mmHg or a systolic blood pressure >170mmHg should be treated with medicaments.**	43 (50)	7 (70)	17 (50)	19 (45)
29	**Patients with mild pre-eclampsia should be treated clinically.**	69 (80)	9 (90)	28 (82)	32 (76)
30	**Patients with severe pre-eclampsia should be treated clinically.**	69 (80)	9 (90)	28 (82)	32 (76)
31	**Patients with pre-eclampsia with a diastolic blood pressure >110mmHg or a systolic blood pressure >170mmHg should be treated with medicaments.**	61 (71)	8 (80)	25 (74)	28 (67)
32	**Patients with severe pre-eclampsia should be stabilized before intervention.**	21 (24)	2 (20)	9 (26)	10 (24)
33	The way of stabilization is mentioned in the protocol.	13 (15)	2 (20)	6 (18)	5 (12)

Table 1. Continued

34	**One of the first steps in the treatment of patients with severe pre-eclampsia is decreasing the blood pressure by medicaments.**	50 (58)	6 (60)	18 (53)	26 (62)
35	**One of the first steps in the treatment of patients with severe pre-eclampsia is magnesium sulphate administration.**	54 (63)	5 (50)	22 (65)	27 (64)
36	When magnesium sulphate is given to prevent eclampsia, the bolus should be 4-6g and the maintenance dose 1g/h.	60 (70)	7 (70)	29 (85)	24 (24)
37	When the serumcreatinine is normal in patients with pre-eclampsia, oliguria should be treated following guidelines (no forced drinking, no fluid impute).	5 (6)	0 (0)	3 (9)	2 (5)
38	In patients with pre-eclampsia and oliguria the fluid balance should be checked.	3 (3)	0 (0)	1 (3)	2 (5)
39	In patients with pre-eclampsia and kidney failure the fluid balance should be checked.	3 (3)	0 (0)	1 (3)	2 (5)
40	In patients with pre-eclampsia and oliguria the electrolytes should be checked.	2 (2)	0 (0)	1 (3)	1 (2)
41	In patients with pre-eclampsia and kidney failure the electrolytes should be checked.	6 (7)	0 (0)	3 (9)	3 (7)
42	**Patients with eclampsia should be treated with magnesium sulphate.**	71 (83)	9 (90)	28 (82)	34 (81)
43	**When magnesium sulphate is given to patients with eclampsia, the bolus should be 4-6g and the maintenance dose 1g/h.**	65 (76)	8 (80)	28 (82)	29 (69)
44	When eclampsia occurs, the anaesthetist/ internist should be warned.	18 (21)	3 (30)	11 (32)	4 (10)

Table 1. Continued

45	When the patient with eclampsia isn't approachable short after the insult, the neurologist should be warned.	17 (20)	1 (10)	7 (21)	9 (21)
46	When the patient with eclampsia has asymmetric reflexes after the insult, the neurologist should be warned.	15 (17)	1 (10)	5 (15)	9 (21)
47	When the patient with eclampsia has failure phenomena after the insult, the neurologist should be warned.	15 (17)	1 (10)	5 (15)	9 (21)
48	In patients with eclampsia the haemostasis should be checked (APTT).	10 (12)	1 (10)	8 (24)	1 (21)
49	Patients with eclampsia should be tested on fibrinogen.	8 (9)	1 (10)	6 (18)	1 (21)
50	In patients with HELLP the haemostasis should be checked (APTT).	14 (16)	0 (0)	10	4 (10)
51	Patients with HELLP should be tested on fibrinogen.	13 (15)	0 (0)	9 (26)	4 (10)
52	**The indications for hospitalization of a patient with hypertension in pregnancy are mentioned in the protocol.**	10 (12)	0 (0)	5 (15)	5 (12)
53	The target for blood pressure is systolic 140-160mmHg and diastolic 90-105mmHg.	47 (55)	7 (70)	21 (62)	19 (45)
54	A first choice of antihypertensive medication is mentioned in the protocol.	38 (44)	7 (70)	17 (50)	14 (33)
55	A second choice of antihypertensive medication is mentioned in the protocol.	31 (36)	6 (60)	16 (47)	9 (21)
56	The effect of the antihypertensive medication is mentioned in the protocol.	41 (48)	5 (5)	18 (53)	18 (43)
57	The side-effects of the antihypertensive medication are mentioned in the protocol.	45 (52)	7 (70)	20 (59)	18 (43)

Table 1. Continued

58	The interactions of the antihypertensive medication are mentioned in the protocol.	6 (7)	2 (20)	2 (6)	2 (5)
59	In the protocol the reasons for preventive administration of magnesium sulphate are mentioned.	25 (29)	3 (30)	12 (35)	10 (24)
60	In the protocol the contra-indications of administration of magnesium sulphate are mentioned.	31 (36)	3 (30)	12 (35)	16 (38)
61	In the protocol the reasons for quitting the administration of magnesium sulphate are mentioned.	12 (14)	0 (0)	7 (21)	5 (12)
62	**The administration of magnesium sulphate should be under control of diureses.**	47 (55)	3 (30)	22 (65)	22 (52)
63	As antidote of magnesium sulphate there should be calciumgluconaat/ calciumlevulaat available.	69 (80)	9 (90)	28 (82)	32 (76)
64	The dose of calciumgluconaat/ calciumlevulaat should be mentioned in the protocol.	67 (78)	8 (80)	28 (82)	31 (74)
65	When magnesium sulphate is not available, 10mg diazepam should be used.	38 (44)	4 (40)	21 (62)	13 (31)
66	The antidote of diazepam is flumazenil.	1 (1)	0 (0)	1 (3)	0 (0)
67	In patients with hypertension in pregnancy corticosteroids should be administrated when delivery is expected on short term.	54 (63)	5 (50)	23 (68)	26 (62)
68	When there are problems of coagulation, the patient shouldn't receive intramuscular injections.	3 (3)	0 (0)	2 (6)	1 (2)
69	In case of section, bleeding or DIS, there should be contact with a doctor specialised in coagulation.	5 (6)	0 (0)	4 (12)	1 (2)

Table 1. Continued

	Indicators on Advice and Referral:				
70	When patients experience severe maternal morbidity/HELLP, lung oedema or eclampsia there should be consultation or refer to a perinatological clinic.	22 (26)	1 (10)	7 (21)	14 (33)
71	When patients experience severe maternal morbidity after 32weeks pregnancy there should be consultation or refer to a perinatological clinic.	21 (24)	2 (20)	7 (21)	12 (29)
72	There are regional agreements about consultation and refer of patients with severe pre-eclampsia before 32 weeks or with a foetal weight <1200g or with severe maternal morbidity.	0 (0)	0 (0)	0 (0)	0 (0)
73	**Patients with severe pre-eclampsia before 32weeks should be referred to a perinatological clinic.**	39 (45)	2 (20)	15 (44)	22 (52)
74	**Patients with severe pre-eclampsia and a foetal weight <1200g should be referred to a perinatological clinic.**	12 (14)	0 (0)	6 (18)	6 (14)
	Indicators on Policy during partum, post partum, retesting and preconceptional advice				
75	When the pregnancy of patients with hypertension during pregnancy >37weeks is terminated, there is a better maternal situation then when no action is taken.	15 (17)	2 (20)	7 (21)	6 (14)
76	The subjects on retesting are mentioned in the protocol.	25 (29)	3 (30)	10 (29)	12 (29)
77	A subject of the retesting is measurement of the blood pressure.	22 (26)	4 (40)	8 (24)	10 (24)

Table 1. Continued

78	In patients with pregnancy induced hypertension, the target blood pressure is lower post partum than before the partus.	15 (17)	3 (30)	1 (3)	11 (26)
79	In patients with pre-eclampsia, the target blood pressure is lower post partum than before the partus.	18 (21)	3 (30)	4 (12)	11 (26)
80	Only in patients with overload disease postpartum diuretic can be administrated.	5 (6)	1 (10)	4 (12)	0 (0)
81	In the protocol the subjects of preconception advice are mentioned.	17 (20)	5 (50)	5 (15)	7 (17)
82	A subject of preconception advice is low dose aspirin to lower the risk of a relapse of pre-eclampsia.	27 (31)	5 (50)	14 (41)	8 (19)
83	A subject of preconception advice is that no ACE-inhibitor can be used in following pregnancies.	5 (6)	0 (0)	4 (12)	1 (2)

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ADDENDUM

Comparative analysis of recommendations in local Dutch guidelines on 'hypertension and pregnancy'

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Local Guidelines (2011)

In the manuscript on local Dutch guidelines entitled Comparative analysis of recommendations in local Dutch guidelines on hypertension and pregnancy, published in Pregnancy Hypertension (2011) we analyzed local protocols on 'hypertension and pregnancy' on a variety of indicators derived after a Dutch study on implementation of guidelines by the Dutch Society of Obstetrics and Gynecology (NVOG) [1]. These included three indicators in the subject of post partum care after hypertensive pregnancy disorders; 1) the target blood pressure post partum should be lower after delivery, 2) preconceptional advice should be mentioned, 3) the preconceptional advice should mentioning the use of low dose aspirin to prevent a relapse of pre-eclampsia (after early onset preeclampsia, < 34 weeks).

This addendum focuses on the specific follow up information and advice on preventive interventions for cardiovascular disease in the Dutch protocols as received in 2011 for the original study. Since we recently found that women with a history of Hypertensive Pregnancy disorders are not always informed of their higher risk on cardiovascular disease later in life, and are not advised on possible preventive interventions, we scored the local protocols on two indicators; a) women should be informed on their higher cardiovascular risk after hypertensive pregnancy disorders and b) advice on possible preventive interventions for cardiovascular disease should be given to women after hypertensive pregnancy disorders [2].

Information on higher Cardiovascular Risk after Hypertensive Pregnancy Disorders from Local Protocols

In the Netherlands in 2011, there was only one regional guideline that stated that women with Hypertensive Pregnancy Disorders should be informed on their increased cardiovascular risk. The statement made in this regional protocol was; it is important to inform women on the increased risk of cardiovascular disease and to instruct them to check and treat risk factors. The regional guideline was created in the academically hospitals in Amsterdam (AMC and VUmc) and was used without adherences in 10 teaching and non-teaching hospitals in the surroundings of Amsterdam. Therefore, of all received local protocols on hypertension in pregnancy (n = 86), information on higher cardiovascular risk after hypertensive pregnancy disorders was addressed in 11% of the protocols.

Advise on Preventive Interventions for Cardiovascular Disease

None of the local protocols mentioned possible preventive interventions for cardiovascular disease in the women with a history of hypertensive pregnancy disorders in 2011.

International guidelines

Since we found that in 2011 local Dutch protocols lacked significantly in information on cardiovascular disease risk after hypertensive pregnancy disorders, we assessed the information on this subject in international guidelines on hypertension in pregnancy.

In 2014, a review of international clinical guidelines on hypertension in pregnancy stated that 5 guidelines give information or advice on follow up [3]. For this addendum we used the search performed for this review since it was done recently. The guidelines in which post partum advice available, were collected trough the websites of the obstetric societies.

Two of the guideline state specifically that women should be informed on the higher risk of further hypertension and cardiovascular disease later in life; the NICE guideline (the United Kingdom; National Institute for Health and Clinical Excellence) [4] and the OAM guideline (Canada; Association of Ontario Midwives) [5].

In three guidelines, it was states that advise on healthy diet and lifestyle, and healthy BMI should be obtained; the NICE guideline, the OAM guideline and the SOGC (Canada; Society of Obstetricians and Gynecologists of Canada) [6]. The QLD guideline (Australia; Queensland Maternity and Neonatal Clinical Guidelines Program) [7] advises to offers "screening" and lifestyle counselling for women with a history of hypertensive pregnancy disorders and the ACOG (the United States of America; American College of Obstetricians and Gynecologists) [8] advises women with preeclampsia and preterm birth or recurrent preeclampsia to consider yearly assessment of blood pressure, lipids, fasting blood glucose and BMI.

In the review it was stated that national guideline from the Dutch Society of Obstetrics and Gynaecology (NVOG) did not give any advise on follow up. In December 2014, the NVOG publicised a new guideline on cardiovascular risk management after reproductive disease including hypertensive pregnancy disorders (CVRM guideline). In this guideline advised further diagnostics and treatment for cardiovascular risk management in patients with a history of preeclampsia. Further is state that women should be counseled to aim a healthy lifestyle including smoking cessation, sufficient physical activity and healthy bodyweight and that blood pressure measurements should be obtained every year from age of 50.

Conclusion

Assessment of the information on cardiovascular disease risk after hypertensive pregnancy disorders in local Dutch protocols from 2011 showed a lack at this point. Only 11% of the local protocols stated that women should be informed on their higher cardiovascular risk and none of the protocols included statements on possible preventive interventions in these women. At this time, not all international guidelines include information on cardiovascular risk after hypertensive pregnancy and advice given in different guidelines is quite diverse. This is probably due to the fact that no substantial research is performed on effective interventions in prevention of cardiovascu-

lar disease in women with a history of hypertensive pregnancy disorders is performed. Although no specific statements on preventive interventions can be made at this time, we feel that women with a history of hypertensive pregnancy disorders should be informed on their higher cardiovascular risk and that this could be achieved by complete international guidelines and local protocols on this matter.

Table 1. Follow up information and advice on cardiovascular disease after hypertensive pregnancy disorders from international guidelines

Society	Guideline	Information on higher risk	Advise on preventive measurements	Follow up advice
NICE[1]	Guideline *Hypertension in Pregnancy* (2010)	Yes	Yes	Advise women with GH[7] or PE[8] (and their primary care physicians) that they are at increased risk of future hypertension and cardiovascular disease in later life. Advise women with PE to keep their BMI within healthy range (18.5-24.8kg/m2).
OAM[2]	Guideline *Hypertensive Disorders of Pregnancy* (2012)	Yes	Yes	Advise women with any HDP[9] that they may be at increased risk of future hypertension and cardiovascular disease in later life. Advise women with any HDP[9] of the benefits of a heart healthy diet and lifestyle.
SOGC[3]	Guideline *Diagnosis, evaluation, and management of the hypertensive disorders of pregnancy* (2014)	No	Yes	Advise women with any HDP[9] to pursue a healthy diet and lifestyle. Advise women with any HDP[9] to keep their BMI within healthy range for long-term health
QLD[4]	Guideline *Hypertensive disorders of Pregnancy* (2010)	No	No	For women with any HDP[9] offer "screening" and lifestyle counselling.
ACOG[5]	Guideline *Hypertensive Disorders in Pregnancy*	No	No	For women with preeclampsia and preterm birth (<37 wks) or recurrent PE[8], consider yearly assessment of blood pressure, lipids, fasting blood glucose and BMI.
NVOG[6]	Guideline *Hypertensive Disorders in Pregnancy* (2011)	No	No	

NVOG[6]	Guideline *Cardiovascular Risk Managment after Reproductive Disease* (2014)	Yes	Yes	Further diagnostics and treatment are advised in patients with a history of preeclampsia for cardiovascular risk management. Women should be counseled to aim a healthy lifestyle including smoking cessation, sufficient physical activity and healthy bodyweight. Women with a history of preeclampsia should undergo a cardiovascular risk profile assessment at age of 50 years.

[1]National Institute for Health and Clinical Excellence, [2] Association of Ontario Midwives, [3]Society of Obstetricians and Gynecologists of Canada, [4] Queensland Maternity and Neonatal Clinical Guidelines Program, [5]The American Congress of Obstetricians and Gynecologists [6]Dutch Society of Obstetrics and Gynecology

[7] GH = gestational hypertension, [8] PE = preeclampsia, [9] Hypertensive Disease of Pregnancy, [10] HDP = hypertensive disease of pregnancy

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