

Patterns In Primary Midwife-led Care In The Netherlands

Trends and variation in intrapartum referrals

Pien Offerhaus

© 2015 - Pien Offerhaus

Patterns In Primary Midwife-led Care In The Netherlands

ISBN 978-90-824061-0-8

Cover design and layout by Studio Gloeiworm, www.studiogloeiworm.nl

Printing by Grafistar, Lichtenvoorde

Financial support by the Royal Dutch Organisation of Midwives
for the publication of this thesis is gratefully acknowledged.

Patterns In Primary Midwife-led Care In The Netherlands

Trends and variation in intrapartum referrals

Proefschrift

Ter verkrijging van de graad van doctor
aan de Radboud Universiteit Nijmegen
op gezag van de rector magnificus prof. dr. Th.L.M. Engelen,
volgens besluit van het college van decanen
in het openbaar te verdedigen op maandag 5 oktober 2015
om 10:30 uur precies

door

Paula Margriet Offerhaus

geboren op 19 juni 1959
te Roosendaal

Promotoren:

Prof. dr. A.L.M. Lagro-Janssen

Prof. dr. P.L.H. Scheepers

Copromotoren:

Dr. A. de Jonge (VUMC)

Dr. K.M. van der Pal-de Bruin (TNO)

Manuscriptcommissie:

Prof. dr. G.P. Westert

Prof. dr. F.G. Schellevis (VUMC)

Prof. dr. S.E. Buitendijk (LUMC)

Contents

Chapter 1	7
<i>Introduction</i>	
Chapter 2	19
<i>Persisting rise in referrals during labour in primary midwife-led care in the Netherlands</i>	
Chapter 3	37
<i>Change in primary midwife-led care in the Netherlands in 2000-2008: A descriptive study of caesarian sections and other interventions among 807,437 low risk births</i>	
Chapter 4	57
<i>Variation in referrals to secondary obstetrician-led care among primary midwifery care practices in the Netherlands: A nation wide cohort study</i>	
Chapter 5	77
<i>Variation in intrapartum referral rates in primary midwifery care in the Netherlands: A discrete choice experiment</i>	
Chapter 6	103
<i>Midwives and variation in referral decisions during labour: A focus group study in the Netherlands</i>	
Chapter 7	119
<i>General discussion</i>	
Summary	141
Samenvatting	148
Curriculum vitae	156
Dankwoord	158



Chapter 1

Introduction

Background

Cultural and historical differences have resulted in remarkable variation across the world in the organisation of maternity care in high resource countries (1). In the late twentieth century Dutch maternity care was described by several authors as extraordinary, in particular because of the high level of home births (1-3). Internationally, Dutch maternity care has been presented as an example that non-medicalised maternity care can be achieved in an industrialised high income country, with good outcomes for mother and child, a low level of interventions, and a realistic option for women to choose their preferred location of birth. In several countries, the Netherlands was used as an example or as a source of inspiration to improve or restore midwife-led care (4, 5).

An important characteristic of Dutch maternity care is that it is based on the assumption that pregnancy and childbirth are physiological processes unless proven otherwise. Independent primary care midwives in the community are responsible for the care for most women as long as they have a physiological pregnancy, labour and postpartum period. Secondary obstetric care is easily available by cooperation with and referral to obstetrician-led care throughout the whole period (2, 3). However, in the 21st century serious concerns have risen about the quality of maternity care in the Netherlands. The perinatal mortality had decreased at a slower rate than in other European countries and appeared to be among the highest according to subsequent European reports (6, 7). This high ranking in the European perinatal mortality statistics was driven more by extreme preterm births than by term births, and was not related to term home births (8, 9). Nevertheless, the unfavourable ranking resulted in negative media attention especially for home births, with headings such as 'Don't try this at home' on the front page of the national newspaper NRC Next in 2010.

Another concern is the rising referral rate during pregnancy and labour. The number of women that receive primary midwife-led care exclusively throughout pregnancy and labour has decreased substantially since 1988 (10). In 2012 this percentage had decreased to 30.1 per cent of all women that gave birth in 2012 (11). The home birth rate also declined rapidly in the 21st century, from 30 per cent in 2000 to 18 per cent in 2012 (12, 13). These figures cast doubt on the expediency of primary midwife-led care in the Netherlands.

In order to reduce the perinatal mortality rate and to improve the quality of maternity care, the minister of Health appointed the Steering Group Pregnancy and Childbirth

(Stuurgroep Zwangerschap en Geboorte). They published their advice 'A Good Beginning' ('Een goed begin') in 2010 (14). Improving or restructuring the collaboration between all providers in maternity care is one of the seven main recommendations in this report. This resulted in an ongoing debate in the Netherlands whether the current model of maternity care is still appropriate, or should be replaced by a model of 'integrated care' with much closer cooperation between midwives and obstetricians and a less clear distinction between primary and secondary care (15).

Paradoxically, evidence of the benefits of midwife-led care is mounting internationally and leads to increasing recognition of its merits. Midwife-led care can be an important component of high quality maternity care that provides an effective response to ongoing medicalisation and rising CS rates, the modern threats for reproductive health and safety in high income countries (16). A Cochrane review concluded that a model of midwife-led continuity of care compared to shared care or medical-led models of care is associated with low intervention rates, good perinatal outcomes, and high maternal satisfaction (17). In this review midwife-led continuity of care is defined as *"care where the midwife is the lead professional in the planning, organisation and delivery of care given to a woman from initial booking to the postnatal period. Some antenatal and/or intrapartum and/or postpartum care may be provided in consultation with medical staff as appropriate. Within these models, midwives are, in partnership with the woman, the lead professional with responsibility for assessment of her needs, planning her care, referral to other professionals as appropriate, and for ensuring provision of maternity services."* It is noteworthy that in this review current Dutch maternity care was described as a 'shared care' model, as primary care midwives in the Netherlands are lead professionals only as long as pregnancy and birth develop physiologically. This means that responsibility for the organisation and delivery of care as a whole is shared between different health professionals.

With the rising referral rate this is increasingly true: care is more often shared between midwives and obstetricians in the Netherlands. This is also true for healthy women who experienced a low risk pregnancy and started labour in primary midwife-led care. However, the impact of these changes has not been evaluated extensively. Before decisions are made to restructure the current model, better insight into the recent changes in primary midwife-led care and associated health outcomes should be obtained.

This information is important, not only for the Netherlands, but also for other countries where midwife-led care and home birth are increasingly being encouraged and where maternity care is being reorganised.

Primary midwife-led care in the Netherlands

The current model

In the current maternity care model pregnant women receive primary care as long as they experience an uncomplicated physiological pregnancy and childbirth. Primary care is predominantly offered by independent midwifery practices in the community, and to a small extent by general practitioners. Women are referred to secondary obstetrician-led care if complications occur or are suspected and obstetric attention or interventions may be indicated. Obstetric interventions such as induction or augmentation of labour and instrumental delivery are only available in secondary obstetrician-led care in hospital. For very complicated pregnancies tertiary perinatal care is available in perinatal centres. The role division between primary and secondary care is guided by the List of Obstetric Indications (Verloskundige Indicatie Lijst) abbreviated as the 'VIL'. The VIL recommends when primary care is adequate and in which situations a referral to secondary obstetrician-led care is advised (18, 19). As a result of the antenatal risk selection process, primary midwife-led care during labour is available for women who are considered at low risk of complications, with a term singleton pregnancy and a vertex presentation. These women can opt for a home birth or, alternatively, plan to give birth in hospital or birth centre accompanied by their own primary care midwife. Obstetric interventions such as induction or augmentation of labour and instrumental delivery are available in secondary obstetrician-led care in the hospital. Offering these interventions involves an intrapartum referral and handing over responsibility to an obstetrician in hospital.

An intrapartum referral can be considered a major intervention in the course of labour performed by primary care midwives (20). An intrapartum referral gives their clients access to obstetric interventions. Many times these interventions are merely performed to support women in the labouring process, but sometimes these interventions can be lifesaving. However, a referral may also have unintended disadvantages. For instance, an intrapartum referral has a negative impact on the birth experience of women, because it leads to discontinuity of care and a loss of sense of control (21-23).

Rising intrapartum referral rates

As mentioned earlier, referrals from primary midwife-led care to secondary care have been rising substantially, prenatally as well as during labour. In the period 1988-2004, intrapartum referrals increased from 18.3 to 23.5 per cent, calculated as a percentage

of all women receiving primary midwife-led care at the start of pregnancy (10). This trend analysis did not describe perinatal and maternal outcomes. Referral reasons that contributed most to the increase were failure to progress during the first stage of labour, need for pain medication, and meconium-stained amniotic fluid. For the years 2001-2003 Amelink et al. showed that most intrapartum referrals were for such non-urgent reasons. Referrals for urgent reasons such as suspected fetal distress during labour or postpartum haemorrhage were a minority. Of all women receiving primary midwife-led care at the start of labour, 28.3 per cent was referred for non-urgent reasons, and 3.6 per cent for urgent reasons in this study (24).

More recently the trend in referral rates have been described by the Netherlands Perinatal Registry (stichting PRN) in their report 'General trends 1999-2012' ('Grote lijnen 1999-2012') (11). During this period the intrapartum referral rates increased from 17.0 to 21.4 per cent, calculated as a percentage of all children born in the Netherlands. These figures suggest that the increase in intrapartum referrals continued after 2004, but the report does not give a detailed description of urgent and non-urgent reasons contributing to this trend. It also gives no description of outcomes of primary midwife-led intrapartum care.

Altogether it is clear that referral rates have continued to rise in recent years, but a detailed analysis of referral reasons contributing to this recent rise is not available. More importantly, to date the impact of the rising referral rates on important maternal and perinatal outcomes has not been explored.

Variation in referral rates

Referral rates vary significantly between midwifery practices (25). Practice quality reports, comparing midwifery practice results with national statistics based on the National Perinatal database, describe a range in intrapartum referral rates from 17 to 35 per cent in 2008 (PRN, 2011). Even when differences in the client population of practices are taken into account, the variation in referral rates between midwifery practices is substantial.

This kind of variation in health care has been a topic of concern since it was addressed by Wennberg and Gittelsohn in 1973 (26). Much scientific effort was aimed at explaining variation in health care. Some variation exists for good reasons such as differences in health needs or client preferences. However, non-medical factors such as a personal

practice style are also a source for variation, especially in areas where a solid scientific consensus is lacking (27). Social and structural factors in the professional context play a role as well (28-31). Such factors may explain why referral rates in midwife-led births in different countries and maternity care settings show a wide variation (32-35). Some studies suggest that non-medical factors also play a role in variation in midwives' intrapartum decisions within comparable settings, in the Netherlands as well as internationally (36-39). As non-medical factors may also play a role in rising referral rates, unravelling the background of the existing variation may help to understand the ongoing rise in referrals.

However, the background of variation in intrapartum referral rates in the Netherlands has not been investigated extensively. More importantly, it is also unclear whether such variation results in differences in health outcomes.

Aim of the thesis

.....

The research in this thesis describes and analyses trends and variation in referrals from primary midwifery care to secondary obstetric care, and associated perinatal and maternal birth outcomes. This thesis aims to contribute to improvements of maternity care for women with uncomplicated physiological pregnancies, in the context of a changing organisation of maternity care in the Netherlands.

Research questions:

.....

1. *Is the rise in referrals in 2000-2008 associated with a change in perinatal safety in primary midwife-led care during labour, and which referral reasons explain the rise in referrals during labour or immediately after birth?*
2. *Is the rise in intrapartum referrals in 2000-2008 from primary to secondary care associated with an increase in caesarean sections?*
3. *Is the intrapartum referral rate in a midwifery practice associated with a woman's chance of an instrumental birth?*
4. *What is the influence of midwife related factors on intrapartum referral decisions and referral rates in primary midwifery care?*

Outline thesis

The findings of the studies are presented in chapter 2-6. In Chapter 2 a trend analysis of nine years (2000-2008) of primary midwifery intrapartum care is presented, based on the combined national perinatal database with routinely registered information on births in the Netherlands. Trends in referrals and referral reasons are described as well as trends in perinatal outcomes (Q1). In Chapter 3 a comparable analysis focuses on trends in labour interventions, maternal outcomes and mode of birth (Q2). In chapter 4 the analysis of variation in intrapartum referral rates and associated birth outcomes in primary midwifery care in the years 2008-2010 is presented (Q3). Chapter 5 and 6 are focussed on the last research question (Q4). Chapter 5 describes the results of a discrete choice experiment among primary care midwives' referral decisions in the first stage of labour. Client related and midwife related factors that contribute to variation in decisions of the participating midwives were analysed. Chapter 6 presents a qualitative study among primary care midwives, who participated in two internet based focus groups about variation in intrapartum referral rates. The final chapter summarises the results and puts them in context in a general discussion.

Overview

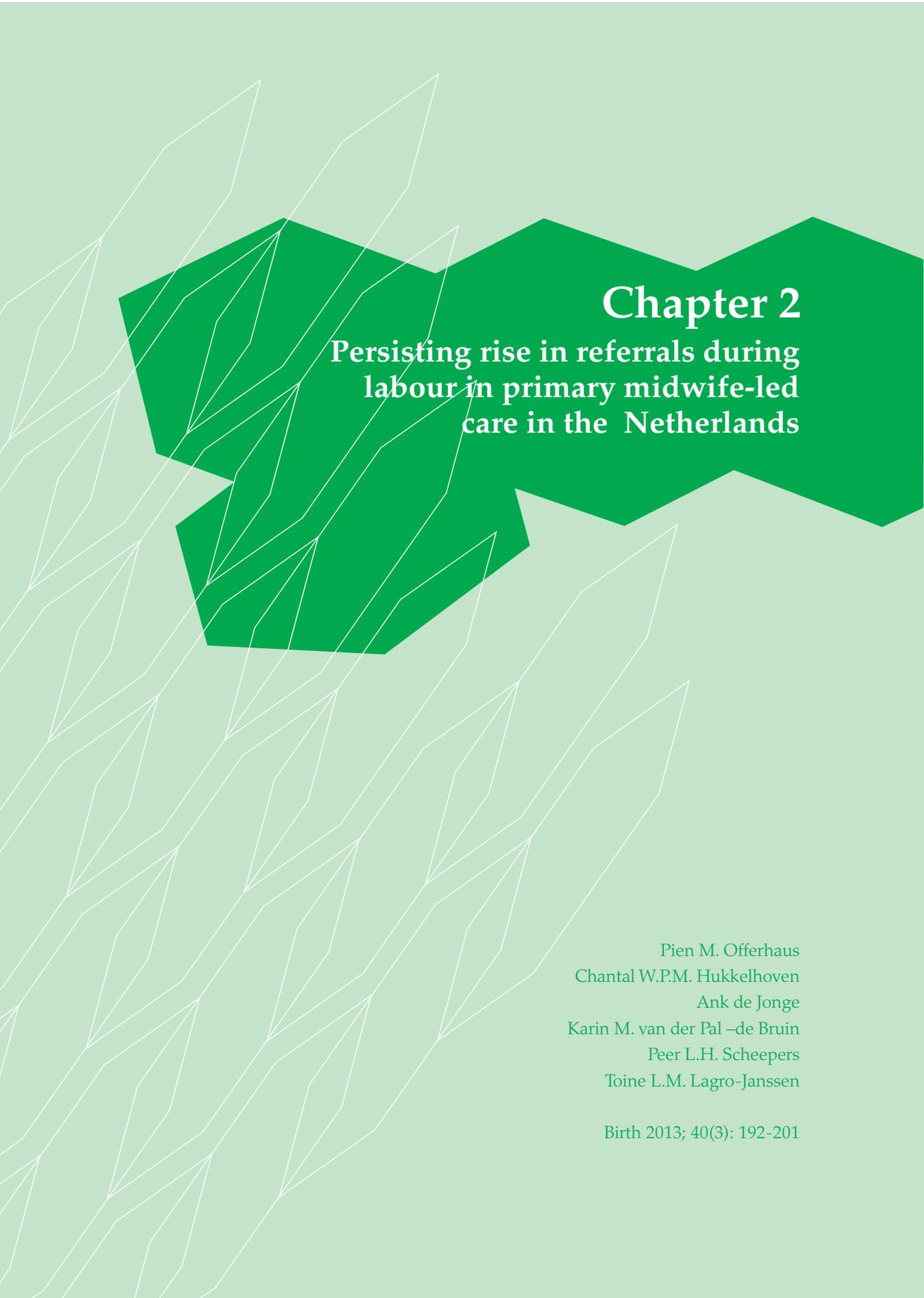
Question	Chapter	Data source	Study sample	Methods
Q1	2	PRN database, 2000-2008	All births that started in primary midwifery care	Observational cohort, logistic regression (trend analysis)
Q2	3	PRN database, 2000-2008	All births that started in primary midwifery care	Observational cohort, logistic regression (trend analysis)
Q3	4	PRN database, 2008-2010	All births that started in all midwifery practices that contributed to PRN database in 2008-2010	Observational cohort, multilevel logistic regression
Q4	5	Questionnaire study (2010)	Random sample of primary care midwives	Discrete Choice Experiment
Q4	6	Two internet-based focus groups (2010)	Convenience sample of primary care midwives	Qualitative analysis

References

1. **de Vries R, Benoit C, van Teijlingen ER, et al.** *Birth by design: pregnancy, maternity care and midwifery in North America and Europe.* New York: Routledge; 2001.
2. **Abraham-van der Mark E.** *Succesful home birth and midwifery: de Dutch model.* Westport: Bergin and Garvey; 1993.
3. **de Vries R.** *A pleasing birth: midwives and maternity care in the Netherlands.* Philadelphia: Temple University Press; 2004.
4. **Malott AM, Davis BM, McDonald H, et al.** *Midwifery care in eight industrialized countries: how does Canadian midwifery compare?* *J Obstet Gynaecol Can* 2009;31(10):974-979.
5. **Oppenheimer C.** *Organising midwifery led care in The Netherlands.* *BMJ* 1993;307(6916):1400-1402.
6. **EURO-PERISTAT Project.** *The European perinatal health report. The health and care of pregnant women and babies in Europe in 2010.* Paris: EURO-PERISTAT Project, 2013. Accessed March 16, 2015. Available at <http://www.europeristat.com/>.
7. **EURO-PERISTAT Project.** *The European perinatal health report. The health and care of pregnant women and babies in Europe in 2004.* Paris: EURO-PERISTAT Project, 2008.
8. **de Jonge A, Baron R, Westerneng M, et al.** *Perinatal mortality rate in the Netherlands compared to other European countries: a secondary analysis of Euro-PERISTAT data.* *Midwifery* 2013;29(8):1011-1018.
9. **de Jonge A, Geerts C, van der Goes B, et al.** *Perinatal mortality and morbidity up to 28 days after birth among 743 070 low-risk planned home and hospital births: a cohort study based on three merged national perinatal databases.* *BJOG* 2014; 122(5): 720-728.
10. **Amelink-Verburg MP, M.E.B. R, Buitendijk S.** *A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988-2004.* *Br J Obstet Gynaecol* 2009;116:923-932.
11. **The Netherlands Perinatal Registry.** *The Netherlands Perinatal Registry, trends 1999-2012.* Utrecht: Stichting PRN, 2013.
12. **Anthony S, Amelink-Verburg MP, Jacobusse GW, et al.** *Home births in the Netherlands 1995-2002. Report for the years 2001-2002.* PRN/TNO: Utrecht/Leiden, 2005.
13. **CBS Statistics Netherlands.** *Bevalling en geboorte: 1989-2013. [Childbirth: 1989-2013]* Heerlen/Den Haag: CBS, 2015. Accessed 31 March 2015. Available at: <http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37302&D1=0-1,45-48&D2=0,5-1&HD=110413-1418&HDR=G1&STB=T>
14. **Steering Group Pregnancy and Childbirth.** *Een goede begin. [A good beginning].* Utrecht: Steering Group Pregnancy and Childbirth, 2009.
15. **de Vries R.** *Verloskunde staat voor een historisch keerpunt.* *De Volkskrant*, 27 maart 2014.
16. **Renfrew MJ, McFadden A, Bastos MH, et al.** *Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care.* *Lancet* 2014;384(9948):1129-1145.
17. **Sandall J, Soltani H, Gates S, et al.** *Midwife-led continuity models versus other models of care for childbearing women.* *Cochrane Database of Syst Rev* 2013, Issue 8 No:CD004667 2013.

18. **Amelink-Verburg MP, Buitendijk SE.** *Pregnancy and labour in the Dutch maternity care system: what is normal? The role division between midwives and obstetricians.* *J Midwifery Womens Health* 2010;55(3):216-225.
19. **CVZ. Verloskundig vademecum.** *Eindrapport van de Commissie Verloskunde van het College voor Zorgverzekeringen. [Obstetrical manual Final report of the Obstetric working Group of the National Health Insurance Board CVZ].* Diemen: CVZ, 2003.
20. **Rijnders M.** *Interventions in midwife led care in the Netherlands to achieve optimal birth outcomes: effects and women's experiences.* Amsterdam: Universiteit van Amsterdam; 2011.
21. **Pel M, Heres MHB.** *Obint. A study of obstetric intervention.* Amsterdam: Universiteit van Amsterdam; 1995.
22. **Rijnders M, Baston H, Schonbeck Y, et al.** *Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands.* *Birth* 2008;35(2):107-116.
23. **Wiegers TA.** *The quality of maternity care services as experienced by women in the Netherlands.* *BMC Pregnancy Childbirth* 2009;9:18.
24. **Amelink-Verburg MP, Buitendijk SE.** *Data of Dutch homebirths needs rectification.* *Br J Obstet Gynaecol* 2008;115(9):1187.
25. **Amelink-Verburg MP.** *Verwijsbeleid van verloskundige praktijken. [Referral rates in primary care midwifery practices].* *Tijdschr Verlosk* 2007;32(3):15-20.
26. **Wennberg J, Gittelsohn.** *Small area variations in health care delivery.* *Science* 1973; 182(4117): 1102-1108.
27. **Wennberg JE.** *Dealing with medical practice variations: a proposal for action.* *Health Aff(Millwood)* 1984;3(2):6-32.
28. **de Jong JD, Groenewegen PP, Westert GP.** *Mutual influences of general practitioners in partnerships.* *Soc Sci Med* 2003;57(8):1515-1524.
29. **de Jong JD, Westert GP, Lagoe R, et al.** *Variation in hospital length of stay: do physicians adapt their length of stay decisions to what is usual in the hospital where they work?* *Health Serv Res* 2006;41(2):374-394.
30. **Mercuri M, Gafni A.** *Medical practice variations: what the literature tells us (or does not) about what are warranted and unwarranted variations.* *J Eval Clin Pract* 2011;17(4):671-677.
31. **Westert GP, Groenewegen PP.** *Medical practice variations: changing the theoretical approach.* *Scand J Public Health* 1999;27(3):173-180.
32. **Blix E, Kumle M, Kjaergaard H, et al.** *Transfer to hospital in planned home births: a systematic review.* *BMC Pregnancy Childbirth* 2014;14(1):179.
33. **Downe S, Finlayson K, Fleming A.** *Creating a collaborative culture in maternity care.* *J Midwifery Womens Health* 2010;55(3):250-254.
34. **Rowe RE, Fitzpatrick R, Hollowell J, et al.** *Transfers of women planning birth in midwifery units: data from the Birthplace prospective cohort study.* *Br J Obstet Gynaecol* 2012;119(9):1081-1090.
35. **Walsh D, Downe SM.** *Outcomes of free-standing, midwife-led birth centers: a structured review.* *Birth* 2004;31(3):222-229.

36. **Mead MMP, Kornbrot D.** *The influence of maternity units' intrapartum intervention rates and midwives' risk perception for women suitable for midwifery-led care.* *Midwifery* 2004;20(1):61-71.
37. **Page M, Mander R.** *Intrapartum uncertainty: A feature of normal birth, as experienced by midwives in Scotland.* *Midwifery* 2013;30(1):28-35.
38. **Wiegers TA, Hukkelhoven CW.** *The role of hospital midwives in the Netherlands.* *BMC Pregnancy Childbirth* 2010;10(1):80.
39. **Fontein Y.** *The comparison of birth outcomes and birth experiences of low-risk women in different sized midwifery practices in the Netherlands.* *Women Birth* 2010;23(3):103-110.



Chapter 2

Persisting rise in referrals during labour in primary midwife-led care in the Netherlands

Pien M. Offerhaus
Chantal W.P.M. Hukkelhoven
Ank de Jonge
Karin M. van der Pal –de Bruin
Peer L.H. Scheepers
Toine L.M. Lagro-Janssen

Birth 2013; 40(3): 192-201

Abstract

.....

Background

There are concerns about the Dutch maternity care system, characterised by a strict role division between primary and secondary care. The objective of this study was to describe trends in referrals and in perinatal outcomes among labours that started in primary midwife-led care.

Methods

We performed a descriptive study of all 789,795 labours that started in primary midwife-led care in 2000-2008 in the Netherlands. Referrals to obstetrician-led care or paediatrician were classified as urgent or non-urgent. Perinatal safety was described by perinatal mortality (intrapartum or neonatal 0-7 days), admission to NICU 0-7 days, and Apgar score < 7 at 5 minutes.

Results

The proportion of labours that were not referred before or after birth declined from 52.6 to 42.6 per cent for nulliparous women and from 83.2 to 76.7 per cent for multiparous women. Especially non-urgent referrals during the first stage increased, for nulliparous women from 28.7 to 40.7 percent and for multiparous women from 10.5 to 16.5 percent. Referrals were less frequent in planned home births. Perinatal mortality was 0.9 per thousand births for nulliparous women, and 0.6 per thousand for multiparous women. A low Apgar score was registered in 8.6 per thousand births for nulliparous women, and 4.1 per thousand for multiparous women.

Conclusions

There was a considerable rise in non-urgent referrals to obstetrician-led care in primary midwife-led care during labour. Perinatal safety did not improve significantly over time. The persisting rise in referrals challenges the sustainability of the current strict role division between primary and secondary maternity care in the Netherlands.

Introduction

The Dutch maternity care model is based on the assumption that pregnancy and childbirth are healthy processes; if no complications occur, women can best be looked after in primary midwife-led care, mostly organised in independent midwifery practices in the community. If complications arise at any time during pregnancy, labour or after birth, women are referred to secondary obstetrician-led care in the hospital. Interventions such as augmentation of labour, pharmacological pain relief, continuous fetal monitoring or instrumental birth only take place in secondary care. After referral, obstetricians and clinical midwives provide obstetric care within the hospital. If neonatal problems arise, the newborn will be referred to the paediatrician.

As a result, a woman in primary midwife-led care at the onset of labour is considered to have a low risk of complications and has no known risk factors. She can choose between a home birth or a planned hospital birth within primary care, attended by one of her own midwives. If the attending midwife needs to refer her client, she no longer has an official role in the woman's care. However, she may choose to stay to provide continuous support.

This risk selection and role division between the professions is based on the List of Obstetric Indications ("Verloskundige Indicatie Lijst" [VIL]) (1), a document that designates the appropriate level of care for more than a hundred obstetrical conditions. One important aim of this model is to ensure safe midwife-led intrapartum care for women with low risk pregnancies, whether they give birth in a hospital or at home. The most distinctive characteristic of the Dutch model is the high level of planned home births: in 2007-2009 25 per cent of all births were at home (2). Internationally, midwife-led care is associated with low intervention rates and good perinatal outcomes (3, 4). Observational studies suggest that this is also the case in the Netherlands. Maassen et al (5) showed that women who were in primary midwife-led care at the onset of labour had a significantly higher chance of a spontaneous vaginal delivery than low risk women who gave birth in a secondary care setting. In a national study, the observed perinatal mortality was 1.3 per thousand term births initially attended by primary care midwives versus 2.8 per thousand term births in the entire group (6). Furthermore, de Jonge et al (7) showed no differences in perinatal deaths or admission to a Neonatal Intensive Care Unit (NICU) among labours planned at home versus in hospital.

At first sight, these results seem reassuring for primary midwife-led care within the Dutch model. However, there are also serious concerns. The overall perinatal mortality rate in the Netherlands is relatively high in comparison with other European countries (8-10). Evers et al. observed in one regional study a relative risk of 2.33 [95% CI 1.12 to 4.83] of perinatal mortality in term births that started in primary midwife-led care compared to births that started in obstetrician-led care (11).

Another concern is the continuous rise in referrals from primary to secondary care, during pregnancy, labour and after birth. The proportion of pregnant women who exclusively receive primary midwife-led care has decreased considerably in the period 1988-2004 (12) and the majority of pregnant women experience a switch from one care provider to another during pregnancy or labour (13).

Amelink-Verburg et al. (14) investigated intrapartum referrals in primary care births in the Netherlands. They concluded that most of the referrals were without urgency, only a small proportion (3.9%) of all women had an urgent referral. Perinatal problems, for instance a low Apgar score at 5 minutes, were low (0.7%). In births without referral this was even lower (0.3%).

It is unclear whether the intrapartum referral rate is still rising. Furthermore, it is unclear whether this has improved perinatal safety in primary midwife-led care, for instance as a result of an increased involvement of obstetric care such as continuous fetal monitoring.

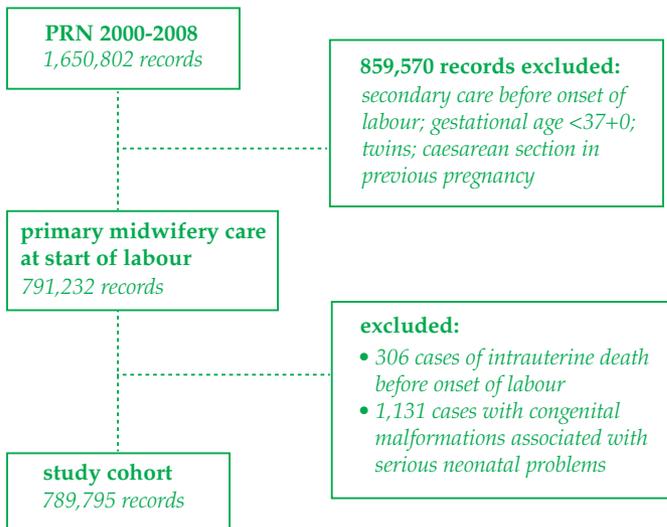
Several other industrialized countries increasingly provide or promote midwife-led care models that offer birth in hospitals, midwife-led units, birth centers or at home, taking the Dutch system as an example (15, 16). Our study can add to the international body of knowledge on effectiveness and safety of these models.

In this study, we describe and analyse trends in referrals during labour or immediately after birth, among labours that started in primary care in the Netherlands during the period 2000 to 2008. Secondly, we describe whether perinatal safety has improved during these years.

Methods

In the Netherlands, data on antenatal, intrapartum and postnatal care are routinely collected in three separate registries, one for primary midwife-led care (LVR1), one for obstetrician-led care (LVR2), and one for neonatal care (LNR). The registries are combined by a validated linkage method into one database: the Netherlands Perinatal Registry (PRN) (17, 18). The Netherlands Perinatal Registry contains at least 95 per cent of all births in the Netherlands (19).

figure 1 flowchart



In the study period 2000-2008, the Netherlands Perinatal Registry contained 1,650,802 birth records. For the purpose of our study we excluded all records of births that were in secondary care before onset of labour, as well as births without a registration in the LVR1. We also excluded all twins, preterm births (< 37 completed weeks), and births after a previous caesarean section, because these are indications for secondary care. Next, we excluded cases of fetal death before the onset of labour, or with a congenital malformation that was associated serious neonatal problems directly postpartum, since the outcomes of these births are not related to intrapartum care. The resulting study database contained a total of 789,795 records of births that were in primary midwife-led care at the onset of labour (see figure 1 for a flowchart). All these births started after a singleton pregnancy at term, without known risk factors and with a live fetus at the onset of labour.

Table 1 Characteristics in births in primary midwife-led care at the onset of labour 2000-2008

		Nulliparous (357,358)		Multiparous (432,343)	
Maternal age	< 25 year	73,165	20.5%	26,386	6.1%
	25-34 year	252,425	70.7%	302,153	69.9%
	≥ 35 year	31,69	8.9%	103,707	24.0%
	Mean (SD)	28.37	(4.66)	31.49	(4.26)
Maternal background	Dutch	295,076	85.1%	348,982	83.4%
	Non Dutch	51,812	14.9%	69,242	16.6%
Planned place of birth	Home	195,967	54.8%	257,03	59.5%
	Hospital primary care	131,179	36.7%	140,051	32.4%
	Unknown	30,212	8.5%	35,262	8.2%
Actual place of birth	Home	115,244	32.3%	255,626	59.2%
	Hospital, primary care	66,902	18.7%	104,137	24.1%
	Hospital, obstetric care	174,942	49.0%	72,279	16.7%

Missing values due to registration errors varied from < 0.1% (age, parity, actual place of birth) to 3.1% (background). Births in which actual place of birth is missing were in primary care, without intrapartum referral.

Maternal characteristics

Maternal age, parity, and ethnic background are recorded in the Netherlands Perinatal Registry. Since ethnic background is categorised less precise and is registered inconsistently, we defined the background of women as 'Dutch' or 'non Dutch'. Planned place of birth (home, hospital primary care) and actual place of birth (home, hospital primary care, hospital obstetric care) are recorded by the primary care midwife only (7). If the planned place of birth was missing, we recoded this as 'unknown'. These characteristics are displayed in table 1. We also collected information on the social economical background and level of urbanisation, based on the available four digits of the postal code.

Referral categories

All referrals from primary care to secondary care were classified by stage of labour and urgency status (14). A referral was considered to be urgent if the referral reason was for a complication that cannot be treated in primary care and that requires immediate investigation or treatment at the secondary care level, such as suspected intrapartum fetal distress or postpartum haemorrhage (PPH). A referral was considered to be non-urgent if a reason was coded for which expedient diagnostics or treatment at the secondary care level is required, but not immediately (14). As a minor adaptation in the classification of Amelink-Verburg et al., we made a clearer distinction between maternal and neonatal referrals within the urgency categories. The complete classification of referral categories with the corresponding referral reasons is available in addendum 1.

In the LVR1 the timing of referral of the mother (during first, second or third stage or directly post partum) is coded by the attending midwife, as well as the reason for referral. A maternal referral and a neonatal referral are recorded separately. A maximum of three reasons can be recorded for a maternal referral. In less than 10 per cent of the records with a referral, more than one reason was mentioned. In that case the most urgent reason was used to define the urgency of the referral. As an example: failure to progress in the first stage is labelled as non-urgent, but if fetal distress was coded as well, the referral was classified as urgent (14).

In a small number of records a postpartum referral was recorded for the mother as well as for the newborn. In these cases, the urgency level of both the maternal and the neonatal referral was assessed and the most urgent reason was used to classify the referral as maternal or as neonatal. If the neonatal and maternal referral had the same urgency level, the referral was labelled as neonatal (14).

Perinatal outcomes

We assessed the following perinatal outcomes possibly related to midwife-led care during labour: Apgar score <7 at 5 minutes, perinatal mortality (intrapartum or neonatal within 7 days), or admission to a neonatal intensive care unit (NICU) up to seven days after birth.

Analysis

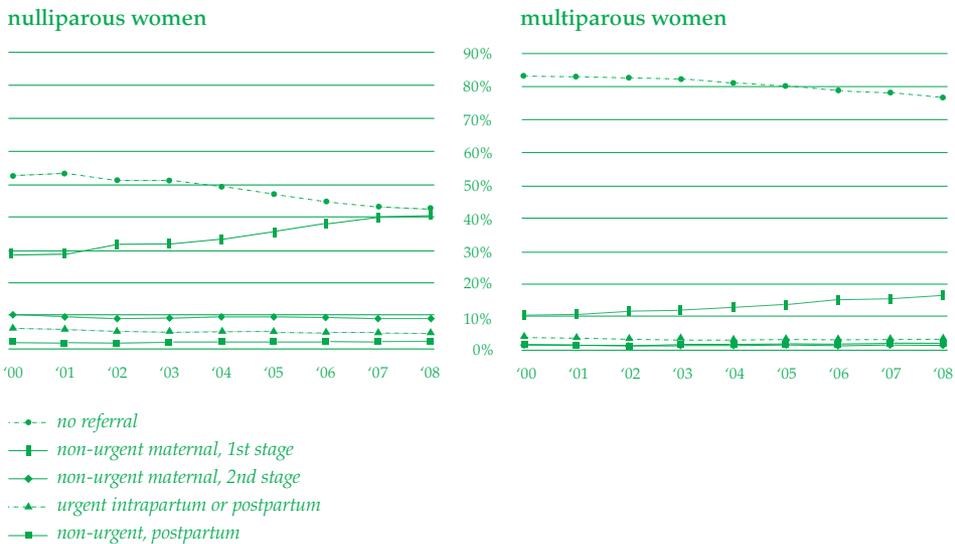
To explore trends, the referral categories and perinatal outcomes were determined per year, for multiparous women and nulliparous women separately. Referral categories were also analysed by planned place of birth. All percentages are calculated on valid numbers, excluding missings. Where appropriate, trends were statistically tested with Chi Square Linear-by-Linear Association. Since the study population is not a sample but each year represents a total population, we assumed in the test procedure that the study population is a random selection of an infinite population.

We used logistic regression to test the overall trend in the referral rate. We analysed this trend for nulliparous and multiparous women separately. In the models the overall referral rate was the dependent variable. The year of birth was entered as a continuous independent variable in the starting model. The obtained unadjusted odds ratio quantifies the changes per year. After that, the other available maternal characteristics (maternal age, background, planned place of birth, social economic status and level of urbanisation) were entered in the model. The obtained adjusted odds ratio quantifies the changes per

Table 2 Trends in referrals in midwife-led births in primary care, by parity

	primiparous women		multiparous women		overall	
	2000	2008	2000	2008	2000	2008
No referral	52.6%	42.6%	83.2%	76.7%	69.1%	61.6%
Urgent referral	6.2%	4.8%	3.5%	3.3%	4.7%	4.0%
<i>intrapartum</i>	3.6%	3.0%	1.1%	1.0%	2.3%	1.9%
<i>maternal 3rd stage</i>	2.0%	1.7%	2.0%	2.1%	2.0%	1.9%
<i>neonatal < 2h</i>	0.5%	0.2%	0.4%	0.2%	0.5%	0.2%
Non-urgent 1st stage	28.7%	40.7%	10.5%	16.5%	18.9%	27.2%
<i>pain relief</i>	4.5%	9.3%	0.5%	1.8%	2.3%	5.1%
<i>progress</i>	7.4%	10.2%	1.8%	3.0%	4.4%	6.2%
<i>meconium</i>	9.5%	11.3%	5.0%	7.1%	7.1%	8.9%
<i>other</i>	7.3%	9.9%	3.1%	4.6%	5.0%	6.9%
Non-urgent 2nd stage	10.4%	9.4%	1.5%	1.5%	5.6%	5.0%
<i>progress</i>	9.6%	8.2%	1.2%	1.2%	5.1%	4.3%
<i>meconium</i>	0.7%	0.5%	0.2%	0.1%	0.4%	0.3%
<i>other</i>	0.1%	0.7%	0.1%	0.2%	0.1%	0.4%
Non-urgent maternal 3rd stage	1.6%	2.1%	0.9%	1.5%	1.2%	1.8%
Non-urgent neonatal < 2h	0.5%	0.3%	0.4%	0.5%	0.5%	0.4%
	100%	100%	100%	100%	100%	100%
	(n=41,070)	(n=37,166)	(n=47,901)	(n=46,986)	(n=88,979)	(n=84,170)

Figure 2 Trend in referrals in nulliparous and multiparous women 2000-2008



year, controlling for changes in the population in these characteristics. An unchanged odds ratio indicates that the changes per year in the referral rate are not due to changes in the composite of the population during the study period. All analyses were conducted with the statistical software package SPSS version 20.0 (20).

Results

.....

Trends in referrals

In the study period the proportion of women who received primary care only declined (table 2). For nulliparous women the decline was 10.0 per cent (from 52.6 % to 42.6%), and for multiparous women this was 6.5 per cent (from 83.2 % to 76.7 %). This means that a considerable rise in referrals took place in the observed nine years, especially for nulliparous women. This is mainly a result of a gradual and continuous increase in non-urgent referrals during the first stage (figure 2). These referrals increased from 28.7 per cent to 40.7 per cent for nulliparous women, and from 10.5 per cent to 16.5 per cent for multiparous women.

Referrals for medical pain relief during the first stage of labour more than doubled for both nulliparous women (4.5% to 9.3%) and multiparous women (0.5% to 1.8%), and referrals for 'failure to progress first stage' increased as well (7.4% to 10.2% for nulliparous women; 1.8% to 3.0% for multiparous women).

Referrals during the first stage for 'meconium stained amniotic liquor' also increased (9.5% to 11.3% for nulliparous women and 5.1% to 7.1% for multiparous women). At the same time there was only a small rise in prevalence of meconium stained liquor (from 16.1% to 17.2% for nulliparous women and from 15.0% to 15.9% for multiparous women). Of the women who had meconium stained liquor an increasing number was referred during the study period: in 2000 75.5 per cent of nulliparous births with meconium stained liquor were referred during labour, this was 87.5 per cent in 2008. In multiparous women this percentage increased from 39.0 to 53.6 percent.

Planned place of birth and referral rates

The planned birth location is associated with the referral rate. Overall, women who opted for a hospital birth were referred most frequently (table 3). The most pronounced difference was observed in non-urgent referrals in the first stage of labour. For nulliparous women who started labour at home the referral rate for non-urgent reasons in the first stage was

Planned place of birth	home	hospital primary care	unknown
Nulliparous women			
No referral	50.7%	45.4%	46.8%
Urgent referral	5.4%	5.1%	4.8%
<i>urgent maternal, intrapartum</i>	3.2%	3.2%	3.0%
<i>urgent maternal, postpartum</i>	1.9%	1.6%	1.5%
<i>urgent neonatal, directly postnatal</i>	0.3%	0.3%	0.3%
Non-urgent, 1st stage	31.1%	38.1%	37.7%
Non-urgent, 2nd stage	10.4%	9.2%	8.6%
Non-urgent maternal, 3rd stage	2.0%	1.6%	1.6%
Non-urgent neonatal, directly postnatal	1.1%	0.6%	0.1%
	100%	100%	100%
Multiparous women			
No referral	85.3%	72.6%	78.9%
Urgent referral	2.5%	4.3%	3.2%
<i>urgent maternal, intrapartum</i>	0.7%	1.3%	0.9%
<i>urgent maternal, postpartum</i>	1.5%	2.6%	2.0%
<i>urgent neonatal, directly postnatal</i>	0.3%	0.4%	0.3%
Non-urgent maternal, 1st stage	9.7%	19.2%	14.9%
Non-urgent maternal, 2nd stage	1.1%	1.9%	1.4%
Non-urgent maternal, 3rd stage	1.2%	1.4%	1.0%
Non-urgent neonatal, directly postnatal	0.3%	0.6%	0.6%
	100%	100%	100%

31.1 percent, compared to 38.1 per cent for those who started labour in hospital. Among multiparous women 9.7 per cent of women who started labour at home were referred versus 19.2 per cent of those who started birth in hospital.

Changes in maternal characteristics

The preferred place of birth changed during the study period. The intention to give birth at home declined from 66.0 per cent to 45.8 per cent in nulliparous women, and from 68.5 per cent to 52.5 per cent for multiparous women. The actual homebirth rate declined as well, from 36.6 to 27.3 per cent for nulliparous women and from 62.8 to 53.8 per cent for multiparous women. This was a result of the changing preference as well as the rising referral rate. In 2000, 70.0 per cent of all women that planned a homebirth gave birth at home (nulliparous women: 51.1%; multiparous: 85.8%). In 2008 this was 66.3 per cent (nulliparous women: 44.5%; multiparous: 81.5%).

The percentage of nulliparous women ≥ 35 year increased from 7.3 to 9.8 per cent and for multiparous women from 10.0 to 11.9 percent. The mean maternal age increased slightly from 28.3 to 28.4 year for nulliparous women and from 31.3 to 31.5 year for multiparous women. The proportion of non Dutch women was stable during the study period.

We tested whether the observed trend in overall referral rates was independent of changes in the composition of the maternal characteristics over time, using logistic regression. The unadjusted odds ratio for the change in referral rate per year was 1.058 [95% CI 1.055-1.061] for nulliparous women, and 1.055 [95% CI 1.055-1.058] for multiparous women. After controlling for maternal characteristics, these odds ratios hardly changed; the adjusted odds ratio for a one year change was 1.054 [95% CI 1.051-1.057] for nulliparous women and 1.045 [95% CI 1.041-1.048] for multiparous women.

Perinatal outcomes

Although perinatal mortality as well as an Apgar score <7 at 5 minutes were slightly less frequent in 2008 than in 2000, these indices for perinatal safety did not improve significantly in the nine year study period (table 4). Perinatal mortality was on average 0.9 per thousand births for nulliparous women, and 0,6 per thousand births for multiparous women. An Apgar score <7 at 5 minutes occurred in 8.6 per thousand nulliparous births of nulliparous women and in 4.1 per thousand births of multiparous women.

Table 4 Perinatal outcomes per 1000 births in primary midwife-led care at the onset of labour 2000-2008

	Year										Total*		p**
	2000	2001	2002	2003	2004	2005	2006	2007	2008	%o	n		
Apgar 5 min <7*													
<i>nulliparous</i>	9.6	8.1	8.5	8.1	9.1	8.9	8.7	8.5	8.2	8.6	3,084	0.334	
<i>parous</i>	4.7	3.9	3.8	4.4	4.4	4.1	3.7	3.3	4.4	4.1	1,764	0.129	
NICU admission 0-7d													
<i>nulliparous</i>	2.3	2.7	3.1	3.2	3.4	3.7	3.9	2.7	3.7	3.2	1,133	0.000	
<i>parous</i>	0.7	1.4	1.3	1.6	1.6	1.9	1.8	1.2	1.4	1.4	624	0.007	
Perinatal mortality***													
<i>nulliparous</i>	1.3	0.8	0.7	0.7	0.7	0.8	0.6	1.1	1.1	0.9	311	0.880	
<i>parous</i>	0.7	0.5	0.4	0.5	0.7	0.5	0.6	0.5	0.5	0.6	239	0.395	

*Apgar score is missing in 510 cases

** trends tested with Chi Square, linear by linear association

*** intrapartum/neonatal mortality 0-7d

At the same time there was a small but significant rise in NICU admissions from 2.3 to 2.7 per thousand births of nulliparous women (p-value <0.001), and from 0.7 to 1.4 per thousand births of multiparous women (p-value 0.007).

Unfavourable perinatal outcomes were more prevalent after referrals during labour. After an intrapartum referral the incidence of a low Apgar score was stable during the study period at 1.25 per cent for nulliparous women and 1.02 per cent for multiparous women. If there was no intrapartum referral, this was 0.50 percent. For intrapartum and neonatal mortality the same pattern was observed.

Discussion and Conclusion

Key findings

In our national study, in which we analysed births attended by primary care midwives in the Netherlands during nine years, we observed a considerable increase in referrals from primary midwife-led care to obstetrician-led care. For both nulliparous and multiparous women the increase in referrals is mainly a result of a rise in non-urgent reasons for referral in the first stage such as need for pain relief, failure to progress and meconium stained liquor. Perinatal mortality (intrapartum or neonatal < 7 days) and a low Apgar score (<7 at 5 minutes) did not decrease over time.

Methodological considerations

The Netherlands Perinatal Registry database that was used for this study has strengths and limitations. A strength is that this database contains retrospective information of at least 95 per cent of the population. The large number of births enabled us to describe major trends and associations in detail. The main advantage of using the linked Netherlands Perinatal Registry database above the LVR1 registry alone is the availability of more extensive data on perinatal outcome, allowing us to give a more complete description of perinatal safety than in the earlier study on referrals in primary midwife-led care (14). A complicating factor is that the three participant registries vary in variables and categories. Furthermore, the information within the separate registries is sometimes conflicting, for instance on timing of referrals. In our study we used the newest definitions based on the combined registries as provided by Netherlands Perinatal Registry. Another limitation of the database is that it offers little information on factors that may be associated with the observed trend in referrals. For instance, maternal characteristics such as BMI and smoking behaviour are not registered. In the near future one new registry for all care providers will be implemented, in which these problems hopefully will be resolved.

Rising referral rates

Rising referral rates were described earlier by Amelink-Verburg et al. for the period 1988-2004 (12). Our study shows that this trend still persists for both nulliparous and multiparous women. Changes in the composition of the population in primary midwife-led care at the onset of labour did not explain the increase in referrals. However, we were not able to adjust for all known confounders, since maternal characteristics such as smoking behaviour or BMI were not available. Formal changes in the risk selection and role division between primary midwife-led care and obstetrician-led care, as agreed upon in the List of Obstetric Indications, can neither explain this trend, since the only update of this list during the study period contained no changes in intrapartum topics (1).

One explanation might be changes in the decision-making process surrounding referrals. For instance, our results suggest that the attitude of midwives towards the presence of meconium stained liquor is changing. The rise in referrals for failure to progress might reflect such change as well. The doubling of referrals for pain relief probably reflects a change in professional attitude as well as a growing request among women in the Netherlands for pain relief during labour. Furthermore, the availability of epidural anaesthesia for labouring women has improved considerably, especially since in 2007 a multidisciplinary guideline for midwives, obstetricians and anaesthesiologists was published (21).

The continuing rise in referrals since 1988 (12) might also have a deeper significance. Internationally, pregnancy and childbirth are increasingly associated with risks and medical procedures, as described by MacKenzie and van Teijlingen (22). Also in the Netherlands the emphasis in the last decade has mainly been on safety, management of risks, and medical procedures such as epidural anaesthesia. This might be at the expense of the Dutch confidence in a physiological birth process, for professionals involved as well as for women and their partners. The observed decline in preference for a homebirth suggests that women increasingly prefer a hospital environment above the comfort of their own home during labour.

Perinatal safety

Our study suggests that the observed rise in referrals is not associated with a change in perinatal outcomes of primary midwife-led care during labour. The level of perinatal safety was high in our study, and about 99.2 per cent of the children was born without any of the measured unfavourable outcomes. There was a small rise in the NICU admission rate. This seems somewhat contradictory, because the prevalence of a low Apgar score

showed a non significant decline rather than an increase, and asphyxia is the most common reason for NICU admission in term births (11). The rising NICU admission rate might reflect improved accessibility of NICU's instead of a change in perinatal outcomes. In 2000, neonatal intensive care was hindered by a severe shortage in capacity of NICU's in the Netherlands (23). Since then, the NICU capacity has expanded (24), and especially the admission of term and near term born children has increased considerably (25).

Intrapartum referrals and safety

In our study intrapartum referrals are related to higher rates of unfavourable perinatal outcomes, as was found earlier (11, 14). An important explanation for these observations is the ongoing risk selection process during labour. In the referred group the birthing process was suboptimal, or an elevated risk was suspected by the midwife.

Whether perinatal safety is compromised by the referral process cannot be investigated in our study. Many factors may play a role. Travel time to the nearest hospital might seem important, but in the Netherlands this is rarely more than 30 minutes (26). A travel time >20 minutes did not elevate the risk in case of intrapartum referrals from primary to secondary care in a recent Dutch study (27). This may indicate that midwives generally succeeded to take the travel time into account in their decisions to refer to the hospital. Timely diagnosis of risks, adequate communication and smooth cooperation between primary and secondary care professionals, are important factors as well for a safe referral process. Perinatal audits, implemented recently in the Netherlands as a national quality improvement tool for maternity care, can evaluate such factors adequately (28, 29).

Implications for practice

In our study, we found no indications that the rising referral rate has improved perinatal safety for low risk women in primary care at the onset of labour. Referral in itself is not considered as an adverse perinatal outcome. However, intrapartum referrals are associated with a less positive birth experience among women (13, 30). Furthermore, the high referral rate has become a challenge for the sustainability of the Dutch maternity care system. Nowadays, more than half of primiparous women with a low risk pregnancy receive care during labour that cannot be provided by their own midwife alone. A need for pain relief or failure to progress accounted for more than 60 per cent of the total increase in referrals, and for nulliparous women this was even 75 percent. Interventions in primary care to help women in coping with labour and labour pain deserve more attention, and might limit the rising trend. Organizing access to nitrous oxide (31), as well as enabling midwives to give more continuous support during labour may be promising new developments in the Netherlands.

On the other hand, it might be time to reconsider the current strict role division between primary care midwives and the obstetric team, and replace this by other models of close cooperation. This might enable midwives to continue their care in non-urgent situations in which pain relief, augmentation or fetal monitoring are provided. Currently, the possibilities for better integration of primary and secondary care during labour are explored in a Dutch research project (32).

Conclusions

In conclusion, our study shows that the persisting rise in referrals from primary midwife-led care to obstetrician-led care during labour is mainly a result of more referrals for non-urgent reasons, such as need for pain relief, lack of progress, and meconium stained liquor without other signs of fetal distress. Perinatal safety was high, and did not improve over time among these women that were low risk at the onset of labour. However, the continuing rise in referrals challenges the sustainability of the current strict role division within the maternity care system in the Netherlands.

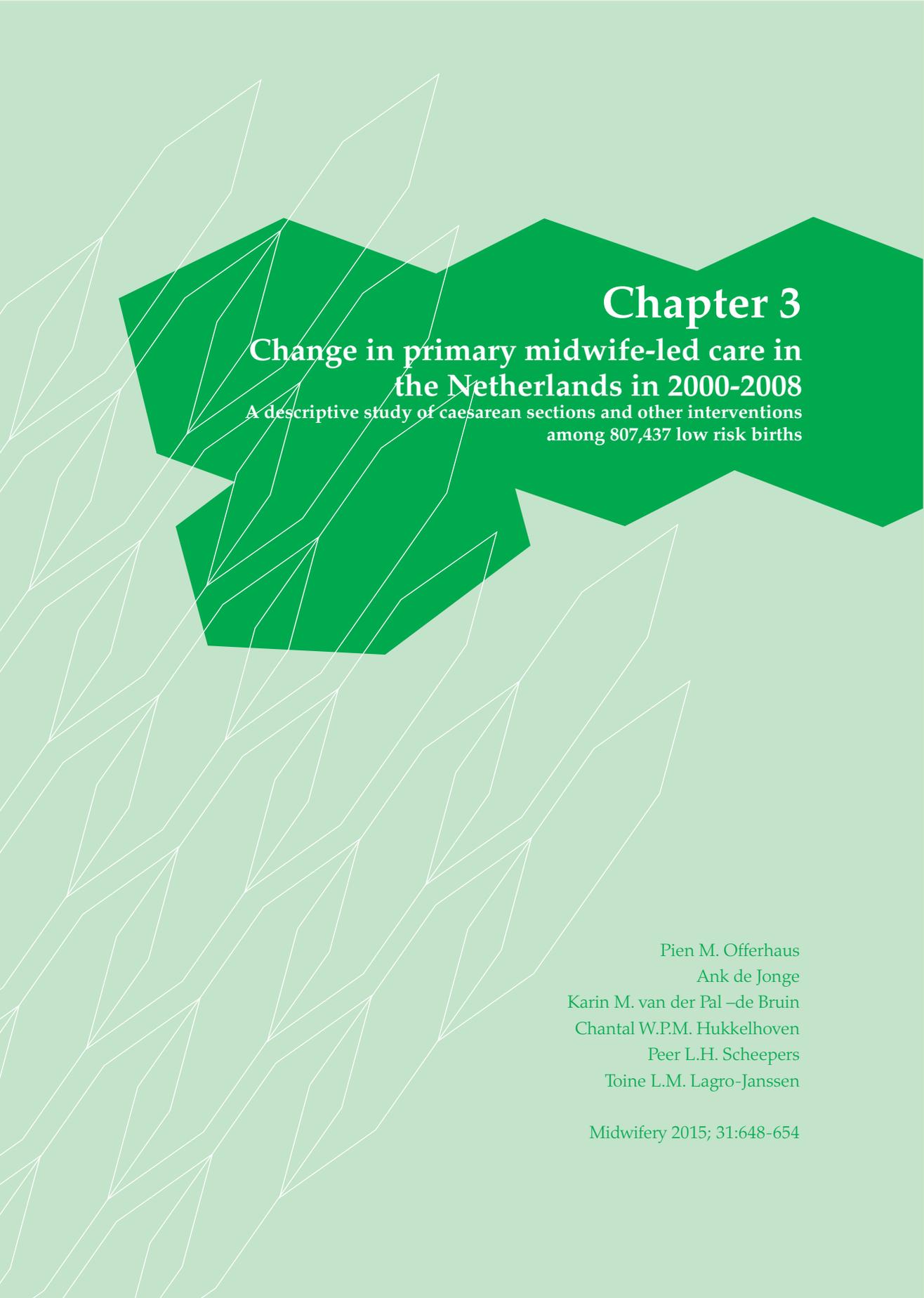
Acknowledgements

We acknowledge all midwives, obstetricians, paediatricians, nurses and residents who take the time to collect all data that are available in the Perinatal database. We thank professor SE Buitendijk who was involved in the first uptake of this study. And we thank Marianne Amelink-Verburg for the access we had to her former work in this field.

References

1. **National Health Insurance Board CVZ.** Verloskundig vademecum 2003. Eindrapport van de Commissie Verloskunde van het College voor Zorgverzekeringen [Obstetrical manual 2003. Final report of the Obstetric working Group of the National Health Insurance Board CVZ]. Diemen: CVZ, 2003.
2. **Houben-van Herten M.** Three quarters of deliveries in hospital. Statistics Netherlands (CBS), 2011. Accessed August 20, 2012. Available at: <http://www.cbs.nl/en-GB/menu/themas/gezondheid-welzijn/publicaties/artikelen/archief/2011/2011-3383-wm.htm?Languageswitch=on>
3. **Hatem M, Sandall J, Devane D, Soltani H, Gates S.** Midwife-led versus other models of care for childbearing women. *Cochrane Database of Syst Rev* 2008; (4):CD004667
4. **Sandall J, Hatem M, Devane D, Soltani H, Gates S.** Discussions of findings from a Cochrane review of midwife-led versus other models of care for childbearing women: continuity, normality and safety. *Midwifery* 2009;25:8-13.
5. **Maassen MS, Hendrix MJ, Van Vugt HC, Veersema S, Smits F, Nijhuis JG.** Operative deliveries in low-risk pregnancies in The Netherlands: primary versus secondary care. *Birth* 2008;35:277-82.
6. **Ravelli AC, Eskes M, Tromp M et al.** Perinatale sterfte in Nederland gedurende 200-2006; risicofactoren en risicoselectie [Perinatal mortality in the Netherlands in 2000-2006; riskfactors and risk selection]. *Ned Tijdschr Geneesk* 2008;152:2728-33.
7. **de Jonge A, van der Goes BY, Ravelli ACJ, Amelink-Verburg MP, Mol BW, Nijhuis JG, et al.** Perinatal mortality and morbidity in a nationwide cohort of 529,688 low-risk planned home and hospital births. *BJOG* 2009;116:1177-84.
8. **Buitendijk S, Zeitlin J, Cuttini M et al.** Indicators of fetal and infant health outcomes. *Eur J Obstet Gynecol Reprod Biol* 2003;111 Suppl 1:S66-S77.
9. **Mohangoo AD, Buitendijk SE, Szamotulska K, et al.** Gestational age patterns of fetal and neonatal mortality in Europe: results from the Euro-Peristat project. *PLoS One* 2011;6:e24727.
10. **Mohangoo AD, Buitendijk S, Hukkelhoven CWPM et al.** Hoge perinatale sterfte in Nederland vergeleken met andere Europese landen: de Peristat-II studie [Higher perinatal mortality in The Netherlands than in other European countries: the Peristat-II study]. *Ned Tijdschr Geneesk* 2008;152:2718-27.
11. **Evers AC, Brouwers HA, Hukkelhoven CW et al.** Perinatal mortality and severe morbidity in low and high risk term pregnancies in the Netherlands: prospective cohort study. *BMJ* 2010;341:c5639.
12. **Amelink-Verburg MP, Rijnders MEB, Buitendijk S.** A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988-2004. *BJOG* 2009;116:923-32.
13. **Wieggers TA.** The quality of maternity care services as experienced by women in the Netherlands. *BMC Pregnancy Childbirth* 2009;9:18.
14. **Amelink-Verburg MP, Verloove-Vanhorick SP, Hakkenberg RMA et al.** Evaluation of 280,000 cases in Dutch midwifery practices: a descriptive study. *BJOG* 2008;115:570-8.
15. **Malott AM, Davis BM, McDonald H, Hutton E.** Midwifery care in eight industrialized countries: how does Canadian midwifery compare? *J Obstet Gynaecol Can* 2009;31:974-9.

16. **McIntyre MJ.** Safety of non-medically led primary maternity care models: a critical review of the international literature. *Aust Health Rev* 2012;36:140-7.
17. **Meray N, Reitsma JB, Ravelli AC, Bonsel GJ.** Probabilistic record linkage is a valid and transparent tool to combine databases without a patient identification number. *J Clin Epidemiol* 2007;60:883-91.
18. **Tromp M, Ravelli AC, Meray N et al.** An efficient validation method of probabilistic record linkage including readmissions and twins. *Methods Inf Med* 2008;47:356-63.
19. **Stichting Perinatale Registratie Nederland.** Perinatale zorg in Nederland 2008 [Perinatal care in the Netherlands 2008]. Utrecht: Stichting Perinatale Registratie Nederland, 2011.
20. **SPSS for Windows, version 20.0.** Chicago, Il: SPSS Inc.; 2011.
21. **Dutch Institute for Healthcare Improvement CBO.** Richtlijn medicamenteuze pijnbehandeling tijdens de bevalling [Guideline pharmacological pain relief during labour]. Utrecht: CBO, 2008.
22. **MacKenzie BH, van Teijlingen ER.** Risk, theory, social and medical models: a critical analysis of the concept of risk in maternity care. *Midwifery* 2010;26:488-96.
23. **Health Council of the Netherlands.** *Intensive care at birth.* Den Haag: Health Council of the Netherlands, 2000. Report No.: 2000/08.
24. **Achterberg PW, Waelpuut AJM.** Recente perinatale sterftetrends in Nederland: 2000-2005. Zicht op verbetering? [Recent perinatal mortality rates in the Netherlands: 2000-2005. View on improvement?]. Bilthoven: RIVM, 2007. Report No.: 270032002/2007.
25. **Stichting Perinatale Registratie Nederland.** Perinatal care in the Netherlands, annual reports. Stichting PRN, 2012. Accessed May 31, 2012. Available at: http://www.perinatreg.nl/jaarboeken_zorg_in_nederland?noCache=302
26. **Deuning CM.** Reistijd (in minuten) tot dichtstbijzijnde ziekenhuis 2011 [Travel time (in minutes) to nearest hospital 2011]. *Public Health Status and Forecasting, Dutch National Atlas of Public Health. Volksgezondheid Toekomst Verkenningen, Nationale Atlas Volksgezondheid*, 2011. Accessed August 20, 2012. Available at: <http://www.zorgatlas.nl/zorg/ziekenhuiszorg/algemene-en-academische-ziekenhuizen/aanbod/reistijd-tot-dichtstbijzijnde-ziekenhuis/>
27. **Ravelli ACJ, Jager KJ, de Groot MH et al.** Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands. *Br J Obstet Gynaecol* 2011;118:457-65.
28. **van Diem MT, De Reu P, Eskes M et al.** National perinatal audit, a feasible initiative for the Netherlands? A validation study. *Acta Obstet Gynecol Scand* 2010;89:1168-73.
29. **van Diem MT, Timmer A, Bergman KA, Bouman K, van Egmond N, Stant DA, et al.** The implementation of unit-based perinatal mortality audit in perinatal cooperation units in the northern region of the Netherlands. *BMC Health Serv Res* 2012;12:195.
30. **Rijnders M, Baston H, Schonbeck Y et al.** Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands. *Birth* 2008;35:107-16.
31. **Van der Stouwe R, Rijnders M, Buitendijk S.** Reliëvopan verdient een tweede kans [Reliëvopan deserves a second chance]. *Medisch Contact* 2010;65:486-90.
32. **INCAS study.** *Studies in Obstetrics, Fertility & Gynaecology*, 2012. Accessed August 20, 2012. Available at: http://www.studies-obsgyn.nl/home/page.asp?page_id=1207



Chapter 3

Change in primary midwife-led care in the Netherlands in 2000-2008

A descriptive study of caesarean sections and other interventions
among 807,437 low risk births

Pien M. Offerhaus

Ank de Jonge

Karin M. van der Pal –de Bruin

Chantal W.P.M. Hukkelhoven

Peer L.H. Scheepers

Toine L.M. Lagro-Janssen

Midwifery 2015; 31:648-654

Abstract

Objective

To study whether an increase in intrapartum referrals in primary midwife-led care births in the Netherlands is accompanied by an increase in caesarean sections.

Design

Nationwide descriptive study.

Setting

The Netherlands Perinatal Registry.

Participants

807,437 Births of nine year cohorts of women with low risk pregnancies in primary midwife-led care at the onset of labour between 2000 and 2008.

Measurements

Primary outcome is the caesarean section rate. Vaginal instrumental childbirth, augmentation with oxytocin, and pharmacological pain relief are secondary outcomes. Trends in outcomes are described. We used logistic regression to explore whether changes in the planned place of birth and other maternal characteristics were associated with the caesarean section rate.

Findings

The caesarean section rate increased from 6.2 to 8.3 per cent for nulliparous and from 0.8 to 1.1 per cent for multiparous women. After controlling for maternal characteristics the year by year increase in the caesarean section rate was still significant for nulliparous women (adj OR 1.03; 95% CI 1.02–1.03). The vaginal instrumental birth declined from 18.2 to 17.4 per cent for nulliparous women (multiparous women: 1.7–1.5%). Augmentation of labour and/or pharmacological pain relief increased from 23.1 to 38.1 per cent for nulliparous women and from 5.4 to 9.6 per cent for multiparous women.

Conclusion

The rise in augmentation of labour, pharmacological pain relief and electronic fetal monitoring in the period 2000–2008 among women in primary midwife-led care was accompanied by an increase in caesarean section rate for nulliparous women. The vaginal instrumental births declined for both nulliparous and multiparous women.

Implications for practice

Primary care midwives should evaluate whether they can strengthen the opportunities for nulliparous women to achieve a physiological birth, without augmentation or pharmacological pain relief. If such interventions are considered necessary to achieve a spontaneous vaginal birth, the current disadvantage of discontinuity of care should be reduced. In a more integrated care system, women could receive continuous care and support from their own primary care midwife, as long as only supportive interventions are needed.

Introduction

Internationally there is concern about the rising caesarean section (CS) rate in high income countries since the 1970s. In 1985, the World Health Organisation (WHO) assessed a CS rate of 10-15 per cent as justifiable (1). Caesarean sections are associated with serious maternal morbidity and mortality when compared to vaginal births (2, 3). It has been suggested that CS rates of more than 15 per cent may lead to increased risks for reproductive health outcomes that outweigh benefits (4). However, most high income countries nowadays have CS rates that are much higher than the WHO recommendation (4). Although in the Netherlands the CS rate has also risen substantially since the 1980s, it has not risen above 15 per cent until now (5-8).

An important factor contributing to this relatively low CS rate is the maternity care model in the Netherlands (7, 9, 10). Non-medicalised childbirth is organised in primary care for healthy women with low risk pregnancies. Secondary obstetrician-led care is mainly provided for complicated pregnancies and births. Healthy women with an uncomplicated pregnancy usually receive care from independent primary care midwives in the community. When problems arise during pregnancy, a referral to the obstetrician-led team in secondary care takes place. As a result of this risk selection process, women who are in primary midwife-led care at the onset of labour can be considered as low risk. They may choose home birth or planned hospital birth accompanied by their own midwife. Regardless of the chosen birth location, obstetrical interventions such as pharmacological pain relief, continuous fetal monitoring, augmentation of labour and instrumental birth are available to them, but only after an intrapartum referral to obstetrician-led care in the hospital. During the past decade, more than half of all pregnant women in the Netherlands were in primary midwife-led care at the onset of labour (11).

In this maternity care model caesarean sections are less common for women who start labour in primary midwife-led care compared to women with a comparable risk profile who are in secondary obstetrician led-care at the start of labour (12, 13). In 2003 the overall CS rate for low risk women was 5.0 per cent. For women who started labour in primary midwife-led care this was 3.4 per cent, and 12.2 per cent among those that started in obstetrician-led care (OR 3.97, CI 3.15-5.01) (13).

In recent observational studies in other developed countries, midwife-led care for low risk women is also associated with low CS rates (14, 15). The lowest CS rate in these studies

was found in planned home births. In a systematic review of randomised controlled trials, midwife-led care was not associated with lower CS rates in comparison with other models of care (16). Other obstetric interventions such as pain relief and augmentation of labour were less common in midwife-led care models than in other models. Birth locations other than the conventional hospital labour ward are also associated with lower intervention rates (17).

However, primary midwife-led care in the Netherlands is changing. The referral rate from primary midwife-led care to obstetrician-led care is rising, both during pregnancy and during labour. Since the start of the national registration of primary midwife-led care on a national basis in 1988, the percentage of women cared for in primary midwife-led care who were referred to obstetrician-led care at some point during pregnancy or labour increased substantially: from 37 per cent in 1988 to 51 per cent in 2004 (18). In 2007 less than half of all women only received primary midwife-led care (19). In the same time period the home birth rate declined from more than 38 per cent in 1990 to less than 24 per cent in 2008 among all 180,000-200,000 births in the Netherlands (20).

As both obstetrician-led care and planned hospital birth are associated with higher intervention rates, these changes might lead to an increasing CS rate for women in primary midwife-led care at the onset of labour. Considering the international concern about rising CS rates, it is important to find out whether the rise in referrals leads to a higher CS rate.

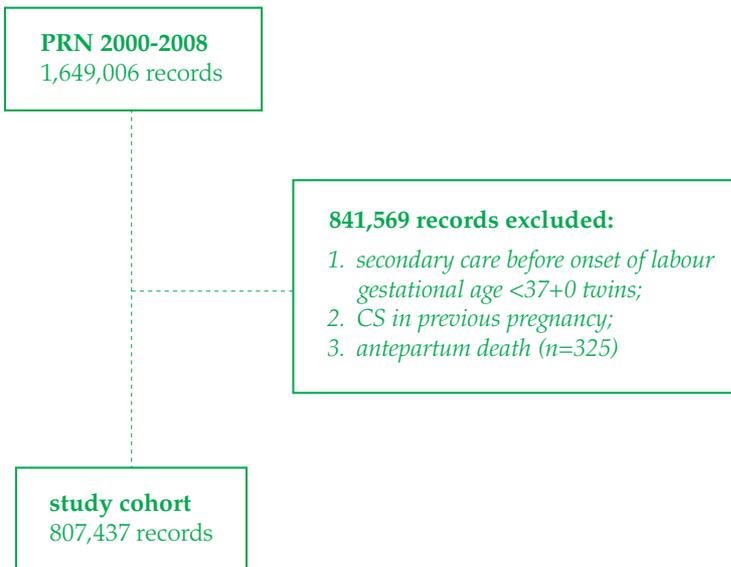
Therefore we investigated whether these changes in primary midwife-led care are accompanied by a rise in CS rate among women in primary midwife-led care at the onset of labour.

Methods

In the Netherlands data on pregnancy, birth and neonatal care are available in a national database, the Netherlands Perinatal Registry (PRN). These data are routinely collected by midwives, general practitioners active in primary maternity care, obstetricians and neonatologists in separate professional registries and combined via a validated linkage method (21, 22). The PRN contains approximately 95 per cent of all births in the Netherlands (8). For our study, data were available for the years 2000–2008. We analysed 1,650,802 records. Births of women who were in primary midwife-led care at the onset of

labour and who were therefore considered low risk were included. Births of women who were in obstetrician-led care at the onset of labour were excluded, for example women with a prior caesarean section. We excluded cases of fetal death before the onset of labour. In total 807,437 births of women in primary midwife-led care, with a low risk pregnancy and a live fetus at the onset of labour were included. The inclusion is described in the flow chart in figure 1.

figure 1: Inclusion and exclusion flowchart



Outcome measures and other variables

Primary outcome is the intrapartum caesarean section rate. Vaginal instrumental (vacuum or forceps) birth, pharmacological sedation or analgesia, epidural anaesthesia, and augmentation of labour with oxytocin are secondary outcomes.

Intrapartum referrals are categorised in this study as non-urgent during first stage of labour, non-urgent during second stage of labour, or urgent intrapartum referral. The level of urgency is based on the reason for referral as coded by the attending midwife. This categorisation in urgency levels was defined by Amelink-Verburg et al. (23). Referrals for fetal distress, suspected placental problems, or other complications that require

immediate investigation or treatment at the secondary care level are coded as urgent. Other intrapartum referrals for reasons such as failure to progress, need for pain relief, or meconium stained liquor, are coded as non-urgent. Referrals during the third stage of labour or directly post partum are coded as 'no intrapartum referral' as these referrals have no impact on interventions during labour or the mode of birth.

Antenatally planned place of birth (home, hospital primary care) and actual place of birth (home, hospital primary midwife-led care, hospital obstetrician-led care) are recorded by the primary care midwife (24). If the planned place of birth was missing, we recoded this as 'unknown'. Maternal age, parity, and ethnic background are possibly related with the planned birth location or intrapartum referral (25) and are available in the Netherlands Perinatal Registry. As ethnic background is registered inconsistently in the various non-Dutch categories, we defined the background of women as 'Dutch' or 'non-Dutch'. We also collected information on the sociodemographic background and level of urbanisation, based on the available four digits of the postal code. Some maternal complications of childbirth (postpartum haemorrhage >1000 ml (PPH), and anal sphincter damage) are available as well.

Analyses

To explore trends, rates of caesarean section and other outcomes were calculated per year for nulliparous and multiparous births separately. Furthermore we described trends in planned place of birth (home or hospital primary midwife-led care), actual place of birth, intrapartum referrals and interventions during labour. Trends in the CS rate and instrumental birth rate were statistically tested with Chi square Linear-by-Linear Association (26). Since the study population is not a sample but each year represents a total population, we assumed in the test procedure that the study population is a random selection of an infinite population.

We used logistic regression to explore whether possible trends in CS rates can be explained by changes in the planned birth location, controlled for other maternal characteristics. We entered the year of birth as an independent continuous variable in the starting model. In the next model we entered the planned place of birth as well as maternal characteristics. A change in odds ratio for year to year changes in caesarean sections in the second model would indicate that the trend is influenced by changes in the rates of planned place of birth. All analyses are conducted with the statistical software package SPSS 20.0 (SPSS, Chicago, IL, USA) and SAS software (Version 9.1; SAS Institute, Cary NC).

Findings

Changes in primary midwife-led care

Characteristics of women that were in primary midwife-led care at the start of labour are presented in table 1, as well as intrapartum referrals, mode of birth and maternal complications. We did not observe relevant changes in maternal demographic characteristics in this specific group of low risk women. However, several aspects of primary midwife-led care changed during the study period. The choice for a planned home birth decreased from 65.8 per cent in 2000 to 45.8 per cent in 2008 among nulliparous women, and from 68.3 to 52.4 per cent among multiparous women. The actual home birth rate dropped almost 10 per cent among both nulliparous and multiparous women. Intrapartum referrals to obstetrician-led care increased from 42.8 per cent in 2000 to 54.1 per cent in 2008 among nulliparous women, and from 13.0 to 18.9 per cent among multiparous women, mainly as a result of an increase in non-urgent referral reasons during the first stage of labour.

Augmentation of labour with oxytocin as well as the use of pharmacological pain relief showed an increase during the study period. The proportion of nulliparous women that gave birth without these interventions decreased from 76.9 to 61.9 per cent, and among multiparous women from 94.6 to 90.4 per cent. The prevalence of PPH increased from 3.9 per cent to 5.5 among nulliparous women, and from 2.4 per cent to 3.4 per cent among multiparous women. We observed a small increase in the prevalence of anal sphincter damage, from 3.3 to 3.6 per cent for nulliparous women and from 1.3 to 1.5 per cent for multiparous women.

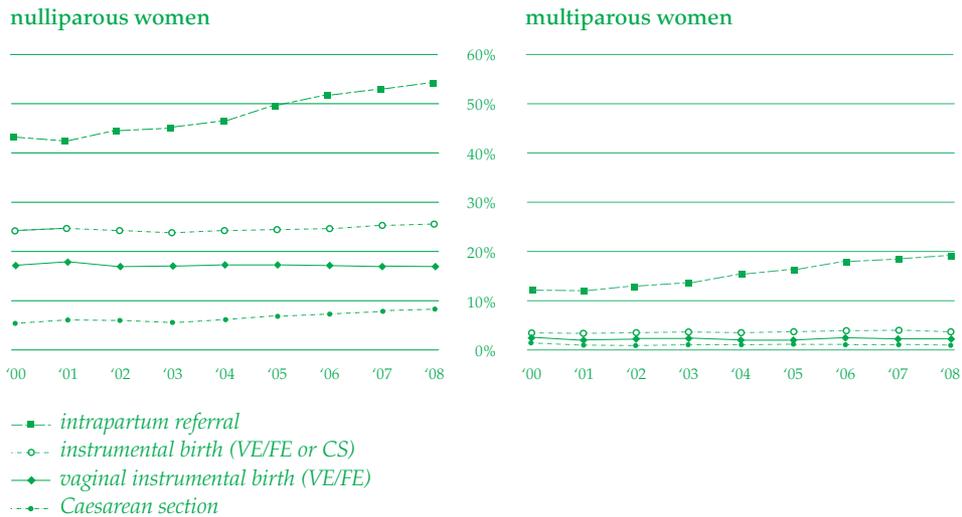
<i>Table 1</i>		<i>Characteristics and outcomes in women in primary midwife-led care at the onset of labour in 2000-2008</i>			
	Year	Nulliparous		Multiparous	
	N	2000	2008	2000	2008
Maternal age					
<25 year		19.6%	20.4%	6.1%	5.9%
25-34 year		72.9%	69.7%	72.5%	68.1%
>= 35 year		7.5%	9.9%	21.4%	25.9%
mean age		28.8	28.9	31.8	32.0
Ethnic background					
Dutch		82.9%	81.6%	81.4%	82.7%
Non Dutch		17.1%	18.4%	18.6%	17.3%
Antenatally intended place of birth					
Home		65.8%	45.8%	68.3%	52.4%
Hospital (primary midwife-led care)		33.9%	45.6%	31.4%	38.7%
Unknown		0.3%	8.7%	0.2%	8.9%
Actual place of birth					
Home		36.0%	26.6%	62.4%	53.7%
Hospital (primary midwife-led care)		19.9%	18.0%	23.6%	26.2%
Hospital (obstetrician-led care)		44.1%	55.5%	14.0%	20.1%
Referral					
No intrapartum referral		57.2%	45.9%	87.0%	81.1%
Intrapartum referral		42.8%	54.1%	13.0%	18.9%
<i>Non-urgent intrapartum referral 1st stage</i>		27.9%	41.2%	10.1%	16.2%
<i>Non-urgent intrapartum referral 2nd stage</i>		10.3%	9.5%	1.5%	1.5%
<i>Urgent intrapartum referral</i>		4.5%	3.4%	1.4%	1.2%
Interventions					
No pain relief or augmentation		76.9%	61.9%	94.6%	90.4%
Pharmacological pain relief		14.6%	27.5%	2.0%	5.1%
<i>Sedation/analgesia</i>		9.5%	14.7%	1.7%	4.0%
<i>Epidural anaesthesia (1st stage)</i>		3.9%	10.9%	0.3%	1.0%
<i>sed/analg and epidural</i>		1.2%	1.8%	0.0%	0.1%
Augmentation (oxytocin)		18.9%	32.4%	4.5%	7.8%
Combination (augmentation and pain relief)		9.8%	20.7%	1.1%	3.0%
Mode of birth					
Caesarean section		6.2%	8.3%	0.8%	1.1%
Vaginal instrumental birth (VE/FE)		18.2%	17.4%	1.7%	1.5%
Instrumental birth (VE/FE or CS)		24.4%	25.7%	2.5%	2.6%
Spontaneous vaginal birth		75.6%	74.3%	97.5%	97.4%
Maternal complications					
PPH> 1000cc		3.9%	5.5%	2.4%	3.4%
3rd/4th degree perineal rupture		3.3%	3.6%	1.3%	1.5%

Missing values due to registration errors varied from <0.1% (age, parity, actual place of birth) to 3.1% (ethnic background). Births in which actual place of birth was missing were all in primary midwife-led care, without intrapartum referral.

Trends in caesarean sections and vaginal instrumental births

The CS rate increased during the study period (figure 2). Among nulliparous women, the CS rate increased from 6.2 per cent in 2000 to 8.3 per cent in 2008. Among multiparous women the CS rate increased slightly from 0.8 to 1.1 per cent. Both trends were significant ($p < 0.01$).

Figure 2 Intrapartum referrals and instrumental births in 2000-2008



We performed a logistic regression analysis in order to explore the year to year changes, adjusting it for changes in planned place of birth as well as in maternal demographic characteristics. In the starting model for nulliparous women, the odds ratio for year by year changes in caesarean section rate was 1.03 (95% CI 1.03–1.04), confirming an upward trend. Entering maternal characteristics and planned place of birth in the model did not change this result (adj OR 1.03, 95% CI 1.02–1.03). For multiparous women, the small increase was not statistically significant after controlling for maternal characteristics (adj OR 1.00, 95% CI 0.99–1.02) (table 2).

The vaginal instrumental birth rate showed a small decline from 18.2 per cent in 2000 to 17.4 per cent in 2008 for nulliparous women (multiparous women: 1.7-1.5 per cent), with adjusted odds ratios below 1.0 (table 2). When caesarean sections and vaginal instrumental births were combined, there was no significant trend for nulliparous women (adj OR 1.00 CI 1.00-1.01), and a small decline was observed for multiparous women (adj OR 0.98 CI 0.98-0.99).

Table 2 *Odds ratio for year to year changes in CS and instrumental births*

	Crude odds ratios			Adjusted* odds ratios		
	OR	CI 95%		OR adj	CI 95%	
Nulliparous women						
<i>Caesarean section</i>	1.03	1.03	1.04	1.03	1.02	1.03
<i>Vaginal instrumental birth (VE/FE)</i>	0.99	0.99	0.99	0.99	0.99	0.99
<i>Instrumental birth (VE/FE or CS)</i>	1.00	1.00	1.01	1.00	1.00	1.01
Multiparous women						
<i>Caesarean section</i>	1.02	1.01	1.03	1.01	0.99	1.02
<i>Vaginal instrumental birth (VE/FE)</i>	0.98	0.97	0.99	0.97	0.96	0.98
<i>Instrumental birth (VE/FE or CS)</i>	0.99	0.99	1.00	0.98	0.98	0.99

**adjusted for: planned place of birth, maternal age, ethnic background, urbanization and social economic status based on postal code
bold odds ratios are statistical significant ($p < 0.05$)*

Planned place of birth

Throughout the study period, the intervention rate was lower among women who planned a home birth compared to those who planned a hospital birth, irrespective of parity (table 3). In 2008, the CS rate was 7.4 per cent among nulliparous women who planned a home birth compared to 9.2 per cent when a hospital birth was planned. A spontaneous vaginal birth was highest among women who planned a homebirth, and when we excluded the use of pain relief or augmentation as well, the difference between a planned home birth and a planned hospital birth was even larger. Among nulliparous women, the proportion of women who gave birth spontaneously without these interventions was 57.2 per cent when a homebirth was planned, and 49.4 per cent when a hospital birth was planned. Among multiparous women, this was 92.6 per cent versus 84.4 per cent.

As a result of the rising referral rate, the proportion of women that gave birth in hospital under obstetrician-led care increased between 2000 and 2008 (table 3). However, this increase was more prominent among both nulliparous and multiparous women who planned a hospital birth.

Discussion

Key finding

We observed a significant increase in the CS rate for nulliparous women that were in primary midwife-led care at the start of labour, whereas the overall instrumental birth rate remained similar. There was a considerable rise in the use of pharmacological pain relief and augmentation of labour with oxytocin.

Strengths and weaknesses of study

The strength of the study is that we had access to all records of low risk women in primary midwife-led care at the start of labour during the nine year study period. This study is an observational retrospective study, based on routinely collected data. This type of study has an explorative character and does not allow for causal explanations. The scope of the study is limited by the data available in the database. Therefore interesting issues such as client preferences and costs of care cannot be addressed.

We also could not measure the use of continuous electronic fetal heart rate monitoring, as this is not recorded in the PRN database. However, it is likely that almost all referred women received electronic fetal monitoring by CTG, as this is common practice after referral to obstetrician-led care.

A rise in CS rates

The rising CS rate in this low risk group of women is of concern, especially regarding the rise in nulliparous women. Changes in the composition of the population, including a decrease in planning a home birth, could not explain this rise. Although we have not been able to adjust for all possible confounders – such as smoking behaviour or BMI – as these factors were not validly recorded in the database, it is not expected that these confounders would have completely eliminated the observed rise. In the decade 1993-2003 a rising CS rate for nulliparous women with a term singleton pregnancy and a fetus in vertex position contributed the most to the slowly rising CS rates in the Netherlands (7). Our results suggest that this is still the case, even for women who start labour in primary midwifery care.

At the same time, there were no relevant changes in the spontaneous vaginal birth rate. The gradual shift from vaginal instrumental births to caesarean sections warrants further attention and investigation in secondary obstetric care, for instance by auditing decisions to perform a caesarean section (27).

The relatively stable spontaneous vaginal birth rate may be a result of a strong commitment in the Netherlands to achieve a spontaneous vaginal birth in primary as well as in secondary care (7, 9, 27). An interesting aspect of this commitment in secondary obstetrician-led care is the growing involvement of clinical midwives in the obstetrician-led teams. In 1995, the Dutch OBINT study demonstrated that employment of clinical midwives was associated with a lower intervention rate in hospitals and was therefore recommended (28). Most hospitals now employ clinical midwives. In secondary obstetrician-led care as a whole, the number of births attended by a midwife rose from less than 10 per cent in 1998 to more than 25 per cent in 2007 (29). Equally, after an intrapartum referral women are increasingly cared for by a clinical midwife. They presumably play an important role in keeping the spontaneous birth rate high.

A changing approach towards childbirth?

The rise in intrapartum referrals is not new, and is ongoing since the first publications on this topic. Partly this might be explained by changes in characteristics of the client population in primary care (18). On the other hand, the rise in intrapartum referrals for non-urgent reasons, together with a rise in planned hospital births and the increased use of medical technologies such as pain relief, fetal monitoring and augmentation of labour, may show that the Dutch approach towards childbirth is becoming more medicalised (30). This change in attitude applies to maternity care providers as well as pregnant women (10, 31).

This can best be illustrated by a changing attitude towards pharmacological pain relief. In 1999, most women had an indifferent or negative attitude towards medical-technical assistance during childbirth (32). The home environment was described as an important factor for coping with pain as well as perceived control (33, 34). In more recent studies, a shift towards a more positive attitude towards pharmacological pain relief is seen. The availability of pharmacological pain relief plays an important role in choosing hospital birth for women as well as their partners (35, 36). Klomp et al. recently described that many women adopt a 'pragmatic natural approach' towards labour pain and pharmacological pain relief. These women combine a confidence in a natural labouring process with an explicit appreciation of the availability of pain relief (37). In the UK a comparable change in attitude towards interventions has been described earlier. This was associated with an increase in instrumental births (38).

Among maternity care providers, the change in attitude towards pharmacological pain relief is reflected in a national guideline on pain management during labour (39). In this

guideline, the decision to use pharmacological pain relief is no longer a strict medical decision, made by maternity care providers. The guideline recommends that women's request for pain relief is sufficient in itself for offering pharmacological pain medication. Altogether, one could argue that availability of pharmacological pain relief in the Netherlands is becoming a part of a 'normal' birth process.

Another example of changing attitudes among care providers is the increase in non-urgent referrals for the presence of meconium stained liquor. This rise is not explained by a small increase in the prevalence of meconium stained liquor that we observed (data not shown). It rather shows that women who had meconium stained liquor were increasingly referred during the study period, in order to receive continuous fetal monitoring. As there was no formal change on this topic in the VIL, this suggests a stricter interpretation of an existing recommendation.

Implications for women

The easier access and thus increased control over the use of pharmacological pain relief can be considered as an improvement for labouring women (19, 40). One could say that Dutch women are 'catching up' in the use of pharmacological pain relief. Augmentation of labour and pharmacological pain relief were used in the past for complicated labours only. However, increasingly they are used in physiological labour. These interventions can be considered supportive for some women to achieve a spontaneous vaginal childbirth. The same might apply to continuous fetal monitoring, as it is increasingly used in mild complications, such as the presence of meconium liquor in otherwise physiological birth.

Nevertheless, our study suggests that the use of these interventions for low risk women in primary midwife-led care comes with the disadvantage of a higher risk of a caesarean section, especially for nulliparous women. The increased use of augmentation or pharmacological pain relief may also have other unwelcome side effects (41, 42). In our study, for instance, we observed a rise in PPH > 1000 ml. The occurrence of PPH was associated with augmentation of labour (data not shown).

Interventions without such side effects that can help women to cope with labour and achieve a physiological birth deserve more attention, such as continuous support (43) and the use of birthing pools (44). Midwives in the Netherlands should evaluate whether they can improve their care further and strengthen the opportunities for women to have a physiological birth. To stimulate this, a new KNOV guideline for midwives is

developed in 2014 (45). In this guideline the whole spectrum of effective interventions to help women in coping with labour pain is described. Another disadvantage is that the use of medical intervention requires a referral to an unknown care provider in secondary care, according to the current role division in the Dutch maternity care model. This is associated with a less positive birth experience (19, 40, 46). Unfortunately, we were not able to evaluate such an effect in our study as women's experiences are not recorded in the database.

Implications for primary midwife-led care

A growing number of women in primary midwife-led care experience an intrapartum referral to an unknown care provider in secondary care. Maternity care for low risk women in the Netherlands is changing from mainly midwife-led care to a model in which the obstetrician-led team is increasingly involved. Our outcomes show that most of these women experience a spontaneous vaginal birth. Many of these births are currently attended by a clinical midwife.

In a more integrated model of maternity care, the attending primary care midwife could expand her role to situations where some supportive interventions are beneficial, and a normal vaginal childbirth of a healthy fetus can be expected. This would reduce discontinuity of care, and result in a larger number of women that give birth assisted by their own primary care midwife. In addition, this may lead to a reduction in health-care costs.

In the Netherlands, some expansion of the basic competences of midwives is required to realise such continuity of care, as the basic education of Dutch midwives is explicitly aimed at assisting labouring women without the use of pain relief, augmentation or continuous fetal monitoring. One of the new challenges might be that primary care midwives could use supportive interventions too easily if they do not need to refer for them, which may lead to unnecessary medical interventions. Currently, the possibilities of such an integrated care model are investigated (47).

Conclusion

.....

The rise in augmentation of labour and pharmacological pain relief in the period 2000-2008 among women in primary midwife-led care was accompanied by an increase in caesarean section rate for nulliparous women. The vaginal instrumental births declined for both nulliparous and multiparous women. Primary care midwives should evaluate whether they can strengthen the opportunities for nulliparous women to achieve a physiological birth without these interventions. If such interventions are considered necessary to achieve a spontaneous vaginal birth, the current disadvantage of discontinuity of care should be reduced. In a more integrated care system, women could receive continuous care and support from their own primary care midwife, as long as only supportive interventions are needed.

References

1. **WHO.** *Appropriate technology for birth. The Lancet* 1985;326(8452):436-437.
2. **Gregory KD, Jackson S, Korst L, et al.** *Cesarean versus vaginal delivery: whose risks? Whose benefits?* *Am J Perinatol* 2012;29(1):7-18.
3. **Zwart JJ, Richters JM, Ory F, et al.** *Severe maternal morbidity during pregnancy, delivery and puerperium in the Netherlands: a nationwide population-based study of 371,000 pregnancies.* *Br J Obstet Gynaecol* 2008;115(7):842-850.
4. **Betran AP, Merialdi M, Lauer JA, et al.** *Rates of caesarean section: analysis of global, regional and national estimates.* *Paediatr Perinat Epidemiol* 2007;21(2):98-113.
5. **Elferink-Stinkens PM, Brand R, Van Hemel OJ.** *Trends in caesarean section rates among high- and medium-risk pregnancies in The Netherlands 1983-1992.* *Eur J Obstet Gynecol Reprod Biol* 1995;59(2):159-167.
6. **EURO-PERISTAT Project.** *The European perinatal health report. The health and care of pregnant women and babies in Europe in 2010.* Paris: EURO-PERISTAT Project, 2013. Accessed March 16, 2015. Available at <http://www.europeristat.com/>.
7. **Kwee A, Elferink-Stinkens PM, Reuwer PJHM, et al.** *Trends in obstetric interventions in the Dutch obstetrical care system in the period 1993-2002.* *Eur J Obstet Gynecol Reprod Biol* 2007;132(1):70-75.
8. **The Netherlands Perinatal Registry.** *Perinatale Zorg in Nederland 2008 [Perinatal care in the Netherlands 2008].* Utrecht: Stichting PRN, 2011.
9. **Bais JM, van der Borden DM, Pel M, et al.** *Vaginal birth after caesarean section in a population with a low overall caesarean section rate.* *Eur J Obstet Gynecol Reprod Biol* 2001;96(2):158-162.
10. **Christiaens W, Nieuwenhuijze MJ, de Vries R.** *Trends in the medicalisation of childbirth in Flanders and the Netherlands.* *Midwifery* 2013;29(1):e1-8.
11. **The Netherlands Perinatal Registry.** *10 jaar Perinatale Registratie Nederland, de grote lijnen, 1999-2008 [Ten years The Netherlands Perinatal Registry, trends 1999-2008].* Utrecht: Stichting PRN, 2011. Accessed January 2, 2013. Available at http://www.perinatreg.nl/trendboek_10_jaar_perinatale_registratie_nederland?wid=173&func=viewSubmission&sid=123&pageId=1&noCache=82:1359728536.
12. **Berghs G, Spanjaards E, Driessen L, et al.** *Neonatal neurological outcome after low-risk pregnancies.* *Eur J Obstet Gynecol Reprod Biol* 1995;62(2):167-171.
13. **Maassen MS, Hendrix MJ, Van Vugt HC, et al.** *Operative deliveries in low-risk pregnancies in The Netherlands: primary versus secondary care.* *Birth* 2008;35(4):277-282.
14. **Birthplace in England Collaborative Group.** *Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study.* *BMJ* 2011;343:d7400.
15. **Janssen PA, Saxell L, Page LA, et al.** *Outcomes of planned home birth with registered midwife versus planned hospital birth with midwife or physician.* *CMAJ* 2009;181(6-7):377-383.

16. **Sandall J, Hatem M, Devane D, et al.** Discussions of findings from a Cochrane review of midwife-led versus other models of care for childbearing women: continuity, normality and safety. *Midwifery* 2009;25(1):8-13.
17. **Hodnett ED, Downe S, Walsh D.** Alternative versus conventional institutional settings for birth. *Cochrane Database of Syst Rev* 2012, Issue 8 No:CD000012 2012.
18. **Amelink-Verburg MP, M.E.B. R, Buitendijk S.** A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988-2004. *Br J Obstet Gynaecol* 2009;116:923-932.
19. **Wiegers TA.** The quality of maternity care services as experienced by women in the Netherlands. *BMC Pregnancy Childbirth* 2009;9:18.
20. **Houben-van Herten M.** [Less homebirths]. Heerlen/Den Haag: Statistics Netherlands (CBS), 2011. Accessed August 20, 2012. Available at <http://www.cbs.nl/nl-NL/menu/themas/gezondheid-welzijn/publicaties/artikelen/archief/2011/2011-3383-wm.htm>.
21. **Meray N, Reitsma JB, Ravelli AC, et al.** Probabilistic record linkage is a valid and transparent tool to combine databases without a patient identification number. *J Clin Epidemiol* 2007;60(9):883-891.
22. **Tromp M, Ravelli AC, Meray N, et al.** An efficient validation method of probabilistic record linkage including readmissions and twins. *Methods InfMed* 2008;47(4):356-363.
23. **Amelink-Verburg MP, Verloove-Vanhorick SP, Hakkenberg RMA, et al.** Evaluation of 280,000 cases in Dutch midwifery practices: a descriptive study. *Br J Obstet Gynaecol* 2008;115(5):570-578.
24. **de Jonge A, van der Goes BY, Ravelli ACJ, et al.** Perinatal mortality and morbidity in a nationwide cohort of 529,688 low-risk planned home and hospital births. *Br J Obstet Gynaecol* 2009;116(9):1177-1184.
25. **Anthony S, Buitendijk SE, Offerhaus PM, et al.** Maternal factors and the probability of a planned home birth. *Br J Obstet Gynaecol* 2005;112(6):748-753.
26. **Field A.** *Discovering statistics using SPSS*. Londen: Sage Publications Limited; 2009.
27. **van Dillen J, Lim F, van Rijssel E.** Introducing caesarean section audit in a regional teaching hospital in The Netherlands. *Eur J Obstet Gynecol Reprod Biol* 2008;139(2):151-156.
28. **Pel M, Heres MHB.** *Obint. A study of obstetric intervention*. Amsterdam: Universiteit van Amsterdam; 1995.
29. **Wiegers TA, Hukkelhoven CW.** The role of hospital midwives in the Netherlands. *BMC Pregnancy Childbirth* 2010;10(1):80.
30. **MacKenzie BH, van Teijlingen ER.** Risk, theory, social and medical models: a critical analysis of the concept of risk in maternity care. *Midwifery* 2010;26(5):488-496.
31. **Smeenk AD, ten Have HA.** Medicalization and obstetric care: an analysis of developments in Dutch midwifery. *Med Health Care Philos* 2003;6(2):153-165.
32. **van der Hulst LAM, van Teijlingen ER, Bonsel GJ, et al.** Does a pregnant woman's intended place of birth influence her attitudes toward and occurrence of obstetric interventions? *Birth* 2004;31(1):28-33.
33. **Johnson TR, Callister LC, Freeborn DS, et al.** Dutch women's perceptions of childbirth in the Netherlands. *MCN Am J Matern Child Nurs* 2007;32(3):170-177.

34. **Kleiverda G, Steen AM, Andersen I, et al.** Place of delivery in The Netherlands: maternal motives and background variables related to preferences for home or hospital confinement. *Eur J Obstet Gynecol Reprod Biol* 1990;36(1-2):1-9.
35. **Hendrix M, Pavlova M, Nieuwenhuijze MJ, et al.** Differences in preferences for obstetric care between nulliparae and their partners in the Netherlands: a discrete-choice experiment. *J Psychosom Obstet Gynaecol* 2010;31(4):243-251.
36. **Pavlova M, Hendrix M, Nouwens E, et al.** The choice of obstetric care by low-risk pregnant women in the Netherlands: Implications for policy and management. *Health Policy* 2009;93(1):27-34.
37. **Klomp T, Mannien J, A. dJ, et al.** What do midwives need to know about approaches of women towards labour pain management? A qualitative interview study into expectations of management of labour pain for pregnant women receiving midwife-led care in the Netherlands. *Midwifery* 2013.
38. **Green JM, Baston HA.** Have women become more willing to accept obstetric interventions and does this relate to mode of birth? Data from a prospective study. *Birth* 2007;34(1):6-13.
39. **CBO.** Richtlijn medicamenteuze pijnbehandeling tijdens de bevalling [Guideline pharmacological pain relief during labour]. Utrecht: 2008.
40. **Rijnders M, Baston H, Schonbeck Y, et al.** Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands. *Birth* 2008;35(2):107-116.
41. **Anim-Somuah M, Smyth RM, Jones L.** Epidural versus non-epidural or no analgesia in labour. *Cochrane Database of Syst Rev* 2011;(12):CD000331
42. **Kramer MS, Dahhou M, Vallerand D, et al.** Risk factors for postpartum hemorrhage: can we explain the recent temporal increase? *J Obstet Gynaecol Can* 2011;33(8):810-819.
43. **Hodnett ED, Gates S, Hofmeyr GJ, et al.** Continuous support for women during childbirth. *Cochrane Database of Syst Rev* 2012;(10): CD003766.
44. **Cluett ER, Burns E.** Immersion in water in labour and birth. *Cochrane Database of Syst Rev* 2009(2):CD000111.
45. **de Boer JB, de Roon-Immerzeel A.** [Guideline Information about pain and pain treatments during labour. Recommendations for midwives]. Utrecht: KNOV, 2013.
46. **Christiaens W, Gouwy A, Bracke P.** Does a referral from home to hospital affect satisfaction with childbirth? A cross-national comparison. *BMC Health Serv Res* 2007;7:109.
47. **INCAS study.** Amsterdam: Studies in Obstetrics, Fertility & Gynaecology, 2012. Accessed August 20, 2012. Available at http://www.studies-obsgyn.nl/home/page.asp?page_id=1207.



Chapter 4

Variation in referrals to secondary obstetrician-led care among primary midwifery care practices in the Netherlands

A nationwide cohort study

Pien M. Offerhaus
Caroline Geerts
Ank de Jonge
Chantal W.P.M. Hukkelhoven
Jos W.R. Twisk
Toine L.M. Lagro-Janssen

BMC Pregnancy and Childbirth 2015;15(1):471

Abstract

.....

Background

The primary aim of this study was to describe the variation in intrapartum referral rates in midwifery practices in the Netherlands. Secondly, we wanted to explore the association between the practice referral rate and a woman's chance of an instrumental birth (caesarean section or vaginal instrumental birth).

Methods

We performed an observational study, using the Dutch national perinatal database. Low risk births in all primary care midwifery practices over the period 2008–2010 were selected. Intrapartum referral rates were calculated. The referral rate among nulliparous women was used to divide the practices in three tertile groups. In a multilevel logistic regression analysis the association between the referral rate and the chance of an instrumental birth was examined.

Results

The intrapartum referral rate varied from 9.7 to 63.7 per cent (mean 37.8; SD 7.0), and for nulliparous women from 13.8 to 78.1 per cent (mean 56.8; SD 8.4). The variation occurred predominantly in non-urgent referrals in the first stage of labour. In the practices in the lowest tertile group more nulliparous women had a spontaneous vaginal birth compared to the middle and highest tertile group (T1: 77.3%, T2:73.5%, T3: 72.0%). For multiparous women the spontaneous vaginal birth rate was 97%. Compared to the lowest tertile group the odds ratios for nulliparous women for an instrumental birth were 1.22 (CI 1.16-1.31) and 1.33 (CI 1.25-1.41) in the middle and high tertile groups. This association was no longer significant after controlling for obstetric interventions (pain relief or augmentation).

Conclusions

The wide variation between referral rates may not be explained by medical factors or client characteristics alone. A high intrapartum referral rate in a midwifery practice is associated with an increased chance of an instrumental birth for nulliparous women, which is mediated by the increased use of obstetric interventions. Midwives should critically evaluate their referral behaviour. A high referral rate may indicate that more interventions are applied than necessary. This may lead to a lower chance of a spontaneous vaginal birth and a higher risk on a PPH. However, a low referral rate should not be achieved at the cost of perinatal safety.

Background

In several Western countries, low-risk women can choose to give birth in midwifery settings. If risk factors or complications occur, they will be referred from midwifery care to an obstetric unit. Internationally, most of the referrals during first or second stage of labour (defined as intrapartum referrals in this article) are for non-urgent reasons such as a request for pain relief or lack of progress. Nulliparous women are referred more often than multiparous women (1-8). This is also the case in the Netherlands (9,10).

Referral rates vary between maternity care settings. Among planned home births the intrapartum referral rates are lower than among planned hospital births or births in midwifery units (11-13). Additionally, the maternity care system plays a role. A recent review showed that intrapartum referral rates among planned home births are higher in countries where this service is a regulated part of the maternity care system (14). In this review, the intrapartum referral rate among planned home births in the Netherlands was the highest of all.

In the Netherlands, independent midwives are the primary caregivers during labour for healthy women with uncomplicated, term pregnancies. These women can opt for a home birth or a hospital birth attended by her own primary care midwife. The attending midwife is responsible for the decision to refer a labouring woman to the obstetric unit, in order to give her access to secondary obstetric care. If birth is planned at home, this referral implies also a transfer to a secondary obstetric care unit. After an intrapartum referral most women will receive fetal monitoring, augmentation of labour, pharmacological pain relief, or a combination of these interventions. Some of them also experience instrumental birth, vaginally or by caesarean section, but most women will still have a spontaneous vaginal birth.

Reasons for referral are listed in the List of Obstetric Indications (VIL: Verloskundige Indicatie Lijst), which is regularly updated by a multidisciplinary group of midwives, obstetricians and general practitioners (15,16). Local protocols developed by midwives and obstetricians are based on the VIL, but may differ in detail. For instance, the VIL recommends a referral to secondary obstetric after 24 hours of ruptured membranes without contractions. It depends on the local collaboration whether this referral takes place in the evening before 24 hours have passed, or the next morning.

Some studies have shown variations in referral rates between midwives in the Netherlands (17,18). In these studies, midwives' attitudes towards home birth (18) and the number of midwives in an independent practice (17) have been associated with referral rates.

Although referral in itself is not a negative birth outcome, it is an important intervention in the course of labour and affects the birth experience of women (6,19). A referral is associated with loss of continuity of care and less sense of control for labouring women (11,20). Referral might also increase the chance of an instrumental birth for women in primary midwifery care which exposes them to potential side effects.

The background and size of variation in referral rates as well as the consequences for individual women is not fully understood. In this nationwide study, our main goal is to describe the variation in referral rates between all midwifery practices in the Netherlands. Secondly, we want to explore whether a woman's chance of an instrumental birth is affected by the referral rate of her midwifery practice.

Methods

Population and measures

In the Netherlands, births are registered in four databases: one for primary care midwifery (national perinatal database-1), one for the small group of general practitioners who provide primary maternity care (national perinatal database-h), one for secondary obstetric care (national perinatal database-2), and one for pediatric care (national neonatal register). These databases are combined using a validated linkage method into the national perinatal database (21,22). The resulting database contains > 96% of all births in the Netherlands (23). For this study we used data from all primary care midwifery practices that contributed to the national perinatal database in each year in the period 2008–2010. We included births of women who were in primary care at the onset of labour and who gave birth at term (gestational age 37 weeks or more). Women with a known risk of complications, such as multiple pregnancy or a previous caesarean section, are referred antenatally and are in obstetrician-led care at the onset of labour. As a result, births in our study can be considered as low risk at the onset of labour.

The primary outcomes were referral rates in midwifery practices, and instrumental birth (forceps or vacuum birth or unplanned caesarean section). Secondary outcomes were obstetric interventions during labour (augmentation with oxytocin and pharmacological pain relief), postpartum hemorrhage (PPH) > 1000 ml, and an Apgar score at 5 minutes <7 and <4.

The intrapartum referral rate for each practice was calculated as the number of referrals during the first or second stage of labour divided by the total number of births attended

by the midwifery practice. Since parity is strongly related to the chance of an intrapartum referral, and the proportion of nulliparous women is likely to be different per midwifery practice, we also calculated the intrapartum referral rates for nulliparous and for multiparous women separately. Referrals were classified into urgency categories (urgent, non-urgent first stage or non-urgent second stage). A referral was classified as urgent if the referral reason was for a complication that requires immediate investigation or treatment in secondary obstetric care, such as suspected intrapartum fetal distress or placental abruption. A referral was considered to be non-urgent if the referral was for a situation that requires diagnostics or treatment in secondary obstetric care, but without emergency. Examples of non-urgent referral reasons are a request for pharmaceutical pain relief, meconium stained liquor without other signs of fetal distress, and lack of progress (9,10).

The median number of births attended in the three years of the study period was used as a measure for the size of each practice. Information on the number of midwives in the practice is not available in the national perinatal database.

The following maternal characteristics that were registered in the national perinatal database and that might be associated with the chance of referral or of an instrumental birth were identified: parity (nulliparous versus multiparous), maternal age (<25; 25–34; ≥35 year), background (Dutch; non Dutch) and planned place of birth (home; hospital; other/unknown). Social economic status (SES) and level of urbanization were recorded, based on the four digits of the postal code.

The presented data are anonymised and cannot be related to individual women or midwifery practices. The privacy committee of the Netherlands Perinatal Registry approved this study. Further consent and ethical approval is not needed in the Netherlands for this type of study.

Analysis

We calculated means and standard deviations for intrapartum referral rates in the practices, overall and for nulliparous and multiparous woman separately. To verify whether low (or high) referral rates in a practice affected both nulliparous and multiparous women, the correlation between nulliparous and multiparous intrapartum referral rates per practice Pearson's Rho was computed. Practices' referral rate for nulliparous women was highly correlated with their referral rate for multiparous women (Pearson's rho .650, $p < .001$), as well as with their overall referral rate (Pearson's rho .863, $p < .001$). We used the nulliparous intrapartum referral rate in the further analyses, and divided the practices into three tertile groups with a lower, intermediate and higher rate of nulliparous referrals.

The association between the level of referrals in a practice and a woman's individual chance of an instrumental birth was examined using multilevel multivariable logistic regression to take into account clustering of maternal characteristics in midwifery practices. Models were built for nulliparous and multiparous women separately. The independent variable in each model was the level of nulliparous intrapartum referrals in the midwifery practice. The tertile group T1, with the lowest rate of referrals, was the reference category. The dependent variable was instrumental birth (yes/ no).

In the multilevel multivariable logistic regression procedure, models were first adjusted for confounding by maternal characteristics (maternal age, gestational age, ethnic background, urbanisation, SES). After that, we entered planned place of birth, practice size, and receiving a labour intervention one by one, to assess the impact of each factor on the individual chance of an instrumental birth. Results were expressed as odds ratios (OR) and 95% confidence intervals.

Descriptive statistics and bivariate analyses were performed in SPSS 20.0 (SPSS, Chicago, IL USA). The multilevel analyses were performed in Stata version 9.0 (Tata Corp., College Station, Texas, USA). A p-value of < 0.05 was considered as statistically significant.

Results

Variation in referral rates

The cohort included 421 primary care midwifery practices and a total number of 242,965 births. The overall intrapartum referral rate varied between practices from 9.7 to 63.7 per cent (mean 37.8; SD 7.0). For nulliparous and multiparous women practices' referral rates varied from 13.8 to 78.1 per cent (mean 56.8; SD 8.4), and from 5.3 to 50.7 per cent (mean 21.7; SD 5.9) respectively (Figure 1).

Practice size and distribution of parity in the three tertile groups of nulliparous referral rates are displayed in Table 1. The distribution of maternal characteristics is presented in Table 2.

Although the differences between tertile groups are small, the practices in the lowest tertile group (T1) had a somewhat more favourable composition of their client population in some aspects. For instance, in these practices more women planned a home birth in comparison with the total population (nulliparous women: 44.4% versus 42.2%;

multiparous women 52.0% vs 49.6%), and more women lived in a rural area (nulliparous women: 23.6% versus 19.4%; multiparous women 27.9% versus 22.7%). In other aspects the client population in these practices was less favourable compared to the total study population. More women had a background that was not Dutch (nulliparous women 19.2% versus 17.2%; multiparous women 19.7% versus 19.4%), and more women lived in a very urban area (nulliparous women: 25.0% versus 22.1%; multiparous women 19.3% vs 16.8%).

Figure 1 Variation in intrapartum referrals in 421 midwifery practices in the Netherlands

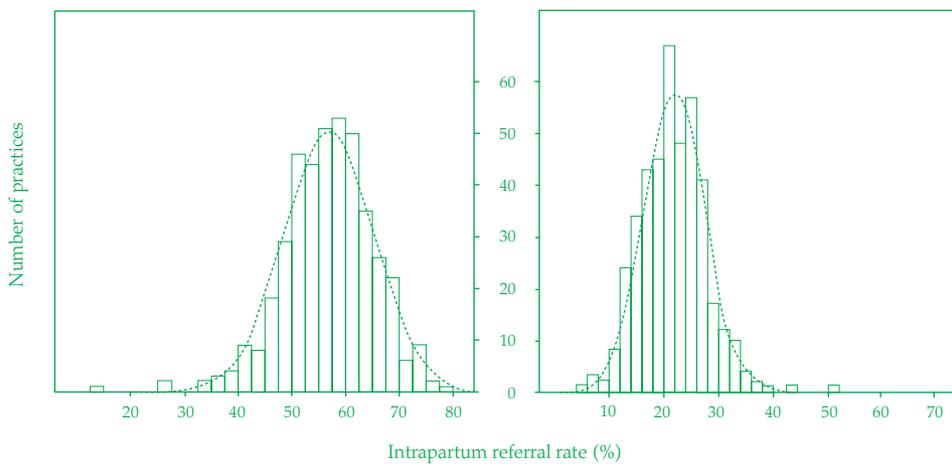


Table 1		Practice characteristics				X ² p-value
		Rate of intrapartum referrals among nulliparous women in midwifery practices (tertiles)				
		T1 (low)	T2	T3 (high)	Total	
		n=140	n=141	n=140	n=421	
Practice size (nr of births attended/yr)	<= 139	57	38	46	141	0.19
	140-229	42	50	47	139	
	>=230	41	53	47	141	
Distribution of parity	<i>Nulliparous women</i>	46.0%	46.4%	46.8%	46.4%	
	<i>Multiparous women</i>	54.0%	53.6%	53.2%	53.6%	

Table 2		Maternal characteristics by intrapartum referral rates in practices				
		Rate of intrapartum referrals among nulliparous women in midwifery practices (tertiles)				
		T1 (low)	T2	T3 (high)	Total	
Nulliparous women		<i>n</i> = 35,180	<i>n</i> =40,021	<i>n</i> =37,605	<i>n</i> = 112,806	<i>X</i> ² <i>p</i> -value
		%	%	%	%	
Maternal age	<25	21.1	19.3	18.9	19.7	<0.001
	25-34	69.2	70.7	70.9	70.3	
	≥ 35	9.7	10.0	10.3	10.0	
Gestational age	37-41+0	82.8	82.9	83.2	82.9	0.025
	>41+0	17.2	17.1	16.8	17.1	
Background	<i>Dutch</i>	80.8	84.9	82.3	82.8	<0.001
	<i>Not Dutch</i>	19.2	15.1	17.7	17.2	
SES (Social economic status)	<i>Cat 1 (high)</i>	21.2	23.2	23.0	22.5	<0.001
	<i>Cat 2</i>	45.7	44.3	43.6	44.5	
	<i>Cat 3 (low)</i>	33.1	32.5	33.4	33.0	
Urbanization	<i>Very urban</i>	25.0	21.9	19.6	22.1	<0.001
	<i>Intermediate</i>	51.4	60.1	63.4	58.5	
	<i>Rural</i>	23.6	18.0	16.9	19.4	
Planned place of birth	<i>Home</i>	44.4	42.6	39.9	42.2	<0.001
	<i>Hospital</i>	44.9	48.8	51.6	48.5	
	<i>Other/unknown</i>	10.6	8.7	8.6	9.2	
Multiparous women		<i>n</i> = 41,273	<i>n</i> = 46,158	<i>n</i> = 42,708	<i>n</i> = 130,139	
		%	%	%	%	
Maternal age	<25	6.2	5.8	5.6	5.9	<0.001
	25-34	68.7	68.2	68.8	68.6	
	≥ 35	25.1	26.0	25.5	25.6	
Gestational age	37-41+0	83.9	83.5	84.2	83.9	0.001
	>41+0	16.1	16.5	15.8	16.1	
Background	<i>Dutch</i>	80.3	82.6	78.9	80.6	<0.001
	<i>Not Dutch</i>	19.7	17.4	21.1	19.4	
SES	<i>Cat 1 (high)</i>	22.6	25.4	25.1	24.4	<0.001
	<i>Cat 2</i>	47.9	45.7	44.6	46.0	
	<i>Cat 3 (low)</i>	29.4	28.9	30.4	29.5	
Urbanization	<i>Very urban</i>	19.3	16.3	14.9	16.8	<0.001
	<i>Intermediate</i>	52.9	62.6	65.7	60.5	
	<i>Rural</i>	27.9	21.1	19.3	22.7	
Planned place of birth	<i>Home</i>	52.0	50.1	46.9	49.6	<0.001
	<i>Hospital</i>	37.4	41.3	44.4	41.1	
	<i>Other/unknown</i>	10.6	8.6	8.8	9.3	

Missing values: parity 20, maternal age: 213; background: 2,350; SES 5,896, urbanization 286

Table 3 Referrals, interventions and birth outcomes in women in primary care, by intrapartum referral rates in practices

	Rate of intrapartum referrals among nulliparous women in midwifery practices (tertiles)				X ² p-value
	T1 (low)	T2	T3 (high)	Total	
Nulliparous women	<i>n</i> = 35,180	<i>n</i> =40,021	<i>n</i> =37,605	<i>n</i> = 112,806	
Referral type	%	%	%	%	
No dp referral	51.9	42.8	35.2	43.1	
Non-urgent 1st stage	33.6	42.1	48.0	41.4	
Non-urgent 2nd stage	7.5	8.9	9.5	8.7	
Non-urgent, stage unclear	4.3	3.1	3.5	3.6	
Urgent	2.7	3.1	3.8	3.2	
Obstetric intervention during labour#					
None	65.4	58.4	51.7	58.4	<0.001
Pain relief (no epidural)	12.6	15.7	15.8	14.8	
Epidural (1st stage)	11.7	14.0	19.3	15.1	
Augmentation	28.6	34.2	39.8	34.3	
Mode of birth					<0.001
Spontaneous vaginal	77.3	73.5	72.0	74.2	
Instrumental vaginal	15.3	18.0	18.8	17.4	
Caesarean section	7.3	8.6	9.2	8.4	
Morbidity					
PPH > 1000 cc	5.3	5.6	6.2	5.7	<0.001
Apgar score (5 min) < 7	1.2	1.0	0.9	1.0	0.019
Apgar score (5 min) < 4	0.3	0.2	0.2	0.2	0.030
Multiparous women	<i>n</i> = 41,273	<i>n</i> = 46,158	<i>n</i> = 42,708	<i>n</i> = 130,139	
Referral type	%	%	%	%	
No dp referral	82.2	78.8	74.3	78.4	
Non-urgent 1st stage	13.5	16.6	20.5	16.9	
Non-urgent 2nd stage	1.3	1.7	1.7	1.6	
Non-urgent, stage unclear	2.1	1.7	2.1	2.0	
Urgent	0.9	1.2	1.4	1.1	
Obstetric intervention during labour#					
None	90.7	89.3	86.4	88.8	<0.001
Pain relief (no epidural)	3.6	4.4	5.4	4.5	
Epidural (1st stage)	1.4	1.5	2.3	1.7	
Augmentation	7.3	8.2	10.2	8.6	
Mode of birth					0.234
Spontaneous vaginal	97.3	97.2	97.2	97.2	
Instrumental vaginal	1.5	1.7	1.6	1.6	
Caesarean section	1.2	1.1	1.2	1.2	
Morbidity					
PPH > 1000 cc	3.3	3.5	3.9	3.6	<0.001
Apgar score (5 min) < 7	0.5	0.4	0.4	0.4	0.390
Apgar score (5 min) < 4	0.1	0.1	0.1	0.1	0.311

Missing values: parity 20, referral type 1; obst. interventions 5; Mode of birth 1,294; PPH 2,374; Apgar score 98.
sums up to >100%, more than one intervention possible

Referrals, interventions and birth outcomes

Table 3 shows referrals, interventions and birth outcomes in the three tertile groups of practices. The largest difference in referrals between practices in the lowest tertile group (T1) versus the highest tertile (T3) group was for non-urgent reasons in the first stage (33.6% versus 48.0% for nulliparous women, and 13.5% versus 20.5% for multiparous women). Differences in urgent referrals were found as well (2.7% in T1 versus 3.8% in T3 for nulliparous women, and 0.9% in T1 versus 1.4% in T3 for multiparous women).

Both pain relief and augmentation were less often used in the lowest tertile group. More nulliparous women had a spontaneous vaginal birth compared to the middle and highest tertile group (T1: 77.3%, T2: 73.5%, T3: 72.0%). Both an instrumental vaginal birth (15.3% versus 18.0% and 18.8%) and a caesarean section (T1: 7.3%, T2: 8.6%, T3: 9.2%) were less often performed in this group. These differences in mode of birth were statistically significant (Chi Square p-value < 0.001). For multiparous women there were no significant differences in mode of birth. More than 97 per cent experienced a spontaneous vaginal birth in all tertile groups.

Nulliparous and multiparous women had a PPH > 1000 ml less often in the lowest tertile group. Among nulliparous women, a low Apgar score happened more often in the lowest tertile group, although the prevalence was low in all groups (AS <7: T1 1.2%, T2 1.0%, T3 0.9%; AS < 4: T1: 0.3%, T2 and T3: 0.2%).

In Table 4 the associations between the referral rate in the practice and the chance of an instrumental birth are presented. Nulliparous women in practices in the middle or highest tertile group had a higher chance of an instrumental birth compared to women in practices in the lowest tertile group. (T2: OR 1.22; CI 1.16-1.31; T3: OR 1.33; CI 1.25-1.41). For multiparous women, no significant association was found.

Adjustment for differences in maternal characteristics did not change these results. Further adjustments by adding planned place of birth and practice size in the model did not change the associations either, although planned place of birth was a significant factor in the model. After adjustment for labour interventions the association was no longer statistically significant.

Table 4 Multilevel logistic regression: rate of referrals in a practice and the chance of instrumental birth

4a. Nulliparous women

	Rate of intrapartum nulliparous referrals in midwifery practice (tertiles)		
	T1 (low)	T2	T3 (high)
Instrumental birth rate	22.7%	26.5%	28.0
Crude OR (95% CI)	1	1.23 (1.16 - 1.31)	1.33 (1.25 - 1.41)
Model 1 adjusted OR (95% CI)	1	1.22 (1.15 - 1.30)	1.33 (1.25 - 1.41)
Model 2 adjusted OR (95% CI)	1	1.22 (1.14 - 1.29)	1.31 (1.23 - 1.39)
Model 3 adjusted OR (95% CI)	1	1.21 (1.14 - 1.29)	1.31 (1.23 - 1.39)
Model 4 adjusted OR (95% CI)	1	1.08 (1.00 - 1.16)	1.05 (0.97 - 1.13)

4b. Multiparous women

	Rate of intrapartum nulliparous referrals in midwifery practice (tertiles)		
	T1 (low)	T2	T3 (high)
Instrumental birth rate	2,7%	2,8%	2.8%
Crude OR (95%)	1	1.06 (0.96 - 1.18)	1.05 (0.95 - 1.17)
Model 1 adjusted OR (95% CI)	1	1.07 (0.96 - 1.18)	1.04 (0.94 - 1.16)
Model 2 adjusted OR (95% CI)	1	1.05 (0.94 - 1.16)	1.01 (0.91 - 1.12)
Model 3 adjusted OR (95% CI)	1	1.05 (0.94 - 1.16)	1.01 (0.91 - 1.12)
Model 4 adjusted OR (95% CI)	1	0.99 (0.89 - 1.10)	0.87 (0.78 - 0.97)

model 1: adjustment for maternal age, gestational age, ethnic background urbanisation, SES

model 2: model 1 + planned place of birth

model 3: model 2 + size

model 4: model 3 + any interventions (pain relief and/or augmentation)

Discussion

Key findings

Our study showed a considerable variation in intrapartum referral rates between midwifery practices in the Netherlands. Women in practices with higher intrapartum referral rates received more often pharmacological pain relief and augmentation of labour. For nulliparous women the chance of an instrumental birth was also higher in these practices, even after adjustment for maternal and practice characteristics. The association between practice referral rate and instrumental birth was no longer significant after adjustment for pain medication and augmentation.

Variation

Our results suggest that the wide range in intrapartum referral rates cannot easily be explained by maternal characteristics alone. Parity, the strongest predictor for referrals, does not explain the differences between the tertile groups, since we defined them based on the referrals of nulliparous women alone. The differences in other maternal characteristics were small and did not show a favourable case-mix of women in the practices in the lowest tertile. It is possible that unmeasured maternal characteristics are confounding the results, but it is unlikely that they can explain the wide range that we observed.

It is therefore probable that the midwifery practice or factors related to the practice are strong contributors to the variation in referral rates. The association between nulliparous and multiparous referral rates supports this suggestion: a practice that refers many nulliparous women also refers many multiparous women.

The variation was predominantly observed for non-urgent referrals during the first stage of labour. Differences between practices in the management of the first stage of labour can play a role, as well as midwives' perception of the chance of a spontaneous vaginal birth (24). Some other studies suggested as well that midwives' risk perception or uncertainty is a factor associated with referral or intervention decisions (25-28). Furthermore, midwifery practices may vary in offering upright birth positions (29) or other non medical interventions that can help in reducing the need for obstetric interventions in physiological labour (30-32). Variation in decision making is not unique for primary midwifery care. Variation is also observed in obstetric care, internationally and in the Netherlands. For instance, caesarean sections rates show considerable variation, even within a homogenous case-mix of nulliparous women with a term singleton vertex birth (33-36). Obstetrician and hospital related factors contribute to this variation (33,37,38).

Since midwifery practices are working closely together with the local hospital and often share local multidisciplinary protocols with the obstetricians, this collaboration may also influence referral rates in their midwifery practice (18).

This kind of practice variation in health care has been a topic of concern since it was addressed by Wennberg and Gittelsohn in 1973 (39). Much scientific effort was aimed at explaining such variation. Some variation can exist for good reasons such as differences in health needs or client preferences such as request for pain relief or planned place of birth. However, subjective factors such as a personal practice style has been suggested as an important source of variation, especially in areas where a solid scientific consensus is lacking (40). Social and structural factors in the professional context play a role as well (41-44). Reducing unwarranted variation is therefore complex. Glantz (2012) argues however that efforts to lower practice variation are worthwhile, since they may help in reducing unnecessary interventions in obstetrics in the US. Raising awareness by providing feedback to practitioners and hospitals about their own results is an essential element in this ambition (35). This may also apply to lowering the variation in referral rates in primary midwifery care in the Netherlands.

Referral: the first step in a cascade of interventions?

Our results show that a high referral rate is not without consequences for the women involved. Apart from the psychological consequences mentioned in the introduction, women also more often experienced a PPH as well as an instrumental birth in the practices with a higher referral rate. Both PPH and instrumental births are associated with an increased risk of serious maternal morbidity and mortality (45).

The higher occurrence of PPH is likely to be explained by the use of oxytocin for augmentation of labour, applied in the majority of births after referral (46). The association between referral rate and instrumental birth is remarkable, even though an instrumental birth is always preceded by a referral. Our logistic regression analysis (model 4) suggests that receiving epidural pain relief and/or oxytocin for augmentation plays a mediating role in the association between a higher referral rate in the practice and a higher chance of an instrumental birth for nulliparous women. This finding is noteworthy. A Cochrane review showed an increased chance of an instrumental vaginal birth among women with epidural anaesthesia, but not of a caesarean section (47). Augmentation with oxytocin had no significant effect on instrumental birth rates in another Cochrane review (48). Moreover, authors who promote Active Management or its Dutch version Proactive Support of Labour (49,50) suggest that early intervention in case of a slow progress during the first stage is effective in preventing CS and instrumental birth.

Our study does not support this assumption. Although we cannot give causal explanations, our results suggest that offering augmentation and/or pain relief increases the likelihood of instrumental birth, including Caesarean sections.

Since long, authors have warned for an accumulation - or cascade - of interventions; pain medication leads to a higher chance of augmentation or vice versa, which leads to an increased chance of an instrumental birth (51,52). In primary midwifery care settings, a referral to obstetrician-led care can be seen as the first step in this cascade.

Perinatal safety

The occurrence of a low Apgar score was rare, regardless of the referral rate, as can be expected in a low risk population. For an individual midwifery practice the incidence of an Apgar score < 4 of 0.1- 0.3% means that this outcome occurs very infrequently, less than once in several years. The clinical significance of the somewhat higher occurrence of such a rare outcome in the lowest tertile group is difficult to interpret. However, this finding should be considered as a warning that a low referral rate should not be achieved at the cost of perinatal safety. It is noteworthy that in the lowest tertile group not only the percentage of non-urgent referrals is lower, but also the percentage of urgent referrals. This may indicate that urgent situations are not always recognized or not addressed adequately, although we can not examine this in the available database.

Perinatal safety should be safeguarded in all midwifery practices, not only in those with low referral rates. Perinatal audits are the best way to reflect in detail on individual cases of perinatal mortality and serious morbidity. Such audits were introduced nationwide successfully in the Netherlands in 2010 (53,54).

Implications for practice

The wide variation in referral rates in the Netherlands is of concern. High intrapartum referral rates suggest that some of the referrals, especially non-urgent referrals during the first stage of labour, might have been unnecessary and therefore triggered avoidable interventions, including instrumental births and associated maternal morbidity. On the other hand, our results also confirm that achieving a low referral rate is no goal in itself. Perinatal safety should be warranted with timely referral to give access to obstetrical care.

An optimal range in referral rates care cannot be derived from our study. However, monitoring referral behaviour can help primary care midwives to maintain high quality midwifery care. Being aware of a high referral rate can stimulate midwives to reflect

critically whether they can improve in supporting and promoting physiological childbirth, as described in the recent Lancet series (55). At the other side of the spectrum, midwives with low referral rates may need to reflect on their ability to address emerging urgent situations in time. Independent midwifery practices should always incorporate the cooperation with the hospital in these reflections.

Strengths and limitations of the study

A major strength of this study is that we had access to all records of low risk women in primary midwifery care during the study period. Using the combined database allowed us to use information from the midwifery registration as well as the obstetric registration. This improved the quality of our data on interventions in obstetrical care. However, the study has some limitations as well. It is based on routinely collected data. This type of study has an explorative character and does not allow for causal explanations. It is the first nationwide study relating referral rates in practices to birth outcomes in healthy low risk women. Controlling for maternal and practice characteristics in the performed analyses was however limited to variables available in the database. Interesting issues such as preferences of clients, organisational aspects of the midwifery practice or information about the collaboration with the hospitals referred to, could not be addressed.

Conclusion

The wide variation between referral rates suggests that these differences between midwifery practices may not be fully explained by medical factors or client characteristics. A high intrapartum referral rate in a midwifery practice is associated with an increased chance of an instrumental birth, which appears to be mediated by the increased use of augmentation and medical pain medication. Midwives should be encouraged to critically evaluate their referral behaviour. A high referral rate in their practice may indicate that during the first stage of labour more interventions are applied than necessary. This may lead to a lower chance of a spontaneous vaginal birth and a higher risk on a PPH. However, a low referral rate should not be achieved at the cost of perinatal safety.

Acknowledgements

First of all we acknowledge all care providers in midwifery and obstetric care for registering the information al pregnancy and childbirth in the national databases so consciously. We thank the Netherlands Perinatal Registry (the PRN-foundation) for the use of the national perinatal database. We also acknowledge the KNOV for funding the costs for the usage of the database, and the department of Midwifery Science for funding the costs of open access publication.

References

1. **Lindgren HE, Hildingsson IM, Christensson K, Radestad IJ.** Transfers in planned home births related to midwife availability and continuity: a nationwide population-based study. *Birth.* 2008;35:9–15.
2. **Cheyney M, Boubjerg M, Everson C et al.** Development and validation of a national data registry for midwife-led births: the midwives alliance of north america statistics project 2.0 dataset. *J Midwifery Womens Health.* 2014;59:8–16.
3. **Gaudineau A, Sauleau EA, Nisand I, Langer B.** Obstetric and neonatal outcomes in a home-like birth centre: a case-control study. *Arch Gynecol Obstet.* 2013;287:211–6.
4. **Overgaard C, Moller AM, Fenger-Gron M et al.** Freestanding midwifery unit versus obstetric unit: a matched cohort study of outcomes in low-risk women. *BMJ Open.* 2011;1:e000262.
5. **Patterson JA, Foureur M, Skinner JP.** Patterns of transfer in labour and birth in rural New Zealand. *Rural Remote Health.* 2011;11:1710.
6. **Rowe RE, Fitzpatrick R, Hollowell J, Kurinczuk JJ.** Transfers of women planning birth in midwifery units: data from the Birthplace prospective cohort study. *BJOG.* 2012.
7. **Stapleton SR, Osborne C, Illuzzi J.** Outcomes of care in birth centers: demonstration of a durable model. *J Midwifery Womens Health.* 2013;58:3–14.
8. **Malott AM, Davis BM, McDonald H, Hutton E.** Midwifery care in eight industrialized countries: how does Canadian midwifery compare? *J Obstet Gynaecol Can.* 2009;31:974–9.
9. **Amelink-Verburg MP, Verloove-Vanhorick SP, Hakkenberg RMA et al.** Evaluation of 280,000 cases in Dutch midwifery practices: a descriptive study. *BJOG.* 2008;115:570–8.
10. **Offerhaus PM, Hukkelhoven CWPM, de Jonge A et al.** Persisting Rise in Referrals During Labour in Primary Midwife-led Care in The Netherlands. *Birth.* 2013;40:192–201.
11. **Geerts C, Klomp T, Lagro-Janssen A, Twisk J, van Dillen J, de Jonge A.** Birth setting, transfer and maternal sense of control: results from the DELIVER study. *BMC Pregnancy Childbirth.* 2014;14:27.
12. **Group BiEC.** Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study. *BMJ.* 2011;343:d7400.
13. **Janssen PA, Saxell L, Page LA et al.** Outcomes of planned home birth with registered midwife versus planned hospital birth with midwife or physician. *CMAJ.* 2009;181:377–83.
14. **Blix E, Kumle M, Kjaergaard H et al.** Transfer to hospital in planned home births: a systematic review. *BMC Pregnancy Childbirth.* 2014;14:179.
15. **Amelink-Verburg MP, Buitendijk SE.** Pregnancy and labour in the Dutch maternity care system: what is normal? The role division between midwives and obstetricians. *J Midwifery Womens Health.* 2010;55:216–25.
16. **CVZ. Verloskundig vademecum 2003.** Eindrapport van de Commissie Verloskunde van het College voor Zorgverzekeringen. [Obstetrical manual 2003. Final report of the Obstetric working Group of the National Health Insurance Board CVZ]. Diemen: CVZ; 2003.

17. **Fontein Y.** *The comparison of birth outcomes and birth experiences of low-risk women in different sized midwifery practices in the Netherlands.* *Women Birth.* 2010;23:103–10.
18. **Wieggers TA, van der Zee J, Kerssens JJ, Keirse MJ.** *Variation in home-birth rates between midwifery practices in The Netherlands.* *Midwifery.* 2000;16:96–104.
19. **Rijnders M, Baston H, Schonbeck Y et al.** *Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands.* *Birth.* 2008;35:107–16.
20. **de Jonge A, Stuijt R, Eijke I, Westerman MJ.** *Continuity of care: what matters to women when they are referred from primary to secondary care during labour? a qualitative interview study in the Netherlands.* *BMC Pregnancy Childbirth.* 2014;14:103.
21. **Meray N, Reitsma JB, Ravelli AC, Bonsel GJ.** *Probabilistic record linkage is a valid and transparent tool to combine databases without a patient identification number.* *J Clin Epidemiol.* 2007;60:883–91.
22. **Tromp M, Ravelli AC, Meray N et al.** *An efficient validation method of probabilistic record linkage including readmissions and twins.* *Methods Inf Med.* 2008;47:356–63.
23. **PRN-foundation.** *Perinatale zorg in Nederland 2010. [Perinatal care in the Netherlands].* Utrecht: the Netherlands Perinatal Registry (PRN-foundation); 2013.
24. **Offerhaus P, Otten W, Boxem- Tiemessen JC et al.** *Variation in intrapartum referral rates in primary midwifery care in the Netherlands: a discrete choice experiment.* *Midwifery.* 2015;16; doi: 10.1016/j.midw.2015.01.005 (epub ahead of print).
25. **Cheyne H, Dalgleish L, Tucker J et al.** *Risk assessment and decision making about in-labour transfer from rural maternity care: a social judgment and signal detection analysis.* *BMC Med Inform Decis Mak.* 2012;12:122.
26. **Mead MMP, Kornbrot D.** *The influence of maternity units' intrapartum intervention rates and midwives' risk perception for women suitable for midwifery-led care.* *Midwifery.* 2004;20:61–71.
27. **Page M, Mander R.** *Intrapartum uncertainty: a feature of normal birth, as experienced by midwives in Scotland.* *Midwifery.* 2013.
28. **Styles M, Cheyne H, O'Carroll R et al.** *The Scottish Trial of Refer or Keep (the STORK study): midwives' intrapartum decision making.* *Midwifery.* 2011;27:104–11.
29. **de Jonge A, Teunissen DA, van Diem MT et al.** *Women's positions during the second stage of labour: views of primary care midwives.* *J Adv Nurs.* 2008;63:347–56.
30. **Lawrence A, Lewis L, Hofmeyr GJ, Styles C.** *Maternal positions and mobility during first stage labour.* *Cochrane Database Syst Rev.* 2013;8:Cd003934.
31. **Jones L, Othman M, Dowswell T et al.** *Pain management for women in labour: an overview of systematic reviews.* *Cochrane Database Syst Rev.* 2012;3:CD009234.
32. **Hodnett ED, Gates S, Hofmeyr GJ, Sakala C.** *Continuous support for women during childbirth.* *Cochrane Database Syst Rev.* 2013;7:Cd003766.
33. **Coonrod DV, Drachman D, Hobson P, Manriquez M.** *Nulliparous term singleton vertex cesarean delivery rates: institutional and individual level predictors.* *Am J Obstet Gynecol.* 2008;198:694.e691-611. discussion 694.e611.

34. **Main EK, Moore D, Farrell B et al.** Is there a useful cesarean birth measure? Assessment of the nulliparous term singleton vertex cesarean birth rate as a tool for obstetric quality improvement. *Am J Obstet Gynecol.* 2006;194:1644–51. discussion 1651–1642.
35. **Glantz JC.** Obstetric variation, intervention, and outcomes: doing more but accomplishing less. *Birth.* 2012;39:286–90.
36. Zorg rond de geboorte [Perinatal care]. In: *Zorgbalans 2014: de prestatie van de Nederlandse gezondheidszorg.* Edited by **Van den Berg MJ, de Boer D, Gijsen R, Heijink R, Limburg LCM, Zwakhals SLN.** Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu; 2014. Available at http://www.gezondheidszorgbalans.nl/Projecten/Zorg_rond_de_geboorte
37. **Eldenburg L, Waller WS.** Decision-case mix model for analyzing variation in cesarean rates. *Med Decis Making.* 2001;21:170–9.
38. **Pel M, Heres MH, Hart AA et al.** Provider-associated factors in obstetric interventions. *Eur J Obstet Gynecol Reprod Biol.* 1995;61:129–34.
39. **Wennberg J, Gittelsohn.** Small area variations in health care delivery. *Science.* 1973;182:1102–8.
40. **Wennberg JE.** Dealing with medical practice variations: a proposal for action. *Health Aff (Millwood).* 1984;3:6–32.
41. **de Jong JD, Groenewegen PP, Westert GP.** Mutual influences of general practitioners in partnerships. *Soc Sci Med.* 2003;57:1515–24.
42. **de Jong JD, Westert GP, Lagoe R, Groenewegen PP.** Variation in hospital length of stay: do physicians adapt their length of stay decisions to what is usual in the hospital where they work? *Health Serv Res.* 2006; 41:374–94.
43. **Mercuri M, Gafni A.** Medical practice variations: what the literature tells us (or does not) about what are warranted and unwarranted variations. *J Eval Clin Pract.* 2011;17:671–7.
44. **Westert GP, Groenewegen PP.** Medical practice variations: changing the theoretical approach. *Scand J Public Health.* 1999;27:173–80.
45. **Zwart JJ, Richters JM, Ory F et al.** Severe maternal morbidity during pregnancy, delivery and puerperium in the Netherlands: a nationwide population-based study of 371,000 pregnancies. *BJOG.* 2008;115:842–50.
46. **Kramer MS, Dahhou M, Vallerand D et al.** Risk factors for postpartum hemorrhage: can we explain the recent temporal increase? *J Obstet Gynaecol Can.* 2011;33:810–9.
47. **Anim-Somuah M, Smyth RM, Jones L.** Epidural versus non-epidural or no analgesia in labour. *Cochrane Database Syst Rev.* 2011;12, CD000331.
48. **Bugg GJ, Siddiqui F, Thornton JG.** Oxytocin versus no treatment or delayed treatment for slow progress in the first stage of spontaneous labour. *Cochrane Database Syst Rev.* 2013;(6): CD007123.
49. **O’Driscoll K, Stronge JM, Minogue M.** Active management of labour. *Br Med J.* 1973;3:135–7.
50. **Reuwer P, Bruinse HW, Franx A.** Proactive support of labor. *The Challenge of normal childbirth.* Cambridge: Cambridge University Press; 2009.
51. **Brody H, Sakala C.** Revisiting “The maximin strategy in modern obstetrics”. *J Clin Ethics.* 2013;24:198–206.

52. **Petersen A, Poetter U, Michelsen C, Gross MM.** *The sequence of intrapartum interventions: a descriptive approach to the cascade of interventions.* Arch Gynecol Obstet. 2013;288:245–54.
53. **Foundation Perinatal Audit in The Netherlands.** *A terme sterfte 2010–2012: perinatale audit op koers. [Term mortality 2010–2012: perinatal audit on track].* Utrecht: Foundation Perinatal Audit in The Netherlands; 2014. English summary available at <http://www.perinataleaudit.nl/>
54. **van Diem MT, De Reu P, Eskes M et al.** *National perinatal audit, a feasible initiative for the Netherlands!? A validation study.* Acta Obstet Gynecol Scand. 2010;89:1168–73.
55. **Renfrew MJ, McFadden A, Bastos MH et al.** *Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care.* Lancet. 2014;384:1129–45.



Chapter 5

Variation in intrapartum referral rates in primary midwifery care in the Netherlands

A discrete choice experiment

Pien M. Offerhaus
Wilma Otten
Jolanda C.G. Boxem-Tiemessen
Ank de Jonge
Karin M. van der Pal-de Bruin
Peer L.H. Scheepers
Toine L.M. Lagro-Janssen

Midwifery 2015;31: e69-e78

Abstract

.....

Objective

In midwife-led care models of maternity care, midwives are responsible for intrapartum referrals to the obstetrician or obstetric unit, in order to give their clients access to secondary obstetric care. This study explores the influence of risk perception, policy on routine labour management, and other midwife related factors on intrapartum referral decisions of Dutch midwives.

Design

A questionnaire was used, in which a referral decision was asked in 14 early labour scenarios (Discrete Choice Experiment or DCE). The scenarios varied in woman characteristics (BMI, gestational age, the preferred birth location, adequate support by a partner, language problems and coping) and in clinical labour characteristics (cervical dilatation, estimated head-to-cervix pressure, and descent of the head).

Setting

Primary care midwives in the Netherlands.

Participants

A systematic random selection of 243 practicing primary care midwives. The response rate was 48 per cent (117/243).

Measurements

The Impact Factor of the characteristics in the DCE was calculated using a conjoint analysis. The number of intrapartum referrals to secondary obstetric care in the 14 scenarios of the DCE was calculated as the individual referral score. Risk perception was assessed by respondents' estimates of the probability of eight birth outcomes. The associations between midwives' policy on management of physiological labour, personal characteristics, workload in the practice, number of midwives in the practice, and referral score were explored.

Findings

The estimated head-to-cervix pressure and descent of the head had the largest impact on referral decisions in the DCE. The median referral score was five (range 0 - 14). Estimates of probability on birth outcomes were predominantly overestimating actual risks. Factors significantly associated with a high referral score were: a low estimated probability of

a spontaneous vaginal birth ($p = 0.007$), adhering to the active management policy Proactive Support of Labour (PSOL) ($p = 0.047$), and a practice situated in a rural area or small city ($p = 0.016$).

Key conclusions

There is considerable variation in referral decisions among midwives that cannot be explained by woman characteristics or clinical factors in early labour. A realistic perception of the possibility of a spontaneous vaginal birth and adhering to expectant management can contribute to the prevention of unwarranted medicalisation of physiological childbirth.

Implications for practice

Awareness of variation in referrals and the associated midwife-related factors can stimulate midwives to reflect on their referral behaviour. To diminish unwarranted variation, high quality research on the optimal management of a physiological first stage of labour should be performed.

Introduction

Background

In midwife-led care models of maternity care, midwives are the primary caregiver during childbirth for healthy women with uncomplicated term pregnancies. In these models, the attending midwife is responsible for the decision to refer her client to the obstetrician or obstetric unit, in order to give her access to secondary obstetric care. If childbirth is planned at home or in a birth centre or unit without obstetric, anaesthetic and neonatal services, this referral implies also a transfer to a secondary obstetric care unit. Primary midwifery care in the Netherlands is such a model. In the Netherlands, regardless whether a home birth or a hospital birth is planned, the primary care midwife needs to refer her client to an obstetrician to give her access to augmentation by oxytocin, pharmaceutical pain relief by opioids or epidural anaesthesia, or other obstetrical interventions. A primary care midwife is not authorised for these interventions.

The number of referred clients in Dutch primary midwifery care provides information about the level of medical assistance or surveillance that midwives seek for their clients that were considered at low risk of complications at the onset of labour and therefore eligible to give birth in a non-medical setting. This information helps to reflect on the level of medicalisation of childbirth for healthy women in maternity care systems.

Variation in referral rates

Recent cohort studies from various countries and settings (1-11) and one systematic review (12) report on intrapartum referrals of women who were considered as low risk at the onset of labour. The referral rate in these studies ranged from 11 per cent in the US (2) to 38 per cent in the Netherlands (7). In all studies referrals were mainly for non-urgent reasons such as failure to progress in the first stage, and nulliparous women were referred more often.

The lowest referral rates were found in studies performed in countries where planning an out of hospital birth is an unusual or even controversial choice for women (2, 6, 11, 13). Women included in these studies are likely to have a strong preference for giving birth out the hospital, and the threshold for referral and transfer to the hospital is probably high. This might also be the case for women in rural or remote areas in developed countries who choose to give birth in a local birth centre instead of a distant hospital (8, 9).

In the UK Birth Place Study referrals to an obstetric unit were less frequent from home and freestanding midwifery units (FMU's), compared to alongside midwifery units (AMU's).

Differences in admission and transfer thresholds between these settings may contribute to this finding. There was also a wide range in referrals within comparable birth place settings. Referral rates ranged from 10 to 50 per cent in AMU's, and from zero to 36 per cent in FMU's. The authors suggest that these wide ranges may be explained by differences in thresholds for intervention in non-urgent situations such as failure to progress and meconium stained liquor (10). In primary midwifery care in the Netherlands mean referral rates are lower for planned home births compared to planned hospital births (4, 7). The planned home birth group had a more favourable socio-demographic profile in both studies, which may have contributed to this difference in mean referral rates.

Variation between primary midwifery practices in the Netherlands

Variation is also observed between primary care practices in the Netherlands. Practice quality reports, comparing midwifery practice results with national statistics based on the National Perinatal database, describe a range in intrapartum referral rates from 17 to 35 per cent in 2008 (14). This variation in referral rates can partly be attributed to differences between midwifery practices in client characteristics such as parity, maternal age, ethnicity, and preferences for home birth. However, these quality reports describe that variation is still considerable after correction for these factors. Clients in midwifery practices may also vary in other aspects that are not registered in the National Perinatal database. For example, overweight and obesity, increasingly present among pregnant women, can also contribute to the variation.

The organisational context in which midwifery practices operate may also play a role. For instance, the permanent availability of epidural anaesthesia for labouring women has recently been recommended in a national guideline and is being introduced in the Netherlands (15). The use of pharmacological pain relief during labour is increasing (16). Women who want to use epidural anaesthesia or other pharmacological pain relief during labour need to be referred to secondary obstetric care. The availability of epidural anaesthesia can vary regionally, which leads to variation in referral rates from practice to practice.

Another factor might be variation in routine management during the first stage of labour in midwifery practices. Internationally, there is no clear evidence for several aspects of routine management of the first stage of labour (17-20). In the Netherlands this has resulted in two competing policies. The first policy is the guideline of the national midwifery association KNOV. This guideline recommends expectant management, based on the WHO partogram (21, 22). The other policy, Proactive Support of Labour (PSOL),

is an adapted version of active management of labour that was first introduced by O'Driscoll in 1973 (23, 24). This policy is not an official guideline, but has been developed by some Dutch obstetricians and promoted as a complete package of care, aimed at reducing caesarean section rates (24). One element of this package of care is a strict definition of adequate progress in labour, which is cervical dilatation of one cm. per hour. Early intervention, using amniotomy and augmentation with oxytocin, is recommended as soon as cervical dilatation progresses slower than one cm. per hour. It is unknown to what extent these policies are used routinely by primary care midwifery practices.

Several studies suggest that midwives themselves also contribute to variation in intervention and referral rates. Mead and Kornbrot (2004), for instance, observed that midwives' perceptions of risk were associated with intervention rates in maternity units. In the Netherlands, Wiegers et al. (2000) showed that midwife and midwifery practice characteristics affected variation in homebirth rates. More recently, Fontein (2010) observed variation in referral rates related to the number of midwives in the practice. Jefford et al. (2010) have highlighted that most studies do not inform about the complexity of midwifery clinical decision-making during birth. A discrete choice experiment is a suitable method to gain insight into the relative contribution of clinical factors on midwives' decision-making (25).

Aim of the study

Variation in referral rates is unwarranted if it leads to overtreatment or medicalisation of physiological pregnancies and births, or, on the other hand, to undertreatment or substandard care in medium or high risk situations. Understanding variation in decision making is important for reflection and improvement of quality of intrapartum midwifery care. Also, it might improve our understanding of the continuing rise in intrapartum referral rates that has been observed in the Netherlands since the introduction of the national perinatal registry in 1988 (7, 26). Therefore, this study examines woman and labour characteristics that influence midwives' referral decisions. Secondly, the association between referral decisions and characteristics of the midwife and her practice is explored. Risk perception, the adopted policy on routine management of labour, and the organisational context of the midwifery practice are explored, as well as demographic characteristics.

Methods

Setting and participants

A survey was performed among practicing primary care midwives in the Netherlands. A systematic random selection was performed based on an alphabetical list of the 1,947 addresses of all members of the national midwifery association KNOV, practising in primary care. One out of eight addresses was selected, starting from a randomly selected address.

Design

The survey was constructed as a Discrete Choice Experiment (DCE). This technique, described as a technique to analyse preferences in health care, has also been used to assess the relative influence of various factors on physicians' and midwives' decisions in a conjoint analysis (25, 27). Among doctors, DCE decisions have been shown to be consistent with real life medical decisions (28).

A questionnaire was developed by the researchers, containing a DCE and additional questions about characteristics of the midwife and her practice. The development of the questionnaire is explained in detail in the next paragraphs. Ten primary care midwives tested the comprehensiveness before the final anonymous questionnaire was posted to 243 primary care midwives. An anonymous non-response form was added to gather a minimal set of demographic characteristics of non-responders. Three and five weeks after the first invitation to participate a reminder was sent to all addresses.

Ethical approval is not warranted in the Netherlands for this type of study.

Discrete choice experiment

The DCE presented structured scenarios (vignettes) of spontaneous early first stage of labour of low risk nulliparous women in primary care, with a term singleton pregnancy and a fetus in vertex position. In all scenarios cervical dilatation progressed 2 cm in the first four hours of labour after the initial assessment (0.5 cm/hour). At the end of each scenario, the midwife was asked to make a decision: continue her primary midwifery care, or refer to secondary obstetric care. The scenarios varied in characteristics that may influence midwives' decisions: woman characteristics (BMI, gestational age, the preferred birth location, adequate support by a partner, language problems and level of coping) as well as clinical labour characteristics assessed at the initial examination in early labour (cervical dilatation, quality of contractions assessed by head-to-cervix pressure felt during

Table 1 Overview of 14 early labour scenarios in the Discrete Choice Experiment

Scenario	Gestation in weeks	BMI	Preferred birth location	Coping	Support partner	Language problems	Dilatation (initial contact)	Descent of the head (Hodge score)*	Head to cervix pressure	Missings** (n)	Referred (%)
1	41 4/7	31	hospital	good	good	no	2-3 cm	H3	good	3	15
2	38 6/7	24	home	good	good	no	4-5 cm	H3	good	2	18
6	38 6/7	31	hospital	distress	poor	yes	4-5 cm	H3	good	3	21
7	38 6/7	24	home	distress	good	yes	2-3 cm	H1	good	5	25
13***	38 6/7	24	hospital	good	poor	yes	4-5 cm	H3	moderate	7	27
5	41 4/7	24	hospital	distress	poor	no	2-3 cm	H1	good	3	28
3	41 4/7	31	home	good	poor	yes	4-5 cm	H1	good	2	36
11	41 4/7	24	home	distress	poor	no	4-5 cm	H3	moderate	7	37
8	38 6/7	24	hospital	good	poor	yes	2-3 cm	H3	moderate	7	39
9	41 4/7	24	hospital	good	good	yes	4-5 cm	H1	moderate	7	39
12	41 4/7	31	home	distress	good	yes	2-3 cm	H3	moderate	7	45
14***	41 4/7	24	hospital	good	poor	yes	4-5 cm	H1	moderate	8	50
10	38 6/7	31	hospital	distress	good	no	4-5 cm	H1	moderate	9	55
4	38 6/7	31	home	good	poor	no	2-3 cm	H1	moderate	2	60

* Hodge 1 (H1); descent above inter-spinal line (station -3); Hodge 3 (H3); descent at inter-spinal line (station 0)

** Missing; if a respondent failed to report a referral decision, this was scored as 'no referral'

*** Holdout scenario

vaginal examination, and level of descent of the fetal head). These characteristics have been associated with prolonged labour or intervention rates (29-34). The relative impact of these nine characteristics on the referral decisions in the scenarios is the main result of the analysis of the DCE.

An orthogonal main-effect design was used to allocate the nine woman and clinical labour characteristics randomly to a minimal number of scenarios (35). This resulted in 14 different scenarios for the conjoint analyses, including two holdout scenarios that are used for validation of the DCE analysis (table 1). On the basis of the nine characteristics in this analysis, a minimum of 90 respondents was necessary to perform the DCE.

Characteristics of the midwife and midwifery practice

An advantage of a DCE is that, in contrast to real life situations, each respondent is confronted with exactly the same set of scenarios and the same woman and labour characteristics. Observed variation in referral decisions can thus be attributed to the respondents. In addition to the DCE analysis, the decision results are used to explore the impact of characteristics of the midwife and the organisational context of her practice, such as risk perception and the adopted policy for routine management of the first stage of labour.

Risk perception was assessed by the midwife's perceived probability of certain birth outcomes among nulliparous women, who are in primary midwife-led care at the onset of labour. Respondents were asked to estimate how frequent these outcomes would occur in thousand births in this low risk group of women (see textbox 1). For the birth outcomes 'duration of labour' (four categories) and 'mode of birth' (three categories), the estimates were only considered valid if the total added up to 1,000.

Other characteristics of the midwife were age, years of experience in primary midwifery care, and the midwifery academy where they graduated: Amsterdam/Groningen (AVAG); Rotterdam (VAR), Maastricht (AVM), or a midwifery academy outside the Netherlands. Midwives were asked how often they adhered to the KNOV guideline, the PSOL policy or another policy for routine management during labour on a five point Likert scale from never (=1) to always (=5).

Practice characteristics were the number of midwives in the practice and the workload per midwife in the practice. The total workload in a practice is expressed in care equivalents. A care equivalent is the administrative equivalent of the total of antenatal, intrapartum and postnatal care given to one client. The workload per midwife in the practice setting was

assessed by dividing the reported total of care equivalents by the number of midwives in the practice. The four numbers of the postal code of the practice were used to define the degree of urbanisation, based on the surrounding address density (36). Furthermore, we asked respondents to disclose the actual percentage of intrapartum referrals of nulliparous women during the first stage of labour, according to the standardised yearly report of the practice.

Textbox 1 Estimates of birth outcomes among healthy nulliparous women

Estimate how frequent the following outcomes will occur among 1000 nulliparous women with a physiological pregnancy, who are in primary midwife-led care at the onset of spontaneous term labour:

- Physiological birth** ... out of 1000 women

defined as a vertex presentation, no complications in 1st, 2nd or 3rd stage or medical interventions (pain relief, augmentation, instrumental birth or CS), no sphincter lesion, no PPH>1000ml, and an Apgar score at 5 min ≥ 7
- Length of labour**

 - < 6 hr ...out of 1000 women
 - 6-12 hr ...out of 1000 women
 - 13-24 hr ...out of 1000 women
 - > 24 hr ...out of 1000 women

total ...out of 1000 women
- Mode of birth**

 - Spontaneous vaginal birth ...out of 1000 women
 - Instrumental vaginal birth ...out of 1000 women
 - Caesarean section ...out of 1000 women

total ...out of 1000 women
- Augmentation with oxytocine** ...out of 1000 women
- Pharmacological pain relief** ...out of 1000 women
(epidural or opioids)
- Post partum haemorrhage** ...out of 1000 women
(PPH>1000ml)
- Apgar score at 5 minutes < 7** ...out of 1000 women
- Perinatal death within 7 days** ...out of 1000 women

Analysis

In the DCE, the relative impact of each factor on the referral decisions in 12 scenarios (excluding both holdout scenarios) is computed by linear regression. If a referral decision was missing in a scenario, this was considered as a no-referral decision in this analysis. The computed impact factor expresses the relative weight that a specific factor has on the referral decision, compared to the other factors in the analysis. The weights of the impact factors are standardised so that their sum is 100 by default. In the conjoint procedure the regression equation is used to predict the referral decisions in all 14 scenarios. The correlation of observed and predicted referrals decisions is tested using a Pearson correlation.

Furthermore an individual referral score was calculated for each respondent, using the total numbers of referrals in the DCE. If a respondent failed to report a referral decision more than twice, the referral score was coded as missing. The correlation between the referral score and the actual percentage of intrapartum referrals as reported by the midwife in the questionnaire was determined with Spearman's rho. This non-parametric test was used as the referral score in the DCE appeared not to be normally distributed. Missings were excluded pairwise.

Since all measures were in different formats and scales, variables were recoded into two to four categories. This made it possible to perform the same test procedure (Chi Square) for all other associations. We tested whether midwife-related and organisational factors were associated with the referral score. We were specifically interested in the association with risk perception, adopted policy and workload per midwife.

The referral score was dichotomised using the median score in low ($<$ median score) or high (\geq median score). The perceptions of birth outcomes were also dichotomised using the median scores, and so was the calculated workload per midwife. The three Likert scales on policy on labour management were used to construct one variable that represents the adopted approach towards normal physiological labour in the first stage (KNOV, PSOL or mixed/other). If the use of the KNOV policy was scored as 3-5 (regularly-always) the approach was coded as 'KNOV', and if the use of PSOL was 3-5 (regularly-always), this was coded as 'PSOL'. If both KNOV and PSOL were scored 3-5, or if 'Other protocol' was scored as 3-5 and both KNOV and PSOL were scored ≤ 2 this was coded as 'mixed/other approach'. If none of the policies was scored as 3-5, this was coded as 'missing/no routine approach'. The five degrees of urbanisation were dichotomised in strongly/moderately urbanised ($>1,500$ surrounding addresses) versus not/hardly/moderately urbanised ($<1,500$ surrounding addresses).

The risk perceptions were compared with the actual outcomes in a recent national cohort of primary care births (7, 37). If the given estimate diverged more than ten per cent from the actual outcome (from 90 to 110 per cent), it was considered an underestimation or overestimation.

Non-response analysis

We asked recipients who chose not to participate in the study to disclose a minimal set of characteristics. These were used to compare non responders with respondents by t-test (age, years of experience) or Chi square (level of urbanisation based on postal code).

Findings

Study population and generalisability

The response rate was 48 per cent (117/243). Most of the respondents worked in a primary care practice, two in a primary care birth centre and 17 as a locum midwife in more than one practice. Eight (6.8 per cent) respondents did not disclose their primary care setting. Characteristics of the study population are described in table 2. The age distribution and academy of registration of the study population did not differ from available national data on primary care midwives (38). Some characteristics were disclosed by 21 of all 126 non-responders. These midwives did not differ significantly from the study population regarding age, years of experience and urbanisation level of the practice.

The impact of woman and labour characteristics

The results of the DCE are shown in table 1. The scenarios are sorted by the percentage of referral decisions for that specific scenario. The percentage of referrals per scenario varied from 15 to 60 percent. The relative impact of the various factors in the DCE, as computed in the conjoint analysis, is shown in table 3. The observed and predicted referral decisions had a strong correspondence (Pearson's $R = 0.99$; p -value < 0.01).

Two labour characteristics appeared to have the largest impact on the decision to refer: a moderate (compared to good) estimated head-to-cervix pressure (Impact Factor 40), and a descent of the fetal head above the inter-spinal line (compared to at the inter-spinal line) at the initial contact (Impact Factor 21). Woman characteristics had a smaller impact than these two clinical labour characteristics. 'High BMI' (Impact Factor 14) was the woman characteristic with the largest impact.

Table 2 Characteristics of respondents and practice setting

Respondents	Study population (n=117)		NIVEL*
	n	%	%
Age			
<30 year	37	34.9	32.4
30-39 year	33	31.1	32.9
≥ 40 year	36	34.0	34.7
mean (SD)	36.09	(10.16)	
(11 missing)			
Primary care experience (years)	n	%	
1-4	28	26.4	
5-10	43	40.6	
>10	35	33.0	
mean (SD)	10.14	(8.39)	
(11 missing)			
Academy of registration**	n	%	%
AVAG	30	28.0	29.7
AVM	31	29.0	28.5
VAR	28	26.2	27.8
Outside the Netherlands	18	16.8	13.9
(10 missing)			
Practice setting			
Practice size (number of midwives)	n	%	
1 or 2	17	15.6	
3 or 4	45	41.3	
5 or more	47	43.1	
(8 missing)	Mean	SD	Range
	4.58	2.2	1-12
Care equivalents per year	Mean	SD	Range
(14 missing)	400.0	204.8	50-1200
Workload (care equivalents per midwife according to practice size)	Mean	SD	Range
Practice size 1 or 2	81.7	28.7	25-126
Practice size 3 or 4	86.8	21.1	46-175
Practice size 5 or more	88.2	17.7	55-150
Percentage home births	Mean	SD	Range
(48 missings)	51.01	22.52	0-93
Percentage referrals (1st stage nulliparous)	Mean	SD	Range
(53 missing)	46.68	12.20	18-70
Routine labour management***	n	%	
KNOV	55	57.9%	
PSOL	17	17.9%	
Mixed/other	23	24.2%	
(12 missing)			
Degree of urbanisation	n	%	
Strongly/extremely urbanised	60	55.6	
Not/hardly/ moderately urbanised	48	44.4	
(9 missing)			

* Percentages based on NIVEL national midwives survey 2009

** AVAG: Academy for Midwifery Amsterdam Groningen; AVM: Academy for Midwifery Maastricht; VAR: Midwifery Academy Rotterdam

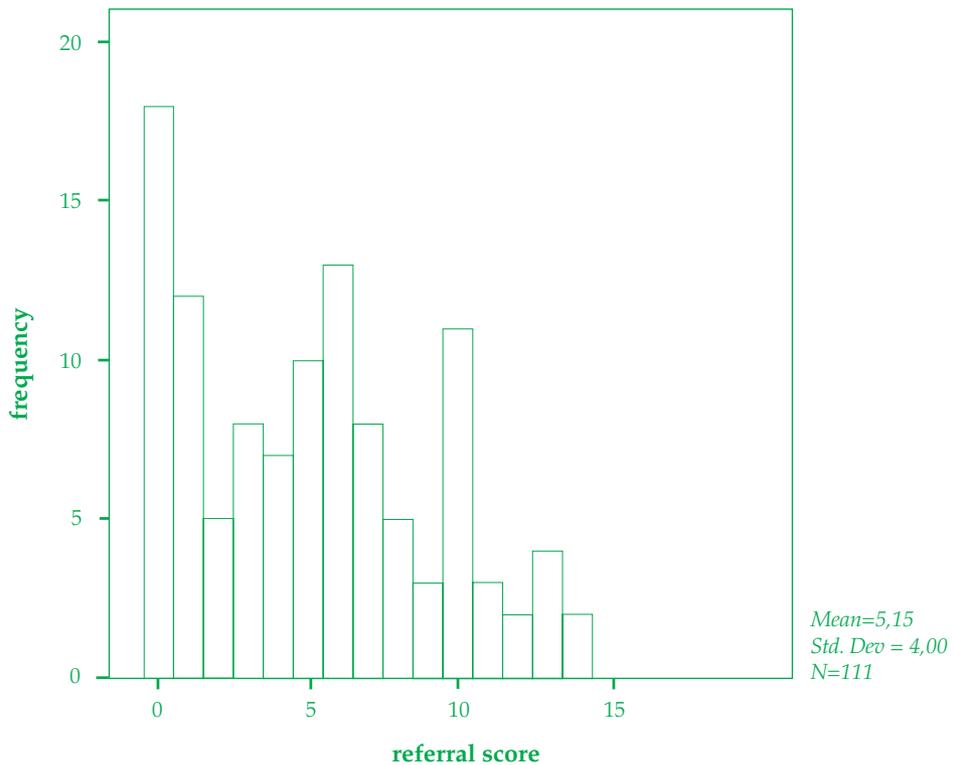
*** KNOV: Royal Dutch Organisation of Midwives; PSOL: Proactive Support Of Labour

Table 3 Impact factors of woman and labour characteristics in the DCE

Characteristic	Impact factor*
Head to cervix pressure	40
Descent of the fetal head	21
BMI	14
Support partner	8
Preferred birth location	7
Gestation in weeks	5
Dilatation (initial contact)	2
Language problems	2
Coping	1

* Sum of impact factor =100 by default

Figure 1 Referral scores in 14 scenarios describing the first stage of nulliparous labour



Variation in referral decisions

The respondents' individual referral scores in the fourteen scenarios varied from zero to fourteen. The median referral score was five (mean 5.15; SD 4.00). As all respondents assessed the same case mix in the scenarios of the DCE, woman and labour characteristics cannot explain this variation. The distribution of the referral score was skewed to the left (figure 1). This cannot be attributed to failure to report a referral decision. Six responders were excluded from this analysis, as they failed to report a decision more than twice. Twelve times failure to report a decision was scored as no referral.

The actual percentage of intrapartum referrals of nulliparous women in the midwifery practice was reported by 64 of the 117 respondents (table 2). Among them, this actual percentage was related to the individual referral score in the fourteen scenarios (Spearman's rho 0.299, p-value 0.016).

Risk perceptions

Risk perception is one of the midwife related factors of interest that may contribute to the observed variation in the referral score. Respondents estimated how frequent certain birth outcomes would occur in thousand births in nulliparous women in primary midwife-led care. The lowest, highest, median estimates and the mean of the estimates for all birth outcomes are presented in table 4. All estimations showed a considerable variation.

Table 4 Risk perception: midwives' estimates of birth outcomes in 1000 healthy nulliparous women

	Estimates per 1000 births				Actual outcomes per 1000 births*	Adequacy of estimates (% of respondents)		
	Median	Min	Max	Mean		Under-estimate	Realistic**	Over-estimate
Physiological birth***	450	100	850	452.7	493	49	26	25
Spontaneous vaginal birth	650	250	850	641.7	763	57	36	7
1st stage >12 hr	350	100	840	371.4	274	16	24	59
Augmentation	250	30	600	258.5	316	61	14	26
Medical pain relief	300	50	750	291.2	259	38	9	54
PPH>1000 ml	50	5	300	80.6	55	23	31	46
Apgar score < 7 (5 min.)	40	0	200	45.2	8.6	9	16	75
Perinatal mortality <7 days	2	0	50	5.9	0.9	10	28	63

*Source: AS<7, perinatal mortality: Offerhaus et al, 2013a ; maternal outcomes: Offerhaus et al, 2013b (data 2008)

**Within 90%-110% range

*** Defined as: no complications in 1st, 2nd or 3rd stage, no PPH>1000cc, no sphincter lesion, Apgar score 5 min \geq 7

The estimates were compared with the actual numbers in a national primary midwifery care cohort. The mean of the respondents' estimates resembled the actual numbers. Perinatal death and a low Apgar score were estimated as rare, and the most common outcome 'spontaneous vaginal birth' was rated as such. However, most estimates were out of the realistic range. The outcomes with the largest proportion of realistic estimates were 'spontaneous vaginal birth' (36 per cent realistic estimates), postpartum hemorrhage (PPH) (31 per cent) and perinatal mortality (28 per cent).

The probability of the healthy birth outcome 'spontaneous vaginal birth' was underestimated by most respondents, whereas most unfavourable outcomes or interventions were overestimated. For instance 63 per cent overestimated the risk of perinatal mortality, and 75 per cent overestimated the risk of a low Apgar score. Augmentation was an exception in this pattern. This intervention was underestimated by 61 per cent of the respondents. The outcome for pain relief was mixed: most respondents (54 per cent) overestimated this probability, but at the same time a relatively large proportion (38 per cent) underestimated the probability of this intervention.

Factors association with referral scores

Risk perception and all other midwife and midwifery practice related factors were tested on their association with the referral score (table 5). Only one of the risk estimates showed a significant association: a lower than median estimated probability of spontaneous vaginal birth was significantly associated with a high referral score (X^2 , $p = 0.007$). This result suggests that midwives who expected a larger proportion of instrumental deliveries referred more frequently than those who reported a high estimated probability of a spontaneous vaginal birth. All other risk estimates were not significantly associated with the referral score.

The policy adhered to was not significantly associated with a high referral score, although a large fraction of the small PSOL group had high referral scores. When the KNOV group was combined with the mixed/other group in the analysis, the association between adhering to PSOL and a high referral score was borderline significant ($p = 0.047$). Workload, expressed as care equivalent per midwife in the practice, was not associated with the referral score.

Among the other factors, only urbanisation showed a significant association, with higher referral scores for midwives practicing in less urbanised areas ($p = 0.016$). This suggests that midwives practicing in rural areas or small cities referred more often than midwives in larger cities.

Table 5 Associations with referral score

Estimates of outcomes in 1000 nulliparous births		n=117	n (%) high referral score#	X ² p-value
Physiological birth	≤ 450	61	35/58 (60%)	0.232
	> 450	56	26/53 (49%)	
Spontaneous vaginal birth	≤ 650	65	40/60 (67%)	0.007
	>650	52	21/51 (41%)	
1st stage >12 hr	<350	49	26/45 (58%)	0.571
	≥ 350	67	34/65 (52%)	
Augmentation	<250	57	32/54 (59%)	0.375
	≥ 250	60	29/57 (51%)	
Medical pain relief	<300	54	32/52 (62%)	0.191
	≥ 300	63	29/59 (49%)	
PPH >1000 ml	<50	27	14/26 (54%)	0.897
	≥ 50	90	47/85 (55%)	
Apgar score <7	<40	55	32/52 (62%)	0.191
	≥ 40	62	29/59 (49%)	
Perinatal mortality <7 days	<2	44	22/41 (54%)	0.821
	≥ 2	71	38/68 (56%)	
Policy on routine labour management*	KNOV/other	55	27 (49%)	0.135
	PSOL	17	13 (77%)	
	Adapted KNOV/other	23	12 (52%)	
	Policy (dichotomous)			
	KNOV/other	78	39 (50%)	0.047
	PSOL	17	13 (77%)	
Workload per midwife	Low (≤ 83)	49	29 (59%)	0.455
	High (>83)	54	28 (52%)	
Other characteristics				
Age	< 30	37	15 (41%)	0.081
	30-39	33	18 (55%)	
	≥ 40	36	24 (67%)	
Years of experience	1-Apr	28	12 (43%)	0.325
	5-Oct	43	26 (60%)	
	>10	35	20 (57%)	
Academy of registration**	AVAG	30	13 (43%)	0.561
	AVM	31	18 (58%)	
	VAR	28	16 (57%)	
	Not in the Netherlands	18	11 (61%)	
Number of midwives in practice	1 or 2	17	6 (35%)	0.214
	3 or 4	45	27 (60%)	
	≥ 5	47	26 (55%)	
Degree of urbanisation	Strongly/extremely	60	26 (43%)	0.016
	Not/hardly/ moderately	48	32 (67%)	

*KNOV : Royal Dutch Organisation of Midwives; PSOL: Proactive Support Of Labour

** AVAG: Academy for Midwifery Amsterdam Groningen; AVM: Academy for Midwifery Maastricht; VAR: Midwifery Academy Rotterdam

#all percentages are computed on valid numbers

Discussion

Key findings

Clinical factors, especially the head-to-cervix pressure and descent of the head as determined at the initial examination, had a stronger impact on referral decisions of midwives than woman characteristics, in written scenarios describing healthy, low risk nulliparous women in early labour. However, a wide variation in referral scores was also observed. Midwife characteristics and organisational factors contributed to this variation. A high risk perception, expressed as an estimated low probability of a spontaneous vaginal birth, was associated with a high referral score. An adopted active management policy for the first stage of labour was related to a high referral score too.

Exploring variation in referral decisions

According to the 'practice style theory' of Wennberg, the largest practice variation can be expected in situations where there is uncertainty on the optimal management, because there is insufficient scientific evidence or professional consensus on diagnosis and treatment (39). The first stage of labour is such a 'grey area'. The level of variation found in our study and the association with midwife related factors fits well in this theory.

Expectation and beliefs are important factors in explaining behaviour, according to various behavioural theories, such as the Theory of Planned Behaviour (40). Therefore risk perception is an interesting topic in relation to midwifery decision making. In the present study, midwives with a low expectation of a spontaneous vaginal birth appeared to have a low threshold for referral in case of slow labour in the first stage. This does not mean that 'risk perception' per se is an explaining factor, as risk estimates for other outcomes were not associated with the referral score. Several of the other presented birth outcomes are not related to slow progress in the early first stage of labour and that might explain the lack of impact on the referral decisions. Recent research exploring aspects of risk perception or risk propensity also failed to demonstrate a relationship with referral decisions (41, 42). On the basis of a qualitative study Page and Mander (2014) suggest that 'intrapartum uncertainty' might be a stronger concept in explaining midwives' variations in decision making in low risk births. The authors describe that intrapartum uncertainty occurs when labour starts to deviate from 'normal'. In the grey area, where there is no clear pathology but labour does not follow the expected physiological course, the midwife's 'tolerance to uncertainty' might shape her decisions. This precisely describes the major difference between the two policies on management of labour - KNOV and PSOL - available for Dutch midwives. The KNOV policy allows broader boundaries of a normal, physiological progress in the early first stage

of labour. The PSOL policy, being a variant of active management of labour, manages uncertainty by defining smaller boundaries of normal progress. In the present study this led to a higher referral score for midwives who adhered to the PSOL policy.

A lower level of urbanisation was also related to a higher referral score. This is consistent with an earlier study on homebirth rates (43), in which referral rates were slightly higher in rural areas. Possibly, midwives in rural areas take into account the longer travel distance to the nearest-by hospital in their referral decisions.

The practice related data showed a large variation in number of midwives per practice and also in workload measured as care equivalents per midwife. Neither of these factors was associated significantly with the referral score. Although this exploratory study was adequately powered to perform the DCE, it may have been too small to measure these associations. It is still conceivable that such factors have impact on referral rates, as suggested by Fontein (44). Also, midwifery practices vary widely in other aspects, such as the organisation of on call hours, the level of continuity of care provided, working hours of the midwife, and perceived workload (45). In future research on the impact of practice size or workload on referral decisions, all these organisational aspects should be taken into account.

Overestimating risks and interventions

Respondents had a tendency towards overestimating risks and interventions. Mead and Kornbrot (2004) showed a comparable overestimation of risks in their research, especially among midwives who worked in settings with high intervention rates. As Dutch primary care midwives work in a low intervention setting, it is unlikely that overestimating risks can be attributed to their practice setting. For perinatal risks, the difficulty of estimating rare events is a likely explanation. However, it is also possible that a recent overexposure to discussions on perinatal risks in the Netherlands, both in the media and in scientific literature, contributes to an overestimation of these and other risks (46, 47).

The low estimated probability of augmentation is an exception in our results. This might be explained by the typical Dutch maternity care setting. After referral for slow progress in early labour, a midwife expects augmentation to be started. However, augmentation can also be additional treatment after referrals for other reasons, such as a request for pain relief. As the primary care midwife is no longer responsible for the care given after her referral, this might lead to less awareness of the actual probability of interventions that are started afterwards.

It is important that midwives are aware of the actual probabilities of birth outcomes among their clients. They need to inform their clients adequately about chances on a physiological uneventful birth. Moreover, risk perceptions or beliefs about the course of labour influence midwives' decisions. However, statistics of low risk or midwifery-led birth settings are not always easy available internationally nor in the Netherlands. It is therefore important that midwives are involved in research and the setting of research agendas, leading to a growing body of knowledge on physiological childbirth and on the care for healthy pregnant women with low risk of complications.

Strength and limitations

Assessing a scenario in a questionnaire is quite different from the real life experience of attending women in early labour. However, the reported real life referral rates of midwives' own practice were significantly associated with the referral scores in the DCE. This suggests that performing a DCE can be a valuable instrument for assessing variation in referral decisions. This small study with 117 respondents made it possible to explore the impact of various factors contributing to this variation. For more robust results, including multivariable analyses, a larger study is required.

Implications

Variation in referral decisions is an important issue, not just in the Netherlands. In England too, large variations in referral rates were found between midwifery units (10). An intrapartum referral affects the birthing experience of women and their partners (4, 48, 49). Furthermore, the rising trend in intrapartum referrals (7, 26) is a challenge for the way maternity care is organised in the Netherlands. This also suggests an ongoing process of medicalisation of childbirth in the Netherlands (16). Midwives can play an important role in providing non-medicalised and high quality maternity care (50). Awareness of existing variation in decisions during birth can stimulate midwives to reflect on the way they perform this role. Better implementation of interventions that help women to cope with labour, such as continuous support (51) and the use of birthing pools (52, 53) can help them to keep referral and intervention rates low, with equally good or even better outcomes for mother and child. A realistic expectation of the high probability of a spontaneous vaginal birth and implementation of expectant labour management can help too.

The most important solution to diminish unwarranted variation in referral rates however can be found in providing better evidence on optimal management in normal, physiological labour. In a recent retrospective cohort study the introduction of PSOL in a

teaching hospital did not lower the caesarean section rate, one of the main goals of this policy (54). High quality research to investigate the effectiveness and cost-effectiveness of active management compared to expectant management of the first stage of labour would provide stronger evidence. As medicalisation of physiological childbirth is not only a concern in the Netherlands but globally, such a study is of international importance.

Conclusion

.....

There is considerable variation in referral decisions among midwives that cannot be explained by woman characteristics or clinical factors in early labour. Midwives should reflect on their own referral behaviour in the first stage of labour. A realistic perception of the possibility of a spontaneous vaginal birth and adhering to expectant management can contribute to the prevention of unwarranted medicalisation of childbirth.

References

1. **Amelink-Verburg MP, Verloove-Vanhorick SP, Hakkenberg RMA, et al.** Evaluation of 280,000 cases in Dutch midwifery practices: a descriptive study. *Br J Obstet Gynaecol* 2008;115(5):570-578.
2. **Cheyney M, Boobjerg M, Everson C, et al.** Development and validation of a national data registry for midwife-led births: the midwives alliance of North America statistics project 2.0 dataset. *J Midwifery Womens Health* 2014;59(1):8-16.
3. **Gaudineau A, Sauleau EA, Nisand I, et al.** Obstetric and neonatal outcomes in a home-like birth centre: a case-control study. *Arch Gynecol Obstet* 2013;287(2):211-216.
4. **Geerts C, Klomp T, Lagro-Janssen A, et al.** Birth setting, transfer and maternal sense of control: results from the DELIVER study. *BMC Pregnancy and Childbirth* 2014;14(1):27.
5. **Hutton EK, Reitsma AH, Kaufman K.** Outcomes associated with planned home and planned hospital births in low-risk women attended by midwives in Ontario, Canada, 2003-2006: a retrospective cohort study. *Birth* 2009;36(3):180-189.
6. **Lindgren HE, Hildingsson IM, Christensson K, et al.** Transfers in planned home births related to midwife availability and continuity: a nationwide population-based study. *Birth* 2008;35(1):9-15.
7. **Offerhaus PM, Hukkelhoven CWPM, de Jonge A, et al.** Persisting Rise in Referrals During Labour in Primary Midwife-led Care in The Netherlands. *Birth* 2013;40(3):192-201.
8. **Overgaard C, Moller AM, Fenger-Gron M, et al.** Freestanding midwifery unit versus obstetric unit: a matched cohort study of outcomes in low-risk women. *BMJ Open* 2011;1(2):e000262.
9. **Patterson JA, Foureur M, Skinner JP.** Patterns of transfer in labour and birth in rural New Zealand. *Rural Remote Health* 2011;11(2):1710.
10. **Rowe RE, Fitzpatrick R, Hollowell J, et al.** Transfers of women planning birth in midwifery units: data from the Birthplace prospective cohort study. *Br J Obstet Gynaecol* 2012;119(9):1081-1090.
11. **Stapleton SR, Osborne C, Illuzzi J.** Outcomes of care in birth centers: demonstration of a durable model. *J Midwifery Womens Health* 2013;58(1):3-14.
12. **Walsh D, Downe SM.** Outcomes of free-standing, midwife-led birth centers: a structured review. *Birth* 2004;31(3):222-229.
13. **Johnson KC, Daviss BA.** Outcomes of planned home births with certified professional midwives: large prospective study in North America. *BMJ* 2005;330(7505):1416.
14. **The Netherlands Perinatal Registry.** [Feedback report primary care 2006-2009]. *Rapportage VOKS 1e lijn 2006-2009*. Utrecht: Stichting PRN, 2011.
15. **CBO.** [Guideline pharmacological pain relief during labour]. Utrecht: 2008.
16. **Christiaens W, Nieuwenhuijze MJ, de Vries R.** Trends in the medicalisation of childbirth in Flanders and the Netherlands. *Midwifery* 2013;29(1):e1-8.
17. **Brown HC, Paranjothy S, Dowswell T, et al.** Package of care for active management in labour for reducing caesarean section rates in low-risk women. *Cochrane Database of Syst Rev* 2013, Issue 9No:CD004907 2013.

18. **Bugg GJ, Siddiqui F, Thornton JG.** Oxytocin versus no treatment or delayed treatment for slow progress in the first stage of spontaneous labour. *Cochrane Database of Syst Rev* 2011, Issue 7No:CD007123 2011.
19. **Smyth RM, Markham C, Dowswell T.** Amniotomy for shortening spontaneous labour. *Cochrane Database of Syst Rev* 2013, Issue 6 No:CD006167 2013.
20. **Wei S, Wo BL, Qi HP, et al.** Early amniotomy and early oxytocin for prevention of, or therapy for, delay in first stage spontaneous labour compared with routine care. *Cochrane Database of Syst Rev* 2013, Issue 8 No:CD006794 2013.
21. **Offerhaus P, De Boer JB, Daemers DO.** [KNOV guideline Slow first stage of labour. Recommendations for guidance, support and prevention]. KNOV-standaard Niet-vorderende ontsluiting. Aanbevelingen voor verloskundig beleid, begeleiding en preventie. Bilthoven: 2006.
22. **WHO.** Appropriate technology for birth. *The Lancet* 1985;326(8452):436-437.
23. **O'Driscoll K, Stronge JM, Minogue M.** Active management of labour. *Br Med J* 1973;3(5872):135-137.
24. **Reuver P, Bruinse HW, Franx A.** Proactive support of labor. *The Challenge of normal childbirth.* Cambridge University Press: 2009.
25. **Vellekoop J, Vrouwenraets FP, van der Steeg JW, et al.** Indications and results of labour induction in nulliparous women: an interview among obstetricians, residents and clinical midwives. *Eur J Obstet Gynecol Reprod Biol* 2009;146(2):156-159.
26. **Amelink-Verburg MP, M.E.B. R, Buitendijk S.** A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988-2004. *Br J Obstet Gynaecol* 2009;116:923-932.
27. **Ryan M, Farrar S.** Using conjoint analysis to elicit preferences for health care. *BMJ* 2000;320(7248):1530-1533.
28. **Mark TL, Swait J.** Using stated preference and revealed preference modeling to evaluate prescribing decisions. *Health Econ* 2004;13(6):563-573.
29. **Cedergren MI.** Non-elective caesarean delivery due to ineffective uterine contractility or due to obstructed labour in relation to maternal body mass index. *Eur J Obstet Gynecol Reprod Biol* 2009;145(2):163-166.
30. **Hodnett ED, Gates S, Hofmeyr GJ, et al.** Continuous support for women during childbirth. *Cochrane Database of Syst Rev* 2007, Issue 3 No:CD003766.
31. **Kjaergaard H, Olsen J, Ottesen B, et al.** Obstetric risk indicators for labour dystocia in nulliparous women: a multi-centre cohort study. *BMC Pregnancy Childbirth* 2008;8:45.
32. **Robertson E, Malmstrom M, Johansson SE.** Do foreign-born women in Sweden have an increased risk of non-normal childbirth? *Acta Obstet Gynecol Scand* 2005;84(9):825-832.
33. **van der Hulst LAM, van Teijlingen ER, Bonsel GJ, et al.** Does a pregnant woman's intended place of birth influence her attitudes toward and occurrence of obstetric interventions? *Birth* 2004;31(1):28-33.
34. **Wuitchik M, Bakal D, Lipshitz J.** The clinical significance of pain and cognitive activity in latent labor. *Obstet Gynecol* 1989;73(1):35-42.
35. **Addelman S.** Orthogonal main-effect plans for asymmetrical factorial experiments. *Technometrics* 1962;4(1):21-46.

36. **CBS Statistics Netherlands**. [Degree of urbanisation]. Den Haag/Heerlen: 2009. <http://www.cbs.nl/en-GB/menu/methoden/begrippen/default.htm?Languageswitch=on&ConceptID=658>.
37. **Offerhaus PM, de Jonge A, van der Pal-de Bruin KM, et al**. Change in primary midwife-led care in the Netherlands in 2000-2008: a descriptive study of caesarean sections and other interventions among 789,795 low risk births. *Midwifery* 2014;30(5):560-566.
38. **Hingstman L, Kenens RJ**. [Figures from the midwifery registration]. *Cijfers uit de registratie van verloskundigen*. Utrecht: 2009.
39. **Wennberg JE**. Dealing with medical practice variations: a proposal for action. *Health Aff(Millwood)* 1984;3(2):6-32.
40. **Ajzen I, Madden TJ**. Prediction of goal-directed behavior: attitudes, intentions, and perceived behavioral control. *J of Exp Soc Psychol* 1986;22(5):453-474.
41. **Cheyne H, Dalglish L, Tucker J, et al**. Risk assessment and decision making about in-labour transfer from rural maternity care: a social judgment and signal detection analysis. *BMC Med Inform Decis Mak* 2012;12:122.
42. **Styles M, Cheyne H, O'Carroll R, et al**. The Scottish Trial of Refer or Keep (the STORK study): midwives' intrapartum decision making. *Midwifery* 2011;27(1):104-111.
43. **Anthony S, Buitendijk SE, Offerhaus PM, et al**. Maternal factors and the probability of a planned home birth. *Br J Obstet Gynaecol* 2005;112(6):748-753.
44. **Fontein Y**. The comparison of birth outcomes and birth experiences of low-risk women in different sized midwifery practices in the Netherlands. *Women Birth* 2010;23(3):103-110.
45. **Wiegiers TA, Warmelink JC, Spelten ER, et al**. Work and workload of Dutch primary care midwives in 2010. *Midwifery* 2013.
46. **de Vries R, Buitendijk S**. Science, safety and place of birth - lessons from the Netherlands. *Eur Obstet Gyn* 2012(7(Suppl. 1)):13-17.
47. **de Vries R, Nieuwenhuijze M, Buitendijk SE**. What does it take to have a strong and independent profession of midwifery? Lessons from the Netherlands. *Midwifery* 2013;29(10):1122-1128.
48. **Rijnders M, Baston H, Schonbeck Y, et al**. Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands. *Birth* 2008;35(2):107-116.
49. **Wiegiers TA**. The quality of maternity care services as experienced by women in the Netherlands. *BMC Pregnancy Childbirth* 2009;9:18.
50. **Renfrew MJ, McFadden A, Bastos MH, et al**. Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. *Lancet* 2014;384(9948):1129-1145.
51. **Hodnett ED, Gates S, Hofmeyr GJ, et al**. Continuous support for women during childbirth. *Cochrane Database of Syst Rev* 2012, Issue 10 No:CD003766 2012.
52. **Cluett ER, Burns E**. Immersion in water in labour and birth. *Cochrane Database of Syst Rev* 2009(2):CD000111.

53. **Lukasse M, Rowe R, Townend J, et al.** *Immersion in water for pain relief and the risk of intrapartum transfer among low risk nulliparous women: secondary analysis of the Birthplace national prospective cohort study.* *BMC Pregnancy Childbirth* 2014;14:60.
54. **Kuppens SM, Hutton EK, Hasaart TH, et al.** *Mode of delivery following successful external cephalic version: comparison with spontaneous cephalic presentations at delivery.* *J Obstet Gynaecol Can* 2013;35(10):883-888.



Chapter 6

Midwives and variation in referral decisions during labour

A focus group study in the Netherlands

Pien M. Offerhaus
Dineke Korfker
Ank de Jonge
Karin M. van der Pal-de Bruin
Peer L.H. Scheepers
Toine L.M. Lagro-Janssen

Submitted

Abstract

.....

Background

Midwifery care practices vary in intrapartum referral rates, partly attributable to differences in referral decisions of the midwives involved. In this study, we want to gain insight into factors that play a role in midwives' decision-making.

Methods

Data were collected in two internet based online focus groups among twenty primary care midwives. A predefined topic list was used to guide the discussion. A thematic analysis was performed.

Results

The main theme was 'defining the boundaries of physiological birth'. Two contrasting attitudes are described within this theme. Midwives who 'emphasize physiology' focused on expectant management and tailor made decisions. 'Operating on the safe side' was characterised by early anticipation on risks and adherence to protocols. Two subthemes - 'the collaboration with the hospital' and 'client involvement' - were strongly related to these attitudes. Some midwives who 'emphasize physiology' experienced tensions in the collaboration with obstetricians. Midwives who operate 'on the safe side' seemed less open for client involvement.

Conclusions

Midwives varied in attitudes towards defining the boundaries of physiological birth. In their decisions they tended to 'emphasize physiology', adhering to expectant management, or on the other hand 'operate on the safe side', anticipating risks and labour problems. The increased focus on risks may lead to higher intrapartum referral rates, resulting in more interventions in physiological births. A stronger focus on physiological birth and better client involvement can enhance quality in Dutch maternity care and reduce variation in referral rates. Into achieve this, good interprofessional collaboration between midwives and obstetricians is required.

Background

In the Netherlands, primary care midwives are autonomous professionals, organized in small independent practices in the community. They provide intrapartum care for healthy women with uncomplicated, term pregnancies. As long as labour develops normally, the midwife is the lead caregiver. Primary care midwives in the Netherlands are not entitled to use continuous fetal monitoring, augmentation of labour, pharmacological pain relief, nor do they perform instrumental deliveries. To give their clients access to such interventions during labour, primary care midwives have to refer their clients to secondary obstetric care. Responsibility for the care is transferred to the hospital staff, usually hospital based midwives and residents under supervision of an obstetrician. The primary care midwife can continue her support or decide to leave, depending on the situation or preference of her client.

Referral decisions are based on the Dutch list of obstetric indications, the VIL (Verloskundige indicatie Lijst) (1, 2). The VIL has been developed based on consensus between midwives, obstetricians, pediatricians and general practitioners and gives national recommendations for the adequate level of care and referrals from primary to secondary care and vice versa. However, there is considerable variation between midwifery practices in intrapartum referral rates (3, 4). Several studies suggest that midwives themselves or midwife related factors contribute to this variation (4-6). Variation in midwifery decisions is also observed in other countries (7-10).

Most intrapartum referrals are without imminent emergency, in various countries and settings (11). In the Netherlands, approximately 90% of all intrapartum referrals are for non-urgent reasons such as lack of progress in the first stage or a request for pain relief (12, 13). More than 60 per cent of these women will still have a spontaneous vaginal birth after intrapartum referral (14).

Nevertheless, referral is an important intervention in the course of labour and affects the birth experience of women (15-17). Intrapartum referral is associated with loss of continuity of care and less sense of control for labouring women (18, 19). Referral might also reduce the chance of a spontaneous vaginal birth for women in primary midwifery care (20).

Variation in referrals is unwarranted if it leads to undertreatment or substandard care or, on the other hand, to overtreatment. Overtreatment and medicalisation of physiological birth is observed in many high income countries, contributing to high rates of medical interventions and even caesarean sections (21-23). Medicalisation is also on the increase in the Netherlands (24).

The observed variation in referrals is therefore of concern. More insight into midwives' decision-making on intrapartum referrals might also improve our understanding of the continuing rise in intrapartum referral rates (25).

This study aims to contribute to this insight. The research question is: *'In what ways do Dutch midwives themselves explain and perceive variation in referral decisions; and which factors play a role in their decision-making?'*

Methods

Data were collected in two online focus groups, moderated by one of the researchers (DK). Participants for each focus group were recruited by convenience sampling among the 1947 members of the Royal Dutch Organisation of Midwives (KNOV) practicing in primary care. An email newsletter was sent to all members of the KNOV. In this email letter the purpose of the study was explained as well as the procedure and the date of the online focus group. Participation was anonymous and participants were free to withdraw from the focus group at any moment. Only midwives practicing in primary care in the Netherlands were eligible, with a maximum of fifteen per group. This maximum was not reached.

At enrollment, participants filled in a short questionnaire. Some demographic characteristics and the location of registration was asked, since these can be relevant factors in variation between professionals (26). The questionnaire also contained questions about the percentage of home births and nulliparous intrapartum referral rate in their practice, based on the annual practice report 2009 provided by the Netherlands Perinatal Registry (PRN-foundation) (27). All participants received a personal code for the focus group session. Participants logged in to the sessions asynchronously, at a time that was convenient for them (28). They used a self-chosen nickname to identify themselves in the group sessions.

Each focus group was online for five days. The first day, the mediator introduced the topic, and started with the main question *"Why do you think that there is so much variation in referral rates in the Netherlands?"* The following days the moderator opened each day with a new question, elaborating on the interaction in the group. For this purpose a predefined list of topics was used related to the research question: decision-making by protocol or otherwise; fear / risk perception; collaboration with the hospital; reflection on own referral rates.

Ethical approval was not needed in the Netherlands for this study, since it does not involve patients and does not affect the participants' physical or psychological integrity.

Analyses were performed by thematic analyses (29). After reading the texts, an extensive coding scheme was developed separately by two researchers (DK and PO), using open coding. After that, consensus was reached between both researchers on the coding scheme. Codes were assigned to the text, using Atlas-TI version 6.0. After rereading the coded texts, codes were combined into preliminary themes. In the final analysis these themes were addressed to the individual participants, based on their contributions to the focus group, and the final description of the themes was made.

Results

Twenty midwives participated, divided in two focus groups of eight and twelve. Characteristics of the participants are displayed in table 1. Their median age was 33 years, and the median working experience as a midwife was seven years. One midwife was male. Eight participants graduated outside the Netherlands. The intrapartum referral rates of nulliparous women in the participants' practices ranged from 29 to 61 percent; in the same year the national mean was 46 per cent (27). In total the participants posted 167 contributions, ranging from 3 to 16 per participant over a period of 5 days.

<i>Table 1</i>	<i>Characteristics 20 participants</i>					
Gender	male: 1	female: 19				
Age (years)	median: 33	range 25-49				
Experience (years)	median: 7	range 1-21				
Academy of graduation*	AVAG: 4	AVM: 5	VAR: 2	Belgium: 6	Other: 2	missing:1
Percentage home births**	median: 67	range 33-92				missing:2
Intrapartum referral rate***	median: 43	range 29-61				missing:2

*AVAG: Midwifery Academy Amsterdam/Groningen; VAR: Midwifery Academy Rotterdam; AVM: Midwifery Academy Maastricht

**among births completed in primary care. Annual practice report 2009

***among nulliparous births, started in primary care. Annual practice report 2009

Three themes were identified in both focus groups. The main theme was 'defining the boundaries of physiological birth'. Within this theme two attitudes could be described: 'emphasizing physiology' and 'operating on the safe side'. Participants were assigned to the attitude that fitted best to them, based on their quotes. Two other themes - 'the collaboration with the hospital' and 'client involvement' - appeared to be strongly related to this attitude. We considered them as subthemes and present them in relation to the attitude.

Defining the boundaries of physiological birth

Differences in decision-making became clear by the way the participants talked about defining the boundaries of physiological birth. Midwives tended to 'emphasize physiology' or on the other hand to 'operate on the safe side'.

'Emphasize physiology'

Eight participants saw a broad grey area between physiological and pathological birth. Births in this grey area are complicated by mild pathology or a risk factor for pathology that needs attention, without being clearly pathological. They pointed out that in these situations usually strong evidence for interventions is missing. Therefore, they consider whether they can offer primary midwifery care to their client safely in these situations. They search for an optimal birth experience for their clients, and try to create optimal opportunities for physiological birth for each individual woman.

(Midwife) M6, Exp (Experience) 7yr, Ref (Referral rate) 36%: For me, it was an eye-opener not to interpret a stagnation or pause in the contractions as pathology too easily, and to impose no limits on labour, except the limits of the woman herself. Mind you, that does not mean that I think that pathology doesn't exist, but it means that every woman is unique and has her own way of giving birth.

They are convinced that this way of working in primary midwifery care is safe and even enhances quality of care by preventing interventions:

M14, Exp 21yr, Ref 41%: In a situation with mild pathology, wait and see is by far not the same as putting a life in jeopardy, if you ask me. [...] You might just as well think that you put two lives at stake, if you refer too easily to secondary care, considering the increased risk of unnecessary interventions.

These participants stated that there is too much fear in today's maternity care and too much focus on risks. They themselves rather focus on what can be achieved in primary

midwifery care with expectant management and a supportive relationship with their clients. They saw an increasing emphasis on risks as an important explanation for high referral rates in midwifery practices. .

M6, Exp 7yr, Ref 36%: *In my opinion we [midwives] need to blame ourselves a 100% for high referral rates. Fear for hassle with obstetricians, fear for complaints, fear for childbirth in general. [...] Obstetricians may have had the lead in creating the idea of pregnancy and childbirth as a risky activity, but midwives have been running behind them full-heartedly.*

Collaboration with the hospital

'Emphasizing physiology' seemed to create tensions in the collaboration with some hospitals. This was mentioned in both focus groups. Not all participants with this attitude felt respected or supported by the hospital staff. One of them explained how this can urge her towards consultation and earlier (or more) intrapartum referral in the hospital where she feels unsafe.

M8, Exp 12yr, Ref 35%: *I often have the idea that obstetricians think it is terrifying and irresponsible what we are doing. They just tolerate us, or at least, I often feel that way. [...] We work in our region with two different hospitals, in one hospital the obstetricians are easily accessible and there is a lot of confidence [...]. When we have a normal birth in [the other] hospital, they - so to speak - are waiting around the corner to intervene. In that hospital I tend to refer much quicker, as a midwife I feel tense, and 'being watched'.*

A good collaboration helps them to continue their primary midwifery care more often, which they see as beneficial for their clients. They explained how they sometimes discussed with the obstetrician about continuation of their primary midwifery care for individual women, in situations that normally would be a reason for referral. One participant described that in her region this is arranged structurally, resulting in low intrapartum referral rates for her practice. For instance, she consults the obstetrician when meconium stained liquor is present. If no other problems are present she continues her care in the hospital, whereas in most hospitals a referral would be required. Several participants, also among those who 'operate on the safe side', stated that they would prefer to collaborate in this way.

One participant made clear that arrangements enhancing the chance of physiological labour in primary care can be initiated in regional multidisciplinary meetings:

M13, Exp 17yr, Ref 35%: *In our region we make joint protocols with the obstetricians. We as midwives are very alert. [...] We always look out for things that cannot be done in primary care (but we can do a lot), and whether a referral is really necessary or a consultation with the obstetrician is sufficient. For instance, this morning I had a Gravida2-Para1, 41+6 gestation, 2cm dilated and no contractions. I did an amniotomy, she is in labour now, and she probably will have a swift home birth, that is what she wants, and if not, she will be augmented tomorrow by the hospital staff, this has already been arranged. [...] If the collaboration is good this surely is beneficial for the mother and physiology can be protected.*

Client involvement

All participants were aware of the impact they have on their clients by the information they give, or the way they coach their clients. Most participants stated that in the end they decide themselves, assessing the needs and preferences of their clients. However, for those who 'emphasize physiology' there seemed to be more room for clients to be actively involved in midwives' decision-making. The most pronounced representatives of this attitude actively work with their clients towards decisions. Sometimes they succeed to create options that are not readily available in local protocols or national guidelines like the VIL.

M1, Exp 7yr, Ref 43%: *I myself often look for the happy medium that is good for my client but also safe and secure. For instance, a client Gravida3-Para2 with a caesarean in her first pregnancy and a spontaneous birth in her second preferred to have a home birth. I talked to her about the advantages of a home birth (for her this meant a quiet environment, only one person attending the birth, no big song and dance, etcetera) and how we could organize that in the hospital. In this example she had a beautiful [hospital] birth with us [midwives], with an intermittent EFM, all in consultation with the hospital team.*

'Operate on the safe side'

Eleven participants worked with a rather strict distinction between physiological and pathological birth. For them, the VIL defines pathology and there is no such thing as 'mild pathology'. If a situation is not clear, they usually consult the obstetrician.

At the same time they mentioned that each situation and each woman is different, and decision-making can be complex. Intuition and gut feelings play an important role in their judgments, and they feel that it helps them in an early recognition of pathology. It is not that they fear for acute situations; they feel capable in handling those. However, they rather operate on the safe side.

P12, Exp 11yr, Ref 44%: *I must say that my feelings and experience are an important guide as well. Usually I can foresee quite well whether there will be progress, or whether a drop of synto [oxytocin] is needed, or good pain relief. [...] It is rather a gut feeling than fear that guides my decisions: do that episiotomy a bit earlier, put her on her left side for a moment to pant, go to the hospital. Better be safe than sorry.*

They agreed with the other participants that rising referral rates reflect a change in perspective on physiological childbirth. Some of them also noticed this change during their own career. In contrast to those who emphasize physiology, these participants seemed to perceive this change as an inevitable development, reflecting a more risk avoiding attitude in society in general.

P2, Exp 6.5 yr, Ref 42%: *And with the progress of science I think that more and more risk factors will be recognized. Therefore the group of women that has a 'real physiological pregnancy' will grow ever smaller.*

Collaboration with the hospital

The midwives who tend to operate on the safe side did not mention major tensions, although some did express frustrations. One participant described how their diagnosis of 'slow labour' is not always accepted at once by the hospital staff, causing delay for her client in commencing the augmentation. Another one felt frustrated because she often needs to present her client to professionals without authorization to start interventions, usually a junior resident or a clinical midwife. She would prefer to discuss her intrapartum referrals directly with the obstetrician on call.

Most of the midwives who tend to operate on the safe side seemed to experience the collaboration as good. Some especially valued the low thresholds for consultation and referral in their collaboration allowing them to use criteria that are stricter than those in current Dutch guidelines, in early anticipation of potential problems. In the practice of one participant the collaboration with the hospital had evolved to a routinely scheduled consultation session with the obstetricians. She described how this resulted in close collaboration during labour:

M9 Exp 1 yr, Ref 43%: *We discuss our women with a certain risk factor in our weekly consultation with the obstetricians. Together we decide on the best policy for the pregnancy and birth. Usually these women can deliver in the hospital, attended by us, as primary care midwives. We announce our arrival on the labour ward, and then*

sometimes the obstetrician does something extra, but we attend the birth. If something happens, the obstetrician is aware of our presence, and is there immediately as soon as we press the button.

Client involvement

Although several participants who tend to operate on the safe side stated that they accounted for client preferences, client involvement in decision making was less apparent. For most of them, abiding to the existing protocols was more important. One participant made very clear that she was not willing to make exceptions for women with specific requests that do not match with protocols.

M4 Exp 14, Ref 60%: *If one [woman] is allowed to give birth at home with meconium or with a previous PPH, the next one wants that too. [...] so with regard to this kind of things: we follow the same guidelines for everyone.*

Specific situations illustrated how midwives' operating on the safe side' were less expectant in their management of physiological labour than the other participants. One example clearly illustrated the difference. One participant explained that she and her colleagues refer women – nulliparous and parous – for an induction or early augmentation of labour, when they think the baby has grown 'too big':

M4 Exp 14yr Ref 60%: *[...] I know that we refer quite a few multips for this reason. This is all consensus in our region, and 'gut feeling' and absolutely hardly evidence based. [...] Even so we have no doubts whether this is the right thing to do. After all, I also tell my clients, my blood pressure needs to stay okay as well and my job pleasant.*

This evoked a dismissive reaction from a participant with a strong emphasis on physiology:

M6, Exp 7yr, Ref 36%: *By the way, what is the matter when you, as a midwife, gets nervous from expected large babies?*

Such examples make it plausible that differences in attitude actually contribute to variation in referral rates. And indeed, on the whole, participants who tended to 'emphasize physiology' had lower intrapartum referral rates in their practices (mean referral rate: 38 percent) than participants who tended to 'operate on the safe side' (mean referral rate: 48 percent).

Discussion

Midwives in this focus group study varied in attitudes towards defining the boundaries of physiological birth'. We identified two attitudes, which can be seen as the extremes of a continuum. Midwives who 'emphasize physiology' focused on expectant management and tailor made decisions, to create more opportunities for physiological birth. 'Operating on the safe side' was characterised by early anticipation of potential pathology and strict adherence to protocols. Subthemes related to this were the collaboration with the local hospital and client involvement. Midwives who 'emphasize physiology' more often reported tensions in the collaboration with the local hospital. More of them emphasized client involvement in decision making. This qualitative study suggests that these differences are related to the actual referral rates that the respondents reported.

Primary care midwives in the Netherlands are supposed to make a distinction between physiological, uncomplicated childbirth and non-physiological childbirth, including a need for pharmacological pain relief. However, what is 'uncomplicated' or physiological in the complex process of labour is not always straightforward, despite available guidelines and protocols. Our study shows that midwives perform this task in different ways, leading to different thresholds for referral. It is noteworthy that for some of these midwives, anticipating on potential risks or labour problems results in a management that is less expectant than recommended by national guidelines, without a sound evidence base. So far, there is no evidence that a higher intrapartum referral rate contributes to improvement of perinatal or maternal outcomes, whereas it is associated with an increase in interventions in these initially physiological births (20, 30).

Comparable differences have also been described in other settings. Page et al. (9), for instance, described how defining normality is part of midwifery decision-making in Scottish labour wards, and how the boundary of normality varies per midwife, determined by 'her own personal set of values, beliefs and tolerance of uncertainty'. Midwives are also highly influenced by the setting they work in (31). For primary care midwives in the Netherlands the hospital where they attend primary care births and that they refer to is a very important partner. Midwives can experience a power imbalance and a lack of trust in this collaboration (32). Hospitals in the Netherlands show a wide variation in obstetric interventions, suggesting a variation in attitudes towards physiological childbirth (33). Tensions as expressed by some of our participants who emphasize physiology may point to a mismatch between the hospital staff and the midwifery practice, which is difficult to resolve if a power imbalance is experienced. National guidelines and additional local

arrangements play an important role in harmonizing the collaboration between the primary care midwives and the hospital staff. They can also restrict options for women if professionals adhere to them too strictly or if they are not based on evidence. Where there is mutual confidence between midwives and obstetricians, individual solutions that are not readily available can be found in shared decision-making with the woman herself (34), as was demonstrated by some participants in our study.

Implication for practice

Worldwide, promoting and strengthening physiological childbirth, tailored to the needs of women can improve the quality of maternity care (23). In the Netherlands, the emphasis in the last decade has mainly been on safety, management of risks, and availability of pharmacological pain relief. This might have been at the expense of the historically strong confidence in a physiological birth process, not only among obstetricians but also among midwives. A renewed focus on physiological birth as well as a better client involvement can contribute to the quality of maternity care in the Netherlands, and reduce the current wide variation in referral rates. This should be achieved in good and constructive interprofessional collaboration between midwives and obstetricians, as described by Downe et al. (35).

Study limitation

Our study was limited to two online focus groups, because of financial constraints. Therefore it is not clear whether saturation has been reached. The variation in the characteristics of the participants was rich, showing a mix of experienced and unexperienced midwives, with low and high referral rates, and educated in all Dutch academies and abroad. It is also reassuring that in both groups all themes were addressed.

Conclusions

.....

Midwives varied in attitudes towards defining the boundaries of physiological birth. In their decisions they tended to 'emphasize physiology', adhering to expectant management, or on the other hand 'operate on the safe side', anticipating risks and potential labour problems. The increased focus on risks may lead to higher intrapartum referral rates in their practices, resulting in more interventions in these initially physiological births.

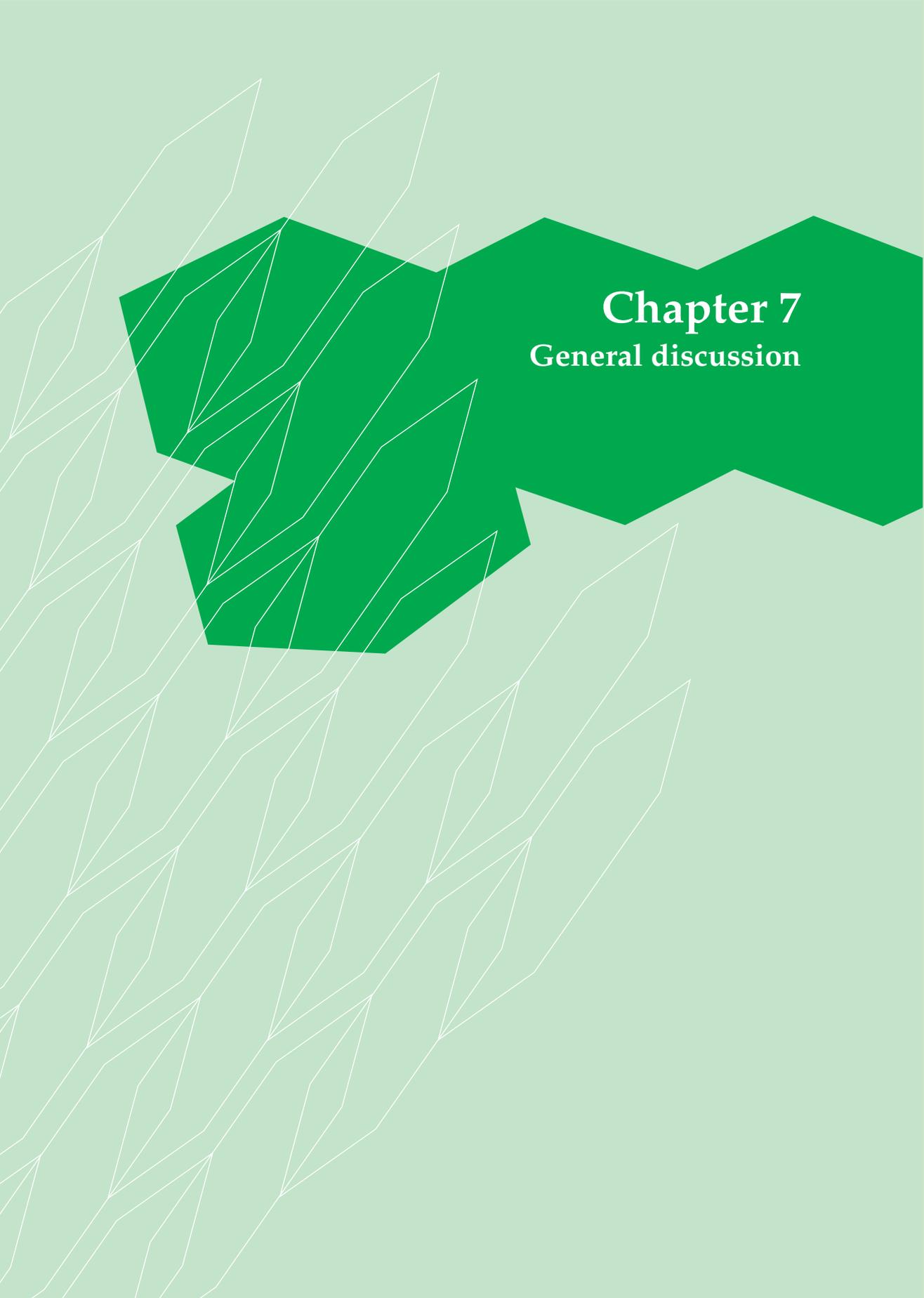
A stronger emphasis on physiological birth and a better client involvement may enhance quality of primary midwifery care for women and reduce variation in referrals. This should be achieved in good interprofessional collaboration between midwives and obstetricians.

References

1. **Amelink-Verburg MP, Buitendijk SE.** Pregnancy and labour in the Dutch maternity care system: what is normal? The role division between midwives and obstetricians. *J Midwifery Womens Health* 2010; 55(3):216-25.
2. **National Health Insurance Board CVZ.** Verloskundig vademecum. Eindrapport van de Commissie Verloskunde van het College voor Zorgverzekeringen. [Obstetrical manual 2003 Final report of the Obstetric working Group of the National Health Insurance Board CVZ]. Diemen: CVZ, 2003.
3. **The Netherlands Perinatal Registry.** Rapportage VOKS 1e lijn 2006-2009. [Feedback report primary care 2006-2009]. Utrecht: stichting PRN, 2011.
4. **Offerhaus P, Otten W, Boxem-Tiemessen JC et al.** Variation in intrapartum referral rates in primary midwifery care in the Netherlands: a discrete choice experiment. *Midwifery* 2015;31 [in press]. <http://dx.doi.org/10.1016/j.midw.2015.01.005>.
5. **Fontein Y.** The comparison of birth outcomes and birth experiences of low-risk women in different sized midwifery practices in the Netherlands. *Women Birth* 2010;23(3):103-10.
6. **Wieggers TA, van der Zee J, Kerssens JJ, Keirse MJ.** Variation in home-birth rates between midwifery practices in The Netherlands. *Midwifery* 2000;16(2):96-104.
7. **Cheyne H, Dalgleish L, Tucker J et al.** Risk assessment and decision making about in-labour transfer from rural maternity care: a social judgment and signal detection analysis. *BMC Med Inform Decis Mak* 2012;12:122.
8. **Mead MMP, Kornbrot D.** The influence of maternity units' intrapartum intervention rates and midwives' risk perception for women suitable for midwifery-led care. *Midwifery* 2004;20(1):61-71.
9. **Page M, Mander R.** Intrapartum uncertainty: A feature of normal birth, as experienced by midwives in Scotland. *Midwifery* 2013;30(1):28-35.
10. **Styles M, Cheyne H, O'Carroll R et al.** The Scottish Trial of Refer or Keep (the STORK study): midwives' intrapartum decision making. *Midwifery* 2011;27(1):104-11.
11. **Blix E, Kumle M, Kjaergaard H et al.** Transfer to hospital in planned home births: a systematic review. *BMC Pregnancy Childbirth* 2014;14(1):179.
12. **Amelink-Verburg MP, Verloove-Vanhorick SP, Hakkenberg RMA et al.** Evaluation of 280,000 cases in Dutch midwifery practices: a descriptive study. *Br J Obstet Gynaecol* 2008;115(5):570-8.
13. **Offerhaus PM, Hukkelhoven CWPM, de Jonge A et al.** Persisting Rise in Referrals During Labour in Primary Midwife-led Care in The Netherlands. *Birth* 2013;40(3):192-201.
14. **Jans SMPJ, De Jonge A, Mol BW, Perdok H.** INCAS Integrated Care System during labour. Final report. Amsterdam: EMGO+ Instituut, 2013.
15. **Christiaens W, Gouwy A, Bracke P.** Does a referral from home to hospital affect satisfaction with childbirth? A cross-national comparison. *BMC Health Serv Res* 2007;7:109.
16. **Rowe RE, Fitzpatrick R, Hollowell J, Kurinczuk JJ.** Transfers of women planning birth in midwifery units: data from the Birthplace prospective cohort study. *Br J Obstet Gynaecol* 2012;119(9):1081-90.

17. **Rijnders M, Baston H, Schonbeck Y et al.** Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands. *Birth* 2008;35(2):107-16.
18. **de Jonge A, Stuijt R, Eijke I, Westerman MJ.** Continuity of care: what matters to women when they are referred from primary to secondary care during labour? a qualitative interview study in the Netherlands. *BMC Pregnancy Childbirth* 2014;14:103.
19. **Geerts C, Klomp T, Lagro-Janssen A et al.** Birth setting, transfer and maternal sense of control: results from the DELIVER study. *BMC Pregnancy and Childbirth* 2014;14(1):27.
20. **Offerhaus P, Geerts C, De Jonge A et al.** Variation in referrals to secondary obstetrician-led care among primary midwifery care practices in the Netherlands: a nationwide cohort study. *BMC Pregnancy and Childbirth* 2015;15 (42)
21. **Glantz JC.** Obstetric variation, intervention, and outcomes: doing more but accomplishing less. *Birth* 2012;39(4):286-90.
22. **MacKenzie BH, van Teijlingen ER.** Risk, theory, social and medical models: a critical analysis of the concept of risk in maternity care. *Midwifery* 2010;26(5):488-96.
23. **Renfrew MJ, McFadden A, Bastos MH et al.** Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. *Lancet* 2014;384(9948):1129-45.
24. **Christiaens W, Nieuwenhuijze MJ, de Vries R.** Trends in the medicalisation of childbirth in Flanders and the Netherlands. *Midwifery* 2013;29(1):e1-8.
25. **Amelink-Verburg MP, M.E.B. R, Buitendijk S.** A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988-2004. *Br J Obstet Gynaecol* 2009;116:923-32.
26. **Pel M, Heres MH, Hart AA et al.** Provider-associated factors in obstetric interventions. *Eur J Obstet Gynecol Reprod Biol* 1995;61(2):129-34.
27. **The Netherlands Perinatal Registry.** *Praktijkanalyse LVR1 2009. [Practice statistics LVR1 2009].* Utrecht: Stichting PRN, 2010.
28. **Tates K, Zwaanswijk M, Otten R et al.** Online focus groups as a tool to collect data in hard-to-include populations: examples from paediatric oncology. *BMC Med Res Methodol* 2009;9:15.
29. **Braun V, Clarke V.** Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006; 3(2):77-101.
30. **Offerhaus PM, de Jonge A, van der Pal-de Bruin KM et al.** Change in primary midwife-led care in the Netherlands in 2000-2008: a descriptive study of caesarean sections and other interventions among 807,437 low risk births. *Midwifery* 2015; 31 (in press) <http://dx.doi.org/10.1016/j.midw.2015.01.013>
31. **O'Connell R, Downe S.** A metasynthesis of midwives' experience of hospital practice in publicly funded settings: compliance, resistance and authenticity. *Health (London)* 2009;13(6):589-609.
32. **van der Lee N, Driessen EW, Scheele F.** Tailoring CanMEDS for training in obstetrics and gynaecology in the Netherlands. Chapter 6 *How the past influences the collaboration between obstetricians and midwives in the Netherlands.* Amsterdam: Vrije Universiteit; 2014.

33. **RIVM.** *Zorg rond de geboorte.*[Perinatal care]. In: Van den Berg MJ, de Boer D, Gijsen R et al. editors. *Zorgbalans 2014: de prestatie van de Nederlandse gezondheidszorg.*[Care Balance 2014: the performance of Dutch health care]. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu; 2014. p. 21-60. Available at:http://gezondheidszorgbalans.nl//dsresource?objectid=rivmp:2598335&type=org&disposition=inline&ns_nc=1 (date accessed: March 7, 2015)
34. **Nieuwenhuijze M, Low LK.** *Facilitating women's choice in maternity care.* *J Clin Ethics* 2013; 24(3):276-82.
35. **Downe S, Finlayson K, Fleming A.** *Creating a collaborative culture in maternity care.* *J Midwifery Womens Health* 2010;55(3):250-4.



Chapter 7
General discussion

General Discussion

Primary midwife-led care is changing rapidly, and the Dutch maternity care model seems to be in transition. These changes have not been evaluated thoroughly. This thesis contributes to such an evaluation. It describes and analyses trends and variations in intrapartum referrals from primary midwife-led care to secondary obstetrician-led care in the Netherlands, and associated perinatal and maternal birth outcomes. We performed a variety of studies to answer four research questions. In this final chapter the main findings are presented. After reflection on these findings, the possibilities for improvement of the quality of primary midwife-led care are discussed and suggestions are made for further research.

Main findings

Trends in intrapartum referrals and associated perinatal outcomes

Our first research question was: Is the rise in referrals associated with a change in perinatal safety in primary midwife-led care during labour, and which referral reasons explain the rise in referrals during labour or immediately after birth? We observed a considerable increase in intrapartum referrals during the study period, in between 2000 and 2010, from 47.4 to 57.4 per cent for nulliparous women and from 16.8 to 23.3 per cent for multiparous women (Chapter 2). For both nulliparous and multiparous women this increase in referrals was mainly a result of a rise in non-urgent reasons for referral in the first stage such as need for pain relief, failure to progress and meconium stained liquor. The observed trend in overall referral rates was independent of changes in maternal characteristics over time.

The rise in referrals was not associated with a change in perinatal safety in these low-risk births. Perinatal mortality (intrapartum or neonatal < 7 days) and a low Apgar score (<7 at 5 minutes) were low and did not decrease over time. There was, however, a small rise in admissions to Neonatal Intensive Care Units (NICU's). This might reflect improved accessibility of NICU's during the study period instead of an actual change in perinatal outcomes.

Trends in intrapartum referrals and associated obstetric interventions and other maternal outcomes

Our second research question concerned the rise in intrapartum referrals from primary to secondary care and the association with caesarean sections and other maternal outcomes (Chapter 3). During the study period the caesarean section rate increased from 6.2 to 8.3

per cent for nulliparous and from 0.8 to 1.1 per cent for multiparous women. However, the overall instrumental birth rate did not change. We also observed an increased use of augmentation of labour and/or pharmacological pain relief for nulliparous and multiparous women. Furthermore, the choice for a planned home birth decreased considerably, from 65.8 per cent in 2000 to 45.8 per cent in 2008 among nulliparous women, and from 68.3 to 52.4 per cent among multiparous women. The actual home birth rate dropped among both nulliparous and multiparous women. Throughout the study period, the caesarean section rate was lower in planned home births compared to planned hospital births in primary midwife-led care.

We tested whether the trend in caesarean section rates could be explained by the decline in planning a home birth or changes in maternal characteristics. This was not the case for multiparous women. After controlling for these characteristics, the year by year increase in the caesarean section rate was still significant for nulliparous women, but not for multiparous women.

Variation in referral rates and associated outcomes

Apart from an increase in intrapartum referrals, there is also wide variation in intrapartum referral rates between primary care midwifery practices. Therefore, we investigated whether a woman's chance of an instrumental birth is associated with the referral rate of her midwifery practice (Chapter 4). The intrapartum referral rate in midwifery practices varied from less than 15 to more than 75 per cent for nulliparous women. This variation occurred predominantly in non-urgent referrals in the first stage of labour. The use of pain relief and augmentation was higher in practices with higher referral rates. Women also more often experienced a postpartum haemorrhage >1000 ml in these practices. Although the prevalence of low Apgar scores was low, it was somewhat higher among nulliparous births in practices with lower referral rates.

The instrumental birth rate was higher among nulliparous women in practices with higher referral rates. For multiparous women this association was not found. The association between a higher referral rate in the midwifery practice and a higher risk on an instrumental birth remained significant for nulliparous women after adjustment for confounding in a multilevel logistic regression analysis. The association was, however, no longer significant when we also controlled for obstetric interventions (pain relief or augmentation). This suggests that the risk of an instrumental birth – including caesarean section – is increased in practices with higher referral rates as a result of elevated rates of augmentation and/or pain relief.

Exploring factors that contribute to variation in referral rates

We explored the influence of factors related to the midwife and her practice on referral decisions in two studies. In the first study we measured variation in referral decisions using a discrete choice experiment. A random sample of primary care midwives participated. Although the participants were confronted with the same scenarios with the same case mix of healthy, low risk nulliparous women in early labour, they showed a wide variation in their referral decisions. We explored several midwife related factors that might contribute to this variation. Three factors were associated with a higher referral score: a lower estimate of the probability of a spontaneous vaginal birth in low risk nulliparous women, adhering to the active management policy Proactive Support of Labour (PSOL), and a practice situated in a rural area or small city. Other factors, such as years of experience, academy of registration, or workload (care equivalents per midwife), were not significantly associated with the referral score.

The second study consisted of two internet based online focus groups among twenty primary care midwives, recruited by convenience sampling. Midwives in this study varied in attitudes towards defining the 'boundaries of physiological birth'. We identified two kinds of attitudes, which can be seen as the extremes of a continuum. Midwives who 'emphasize physiology' focused on expectant management and tailor made decisions. 'Operating on the safe side' was characterised by early anticipation of risks and adherence to protocols. Two subthemes - 'the collaboration with the hospital' and 'client involvement' - were strongly related to these attitudes. Midwives who 'emphasize physiology' more often reported tensions in their collaboration with the obstetricians in the local hospital. More of them emphasized client involvement in decision making. Furthermore, midwives who 'emphasize physiology' reported lower intrapartum referral rates in their practices.

Strengths and limitations

Three of the presented studies used the database of the linked Netherlands Perinatal Registry (PRN), in which routinely collected information on primary midwife-led care, obstetrician-led care, and paediatric care is combined. All of these analyses have a descriptive or explorative character and do not allow for causal explanations. Using the linked PRN database comes with strengths and limitations. The database contains at least 95 percent of the population of interest. An important advantage of using the linked database instead of the primary midwife-led care registry alone is the availability of more extensive data on perinatal outcomes. This allowed us to give a description of

perinatal safety. However, the information in the three linked registries is sometimes conflicting on variables of interest. For these variables we used the definitions as provided by Netherlands Perinatal Registry (the PRN foundation). Another limitation is that the database offers little information on factors that may be associated with maternal health and thus with referral decisions. For instance, maternal characteristics such as BMI and smoking behaviour are not registered. Interesting issues such as client preferences and costs of care can also not be addressed.

The other two studies explored the background of existing variation in referral decisions, a topic that has not been investigated extensively to date. The discrete choice experiment proved to be a valuable instrument for assessing variation in referral decisions. This allowed us to explore the impact of various factors contributing to this variation. For more robust results, including multivariable analyses, a larger study is required. To our knowledge, the focus group study is the first among Dutch midwives into factors that influence their decisions to refer women during labour. A mix of experienced and unexperienced midwives participated, with low and high referral rates, and educated in all Dutch academies and abroad. Although we cannot be sure that saturation was reached in this qualitative study, it is reassuring that in both groups all themes were addressed.

Reflection on findings

No change in perinatal mortality

After the EURO-Peristat project reported a relatively high perinatal mortality rate in the Netherlands (1, 2), improving perinatal safety was the main objective of all efforts to improve maternity care in the Netherlands. According to our study, the increase in intrapartum referrals and the associated rise in caesarean section rates did not contribute to this aim (chapter 3). A recent publication confirmed that there was no improvement in perinatal mortality among all term, singleton, vertex births in the Netherlands in the years 1999-2009 (3). In this study the perinatal mortality rate was lower and Apgar scores were better in births that started labour in primary midwife-led care compared to the national average. This reflects the lower risk profile of term births that start in primary care as a result of the risk selection process during pregnancy in Dutch maternity care.

At first sight the stable level of perinatal mortality seems in contrast with the overall decrease in term perinatal mortality that has been observed since 2001, from 3.8 per thousand term births in 2001 to 2.0 per thousand term births in 2012 (4). However,

this decrease in perinatal mortality is for the largest part the result of a decrease in fetal mortality. This is not reflected in our nor in Ensing's results, because both studies focused on intrapartum care and not on prenatal care. Therefore, women who experienced a stillbirth before start of labour were not included.

Overall, we observed low perinatal mortality and a low incidence of low Apgar scores in primary care. Nevertheless, we also observed that the incidence of a low Apgar score was somewhat higher among nulliparous births in practices with low intrapartum referral rates (chapter 4). The clinical significance of the higher occurrence of such a rare outcome is difficult to interpret. However, this finding should be considered as a warning that a low referral rate should not be achieved at the cost of perinatal safety.

Considerable changes for women

Where there was no improvement in perinatal outcomes, the changes in maternal outcomes for women receiving primary midwife-led care were considerable (chapter 3). There has been more use of pharmacological pain relief, but also a considerable loss of continuity of care. Apart from pain relief, other interventions also increased, cumulating in a higher rate in caesarean sections for nulliparous women. This rise in interventions implies an increased risk of associated morbidity.

Overall, the increased use of pharmacological pain relief, augmentation of labour with oxytocin and the associated use of continuous fetal monitoring by CTG (a routine procedure after most referrals) is a self-evident consequence of the rise in non-urgent referrals in this low risk group of women. The increased use of pain relief reflects improved availability, which has been welcomed by women as well as midwives (5). Having a realistic choice of pain relief contributes to a good birth experience (6). Access to pharmacological pain relief without need for transfer during active labour is for some women (or for their partners) a reason to opt for a hospital birth (7), which may also play a role in the over-time decline in preference for a home birth that we observed. Nevertheless, prenatally the vast majority of women in primary care do not have a preference to use pharmacological pain relief, as long as they can be confident that it is available when needed (8).

Apart from the availability of pain relief, our study does not suggest an improvement in maternal outcomes as a result of the increased referral rates. Nowadays, almost 50 per cent of nulliparous women and one out of six multiparous women are transferred to obstetrician led care during the first stage of labour without urgent medical reason (Chapter 2). Such a transfer is associated with a more negative birth experience (6). After

referral they are usually supported by clinical midwives, without active involvement of an obstetrician (9, 10). Most of them will still have a spontaneous vaginal birth. At the same time, they have experienced discontinuity of care during labour and a loss of sense of control (11), both important factors for a positive birth experience (12-14).

Another concern is the increased use of interventions in these basically physiological births. Nowadays in 40 per cent of all nulliparous births that started in primary midwife-led care, pharmacological pain relief or augmentation is used, often in combination. Augmentation with oxytocin was once used in pathological labour only, but is now administered in one out of three of these low risk nulliparous birth (Chapter 3). Pharmacological pain relief and augmentation are both interventions intended to support women in having a good vaginal birth. Nevertheless, both interventions are associated with maternal morbidity such as intrapartum fever, respiratory depression and postpartum haemorrhage (15-17). In our study too, a higher rate of postpartum haemorrhage >1000 ml, was associated with the use of oxytocin (Chapter 3&4).

Moreover, our cohort study (Chapter 3) suggests that the increase in the use of interventions also results in an increase in the caesarean section rate, at least for nulliparous women. Our analysis of the impact of higher referral rates in midwifery practices confirmed this association (Chapter 4). The underlying mechanisms of this association are less clear. A complicating factor for assessing the impact of these interventions on caesarean section rates is that these interventions are often combined. This has been described as the 'cascade of interventions', culminating in a higher caesarean section rate (18, 19). In primary midwife-led intrapartum care, referral to obstetrician-led care can be seen as the first step of this cascade.

When looking at the interventions independently, the evidence for an association with caesarean section is not clear. The increased use of CTG after referral is likely to play a role, as it is associated with higher caesarean section rates (20). Whether the use of epidural anesthesia affects the caesarean section rate is controversial. In a Cochrane review this association was not observed (15). However, recent large observational studies confirmed a higher chance of a caesarean section when epidural anesthesia is administered during labour (21, 22). A possible association of increased use of augmentation of labour with more caesarean sections is even more controversial. Early administration of oxytocine in case of slow progress during the first stage of labour is seen by several authors as an intervention that may improve the likelihood of a vaginal birth, usually as an important component of the package of care known as 'active management' or 'proactive support' of

labour (23-26). This philosophy has influenced recommendations in the Dutch obstetric guideline on spontaneous labour (27) and the practice of some midwives (Chapter 5). However, it is still unclear whether this package is really effective in reducing caesarean section rates (28, 29), and whether augmentation is the most important component (26). A recent systematic review did not find a reduction in caesarean section rates as a result of augmentation (30). Furthermore, the threshold for 'failure to progress' that is used in these packages is likely to be too strict, especially before 6 cm of dilatation has been reached (31-33).

Although the caesarean section rate is low in primary midwife-led births, the gradual rise is of concern. A caesarean section is a major intervention that increases the risks of serious maternal morbidity in the current and subsequent pregnancies (32, 34). The rise in caesarean sections performed in low risk births that started in primary midwife-led care has contributed to an overall increase in the Netherlands. The national caesarean section rate more than doubled from 8.1 per cent in 1993 to 17.0 per cent in 2010 (35, 36). Unplanned caesarean sections performed in nulliparous women with a term, singleton, vertex pregnancy contributed most to this rise (35, 37). This gradual but consistent rise fits in a global trend to rising caesarean section rates in high income countries (38, 39). Lowering the caesarean section rate, or at least preventing a further increase is an important women's health issue in these countries. In Dutch maternity care too, a reduction of avoidable caesarean sections is possible (40, 41) For instance, results of a recent Dutch study (41) indicate that a too early decision for a caesarean section in cases of slow progress during labour is one of the three main factors contributing to higher caesarean section rates (42). Reducing avoidable caesarean sections should be an important priority in Dutch maternity care as a whole. Avoiding unnecessary referrals in primary midwife-led care may contribute to this goal.

Optimising physiological birth

The role division between primary midwife-led care and secondary obstetrician-led care in Dutch maternity care, is based on the assumption that pregnancy and childbirth are physiological processes unless proven otherwise: medical interventions should only be performed if the beneficial effect of the intervention outweighs the disadvantages. Very recently an international multidisciplinary team of researchers reinforced this assumption in a framework of high quality maternal and newborn care (39). One of the core characteristics of such care is described as: "optimising normal biological, psychological, social, and cultural processes of reproduction and early life".

However, in the Netherlands the emphasis in the last decade has been on lowering perinatal mortality, management of risks, and medical procedures such as epidural anaesthesia and augmentation of labour, and not on optimising physiological birth. This emphasis fits better in a 'medical model' of childbirth (43). Primary care midwives in the Netherlands are not immune for such developments. This may contribute to the rise in referrals that we found as well as to the variation in the way midwives make a distinction between physiological, uncomplicated birth and non-physiological birth (Chapter 6). Some tend to operate on the safe side, as in the 'medical model' of maternity care. Overestimating risks and underestimating the chance of a spontaneous vaginal birth (Chapter 5) may contribute to this attitude. Anticipating potential risks or labour problems can result in management that is less expectant than recommended by the List of Obstetric Indications (Verloskundige Indicatie Lijst) (44), without a sound evidence base. This may result in unnecessary referrals and interventions.

Personal attitudes and thresholds play a role in referral decisions (45, 46), but midwives are also highly influenced by the setting they work in (47). For primary care midwives in the Netherlands the hospital is an important component of this setting. Most midwifery practices are members of regional multidisciplinary collaborative groups (Verloskundige Samenwerkings Verbanden: VSV's) around the local hospital, which developed in the last two decades (48, 49). Hospitals vary considerably in obstetric care (37), and the collaboration with the local hospital has impact on referral rates of midwifery practices (Chapter 6).

Participating in VSV's does not necessarily mean that good inter-professional collaboration is achieved. As in other maternity care systems, Dutch midwives often experience a power imbalance and a lack of trust in the collaboration with obstetricians (47, 50). This can make it difficult for them to perform their autonomous professional role as a midwife. In our study, especially midwives who emphasize physiology expressed major tensions in the collaboration (Chapter 6). This possibly reflects a mismatch with a local hospital that is focused on the 'medical model' of childbirth. Such issues are difficult to resolve if a power imbalance is experienced by midwives. Compliance to the hospital's or the obstetricians' policies in such situations will lower the tension, and may even be perceived as good collaboration. However, truly collaborative relationships between autonomous professionals are characterised by mutual trust and respect for each other's competences (51). Creating such a truly collaborative culture is an important issue in the Netherlands, not only for the professionals involved but also for the women they care for. To quote one of the respondents of our focus group: 'If the collaboration is good, this surely is beneficial for the mother and physiology can be protected.'

Implications for practice

The aim of this thesis was to contribute to improvements of maternity care for women with uncomplicated physiological pregnancies. Considering the stable and good perinatal results in primary midwife-led care, improving quality of care for women by providing better continuity of care and optimising chances on a physiological birth needs equally attention as reducing perinatal mortality. This paragraph discusses how this can be achieved. Monitoring quality of care and improvements within primary midwife-led care are needed. The possibility of adapting the current role division between primary and secondary care, and implications for the profession of midwives are discussed as well.

Monitoring quality of care in midwifery practices and in VSV's

Since 2010, term perinatal mortality is evaluated in local multidisciplinary perinatal audit meetings to improve quality of maternity care (52). This has contributed to perinatal safety. In a comparable way, monitoring intrapartum referrals and caesarean sections could help in maintaining a high quality of maternity care by optimising physiological birth and reducing avoidable caesarean sections (53). Being aware of a high referral rate in their practice can stimulate midwives to reflect critically whether they can improve in optimising physiological birth in order to reduce avoidable referrals and discontinuity of care. The collaboration with the local hospital should be part of their reflections. At the VSV level, multidisciplinary audits of caesareans among term nulliparous women can help to reduce caesarean section rates (40).

Optimising physiological birth in primary midwife-led care

Primary care midwives can strengthen the opportunities for women to achieve a physiological birth and a positive birth experience. Non-medical interventions that can help women to cope with labour deserve more attention (54), such as continuous support (13), the use of birthing pools (55), offering various birthing positions (56), and reintroducing the use of nitrous oxide as an extra option in the available spectrum of pain treatment. These can all reduce the need for medical interventions, reduce referral rates and contribute to more continuity of care. Although such interventions are offered by primary care midwives to some extent, there are indications that improvement is possible (57). In addition, reducing the high caseloads in primary midwife led care may help midwives to provide adequate continuous support during labour (5). Providing good preparation for childbirth and improving choices for women by using shared-decision making can improve women's experiences of childbirth and contribute to quality of care (58, 59).

Extending the role of primary care midwives?

In the current role division in maternity care, primary care midwives who refer their clients for a non-urgent reason hand over responsibility to a clinical midwife. Clinical midwives will attend most of these births without actual involvement of the supervising obstetrician who formally has the final responsibility for this care (9). Thus, in the Netherlands midwives provide midwife-led care without the continuity that is beneficial and that is appreciated by women (60). Sharing care between midwives could be avoided, if competencies of primary care midwives are extended to attending births where pain relief, augmentation of labour, or CTG is indicated, whether or not in consultation with the clinical midwife or obstetrician in charge. This would improve continuity of care for most women who are now referred for non-urgent reasons. As long as a spontaneous vaginal birth is still to be expected and the fetal condition is good, such interventions can be seen as supportive of physiological birth instead of treatment of pathology (61). This would be in line with midwife-led care as provided in for example New Zealand and Canada, where midwives continues her care in such situations without handing over responsibilities.

Strengthening the profession of midwives

Primary care midwives can only provide safe midwifery care, if they can rely on good collaboration with the local hospital. However, midwives also need to be able to make autonomous decisions while providing care to individual women. This is necessary as they are supposed to give personalised care and balance the benefits and disadvantages of interventions and referrals at an individual level, in acute and non-acute situations. If inter-professional collaboration is good, this autonomous position of midwives is acknowledged and respected (51).

Sharing protocols with the local hospital can support the collaboration between midwifery practices and hospitals. However, midwives need to make sure that these protocols support and respect the physiological approach in primary midwife-led care and that they are not stricter than recommended in the VIL. In addition, guidelines and protocols should not be a barrier for providing care that is sensitive to needs and preferences of individual women.

Midwives should be prepared during their training in working as autonomous professionals in inter-professional collaboration. Achieving academic competencies is also important. The midwifery profession should be able to evaluate midwifery care and strengthen physiology in pregnancy and labour with scientific research. Academic

competencies may also help in participating adequately in inter-professional decision making, in individual care and in developing shared protocols with the hospital team. Therefore, in the future midwifery education should be provided at an academic level, as in many other Western countries.

If primary care midwives are to extend their tasks and responsibilities to situations where supportive interventions are indicated, they need to acquire additional competencies.

Recommendations for research

Improving physiological birth and reducing avoidable caesarean sections should be as high on the research agenda as reducing perinatal mortality. Considering the large variation in management in the first stage of labour, research in the optimal management of a slow first stage of labour is a priority. Randomised controlled trials can provide information for the optimal criteria for starting augmentation of labour. Furthermore, research into interventions that prevent and treat failure to progress is important. Priority should be given to implementation studies that evaluate the feasibility and cost-effectiveness of continuous support during labour in the Netherlands. The high workload in many primary care practices is a barrier to guarantee such support (62). An implementation study can establish the optimal organisation and workload within midwifery practices in the Netherlands. The same may apply to the implementation of one-to-one support in secondary care. Last but not least, experiments with innovative methods to help women preparing for physiological birth deserve attention too.

Further research into variation in midwife-led and obstetrician-led care is also needed. Descriptive studies as well as in-depth analyses of factors that contribute to this variation can help to improve the quality of care. In regions with high referral rates and high rates of unplanned caesarean sections in term nulliparous women, factors contributing to these high rates should be determined. Analysing and improving the local collaborative culture deserves attention (51). In addition, local protocols can be analysed and improved in accordance with the latest evidence and the VIL. Furthermore, the possibility of quality improvement by providing feedback information on intrapartum referrals and performing audits on intrapartum referrals and caesarean sections should be explored.

Primary care midwives, clinical midwives and obstetricians in the Netherlands agree with each other that current intrapartum care is fragmented and continuity of care could be improved by extending the role of primary care midwives. However, they disagree with each other about how responsibilities and tasks can be redistributed (63). Regional

experiments have been started to find out how best to integrate primary and secondary care (64). Experimental changes in the organisation of maternity care, including redistribution of tasks to primary care midwives, should be evaluated scientifically in terms of cost-effectiveness, preferences and experiences of women, their partners and the professionals involved, before they are implemented on a national basis.

To improve the quality of monitoring perinatal care and observational studies in perinatal care, the quality and accessibility of data available in the National Perinatal Registry should be evaluated and further improved.

Final conclusions

Midwife-led primary care in the Netherlands results in a high level of spontaneous vaginal births and good perinatal results. Rising referral rates do not improve perinatal safety any further in this group of low risk women. At the same time, rising referral rates lead to discontinuity of care for these women. The increased use of medical interventions during labour increases the risk of maternal morbidity and for nulliparous women the risk on a caesarean section.

Improvement can be achieved by providing better continuity of care and optimising physiological birth. Better implementation of effective non-medical interventions can lower the need for pharmacological pain relief and augmentation of labour. This reduces the need for referrals, improves continuity of care, and helps to keep the caesarean section rate low.

These improvements can be achieved without major changes in the current Dutch maternity care model. Improving continuity of care for women even further may be achieved by extending primary midwife-led care in non-urgent situations, naturally in good inter-professional collaboration with the hospital team.

References

1. **EURO-PERISTAT Project.** *The European perinatal health report. The health and care of pregnant women and babies in Europe in 2010.* Paris: EURO-PERISTAT Project, 2013. Accessed March 16, 2015. Available at <http://www.europeristat.com/>.
2. **EURO-PERISTAT Project.** *The European perinatal health report. The health and care of pregnant women and babies in Europe in 2004.* Paris: EURO-PERISTAT Project, 2008.
3. **Ensing S, Abu-Hanna A, Schaaf JM, et al.** Trends in birth asphyxia, obstetric interventions and perinatal mortality among term singletons: a nationwide cohort study. *J Matern Fetal Neonatal Med* 2014;1-6.
4. **Foundation Perinatal Audit in The Netherlands.** *A terme sterfte 2010-2012: perinatal audit op koers.* [Term mortality 2010-2012: perinatal audit on track]. Utrecht: Foundation Perinatal Audit in The Netherlands, 2014.
5. **Klomp T.** *Management of labour pain in midwifery care: Radboud University Nijmegen; 2015.*
6. **Rijnders M, Baston H, Schonbeck Y, et al.** Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands. *Birth* 2008;35(2):107-116.
7. **Hendrix M.** *Home or home-like hospital birth for low-risk nulliparae: does it matter? Maastricht: Universiteit van Maastricht; 2010.*
8. **Klomp T, de Jonge A, Hutton EK, et al.** Dutch women in midwife-led care at the onset of labour: which pain relief do they prefer and what do they use? *BMC Pregnancy Childbirth* 2013;13:230.
9. **Cronie D, Rijnders M, Buitendijk S.** Diversity in the scope and practice of hospital-based midwives in the Netherlands. *J Midwifery Womens Health* 2012;57(5):469-475.
10. **Wieggers TA, Hukkelhoven CW.** The role of hospital midwives in the Netherlands. *BMC Pregnancy Childbirth* 2010;10(1):80.
11. **Geerts C, Klomp T, Lagro-Janssen A, et al.** Birth setting, transfer and maternal sense of control: results from the DELIVER study. *BMC Pregnancy and Childbirth* 2014;14(1):27.
12. **Goodman P, Mackey MC, Tavakoli AS.** Factors related to childbirth satisfaction. *J Adv Nurs* 2004;46(2):212-219.
13. **Hodnett ED, Gates S, Hofmeyr GJ, et al.** Continuous support for women during childbirth. *Cochrane Database of Syst Rev* 2012(10):CD003766.
14. **Larkin P, Begley CM, Devane D.** Women's experiences of labour and birth: an evolutionary concept analysis. *Midwifery* 2009;25(2):e49-59.
15. **Anim-Somuah M, Smyth RM, Jones L.** Epidural versus non-epidural or no analgesia in labour. *Cochrane Database of Syst Rev* 2011(12):CD000331 .
16. **Kramer MS, Dahhou M, Vallerand D, et al.** Risk factors for postpartum hemorrhage: can we explain the recent temporal increase? *J Obstet Gynaecol Can* 2011;33(8):810-819.
17. **Freeman LM, Bloemenkamp KW, Franssen MT, et al.** Patient controlled analgesia with remifentanyl versus epidural analgesia in labour: randomised multicentre equivalence trial. *BMJ* 2015;350:h846.

18. **Brody H, Sakala C.** Revisiting “The maximin strategy in modern obstetrics”. *J Clin Ethics* 2013; 24(3):198-206.
19. **Petersen A, Poetter U, Michelsen C, et al.** The sequence of intrapartum interventions: a descriptive approach to the cascade of interventions. *Arch Gynecol Obstet* 2013;288(2):245-254.
20. **Alfirevic Z, Devane D, Gyte GM.** Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour. *Cochrane Database Syst Rev* 2013(5): Cd006066.
21. **Bannister-Tyrrell M, Ford JB, Morris JM, et al.** Epidural analgesia in labour and risk of caesarean delivery. *Paediatr Perinat Epidemiol* 2014;28(5):400-411.
22. **Wassen MM, Hukkelhoven CW, Scheepers HC, et al.** Epidural analgesia and operative delivery: a ten-year population-based cohort study in The Netherlands. *Eur J Obstet Gynecol Reprod Biol* 2014;183:125-131.
23. **Achterberg PW, Waelput AJM.** [Recent perinatal mortality rates in the Netherlands: 2000-2005. View on improvement?]. Bilthoven: RIVM, 2007.
24. **Brown HC, Paranjothy S, Dowswell T, et al.** Package of care for active management in labour for reducing caesarean section rates in low-risk women. *Cochrane Database of Syst Rev* 2013(9): CD004907.
25. **Reuwer P, Bruinse HW, Franx A.** Proactive support of labor. The challenge of normal childbirth. Cambridge University Press: 2009.
26. **Wei S, Wo BL, Qi HP, et al.** Early amniotomy and early oxytocin for prevention of, or therapy for, delay in first stage spontaneous labour compared with routine care. *Cochrane Database of Syst Rev* 2013(8):CD006794.
27. **NVOG.** NVOG-richtlijn Spontane vaginale baring. [NVOG guideline spontaneous vaginal birth] Utrecht: NVOG, 2014.
28. **NICE.** Guidance CG190: Intrapartum care. Care of healthy women and their babies during childbirth. London: National Collaborating Centre for Women’s and Children’s Health, 2014.
29. **Kuppens SM, Hutton EK, Hasaart TH, et al.** Mode of delivery following successful external cephalic version: comparison with spontaneous cephalic presentations at delivery. *J Obstet Gynaecol Can* 2013;35(10):883-888.
30. **Bugg GJ, Siddiqui F, Thornton JG.** Oxytocin versus no treatment or delayed treatment for slow progress in the first stage of spontaneous labour. *Cochrane Database of Syst Rev* 2011; (7): CD007123 2011.
31. **Neal JL, Lowe NK, Patrick TE, et al.** What is the slowest-yet-normal cervical dilation rate among nulliparous women with spontaneous labor onset? *J Obstet Gynecol Neonatal Nurs* 2010;39(4):361-369.
32. **Caughey AB, Cahill AG, Guise JM, Rouse DJ.** Safe prevention of the primary cesarean delivery. Washington: ACOG & Society for Maternal Fetal Medicine, 2014.
33. **Zhang J, Landy HJ, Branch DW, et al.** Contemporary patterns of spontaneous labor with normal neonatal outcomes. *Obstet Gynecol* 2010;116(6):1281-1287.
34. **Zwart JJ, Richters JM, Ory F, et al.** Severe maternal morbidity during pregnancy, delivery and puerperium in the Netherlands: a nationwide population-based study of 371,000 pregnancies. *Br J Obstet Gynaecol* 2008;115(7):842-850.
35. **Kwee A, Elferink-Stinkens PM, Reuwer PJHM, et al.** Trends in obstetric interventions in the Dutch obstetrical care system in the period 1993-2002. *Eur J Obstet Gynecol Reprod Biol* 2007;132(1):70-75.

36. **Macfarlane A, Blondel B, Mohangoo A, et al.** Wide differences in mode of delivery within Europe: risk-stratified analyses of aggregated routine data from the Euro-Peristat study. *BJOG* 2015.
37. **RIVM.** Zorgbalans 2014. De prestaties van de Nederlandse gezondheidszorg. Hoofdstuk 2 Zorg rond de geboorte. [The performance of Dutch Healthcare. Chapter 2. Perinatal care]. Bilthoven: RIVM, 2014.
38. **Gibbons L, Belizán JM, Lauer JA, et al.** The global numbers and costs of additionally needed and unnecessary caesarean sections performed per year: overuse as a barrier to universal coverage. Geneva: World Health Organization (WHO), 2010.
39. **Renfrew MJ, McFadden A, Bastos MH, et al.** Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. *Lancet* 2014;384(9948):1129-1145.
40. **van Dillen J, Lim F, van Rijssel E.** Introducing caesarean section audit in a regional teaching hospital in The Netherlands. *Eur J Obstet Gynecol Reprod Biol* 2008;139(2):151-156.
41. **Melman S, Schoorel EN, Dirksen C, et al.** SIMPLE: implementation of recommendations from international evidence-based guidelines on caesarean sections in the Netherlands. Protocol for a controlled before and after study. *Implement Sci* 2013;8:3.
42. **SIMPLE-study.** Report SIMPLE-study. Den Haag: ZonMw, 2014. Accessed 2 April 2015. Available at <http://www.zonmw.nl/nl/projecten/project-detail/current-dutch-practice-on-caesarean-sections-identification-of-barriers-and-facilitators-for-optimal/voortgang/>
43. **MacKenzie BH, van Teijlingen ER.** Risk, theory, social and medical models: a critical analysis of the concept of risk in maternity care. *Midwifery* 2010;26(5):488-496.
44. **CVZ.** Verloskundig vademecum. Eindrapport van de Commissie Verloskunde van het College voor Zorgverzekering. [Obstetrical manual Final report of the Obstetric working Group of the National Health Insurance Board CVZ]. Diemen: CVZ, 2003.
45. **Page M, Mander R.** Intrapartum uncertainty: a feature of normal birth, as experienced by midwives in Scotland. *Midwifery* 2014;30(1):28-35.
46. **Wiegers TA, van der Zee J, Kerssens JJ, et al.** Variation in home-birth rates between midwifery practices in The Netherlands. *Midwifery* 2000;16(2):96-104.
47. **O'Connell R, Downe S.** A metasynthesis of midwives' experience of hospital practice in publicly funded settings: compliance, resistance and authenticity. *Health (London)* 2009;13(6):589-609.
48. **de Veer AJ, Meijer WJ.** Obstetric care: competition or co-operation. *Midwifery* 1996;12(1):4-10.
49. **IGZ.** Mogelijkheden voor verbetering geboortezorg nog onvolledig benut. Samenvattend eindrapport van het inspectieonderzoek naar de invoering van het Advies van de Stuurgroep zwangerschap en geboorte. [Possibilities for improvements in perinatal care are underused]. Den Haag: Inspectie voor de Gezondheidszorg, 2014.
50. **van der Lee N, Driessen EW, Scheele F.** Tailoring CanMEDS for training in obstetrics and gynaecology in the Netherlands. Chapter 6 How the past influences the collaboration between obstetricians and midwives in the Netherlands. Amsterdam: Vrije Universiteit; 2014.
51. **Downe S, Finlayson K, Fleming A.** Creating a collaborative culture in maternity care. *J Midwifery Womens Health* 2010;55(3):250-254.
52. **van Diem MT, De Reu P, Eskes M, et al.** National perinatal audit, a feasible initiative for the Netherlands!? A validation study. *Acta Obstet Gynecol Scand* 2010;89(9):1168-1173.

53. **Glantz JC.** *Obstetric variation, intervention, and outcomes: doing more but accomplishing less.* *Birth* 2012;39(4):286-290.
54. **de Boer JB, de Roon-Immerzeel A.** *Voorlichting over pijn en pijnbehandeling tijdens de baring. Aanbevelingen voor verloskundigen [Guideline Information about pain and pain treatments during labour. Recommendations for midwives].* Utrecht: KNOV, 2013.
55. **Cluett ER, Burns E.** *Immersion in water in labour and birth.* *Cochrane Database of Syst Rev* 2009(2):CD000111.
56. **De Jonge A, Teunissen TA, Lagro-Janssen AL.** *Supine position compared to other positions during the second stage of labor: a meta-analytic review.* *J Psychosom Obstet Gynaecol* 2004;25(1):35-45.
57. **de Jonge A, Teunissen DA, van Diem MT, et al.** *Women's positions during the second stage of labour: views of primary care midwives.* *J Adv Nurs* 2008;63(4):347-356.
58. **Nieuwenhuijze MJ.** *On speaking terms. Choice and shared decision-making in maternity care.* Nijmegen: Radboud Universiteit; 2014.
59. **Rijnders M, van der Pal K, Aalhuizen I.** *Centering Pregnancy biedt zwangere centrale rol in Nederlandse verloskundige zorg. [Centering Pregnancy offers pregnant women a central position in prenatal care].* *Tijdschrift voor Gezondheidswetenschappen* 2012;90(8):513-516.
60. **Sandall J, Soltani H, Gates S, et al.** *Midwife-led continuity models versus other models of care for childbearing women.* *Cochrane Database of Syst Rev* 2013;(8):CD004667.
61. **De Jonge A, De Vries JIP, Lagro-Janssen AL, et al.** *The importance of evaluating primary midwifery care for improving the health of women and infants.* *Front Med* 2015;2(17):2-5.
62. **Klomp T, De Jonge A, Hutton EK, et al.** *Management of labour pain in midwifery care. Chapter 7. Management of labour pain; perceptions of labour pain by Dutch primary care midwives, a focus group study.* Radboud University Nijmegen; 2015.
63. **Perdok H, Morkink L, van Dillen J, et al.** *Opinions of maternity care professionals about integration of care during labor for "moderate risk" indications: a Delphi study in the Netherlands.* *Birth* 2014;41(2):195-205.
64. **INCAS study.** *Amsterdam: Studies in Obstetrics, Fertility & Gynaecology, 2012. Accessed August 20, 2012. Available at http://www.studies-obsgyn.nl/home/page.asp?page_id=1207*



**Summary
Samenvatting
Curriculum vitae
Dankwoord**

Summary

Summary

Chapter 1

This introducing chapter describes the rationale, the aim and the outline of the thesis. Dutch maternity care is based on the assumption that pregnancy and childbirth are healthy, physiological processes unless proven otherwise. Independent primary care midwives in the community are responsible for the care for most women as long as they have a physiological pregnancy, labour and postpartum period. Interventions such as augmentation of labour, pharmacological pain relief, continuous fetal monitoring (EFM) or instrumental birth only take place in secondary obstetric care. This care is easily available by collaboration with and referral to secondary obstetric care. Internationally Dutch maternity care is presented as an example in which non-medicalised maternity care can be achieved in an industrialised high income country, with good outcomes for mother and child, a low level of interventions such as caesarean sections, and a realistic option for women to choose their preferred location of birth.

In the first decade of the 21st century concerns have risen about the quality of maternity care in the Netherlands. The perinatal mortality appeared to be among the highest in comparison with other European countries. Furthermore, referral rates from primary midwife-led care to secondary obstetrician-led care were rising, leading to more discontinuity of care during labour. In order to improve the quality of maternity care, the advisory report 'A Good Beginning' was published in 2010. In this report improving or restructuring the collaboration between care providers in maternity care was one of the main recommendations. This resulted in an ongoing debate in the Netherlands whether the role division between primary midwife-led care and secondary obstetrician-led care should be replaced by a model of integrated care with much closer collaboration between midwives and obstetricians.

Before decisions are made to restructure the current model, better insight into primary midwife-led care, recent changes in referral rates and associated health outcomes should be obtained. Therefore five studies have been conducted to describe and analyse trends and variation in intrapartum referrals from primary midwife-led care to secondary obstetrician-led care, including associated perinatal and maternal outcomes. The aim of this thesis is to contribute to improvements of maternity care for women with uncomplicated physiological pregnancies, in the context of a changing organisation of maternity care in the Netherlands.

Chapter 2

This chapter describes a national study in trends in referrals and in perinatal outcomes. In the national perinatal database (PRN) we analysed 789,795 low risk labours that started in primary midwife-led care in the years 2000 to 2008. Intrapartum referrals (including referrals immediately postpartum) to obstetrician-led care or to a paediatrician were classified as either urgent or non-urgent.

During the study period a considerable rise in referrals was seen, especially for nulliparous women. This was mainly a result of a increase in non-urgent referrals during the first stage of labour for reasons such as a request for pain relief, lack of progress or meconium stained liquor. These referrals increased from 28.7% to 40.7% for nulliparous women and from 10.5% to 16.5% for multiparous women. As a result, the proportion of women that stayed in the care of their own midwife throughout childbirth declined. Women who opted for a hospital birth in the care of their primary care midwife were referred more frequently. The proportion of women opting for a hospital birth increased during the study period. The yearly rise in referrals was statistically significant, also after controlling for the increase in planned hospital births and for demographic characteristics of women. Perinatal outcomes did not change during the study period. Intrapartum and neonatal mortality (0-7 days) was on average 0.9 per thousand births for nulliparous women, and 0.6 per thousand births for multiparous women. An Apgar score <7 at 5 minutes occurred in 8.6 per thousand births for nulliparous women and in 4.1 per thousand births for multiparous women. These low frequencies of mortality and morbidity can be expected in a low risk cohort.

This chapter concludes that a considerable rise in non-urgent referrals to obstetrician-led care in primary midwife-led care during labour was not associated with an improvement of perinatal safety.

Chapter 3

In the second study we investigated whether the rising intrapartum referral rate was accompanied by a rise in the caesarean section rate among the women involved. In the PRN database we analysed all labours of women who were in primary midwife-led care at the onset of labour between 2000 and 2008. Women with a caesarean section in a previous pregnancy were not included.

No relevant changes in maternal demographic characteristics in this group of low risk women were observed. However, the choice for a planned home birth decreased from

65.8% in 2000 to 45.8% in 2008 among nulliparous women, and from 68.3% to 52.4% among multiparous women. The actual home birth rate during this period dropped almost 10% among both nulliparous and multiparous women. The rise in non-urgent referrals during the study period was accompanied by a considerable increase in augmentation of labour with oxytocin and the use of pharmacological pain relief. Although EFM is not registered in PRN, we can safely assume that the use of EFM also increased as this is a routine procedure after referral to secondary obstetrician-led care. The proportion of nulliparous women who gave birth with pain relief or oxytocin increased with 15.0% to 38.1%. For multiparous women this increased with 4.2% to 9.6%. The prevalence of post partum haemorrhage >1000 ml (PPH) increased from 3.9% to 5.5 among nulliparous women, and from 2.4% to 3.4% among multiparous women. The occurrence of PPH was higher when labour was augmented. Throughout the study period, the intervention rate was lower among women who planned a home birth compared to those who planned a hospital birth.

The caesarean section rate increased from 6.2% to 8.3% for nulliparous and from 0.8% to 1.1% for multiparous women. The vaginal instrumental birth rate declined from 18.2% to 17.4% for nulliparous women and from 1.7% to 1.5% for multiparous women. After controlling for maternal characteristics including the planned place of birth, the yearly increase in caesarean section rate was still significant for nulliparous women (adj OR 1.03; 95% CI 1.02–1.03).

This chapter concludes that the rise in augmentation of labour, pharmacological pain relief and EFM among women in primary midwife-led care was accompanied by an increase in caesarean section rate for nulliparous women only. Vaginal instrumental deliveries declined for all women.

Chapter 4

The aim of this chapter is to describe variation in practice referral rates and to explore the association between the practice referral rate and a woman's chance of an instrumental birth (caesarean section or instrumental vaginal birth). Low risk births in primary care midwifery practices in the period 2008–2010 were selected in the PRN database. Intrapartum referral rates per practice were calculated. The referral rate among nulliparous women was used to divide the practices in three equal groups (tertiles).

The intrapartum referral rate for nulliparous women varied from 13.8% to 78.1% (mean 56.8; SD 8.4) and for multiparous women from 5.3% to 50.7% (mean 21.7; SD 5.9). The

Summary

variation occurred predominantly in non-urgent referrals during the first stage of labour. This wide variation between referral rates may not be explained by medical factors or client characteristics alone.

In the practices in the lowest tertile group of referrals (T1), more nulliparous women had a spontaneous vaginal birth compared to the middle (T2) and highest tertile group (T3): T1: 77.3%, T2: 73.5%, T3: 72.0%. Such difference was not found for multiparous women, who had a spontaneous vaginal birth rate of 97%. For nulliparous women the chances of an instrumental birth were significant higher in the middle tertile group (T2: OR 1.22; CI 1.16-1.31) and in the high tertile group (T3: OR 1.33; CI 1.25-1.41) in comparison with the low tertile group, even after adjustment for maternal characteristics. This association was no longer significant after controlling for the use of pain relief or augmentation.

This study shows that a high intrapartum referral rate is associated with an increased chance of an instrumental birth for nulliparous women, which is mediated by the increased use of obstetric interventions. A high referral rate may indicate that more interventions are applied than necessary, possibly leading to a lower chance of a spontaneous vaginal birth and a higher risk of a PPH. Midwives should critically evaluate their referral behaviour. However, a low referral rate should not be achieved at the cost of perinatal safety.

Chapter 5

This chapter describes a study in which we explored the influence of midwife-related factors on intrapartum referral decisions of Dutch midwives. We sent a questionnaire to a random selection of 243 primary care midwives. The response rate was 48% (117/243). The questionnaire presented 14 scenarios of early labour of nulliparous women in which midwives were asked to make a referral decision in a discrete choice experiment (DCE). The scenarios varied in woman characteristics and in clinical labour characteristics.

The estimated force of contractions and descent of the fetal head appeared to have the largest impact on respondents' referral decisions in the DCE. Furthermore, we found a wide variation in referral decisions in the DCE: the median number of referrals in the DCE was five, with a range from zero to fourteen. To explore this variation in referral scores, we measured several midwife related factors in the questionnaire, for instance risk perception. Respondents had a tendency towards overestimating risks and interventions, and an estimated low probability of a spontaneous vaginal birth was indeed associated with a high referral score. Furthermore, an adopted active management policy for the first stage of labour and a practice situated in a rural area or small city were also related to a high referral score.

This study concludes that considerable variation in referral decisions exists among midwives. A realistic perception of the possibility of a spontaneous vaginal birth and adhering to expectant management can contribute to the prevention of unwarranted medicalisation of physiological childbirth. Awareness of variation in referral decisions can stimulate midwives to reflect on their referral behaviour. Also, high quality research on the optimal management of the first stage of labour is necessary to diminish this variation.

Chapter 6

With the study described in this chapter we wanted to gain insight into factors that play a role in midwives' decision-making. Data were collected by means of two online focus groups among twenty primary care midwives. Each focus group was online during five full days. On the first day the moderator presented the main research question: "Why do you think so much variation in referral rates exists in the Netherlands?" Subsequently a new question was put forward by the moderator each day, whilst also elaborating on the answers and the interaction in the group. With thematic analysis we identified 'defining the boundaries of physiological birth' as the main theme. Two contrasting attitudes are described within this theme. Midwives who 'emphasize physiology' focused on expectant management and tailor made decisions. 'Operating on the safe side' was characterised by early anticipation of risks and adherence to protocols. Some midwives who 'emphasize physiology' experienced tensions in the collaboration with obstetricians. Midwives who operate 'on the safe side' seemed less open for client involvement.

In conclusion, midwives varied in attitude towards defining the boundaries of physiological birth. In their decisions they either tended to 'emphasize physiology' or they would 'operate on the safe side'. The increased focus on risks in Dutch midwifery care may lead to higher intrapartum referral rates, resulting in more interventions in physiological births. A stronger focus on physiological birth and better client involvement could enhance quality and reduce variation in referral rates. In order to achieve this, good interprofessional collaboration between midwives and obstetricians is required.

Chapter 7

In chapter 7 the findings of the conducted studies are discussed within the scope of this thesis and suggestions are made for improvement for the quality of primary midwife-led care and for further research. Three studies used the PRN database, which combines routinely collected information registered by midwives, obstetricians and paediatricians, and contains data of at least 95 percent of the population of interest. The database contains

Summary

only a limited set of client characteristics, and no client preferences or experiences. Since no other data sources were used, these topics could not be addressed. The two other studies explored the background of the variation in midwives' referral decisions, a topic which has not been investigated previously. All studies carried out as part of this thesis have a descriptive or explorative character and do not allow for causal explanations.

We observed low intrapartum and neonatal mortality in the group of low risk births throughout the study period. The overall decrease in term perinatal mortality that has been observed in the Netherlands since 2001, is mainly the result of a decrease in fetal mortality before the start of labour, and is therefore not reflected in our study. The rise in intrapartum referral rates did not contribute to further improvement of perinatal safety.

For the women involved, the higher referral rate affected continuity of care and several maternal outcomes. Although better availability of pain relief can be seen as an improvement, women experienced more fragmentation of care. The increased use of interventions accumulated in higher morbidity and for nulliparous women in a higher rate of caesarean sections. This gradual rise in caesarean sections among nulliparous women with a singleton term pregnancy has also been observed by others and is reason for concern.

Reducing perinatal mortality rates is a primary concern for all those involved in providing care for pregnant women. However, improving quality of care for women needs as much attention in Dutch maternity care. Improvements within primary midwife-led care can be found in providing better continuity of care and optimising chances of a normal, physiological birth. Better implementation of effective non-medical interventions could lower the need for pharmacological pain relief and augmentation of labour. This reduces the need for referrals, improves continuity of care, and helps to keep the caesarean section rate low. At the same time, a low referral rate should not be a goal in itself and should not be achieved by compromising perinatal safety.

The variation in referral rates indicates that monitoring intrapartum referrals and caesarean sections in midwifery practices may help midwives to critically reflect provided care and to investigate whether they can further optimise normal, physiological birth. Good and effective interprofessional collaboration with the local hospital team should be part of these reflections. Multidisciplinary audits of caesarean sections among term nulliparous women could help to reduce caesarean section rates.

These goals could all be achieved without major changes in the current Dutch maternity care model. Improving continuity of care for women even further presupposes adaptation of the strict role division between primary and secondary care. Primary midwife-led care during labour should be extended to non-urgent situations in which a spontaneous vaginal birth is still to be expected, but where pain relief, EFM or augmentation of labour are used as supportive interventions. That this adaptation is achieved only in good collaboration with the hospital team goes without saying.

Practice variation in Dutch maternity care is not limited to primary midwife-led care. Considerable variation is also observed in obstetric interventions in secondary obstetrician-led care, for instance for unplanned caesarean sections in nulliparous women with a term singleton pregnancy. Considering this practice variation, further research into the optimal management of the first stage of labour is a priority. Descriptive studies as well as in-depth analyses of factors that contribute to variation could help to improve the quality of care. Analysing and improving the local collaboration between midwifery practices and the hospital team deserves attention. In regions with high referral rates and high rates of unplanned caesarean sections in term nulliparous women, factors contributing to these high rates should be determined.

The midwifery profession needs to be strengthened by achieving additional competencies to attend non-urgent situations during labour and also academic competencies. Midwives should be able to strengthen physiology in pregnancy and childbirth and to evaluate their midwifery care with scientific research. In the future, midwifery education should be provided at an academic level, as is common in many other Western countries.

Final conclusion

Midwife-led primary care in the Netherlands results in a high level of spontaneous vaginal births and good perinatal results. Rising referral rates do not improve perinatal safety any further. At the same time, rising referral rates lead to discontinuity of care. The increased use of medical interventions during labour increases the risk of maternal morbidity and for nulliparous women the risk on a caesarean section.

Improving continuity of care and optimising the chances of a physiological birth in primary midwife-led care can be achieved without major changes in the current Dutch maternity care model. Improving continuity of care for women may also be achieved by extending primary midwife-led care in non-urgent situations. This is only achieved with good inter-professional collaboration with the hospital team.

Samenvatting

Hoofdstuk 1

Dit inleidende hoofdstuk beschrijft de rationale, het doel en de opzet van het proefschrift. Verloskundige zorg in Nederland is gebaseerd op het uitgangspunt dat zwangerschap en bevalling fysiologische processen zijn, tenzij er complicaties ontstaan of dreigen te ontstaan. Zelfstandige eerstelijns verloskundigen zijn verantwoordelijk voor de zorg voor vrouwen die een normale, fysiologische zwangerschap, bevalling en kraamtijd doormaken. Tweedelijns verloskundige zorg in het ziekenhuis is gedurende de gehele periode beschikbaar, door de samenwerking met en doorverwijzing naar de gynaecoloog. Als tijdens de bevalling pijnbestrijding, bijstimulatie van de weeën of continue monitoring van de foetale harttonen (CTG) nodig is, verwijst de eerstelijns verloskundige haar cliënten naar de tweede lijn. Internationaal wordt dit model gepresenteerd als een voorbeeld dat niet-gemedicaliseerde verloskundige zorg kan worden bereikt in een geïndustrialiseerd land, met goede resultaten voor moeder en kind, een laag niveau van interventies zoals een keizersnede, en een realistische optie voor vrouwen om te kiezen voor een thuisbevalling of een bevalling in een geboortecentrum of ziekenhuis.

In het eerste decennium van de 21e eeuw zijn er zorgen ontstaan over de kwaliteit van de verloskundige zorg in Nederland. De perinatale sterfte bleek een van de hoogste te zijn in vergelijking met andere Europese landen. Bovendien bleven de verwijzingen vanuit de eerstelijns verloskundige zorg naar de tweedelijns zorg stijgen. Om de kwaliteit van de verloskundige zorg te verbeteren werd het advies 'Een goed begin' gepubliceerd in 2010. In dit rapport was een van de belangrijkste aanbevelingen het verbeteren of herstructuren van de samenwerking tussen de diverse zorgverleners in de verloskundige zorg. Dit resulteerde in een debat in Nederland of de rolverdeling tussen de eerstelijns en tweedelijns verloskundige zorg moet worden vervangen door een model van geïntegreerde zorg met een veel nauwere samenwerking tussen verloskundigen en gynaecologen.

Voordat beslissingen worden genomen om het huidige model ingrijpend te veranderen, zou er een beter inzicht moeten worden verkregen in de eerstelijns verloskundige zorg, de recente veranderingen in verwijzingen naar de tweede lijn en de daarmee geassocieerde gezondheidseffecten. Daarom zijn vijf studies uitgevoerd om trends en variatie in verwijzingen tijdens de bevalling van eerstelijns naar tweedelijns verloskundige zorg te beschrijven en analyseren, inclusief de bijbehorende perinatale en maternale uitkomsten. Het doel van dit proefschrift is om bij te dragen aan verbetering

van verloskundige zorg voor vrouwen met een ongecompliceerde fysiologische zwangerschap, in het kader van een veranderende organisatie van de verloskundige zorg in Nederland.

Hoofdstuk 2

Dit hoofdstuk beschrijft een nationale studie naar trends in verwijzingen en perinatale uitkomsten in de eerstelijns verloskundige zorg. We analyseerden 789.795 laag risico bevallingen die onder begeleiding van eerstelijns verloskundigenpraktijken begonnen, in de periode 2000-2008, geregistreerd in de nationale perinatale database (PRN). Verwijzingen tijdens of direct na de bevalling naar tweedelijns verloskundige zorg of kinderarts werden geclassificeerd als urgent of niet-urgent. Tijdens de studie periode heeft een aanzienlijke stijging van deze verwijzingen plaatsgevonden, vooral onder vrouwen die bevielen van hun eerste kind (nulliparae).

De stijging was vooral een gevolg van een geleidelijke toename van niet-urgente verwijzingen tijdens de ontsluitingsfase, bijvoorbeeld vanwege een verzoek om pijnbestrijding, gebrek aan voortgang of meconiumhoudend vruchtwater. Deze verwijzingen stegen van 28,7% tot 40,7% voor nulliparae en van 10,5% tot 16,5% voor vrouwen die al eerder waren bevallen (multiparae). Als gevolg daalde het aantal vrouwen dat gedurende de hele bevalling zorg kreeg van de eigen verloskundige. Vrouwen die vooraf hadden gekozen voor een bevalling in het ziekenhuis werden vaker verwezen. Het aandeel vrouwen dat voor een ziekenhuisbevalling koos steeg tijdens de studie periode. Ook als gecorrigeerd werd voor deze stijging in geplande ziekenhuisbevallingen en demografische kenmerken van de vrouwen bleef de jaarlijkse stijging in de verwijzingen statistisch significant.

Perinatale uitkomsten veranderden niet tijdens de studieperiode. Intrapartum en neonatale sterfte (0-7 dagen) was gemiddeld 0,9 per duizend geboorten voor nulliparae, en 0,6 per duizend geboorten voor multiparae. Een Apgar score <7 op 5 minuten kwam voor bij 8,6 per duizend geboorten voor nulliparae en 4,1 per duizend geboorten voor multiparae.

De conclusie van de studie is dat de aanzienlijke stijging van de niet-urgente verwijzingen naar tweedelijns verloskundige zorg tijdens de bevalling niet gepaard ging met een verdere verbetering van de perinatale veiligheid. De aanhoudende stijging van de verwijzingen is een uitdaging voor de huidige strikte rolverdeling tussen eerstelijns en tweedelijns verloskundige zorg in Nederland.

Hoofdstuk 3

In de tweede studie hebben we onderzocht of de stijging in verwijzingen tijdens de bevalling gepaard ging met een stijging van keizersnedes. We analyseerden alle bevallingen van vrouwen die in 2000-2008 in eerstelijns verloskundigenpraktijken onder begeleiding waren bij het begin van de bevalling, geregistreerd in de nationale perinatale database (PRN). Vrouwen met een keizersnede in een eerdere zwangerschap werden niet geïncludeerd.

Er waren geen relevante veranderingen in de demografische kenmerken van deze groep laagrisico vrouwen tijdens de studie periode. De keuze voor een thuisbevalling daalde wel, van 65,8% in 2000 tot 45,8% in 2008 bij nulliparae en van 68,3% tot 52,4% bij multipara. Thuisbevallingen daalden met bijna 10% bij zowel nullipara en multiparae. De toename van de niet-urgente verwijzingen gedurende de onderzoeksperiode ging gepaard met een aanzienlijke toename van interventies (bijstimulatie van de weeën met oxytocine en het gebruik van farmacologische pijnbestrijding) met 15,0% bij nulliparae en met 4,6% bij multiparae. En hoewel het gebruik van CTG-bewaking niet wordt geregistreerd, kunnen we er van uitgaan dat ook dit gebruik is toegenomen. CTG-bewaking is routine na een verwijzing tijdens de baring. De prevalentie van bloedverlies van meer dan 1000 ml (HPP) steeg van 3,9% tot 5,5% bij nulliparae en van 2,4% tot 3,4% bij multiparae. Het optreden van een HPP was geassocieerd met bijstimulatie van de weeën. Gedurende de onderzoeksperiode was het aantal interventies lager bij vrouwen die een thuisbevalling hadden gepland dan bij vrouwen die een ziekenhuis bevalling hadden gepland.

Het percentage keizersnedes steeg van 6,2% naar 8,3% bij nulliparae en van 0,8% naar 1,1% bij multiparae. Het percentage vaginale instrumentele bevallingen daalde van 18,2% tot 17,4% bij nulliparae en bij multiparae van 1,7% tot 1,5%. Na statistisch correctie voor factoren zoals de geplande plaats van bevalling, was de jaarlijkse toename van keizersnedes nog steeds significant voor nulliparae (adj OR 1,03; 95% BI 1,02-1,03).

De conclusie van deze studie is dat de stijging van bijstimulatie, farmacologische pijnbestrijding en CTG bewaking in de eerstelijns verloskundige zorg gepaard is gegaan met een toename van keizersnedes, maar alleen bij nulliparae. De vaginale instrumentele bevallingen daalden voor zowel nulliparae en multiparae.

Hoofdstuk 4

Het doel van deze studie was om de variatie bij verloskundigenpraktijken in verwijscijfers te beschrijven en de associatie tussen het praktijk verwijscijfer en de kans van een vrouw op een instrumentele bevalling (keizersnede of vaginale instrumentele bevalling) te

onderzoeken. Bevallingen in eerstelijns verloskundigenpraktijken in de periode 2008-2010 werden geselecteerd in de PRN-database. Verwijscijfers per praktijk werden berekend. Het verwijscijfer bij nulliparae werd gebruikt om de praktijken in drie even grote groepen (tertielen) te verdelen.

Het verwijscijfer voor nulliparae varieerde van 13,8% tot 78,1% (gemiddeld 56,8; SD 8.4) en voor multiparae van 5,3% tot 50,7% (gemiddeld 21,7; SD 5.9). De variatie trad voornamelijk op in de niet-urgente verwijzingen tijdens de ontsluitingsfase. In de praktijken in de tertieltgroep met de laagste verwijzingen, hadden meer nulliparae een spontane vaginale geboorte in vergelijking met de praktijken in de middelste en hoogste tertielt groep (T1: 77,3%, T2: 73,5%, T3: 72,0%). Voor multiparae werd dit verschil niet gevonden, en bij hen was het percentage spontane vaginale bevallingen 97%.

Voor nulliparae was het risico op een instrumentele bevalling hoger in de middelste tertieltgroep (T2: OR 1,22; BI 1,16-1,31) en in de hoogste tertielt groep (T3: OR 1,33; BI 1,25-1,41), in vergelijking met de laagste tertielt groep. Dit verhoogde risico was niet meer statistisch significant na correctie voor verloskundige interventies (pijnstilling of bijstimulatie). Dit maakt aannemelijk dat het gebruik van deze interventies bijdraagt aan het hogere risico op een instrumentele bevalling in de praktijken met hogere verwijscijfers.

Deze studie laat zien dat een hoog verwijscijfer in een verloskundigenpraktijk geassocieerd is met een verhoogd risico op een instrumentele bevalling voor nulliparae. Het hogere gebruik van verloskundige interventies draagt bij aan dat verhoogde risico. Een hoog verwijscijfer kan erop wijzen dat meer interventies worden toegepast dan noodzakelijk is. Dit leidt mogelijk tot een kleinere kans op een spontane vaginale bevalling en een groter risico op morbiditeit zoals een HPP. Verloskundigen zouden daarom het verwijscijfer in hun praktijk kritisch moeten evalueren. Echter, een laag verwijscijfer is geen doel op zich en mag niet ten koste gaan van perinatale veiligheid.

Hoofdstuk 5

Dit hoofdstuk beschrijft de studie waarin de invloed is verkend van factoren bij de verloskundige op beslissingen voor verwijzingen tijdens de bevalling. We stuurden een vragenlijst naar een aselecte steekproef van 243 praktiserende eerstelijns verloskundigen. De respons was 48% (117/243). In de vragenlijst waren 14 scenario's beschreven van een vroege ontsluitingsfase bij nullipare vrouwen, waarbij de verloskundigen werd gevraagd of zij zouden verwijzen of niet. In de scenario's van dit Discrete Choice Experiment (DCE) varieerden de kenmerken van de vrouw en van het ontsluitingsproces. De inschatting van

de druk van de weeën op de baarmoedermond en de mate van indaling van het hoofd hadden de grootste impact op het besluit om te verwijzen. Verder vonden we variatie in de beslissingen van geen enkele verwijzing tot een verwijzing in alle veertien scenario's. De mediane verwijsscore in het DCE was vijf.

Om deze de variatie in verwijsscores te verkennen vroegen we ook naar verschillende kenmerken van de verloskundige of haar praktijk, waaronder risicoperceptie. De respondenten hadden de neiging om de kansen op interventies en op ongunstige uitkomsten te overschatten. Een lage schatting van de kans op een spontane vaginale geboorte was geassocieerd met een hogere verwijsscore. Ook respondenten die aangaven actief management tijdens de ontsluitingsfase te gebruiken hadden een hogere verwijsscore, net zo als respondenten met een praktijk in een landelijk gebied of een kleine stad.

De conclusie van deze studie is dat er aanzienlijke variatie bestaat in beslissingen over verwijzingen tijdens de ontsluitingsfase. Kenmerken van de verloskundige en haar praktijk spelen daarbij een rol. Een realistische perceptie van de kansen op een spontane vaginale geboorte en het volgen van een afwachtend beleid kan mogelijk bijdragen aan preventie van onnodige medicalisering van fysiologische bevallingen. Kennis over deze variatie kan verloskundigen stimuleren om kritisch te reflecteren op hun verwijsgedrag. Ook is goed onderzoek nodig naar het optimale beleid bij een fysiologische ontsluitingsfase nodig om ongewenste variatie te verminderen.

Hoofdstuk 6

Met het onderzoek dat in dit hoofdstuk wordt beschreven wilden we meer inzicht krijgen in factoren die een rol spelen in de besluitvorming van verloskundigen. Gegevens werden verzameld in twee online focusgroepen onder twintig eerstelijnsverloskundigen. Elke focusgroep was vijf dagen online. Op de eerste dag introduceerde de moderator de belangrijkste vraag: "Waarom denk je dat er zoveel variatie is in verwijzingen tijdens de bevalling in Nederland?" De volgende dagen opende de moderator steeds met een nieuwe vraag, voortbordurend op de interacties in de groep.

Door middel van thematische analyse identificeerden we als hoofdthema 'het definiëren van de grenzen van de fysiologische bevalling'. Twee contrasterende attitudes pasten binnen dit thema, als de uitersten van een spectrum. Verloskundigen die 'fysiologie benadrukken' waren gericht op een afwachtend beleid en beslissingen passend bij de

individuele cliënte. Aan de andere kant van het spectrum werd 'het zekere voor het onzekere nemen' gekenmerkt door een vroege anticipatie op eventuele risico's en op strikte naleving van protocollen. Sommige verloskundigen die 'fysiologie benadrukken' ervoeren spanningen in de samenwerking met het ziekenhuis. Verloskundigen die 'het zeker voor het onzekere nemen' leken minder gericht op het betrekken van cliënten bij hun beslissingen.

Deze studie laat zien dat verloskundigen variëren in attitude ten aanzien van het vaststellen van grenzen van de fysiologische, normale bevalling. Bij hun beslissingen neigen sommigen naar 'het benadrukken van fysiologie', terwijl anderen neigen naar 'het zeker voor het onzeker nemen'. Een toegenomen focus op risico's kan leiden tot hogere intrapartum verwijzingen, wat resulteert in meer interventies tijdens de bevalling. Een sterkere focus op fysiologische bevalling en meer betrokkenheid van de cliënte zou de kwaliteit in de Nederlandse verloskundige zorg verder kunnen verbeteren en de variatie in verwijscijfers verminderen. Dat kan alleen in een goede interprofessionele samenwerking tussen verloskundigen en gynaecologen.

Hoofdstuk 7

In dit hoofdstuk worden de resultaten van de studies in samenhang besproken, en worden suggesties gedaan voor verbetering van de kwaliteit van de eerstelijns verloskundige zorgverlening en voor verder onderzoek. Drie studies zijn uitgevoerd met behulp van de gekoppelde PRN-database, waarin de routinematig verzamelde informatie van verloskundigen, gynaecologen en kinderartsen is gecombineerd. Deze database bevat minstens 95% van de bevallingen begeleid door eerstelijns verloskundigen. De database beschrijft slechts een beperkte set van de kenmerken van de zwangere vrouwen, en bevat geen cliënt voorkeuren of cliënt ervaringen. Daarom konden deze onderwerpen niet worden onderzocht in deze studies. De twee andere studies verkenden achtergronden van variatie in intrapartum verwijzingen door verloskundigen, een onderwerp waarover tot nu toe niet veel bekend is. Alle uitgevoerde studies hebben een beschrijvend of verkennend karakter.

We observeerden een lage intrapartum en neonatale sterfte gedurende de hele onderzoeksperiode. De stijging van de verwijzingen naar tweedelijns verloskundige zorg heeft niet bijgedragen aan een verdere verbetering van de perinatale veiligheid. De daling in de a terme perinatale sterfte die is waargenomen in Nederland sinds 2001 is voornamelijk het gevolg van een afname in sterfte vóór het begin van de bevalling en is daarom niet zichtbaar in onze studie.

Samenvatting

Voor de betrokken vrouwen heeft de stijging van de verwijzingen - vooral tijdens de ontsluitingsfase - wel gevolgen. Hoewel betere beschikbaarheid van pijnbestrijding een verbetering is voor vrouwen, ervaren zij tegelijkertijd ook meer fragmentatie van zorg. Bovendien draagt het toegenomen gebruik van interventies bij aan meer morbiditeit en voor nulliparae aan een hoger percentage keizersnedes. Deze geleidelijke stijging van ongeplande keizersnedes bij nulliparae is in Nederland ook door anderen waargenomen, en is een zorgwekkende trend.

Verminderen van perinatale sterfte in Nederland is een belangrijk doel voor alle professionals die betrokken zijn bij de verloskundige zorg. Maar verbetering van de kwaliteit van de verloskundige zorg voor vrouwen in Nederland verdient evenveel aandacht. Verbetering binnen de eerstelijns verloskundige zorg kan worden gevonden in meer continuïteit van de zorg en het optimaliseren van de kansen op een normale, fysiologische bevalling. Betere implementatie van effectieve niet-medische interventies kan de behoefte aan farmacologische pijnbestrijding en stimulatie van de weeënactiviteit verlagen. Dit vermindert de noodzaak voor verwijzingen, verbetert de continuïteit van de zorg, en helpt om het percentage keizersnedes laag te houden. Tegelijkertijd is een laag verwijscijfer geen doel op zichzelf, en dit moet niet nagestreefd worden ten koste van perinatale veiligheid.

De gevonden variatie geeft aan dat het zinvol kan zijn voor eerstelijns verloskundigen om hun verwijzingen en het aantal keizersnedes bij hun cliënten te monitoren. Dit kan hen helpen om kritisch te reflecteren op de zorg die zij leveren en te onderzoeken hoe zij de kansen voor vrouwen op een normale, fysiologische bevalling verder kunnen optimaliseren. De samenwerking met het plaatselijke ziekenhuis zou onderdeel van die reflecties moeten zijn. Multidisciplinaire audits van keizersnedes bij a terme nulliparae kunnen ook helpen om verdere stijging van het percentage keizersnedes in deze groep tegen te gaan of zelfs te verlagen.

Dit alles kan worden bereikt zonder grote veranderingen in het huidige Nederlandse model voor verloskundige zorg. Om de continuïteit van zorg voor vrouwen tijdens de bevalling nog verder te verbeteren is aanpassing nodig in de strikte rolverdeling tussen eerstelijns en tweedelijns verloskundige zorg. Eerstelijns verloskundige zorg tijdens de bevalling kan dan worden uitgebreid tot niet-urgente situaties waarin een spontane vaginale bevalling te verwachten is, maar waarbij pijnbestrijding, CTG bewaking of bijstimulatie van de weeënactiviteit wordt ingezet als ondersteunende interventies. Dat dit alleen kan in goede en respectvolle samenwerking met de zorgverleners in het ziekenhuis is vanzelfsprekend.

Praktijkvariatie is niet beperkt tot de eerstelijns verloskundige. Ook in de tweedelijns zorgverlening zijn grote verschillen waargenomen, bijvoorbeeld in het percentage ongeplande keizersnedes bij nullipare vrouwen met een atermee eenling zwangerschap. Gezien deze praktijkvariatie is verder onderzoek naar het optimale beleid tijdens de ontsluitingsfase van de bevalling een prioriteit. Meer onderzoek naar factoren die bijdragen aan deze variatie kan helpen om de kwaliteit van zorg te verbeteren. Het analyseren en verbeteren van de lokale samenwerking tussen verloskundige praktijken en het ziekenhuis team verdient daarbij aandacht. In regio's met hoge verwijscijfers en hoge percentages ongeplande keizersnedes bij a termee nulliparae kunnen factoren die bijdragen aan deze hoge percentages worden vastgesteld.

Het beroep van verloskundige kan worden versterkt met extra competenties voor de begeleiding van bevallingen waarbij pijnbestrijding, CTG bewaking of bijstimulatie nodig is, en met academische competenties. Het is belangrijk dat verloskundigen met wetenschappelijk onderzoek kunnen bijdragen aan het versterken van de gezonde, fysiologische aspecten van zwangerschap, bevalling en kraamperiode en dat zij hun zorgverlening kunnen evalueren met wetenschappelijk onderzoek. De opleiding tot verloskundige moet daarom op universitair niveau worden aangeboden, zoals ook gebruikelijk is in veel andere westerse landen.

Eindconclusie

Eerstelijns verloskundige zorg tijdens de bevalling leidt tot een hoog niveau van spontane vaginale bevallingen en goede perinatale resultaten. Toenemende verwijzingen dragen niet bij aan het verder verhogen van de perinatale veiligheid in de groep vrouwen die zij begeleiden. Het toegenomen gebruik van medische interventies tijdens de bevalling is geassocieerd met een hoger risico op maternale morbiditeit en voor nulliparae ook met een hoger risico op een keizersnede.

Het verbeteren van de continuïteit van de zorg en het optimaliseren van de kansen op een normale, fysiologische bevalling in de eerstelijns verloskundige zorg kan worden bereikt zonder grote veranderingen in het huidige Nederlandse model voor verloskundige zorg. Verdere verbetering van continuïteit van zorg voor vrouwen kan worden bereikt door de eerstelijns verloskundige zorgverlening uit te breiden tot niet-urgente situaties tijdens de bevalling, vanzelfsprekend in goede interprofessionele samenwerking met de tweedelijns zorgverleners in het ziekenhuis.

Curriculum Vitae

Pien Offerhaus is geboren als Paula Margriet op 19 juni 1959 in Roosendaal, als achtste kind en zevende dochter van Rikus en Margriet Offerhaus-van den Bosch. Na het gymnasium probeerde zij enkele studies, voordat ze in 1982 terechtkwam op de Kweekschool voor Voedvrouwen in Amsterdam. In 1985 behaalde ze haar diploma, en werkte tien jaar in diverse eerstelijns verloskundigenpraktijken. Daarna raakte ze als junior onderzoeker betrokken bij wetenschappelijk onderzoek bij TNO in Leiden en studeerde parttime gezondheidswetenschappen in Maastricht. Ze behaalde haar universitaire diploma in 2001. Na een tussenstap bij de WOK (IQ Healthcare) in Nijmegen, ging ze in 2003 werken voor de beroepsorganisatie van verloskundigen, de KNOV. Ze heeft meegewerkt aan het opstellen van verschillende richtlijnen, zowel mono- als multidisciplinair. Daarnaast is ze op verschillende manieren betrokken bij wetenschappelijk onderzoek en werkt ze veel met de PRN database. Een belangrijk doel in haar werk is om het handelen van verloskundigen zo veel mogelijk van een goede wetenschappelijke basis te voorzien, om op die manier bij te dragen aan optimale zorg voor zwangere vrouwen en haar hun (ongeboren) kinderen. Pien woont in Nijmegen, samen met haar vriendin Francie.

Pien Offerhaus was born on 19th June 1959 in Roosendaal as Paula Margriet, the eighth child and seventh daughter of Rikus and Margriet Offerhaus-van den Bosch. After graduating from secondary school she tried several studies before she entered the Training school for Midwives in Amsterdam. In 1985 she was registered, and she worked during ten years in several primary care midwifery practices. Then she became involved in scientific research, as a junior researcher at TNO in Leiden. She completed her Master's degree in Health Sciences at the University of Maastricht in 2001. She worked first at the WOK – now IQ Healthcare – before she started in 2003 as a guideline developer for the Royal Dutch Organisation for Midwives, the KNOV. She was involved in a variety of monodisciplinary and multidisciplinary guidelines. She is also involved in several ways in scientific research and works on a regular basis with the PRN database. An important aim in her work is to improve the evidence basis for the work of midwives, in order to contribute to optimal care for pregnant women and their children. Pien lives in Nijmegen with her partner Francie.

Peer reviewed publications and scientific reports

- Kortekaas JC, Bruinsma A, Keulen JK, van Dillen J, Oudijk MA, Zwart JJ, Bakker JJ, de Bont D, Nieuwenhuijze M, Offerhaus PM, van Kaam AH, Vandenbussche F, Mol BW, de Miranda E. Effects of induction of labour versus expectant management in women with impending post-term pregnancies: the 41 week - 42 week dilemma. *BMC Pregnancy Childbirth*. 2014 Oct 23;14:350. doi: 10.1186/1471-2393-14-350.
- Offerhaus P.M., Otten W., Boxem- Tiemessen J.C.G., de Jonge A., van der Pal-de Bruin K.M., Hukkelhoven C.W.P.M., Scheepers P.L.H., Lagro-Janssen A.L.M. Variation in intrapartum referral rates in primary midwifery care in the Netherlands: a discrete choice experiment. *Midwifery* 2015; 31: e69–e78
- Offerhaus P.M., Geerts C., de Jonge A., Hukkelhoven C.W.P.M., Twisk, J.W.R., Lagro-Janssen A.L.M. Variation in referrals to secondary obstetrician-led care among primary midwifery care practices in the Netherlands: a nationwide cohort study. *BMC Pregnancy and Childbirth* 2015; 15 (1): 471
- Offerhaus P.M., de Jonge A., van der Pal-de Bruin K.M., Hukkelhoven C.W.P.M., Scheepers P.L.H., Lagro-Janssen A.L.M. Change in primary midwife-led care in the Netherlands in 2000-2008: A descriptive study of caesarean sections and other interventions among 807,437 low risk births. *Midwifery* 2015; (31): 648-654.
- Offerhaus P.M., Hukkelhoven C.W.P.M., de Jonge A., van der Pal-de Bruin K.M., Scheepers P.L.H., Lagro-Janssen A.L.M. Persisting rise in referrals during labour in primary midwife-led care in the Netherlands. *Birth* 2013; 40 (3): 192-201.
- Amelink-Verburg, M.P., Herschderfer K.C., Offerhaus P.M., Buitendijk S.E. The development of evidence based midwifery in the Netherlands: the journey from midwifery knowledge to midwifery research to midwifery standards of practice. In: Spiby, H., Munro, J. (ed). *Evidence Based Midwifery: applications in context*. London, Wiley Blackwell, 2010.
- Rijnders M, Offerhaus P, van Dommelen P, Wiegers T, Buitendijk S. Prevalence, outcome, and women's experiences of external cephalic version in a low-risk population. *Birth*. 2010 Jun;37(2):124-33.
- Anthony S, Buitendijk SE, Offerhaus PM, Dommelen P, Pal-de Bruin KM. Maternal factors and the probability of a planned home birth. *BJOG*. 2005 Jun;112(6):748-53.
- Offerhaus P, Fleuren M, Wensing M. Guidelines on anaemia: effect on primary-care midwives in The Netherlands. *Midwifery*. 2005 Sep;21(3):204-11.
- Offerhaus, P.M., Anthony, S., Oudshoorn, C.M.G., van der Pal-de Bruin, K.M., Buitendijk, S.E. (2002). *De thuisbevalling in Nederland. Eindrapportage: 1995-2000*. Leiden: TNO-PG

Dankwoord

Promoveren is een hele onderneming. Ik heb veel gezucht onderweg, en had regelmatig even tijd nodig om op adem te komen. Maar nu is het volbracht. En daarom is het een goed moment om iedereen te bedanken die me op wat voor manier dan ook heeft geholpen.

Om te beginnen heeft dit onderzoek alleen maar plaats kunnen vinden dankzij de trouwe registratie van zoveel gegevens in de PRN database door verloskundigen, gynaecologen en kinderartsen. En ook de verloskundigen die meededen met het vragenlijstonderzoek en de online focusgroepen ben ik bijzonder dankbaar. Ik weet niet wie jullie zijn, maar ik hoop dat jullie dit proefschrift onder ogen krijgen.

Dan mijn promotoren en co-promotoren. Het was fijn om met jullie te werken. Ik kijk terug op een flink aantal prettige bijeenkomsten. Altijd op de kamer van Toine, met thee en iets lekkers erbij, en met volop ruimte om mijn kijk op de data en analyses toe te lichten. Soms leverde dat een pittige discussie op, maar het was steeds constructief, en ik kwam er altijd vandaan met nuttige adviezen en met het vertrouwen dat het allemaal wel goed zou komen....uiteindelijk. Toine, als geen ander wist je jouw persoonlijke aandacht voor alle personen aan tafel te combineren met strak voorzitterschap. Het was heel bijzonder om je eerst als betrokken huisarts te leren kennen, en je daarna in deze rol mee te maken. Peer, het was leuk om op deze manier kennis met je te maken. Je was altijd de rust zelf, en je bracht een prettige blik van buiten de verloskunde mee. Fijn dat je tijd hebt willen maken voor dit project, tussen al je reizen en andere drukke bezigheden door. Karin, het was vertrouwd om weer eens met je te werken, zoveel jaar nadat ik bij TNO ben vertrokken uit jouw team. En Ank, ook jij bedankt voor je altijd kritische bijdrage. Je hebt een enorme inzet voor de academisering van de verloskunde, en ik kijk er naar uit om nog vaak op welke manier dan ook met je te kunnen werken.

Chantal, je was en bent mijn steun en toeverlaat bij stichting PRN. Heel wat uurtjes hebben we doorgebracht met het klaarzetten van alle data voor dit onderzoek. En als jij meeschreef aan een van de artikelen, dwong me dat steeds om scherp te blijven. Vooral het verschil tussen een associatie en een causale relatie had je aandacht, en we hebben regelmatig samen naar de juiste nuance gezocht.

Caroline, Wilma, Jolanda, Dineke: bedankt voor het mee denken en schrijven aan mijn artikelen. Dit heeft ook jullie veel tijd en inspanning gekost. Jullie hebben regelmatig

meegemaakt hoe ik worstelde met analyses, met schrijven, of gewoon met alle tijd en energie die het kostte om aan de gang te blijven als het tegenzat. Ik heb jullie daar nooit over heb horen klagen. En Jos, dank voor het inbrengen van je statistische expertise.

Ineke, zonder jouw eerste idee was ik er misschien niet eens aan begonnen. Kansen zien en mensen stimuleren horen tot jouw vele talenten. En Jos en Diny, nu ex-collega's, jullie zijn er steeds in blijven geloven. Anders was promoveren naast mijn baan beslist niet mogelijk geweest. Marjolein, heerlijk dat je al mijn referenties en literatuurlijsten in orde hebt gemaakt, en altijd snel, ook als ik onverwacht kwam aanzetten met een verzoek. En Greta, mijn buddy, je hebt me regelmatig op het juiste spoor gehouden als ik het overzicht weer eens kwijt was.

Alle andere collega's, vrienden, burens, tennismaatjes, en iedereen in mijn omgeving: was mijn promotietraject vaak nadrukkelijk en misschien wel hinderlijk aanwezig. Dank voor jullie geduld.

Marian en Gerrie, mijn paranimfen, het was fijn om op jullie steun te kunnen rekenen in het laatste stukje van dit project.

Lieve vriendinnen van touche: dit was dan de laatste proefpromotie in ons clubje...dus gauw een andere aanleiding verzinnen om af en toe bij elkaar te komen.

Mijn broers en zussen: parallel aan dit promotietraject was er de zorg voor pa en ma, die we met ons elven deelden. Dat hebben we goed gedaan met elkaar, ik ben trots op ons gezin. Het is heel jammer dat pa en ma dit feest niet meer mee kunnen maken, ze zouden er zeker van genoten hebben.

En tot slot, lieve Francie, als er iemands geduld op de proef is gesteld afgelopen jaren is het wel het jouwe. Voor jou werd het pas echt leuk toen je eindelijk aan het opmaken van het boek kon beginnen. Je hebt er echt iets unieks van gemaakt, en het is een mooi product van ons samen geworden.

