Birthing positions revisited

examining the evidence for a routine practice

Ank de Jonge

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Voor Charles en mijn ouders

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Proefschrift

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Stellingen

1. Er zijn geen goede argumenten voor het standaard gebruik van de rugligging tijdens de uitdrijving (dit proefschrift).

2. Vrouwen moeten een geïnformeerde keuze kunnen maken over baringshoudingen (dit proefschrift).

3. Bij een traag vorderende uitdrijving of cortonenpathologie dient de rugligging te worden afgeraden (dit proefschrift).

4. Om de hoeveelheid bloedverlies te beperken bij een zittende baringshouding is het zinvol oedeem te voorkomen door bijvoorbeeld regelmatig van houding te wisselen tijdens de uitdrijving (dit proefschrift).

5. Er is nog onvoldoende evidence om een specifieke baringshouding aan te bevelen ter voorkoming van perineumletsel (dit proefschrift).

6. De invloed van baringshoudingen op psychische uitkomsten is complex. Invloed hebben op de keuze van baringshoudingen lijkt voor vrouwen belangrijker dan het type houding (dit proefschrift).

7. Als niet meer aandacht wordt geschonken aan de werkomstandigheden van verloskundigen bij het begeleiden van vrouwen in andere houdingen dan de rugligging, zullen veel vrouwen verstoken blijven van een geïnformeerde keuze in baringshoudingen (dit proefschrift).

8. Het feit dat een bevalling thuis plaatsvindt, garandeert niet dat onnodige interventies worden vermeden.

9. Voor vooruitgang in deze wereld zijn mensen nodig die tegen de wind in durven fietsen.

10. Mensen komen het meest tot hun recht als ze het leven leiden dat bij hen past. En dat geldt niet alleen tijdens de baring.

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Chapter 1

General introduction

Motivation to write this thesis

In 2000, I moved to the Netherlands and started to work as a primary care midwife. I had been looking forward to work in a system that is unusual in the western world. In the United Kingdom, where I was trained, the Dutch maternity care system was often heralded as an example of a system with a low degree of medicalisation in which home birth is still a logical option for women[1]. Unlike in many western countries, where birth is only considered normal in retrospect, in the Netherlands pregnancy and birth are regarded as physiological processes unless complications arise[2].

Therefore, I was very surprised when I realised that most women gave birth lying on their back. In Britain, I was trained in assisting women in various birthing positions. Surely, a maternity care system that empowers women to choose their place of birth would also encourage them to use birthing positions that are most appropriate to them!

This experience triggered my interest in the topic of birthing positions.

Historical perspective

Before the 17th century, the use of the supine position for the second stage of labour was uncommon[3;4]. The vast majority of societies generally used other birthing positions, such as kneeling, hands and knees, squatting, standing or sitting[3;5]. Women who gave birth in supine position often did so because labour lasted very long or was very difficult and therefore exhausting[5]. Several devices were used to support women in upright positions and the birthing stool or chair has been used extensively since long before Christ[3].

The introduction of the supine position into western obstetrics has been attributed to the French obstetrician Francois Mauriceau who replaced the birthing chair with the bed[4]. However, Dunn quoted passages from Mauriceau's book to show that he plagiarised Aristotle and therefore the supine position was not as novel as is generally thought[6]. Nevertheless, he also acknowledged that Aristotle's recommendation of the supine position for birth deviated from the advice of most other classical authors who recommended the upright position.

The use of obstetric instruments in the 18th century, such as the forceps, contributed to the increasing popularity of the supine position[4]. Yet, it was not until the 19th century that the supine position became very common[3;7]. Its use spread from Europe, especially France, to America and by the beginning of the 20th century it was the customary position in the western world.

In countries where western health care has not had much influence, the upright position is still very common[8-10].

The supine position as a medical intervention

During the twentieth century childbirth became safer and more comfortable because of the use of new technologies[11]. However, in the second half of this century there was a growing awareness among obstetricians that many medical interventions had been introduced into maternity care without knowledge of their real effects[11]. This realisation resulted in a move towards 'evidence based obstetrics'. The beneficial and harmful effects of the various elements of obstetric care were examined to guide decision-making[11]. Midwives soon followed suit and books appeared on 'evidence based midwifery'[12;13].

Midwifery researchers advocate the reduction of inappropriate interventions to promote 'normal birth'[14]. Home birth is considered the touchstone of midwives' commitment to normal birth physiology[15]. However, the fact that a birth takes place at home does not guarantee that unnecessary interventions are avoided. Nevertheless, many everyday practices of midwives are often not considered interventions even if they could be classified as such. A common intervention is the routine use of the supine position during the second stage of labour.

The supine position became popular because it was promoted by health professionals, but its widespread use was not based on sound scientific evidence[4;7;16]. If women feel free to choose, they use a variety of supine and non-supine positions[8;17]. The routine use of the supine position in the western world can therefore be regarded as a medical intervention in the natural course of labour.

However, the supine position has become so common that neither health workers nor women now regard this as an intervention[3]. Even if health workers do not tell a woman to lie down, she will often do so because she assumes this is what is expected of her. Also, the prominence of the delivery bed in labour rooms implicitly tells women that the supine position is 'normal'[16].

One article listed the seven most common interventions in independent midwifery practices in the Netherlands[15]. All of these were medical interventions, such as referral to an obstetrician for induction of labour. Only one of these interventions, stripping of the membranes, did not involve the care of an obstetrician. The routine use of the supine position was not mentioned.

In view of the importance to practice evidence based midwifery, it is necessary to examine the advantages and disadvantages of this intervention. Other obstetric interventions, such as routine episiotomy, have been abolished after it became apparent that the disadvantages outweigh the advantages[18].

If no evidence were found for the continuation of the routine use of the supine position, another question remains to be answered: Which factors influence the use of various birthing positions and how can women be assisted in finding positions that are most suitable for them?

Study population

In international studies low- and high-risk women are often combined[19-23]. In the Netherlands, primary care midwives look after low risk women only. Results from international studies may not always apply to their situation. The aim of this thesis was to make a contribution to the scientific knowledge primary care midwives need to give women the best possible care.

The main focus was therefore on women who do not have risk factors at the beginning of labour and who give birth without interventions such as epidurals, oxytocin infusions or instrumental deliveries. These risk factors and interventions may confound the effect of birthing positions.

Summary of the literature

Many studies have compared the benefits of various birthing positions[22;24-28]. As far back as 1976, an anthropologist wrote that there is not one correct delivery position but that there should be a range of alternatives to suit the individual's physiological processes[3]. Nevertheless, obstetric and midwifery research is often focused on demon-

strating the superiority of one position over another. Even authors that aim to increase choice in birthing positions, equate choice with the use of non-supine positions[29;30].
In this paragraph a summary is given of the research into the influence of the supine versus other positions on obstetric outcomes. Also, a description is given of what is known about the factors that influence position choice.

Obstetric outcomes

A Cochrane systematic review of randomised controlled trials determined the benefits and risks of different birthing positions during the second stage of labour on maternal, fetal, neonatal and caregiver outcomes[31]. The conclusions were that upright or lateral positions compared with supine position led to a small reduction in instrumental deliveries, a reduction in episiotomies, a smaller increase in second degree perineal tears and fewer abnormal fetal heart rate patterns. Women also reported severe pain less often in upright or lateral positions. The only disadvantage was an increase in blood loss, particularly among women allocated to the birth chair.
In this review some studies were included in which lateral or lateral tilt positions were combined with supine positions. Also, in some settings health professionals appeared to be unconfident in assisting births in non-supine positions and this may have caused bias in the results.
Since the supine position is the routine intervention that needs evaluation, it would be useful to conduct a review in which randomised controlled trials as well as good quality cohort and case-control studies are included that compare the supine positions to other positions. This review should only include studies in which professionals are experienced in assisting births in various positions.

Blood loss and perineal damage

The effect of birthing positions on blood loss and perineal damage warrants further investigation. Several studies into birthing positions included women with obstetric interventions, such as oxytocin infusion and epidural anaesthesia, which may increase the risk of blood loss and perineal damage[19;22;23;28;32-36]. Many observational studies did not control for these risk factors[19;20;22]. Studies conducted among women without obstetric interventions would avoid some major biases.

It is not clear which factors contribute to the increased blood loss in upright positions[28;37].
Measurement error may be one of these factors. In most studies, *estimated* blood loss was used as the outcome measure[26;28;33;38]. In upright positions the same amount of blood loss may appear to be more than in recumbent position because it can be collected in a receptacle[28]. To examine whether there is a real difference in blood loss between supine and upright positions, more *accurate measurements* need to be used.
Even if a real difference were established with more accurate methods, the origin of the excess in blood loss is not clear. The bleeding source could be the uterus or perineal

damage. Uterine atony is a serious cause of postpartum haemorrhage and an important indication for emergency peripartum hysterectomy in the Netherlands[39]. If there is an increase in blood loss in sitting positions, it is therefore important to establish where this originates from.

The evidence on the association between birthing positions and perineal trauma also needs further investigation. The overall intact perineum rate did not differ between position groups in some studies[24;33;40]. Other studies found a difference with some showing a higher rate of intact perineum in upright positions[25;32;41;42] and others showing lower rates[27;43;44].
Labial tears were more frequent in upright positions in a few studies[28;42] but usually labial damage was not reported. Often no distinction was made between positions during the second stage of labour and position at the time of birth. Therefore, authors of a systematic review concluded that, although birthing position did not affect the overall perineal trauma rate, an increase in trauma in upright position for *birthing* could not be ruled out[45].
In addition, the type of health professional may influence the incidence of perineal damage. In one study, midwives had lower rates of perineal trauma than obstetricians[27]. Often researchers did not report which type of professional attended the birth.
It would be useful to conduct a study into position at the time of birth and perineal damage whereby only one type of health professional assists at women's births.

Women's experiences of birthing positions

The efforts to reduce risk in childbirth have led to an increase in interventions and a shift in power from women to health professionals[46;47]. These practices have resulted in increasing dissatisfaction among women, especially in maternity care systems with a strong emphasis on technology[47]. There is a growing awareness that a good outcome of childbirth is not only a live mother and baby in good physical health. Psychological outcomes are also recognized as important aspects of quality of care.
The experience of childbirth has a profound effect on women and has the potential for a permanent positive or negative impact[48-51]. Because women's childbirth experiences change over time, measuring psychological outcomes soon after birth may be too optimistic and not relevant in understanding its long-term effects[52;53].
Birthing positions influence childbirth experience and can have an impact on women even after many years[54]. Non-supine compared to supine birthing positions have been associated with reduced pain, increased birth satisfaction and an increased feeling of being in control, measured soon after birth[55-57]. It is not known whether birthing positions influence *long-term* birth satisfaction, level of self-esteem and level of well-being.

The associations between birth in non-supine positions and a good birth experience and lower incidence of severe pain were found in quantitative studies[24;28;58]. However,

due to methodological problems, these findings have to be interpreted with caution. The way in which questions were worded was not always clear and sometimes not even reported. In addition, if the midwife who assisted the woman at the birth handed out a questionnaire, this may have led to desirable answers[28].
Moreover, quantitative studies do not shed light on *how* birthing positions contribute to women's experiences. Why do more women experience severe pain in supine position? Do they feel more physical pain or are they less able to cope with the pain? Some authors have suggested that women can communicate at a more equal level with the midiwife when they are upright[59]. This may increase their feeling of being in control of their pain.
Qualitative methods are more appropriate to study these underlying mechanisms[60]. A qualitative study would give more insight into women's individual experiences of birthing positions.

Factors that influence the use of the supine position

Although widespread use of obstetric instruments, such as the forceps, contributed to the popularity of the supine position, the invention of Doppler ultrasound transducers facilitated listening to the fetal heart in non-supine positions[25]. Nevertheless, the supine position is still the dominant birthing position in western countries today. It is important to examine which factors contribute to the continuation of this practice.
The maternity care setting and the characteristics of a woman seem to have an influence on position choice. Midwives have reported that the work environment and clinical factors influence their tendency to use certain positions[61]. Midwives who experience more autonomy in their work places are more likely to use non-supine positions[61;62]. Midwives are more likely to do so than obstetricians[63;64].
In one study, women in non-supine positions were older and more often highly educated but only the position at the time of birth was recorded[65].
Identifying factors that influence the use of birthing positions would shed more light on the midwife-client dynamic in position choice[29;61]. A study to identify factors that influence the use of birthing positions would be best conducted among low risk women to minimise the effect of medical interventions. Places where midwives are autonomous practitioners are ideal for such a study because organisational restraints in the use of positions will be minimal.

Because midwives are more likely to use non-supine positions than obstetricians and they are more likely to use these positions if they have more autonomy, it follows that the influence of these professionals is crucial in the use of birthing positions[62-64;66]. To understand why the supine position remains so dominant in the western world, it is necessary to find out how midwives deal with birthing positions.
Midwives' views have only had limited attention and mainly in questionnaire surveys[61;66;67]. Coppen identified a 'dichotomy jigsaw' among midwives[67]. Midwives who gave women control over their own body preferred upright positions, whereas recum-

bent positions were preferred by midwives who were more concerned about their own comfort and who needed to have more control over the delivery. Coppen equates giving women control with encouraging them to use non-supine positions[67].
However, this view ignores the fact that some women may choose to give birth in supine position, even if they are fully aware of other options. On the other hand, many women may choose supine positions because the culture in which they live has indoctrinated them with the idea that this is 'normal'.
A qualitative study among midwives can give insight into the ways in which midwives can enable women to use birthing positions that are most appropriate to them within societies that are heavily biased towards the use of the supine position.

Aims of thesis

The central aims of this thesis were:

- To gain insight into the advantages and disadvantages of the routine use of the supine position during the second stage of labour among low risk women.
- To gain insight into the factors that influence the use of birthing positions.

Research questions

A variety of study designs were used to achieve our aims by answering the following research questions:

Advantages and disadvantages of the supine position:

1. What are the benefits of the routine use of the supine position during the second stage of labour compared to other positions, in terms of maternal morbidity and comfort and perinatal morbidity?
2. What is the influence of semi-sitting and sitting compared with recumbent birthing positions on the risk of severe blood loss, net of other factors, when accurate measurements of blood loss are used?
3. What is the influence of position at the time of birth (recumbent, semi-sitting or sitting) on perineal damage, controlled for other factors?
4. Does the use of only the supine position during the second stage of labour influence long-term birth satisfaction, level of self-esteem and level of well-being net of other influencing factors?

Factors that influence the use of birthing positions:

5. What are women's experiences with and views on various birthing positions during the second stage of labour?
6. What is the influence of socio-demographic and labour factors on the use of birthing positions during the second stage of labour and at the time of birth?

7. How do midwives deal with birthing positions and which factors influence their use of various positions?

Outline of the thesis

The research questions are answered in chapter 2 to 8:

Chapter 2 describes a meta-analytic review into the obstetric outcomes of the routine use of the supine position for the second stage of labour compared to other positions. Nine randomised controlled trials and one cohort study comparing the supine position to another position were included. Data from the randomised controlled trials were pooled. Non-pooled data on women's experiences with birthing positions were also examined.

In *Chapter 3* the findings are reported of a secondary analysis of a large trial in twenty primary care midwifery practices in the Netherlands. Differences in blood loss were examined in recumbent, semi-sitting and sitting position using accurate measurements. We established net effects and examined the interaction between birthing position and perineal damage.

Chapter 4 describes the results of a study into the influence of position at the time of birth (recumbent, semi-sitting or sitting) on perineal damage, controlling for other factors. The same data were used as in chapter three.

Chapter 5 shows the results of a retrospective cohort study into the effect of the use of only the supine position on long-term birth satisfaction, level of self-esteem and level of well-being in low risk women net of other influencing factors. A questionnaire was sent to women three to four years after they gave birth. The Rosenberg Self-esteem Scale and the Edinburgh Depression Scale were used to measure self-esteem and emotional well-being.

Chapter 6 presents the results of a qualitative study into the views of women about various birthing positions. In-depth interviews were held with women 7 to 19 weeks after their birth.

In *Chapter 7* the findings are reported of a study into socio-demographic and labour factors that influence the use of birthing positions during the second stage of labour and at the time of birth. The retrospective cohort study mentioned in chapter 5 was used to answer this research question.

Chapter 8 describes the results of a focusgroup study among primary care midwives to explore how midwives deal with birthing positions and which factors influence their use of various positions.

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Chapter 2

Supine position compared to other positions during the second stage of labour: a meta-analytic review

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Abstract

The routine use of the supine position during the second stage of labour can be considered to be an intervention in the natural course of labour. This study aimed to establish whether the continuation of this intervention is justified. Nine randomised controlled trials and one cohort study were included. A meta-analysis indicated a higher rate of instrumental deliveries and episiotomies in the supine position. A lower estimated blood loss and lower rate of postpartum haemorrhage were found in the supine position, however it is not clear whether this is a real or only an observed difference. Heterogeneous, non-pooled data showed that women experienced more severe pain in the supine position and had a preference for other birthing positions.

Many methodological problems were identified in the studies and the appropriateness of a randomised controlled trial to study this subject is called into question. A cohort study is recommended as a more appropriate methodology, supplemented by a qualitative method to study women's experiences. Objective laboratory measurements are advised to examine the difference in blood loss.

The results do not justify the continuation of the routine use of the supine position during the second stage of labour.

Key words: supine/upright/lateral birthing position, birth experience

Introduction

Before the 17th century the upright birthing position was common in western countries[1,2]. Women only started to adopt the supine position on a large scale when obstetric instruments were introduced such as the delivery forceps[3]. The supine position became popular because of the convenience of health professionals rather than the benefits for women[4]. In countries where western health care has not had much influence, the upright position is still very common[3,5,6]. The widespread use of the supine position during the second stage of labour, even for women who do not need an instrumental delivery, can be considered as an intervention in the natural course of labour. The delivery bed can therefore be regarded as a midwifery instrument[7]. Based on experiences in non-western countries and in western countries before the 17th century, it can be assumed that women will not only lie down during the second stage of labour, if they feel free to use other positions. Studies have confirmed that women use various positions, supine and non-supine, if they are left to choose[6,8,9]. The supine position, however, has become so common that neither health workers nor women now regard this as an intervention[3].

In the last few decades of the twentieth century, alternatives to the supine position have gained some popularity. The invention of Doppler ultrasound transducers has made it easier to listen to the foetal heart when the woman is in non-supine positions[10,11]. Physical benefits supposedly associated with non supine positions are increased uterine pressure, more effective bearing down efforts, improved foetal positioning, reduced risk of aorto-caval compression and increased diameters of the pelvis[3,5,12-15]. Psychological benefits that have been ascribed to upright positions include reduced experience of pain, increased feeling of being in control, communication with the delivery attendant on a more equal level and more active involvement of the woman's partner[7,16,17]. These aspects are important in view of the increasing emphasis on the autonomy of women and on a positive birth experience[18].

Expecting women to adopt one particular position, whether supine or non-supine, during the second stage of labour, can only be justified if there is good evidence that this has important advantages for the health of either the mother or the baby[19].

A meta-analysis has been conducted into the benefits and risks of different positions during the second stage of labour[20]. The authors conclude that the use of any upright or lateral position, compared with a supine or lithotomy position, was associated with a reduced duration of the second stage of labour, a reduced reporting of severe pain and a reduction in assisted deliveries, abnormal foetal heart rate patterns and episiotomies. On the other hand, they found an increase in second degree tears and an increased risk of blood loss of more than 500 ml. Randomised trials were included in which lateral or lateral tilt and supine positions were combined as recumbent positions.

In this article it is not assumed that there is one superior position for the second stage of labour. However, since the supine position is often used routinely in western countries[3], this meta-analysis aimed to establish the benefits of this intervention in the light

of evidence-based medicine. Studies included should therefore compare the supine position to the use of one other or several positions.
The key question was: what are the benefits for women of the routine use of the supine position for the second stage of labour compared to other positions, in terms of maternal morbidity and comfort and perinatal morbidity?

Methods

Formulation of the problem

This meta-analysis focused on women in the second stage of labour who were expected to have a vaginal birth. The onset of the second stage was defined as full dilatation of the cervix or from the time of expulsive effort if full dilatation was not established. The supine position was defined as the woman lying on her back, supported with pillows or a bed rest to a maximum of 45° from the horizontal. If authors did not specify when exactly the position had been used, it was assumed that it had been adopted during most of the second stage. Randomised controlled trials (RCTs) were included as well as case-control and cohort studies. The following outcomes for the mother were included: medical interventions for failure to progress, trauma to the birth canal, estimated or measured blood loss, postpartum haemorrhage (more than 500 ml), haemoglobin levels after delivery, incontinence of urine or faeces, pelvic pain or instability and the mother's satisfaction with the birth experience including perception of pain. Trauma to the birth canal was defined as: intact perineum, first, second or third degree tear. For the child the following outcomes were included: abnormal foetal heart rate patterns, Apgar scores, mean umbilical cord artery pH and the need for neonatal resuscitation.
Although in many trials the duration of the second stage has been compared between groups, this criteria was not included. The onset of the second stage is very arbitrary. Some take full dilatation as the onset, others the start of active pushing. In addition, it is questionable whether the duration of the second stage is a clinically important variable. It is more important whether intervention was needed because of a delay in the progress of the second stage; therefore this criteria was chosen instead.
Findings of studies in which health professionals appear to be unconfident in assisting births in non-supine positions could easily have been biased and such studies were therefore excluded. In some articles the inexperience of professionals was described by the authors, in others it was clear that the use of a new birthing position had been introduced at the start of the study with which the professionals were unfamiliar.
While developing the protocol it was decided to perform subanalyses on supine versus upright positions and on supine versus lateral positions, on primigravidas and multigravidas, and on inclusion or exclusion of women who had used oxytocin infusion or epidural anaesthesia.

Search strategy

Literature was searched between 1 February 2001 and 31 March 2002 from 1966 (or from the earliest available date) onwards via Medline, Embase, The Cochrane Library (including the CENTRAL/CCTR database), Web of Science, Cinahl, Midirs (Midwifery Database), and Picarta (keywords and related articles). The following trial registers have been contacted: National Institutes of Health Inventory of Clinical Trials and Studies, Colombia Registry of Clinical Trials and International Registry of Perinatal Trials. Some articles were found via reference lists of other studies. From the articles that were initially found, a cited reference search was done. The search was limited to the English, German, French and Dutch languages. Keywords used were: delivery/ birth/ birthing/ bearing down/ pushing/ upright AND position, birth(ing) stool/chair/cushion, second AND stage AND labour.

Table 1: Studies excluded from the review

Study (first author)	Reason for exclusion
Aarnoudse (1984)[39]	No outcome measures in line with protocol
Aikins Murphy (1998)[40]	Position not clearly defined
Allahbadia (1992)[41]	Professionals unfamiliar with squatting position
Bastian (1994)[42]	Cohort with quality mark 1
Bhardwaj (1994)[43]	Only abstract found
Bomfim-Hyppolito (1998)[44]	Randomised controlled trial with quality mark 3
Chan (1963)[45]	Randomised controlled trial with quality mark 3.5
Crowley (1991)[46]	More senior midwives in birth chair group, medical students only involved in recumbent deliveries
Drähne (1982)[47]	Only abstract found
Gardosi (1989a)[38]	Professionals unfamiliar with upright position
Gardosi (1989b)[48]	Semi-recumbent and lateral position combined in one group
Gåreberg (1994)[49]	Comparison of two upright positons
Golay (1993)[11]	Cohort with quality mark 1.75
Gupta (1989a)[50]	Professionals unfamiliar with squatting position
Hagymasy (1998)[36]	Cohort with quality mark 1.5
Hemminki (1986)[51]	Professionals unfamiliar with birth chair
Kafka (1994)[52]	Cohort with quality mark 1.25
Kleine-Tebbe (1996)[53]	Control group includes other than supine position
Liddell (1985)[54]	Randomised controlled trial with quality mark 3.5
Liu (1974)[55]	Semi-upright position defined as 30° from horizontal
Liu (1989)[56]	Semi-upright position defined as 30° from horizontal
McManus (1978)[57]	Control group adopted lateral recumbent position
Moll (1985)[58]	Cohort with quality mark 1
Nodine (1987)[59]	Cohort with quality mark 1
Olson (1990)[60]	Cohort with quality mark 0.75
Racinet (1999)[61]	Professionals unfamiliar with squatting position

Radkey (1991)[62]	Only abstract found
Roberts (1984)[63]	Position not well defined
Rohrbacher (1998)[64]	Position not well defined
Romney (1984)[65]	Professionals not familiar with birth chair
Schneider-Affeld (1982)[66]	Only abstract found
Shannahan (1985)[67]	Cohort with quality mark 0.75
Shannahan (1989)[68]	Cohort with quality mark 0.75
Shorten (2002)[69]	Cohort with quality mark 1.5
Stewart (1989)[70]	Supine position includes lateral tilt
Van Diem (2002)[37]	Supine position includes lateral position

Inclusion criteria

Initially, the researcher (AJ) found 46 studies. Two unpublished trials were identified. In table 1 the excluded studies and the reason for exclusion are given.

In 12 studies the position or outcomes did not meet the criteria of the protocol. For example, in some studies the supine position also included a lateral tilt. For 4 other trials only an abstract was found. Several attempts were made to obtain more details about these studies from the authors, their places of work and publishers but these efforts were unsuccessful. Two researchers (A. De Jonge and D. Teunissen) assessed whether the professionals in the remaining studies were competent in the management of labour in all the positions that occurred in the study and unanimously decided to exclude seven studies.

The second researcher (TT) was only given the information which was essential for assessing the trial; names of authors, journals, institutions, places where studies were undertaken and years of publication were removed. The remaining 23 studies, 13 RCTs and 10 cohort studies, were assessed using a quality criteria list based on the Delphi-list21 (table 2).

Table 2: Quality criteria list (modified Delphi list)[21]

A.	Was randomization in an RCT conducted in a concealed manner? Randomisation and concealed (computer, table with random numbers, etc.) = 1, randomised but not concealed (hospital number, date of birth, length, alternation, etc.) = 0.5, not randomised or not clear how randomisation was performed = 0.
B.	Were groups similar at baseline regarding the most important prognostic indicators? • parity • maternal age • induction or augmentation with prostin and/or oxytocin infusion • epidural or pethidine for painrelief • birthweight If groups are similar for all but one indicators = 1, if more than one indicator is not mentioned where it should have been = 0.5, if more than 2 are not mentioned = 0 If for 1 or more indicators there is a significant difference between the groups ($P < 0.05$) = 0.
C.	Were the eligibility criteria specified (for inclusion in the trial as well as for the inclusion in either study or the control group)? Clearly specified = 1, partly described = 0.5, not specified = 0. If the supine group includes women in lateral position, and it has not been specified how many women adopted this position, the study should be excluded.
D.	Was the outcome assessor blinded?
E.	Was the care provider blinded?
F.	Was the patient blinded?
G.	Were point estimates and measures of variability presented for the primary outcome measures? Yes = 1, partly so = 0.5, no = 0.
H.	Did the analysis in an RCT include an intention to treat analysis? Yes = 1, doubtful = 0.5, no = 0.
I.	Is the compliance rate (in each group) in an RCT unlikely to cause bias? If > 80% have adopted the allocated position (in each group) = 1, 70 – 80% = 0.5, < 70% or not known = 0.

Per item the score is 1 if the criteria has been satisfied, 0 if not and 0.5 if partly satisfied.
Randomised controlled trial: maximum score 9: included if score is more or equal to 4
Cohort study: only B,C and G are scored: maximum score 3:
included if score is more or equal to 2

The two researchers scored the studies independently. For one researcher (TT) the studies were blinded as mentioned above. The maximum score given to RCTs was 9 and for cohort studies was 3. In 7 studies the second researcher (TT) scored 0.5 point higher than the first researcher (AJ) and in 1 study 1 point higher. In 1 study the first researcher (AJ) scored 0.5 point higher than the second researcher (TT). In table 3 the included studies are listed with the average quality score for each. The cut off point for inclusion for RCTs was a score of 4 or higher and for cohort studies 2 or higher. This low cut off point was taken because almost all studies scored 0 on all the items concerning blinding. Only one study scored 0.5 on the item of blinding of the outcome assessor because an independent person recorded haemoglobin levels and women's experiences but the attending midwife assessed other outcomes. Nevertheless, the items about blinding remained in the list to indicate their importance and to show the loss of quality because these criteria could not be met. Only in one cohort study[11] the difference in scoring led to disagreement about whether to include the trial or not. This was resolved by asking the opinion of a third researcher (ALJ) after which the study

was excluded. After the quality assessment, 9 RCTs and 1 cohort study were finally included in the review. The maximum score for methodological quality of the RCTs was 6.75 out of 9 and the median was 4.5. The only cohort study scored 2.

Table 3: Studies included in the review

Study (first author)	Study design	Quality mark	N[a]	Sample (n[b])
Chen (1987)[29]	RCT	5.25	116	supine (43) versus birthing chair (73)
De Jong (1997)[25]	RCT	6.75	517	supine (260) versus squatting on step stool (257)
Hillan (1984)[31]	RCT	4.5	500	supine (250) versus chair (250)
Humphrey (1973)[23]	RCT	4.0	40	supine (20) versus lateral tilt (20)
Johnstone (1987)[24]	RCT	4.25	58	supine (30) versus lateral tilt (28)
Lydon-Rochelle (1995)[26]	Cohort	2.0	393	supine (197) versus other positions (196)
Marttila (1983)[28]	RCT	4.5	100	supine (50) versus chair made from bed (50)
Stewart (1983)[30]	RCT	4.5	189	supine (90) versus chair (94)
Turner (1986)[32]	RCT	4.0	636	supine (370) versus chair (266); for analysis 313 versus 226 (no intention to treat analysis)
Waldenström (1991)[27]	RCT	5.0	294	supine (146) versus birthing stool (148)

[a] = Total number of women in the study
[b] = Number of women in the sub-sample
RCT = Randomised controlled trial

Statistical analysis

A meta-analysis was performed on the nine RCT's for all physical outcomes, using a random effects model. The RevMan software was used which was developed by the Cochrane Collaboration[22]. Analyses were performed according to the random effects model. Heterogeneous outcomes, dealing with the experiences of the mother, and those from the cohort study were not pooled together and were described separately. Odds ratios were given for categorical data and weighted mean differences for continuous data. P-values were based on the normal Z-test. Statistical significance was defined as $P < 0.05$.

Results

The compliance rate varied greatly between the studies (from 49.3% to 100%). Some studies did not include standard deviations for continuous variables and could therefore not be included in the meta-analyses for these outcomes. Only one birthing position was mentioned. It was not always clear whether this position had been adopted throughout the entire second stage. Table 4 shows the outcomes of the meta-analysis.

The supine position compared with other positions was associated with an increased rate of instrumental deliveries. In the supine position there was a decreased estimated blood loss and the incidence of postpartum haemorrhage was also decreased. Both these differences were only significant for multigravidas and when supine and upright positions were compared. Only two studies compared women in supine position to those with a lateral tilt[23,24]. Only one of these looked at the difference in estimated blood loss (without analysing separately for primigravidas and multigravidas) and found no significant difference between the two groups[24]. There was no significant difference in the requirement for a blood transfusion. In only one study in which postpartum haemorrhage was an outcome measure, neither oxytocin nor epidural infusion were used during the first stage of labour[25]. Women in this study were randomised in a supine and a squatting group. In this study, which was also the best quality study in the review, the lowest incidence of postpartum haemorrhage was reported and there was no difference between the two groups.
An increase in episiotomies was found in the supine position. There was a tendency towards a decrease in second degree tears but this was not significant. When episiotomies and second degree tears were combined, to give an impression of perineal damage in need of suturing, the rate was higher in the supine position (borderline statistically significant) (P=0.05). The incidence of third degree tears was not reported in any of the studies.

In the cohort study, a higher rate of episiotomies was found in lithotomy and semi-sitting (25-45°) position compared to alternative positions (34% and 11% versus 9%)[26]. The relative risk of an episiotomy in an alternative position was 0.59 (Confidence Interval 0.37, 0.93, P< 0.02). There was no significant difference in perineal tears between the three groups.

There were no significant differences in Apgar scores, abnormal foetal heart rate patterns or requirement of neonatal resuscitation. The difference in mean artery pH of - 0.02 in supine position was borderline statistically significant (P=0.05).

Table 4: Outcomes of meta-analysis. Supine versus non-supine positions: maternal and perinatal morbidity.

Outcome	Studies	Supine n[a] or o/n[b]	Not supine n[a] or o/n[b]	OR or WMD	95% CI	P-value
Instrumental delivery	De Jong[25], Hillan[31], Johnstone[24], Marttila[28], Stewart[30], Turner[32], Waldenström[27]	130/1139	88/1053	1.37	[1.03, 1.84]	**0.03**
EBL in ml	Hillan[31], Johnstone[24], Stewart[30]	370	372	- 58.98	[-88.55, -29.41]	**< 0.001**
EBL supine versus upright	Hillan[31], Stewart[30]	340	344	- 71.63	[-107.70, -35.57]	**< 0.001**
EBL supine versus lateral tilt	Johnstone[24]	30	28	- 33.00	[-84.67,18.67]	n.s.
EBL primigravida's	Hillan[31], Stewart[30]	161	165	- 43.07	[-101.95, 15.81]	0.15
EBL multigravida's	Hillan[31], Stewart[30]	179	179	- 92.04	[-134.58, - 9.51]	**< 0.001**
PPH (> 500ml)	De Jong[25], Hillan[31], Stewart[30], Turner[32] Waldenström[27]	53/1017	90/943	0.52	[0.36, 0.75]	**< 0.001**
Bloodtransfusion	De Jong[25], Waldenström[27]	1/406	4/405	0.35	[0.05, 2.30]	0.3
Episiotomy	De Jong[25], Hillan[31], Johnstone[24], Stewart[30], Turner[32], Waldenström[27]	394/1089	252/1003	1.73	[1.20, 2.50]	**0.003**
Second degree tear	De Jong[25], Hillan[31], Stewart[30], Waldenström[27]	111/746	139/749	0.74	[0.52, 1.04]	0.09
Episiotomy and second degree tear	De Jong[25], Hillan[31] Stewart[30], Waldenström[27]	371/746	297/749	1.56	[0.99, 2.45]	0.05
Abnormal fetal heartrate pattern	De Jong[25], Marttila[28]	36/310	32/307	1.52	[0.30, 7.59]	0.6
Apgar = or < 7 at 1 min	De Jong[25], Johnstone[24] Marttila[28]	17/340	11/335	1.38	[0.59, 3.23]	0.5
Apgar = or < 7 at 5 mins	Johnstone[24], Marttila[28] Turner[32]	3/393	1/304	1.85	[0.27, 12.79]	0.5
Mean artery pH	Chen[29], Humphrey[23] Johnstone[24]	93	121	-0.02	[-0.05, 0.00]	0.05
Neonatal resuscitation	De Jong[25], Johnstone[24]	16/290	12/285	1.32	[0.61, 2.86]	0.5

[a] = total number of subjects in the subgroup (i..e. supine or not supine), [b] = number with outcome of categorical variable / total number of subjects in the subgroup, OR = Odds Ratio, WMD = Weighted Mean Difference, CI = Confidence Interval, EBL = Estimated Blood Loss, PPH = Postpartum Haemorrhage,
n.s. = non-significant

Table 5: Supine versus non-supine position: women's birth experiences

Study (first author)	N[a]	Method	Results	P
Experience of pain				
De Jong[25]	517	Independent midwife recorded pain day after delivery; mild, moderate, severe, extreme	Fewer women in squatting group reported significant pain	trend **0.003**
Marttila[28]	100	Not described	Fewer women in half-sitting Position reported intolerable Pain (0 vs 4)	**< 0.05**
Waldenström[27]	287	Questionnaire given by assisting midwife 2 hours after delivery; indicate level of pain on scale from 1 to 10	Birthing stool lower average level of pain compared to supine (6.9 versus 7.6)	**0.02**
Bearing down effort				
Chen[29]	116	Questionnaire filled in on 6th day postpartum	More nullipara's on birthing chair found it easy to bear down More multipara's on birthing chair found it easier to bear down than at the previous delivery	**< 0.05** **< 0.05**
Experience				
De Jong[25]	517	Independent midwife recorded satisfaction day after delivery: very unhappy, slightly unhappy, satisfied, very satisfied, very happy	No significant difference in maternal satisfaction	trend 0.09
Marttila[28]	100	Not described	In half-sitting position 5 women had a very unpleasant experience, in supine position 9 women	1
Waldenström[27]	287	Questionnaire given by assisting midwife 2 hours after delivery; excellent, fairly good, neither good nor bad, not good or very bad experience	Women on birthing stool more positive experience	trend **0.011**
Preferred position for next delivery				
Marttila[28]	100	Not described	96% of women in half-sitting position and 86% in supine position prefer half-sitting position next time	
Waldenström[27]	287	Questionnaire given by assisting Midwife 2 hrs after delivery	53% of women on birthing stool and 41% of women in supine position prefer same position for next delivery Of women who actually delivered in allocated position these percentages were 90% and 49% respectively	

[a]Number of women who were assessed for these outcomes

Four studies measured aspects of women's birth experience (see table 5)[25,27-9].
They all used very different methods. Three studies asked women about the experience of pain and about the satisfaction with the birth[25,27,28]. De Jong et al. found a significant trend towards women reporting more significant pain in the supine position[25]. Marttila et al. stated that more women reported intolerable pain in supine position[28]. They did not describe how and by whom women were asked about this. Waldenstrøm & Gottvall asked women to indicate their pain on a scale from 1 to 10 and found an average of 7.6 for women in supine position as opposed to 6.9 for women on a birthing stool[27].

De Jong et al. also asked women about their satisfaction by letting them choose between 5 options[25]. There was no significant difference in satisfaction between the two groups. Marttila et al. found that more women reported the delivery to be an unpleasant experience in the supine group compared to the half-sitting group but this difference was not significant[28]. Waldenstrøm & Gottvall[27] found a significant trend for women on the birthing stool to have a better experience than those in supine position. No women in either group reported to have a very bad experience.

Chen et al. asked women how easy it was to bear down[29]. More nulliparas reported difficulty in bearing down in the supine position compared to those in the birthing chair. Fewer multiparas in the supine position said they found it easier to bear down than during the previous delivery, which would probably have been in supine position.

Two studies asked women in which position they would like to give birth next time[27,28]. In Marttila et al.'s study the majority of women in both groups would like to give birth in a half-sitting rather than supine position next time[28]. In Waldenstrøm and Gottvall's study fewer women in the supine group would like to use the same position next time compared to the birthing stool group and when women who actually gave birth in the allocated position were compared the difference was much larger (49% versus 90%)[27].

The other outcomes mentioned in the protocol were not measured in the studies in the review.

Discussion

The approach taken in this meta-analyisis was different from the one conducted by Gupta and Nikodem[20]. The outcomes are not very different from their comparison between supine or lithotomy position and upright or lateral position. We too, found an increase in instrumental deliveries and epsiotomies in the supine position compared to other positions and a decrease in blood loss and postpartum haemorrhage. The decrease in second degree tears in supine position found in their study did not reach significance in ours ($P = 0.09$). They observed more abnormal foetal heart rate patterns in the supine position, whereas we did not. In both meta-analyses, no differences in low Apgar scores or neonatal resuscitation were found. The inclusion by Gupta and Nikodem[20] of studies in which professionals appeared not to be confident in assisting women in all the positions which occurred, did not produce different outcomes to

our meta-analysis which excluded these studies. Inexperience with births in different positions should therefore not be an argument against allowing women to use them. We found no studies which investigated the use of various positions by women during the second stage.

Many methodological problems were observed in the studies.
The exclusion rate of 'unsuitable participants' was not always given but appeared to be considerable in some studies. One reason for exclusion was a preference of the woman for a particular birthing position. It is possible that the women who had this preference had different characteristics to the women who were included in the studies. None of the studies examined this possibility of bias.
Many problems are encountered when setting up a randomised controlled trial into birthing positions. The fact that blinding is not possible meant that these studies received only moderate quality scores and may have caused several forms of bias. The results should therefore be interpreted with caution. The variation in compliance rate may partly be explained by the fact that some positions are easier to adopt than others. The lowest compliance was in a study where women gave birth on a birthing stool[27]. A 100% compliance rate appeared to be met in studies where women used a chair or a lateral tilt position[23,24,28-32]. Women may also have been encouraged to adopt the allocated position even if they would rather move to another position during the second stage, or they may have felt obliged to comply. It is debatable whether it is ethical to ask women to participate in a study whereby they agree to adopt a certain birthing position even though they do not know how they will feel during labour. The main advantage of an RCT is that through randomisation and blinding several sources of bias are reduced. Since blinding is hardly possible and randomisation results in problems regarding ethical and compliance issues, a cohort study is more appropriate to research birthing positions. In our included cohort study the supine position was associated with more episiotomies[26]. However, many more occurred in the lithotomy rather than in the semi-sitting (25-45°) position. The authors suggest that some care providers may have changed the woman's position to lithotomy in order to perform an episiotomy. In a cohort study information on possible confounders, such as medical reasons for a change in position, should be carefully recorded.
In some studies it was not clear how the second stage was defined and therefore, it was not clear how long the position at the time of birth had been adopted for. In addition, if a second stage in supine position lasts only a few minutes an upright position during the hour before may still have influenced the birth outcome. Much could be learnt from knowing all the positions women adopt during the entire second stage and during the last hour of the first stage. This may also bring to light benefits of using several positions rather than just one during the second stage. Authors have suggested that the movement from one position to another may be beneficial, but there is a lack of evidence to support this[33,34].
Many of the studies were carried out in settings with a high rate of obstetric interventi-

ons such as the use of oxytocin or epidural infusions. The rate of postpartum haemorrhage was much lower in one study without these interventions[25]. Although the numbers involved are low, this suggests that outcomes may be different in low intervention settings. Well designed cohort studies in low intervention settings may produce useful results for professionals who use very few methods of obstetric intervention.

Most outcomes were subjectively assessed by the assisting health professional. Especially when it comes to estimating blood loss, professionals are known to underestimate the amount, in particular when the loss is considerable[35]. In an upright position the blood loss may appear more than in supine position because it can be collected in a receptacle[27,31,36]. Even if more blood may be lost at the time of the birth due to the force of gravity, the subsequent lochia may be reduced[27,31]. It has also been suggested that the increased pressure on the perineum in an upright position may cause an increased blood loss from perineal damage rather than an atonic uterus[31,37,38]. Even if there were a real decreased blood loss in the supine position, the question remains whether this difference is clinically significant. Although the difference in blood loss found in this review was statistically significant, it was only a difference of almost 60 ml and a difference in the requirement of a blood transfusion was not found. The risk of severe blood loss may not be the same for every woman. In this meta-analysis, the difference was only significant for multigravidas. It has been suggested that multigravidas who give birth very quickly tend to have a greater blood loss[31]. In daily clinical practice the assisting health professional may suggest to these women that they lie down and use the supine position to slow the progress of labour. An RCT in which these women adopt the allocated position will not take these clinical differences into account and may therefore overestimate the risk of blood loss for all women.

The only difference in neonatal outcome which reached borderline significance was the difference in umbilical artery pH ($P = 0.05$) but the difference of -0.02 in supine position is unlikely to be clinically significant.

Most women preferred positions other than the supine position and more women had a good experience in other positions. More women reported severe pain in the supine position and more women found it difficult to bear down. These results should be interpreted cautiously because of methodological problems. One study does not explain how they asked women about their experience of pain[28]. In another one the assisting midwife handed out the questionnaire and this may have influenced the results[27]. The fact that no women in either group in this study reported to have had a very bad experience may be because they did not want to offend her. The wording used for the questions varied and was sometimes open to various interpretations. For example, women may have had difficulty choosing between very satisfied and very happy[25]. Finally, although the non-pooled data give some impression of women's experiences, they do not explain how different birthing positions contribute to women's experiences. For example; women reported severe pain more often in the supine position. They may have felt more physical pain or the partner may have been less able to give support,

or women may have felt less in control and were therefore less able to cope with the pain. To investigate these underlying mechanisms, a qualitative research method will be useful.

Conclusion

Due to methodological problems in the studies included in this meta-analysis the results need to be considered cautiously. Nevertheless, it appears that the routine use of the supine position may have some disadvantages in terms of more instrumental deliveries and episiotomies. Also, more women appear to experience significant pain in this position and to prefer other positions. The observed reduced blood loss in the supine position may not be an actual, physical difference and may not be clinically significant. In summary, these results do not justify the routine use of the supine position for all women during the second stage of labour.

A cohort study in a low intervention setting complemented by a qualitative method is suggested as the most appropriate form of research into this subject. Not only should the position at the moment of birth be registered, but also the positions during the entire second stage and during the last hour of the first stage in order to measure their influence on the birth outcome. Additionally, this would allow the investigation of benefits of using various positions during the final stages of labour. Information on possible confounders should be carefully registered. Objective outcome measures such as blood indices postpartum will be needed to test the difference in blood loss.

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Chapter 3

Increased blood loss in upright birthing positions originates from perineal damage

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Abstract

The aim of this study was to assess whether the risk of severe blood loss is increased in semi-sitting and sitting position and, if so, to which extent blood loss from perineal damage is responsible for this finding. We performed a secondary analysis of data from a large trial conducted in primary care midwifery practices in the Netherlands. Sixteen hundred and forty-six low risk women were included who had a spontaneous vaginal delivery. Blood loss was measured using a weighing scale and measuring jug. Mean total blood loss and the incidence of blood loss greater than 500 ml and 1000 ml were increased in semi-sitting and sitting position. In logistic regression analysis, the interaction between birthing position and perineal damage was almost significantly associated with an increased risk of blood loss greater than 500 ml. Semi-sitting and sitting position were only significant risk factors among women with perineal damage (OR 1.30, 95% CI 1.00 - 1.69 and OR 2.25, 95% CI 1.37 - 3.71 respectively). Among women with intact perineum no association was found. We concluded that semi-sitting and sitting birthing positions only lead to increased blood loss among women with perineal damage.

Keywords: Birthing positions, blood loss, perineal damage

Introduction

The supine position is most commonly used for the second stage of labour in western cultures[1;2]. Studies have shown that women use a variety of positions if they are allowed to make their own choices[3;4]. Therefore, the routine use of the supine position can be considered an intervention in the normal course of labour. The evidence to support the use of this intervention is not clear[5].

Several studies have compared the outcomes of labour in supine versus other positions. Two meta-analytic reviews have indicated some disadvantages of the supine position, most notably an increase in instrumental deliveries and episiotomies[5;6]. In addition, women have reported reduced pain in non-supine positions and a preference for other positions in quantitative studies[7-9]. A qualitative study showed that women vary in their experiences with birthing positions but having an influence on the choice of position may contribute to a better birth experience[10].

The main advantage of the supine position is reduced mean blood loss and incidence of blood loss greater than 500 ml compared to other positions[5;6]. These differences were only found between supine and upright positions, mainly among women using the birthing chair or birthing stool. It is not clear which factors contribute to these findings[9;11].

Measurement error may explain some of the differences found. The same amount of blood loss may appear to be more in upright than in recumbent position[9]. In most studies, estimated blood loss is used as the outcome measure[9;12-15]. We wanted to improve upon previous research and establish whether there is an actual increase in blood loss in sitting positions by using more accurate, objective measurements.

If there is a real difference, it is not clear whether this excess in blood loss originates from perineal damage or from the uterus. Uterine atony is a serious cause of postpartum haemorrhage and is the second most important indication for emergency peripartum hysterectomy after placenta accreta in the Netherlands[16]. If there is an increase in blood loss in sitting positions, it is therefore important to establish where this originates from.

Many studies into birthing positions include women with risk factors for postpartum haemorrhage, such as oxytocin infusion, epidural anaesthesia and instrumental delivery[9;12;14;17-20]. Results of these studies may not apply to women in low risk settings. We therefore performed a study among low risk women only.

We had two main research questions. Is the risk of severe blood loss increased in semi-sitting and sitting compared to recumbent birthing positions when accurate measurements of blood loss are used? If so, to what extent is the excess risk due to blood loss from perineal damage?

Methods

We used data from a trial into active versus physiological management of the third stage of labour (unpublished data) for this secondary analysis. This trial was conduc-

ted from 1 May 1995 to 1 September 1996. Twenty independent midwifery practices with a total of 70 midwives were recruited all over the Netherlands through advertisement in the national midwifery journal and through local midwifery groups.
Independent midwives only look after women who have a spontaneous vaginal delivery at term with a single fetus in cephalic presentation either at home or in hospital. When risk factors occur, these women are referred to obstetrician led care. Many potential confounding factors, such as oxytocin infusion, epidural anaesthesia and instrumental delivery, were therefore not present in those women delivered by these midwives.
Exclusion criteria in the trial were defined as previous postpartum haemorrhage (blood loss more than 1000 ml) , Hb $\leq$ 6.0 mmol/l, large uterine size, prolonged first stage of labour and second stage of labour of more than 90 minutes in primigravidas or more than 45 minutes in multigravidas. Women who were unable to read the Dutch language were excluded because they would not be able to answer the questionnaire employed in this study.
The Medical Ethics Committee of the Netherlands Institute of Applied Scientific Research (TNO) in Leiden granted ethical approval for this trial.
The main outcome measures in our study were mean total blood loss and the incidence of blood loss greater than 500 ml and 1000 ml. The World Health Organization (WHO) has defined postpartum haemorrhage as blood loss greater than 500 ml[21]. In the Netherlands this definition is restricted to cases whereby the blood loss is greater than 1000 ml[22]. We therefore used both cut off points for the purpose of this study. Blood loss was measured from the delivery of the fetus till one hour after the delivery of the placenta. All midwives received a digital weighing scale, a measuring jug and perineal pads to measure the blood loss accurately.
Haemoglobin levels provided a more objective indication of the consequences of blood loss. Haemoglobin levels were measured on the 4th to 6th day postpartum and compared to haemoglobin levels at 36 weeks gestation. HemoCue haemoglobin meters were provided and checked every 2 months to the standards required for national quality control.
Position at the time of delivery was recorded as recumbent (supine or lateral), semi-sitting (supported by pillows or a bedrest) or sitting (in bed supported by a person or on a birthing stool or similar birthing aid). In the Netherlands women rarely give birth in lateral position and the birthing stool is most commonly used for the sitting position.
We categorised perineal damage into intact perineum and perineal damage (perineal or labial tear in need of suturing or episiotomy).

An association with an increased risk of postpartum haemorrhage has been reported in the literature for the following factors other than birthing position: maternal age[23], primiparity[23;24], third stage of labour longer than 30 minutes[25], high birthweight[25-27], perineal damage[25;26] and prolonged second stage of labour[25;26]. Active management of the third stage of labour decreases the risk of postpartum haemorrhage[15]. We examined the net effects of these factors on postpartum blood loss greater than 500 ml.

If the difference in blood loss was due to uterine factors, sitting positions would be significant risk factors regardless of the presence of perineal damage. On the other hand, if the difference was due to excessive bleeding from perineal damage, this would be the case among women with perineal damage only. We therefore examined the interaction between birthing position and perineal damage.

Data analysis

We used t-test and one-way Anova for continuous variables and Chi-square and Fisher's exact test for categorical variables. The Bonferroni post-hoc test was used for multiple comparisons to reduce the risk of erroneously finding a significant difference due to multiple testing. A logistic regression analysis was used to establish the net effects.

All statistical tests were two-tailed and P-values < 0.05 were considered statistically significant. SPSS 11.5 for Windows was used for data analysis (SPSS Inc, Chicago, Illinois, USA).

Results

Most of the 1646 women in the study gave birth in recumbent position followed by semi-sitting and sitting position (table 1).

The mean blood loss in the total group was 508 ml. Blood loss greater than 500 ml occurred in 38.5% and greater than 1000 ml in 9.1% of women. In semi-sitting and sitting position the mean total blood loss was significantly greater than in recumbent position. A significant linear association was found for the following variables: the risk of blood loss greater than 500 ml and 1000 ml was greater in semi-sitting than in recumbent position and greater in sitting than in semi-sitting position.

Mean haemoglobin at the 4-6th day postpartum was lower in the semi-sitting and sitting position groups. In addition, variation was found between these groups in the difference between the postpartum haemoglobin and that at 36 weeks gestation. Only the differences between recumbent and sitting position were significant.

Women in sitting positions were older than women in other positions. A higher proportion of women in sitting position had a second stage of labour longer than 60 minutes compared to women in other positions. Only 50 women were of non-Dutch origin.

Table 1: Demographic and obstetric data of the population by birthing position

	All positions combined (n=1646)	**Recumbent (n=922)**	**Semi-sitting (n=605)**	**Sitting (n=119)**	**P-value**
Total blood loss in ml*	508 [30, 2830]	480† ‡ [30, 2830]	538† [40, 2301]	570‡ [95, 1700]	**.001**
> 500 ml**	633 (38.5)	322 (34.9)	251 (41.5)	60 (50.4)	**.001**$^{\Psi}$
> 1000 ml**	150 (9.1)	73 (7.9)	61 (10.1)	16 (13.4)	.083^{O}
Age in years**					
≥25 years	145 (8.9)	85 (9.3)	55 (9.2)	5 (4.2)	
26 to 30 years	552 (33.8)	312 (34.1)	213 (35.6)	27 (22.9)	
31 to 35 years	712 (43.6)	399 (43.6)	252 (42.1)	61 (51.7)	
≥36 years	223 (13.7)	119 (13.0)	79 (13.2)	25 (21.2)	**.019**
Non-Dutch origin**	50 (3.0)	25 (2.7)	19 (3.2)	6 (5.0)	.384
Primiparous**	640 (39.3)	336 (36.8)	251 (42.0)	53 (44.9)	.057
Duration second stage > 60 minutes**	211 (12.9)	104 (11.3)	81 (13.5)	26 (21.8)	**.005**
Duration third stage > 30 minutes**	120 (7.3)	66 (7.2)	43 (7.1)	11 (9.3)	.689
Active management of third stage**	834 (50.7)	457 (49.6)	317 (52.4)	60 (50.4)	.556
Perineal damage**	1178 (71.7)	655 (71.1)	442 (73.4)	81 (68.1)	.405
Birthweight in g*	3518 [2175, 5200]	3517 [2175, 4870]	3517 [2480, 5200]	3534 [2640, 4600]	.915
Hb 4-6 days postpartum in g/dL*	12.00 [6.94, 16.78]	12.06 [6.94, 16.78]	11.95 [7.26, 16.13]	11.63 [7.90, 16.61]	**.010**
Hb 4-6 days postpartum minus Hb at 36 wks gestation in g/dL*	0.22 [-5.16, 6.29]	0.29 [-5.16, 6.29]	0.19 [-4.84, 5.00]	-0.16 [-4.03, 3.06]	**.015**

Missing values are excluded.

* Mean [range]

** Number of subjects (%)

† Multiple comparisons (Bonferroni) mean difference –58 [-101, -14], significant at .05 level

‡ Multiple comparisons (Bonferroni) mean difference –90 [-170, -9], significant at .05 level

$^{\Psi}$ Linear-by-linear association P< 0.001

^{O} Linear-by-linear association P= 0.027

The associations between various factors and blood loss are given in table 2 for women with intact and damaged perineum.

Among women with perineal damage, semi-sitting and sitting position, primiparity and second stage of labour longer than 60 minutes were strongly associated with increased total blood loss and blood loss greater than 500 ml and 1000 ml. These associations were not found among women with an intact perineum. Equally, birthing position was linearly related to blood loss greater than 500 ml and 1000 ml among women with perineal damage, but not among women with an intact perineum. Third stage longer than 30 minutes and birthweight over 4 kg were risk factors for most outcomes in women with and without perineal damage. Active management of the third stage was a protective factor.

When logistic regression analysis was performed, the interaction between sitting position and perineal damage was almost significantly related to blood loss greater than 500 ml. We therefore reported the outcomes of the logistic regression analysis separately for women with and without perineal damage. In table 3 variables are shown that were significantly related to the outcome. More details are available from the first author on request. Birthweight was linearly related to the log-odds of blood loss greater than 500 ml and was therefore included as a continuous variable. Maternal age was not and was included as a categorical variable.

In the group with perineal damage, semi-sitting and sitting position were significantly associated with an increased risk of blood loss greater than 500 ml (OR 1.30 and OR 2.25 respectively). Among women with an intact perineum this association was not found. Other significant factors in both groups were birthweight, active management of the third stage of labour and third stage longer than 30 minutes. Among women with perineal damage primiparity was also a significant factor.

Table 2: Associations between various factors and blood loss for women with intact perineum and women with perineal damage

Women with intact perineum (n=464)								Women with perineal damage (n=1178)							
Risk factor , total sample with intact perineum	**Risk factor present (n)**	**Blood loss > 500 ml n (%)**	**P**	**Blood loss > 1000 ml n (%)**	**P**	**Mean total blood loss (ml)**	**P**	**Risk factor , total sample with perineal damage**	**Risk factor present (n)**	**Blood loss > 500 ml n (%)**	**P**	**Blood loss > 1000 ml n (%)**	**P**	**Mean total blood loss (ml)**	**P**
Birthing position								**Birthing position**							
Recumbent	266	70 (26.3)		17 (6.4)		422		Recumbent	655	252 (38.5)		56 (8.5)		504	
Semi-sitting	160	53 (33.1)		11 (6.9)		465		Semi-sitting	442	197 (44.6)		50 (11.3)		566	
Sitting	38	12 (31.6)	.306†	1 (2.6)	.673‡	421	.361	Sitting	81	48 (59.3)	**.001†**	15 (18.5)	**.014‡**	640	**.001**
Duration 2nd stage								**Duration 2nd stage**							
More than 60 mins	39	15 (38.5)		3 (7.7)		524		More than 60 mins	172	86 (50.0)		27 (15.7)		607	
Up to 60 mins	424	120 (28.3)	.182	26 (6.1)	.726	429	.067	Up to 60 mins	1002	409 (40.8)	**.024**	93 (9.3)	**.010**	525	**.005**
Birthweight								**Birthweight**							
More than 4 kg	55	24 (43.6)		5 (9.1)		545		More than 4 kg	155	94 (60.6)		32 (20.6)		706	
Up to 4 kg	408	111 (27.2)	**.012**	24 (5.9)	.370	422	**.006**	Up to 4 kg	1019	402 (39.5)	**<.001**	88 (8.6)	**<.001**	510	**<.001**
Management 3rd stage								**Management 3rd stage**							
Active	243	59 (24.3)		11 (4.5)		412		Active	589	216 (36.7)		43 (7.3)		485	
Physiological	221	76 (34.4)	**.017**	18 (8.1)	.108	463	.074	Physiological	589	281 (47.7)	**<.001**	78 (13.2)	**.001**	589	**<.001**
Duration 3rd stage								**Duration 3rd stage**							
More than 30 mins	46	27 (58.7)		12 (26.1)		705		More than 30 mins	73	46 (63.0)		18 (24.7)		678	
Up to 30 mins	416	108 (26.0)	**<.001**	17 (4.1)	**<.001**	407	**<.001**	Up to 30 mins	1098	448 (40.8)	**<.001**	102 (9.3)	**<.001**	527	**<.001**
Maternal age								**Maternal age**							
25 years or younger	50	16 (32.0)		1 (2.0)		414		25 years or younger	95	41 (43.2)		11 (11.6)		536	
26 to 30 years	153	42 (27.5)		7 (4.6)		419		26 to 30 years	398	169 (42.5)		54 (13.6)		563	
31 to 35 years	183	48 (26.2)		14 (7.7)		429		31 to 35 years	529	220 (41.6)		38 (7.2)		510	
36 years or older	77	28 (36.4)	.375	7 (9.1)	.268	501	.239	36 years or older	145	62 (42.8)	.986	17 (11.7)	**.014**	566	.112
Parity								**Parity**							
Primiparous	133	42 (31.6)		7 (5.3)		438		Primiparous	507	249 (49.1)		66 (13.0)		581	
Multiparous	328	91 (27.7)	.410	22 (6.7)	.563	434	.896	Multiparous	659	244 (37.0)	<.001	55 (8.3)	**.010**	504	**<.001**

†linear-by-linear association P= 0.186 ‡linear-by-linear association P= 0.65 †linear-by-linear association P < 0.001 ‡linear-by-linear association P= 0.006

Table 3: Multiple logistic regression of predictors of blood loss > 500 ml in women with intact perineum and women with perineal damage[*].

Intact perineum N=457, > 500 ml (n = 133)			**Perineal damage N=1153, > 500 ml (n = 487)**		
Predictor variable	**OR**	**(95% CI)**	**Predictor variable**	**OR**	**(95% CI)**
Birthing position			**Birthing position**		
Recumbent position	1.0	Reference	Recumbent position	1.0	Reference
Semi-sitting position	1.33	(0.84, 2.10)	Semi-sitting position	1.30	**(1.00, 1.69)**
Sitting position	0.97	(0.43, 2.20)	Sitting position	2.25	**(1.37, 3.71)**
Birthweight (in kg)	3.17	**(1.91, 5.25)**	**Birthweight (in kg)**	3.98	**(2.89, 5.49)**
Management of the third stage of labour			**Management of the third stage of labour**		
Physiological management	1.0	Reference	Physiological management	1.0	Reference
Active management	0.57	**(0.37, 0.88)**	Active management	0.59	**(0.46, 0.76)**
Duration of the third stage of labour			**Duration of the third stage of labour**		
≤30 minutes	1.0	Reference	≤30 minutes	1.0	Reference
> 30 minutes	4.14	**(2.11, 8.19)**	> 30 minutes	2.41	**(1.43, 4.06)**
Parity			**Parity**		
Multipara	1.0	Reference	Multipara	1.0	Reference
Primipara	1.18	(0.70, 1.97)	Primipara	2.30	**(1.70, 3.11)**

[*] Variables shown are significantly related to the outcome after controlling for other factors. Other variables included in the analysis were: duration of second stage > 60 minutes, maternal age (in categories).

Discussion

In this study mean total blood loss and the incidence of blood loss greater than 500 ml and 1000 ml were increased in semi-sitting and sitting position. These positions were only significant risk factors among women with perineal damage and not among women with intact perineum.

In this study blood loss was measured as opposed to estimated, which is a common feature in the design of most other studies[9;12-15]. This explains the larger mean blood loss and higher number of women with blood loss greater than 500 ml in our study. It confirms the observation that health professionals underestimate blood loss when the measured amount is more than 300 ml[28-30]. It also corresponds with the finding that almost half of all women who give birth vaginally will loose more than 500 ml of blood if it is measured accurately[31;32].

In spite of accurate measurements, some underestimation of blood loss may have occurred in women who gave birth in recumbent position and remained lying down during the first hour after birth. Nevertheless, the difference in haemoglobin levels on the 4-6th day after delivery and the variation in difference compared with haemoglobin levels at 36 weeks gestation confirmed a real difference in blood loss between the different study groups.

The increased blood loss in upright positions may be due to various factors. Sitting on the hard surface of a birthing stool or chair may obstruct venous return and therefore lead to an increase in blood loss from perineal damage[33]. On the other hand, upright

positions might cause increased hydrostatic pressure both on the arterial and venous side which could contribute to increased bleeding from the uterus and placental site[9]. It has also been suggested that upright birthing positions may affect the production of prostaglandins that play a role in the placental separation, and therefore contribute to uterine atony[19]. Multigravidas with a rapid delivery in an upright position might be particularly at risk of haemorrhage from an atonic uterus[11].

Our findings support the theory that increased blood loss in sitting positions originates from perineal trauma. Most studies in which increased blood loss was found in upright position compared supine position to position on a birthing chair or birthing stool[9;11;12;14;19;20]. Several authors have noted an increase in oedema in these positions which might be due to obstructed venous return[9;12;34] The oedema may lead to increased blood loss when perineal damage occurs.

Only one study found a higher mean total blood loss after delivery on a birthing chair, even within the group of women with an intact perineum[9]. Blood loss was estimated in this study and hence measurement bias may therefore explain this finding. In addition, oxytocin infusion and epidural anaesthesia were used in this study and some women also had instrumental deliveries. Further studies need to clarify whether upright position leads to increased blood loss when these risk factors are present, even if the perineum is intact.

Studies involving a non-sitting upright position, such as squatting, found no difference in blood loss between upright and supine position[7;17;35;36]. In this position venous return from the perineum is not obstructed. Gardosi et al found that a modified squatting position on a birth cushion, which gives way when a woman is bearing down, did not increase blood loss compared to supine position[18]. We found a linear association between a more sitting position (recumbent, semi-sitting, sitting) and an increased risk of blood loss in the subgroup of women with perineal damage, but not among women with an intact perineum. This indicates that venous obstruction caused by the birthing stool or hard mattress caused the increase in blood loss.

Obstruction in venous return may be prevented by alternating positions during the second stage of labour. In addition, positions could be used in which venous return is not obstructed, such as squatting, lateral and hands and knees position.

The incidence of perineal damage did not differ between position groups. Thirty one women had a third or fourth degree tear and the incidence did not differ between the groups (P=0.656). Lithotomy, sitting, standing and squatting position have all found to be associated with an increase in third degree tears, although the differences with the control group were not always significant due to the low number of women with this complication[17;37-43]. Other studies have not confirmed these findings[7;36] and some showed less perineal trauma in sitting, semi-sitting, hands and knees or kneeling position[44-47]. The association between birthing positions and severe perineal trauma is still unclear and is not a reason for restricting women's choice of birthing position[17;33;47].

In our study, perineal damage was independently associated with blood loss greater

than 500 ml. A policy of restricted rather than routine use of episiotomy leads to less perineal damage[48]. Regardless of the birthing position, restricting the use of an episiotomy to medical indications may reduce the number of women with severe blood loss.

There are some limitations in this study. Firstly, a common problem in studies examining different birthing positions is that the distinction between the various positions is not always clear-cut[49]. Some misclassification, especially between recumbent and semi-sitting position, might have decreased the observed differences. Nevertheless, significant differences were found between these two groups.
Secondly, the midwives and the study population may not have been entirely representative for the whole country. The sample of midwifery practices was self selected based on their willingness to participate. However, the selection was not based on midwives' attitudes towards birthing positions and position was only registered as a possible confounder in the trial. Therefore, selection bias was unlikely to influence the measurement of blood loss in the various birthing positions.
The exclusion of women who were unable to read the Dutch language resulted in a very small number of women of non-Dutch origin in the sample. It is therefore unclear to which extent our results apply to ethnic minority populations in the Netherlands.
Third, the data were collected a decade ago. The characteristics of women and midwifery management may have changed since then. Even so, we have no reason to believe that practices with regard to birthing positions and management of the third stage of labour have changed significantly during this time period. The findings on the relationship between birthing position, perineal damage and blood loss are still relevant today.
Although postpartum haemorrhage is defined by the WHO as blood loss greater than 500 ml, healthy women can tolerate at least twice this amount without serious consequences[21;31]. It is reassuring that the increased blood loss found in upright birthing positions is unlikely to be of uterine origin as this can lead to excessive amounts of blood loss in a very short time.

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Chapter 4

Risk of perineal damage is not a reason to recommend a particular birthing position

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Abstract

The aim of this study was to examine the influence of position at the time of birth on perineal damage among low risk women. We performed a secondary analysis of data from a large trial conducted in primary care midwifery practices in the Netherlands. Sixteen hundred and forty six women were included who had a spontaneous, vaginal delivery and who did not need obstetric interventions.

Perineal outcomes were compared between women in recumbent, semi-sitting and sitting position. Logistic regression analysis was used to examine the effects of these positions controlled for other factors.

No significant differences were found in intact perineum rates between the position groups. Women in sitting position were less likely to have an episiotomy and more likely to have a perineal tear than women in recumbent position. After controlling for other factors the odds ratios were OR 0.29 (95% CI 0.16-0.54) and OR 1.83 (95% CI 1.22-2.73) respectively. Women in semi-sitting position were more likely to have a labial tear than women in recumbent position (OR 1.43, 95% CI 1.00-2.04). Based on the results, no particular birthing position can be strongly recommended or discouraged to prevent perineal damage.

Keywords: Birthing positions, perineal damage, episiotomy

Introduction

In Western countries the supine position is most commonly used during the second stage of labour[1;2]. Since a few decades several authors have been advocating for women to have more choice in the use of birthing positions[3-5]. Nevertheless, an authoritative textbook of obstetrics still states that the dorsal lithotomy position is often the most satisfactory birthing position[6]. A supine position may be most convenient for health workers but not necessarily for women[3].

Several studies have suggested that being able to choose comfortable positions can increase the experience of being in control[7-10]. Feeling in control is a major factor contributing to childbirth satisfaction[9;11-14].

To be able to make an informed choice, women need evidence based information on the advantages and disadvantages of various positions. Two meta-analyses showed that non-supine positions are associated with a reduction in instrumental deliveries and reduced reporting of severe pain[15;16]. In one meta-analysis more abnormal fetal heart rates were found in supine position[16] and in another a lower umbilical artery pH was borderline significant[15]. The risk of blood loss greater than 500 mls is increased in upright positions[15;16]. However, the increase in blood loss probably originates from perineal damage rather than from the uterus[17].

Evidence on the association between birthing positions and perineal trauma is not conclusive. The two meta-analyses mentioned above found fewer episiotomies in non-supine positions, which was only partly offset by an increase in perineal tears[15;16]. The overall intact perineum rate did not differ between position groups in some studies[18-20]. Other studies found a difference with some showing a higher rate of intact perineum in upright positions[21-24] and others showing lower rates[25-27;45].

A few studies found higher rates of labial tears in upright positions[23;28] but the majority of studies did not report labial damage. Supine, semi-recumbent, standing and squatting position have all found to be associated with an increase in third degree tears compared to other positions[24;29-31].

Many studies did not distinguish between positions during the second stage of labour and position at the time of birth. Therefore, authors of a systematic review concluded that, although birthing position did not affect the overall perineal trauma rate, an increase in trauma with upright position for birthing could not be ruled out[32].

Several studies into birthing positions include women with obstetric interventions, such as epidural anaesthesia, which may increase the risk of perineal damage[5;22;28;30;33-35]. Many observational studies did not control for known risk factors for perineal damage[25;29;33;36;37]. Also, in one study midwives had lower rates of perineal trauma than obstetricians[26] and in many studies no information is available on the type of professional who attended the birth. In the Netherlands, primary care midwives provide the entire intrapartum care for low-risk women. Therefore, this country is ideally suited to study the effect of birthing positions on perineal damage among women who are looked after by one particular group of birth attendants and who do not need obstetric interventions.

We aimed to find out whether the risk of perineal damage could influence a woman's choice of birthing positions, as some authors suggest[22;27]. In this study we examined the influence of position at the time of birth (recumbent, semi-sitting or sitting) on perineal outcomes, controlling for other factors.

Methods

Participants and data collection

We used data from a trial into active versus physiological management of the third stage of labour (K.C. Herschderfer et al, unpubl.obs.) for this secondary analysis. The full details of the methods have been described elsewhere[17]. In short, this trial was conducted from 1 May 1995 to 1 September 1996 among twenty independent midwifery practices from all over the Netherlands with a total of 70 midwives.

Independent midwives only look after women who have a spontaneous vaginal delivery at term with a single fetus in cephalic presentation either at home or in hospital. When risk factors occur, these women are referred to obstetrician led care. Many potential confounding factors, such as oxytocin infusion, epidural anaesthesia and instrumental delivery, were therefore not present in our study.

The condition of the perineum was recorded as intact, first or second degree tear, third degree tear (involving the anal sphincter), fourth degree tear (involving the anal sphincter and rectal mucosa), mediolateral episiotomy, median episiotomy or labial tear. More than one type of perineal damage could be registered and damage was only recorded if at least one suture was needed. For the present study, third and fourth degree tear were combined as anal sphincter damage because of the low numbers involved. For the bivariate and multivariate analyses all first, second and third degree perineal tears were combined as perineal tear because of the rare occurrence of anal sphincter damage. Mediolateral and median episiotomy were combined as well.

Position at the time of delivery was recorded as recumbent (supine or lateral), semi-sitting (supported by pillows or a bedrest) or sitting (in bed supported by a person or on a birthing stool or similar birthing aid). In the Netherlands, women rarely give birth in lateral position and the birthing stool is most commonly used for the sitting position[38].

An association with an increased risk of perineal damage has been reported for the following factors other than birthing position: maternal age[21;39], ethnic background[22;39;40], parity[5;22;26;41;42], duration of the second stage of labour[21;26] and birthweight over 3500 g[5;22;42]. We examined the association of these factors with the incidence of intact perineum, episiotomy, perineal tear or labial tear. We studied the net effects of these factors as well.

Age and the log-odds of perineal damage were not linearly related in our study. We therefore used age categories for the analyses. Only a small number of women were of

non-Dutch ethnic background and we therefore combined all of them in one category. More perineal damage has been found in women with a long duration of the second stage of labour[21;26]. On the other hand, precipitous deliveries may also lead to extensive perineal damage[43]. Duration of the second stage of labour was therefore divided into up to 10 minutes, 11 to 60 minutes and over 60 minutes.

Data analysis

We used Chi-square and Fisher's exact test for categorical variables in the bivariate analyses.

A logistic regression analysis (Enter method) was used to establish the net effects. All variables from the bivariate analyses were included in this analysis apart from ethnic background because of the low number of women of non-Dutch ethnic background.

All statistical tests were two-tailed and P-values < 0.05 were considered statistically significant. SPSS 11.5 for Windows was used for data analysis (SPSS Inc, Chicago, Illinois, USA).

Findings

Descriptive analyses

Most of the 1646 women in the study gave birth in recumbent position followed by semi-sitting and sitting position (table 1). Women in sitting position were more likely to be older (over 30 years) than women in other positions. In recumbent position fewer women were primiparous than in other positions, but this difference was not significant. The duration of the second stage was most likely to be up to ten minutes in women in recumbent position, between 11 and 60 minutes in women in semi-sitting position and more than 60 minutes in women in sitting position. There were no differences in ethnic background and birthweight over 3500 g between the position groups.

Incidence of perineal damage in various position groups

Figure 1 shows the occurrence of perineal damage in the position groups in percentages. Many women had more than one type of perineal damage. In the total group, 720 (43.8%) women had a first or second degree tear. This was the most common type of perineal damage. An episiotomy was performed in 375 (22.8%) women. Of these episiotomies, 15 were median and 360 were mediolateral (data not shown). A third degree tear occurred in 31 (1.9%) women. Eighteen women in recumbent position (2.0%), 9 (1.5%) in semi-sitting position and 4 (3.4%) in sitting position had a third degree tear. These differences were not significant (P=0.378). A labial tear occurred in 153 (9.3%) women.

Bivariate analyses

Table 2 shows the associations between various factors and perineal outcome.

There were no significant differences in the intact perineum rate between the position groups. Women in sitting position had fewer episiotomies and more second degree perineal tears than women in recumbent or semi-sitting position. Women in semi-sitting position had more labial tears than women in other positions but this difference was only borderline significant. Women aged 25 years or younger and 36 years or older were more likely to have an intact perineum than women between 26 and 35 years.

Figure 1. Perineal damage

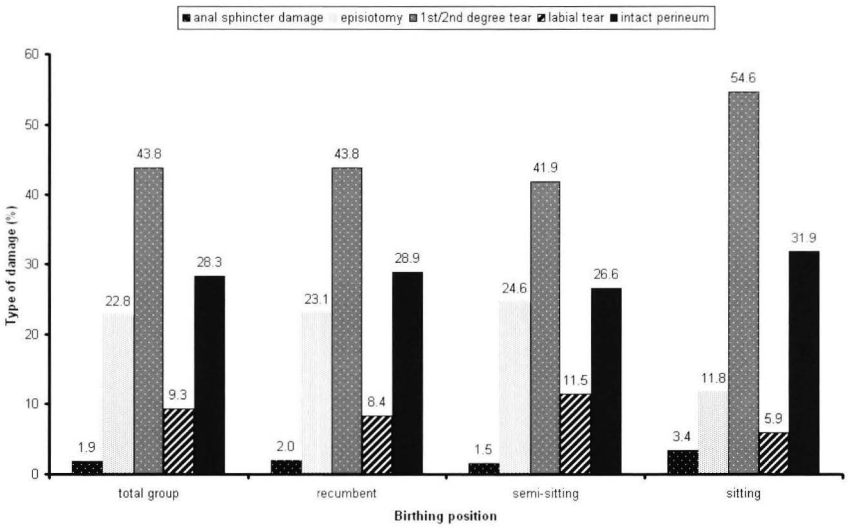

Table 1: Demographic and obstetric data of the population by birthing position

	All positions combined (n= 1646) n (%)	**Recumbent (n= 922) n (%)**	**Semi-sitting (n= 605) n (%)**	**Sitting (n= 119) n (%)**	**P-value**
Maternal age					
≤ 25 years	145 (8.9)	85 (9.3)	55 (9.2)	5 (4.2)	
26 to 30 years	552 (33.8)	312 (34.1)	213 (35.6)	27 (22.9)	
31 to 35 years	712 (43.6)	399 (43.6)	252 (42.1)	61 (51.7)	
≥36 years	223 (13.7)	119 (13.0)	79 (13.2)	25 (21.2)	**.019**
Non-Dutch ethnic background	50 (3.0)	25 (2.7)	19 (3.2)	6 (5.0)	.384
Primiparous	640 (39.3)	336 (36.8)	251 (42.0)	53 (44.9)	.057
Duration second stage					
≤ 10 minutes	542 (33.1)	341 (37.1)	167 (27.7)	34 (28.6)	
11 to 60 minutes	886 (54.1)	473 (51.5)	354 (58.8)	59 (49.6)	
> 60 minutes	211 (12.9)	104 (11.3)	81 (13.5)	26 (21.8)	**< .001**
Birthweight > 3500 g	794 (48.4)	438 (47.7)	295 (49.0)	61 (51.3)	.722

Missing values are excluded

Table 2: Associations between various factors and perineal outcome[θ]

Risk factor	Risk factor present (n)	Episiotomy n(%)	P	Perineal tear n(%)	P	Labial tear n(%)	P	Intact perineum n(%)	P
Birthing position									
Recumbent	921	213 (23.1)		421 (45.7)		77 (8.4)		266 (28.9)	
Semi-sitting	602	148 (24.6)		261 (43.4)		69 (11.5)		160 (26.6)	
Sitting	119	14 (11.8)	**.009**	69 (58.0)	**.014**	7 (5.9)	.051	38 (31.9)	.405
Maternal age									
≤25 years	145	30 (20.7)		57 (39.3)		21 (14.5)		50 (34.5)	
26 to 30 years	551	132 (24.0)		241 (43.7)		62 (11.3)		153 (27.8)	
31 to 35 years	712	170 (23.9)		341 (47.9)		56 (7.9)		183 (25.7)	
≥36 years	222	35 (15.8)	.058	109 (49.1)	.131	14 (6.3)	**.011**	77 (34.7)	**.022**
Ethnic background									
Dutch	1591	365 (22.9)		730 (45.9)		148 (9.3)		446 (28.0)	
Non-Dutch	50	10 (20.0)	.626	20 (40.0)	.411	4 (8.0)	.815	18 (36.0)	.218
Parity									
Multiparous	987	142 (14.4)		496 (50.3)		56 (5.7)		328 (33.2)	
Primiparous	640	225 (35.2)	**< .001**	251 (39.2)	**< .001**	97 (15.2)	**< .001**	133 (20.8)	**< .001**
Duration 2nd stage									
Up to 10 minutes	542	46 (8.5)		274 (50.6)		25 (4.6)		213 (39.3)	
11 to 60 minutes	884	216 (24.4)		413 (46.7)		109 (12.3)		211 (23.9)	
> 60 minutes	211	113 (53.6)	**< .001**	60 (28.4)	**< .001**	19 (9.0)	**< .001**	39 (18.5)	**< .001**
Birthweight									
≤3500 g	844	176 (20.9)		360 (42.7)		88 (10.4)		271 (32.1)	
> 3500 g	793	197 (24.8)	.054	388 (48.9)	**.011**	65 (8.2)	.121	192 (24.2)	**< .001**

Missing values are excluded.

[θ] Women can have more than one type of perineal damage. Only perineal damage in need of suturing is recorded.

They had a non-significant tendency to fewer episiotomies. There were fewer labial tears with increasing age.

No significant differences were found in perineal damage between women of Dutch and non-Dutch ethnic background.

Primiparous women had more episiotomies and more labial tears, whereas multiparous women had more perineal tears but also more often an intact perineum.

A longer duration of the second stage was associated with fewer intact perinea, more episiotomies and fewer perineal tears. Women with a second stage between 11 and 60 minutes were more likely to have a labial tear than women with a second stage up to 10 minutes and those with a second stage over 60 minutes. Birthweight over 3500 g was associated with fewer intact perinea and more perineal tears. The association between birthweight over 3500 g and more episiotomies was borderline significant.

Multiple logistic regression analysis

We conducted a logistic regression analysis to study the net effects of various factors on perineal outcome (table 3).

No significant differences were found in intact perineum rates between the position

groups. Women in sitting position were less likely to have an episiotomy and more likely to have a perineal tear than women in other positions. Women in semi-sitting position were more likely to have a labial tear.

Age 25 years and below was associated with a higher rate of intact perineum than age between 26 and 35 years. Women between 31 and 35 years were also more likely to have an episiotomy than women of 25 years or younger.

Primiparous women had fewer intact perinea, more episiotomies and more labial tears than multiparous women.

Fewer women with a second stage longer than 10 minutes had an intact perineum and more had an episiotomy than women with a second stage of 10 minutes or below. A second stage between 11 and 60 minutes was associated with more labial tears and over 60 minutes with fewer perineal tears.

Birthweight over 3500 g was associated with fewer intact perinea, more episiotomies and more perineal tears.

Table 3: Logistic regression analysis of predictors of perineal outcome

Predictor variable **Total No = 1619**	**Episiotomy (n=366)**		**Perineal tear (n=741)**		**Labial tear (n=148)**		**Intact perineum (n=459)**	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Birthing position								
Recumbent	1.0	Reference	1.0	Reference	1.0	Reference	1.0	Reference
Semi-sitting	0.96	(0.74, 1.25)	0.93	(0.76, 1.15)	1.43	**(1.00, 2.04)**	0.96	(0.76, 1.22)
Sitting	0.29	**(0.16, 0.54)**	1.83	**(1.22, 2.73)**	0.73	(0.32, 1.65)	1.31	(0.85, 2.02)
Maternal age								
≤ 25 years	1.0	Reference	1.0	Reference	1.0	Reference	1.0	Reference
26 to 30 years	1.52	(0.95, 2.44)	1.10	(0.75, 1.61)	0.90	(0.52, 1.56)	0.63	**(0.42, 0.94)**
31 to 35 years	1.95	**(1.21, 3.14)**	1.20	(0.82, 1.75)	0.75	(0.43, 1.32)	0.49	**(0.32, 0.73)**
≥ 36 years	1.47	(0.82, 2.64)	1.13	(0.73, 1.77)	0.71	(0.34, 1.50)	0.71	(0.44, 1.13)
Parity								
Multiparous	1.0	Reference	1.0	Reference	1.0	Reference	1.0	Reference
Primiparous	1.99	**(1.47, 2.71)**	0.80	(0.62, 1.04)	2.44	**(1.59, 3.74)**	0.61	**(0.45, 0.82)**
Duration 2nd stage								
≤ 10 minutes	1.0	Reference	1.0	Reference	1.0	Reference	1.0	Reference
11 to 60 minutes	2.70	**(1.87, 3.91)**	0.98	(0.77, 1.25)	1.99	**(1.18, 3.36)**	0.56	**(0.43, 0.72)**
> 60 minutes	8.02	**(4.97, 12.95)**	0.48	**(0.32, 0.72)**	0.94	(0.44, 1.97)	0.49	**(0.31, 0.77)**
Birthweight								
≤ 3500 g	1.0	Reference	1.0	Reference	1.0	Reference	1.0	Reference
> 3500 g	1.48	**(1.14, 1.91)**	1.25	**(1.02, 1.53)**	0.92	(0.65, 1.31)	0.62	**(0.49, 0.78)**

Missing values are excluded. OR = Odds ratios, CI = Confidence intervals

Discussion

This study has some limitations. Firstly, a common problem in studies examining different birthing positions is that the distinction between the various positions is not always clear-cut[44]. Some misclassification, especially between recumbent and semi-sitting position, might have decreased the observed differences. Also, some midwives may have asked women to lie down in order to perform an episiotomy.

To study this effect, information on positions during the entire second stage is needed. Secondly, the midwives and the study population may not have been entirely representative for the whole country. The sample of midwifery practices was self selected based on their willingness to participate in the trial. However, the selection was not based on midwives' attitudes towards birthing positions. Perineal damage and birthing positions were only registered as possible confounders in the trial. Therefore, selection bias was unlikely to influence the results.
The exclusion of women who were unable to read the Dutch language resulted in a very small number of women of non-Dutch ethnic background in the sample. Some studies have shown a difference in incidence of perineal damage in various ethnic groups[22;39;40]. Larger studies that include enough ethnic minority women are needed to examine a possible influence of ethnicity on the association between birthing positions and perineal damage.
Thirdly, the data were collected a decade ago. The characteristics of women and midwifery management may have changed since then. However, we have no reason to believe that practices with regard to conducting deliveries in various birthing positions have changed significantly during this time period. In fact, our recent study showed that about the same percentage of women gave birth in supine position in the Netherlands four years ago as did ten years ago[38].

No differences were found in intact perineum rates between the position groups. Women in sitting position were less likely to have an episiotomy and more likely to have a perineal tear than women in other positions. Women in semi-sitting position were more likely to have a labial tear.
Some studies have found an increased rate of intact perineum in upright positions[21-24], others a decreased rate[25-27;45]. These contradictory results may be due to the variations among positions that were compared. For example, in one study fewer primigravidas had an intact perineum in squatting compared to semi-recumbent position but no difference was found for women in standing compared to semi-recumbent position[26]. Another study found an increased rate of intact perineum in sitting compared to other positions[22]. Even studies that compared sitting positions to recumbent positions showed contradictory results[23;37;45;46] perhaps due to the difference in equipment that was used for women to sit on.
In the Netherlands, a Dutch design birthing stool (Birth Mate) is used most often for the sitting position during labour. Outside the Netherlands, Waldenström describes the use of this particular type of stool[28]. Her study was a randomised controlled trial but only 49.3% of women who were allocated to using this stool adopted this position. No differences were found in perineal damage between this position and the supine or semi-recumbent position in the intention to treat analysis. The subgroup data for the actual position in which women delivered indicated that more labial tears and vulvar oedema occurred on the birthing stool but significance levels were not given. Levels of oedema were not reported in our study but in a previous analysis of the data we

found an increase in blood loss in women in sitting position with perineal damage[17]. We suggested that this could be due to vulvar oedema which would be consistent with the finding in Waldenström's study. Others have noted an increase in oedema in using a birthing chair[18;47] although in most studies vulvar oedema was not recorded.

The decreased rate of episiotomies and increased rate of perineal tears is consistent with findings from meta-analyses[15;16]. There is limited evidence that episiotomy carries an increased risk of side-effects compared to perineal tear[48-50]. One cohort study found a higher infection rate and a longer healing period among women with an episiotomy compared to those with a perineal tear[48]. A case-control study found that repair of an episiotomy was more likely to break down than repair of a perineal tear, but only in combination with operative delivery[50]. Another study found an association between episiotomy and dyspareunia and perineal pain but the control group comprised women with intact perinea, first and second degree tears[49]. Episiotomy is sometimes performed to prevent severe perineal tears[51;52]. However, a policy of restricted rather than routine episiotomy is now recommended because of the lower rate of posterior perineal trauma and complications[32;51;53].

Unlike Waldenström, we did not find more labial tears in sitting position[28]. We found an increase of these tears in the semi-sitting compared to the recumbent position. Another study found an increase of labial tears in squatting position on a birth cushion compared to semi-recumbent position[23]. The authors contribute this to a more anterior transit of the fetal head at delivery. It is difficult to see how this would explain an increase in labial tears in semi-sitting but not in sitting position in our study. In semi-sitting position less space is available to perform downward traction for the delivery of the first shoulder. Possibly, labial tears occurred when the upward movement for the delivery of the posterior shoulder was commenced before the anterior shoulder was fully delivered. Labial tears usually heal more quickly than perineal tears[23].

The incidence of third degree tears did not differ between position groups, but larger numbers are needed to show a significant difference. In two American studies the incidence of anal sphincter injury was increased in semi-recumbent or supine position compared to upright positions[24;31]. In one of them all sphincter damage occurred as an extension of an episiotomy[24]. In the USA the median episiotomy is often used. Although this type of episiotomy is easier to perform and heals more quickly, extension to the anal sphincter is more likely than from a mediolateral episiotomy[53].

In a retrospective study, third degree tears were more frequent in unsupported upright position (squatting, kneeling or standing) compared to sitting position[29]. The authors give several possible explanations for the differences found, such as a better view of the perineum in sitting position, the ability to offer manual support and the ability for the woman to lean backwards to a more semi-recumbent position. However, another study found more anal sphincter tears when women were squatting on a low chair compared to other positions which included kneeling and standing[30]. Thus, the association between birthing positions and anal sphincter injury is far from clear. Large

studies are needed to shed more light on the question whether birthing positions play a role in the incidence of this serious delivery complication.

Age below 25 years was associated with a higher rate of intact perineum than age 26 to 35. Age between 31 and 35 years was associated with an increase in episiotomy after controlling for other factors. Increasing age was associated with a reduced incidence of labial tears in the bivariate analysis, but this association disappeared after controlling for other factors. This may be explained by the fact that multiparous women are more likely to be older and they had fewer labial tears. The association between age and perineal damage is not clear. Some studies have found higher or lower rates of perineal trauma in older women[21;26;39]. Others have found no association with age[5;41].
The increased incidence of perineal damage in primiparous women is consistent with results from many other studies[5;22;26;41;42]. The decreased rate of perineal tears found in primiparous women was no longer significant after controlling for other factors. This may be due to the fact that primiparous women tend to have smaller babies and birthweight up to 3500 g was associated with fewer perineal tears.
The association between a longer duration of the second stage and perineal damage has also been found by others[21;26]. The lower incidence of perineal tears in women with a second stage longer than 60 minutes was probably due to the high percentage of episiotomies in this group (53.6%).
It is not surprising that birthweight over 3500g was associated with fewer intact perinea, more episiotomies and perineal tears because the large size of the head puts more strain on the perineum. Other studies showed similar findings[5;22;42]. One study did not find an association and the authors argue that this may be because only midwives and no physicians conducted deliveries in this study[21]. Our results do not confirm this as all women were looked after by primary care midwives only. The fact that the association between birthweight and episiotomy was not significant in the bivariate analysis may be explained by multiparous women having bigger babies and they also had fewer episiotomies.

In conclusion, our study showed no difference in intact perineum rates between position groups. Fewer episiotomies and an increase in perineal tears occurred in sitting compared to recumbent birthing position. More labial tears were found in semi-sitting position. Larger studies are needed to examine differences in anal sphincter damage. Future studies should not only examine the effect of the position at the time of birth but of positions during the entire second stage on perineal outcomes.
Based on our results and evidence from other studies no birthing position can be strongly recommended or discouraged to prevent perineal damage. Women should be encouraged to use the positions that are most appropriate to them.

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Chapter 5

Birthing positions during the second stage of labour and long-term psychological outcomes in low risk women

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Abstract

Little is known about the aspects of care that influence women's long-term experiences of childbirth. We examined the long-term influence of birthing positions during pushing, as well as other factors, on birth satisfaction, self-esteem and emotional well-being.

Three to four years after delivery, a postal questionnaire was sent to all 3200 women who received care in eight midwifery care practices from all over the country in 2001. Of those who responded (44%), 591 were low risk and were included in the analysis. The Rosenberg Self-esteem Scale and the Edinburgh Depression Scale were used.

Regression analyses showed that birthing positions were not related to childbirth satisfaction, self-esteem or emotional well-being. Age between 26 and 35 years was associated with being very satisfied. Pain, fear for own or baby's life and negative experience with the midwife were associated with reduced satisfaction. Age between 26 and 35 and higher education were related to higher self-esteem. Age between 26 and 35 years was associated with enhanced emotional well-being.

Concern about long-term psychological outcomes is not a reason to recommend either supine or non-supine positions. Further research should clarify whether having a choice in the use of birthing positions rather than the type of position influences psychological outcomes.

Keywords: birthing positions, birth satisfaction, self-esteem, postnatal well-being

Introduction

The experience of childbirth has a profound effect on women and has the potential for a permanent positive or negative impact[1-4]. Even after 15 to 20 years, women with a satisfying experience reported that this contributed to their self-confidence and self-esteem[5]. Long-term psychological outcomes are increasingly recognized as important aspects of quality of care[1;5;6].

Women's childbirth experiences change over time[4;7]. Once the initial excitement after delivery fades, negative aspects loom larger[4;8;9]. Some authors suggest that measures of childbirth experience soon after birth may be too optimistic and less relevant in understanding its long-term effects[6;7]. More research is needed into the aspects of care that influence women's long-term experiences of childbirth[2;5].

One of the aspects that influence birth experience is the use of birthing positions. The supine position is most commonly used in western countries and often women are not offered other choices[10]. Several studies suggest that being able to choose birthing positions that are most comfortable increases the experience of being in control[10-14]. Feeling in control is a major factor contributing to a positive birth experience and postnatal well-being[13;15-18]. Not being able to influence birthing positions may have a negative impact on women even after many years[5].

In four randomized controlled trials non-supine positions during the second stage of labour were associated with reporting less pain and in two of these studies with increased birth satisfaction[19-22]. These studies suggest that not only having a choice in birthing positions but also the type of positions can influence birth experience.

Additionally, it has been argued that upright birthing positions empower women and facilitate communication between a woman and a midwife at a more equal level during labour[23]. This may result in women feeling more in control in upright than in supine positions.

Since the use of birthing positions influences birth experience this may have an effect on long-term psychological outcomes. On the other hand, many non-obstetric factors are better predictors of postnatal depression and self-esteem[24-30]. Nevertheless, it is important to establish whether birthing positions have an impact on psychological outcomes as well.

We wanted to find out whether birthing positions, in particular the use of only the supine position during pushing, influence long-term birth satisfaction, level of self-esteem and level of well-being in low-risk women net of other influencing factors.

Methods

Participants and data collection

This study was part of a retrospective cohort study in the Netherlands among women three to four years after their delivery, using a postal questionnaire. The study design was similar to the three year follow-up of the replication of the Greater Expectations

study in England[31]. Eight primary care midwifery practices from all parts of the country took part in the study. In January and February 2005, a total of 3200 questionnaires were sent to all women who had received care in these midwifery practices in 2001. Two letters accompanied the questionnaire. One letter explained the aim of the study and invited women to participate. The second letter was signed by a midwife from the practice and expressed support for the study.
We only used data from women who were in midwife led care at the time of birth. This means that a primary care midwife was the lead professional during the entire labour and responsible for the intrapartum care. In the Netherlands, primary care midwives look after low risk women only who can choose to give birth either at home or in hospital. Therefore, none of these women had any medical interventions such as epidural anaesthesia, augmentation, continuous electronic foetal monitoring or instrumental delivery because if they needed these interventions they would have been referred to obstetrician led care. Women who had a perinatal death or whose child died during the first 4 years of life were excluded from the study.

Birthing positions

Birthing positions were defined as: supine (< 45° from the horizontal), lateral, sitting (> 45°), birthing stool, standing, squatting, hands and knees, bath and other. Women were asked to indicate all the positions they used during pushing and the position in which they gave birth. For the bivariate and multivariate analyses, birthing positions during pushing were defined as only pushing in supine position or (also) pushing in other positions.

Birth satisfaction

Satisfaction with the birth experience was measured with the question: "How do you feel when you look back on your experience of birth in 2001?" We compared women who answered " I am very happy with the way the birth went" with those who gave one of the other four options: somewhat happy, no special feelings, not so happy, not at all happy.

Self-esteem

Self-esteem was measured using the 10-item Rosenberg Self-esteem Scale (RSE) with a range of 0 to 30 (appendix 1)[32]. Higher scores indicate higher levels of self-esteem. This scale is often used to measure self-esteem and reliability coefficients of 0.84 and 0.87 have been reported in postnatal women[28;33]. In our study Cronbach's alpha was 0.84.

Emotional well-being

To assess level of emotional well-being we used the 10-item Edinburgh Depression Scale (EDS), with a range of 0 to 30 (appendix 2). This scale was developed and validated as the Edinburgh Postnatal Depression Scale (EPDS) in postnatal women[34]. It

was also validated in non-postnatal women, whose youngest child had a mean age of almost four years, and referred to as the Edinburgh Depression Scale (EDS)[35]. Higher scores indicate a lower level of emotional well-being.
The scale was originally designed as a screening tool to identify women with a high risk of depression who need further assessment[34]. Some authors have used the score as a continuous measure of emotional well-being[13;27]. Because we were interested in the whole spectrum of emotional well-being we used the continuous measurement. The Cronbach's alpha has been reported as 0.87[34] and was 0.83 in our study.
We used validated Dutch translations of the RSE[36] and EDS[37] scales.

We examined the infuence of variables known to be associated with emotional well-being, self-esteem or birth satisfaction. Variables that influence these outcomes include: age[30;38], education[15;38], single marital status[27;29;39], parity[7;13], place of birth[40;41], pain[18], duration of labour[42], fear[43], negative experiences with health professionals[2;18;38;44-46], having had another baby after the index birth[8] and possibly ethnicity[30;47].
Age 25 years or below is associated with reduced satisfaction with the birth experience and with health care in general and with postnatal depression[30;38]. A previous analysis of the data showed that age over 36 years, higher education and duration of pushing longer than 60 minutes were associated with using more non-supine positions[48]. We therefore categorized age into 'below 25 years', ' between 26 and 35 years' and ' 36 years or older'. Based on the previous analysis, duration of pushing was recorded in minutes and categorised into shorter or longer than 60 minutes and educational level was defined as low/ medium (higher level secondary education or vocational education or below) or high (diploma level or university education).
Women who were single, divorced, widowed or separated were combined as 'living alone'. Those who were married or living with their partner were combined as '(as) married'.
Women who gave birth for the first time in 2001 were classified as primiparous and those who had given birth before 2001 as multiparous.
Low-risk women who choose to give birth in hospital usually spend the first part of their labour at home and go to hospital when delivery is expected within the next few hours. Place of birth was defined as the place where the baby was born.
Women were asked to indicate their overall level of pain during labour on a scale of 0 to 10. A cut-off point of 7 was used to distinguish between low and high level of pain.
Respondents circled positive and negative words that described their midwife. We compared women who circled at least one negative characteristic (rushed, insensitive, unhelpful, off-hand, rude, inconsiderate, bossy, condescending) to women who did not.
Women indicated whether they felt that the baby or their own life was in danger at any time during the birth. A positive answer to any of these questions was described as 'fear for own or baby's life'. Women of non-Dutch origin were combined because of the low numbers involved (table 1).

Data Analysis

The Chi-square and exact test were used for categorical variables and the t-test and Analysis of variance for continuous variables.

A multiple linear regression analysis (Stepwise Backward) was used to determine the variables with the strongest associations with RSE and EPDS scores. A logistic regression analysis was conducted with birth satisfaction as the outcome.

The effect of the interaction between birthing positions during pushing and the variables age, education, pain and duration of pushing on the outcome variables was examined using analysis of variance and logistic regression. None of the interactions had a significant effect on the outcome variables.

After examining residuals and unusual observations, two cases were removed in the regression analysis for EPDS scores and three cases for RSE scores. The adjusted R square was 0.036 for the linear regression with RSE score and 0.025 with EPDS score as the outcome variable. The final logistic regression model explained between 11.7% and 17.4% of the variance in birth satisfaction.

All statistical tests were two-tailed and P-values < 0.05 were considered statistically significant. SPSS 11.5 for Windows was used for data analysis (SPSS Inc, Chicago, Illinois, USA).

Results

From the 3200 questionnaires 228 came back unopened because the address was no longer correct. Another 1309 questionnaires were returned that could be used (44% response rate). We compared characteristics of the respondents to those of all women who gave birth in the same year, using the national data from the Dutch Perinatal Registers in 2001[49]. In our sample, women were slightly older (mean age 31.3 versus 30.3 years), fewer women were primiparous (44.3% versus 47.1%) and fewer women were of non-Dutch origin (5.4 % versus 19.2%) compared to the national data.

From the 1309 women, 595 women gave birth in midwife led care. Four women did not indicate their position at the time of birth and data from the remaining 591 women were analysed (table 1). During pushing, 426 (72.1%) women used only the supine position and 530 (89.7%) gave birth in supine position.

Birth satisfaction

The majority of women (75.2%) were very happy with their birth experience (table 2). Birthing positions during pushing had no influence on satisfaction (table 3). Age between 26 and 35 years was associated with being more often very satisfied compared to age below 25 years. Painscore over 7, fear for own or baby's life and negative experience with the midwife were associated with reduced satisfaction. These associations remained significant after controlling for other variables and hence may be considered to be net determinants.

Table 1. Sample characteristics (n=591)

Variable	No.	(%)
Pushing only in supine position	426	72.1
Supine position at time of birth	530	89.7
Maternal age in categories		
25 years or younger	39	6.7
26 to 35 years	463	79.1
36 years or older	83	14.2
Education		
low/ medium	351	59.9
high	235	40.1
Living alone	30	5.1
Non-Dutch ethnic background	31	5.3
Primiparous	211	35.7
Homebirth	436	73.8
Painscore; VAS 0-10 (mean, sd)	6.4	2.2
Painscore higher than 7	240	40.7
Duration of pushing > 60 minutes	43	7.7
Fear for own or baby's life	71	12.3
Negative comment about midwife	95	16.1
Another birth since 2001	172	29.7

Missing values are excluded.

Table 2. Psychological outcomes after birth (n=591)

Psychological outcome		
Satisfaction with the birth experience, N (%)		
Very happy	443	(75.2)
Somewhat happy	107	(18.2)
No particular feelings	7	(1.2)
Not so happy	24	(4.1)
Not at all happy	8	(1.4)
RSE score, mean (range)	22.6	(3, 30)
EPDS score, mean (range)	5.8	(0, 23)

Missing values are excluded

Table 3. Variables associated with birth satisfaction: very satisfied versus less than very satisfied

Variable	n	Very satisfied n (%)	Unadj OR	(95% CI)	Adj OR[1]	(95% CI)
Pushing position						
(also) other positions	165	116 (70.3)		Reference		
only supine	424	327 (77.1)	1.42	(0.95-2.13)		
Young maternal age						
25 years or younger	39	23 (59.0)		Reference		Reference
26 to 35 years	461	355 (77.0)	**2.33**	**(1.19 - 4.57)**	**2.90**	**(1.36 - 6.18)**
36 years or older	83	62 (74.7)	2.05	(0.92 - 4.61)	2.21	(0.90 - 5.44)
Education						
Low/ medium	350	259 (74.0)		Reference		
high	234	180 (76.9)	1.17	(0.80 - 1.72)		
Marital status						
(as) married	559	424 (75.8)		Reference		
living alone	30	19 (63.3)	0.55	(0.26 - 1.19)		
Ethnic background						
dutch	557	419 (75.2)		Reference		
non-Dutch	31	23 (74.2)	0.95	(0.41 - 2.17)		
Parity						
multiparous	378	291 (77.0)		Reference		
primiparous	211	152 (72.0)	0.77	(0.52 - 1.13)		
Place of birth						
hospital birth	155	110 (71.0)		Reference		
homebirth	434	333 (76.7)	1.35	(0.89 - 2.04)		
Painscore (VAS 0-10)						
7 or less	348	285 (81.9)		Reference		Reference
more than 7	240	157 (65.4)	**0.42**	**(0.29 - 0.61)**	**0.45**	**(0.30 - 0.70)**
Duration of pushing						
≤ 60 minutes	512	389 (76.0)				
> 60 minutes	43	28 (65.1)	0.59	(0.31 - 1.14)		
Fear for own or baby's life						
no	504	398 (79.0)		Reference		Reference
yes	71	35 (49.3)	**0.26**	**(0.16 - 0.43)**	**0.30**	**(0.17 - 0.52)**
Negative about mid-wife						
not at all	494	387 (78.3)		Reference		Reference
yes	95	56 (58.9)	**0.40**	**(0.25 - 0.63)**	**0.37**	**(0.22 - 0.62)**
Another birth since 2001						
no	406	309 (76.1)		Reference		
yes	171	125 (73.1)	0.85	(0.57 - 1.28)		

Missing values were excluded. Unadj = unadjusted. Adj = adjusted.

[1]Logistic regression (Backward elimination): Total No is 520. Very satisfied No is 392.

Table 4. Variables associated with RSE (Rosenberg Self Esteem) scores

Variable	n	RSE score	P	Beta[1]	P
Pushing position					
(also) other positions	165	22.6			
only supine	423	22.6	.825		
Maternal age					
25 years or younger	38	**21.0**		Reference	
26 to 35 years	461	**23.0**		**0.146**	**.001**
36 years or older	83	**21.7**	**.004**		
Education					
low/ medium	348	**22.3**			
high	235	**23.1**	**.026**	**0.145**	**.001**
Marital status					
(as) married	558	22.6			
living alone	30	22.6	.950		
Ethnic background					
Dutch	556	22.6			
non-Dutch	31	22.2	.591		
Parity					
multiparous	378	22.5			
primiparous	210	22.8	.407		
Place of birth					
hospital birth	154	22.9			
homebirth	434	22.5	.328		
Painscore (VAS 0-10)					
up to 7	350	22.4			
more than 7	237	22.9	.233		
Duration of pusbing					
≤60 minutes	511	22.5			
> 60 minutes	43	23.0	.508		
Fear for own or baby's life					
no	502	22.8			
yes	70	21.9	.200		
Negative about midwife					
not at all	493	22.5			
yes	95	23.3	.051		
Another birth since 2001					
no	405	**22.4**			
yes	171	**23.3**	**.027**		

[1] Multiple linear regression: total no is 574

Missing values are excluded.

Table 5. Variables associated with EPDS (Edinburgh Postnatal Depression Scores)

Variable	n	EPDS score	P	Beta[1]	P
Pushing position					
(also) other positions	159	6.2			
only supine	422	5.7	.215		
Young maternal age					
25 years or younger	37	6.7			
26 to 35 years	457	5.5		Reference	
36 years or older	81	6.5	.057	**- 0.110**	**.013**
Education					
low/ medium	345	5.8			
high	233	5.7	.792		
Marital status					
(as) married	552	5.8			
living alone	29	6.9	.165		
Ethnic background					
Dutch	550	**5.7**		Reference	
non-Dutch	30	**7.3**	**.042**	0.086	.050
Parity					
multiparous	374	5.6			
primiparous	207	6.2	.116		
Place of birth					
hospital birth	152	5.5			
homebirth	429	5.9	.329		
Painscore (VAS 0-10)					
up to 7	344	5.7			
more than 7	236	6.0	.394		
Duration of pushing					
≤60 minutes	504	5.9			
> 60 minutes	43	5.9	.961		
Fear for own or baby's life					
no	496	**5.6**			
yes	70	**7.1**	**.008**	0.075	.089
Negative about midwife					
not at all	487	5.7			
yes	94	6.3	.246		
Another birth since 2001					
no	400	5.9			
yes	169	5.5	.320		

Missing values are excluded.

[1] Multiple linear regression. Total number is 557.

Self Esteem (RSE scores)

The mean RSE score was 22.6 (table 2). Birting positions during pushing had no influence on RSE scores (table 4). Age between 26 and 35, higher education and having had another birth were associated with higher RSE scores. Only the association with age and higher education remained significant controlling for other factors, indicating these characteristics to be net determinants of self-esteem.

Well-being (EPDS scores)

The mean EPDS score was 5.8 (table 2). Birthing positions during pushing had no

influence on EPDS scores (table 5). Fear for own or baby's life and non-Dutch origin were associated with higher EPDS scores. After controlling for other factors, age between 26 and 35 years was associated with lower EPDS scores.

Discussion

This study examined the influence of birthing positions on psychological outcomes three years after birth. Birthing positions during pushing were not related to childbirth satisfaction, self-esteem and emotional well-being. This finding contrasts Green's study in which being able to get into comfortable birthing positions was related to various psychologicial outcomes[13].

We only examined the influence of type of positions. We had no information on the influence a woman had on the choice of birthing positions. Previous analysis of the data showed that women with a longer second stage of labour were more likely to use non-supine positions[48]. Other positions may have been used as an intervention by midwives to augment labour and may not have been chosen or preferred by women[50;51].

If choice matters, it is surprising that two randomised controlled trials found that women had a better experience in non-supine positions because in these studies position was allocated rather than chosen[20;22]. However, women did have a choice to consent to the trial and in one study only 49.3% of women allocated to the birthing stool gave birth in that position, indicating that many chose to opt out[22].

Future studies should clarify whether having a choice in birthing positions rather than the type of positions influences psychological outcomes[11-13].

As in other studies, most women were very satisfied with their birth experience[13;52]. More specific questions about certain aspects of care, such as (choice of) birthing positions, are likely to generate more variation in women's responses[53]. In addition, open-ended rather than forced-choice questions may be less likely to overestimate satisfaction levels[6].

The significant association between negative experiences with the midwife and lower birth satisfaction confirms findings in other studies that the midwife's attitude is crucial to women's birth experiences[13;18;38;44;45]. Aspects of the midwife's attitude that matter to women include giving information and involving them in decision making[45].

With regard to birthing positions, women are not often offered other choices than the supine position[10]. To enable women to move into positions that are comfortable to them, midwives need to inform women about the choices that are available to them and they should encourage them to make their preference of positions known[10].

Pain and fear for own or baby's life were associated with lower birth satisfaction. Lower birth satisfaction may have been the result of pain and fear during labour or, alternatively, certain psychological characteristics may have resulted in experiencing more pain and fear and in being less satisfied. Green13 found that women who were very anxious about labour pain during pregnancy were less satisfied and had lower emotional well-being after birth. Also, women who expected labour to be very painful

were likely to find that it was. Studies that measure psychological factors during as well as some years after pregnancy can clarify whether pain and fear during labour influence long-term psychological outcomes.

Similar to another Dutch study, we did not find an association between place of birth and satisfaction[39]. Non-Dutch studies have shown increased satisfaction with a home birth compared to birth in hospital[40;41]. In the Netherlands, low risk women can choose where they want to give birth. About one third of all women give birth at home. It may be that in countries where homebirths are less common, women make a more conscious decision to choose the 'alternative' option of giving birth at home and therefore appreciate it more.

The only factors related to self-esteem were maternal age 26 to 35 years and higher education and this age bracket was also related to lower EPDS scores. No clinical factors were related to self-esteem. Even though in qualitative studies women reported that a positive birth experience had boosted their self-esteem, this may not translate into higher RSE scores three years after birth[2;5].

Unlike in other studies, parity had no influence on birth satisfaction[7;13;16;17]. We only included women who gave birth in midwife led care and therefore all births with obstetrical interventions were excluded which occur more often in primiparas. Although the bivariate analysis showed a non-significant trend to multiparas being more satisfied, the difference was not significant. In the multivariate analysis we controlled for factors that are more common in primiparae, such as severe pain, which reduced the difference even further.

Since the final regression models only explained a small amount of the variation in well-being and self-esteem, other factors that were not measured in this study are likely to be relevant. This confirms the finding in other studies that non-obstetric factors play an important role in these outcomes[24;25;27-30]. Although birthing positions have been linked to postnatal well-being[13], other factors than obstetric variables, such as history of depression, physical symptoms, everyday stressors, quality of marital and other relationships and lack of support are better predictors of postnatal depression[24-27;29;30;54]. Equally, low self-esteem is related to everyday stressors, low quality intimate relationship, low education level and income and young age[25;28].

The timing of the data collection may partly explain why we did not find an association between birthing positions and psychological outcomes while Green's study did[13]. Although some authors advise against measuring birth experience too soon after birth[6;7], birthing positions may influence immediate psychological outcomes after birth but no longer have an effect after three years.

In addition, some recollection bias may have occurred, even though women tend to remember many birth details accurately[4;55]. Some misclassification, especially between supine and lateral or between supine and sitting position may therefore have occurred. It is unlikely that this influenced the results as this misclassification probably occurred in all the groups.

A limitation of the study is the moderate response rate of 44%. The characteristics in

non-responders may be different from women who responded. Although the women in the sample were only slightly older and somewhat more likely to be multiparous, the proportion of women of non-Dutch origin was much lower than in the Dutch population. The results may be different in ethnic minority groups. Because of the low numbers, all women from non-Dutch origin were combined. However, minority groups differ from each other in birth satisfaction and postnatal emotional well-being[30;47]. A larger study is needed to explore differences between these groups.

In conclusion, we studied the hypothesis that birthing positions during pushing may affect long-term psychological outcomes because they influence the childbirth experience. Our results showed no association between using only the supine position and long-term birth satisfaction, level of self-esteem and level of well-being. Concern about long-term psychological outcomes is not a reason to recommend either supine or non-supine positions. Long-term well-being and self-esteem may be influenced more by non-obstetric factors. Further research should clarify whether having a choice in the use of birthing positions rather than the type of position influences psychological outcomes.

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Chapter 6

Birthing positions: A qualitative study into the views of women about various birthing positions

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Abstract

The aim of this study was to gain insight into the influences on women's use of birthing positions and into the labour experiences of women in relation to the positions they used.

Quantitative studies have shown some medical advantages of non-supine birthing positions. They also suggested some psychological benefits but these are difficult to interpret. In this study in-depth interviews were conducted to gain a deeper understanding of the relationship between birthing positions and labour experience.

We found that the advice given by midwives was the most important factor influencing the choice of birthing positions. If medically possible, women benefited from having the autonomy to find the positions that were most useful for them. They varied greatly in their choices and in their experience of pain in relation to the type of position. Women, regardless of ethnicity, were most familiar with the supine position but valued practical information on other options.

Because the supine position is dominant in westernised societies, midwives have an important role to play in widening the range of women's choices. Midwives should empower women to find the positions that are most suitable for them, by giving practical advice during pregnancy and labour.

Keywords: birthing positions, labour experiences, labour pain, patient preference, patient control

Introduction

Before the 17th century the upright birthing position was common in western countries[1,2]. Following the introduction of obstetric instruments, such as the delivery forceps, the supine position became popular because of its convenience for health professionals rather than the benefit to women[3,4]. In many non-western countries the upright position is still very common[3,5,6]. If they are left to choose, women use various positions[6,7,8]. The supine position, however, has become so common that neither health workers nor women now regard this as an intervention[3].

In the last few decades of the twentieth century, alternatives to the supine position have gained some popularity. Nevertheless, the majority of women in the western world give birth in a supine position[9,10].

In many randomised controlled trials the benefits of one birthing position over another have been studied. Two meta-analyses of these trials indicated that most women preferred alternatives to the supine position and that more women had a good experience using other positions[11,12]. More women reported severe pain in the supine position and more women found it difficult to bear down. However, owing to methodological problems, these results should be interpreted cautiously.

Although quantitative data give some impression of women's experiences, they do not explain how different positions contribute to the birthing experience. Qualitative methods are more suitable to show "linkages between events and activities and to explore people's interpretations of the factors which produce such connections"[13]. In this study in-depth semi-structured interviews were used to gain insight into women's perceived benefits of various birthing positions and the implications for midwives in assisting women to adopt positions that are most appropriate for them.

Design

Methods

The study took place in Nijmegen from April to December 2002. A pilot cohort study was conducted into the advantages and disadvantages of the supine position versus other positions during the second stage of labour. Only women who started the second stage of labour under the care of the midwife were included. After obtaining written consent, midwives collected medical data about the delivery and filled in a registration form with questions relating to birthing positions. About 6 weeks after the delivery, women were sent a survey questionnaire to collect quantitative information about their experiences and health problems. They were asked to indicate on the questionnaire whether they were willing to participate in an interview, which took place between 7 and 19 weeks after the delivery. Individual interviews were held to collect in-depth, personal data and to hear minority opinions[14].

Although the emphasis was on positions used during the second stage, women were also asked about their positions during the first stage because these were thought to

influence the second stage and women do not always experience the two stages as separate entities.

A topic guide, with semi-structured questions, was used (appendix 3). Topics included factors affecting position choice, the influence of birthing positions on the labour experience, the preparation with regard to positions by midwives and in antenatal classes, the influence of positions on health problems and position preferences in a subsequent birth. The wording of some questions was changed as a result of two pilot interviews and new probes were added based on themes that emerged during the interviews. For example, a question was added on the role of other women's birth stories and the media in the preparation for labour. For women from ethnic minority groups a question was added on customs in their country of origin with regard to birthing positions. A probe was added concerning the embarrassment regarding certain positions as this emerged as a theme that was relevant to some women.

Women chose where the interview took place. One woman was interviewed in the health centre, all others at home. Written consent was obtained at the start of the interview. Women were told they could discontinue participation at any time and that they need not answer questions that made them feel uncomfortable. Their names were removed from the transcripts of the interviews and only the two researchers had access to the original interviews.

The interviewer was also one of the midwives who provided the care for the women and in five cases assisted at their delivery. As this could easily lead to bias due to favourable comments about the care they received, women were encouraged to be very critical during the interview and to regard the interviewer not as their midwife but as a researcher interested in improving midwifery care.

All interviews were recorded, transcribed and analysed by the interviewer. The background information from the pilot was used and the free text filled in by the midwives on the registration forms and by women on the questionnaires was also used in the analysis. This triangulation of methods was thought to enhance the quality of the findings[15]. Coding categories were used to analyse the data and emerging themes were formulated[14] . The themes were discussed with the second researcher, who also read all the interviews. Simple counting techniques were used to gain an impression of the whole corpus of data rather than of a few selected fragments[16] . Quotes have been selected to illustrate the themes that emerged from the interviews and have been translated into English.

Key:

Px = Participant number x

I = Interviewer

[ ] = Explanation by the author

[...] = Text left out

Participants

No approval from an ethics committee was required because the women were all patients belonging to the midwifery practice of the researcher. To obtain a varied sample of participants, a purposive sampling methodology was used[17] . At first, all women who were willing to participate were included. Later on, women were selected who had used various positions, who expressed interesting views on the questionnaires and those from ethnic minority background as this was thought to generate new information. Only three women from an ethnic minority group were interviewed. One woman came from South West Asia, one from Africa and one was born in The Netherlands but her parents originated from Eastern Europe.

Of the twenty women, eight were having their first baby (table 1). Thirteen women used more than one position during the second stage. Ten used mainly the supine position and ten other positions. Eleven gave birth in supine position and nine in non-supine position. Six gave birth in hospital and fourteen at home.

Findings

Factors that influence the use of birthing positions

The advice given by the midwife was by far the most important factor that influenced the choice of birthing positions, seventeen women mentioned this explicitly. For example: One woman (first baby), who had given birth on her back, mentioned this in the questionnaire:

> ***P8:*** *The role of the midwife is also very important, you more or less follow her advice anyway, especially during your first delivery*

Only one woman was adamant she would use the birthing stool again next time, even if the midwife advised her something else. Two women stated that they would use positions of their own preference next time unless the midwife suggested other positions for medical reasons.

On the registration forms, midwives indicated that they had advised ten women to adopt a certain position for medical reasons such as foetal bradycardia or failure to progress. Women with a quick second stage were more likely to use the supine position: six out of eight women with a second stage of less than 10 minutes mainly used the supine position, while eight out of twelve women with a second stage of more than 10 minutes used mainly non-supine positions. Two women lay down to enable the midwife to examine them and subsequently remained in this position for the birth. The following woman (first baby) had used upright positions during the first stage:

P3: *...when I wanted to push she said, now you have to lie on your back for a moment, so that I can check how far you are and WHETHER you can push, yes and then...the head was already crowning so that all went very fast, then I remained lying down like that*

Table 1: Participant characteristics summary

Participant	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Para	1	2	0	1	1	0	1	1	1	0
First stage most	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other
Sec. Stage positions	Sup.	H&K	Sup. lat. H&K	Sup. Stand. H&K	Sup. Lat.	Sup.	Stand. BS	Sup.	Sup. BS lat.	Sup. Lat. BS
Sec. stage most	Sup.	Other	Other	Other	Sup.	Sup.	Other	Sup.	Sup	Other
Birth pos.	Sup.	H&K	Sup	Stand.	Lat.	Sup.	BS	Sup.	Lat	BS
Duration 2nd stage (mins)	3	9	19	25	3	9	8	9	35	60
Perineal damage	Intact	Intact	2nd	2nd	Intact	Intact	2nd	2nd	2nd	2nd
Pl. of birth	Hosp	Home	Hosp	Home	Home	Hosp.	Home	Hosp	Home	Home

Participant	**P11**	**P12**	**P13**	**P14**	**P15**	**P16 ***	**P17**	**P18**	**P19**	**P20**
Para	1	0	1	1	1	0	0	0	0	1
First stage most	Sup	Other	Other	Other	Other	Other	Other		Other	Other
Sec. stage positions	Sup	Sup. Lat. H&K	Sup. BS	Sup. Lat.	Sup. Lat.	Sup. Lat. Stand. BS H&K	Sup.	Sup.	Staand BS	Sup. Lat.
Sec. stage most	Sup	Other	Other	Sup.	Other	Other	Sup.	Sup.	Other	Sup.
Birth pos.	Sup	Sup.	BS	Sup.	Lat.	Sup.	Sup.	Sup.	BS	Sup.
Duration 2nd stage (mins)	3	67	15	3	15	147	48	43	46	98
Perineal damage	2nd	Intact	2nd	2nd	2nd	Epi	Intact	2nd	2nd	2nd
Pl. of birth	Home	Hosp	Home	Home	Home	Hosp	Home	Home	Home	Home

First Stage = Positions used > 50% of the time during the first stage; Sup(supine), Other (all other positions combined)

Sec. Stage Pos. = All positions used during second stage; sup(supine), lat (lateral), sit (sitting), BS (birthing stool), H&K (hands and knees), stand (standing)

Sec. Stage Most = Position used > 50% of time during the second stage Sup(Supine), Other (all other positions combined)

Birth Pos. = Position at birth, Perineal Damage; intact (no sutures needed), 2nd (sutured 2° tear), epi (episiotomy)

Hosp. = Hospital, * = referred to obstetrician for failure to progress - vacuum delivery (no other patient was referred)

Other influences on the use of birthing positions included information women obtained from midwives, during antenatal classes, via the media and from other women's stories. Eighteen women said that they thought the supine position is the most commonly used in the Netherlands which was reflected in them calling this position the "traditional", "normal" or "old-fashioned" position. Two of the women from ethnic minority background thought that the supine position was predominant in their country of origin. One woman (first baby) knew nothing about birthing practices in her country of origin:

> ***P6:*** *I know about [my country], but in another way but not about the delivery...because delivery, you don't have to talk about it...they will say you are a child...you should not talk about it...only people that have given birth and when you give birth to one, they don't even consider that one...*

Women's partners did not influence their choice of birthing position, nor did the women expect them to give advice. Only one woman took advice from her sister-in-law who attended the birth and who she regarded to be an expert, since she had already given birth herself. For most women the choice of position was not influenced by the kind of support they could receive from their partner. Although three women mentioned that their partner could give most support on the birthing stool only one woman would choose this position specifically so that her partner could push against her lower back.

When asked about the difference in using positions at home or in hospital, fourteen women thought the place of birth would not make a difference, two thought having more space in hospital makes it easier for attendants to support them in positions off the bed and two mentioned the lack of a bath in the hospital as a disadvantage. Four women felt that the atmosphere in the hospital would inhibit them; they would be confined to one room, whereas at home they could move around freely from one room to another and would think of trying other positions more easily. The following woman (first baby) gave birth on a birthing stool at home:

> ***P19:*** *I think if you are in your own home, then you feel at ease and in the right place and then you are going to try out more things for yourself....I don't think you do that as easily in a hospital...*
> ***I:*** *why not?*
> ***P19:*** *yes, that's a good question, why not...yes, because the familiarity is not there...[....]...if you don't feel at ease somewhere, [...] then fewer ideas occur in your head I think ...like, I could do that or I could do that.....*

Effect on labour experience

Three women felt the labour pain was more intense in an upright compared to supine

position and two women felt the opposite. Two women felt more intense pain in supine position compared to a lateral position. Four women said the position had no influence on the intensity of pain.
For nine women the position had no influence on the type of pain. Two women experienced more back pain when lying on their back, while for two women the pain decreased in this position because of the counter pressure of the bed. One woman, who only used upright positions, felt more abdominal pain in a sitting position and more back pain while standing.
Five women felt less tired in the supine position than in upright or lateral position and one woman felt less tired on the birthing stool than in supine position. One woman had planned to give birth on the birthing stool, which she used for some time, but in the end she got tired and adopted the supine position. Afterwards she felt she might consider using the hands and knees position next time, as this combines an upright position with the possibility to rest in between.
Eight women felt they had more control over their pushing in the second stage when they were in upright position compared to supine position. The following woman (first baby) used the supine and lateral position and the birthing stool:

> ***P10:*** *...once I sat on that birthing stool, I was better able to concentrate you know, then it is just like you only have to concentrate on one point and then you are like, 'all right, pushing down below' [...] because on the bed you have to use your whole body, pain in your neck, pain in your shoulders, pain in your arms....*

Two women felt the opposite. One of them (first baby) tried the hands and knees and lateral position before she adopted the supine position which she preferred:

> ***P12:*** *Yes, that went well, actually I had the feeling that I was able to put more pressure right down like that*
> ***I:*** *yes?...you found that easier than in those other positions?*
> ***P12:*** *yes I felt that I could give more pressure from where it should be....look, otherwise you push with your whole body but you should actually push right down...well, I was able to do that very well then*

Two women felt they were more in control when they were standing compared to when they were using the birthing stool and one woman felt most in control in lateral position compared to other positions.
Three women said that they considered the supine position to be the most embarrassing one, especially in the hospital, because (unfamiliar) people who entered the door would look straight into their vagina. One woman had a clinical delivery in the hospital on her back the first time and disliked this position because of "all those people looking down on me". This time, she gave birth at home, used various positions and

in the end lay down for the birth. In this situation she did not find the supine position embarrassing, because she had felt there was an equal relationship between her and her attendants, she felt free to move around as she wanted and therefore felt much more in control.
One woman associated the hands and knees position with a dog-like position and the birthing stool with the toilet. She therefore was hesitant about trying these positions, but would try them if the midwife advised them.
Although three women felt more intense pain in upright position, they all considered using this position again for a next birth. One woman had given birth twice in supine position. For her third birth the midwife advised her to stand up because of a lack of progress.

> ***P2:*** *yes, I did find it stronger...eh...because I noticed [...]...with the pushing for example, I noticed when I came off the bed [...] that the pressure was just a lot stronger*
> *[...]*
> ***I :*** *on your back was actually nicer?*
> ***P2:*** *yes*
> ***I:*** *was more comfortable?*
> ***P2:*** *yes....well, in that respect, but this way I liked more that more could be done with the body...during that severe pain I bent my back a little, then I bowed down a bit, it may sound stupid but that was really nice, yes, so in that respect it was.....yes, it has advantages and disadvantages I think*

Six women mentioned that using a variety of positions helped to distract them from the pain.
Women who gave birth in an upright position liked the fact that they were the first person to see their baby, while women who lay down liked the feeling of having the warm, new-born baby on their abdomen. However this was not an important factor in women's preference for certain positions.
All women were either quite or very satisfied with the positions they used. Of the ten women who used mainly the supine position four wanted to use this position initially next time, three would prefer the lateral position, two upright positions and one had no preference. Of the ten women who mainly used non-supine positions six women would prefer non-supine positions initially next time and three women would prefer the supine position. One woman used the supine position in previous births and the hands and knees position this time and she would use either of these two next time.
All women emphasised the need to be flexible and would also advice other pregnant women to be open-minded. One woman (first baby) had intended to use the birthing stool but during labour only wanted to lie down:

I: *...say, you meet women who are pregnant for the first time...would you recommend anything regarding birthing positions?*
P17: *no, ... I don't think that you can say for definite like that's how I want to give birth and that's how it will happen...that I think I would give for advice, like when the time is there you will notice automatically, well...whatever is most pleasant for you*

Factors that influenced the choice of birthing position included the advice of the midwife, the duration of labour, the kind of pain and medical complications. Four women said they would lie down if labour went very fast and one midwife indicated on the registration form that she had advised one woman to lie down for this reason.

Effects on postpartum health

Women found it very difficult to relate the adopted birthing positions to the development of pelvic pain, incontinence, tiredness or difficulties in daily activities postpartum. Three women reported a relationship with emotional difficulties and the possibility of choosing birthing positions was suggested as part of being able to have influence during labour and this was considered an important factor for postnatal emotional well-being. One woman had a difficult hospital delivery the first time and developed postnatal depression afterwards. This time she gave birth at home where she used various positions and reported feeling a lot better emotionally:

I: *so it is not just the position but also the kind of delivery and where it was...*
P13: *the kind of delivery and where it was, yes...and that so many interventions were needed [the first time] ...yes*
I: *but the position also played a part you think?*
P13: *yes, definitely*
I: *that has given you a better feeling....?*
P13: *yes, yes, that I was really able to do it myself...yes, that you can be in charge a little bit...yes, of course with the support of the midwife ...of course that is very important...but I find that you, yes, the more you can suggest yourself, or find out positions for yourself, the better I find it for coming to terms with it, rather than somebody saying, and now you lie down, and you just push, look, because than I feel like...[...]...you were not able to do it yourself*

One woman thought the birthing stool was the cause of swelling in her vagina after the birth. Another woman thought using the stool caused her to rupture more severely and led to incontinence and sexual problems. Nevertheless these women still said they would prefer to use the birthing stool again because their problems were improving and they felt the advantages outweighed the possible disadvantages.

Need for information

Eighteen women felt it is important for midwives to give information on birthing positions and some commented that they expected the midwife to do this. In the words of one woman (second baby):

> ***P14:*** *...actually I find it very strange that ...that ...yes, you are there [at the antenatal clinic] so often, so many discussions you are having there and something as essential as birthing positions is actually not discussed.*

Women thought information was important in order to make preparations if necessary, for example creating space for the birthing stool. If they had received information they would start trying positions in early labour before the midwife arrived the first time. Also, they would feel less hesitation to use the more unusual positions if these had been mentioned by the midwife during pregnancy.

Seven women attended antenatal classes. During the classes many more birthing positions were discussed than by the midwives and women greatly appreciated this preparation. Practical information in particular was valued but needs to be improved. One woman who gave birth in standing position would have liked to be prepared for the fact that the baby was put forward to her between her legs. Another woman would have liked to try various positions during the information evening given by the midwives. One woman said she would have liked a video to take home and another suggested a leaflet explaining various positions, so that they could practice positions in their own environment.

Two women, both expecting their second baby, felt the absence of such information was not a problem but would not have minded if birthing positions had been discussed. One woman felt the information at antenatal classes was sufficient but others commented that not all women attend these classes and therefore midwives should also provide this information.

Discussion

There is a lack of knowledge about women's preferences regarding position choice in relation to the midwife-client dynamic[8]. In this study women expected midwives to provide professional advice on positions and this advice was a stronger influence than their personal preference. However, when the medical situation allowed it, the women liked to find the most suitable positions through a combination of their own preferences and the midwife's suggestions. The freedom to adopt positions freely as part of having influence over their own labour contributed to a better overall experience and for some women to better emotional well-being afterwards.

Eight women had more control over their pushing when in upright position which is consistent with Chen et al's[18] quantitative study findings. However, the two women who felt more in control in supine position show that women's experiences vary. Some

women coped better with the pain using a variety of positions which has also been reported by other authors[19,20,21].
Two women gave birth in a supine position because they had lain down for a vaginal examination after which they had given birth rapidly. If a woman is comfortable in a non-supine position and starts to bear down, a midwife should consider waiting for a while to see if the head becomes visible in order to avoid an examination and an undesired change in position. However, if the midwife thinks full dilatation is unlikely, a vaginal examination will be necessary[22]. It has been suggested that a supine position is useful to slow down a fast labour[20,23]. This factor may have had some influence in this study, as more women with a short second stage used the supine position and four women and one midwife cited this as a reason for a supine position.
The birthing partner rarely influenced the choice of position, nor was the kind of support the partner could give in relation to a certain position an important factor.

Although in quantitative studies women appeared to experience less pain in non-supine positions[24,25,26], our data are not consistent. The experience of type and intensity of pain and the accompanying preference for a certain birthing position varied widely. One reason for the difference in findings may be that in a quantitative study women have to choose between a few given answers which may not fully represent their views[17]. If asked to indicate their level of pain, the degree of satisfaction and feeling in control may have influenced women's answers. Feeling in control appeared to be more important than the intensity of pain, indicated by three women who liked to be upright for this reason in spite of increased intensity of the contractions.
Embarrassment was an issue for some women in using certain positions but this would not stop them from using them if advantages seemed likely. Also, embarrassment decreased if women were informed in advance about position options and if they felt they had influence over their labour. A reduced feeling of influence was also an important reason why some women felt more embarrassed in hospital and felt less free to try various positions there.

The fact that the interviewer was one of their carers might have prompted women to give desirable answers. Many women knew that the interviewer was in favour of letting women use various positions during labour and they might have felt that she was looking for advantages of non-supine positions. Although many advantages of the supine position and disadvantages of non-supine positions were mentioned and seven women said they would prefer a supine position next time, some bias may have occurred.
Women from ethnic minority groups were reluctant to take part. The language barrier was a practical problem for some of them. Some stated that they had nothing to say about the topic. Embarrassment about discussing the birth experience may have played a role as was illustrated by the woman who explained that talking about birth was taboo in her country of origin. Additionally, being interviewed by a white resear-

cher may have raised anxiety[27]. Instead of asking women to indicate on the questionnaire whether they wished to be interviewed, it may have been better to invite women by phone or in person, so that the importance of understanding their experience could have been explained[27]. An unexpected finding was that the three women from ethnic minority groups were not familiar with upright positions[3,5,6]. The supine position may have become "the norm" in many non-western countries due to western medical influence as was indicated by the fact that two women thought the supine position was used predominantly in their country of origin.

Several authors have stressed the importance of giving information to prepare women for childbirth[28,29]. Women in this study felt it was important that midwives gave information about birthing positions during pregnancy and labour. They preferred exact information on practical issues and suggested a leaflet with pictures explaining the various options and the different birth mechanisms. Eleven women would prefer non-supine positions next time and all women stressed the need to be flexible and recommended that the position should depend on the kind of labour. Nonetheless the supine position is most common in the western world[9,10] and women heard about this position most frequently via the media and from other women's birth stories. Women in this study have shown clearly that they appreciate a range of options. Further research should clarify which factors would enable midwives and other obstetric staff to widen the range of choices, and help women use the positions that are most suitable for them.

Conclusion

The choice of birthing positions was determined more by midwives' advice than women's personal preferences. Being encouraged to find the most suitable positions was described as part of having control over labour, which contributed to a good experience and emotional well-being afterwards for some women. The experience of type and intensity of pain and the accompanying preference for a certain birthing position varied widely. Women were most familiar with the supine position because this position is dominant in westernised societies. Most would like practical information from midwives on various positions during pregnancy and labour, which would widen the range of their options. Future research should examine the factors that would enable midwives and other obstetric staff to empower women to use the positions that are most suitable for them.

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Chapter 7

Are there inequalities in choice of birthing positions? Socio-demographic and labour factors associated with the supine position during the second stage of labour

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Abstract

The aim of this study was to establish factors that are associated with birthing positions during the entire second stage of labour and at the time of birth. A postal questionnaire was sent to women three to four years after delivery to women who received care in primary care midwifery practices in the Netherlands. Six hundred and sixty five low risk women were included who received midwife led care.

The number of women using only the supine position during the second stage varied between midwifery practices, ranging from 31.3% to 95.9% ($P < 0.001$). The large majority of women pushed and gave birth in supine position. For positions used during the entire second stage, a logistic regression analysis was used to examine effects controlled for other factors. Women of 36 years and older and highly educated women were less likely to use only the supine pushing position (OR 0.54, 95% CI 0.31–0.94 and OR 0.40, 95% CI 0.21–0.73 respectively). Women who pushed longer than 60 minutes and who were referred during the second stage of labour were also less likely to use only the supine position (OR 0.32, 95% CI 0.16-0.64 and OR 0.44, 95% CI 0.23-0.86).

Bivariate analyses were conducted for effects on position at the time of birth. Age of 36 years and older, higher education and homebirth were associated with giving birth in non-supine position.

The finding that highly educated and older women were more likely to use non-supine birthing positions suggests inequalities in position choice. Although the Dutch maternity care system empowers women to choose their own place of birth, many may not be encouraged to make choices in birthing positions.

Education of women, midwives and obstetricians and perhaps of the public in general is necessary to make alternatives to the supine position a logical option for all women. Future studies need to establish midwife, clinical and other factors that have an effect on women's choice of birthing positions and identify strategies that empower women to make their own choices.

Keywords: birthing positions, consumer choice, maternal age, educational status, homebirth

Introduction

Before the 17th century the upright birthing position was common in western countries[1;2]. Following the introduction of obstetric instruments, such as the delivery forceps, the supine position became popular. Today, the supine position is the norm for the second stage of labour in western cultures. This position is convenient for health professionals but not always of benefit to women.

Two meta-analyses showed that the supine position was associated with more instrumental deliveries and increased reporting of severe pain compared to other positions[3;4]. In addition, more episiotomies were found in supine positions and this finding is partly offset by a decrease in perineal tears. In one meta-analysis more abnormal fetal heart rates were found in supine position and in another a lower umbilical artery pH was borderline significant. The risk of blood loss greater than 500 ml was increased in upright positions. However, an increase in blood loss probably originates from perineal damage rather than from the uterus[5].

Birthing positions also influence psychological outcomes. Being able to choose positions that are most comfortable can increase women's experience of being in control[6-9]. Feeling in control is a major factor contributing to a positive birth experience and postnatal well-being[8;10-13]. These psychological outcomes are increasingly recognised as important aspects of quality of care[14-16]. Women are often not aware of position options and their advantages and disadvantages, which restricts their ability to choose non-supine birthing positions.

There is limited evidence that the ability to choose positions is dependent on the maternity care setting and on the characteristics of a woman. Midwives' tendency to use certain positions is influenced by clinical factors and the work environment[17]. Midwives are more likely than obstetricians to use non-supine positions and midwives who work in settings where they have a great deal of autonomy are more likely to use non-supine positions[17-19]. It has been argued that autonomous midwives are innovative and that they empower women to be actively involved in their birth[17;19]. Empowering women in this respect is often equated with encouraging the use of non-supine positions.

There is a lack of knowledge about the practitioner-client dynamic in position choice during the second stage of labour[17;20]. It is important to identify factors that influence the use of birthing positions. This knowledge can help to design strategies that enable women to get into positions that are most comfortable for them.

To minimise the effect of medical interventions and restrictive clinical environments, a study into factors influencing birthing positions is best conducted among low risk women in settings where midwives are autonomous practitioners. In the Netherlands, independent primary care midwives look after low risk women only and this setting is therefore ideal for such a study.

We examined the relative influence of socio-demographic and labour factors on the use of birthing positions during the second stage of labour and at the time of birth.

Methods

Participants and Data Collection

This study was part of a retrospective cohort study in the Netherlands among women three to four years after their delivery using a postal questionnaire. The study design was similar to the three year follow-up of the Greater Expectations study in England[21].

Eight primary care midwifery practices from all over the country took part in the study. In January and February 2005 questionnaires were sent to all women who had received care in these midwifery practices in 2001. Two letters accompanied the questionnaire. One letter explained the aim of the study and invited women to participate. The second letter was signed by a midwife from the practice and stated approval from the practice for participation in the study. Ethical approval was not necessary for this type of study in the Netherlands.

We only used data from women who were in midwife led care at the start of the second stage of labour. This means that a primary care midwife was the lead professional and responsible for the intrapartum care. In the Netherlands, primary care midwives look after low risk women only who can choose to give birth either at home or in hospital. These midwives do not use any medical interventions such as epidural anaesthesia, augmentation, continuous fetal monitoring or instrumental delivery. Some of the women developed a problem during the second stage of labour and were referred to obstetrician led care. Women who had a perinatal death or whose child died during the first 3 years of life were excluded.

Birthing positions were defined as: supine (< 45° from the horizontal), lateral, sitting (> 45°), birthing stool, standing, squatting, hands and knees, bath and other. Women who were only in supine position during the second stage were compared to those who used other positions solely or in addition to the supine position. Women who gave birth in supine position were compared with those who gave birth in any other position.

Socio-demographic and labour factors were identified based on limited evidence in the literature that they may influence the use of birthing positions.

In a Dutch study, non-supine positions at the time of birth were more often used by older and highly educated women and therefore age and education were included[22]. Age was not linearly related to the log-odds of birthing position and was therefore classified in categories. Educational level was defined, depending on the highest level of achievement, as low (medium level secondary education or below), medium (higher level secondary education or vocational education) or high (diploma level or university education).

Women who originate from countries where non-supine positions are still widely used, may be more likely to use non-supine positions and therefore the effect of ethnicity was examined[23]. Women of non Dutch origin were combined because of the low numbers involved.

Midwives have indicated that they influence the use of position depending on (lack of) progress in labour and parity[17]. This was a reason to investigate the influence of the midwifery practice, parity, duration of pushing and referral during the second stage of labour. Women who gave birth for the first time in 2001 were classified as primiparous and those who had given birth before 2001 as multiparous. We included duration of second stage as a categorical variable defined as up to 10 minutes, 11 to 60 minutes and more than 60 minutes. The rationale for this was that women who give birth very quickly, mainly multiparas, may be asked to lie down to slow the progress of labour[3]. Equally, women with a prolonged second stage may be asked to adopt non-supine positions to aid progress and prevent referral for failure to progress[17].
Some birthing positions, such as sitting on a birthing stool, involve intimate support of the birthing partner. We therefore studied the influence of marital status. Women who were single, divorced, widowed or separated were combined as 'living alone'. Women who were married or living with their partner were combined as '(as) married'.
Some studies showed higher rates of non-supine positions in home births and we therefore included this variable[24;25]. Low risk women who choose to give birth in hospital usually spend the first part of their labour at home. Place of birth was defined as the place where the baby was born.

Data Analysis

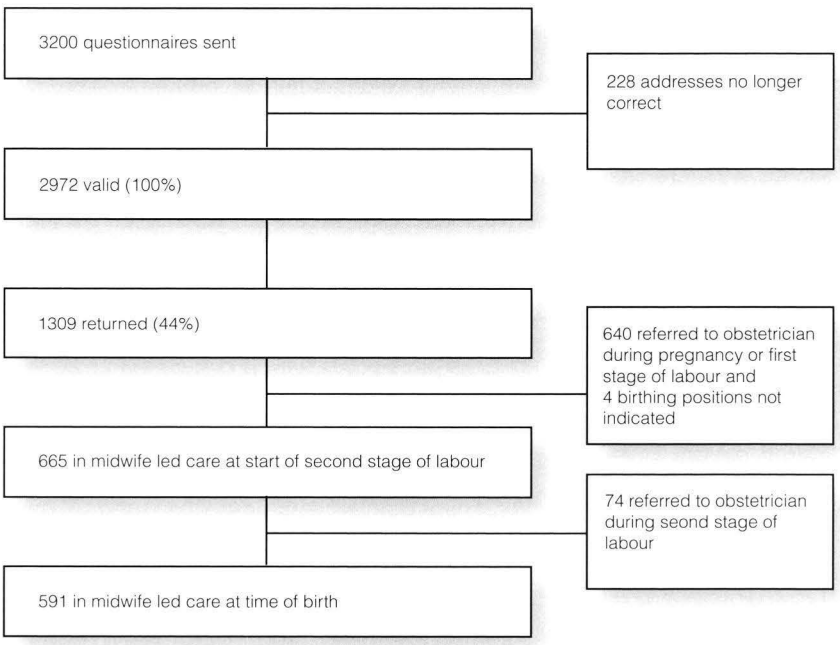
We used the Chi-square and Fisher's exact test for categorical variables.
A logistic regression analysis was used to assess the association of each characteristic with the use of supine position controlled for other factors. All variables were entered in the model because little is known so far about the influence of various factors on the use of birthing positions during the entire second stage of labour. For this reason, we chose a Forward-Stepwise Selection method (with the Likelihood-Ratio Criterion)[26]. This method started without any variables in the model. At each step, the variable with the strongest association with supine position, provided the significance level was less than 0.05, was entered into the model. For each variable in the model the significance level was then calculated for the change in -2 Log Likelihood of the model if the variable was taken out. If the significance level for the change in -2 Log Likelihood was above 0.1 the variable was removed. No logistic regression was performed for position at time of birth because the numbers were too small.
All statistical tests were two-tailed and P-values < 0.05 were considered statistically significant. SPSS 14.0 for Windows was used for data analysis (SPSS Inc, Chicago, Illinois, USA).

Findings

A total of 3200 questionnaires were sent and 228 came back unopened because the address was no longer correct. Another 1309 questionnaires were returned that could be used (44% response rate). We compared characteristics of the respondents to the

national data from Dutch Perinatal Registers in 2001[27]. In our sample, women were slightly older (mean age 31.3 versus 30.3 years), fewer women were primiparous (44.3% versus 47.1%) and fewer women were of non-Dutch origin (5.4% versus 19.2%) compared to the national data.

Figure 1: Flow chart of women in the study



From the 1309 women, 665 women who indicated the birthing positions they used, were in midwife led care at the start of the second stage of labour (figure 1). Of these, 606 used the supine position some of the time, 462 only used this position and 508 used supine or lateral position only (table 1). From the 591 women in midwife led care at the time of birth, 530 gave birth in supine position.

Associations between various factors and positions during the second stage of labour are shown in table 2. Positions differed significantly between the age categories. Women of 36 years and older women were less likely to use only the supine position compared to the other age groups. The same was true for highly educated women compared to those with low or medium education. Women who pushed over 60 minutes were less likely to be only in supine position than women who pushed up to 10 minutes or 11 to 60 minutes. Women who were referred during the second stage were more likely to use other than supine positions than those who were not. The number of

women using only the supine position differed between midwifery practices, ranging from 31.3% to 95.9%. Marital status, ethnic origin, parity and place of birth were not significantly associated with positions during the second stage of labour.

Table 1: Birthing positions during the second stage of labour and at the time of birth.

	Positions during second stage[§] n = 665		**Position at birth[#] n = 591**	
	n	%	n	%
Supine	606	91.1	530	89.7
Lateral	74	11.1	4	0.7
Birthing stool	80	12.0	34	5.8
Sitting	33	5.0	8	1.4
Standing	35	5.3	4	0.7
Hands and knees	25	3.8	5	0.8
Squatting	18	2.7	3	0.5
Bath	20	3.0	3	0.5
Only supine	462	69.5		
Only supine or lateral	508	76.4		

[§] Women in midwife led care at the start of the second stage of labour.
A woman may have used more than one position during the second stage of labour.
[#] Women in midwife led care at the time of birth.

In table 3 the associations between various factors and position at the time of birth are shown.

Women over 36 years were less likely than women in other age groups to be in supine position at the time of birth. Highly educated women were less likely to give birth in supine position compared to women with low or medium education. This was also the case for women who gave birth at home compared to women in hospital. Marital status, ethnic origin, parity and duration of pushing were not significantly associated with position at the time of birth. The percentage of women who gave birth in supine position varied between midwifery practices from 64.3% to 97.8% but the exact test could not be calculated because of the low numbers involved.

Table 4 shows the result of the logistic regression analysis for the various factors and birthing positions during the second stage of labour. Age was entered as a dichotomous variable (women of 36 years and older or younger than 36) based on the results of the bivariate analysis. Maternal age of 36 years and older and higher compared to lower education remained associated with fewer women using only the supine positions during the second stage of labour. Other factors associated with fewer women using only the supine position were duration of second stage over 60 minutes com-

pared to less than 10 minutes and referral during the second stage. Type of midwifery practice remained associated with birthing positions as well.

Table 2: Associations between various factors and positions during the second stage of labour for women in midwife led care at the start of the second stage

Factor	n	supine position only n = 462 (69.5%)	(also) other positions n = 203 (30.5%)	p
Age				
≤ 25 years	47	35 (74.5)	12 (25.5)	
26 to 30 years	242	166 (68.6)	76 (31.4)	
31 to 35 years	274	202 (73.7)	72 (26.3)	
≥ 36 years	93	51 (54.8)	42 (45.2)	**.006**
Marital status				
(As) married	629	442 (70.3)	187 (29.7)	
Living alone	35	20 (57.1)	15 (42.9)	.100
Education				
Low	123	97 (78.9)	26 (21.1)	
Medium	271	208 (76.8)	63 (23.2)	
High	266	155 (58.3)	111 (41.7)	**< .001**
Ethnic origin				
Dutch	626	437 (69.8)	189 (30.2)	
Non-Dutch	38	24 (63.2)	14 (36.8)	.388
Parity				
Multiparas	396	289 (73.0)	107 (27.0)	
Primiparas	268	172 (64.2)	96 (35.8)	**.016**
Duration of pushing				
≤ 10 minutes	205	160 (78.0)	45 (22.0)	
11 to 60 minutes	341	240 (70.4)	101 (29.6)	
> 60 minutes	71	32 (45.1)	39 (54.9)	**< .001**
Referral during second stage of labour				
No	592	426 (72.0)	166 (28.0)	
Yes	73	36 (49.3)	37 (50.7)	**< .001**
Place of birth				
Hospital	229	157 (68.6)	72 (31.4)	
Home	436	305 (70.0)	131 (30.0)	.710
Midwifery practice				
Practice A	64	20 (31.3)	44 (68.8)	
Practice B	96	66 (68.8)	31 (31.3)	
Practice C	96	75 (78.1)	21 (21.9)	
Practice D	52	45 (86.5)	7 (13.5)	
Practice E	67	42 (62.7)	25 (37.3)	
Practice F	64	44 (68.8)	20 (31.3)	
Practice G	49	46 (95.9)	2 (4.1)	
Practice H	164	114 (69.5)	50 (30.5)	**< .001**

Missing values are excluded.
n (%) are given for the number of women with a certain factor that adopted only the supine or (also) other positions.

Table 3: Associations between various factors and position at the time of birth for women in midwife led care at the time of birth

Factor	n	Birth in supine position n = 530 (89.7%)	Birth in other position n = 61 (10.3%)	p
Age				
≤ 25 years	39	37 (94.9)	2 (5.1)	
26 to 30 years	211	193 (91.5)	18 (8.5)	
31 to 35 years	250	226 (90.4)	24 (9.6)	
≥ 36 years	83	66 (79.5)	17 (20.5)	**.011**
Marital status				
(As) married	561	504 (89.8)	57 (10.2)	
Living alone	30	26 (86.7)	4 (13.3)	.758
Education				
Low	109	105 (96.3)	4 (3.7)	
Medium	242	228 (94.2)	14 (5.8)	
High	235	194 (82.6)	41 (17.4)	**< .001**
Ethnic origin				
Non-Dutch	31	27 (87.1)	4 (12.9)	
Dutch	559	502 (89.8)	57 (10.2)	.760
Parity				
Primiparas	211	190 (90.0)	21 (10.0)	
Multiparas	380	340 (89.5)	40 (10.5)	.826
Duration of pushing				
≤ 10 minutes	196	178 (90.8)	18 (9.2)	
11 to 60 minutes	318	282 (88.7)	36 (11.3)	
> 60 minutes	43	38 (88.4)	5 (11.6)	.756
Place of birth				
Home	436	384 (88.1)	52 (11.9)	
Hospital	155	146 (94.2)	9 (5.8)	**.031**
Midwifery practice				
Practice A	56	36 (64.3)	20 (35.7)	
Practice B	84	79 (94.0)	5 (6.0)	
Practice C	86	82 (95.3)	4 (4.7)	
Practice D	46	45 (97.8)	1 (2.2)	
Practice E	63	53 (84.1)	10 (15.9)	
Practice F	57	51 (89.5)	6 (10.5)	
Practice G	44	43 (97.7)	1 (2.3)	
Practice H	142	130 (91.5)	12 (8.5)	Not calculated [§]

Missing values are excluded.

n (%) are given for the number of women with a certain factor that gave birth in supine or other position.

[§] exact test could not be calculated for midwifery practice and birthing position because the numbers were too small.

Table 4: Final model of multiple logistic regression (stepwise forward). Factors associated with using only the supine position during the second stage of labour for women in midwife led care at the start of the second stage. Total number is 595. Number of women in supine position only is 419.

Predictor variable	OR	95% CI for OR	
		Lower	Upper
Age			
< 36 years	1.00		
≥ 36 years	0.54	0.31	0.94
Education			
Low	1.00		
Medium	0.95	0.50	1.79
High	0.40	0.21	0.73
Duration of pushing			
≤ 10 minutes	1.00		
11 to 60 minutes	0.64	0.40	1.01
> 60 minutes	0.32	0.16	0.64
Referral during second stage of labour			
No	1.00		
Yes	0.44	0.23	0.86
Practice			
A	1.00		
B	3.62	1.64	7.98
C	6.36	2.79	14.47
D	10.82	3.88	30.14
E	2.18	0.94	5.05
F	3.63	1.58	8.35
G	33.21	6.83	161.39
H	4.58	2.26	9.30

Missing values are excluded listwise (n=72).
All factors from table 2 were included in the analysis.

Discussion

The data in this study were collected three to four years after delivery. Even though women tend to remember many birth details accurately[28;29], some recollection bias may have occurred. The distinction between positions used during the end of the first and beginning of second stage may not have been recollected clearly by all women. On the other hand, the definition of the onset of second stage is always a little arbitrary even among professionals[19;30].

In addition, the definition of birthing position is not always clear cut[31]. Some misclassification, especially between supine and lateral or between supine and sitting position may therefore have occurred. It is unlikely that this influenced the results as this misclassification probably occurred in all the groups.

The response rate of 44% is comparable with that in other Dutch studies[32;33]. The women in the sample were only slightly older and somewhat more likely to be multiparous, but the proportion of women of non-Dutch origin was much lower than in

the Dutch population and comprised women from various backgrounds. Although no differences were found between women from non-Dutch and Dutch origin, this may be due to the low number and imprecise definition. More detailed studies are needed to establish whether women who originate from countries where non-supine positions are commonly used, are more likely to use these positions[22;23;34].

Women of 36 years and older and highly educated women were less likely to use only the supine position during the second stage of labour, even after controlling for other factors. They were also less likely to use the supine position at the time of birth. It confirms similar findings in another Dutch study[22] and suggests possible inequalities in the choice of birthing positions.

Many countries develop policies to address inequalities in health[35] but it is often not clearly defined which clients are considered to be 'disadvantaged' and what individual practitioners should be doing in relation to them[36]. In one study, some midwives equated aiming for 'equality of care' with giving 'individualized' or 'woman-centered' care[36]. However, this ideology may result in articulate, educated women receiving more midwifery resources than others[36].

In our study, older and highly educated women may have had easier access to information on alternatives to the supine position. Some midwives might have been willing to accommodate women's request for non-supine positions without offering choices to women who did not bring up the issue of birthing positions.

It could be argued that most women may have preferred to give birth in supine positions. However, studies have shown that women use various positions, supine and non-supine, if they feel free to make their own choices[34;37;38]. Also, using non-supine positions in a culture where the supine position is common may indicate choice[39].

No information was collected on the influence women had on the type of positions used. Being able to get into positions that are most comfortable may be more important than the actual positions used[6-8;40] Future studies should look into the effect of various factors on the ability of women to choose their birthing positions. This is important because of the association between choice of position and feeling in control and the effect of personal control on birth satisfaction[8;10-13].

Some authors observed that midwives who function autonomously predominantly use non-supine positions[17;19]. Although all midwives in this study worked in independent practices and therefore in autonomous settings, considerable variation was found in the use of positions between practices. This suggests that the preference of health professionals plays an important role in the use of birthing positions. Nevertheless, after controlling for differences between practices, the influence of several factors remained significant.

In all but one practice, more than 60% of women only used the supine position during the second stage of labour. The supine position is so common in many cultures that women as well as practitioners are most familiar with this position[1;38;41]. Autonomy of practitioners may not by itself increase women's choice in birthing positions.

Although the place of birth had no influence on positions during the entire second

stage, at home fewer women were in supine position at the time of birth. Higher rates of non-supine positions in home births were found in other studies[24;25], but it is perhaps more surprising that place of birth should make a difference in the Netherlands. Home births are still very common in the Netherlands whereas in other countries women who choose to give birth at home are a distinctive, highly motivated population[24]. Yet, even in the Netherlands, women characteristics differ depending on the place of birth[42]. Women who give birth at home are less likely to be younger than 25 years, primiparous, from non-Dutch origin and to live in big cities. Possibly, women who choose to give birth at home are more likely to choose non-supine birthing positions as well. Nevertheless, more than 88% of women at home gave birth in supine position. This shows that a maternity care system which empowers women to choose their own place of birth does not necessarily encourage them to make choices about other aspects of care.

Women with a second stage of labour longer than 60 minutes and who were referred during the second stage were less likely to use only the supine position. Althoug in theory this could mean that women in non-supine positions have longer labours, a meta-analysis showed that these positions shorten the duration of the second stage[43]. It is therefore more likely that women may have felt a need to change as time progressed. In addition, midwives may have used other positions as an intervention to encourage progress[17]. Other clinical factors may also have influenced midwives in encouraging certain positions, such as position of the fetal head, estimated birth weight and suspected fetal distress[17;44]. These factors were not recorded in this study. In future studies it will be important to record clinical factors and whether these influenced the use of position.

We expected multiparas who gave birth very fast to be most often in supine position. Although this was the case, 22.5% of multiparas and 26.5% of primiparas who gave birth within 10 minutes of pushing still used other than supine positions. Midwives may not always have performed a vaginal examination to establish full dilatation which allowed women to give birth in the position they were in at the end of the first stage. A prospective cohort study could clarify the influence of these clinical decisions on the use of positions.

In conclusion, this study showed that older and highly educated women were more likely to use non-supine birthing positions. This suggests inequalities in position choice. Education of women, midwives and obstetricians and perhaps of the public in general is necessary to make alternatives to the supine position a logical option for all women. In addition, empowerment of women to make choices during labour may make position options more widely available. Midwives and obstetricians have an important role to play in helping women to find positions that are most comfortable to them.

Most women only used the supine position and a lot of variation was found between midwifery practices in the use of positions. Apparently, autonomy of midwives is not enough to make non-supine positions widely available to women. Moreover, a maternity care system in which low risk women are encouraged to choose their place of birth does not necessarily encourage them to choose their own birthing positions.
Future studies need to establish midwife and clinical factors that play a role in the use of birthing positions, factors that have an effect on women's choice of positions, and strategies that empower women to make their own choices.

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Chapter 8

Primary care midwives' dealing with birthing positions
" You can choose, but only if you ask"

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Abstract

The routine use of the supine position can be considered as an intervention in the natural course of labour. To improve upon this practice, many authors recommend encouraging women to use positions that are most comfortable to them. Others advocate encouragement of non-supine positions because offering 'choice' is not enough to reverse the strong cultural norm of giving birth in supine position.

Based on the theory of Thachuk, we investigated whether using a relational approach to women's autonomy, by giving them informed choice, enables midwives to help women find positions that are most appropriate for them. We examined the way in which primary care midwives deal with birthing positions during the second stage of labour using a focus group methodology. A total of six focus groups were conducted with a total of 31 midwives.

The results of our study show that midwives operate on a continuum between giving women informed consent and giving them informed choice when dealing with birthing positions.

Giving women informed consent means that the use of positions is based on the midwife's own position preferences.

When midwives give women informed choice, they help them find positions that are most suitable for them. They give women information during pregnancy and discuss their preferences regarding positions. Subsequently, a midwife will assist women during labour in finding positions that are most appropriate for them. A woman's preference is the starting point but the midwife will suggest other options, if this is in her interest. Women should be prepared for the unpredictability of their feelings in labour and for obstetrical factors that may play a role. To achieve informed choice regarding birthing positions for all women, working conditions of midwives need serious consideration. In addition, (student) midwives need to be able to gain experience in conducting labour in non-supine positions.

Keywords: the Netherlands, focus groups, midwives, birthing positions, informed choice

Background

The routine use of the supine position can be considered as an intervention in the natural course of labour which was introduced without evidence of its advantage over using various positions[1-3]. In quantitative studies, women indicated that they preferred other than supine positions and more women had a good experience using other positions[4-6]. In addition, severe pain and difficulty in bearing down were reported more frequently by women in supine position.

Our qualitative study showed that women vary in their experiences, with some preferring the supine position and others upright or lateral positions[7]. Women expected midwives to give professional advice on the use of positions and this advice was a stronger influence than their personal preference.

Since the influence of the midwife is so crucial in the use of birthing positions, it is important to find out how midwives deal with this aspect of care. A central theme underlying this question is the nature of the midwife-client dynamic in position choice, which warrants further research[8;9]. The limited research into midwives' views of birthing positions has been conducted mainly through questionnaire surveys[9;11]. One study identified a 'dichotomy jigsaw' among midwives: those who preferred the upright position were more in favour of providing comfort for women and giving them control over their own body, whereas those who preferred the recumbent positions were more concerned about their own physical needs and the importance of having control over the delivery[11]. The author equates giving women control with encouraging them to use non-supine positions.

However, the evidence does not support the superiority of one particular type of position[7;12;13]. Several authors recommend encouraging women to use positions that are most comfortable to them[4;13-15].

Walsh argues that encouraging women to choose comfortable positions is a 'soft position' and is insufficient for rolling back a few centuries of birth posture medicalisation[3]. He advocates informing women of the disadvantages of recumbent positions.

Qualitative studies confirmed that women need information on birth options that are less common in order to be able to make choices[7;16]. Giving women a choice without providing information on the various birthing options equals asking their consent for the choices of health professionals. Nevertheless, when women are encouraged to make their own choices they may choose options, in this case supine positions, that are uneasy for midwives who support the normalcy of birth[17].

So, how can midwives truly offer women choices about birthing positions within societies that are heavily biased towards the use of the supine position? If women choose supine positions, it can be argued that they do so because the culture in which they live has indoctrinated them with the idea that this is 'normal'. If we would encourage them to use other positions, as some authors advocate[3;8], we ignore that some women would choose the supine position, even if they are fully aware of other options. Thachuk's distinction between informed consent and informed choice may be of help.

Informed consent versus informed choice

Thachuk distinguishes two models of care that differ in the way women's autonomy is defined and therefore in the way women are involved in decision-making during childbirth[18]: the medical model of informed consent and the midwifery model of informed choice. These models are not static and individual midwives and obstetricians operate on a continuum between these two models.

The medical model of informed consent is based on the right to relevant information and facilitates competent and non-coerced consent. It maintains the woman as a 'passive recipient' of the information and choices the professional decides to give. A woman has the right to opt out of procedures. Yet, informed refusal is often interpreted as non-compliance and is rarely tolerated[18;19].

In the midwifery model of informed choice the locus of power is shifted to the woman as the primary decision-maker who has a right to opt for procedures and who can present potential options herself. This model emphasizes the relational aspect of autonomy and it requires both the midwife and the woman to actively participate in the process of informed choice. The midwife gives information that takes into consideration a woman's individual situation, including her values, goals and beliefs. Choices are not static and can be changed. Nevertheless, the midwife maintains a position of authority through her professional role of disseminating information and risk assessments. The midwife should remain aware of power differentials and how these may influence the decision-making process.

Thachuk uses this theory to illustrate how the integration of a relational approach to care enhances and empowers women.

The Study

Aim

Based on Thachuk's theory, we examined how midwives deal with birthing positions during the second stage of labour.

Methodology

We used a simplified model of the grounded theory[20]. To ensure that analysis of the data moved beyond anecdotal reporting, we used the method of hypothesis testing[21]. Based on the literature we examined the hypothesis that midwives would either give women informed consent or informed choice regarding birthing positions. With informed consent we mean that the midwife decides which information to give about positions and that she implicitly or explicitly asks women's consent for what she prefers. With informed choice we mean that the midwife explores how women think about birthing positions, that she actively gives them appropriate information on various position options and assists them in making their own choices.

Participants

A purposeful sample of midwives was selected, with the aim to include participants with a variety of characteristics. Midwives were invited through local midwifery

groups to take part in the study. We emphasised that we were interested in midwives who use various birthing positions as well as midwives who mainly use the supine position. Participants were invited from large and small practices and from rural, semi-urban and urban areas from various parts of the country. In each focus group we included more than one practice. This was thought to generate more ideas through the exchange of different approaches to dealing with birthing positions.

From each midwifery practice one to three midwives were included. Some of the midwives knew the interviewers. To prevent socially desirable comments, the researchers emphasised that they did not believe in good or bad birthing positions and that the participants would help them by expressing their opinions as openly as possible.

Data collection

This study took place from May 2006 to March 2007 among primary care midwives in the Netherlands. A focus group methodology was chosen because we wanted to use group dynamics to stimulate discussion and generate ideas[22]. Focus group interviews took place at one of the local midwifery practices or midwife's homes and lasted one and a half to two hours. Prior to each interview a short questionnaire was sent to participants to collect data on individual and practice characteristics.

Two midwife researchers (AJ and MB) conducted most of the focus groups and alternately were the moderator and the assistant. In one focus group a research psychologist (SP) was the assistant. The assistant took field notes and observed non-verbal communication. After each interview the two researchers discussed their impressions.

A topic guide with semi-structured questions was developed based on prior knowledge about the topic and on results from our interview study among women (appendix 4)[7]. The main topics included midwives' experience with birthing positions, the information they give to women about positions, factors that influence their use of positions and knowledge and skills in assisting births in various positions.

Ethical considerations

In the Netherlands, ethical approval is not required for this type of study. Midwives in each focus group gave permission to record the interview. They were reassured of the confidential handling of the research data. Participants received a voucher (€ 20.00) as a token of appreciation for their cooperation.

Data analysis

All interviews were transcribed. A software programme (Kwalitan 5.09) was used to aid the analysis.

One of the researchers who conducted the interviews (AJ) and a second researcher (DT) analysed the transcripts independently of each other. The second researcher (DT) was a general practitioner who had attended primary care births until recently. First, codes were allocated to fragments of the transcripts. The two researchers compared these and reached consensus about the set of codes to be used. When more data became available these were constantly compared to the codes that had been formulated and where necessary these were adjusted. The codes were grouped in categories. Finally, overriding themes were formulated.

Memos were written during the process to aid the analysis. For example, we realised that it was not always clear from the transcripts whether midwives were talking about birthing positions during the first or second stage of labour or at the time of birth. When we asked midwives to be more specific, we realised that some used upright positions during the first and second stage but would ask women to lie down for the actual birth.

Findings

A total of six focus groups were conducted with four to six midwives in each group and a total of 31 female participants (table 1). After six interviews we felt our data were saturated as few new themes emerged during the last interview.

The sample consisted of midwives of various ages, places of education and types of practice. Midwives were asked to write down in which position women gave birth during the last ten births that they assisted: the number in supine position varied from two to ten, although all midwives indicated that they use non-supine and supine positions. All but five midwives stated that they use the birthing stool, which is the most commonly used upright position in the Netherlands[23].

The main themes that emerged during the analysis are discussed below and quotes (translated into English) are given to illustrate them. Key to the quotes:

Px = Participant number x
I = Interviewer
[ ] = Explanation by the authors
[...] = Text left out

Informed choice versus informed consent

Using the theory of Thachuk, aspects of giving informed consent were apparent in the behaviour of most midwives. Some midwives inform women about position options during an information evening, but most midwives only give information about these when women ask for it. The majority of midwives have a preference for using either the supine or an upright birthing position. Those who prefer the upright position most often use the birthing stool although other positions were mentioned such as standing, all fours, squatting and sitting on the toilet.

Although several midwives confirmed that the supine position is very common, some commented on times in the past when the birthing stool was strongly advocated. In their view this was not always to the benefit of women:

> *And then loads of them had to go on the birthing stool and then would not succeed. Well, people really felt that was terrible. Well, that was more or less the message in those days, if you only do that...then it [labour] will go well and that is no longer the case nowadays...*

Table 1: Characteristics of midwives (6 groups with a total of 31 midwives)

	Sample population	National Population[¥]
	n (%)[§]	(%)[§]
Age group		
< 25 years	5 (16)	(9)
25 - 39 years	17 (55)	(53)
40 – 54 years	6 (19)	(31)
≥ 55 years	3 (10)	(8)
Place of education		
Amsterdam/ Groningen	10 (32)	(27)
Rotterdam	5 (16)	(28)
Limburg	9 (29)	(27)
Abroad	7 (23)	(18)
Type of practice		
solo	2 (7)	(5)
duo	2 (7)	(11)
group	25 (87)	(84)
independent locum midwife	2	
Practice population: urbanisation*		
city	15 (54)	
suburb/ small town	3 (11)	
rural area	3 (11)	
combination	7 (25)	
Number of midwives using non-supine positions		
birthing stool	26 (84)	
bath	11 (35)	
lateral	24 (77)	
other	25 (81)	
How many of last 10 births in supine position		
< 5	9 (29)	
5 - 7	8 (26)	
8 - 9	6 (19)	
10	8 (26)	

[¥] Muysken,J., Kenens, R.J. & Hingstman,L. Figures from the registration of midwives – assessment 2006. [Cijfers uit de registratie van verloskundigen – peiling 2006], Nivel 2006

[§] Percentages may not add up because of rounding error

* No practice details are given for the locum midwives and for one midwife data are missing

Women often give birth in the position the midwife prefers. Midwives are very aware of the influence they have and some are not always happy about this.

> *"... Well, like we have been discussing in our practice, what the two of us noticed very much...I have a very strong preference for the birthing stool. And that you notice at times that YOUR preference for a birthing position is actually very influential"*
>
> ***I:** "yes?"*
>
> *"And that we find that very awkward sometimes...eh...I can get a woman on a birthing stool, because I get them on it very frequently, but I can also easily get them off it ..."*

Only one midwife said she routinely discusses birthing positions with women in the antenatal clinic. Although most midwives do not actively offer women an informed choice, a few midwives mentioned that they try to help a woman find the position that is most appropriate for her. They would go along with the positions women adopt unless she appears uncomfortable or there are obstetric factors that make a change of position necessary.

> *"Yes, that you connect as much as possible with what someone can, what someone wants, what someone wishes....Well...and then you sometimes have to manoeuvre yourself in all kinds of different angles literally and figuratively...hm...well, with love I would say...*
> ***I:** "And do you then see that people themselves try out positions?"*
> *"Yes, of course. That's how you meet them when you arrive, yes, and you let that exist as much as possible....unless, what you [towards another participant] said, if from an obstetric point of view something else is needed or if it is inefficient...or even to be discouraged."*

Based on these findings we added a dimension to the definition of informed choice. Informed choice was defined as actively giving women a choice in birthing positions but to take control if obstetrically indicated or if women can or will not make choices themselves.

Although most midwives showed that they start off with giving women informed consent, they very easily move towards informed choice if women express particular wishes about birthing positions. Midwives who took part in this study are prepared to go a long way to try and meet a woman's request to give birth in a particular position. Some mentioned colleagues who are less flexible and who would not use non-supine positions. A few midwives in this study will not use certain positions even if women ask. A water birth was mentioned most frequently as an option some midwives will not offer.

> *"Yes, ...actually I do not have many good experiences with water births, I have experience with a few in Great Britain and...I eh...I really do not like it at all....you can not get to it very well and sometimes.....No, I really do not like it at all...I find it messy and I do not know what to think of it but I think it is so unnatural as well...."*

If a woman asks for it she will be given the option to seek care in another practice where midwives do support water births.

Midwives' dealing with birthing positions moves on a continuum between giving informed consent and informed choice. For clarification we now discuss these approaches as if they were two separate entities.

Factors related to giving informed consent

Which birthing positions a midwife prefers depends on the exposure she had to various positions during her training and in her career, her knowledge and skills, which routines she has developed and the amount of experience she has as a midwife. Many midwives had limited experience with non-supine positions and if they had it was mainly with using the birthing stool.

> ***P 1*** *"and then I saw it [all fours position on a patient's video] but after that I have actually never again let somebody...yes, ..with a shoulderdystocia...but otherwise never put somebody ....eh....on all fours....while it is actually just a very good position....*
> ***P 2:*** *"yes"*
> ***P 1:*** *"but that's because people themselves don't bring it up...*
> ***P 3:*** *"but it's just not on my mind, because I am not used to it...*

Some midwives said the focusgroup discussion motivated them to try non-supine positions in the future.

Personal traits that influence midwives' preference are how much they conform to a medical model of care in which the supine position is the norm, which positions they consider to be 'natural', their self-confidence in trying out new practices and their own labour experience.
The working conditions of midwives emerged as very important motivations for giving women informed consent rather than informed choice.

Working conditions

A midwife is more likely to give women informed consent if she is concerned about her own comfort or about the ease of carrying out midwifery procedures. However, in all groups, midwives said they are prepared to sacrifice their own comfort to a great extent if a woman expresses a strong desire to use a certain position.

> *"But I always say that it does not satisfy proper working conditions, but I really conduct many birthing stool births and I notice that it is not so great for my own back. But that is secondary to the interest of the people themselves at the time".*

Some midwives do not want to tell women that they have difficulty assisting them in certain positions for example because they themselves are pregnant. Some then use tricks to let women give birth on the bed, for instance by asking them to lie down for a vaginal examination shortly before birth.
In most groups, midwives mentioned that they prefer to perform an episiotomy or vaginal examination in supine position and as a result women often proceed to have a

supine birth. In five of the groups, some of the midwives let women lie on their back for the actual birth even if they have been pushing in other positions, to have a better view of the perineum or because conducting the delivery in that position is easier. Some midwives are more inclined to do so if they anticipate problems, such as blood loss or neonatal distress, which they find easier to deal with if the woman is lying on her back. Some midwives do not assist water births out of fear of shoulderdystocia or blood loss.
Many midwives pointed out that some equipment, like a birthing pool, is not user-friendly. They improvise to improve their own working conditions. For example, one midwife uses a small stool to make assisting a birth on a birthing stool easier.

Factors related to giving informed choice

Midwives mentioned many types of behaviour that could be classified as giving women an informed choice. For example: giving women information about position options, letting women's preference prevail over their own, encouraging women to trust their own body in finding positions that are most comfortable and being prepared to try positions that women want to use.
Midwives said that not all women are equally likely to choose their own birthing positions. According to them, women are more likely to do so if they are actively looking for information about birth, feel in control of their birth, have confidence in their own body and do not feel embarrassed about less common positions.
Midwives indicated that the characteristics of a woman affect her position preferences. Women in cities and highly educated women are more aware of position options. A particular good or bad experience with certain positions during a previous birth has consequences for a woman's choice next time. Many midwives commented that having a choice in positions was much more important during the first than during subsequent births because the duration of the second stage is usually much longer the first time and therefore has a greater influence on the birth experience.
According to the midwives some ethnic minority women originate from areas where non-supine positions are still very common, such as rural West Africa. But they felt that the supine position was the norm in many countries, such as Turkey and Morocco, and women from these countries are most familiar with this position.
In four groups, midwives commented on women who have fixed expectations about birth and the positions in which they want to give birth. They highlighted the importance of preparing them that birth is unpredictable: they might feel differently than they anticipated and circumstances could warrant the use of other positions.

> *But I also find that women can be extremely disappointed at times, that they can have the feeling that they have failed at times, if they are fixed on only one thing. And then you can even say beforehand, yes, but yes, there can be things that make things go a bit differently, they know that also but yes....but then they still don't feel happy with it.*

Many obstetrical factors were mentioned that restrict women's choice.

Obstetrical factors

Although most midwives are willing to sacrifice their own comfort to please a woman, they will override a woman's choice for obstetrical reasons. By far the most frequently mentioned were labour progress and pain, discomfort or restlessness of the woman. If labour progress is slow, midwives use upright positions as an intervention.

> *But you know, you can be very authoritative...and I find basically, I prefer it when it happens as the woman intends it [...]and if there is really no progress, and some women feel it themselves as well, like....this is not going well, this has to be different, [...]...but if it really does not progress and that woman does not want to use the birthing stool, then you can sometimes overrule her a bit,[...] if you just put it a bit nicely and with good motivation, then they will go along with you after all, if they make themselves do it...*

This intervention is also used if midwives feel a woman is not pushing effectively. If labour proceeds very fast, they use the recumbent position to make the birth more controlled.

Pain, discomfort or restlessness of a woman might be a reason for a woman to change position. But midwives also advise women to adopt another position if they feel this might make her more comfortable.

In all groups, midwives discussed that prolonged pushing on a birthing stool can lead to oedema and most midwives will therefore suggest a change of position after some time.

Other reasons to change position are an unfavourable position of the foetal head, foetal heart rate abnormalities, a narrow pelvic outlet, shoulder dystocia or anticipated increased blood loss, perineal tears or foetal compromise due to the birthing position. Midwives did not agree on some obstetrical factors. For example, some midwives thought an upright position would lead to increased blood loss while others did not.

Discussion

This study had some limitations. No midwives in our sample were adamantly opposed to non-supine positions although they commented on colleagues who were. Also, midwives may have made socially desirable comments because they knew the researchers had an interest in birthing positions. Nevertheless, many negative comments were made about non-supine positions during the course of the interviews and several midwives expressed a preference for the supine position. Also, a quarter of all midwives stated that all of the last ten births that they assisted were in supine position. Nevertheless, some bias may have occurred.

The results of our study suggest that giving women an informed choice in birthing

positions may assist them in using positions that are most appropriate. It became apparent during our analysis that informed choice constitutes more than letting women choose: our definition includes a dimension that is often missing in the international discourse. It explicates the need for midwives to give direction if women need it or for obstetrical reasons. This dimension sheds some light on the midwife-client dynamic during labour, whereby a woman can still feel in control even if a midwife has to give direction.

Although many studies have shown that control during childbirth is associated with birth satisfaction, the concept of control has various aspects[24-27]. Green showed that making choices was only one aspect of control during labour and that feeling in control of what staff were doing was even more important to women[25]. The latter related much more to the type of relationship women had with the staff.

In one focus group study, midwives felt that women want them to take control as labour progresses[28]. Although the authors questioned this view of midwives, Anderson showed that women expect midwives to give directions during the second stage of labour, for example, if they are loosing control[29]. In our qualitative study women also expected midwives to give advice on birthing positions during labour[7]. Other studies have shown that women like to be reminded of position options during labour[30;31].

Midwives in this study emphasised that women should be prepared that the process of birth is largely unpredictable. Kitzinger also advised midwives to prepare women that 'you can no more control birth than you can control the tides of the sea,[19]. Women may feel differently about positions during labour than they anticipated. Furthermore, the powers of labour may be so overwhelming that they are not able to feel which position is most appropriate. In addition, obstetric indications may arise that warrant a change of position. Therefore, when discussing women's preferences, contingency plans should be discussed as well[32] whereby the midwife explains that she will suggest position options if she thinks this will benefit the woman.

Only a few authors mention obstetric difficulties as a reason for changing position[33-36]. Midwives in this study mentioned a wide array of obstetrical indications. Some are supported by research evidence. For example, systematic reviews have shown that women in non-supine positions have fewer instrumental deliveries[12;37]. Therefore, women should be informed about this and be encouraged to use non-supine positions if labour progress is slow[38].

Other obstetric indications may be prevented by simple measures. Many midwives mentioned the risk of oedema due to the birthing stool which some authors have mentioned as well[6;39]. This can be prevented by alternating positions or offering alternative upright positions[39].

Midwives disagreed on certain obstetrical factors and some were not sure about their relevance. One example was whether an upright position leads to excess blood loss. In our recent study we showed an increased blood loss in sitting position which is probably due to oedema in combination with perineal damage[39]. Educating midwives

about emerging evidence regarding birthing positions enables them to give accurate information to women.

Limited exposure to non-supine positions was an important reason for midwives not to use them. The vicious circle of students only gaining experience in assisting supine births and then supervising students when they are qualified exposing them to only supine births as well maintains the dominance of the supine position. Teaching students and midwives the necessary skills for births in other positions may change this[3;40].

Surprisingly little has been written about the influence of midwives' working conditions on the use of birthing positions, although this emerged as an important factor in this study. If working conditions are mentioned, they are not considered a valid reason for influencing women's position[3;11]. In one trial, midwives who looked after women who gave birth on a birthing stool were less satisfied with their own working posture than those who cared for women in supine position[6]. In another study midwives were asked if they were willing to assist a woman in a position which is uncomfortable for them[11]. Only 5% said they would not, 58% would possibly and 37% would definitely do so. This is consistent with our finding that most midwives would go a long way to let a woman give birth in the position of her choice, even if it was inconvenient for them.

Nevertheless, the working conditions of midwives deserve attention. In Coppen's study, one of the reasons why many midwives had a strong preference for the semi-recumbent position was their own comfort[11]. Also, it was the convenience of birth attendants that led to the increasing popularity of the supine position in the past[33;41]. If this issue is not addressed, many women will remain deprived of a choice in birthing positions in the future.

Firstly, better equipment can be developed which takes into account midwives' working conditions.

Secondly, midwives can learn to let women give birth in various positions while looking after their own back at the same time[3]. Finally, some positions may be too cumbersome for midwives at times. Midwives with back pain or who are pregnant will be more reluctant to assist a birth on a birthing stool or in a pool. Rather than having to manipulate women into other positions, these restrictions can be discussed with women during their pregnancy. Women can then be offered to seek care in another practice or choose alternative options, such as the all fours or lateral positions.

Conclusions

Midwives' dealing with birthing positions appeared to move on a continuum between either giving women informed consent or giving them informed choice. Informed choice was defined as actively giving women a choice in birthing positions but to take control if obstetrically indicated or if women can or will not make choices themsel-

ves. This will require giving them individually tailored information during pregnancy and discussing their preferences regarding positions. A woman's preference will be the starting point but the midwife will suggest other options, if this is in her interest. Women should be prepared for the unpredictability of their feelings in labour and for obstetrical factors that may play a role.

To achieve informed choice regarding birthing positions for all women, working conditions of midwives need serious consideration. In addition, (student) midwives need to learn the skills to assist births in non-supine positions.

Giving women an informed choice in birthing positions can be a good alternative to either letting women choose or encouraging them to use upright positions.

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Chapter 9

General Discussion

The main aims of this thesis were to examine the evidence for the routine use of the supine position during the second stage of labour and to gain insight into the factors that influence the use of birthing positions. In this chapter we will discuss the main findings of this thesis.

Main findings

Obstetric outcomes

We started our research by bringing together the best available evidence on the effects of the supine position on obstetric outcomes in a meta-analytic review.

Data pooled in a meta-analysis showed a higher rate of instrumental deliveries and episiotomies in supine position compared to other positions. A lower estimated blood loss and lower rate of postpartum haemorrhage were found in the supine position. These latter outcomes were only significant for multigravidas and when supine and upright positions were compared.

Heterogeneous, non-pooled data showed that women experienced more severe pain in the supine position and had a preference for other birthing positions. They also found it more difficult to bear down in supine position. In one study women had a better birth experience in non-supine positions and in one study no difference in satisfaction was found.

In our secondary analysis of trial data, mean blood loss and the incidence of blood loss greater than 500 ml and 1000 ml were increased in semi-sitting and sitting position compared to recumbent position. These differences were reflected in postpartum haemoglobin levels. Semi-sitting and sitting positions were only significant risk factors among women with perineal damage and not among women with an intact perineum.

Data from the same trial were used to examine the influence of recumbent, semi-sitting and sitting position at the time of birth on perineal damage. No differences were found in intact perineum rates between position groups. Women in sitting position were less likely to have an episiotomy and more likely to have a perineal tear than women in other positions. Women in semi-sitting position were more likely to have a labial tear.

In a retrospective cohort study we examined the influence of birthing positions on psychological outcomes three to four years after birth. We found that the type of birthing position was not related to childbirth satisfaction, self-esteem and emotional well-being.

Factors that influence the use of the supine position

In our in-depth interview study among women the advice given by midwives emerged as the most important factor influencing the choice of birthing positions. If the obste-

trical situation allowed it, women benefited from having the autonomy to find positions that were most useful to them. Their choices and their experience of pain in relation to the type of position varied greatly. All women were most familiar with the supine position but appreciated information on other options.
Our retrospective cohort study showed that highly educated and older women were less likely to use only the supine position during the second stage of labour.

As midwives play a crucial role in the choice of position, it is important to find out how they deal with this aspect of care. Our focus group study showed that midwives operate on a continuum between giving women informed consent and informed choice in birthing positions. Informed consent is based on the midwife's preference. Unfamiliarity with assisting births in non-supine positions and awkward working conditions in these positions are important reasons for midwives to give women informed consent. When midwives give informed choice, a woman's preference is the starting point. The midwife will suggest other options, if this is in the woman's interest. Obstetrical factors are important reasons for deviating from women's preferences.

General Discussion

The findings in this thesis did not show that the supine position is superior to using other positions during the second stage of labour. There is no evidence for the continuation of the routine use of the supine position during the second stage of labour in low risk women.
Three important themes emerged from this thesis which we will discuss: obstetric reasons for using certain positions, giving women informed choice in birthing positions and the midwife's role during labour. Subsequently, we will address limitations of this thesis and give recommendations for future studies. Finally, we will put forward some implications for other midwifery practices.

Obstetric reasons for using certain positions

More women in supine position had an instrumental delivery in our meta-analytic review. Prolonged duration of the second stage of labour is an important indication for an instrumental delivery[1]. Upright positions in particular, can shorten this duration[2]. Gravity facilitates pushing in upright positions and obstetric pelvimetry has shown that pelvic bony dimensions are increased in these positions[3;4]. There is some evidence that hands and knees and lateral positions may be effective in correcting foetal malposition[5;6].
Due to methodological problems the results of the meta-analytic review have to be interpreted cautiously. For example, the exclusion rate was not always given but in some studies many women did not take part because of a preference for a particular birthing position. The compliance rate with the allocated position was low in some studies[7;8]. The differences between groups were relatively small.

Therefore, the results do not justify dissuading all women from using the supine position. However, when labour progress is not satisfactory, position change should be used to facilitate rotation and descent of the fetal head and encourage effective pushing[9].
Another common indication for instrumental delivery is fetal distress[10]. In our meta-analytic review, only a borderline significant reduction in mean umbilical artery pH of 0.02 was found in supine position and this is unlikely to be clinically significant. In another meta-analysis more abnormal fetal heart rate patterns were observed in supine position[2]. Carbonne et al used pulse oximetry and showed that the maternal supine position leads to a reduction in fetal oxygenation saturation compared to lateral positions, probably due to compression of the aorta and vena cava by the uterus[11]. Women should be discouraged from lying flat on their back too long unless they are tilted upwards or laterally to take the uterine weight off their main blood vessels[1;12-14]. When fetal heart rate abnormalities occur, a woman should be encouraged to adopt a non-supine position.

Some results of our meta-analytic review were not easy to interpret. Obstetric interventions, such as oxytocin or epidural infusions, may have influenced blood loss and perineal damage. Methods that were used to investigate women's experiences were not well described. All these methods were quantitative and measured experiences soon after birth.
We therefore examined the influence of birthing positions on blood loss, perineal damage and women's experience more closely in studies conducted in independent midwifery practices in the Netherlands. We only included women who gave birth in midwife-led care without obstetric interventions.

Fear of blood loss and perineal damage are the main reasons for authors to caution against non-supine positions[7;15;16].
Most studies into the effect of birthing positions on blood loss used estimated blood loss as the outcome measure[8;17-20]. This may have led to measurement error. The same amount of blood may appear more in upright than in supine position because it can be collected in a receptacle[8].
In our secondary analysis of trial data, blood loss was measured more accurately with a weighing scale, measuring jug and perineal pads. Our results confirmed an increase in blood loss in upright positions compared to the supine position. Because the increased blood loss was only found in women with perineal damage, oedema exacerbated by obstructed venous return, was the likely cause. To reduce blood loss, alternative non-supine positions can be offered, whereby the venous return is not obstructed. In addition, oedema in sitting positions can be prevented by alternating positions during the second stage of labour.

We found no differences in intact perineum rates between women in recumbent, semi-sitting and sitting position. Other studies showed contradictory results in the effect of birthing positions on perineal damage[7;20-28].

At the moment, no particular birthing position can be recommended because of the risk of perineal damage. Nevertheless, some important questions regarding perineal damage remain unanswered.

First, our focus group study showed that some midwives ask women in upright position to lie down if they want to perform an episiotomy. This will increase the episiotomy rate in supine position because this position is used to carry out the procedure but not due to the position itself. To control for this effect, information is needed on positions during the entire second stage and not just at the time of birth.

Second, the evidence on the incidence of anal sphincter damage is not conclusive. We did not find a difference between position groups and other studies have shown inconsistent results[25;28-30]. Because the occurrence of this serious complication is rare, large observational studies are needed to study the effect of birthing positions on this outcome.

Third, our focus was on supine versus other birthing positions. Perineal damage may also vary between non-supine positions. For example, some studies showed a higher rate of intact perineum in lateral position[22;27;31] and one of them a lower rate in squatting position[27] compared to other positions. However, other studies found higher rates of intact perineum in squatting position compared to other positions or no difference between these groups[25;32]. Equally, kneeling or hands and knees position were associated with more women with an intact perineum in some studies[21;33] but not in another[27]. The different findings may be explained by differences in control groups, clinical experience of health professionals and a lack of power in some studies. Further monitoring of the occurrence of perineal damage is required in each type of birthing position.

Pyschological outcomes are increasingly recognized as important aspects of quality of care[34;35]. The effect of birthing positions on psychological outcomes seems complex. Randomised controlled trials showed some psychological benefits of non-supine compared to supine positions soon after birth but no differences were found in our study three to four years after birth.

Several studies suggest that being able to choose birthing positions that are comfortable increases the experience of being in control[36-40]. Feeling in control is a major factor contributing to a positive birth experience and postnatal well-being[38;39;41-43].

The emerging evidence suggests that choice in position matters more than which type of position is used. Although in randomised controlled trials women were allocated to a particular birthing position and did not make their own choices, they chose to take part in the trial. The low compliance rate in some of these studies suggests that once they were in labour, many women decided not to use the allocated position[7;8].

Informed choice

Since there are no obstetric reasons to recommend the routine use of the supine birthing position, many authors have recommended encouraging women to choose the positions they find most comfortable[2;32;44;45]. Walsh argues that this is a 'soft position' and that it is insufficient for reversing birth posture medicalisation[46]. He advocates educating women about the disadvantages of recumbent positions and removing conventional beds from normal birth rooms.

Indeed, giving women a choice without providing sufficient information on position options that are less common, equals asking their consent for the choices of health professionals[47;48]. However, even after having had enough information, some women may choose options, in this case supine positions, that are uneasy for midwives who support the normalcy of birth[49]. Advocating any birthing position, be it supine or non-supine, can be considered as an obstetrical intervention[50].

In our focus group study, giving women an informed choice emerged as an alternative approach to reversing the routine use of the supine position. A woman's preference will be the starting point but the midwife will suggest other options, if this is in her interest.

Our interview study showed that the experiences of women with birthing positions vary but that they like to have an influence on the choice of position. In order to make an informed choice, women need to know about the various position options and their advantages and disadvantages. The fact that older and highly educated women use more non-supine positions suggests inequalities in choice of birthing positions. Our focus group study showed that many midwives only give information about birthing positions if women ask for it. Older and highly educated may have had easier access to information on birthing positions and may have been more assertive to ask midwives about this topic. Giving women informed choice should start with giving all women adequate information.

The best strategy to inform women is not clear. Women in our interview study appreciated practical information, for example via a leaflet or a video, which explains various options so that they could practice them at home before labour. As far as we are aware, only two studies examined the effect of giving information on birthing positions and they were both very small[51-53].

In one pilot study most women found a leaflet on birthing positions very or quite helpful[53]. However, only 5% said the leaflet helped them talk about their care with midwives and most women thought the leaflet did not affect what they did in labour. Some women indicated that they needed to be reminded about position options during labour.

In another study women were randomised into an experimental group which received an educational session on birthing positions and a control group which had a session on strategies for coping with labour, mainly dealing with pain relief[51;52]. More women in the experimental group felt that the educational session had helped with collabo-

rative decision-making during labour. Interestingly, the majority of women in both groups said they would like to be reminded of the benefits of upright positions when they went into labour and half the women in both groups did not give birth in the position of their choice.

The limited evidence so far shows that giving women an informed choice about birthing positions involves a lot more than just giving them information during pregnancy. It requires of midwives that they do not follow a blueprint of arbitrary care but that they individualise evidence-based care to a woman's personal needs[1]. Women's preferences should be discussed and women need to be prepared that the midwife will suggest position options during labour if this is in the woman's interest. They should be informed of obstetric factors that may be a reason for changing positions and of the unpredictability of labour, which makes it difficult to decide before hand which positions will be most comfortable.
More evidence is needed on how women should be informed about birthing positions and the effect of this information on women's experiences. Group education can be used but should not substitute one to one discussion of birthing positions during antenatal clinic appointments. Besides, the mass media can play an important role in making the public more aware of other position options.

The midwife's role during labour

We added a dimension to the definition of informed choice that is often missing in the international discourse. It explicates the need for midwives to give direction if required for obstetrical reasons or if a woman indicates she can or will not make choices herself.
Including this dimension should not be an excuse for midwives to maintain control over labour. It is important that midwives are aware of the power they have as professionals and that they do not intrude unnecessarily in a woman's natural process of giving birth[54]. If there is a need to give direction this can be done in such a way that a woman still feels in control. Roberts observed in a study of videotapes that a midwife can give guidance through supportive praise coupled with supportive direction without negating the innate urges of women's own bodies[55].
Further studies into the midwife-client dynamic during the second stage of labour can help define strategies to assist women in finding positions that are most suitable for them.

The findings in this thesis confirmed that midwives play a very important role in the use of birthing positions[27;56;57]. Convenience for health professionals contributed to the increasing popularity of the supine position in the past and it is still an important factor in maintaining its routine use. If working conditions of midwives in assisting births in non-supine positions are not addressed, many women will remain deprived of a choice in birthing positions.

Midwives can be taught how to assist births in non-supine positions without compromising their own working conditions[58]. If a midwife is not able to assist a woman in a particular position, for example, because of back problems, she should discuss this and offer alternative birthing positions or care in another midwifery practice. Additionally, equipment should be developed that facilitates midwives in assisting births in various positions. For example, more devices can be invented that enable various upright positions on the bed, so that the midwife can remain standing. Alternatively, small chairs can be designed that make midwives more comfortable when assisting a birth on a birthing stool.

Lack of knowledge and experience is another reason for midwives not to offer choice in positions. Students and midwives need to learn the necessary skills for assisting births in non-supine positions[46;59].
Student midwives should learn about the advantages and disadvantages of various birthing positions and become familiar with assisting births in various positions during their training. The vicious circle of students being trained by midwives who are familiar with only the supine position needs to be broken. Evidence based guidelines, practical workshops, the use of influential peer practitioners and audit are instruments that can be used to change the practice of qualified midwives[59].

Limitations of this thesis

A problem in most of the studies in this thesis was that some misclassification between positions may have occurred, for example between recumbent and semi-sitting position[60]. This would have attenuated the differences found between position groups. Nevertheless, important differences were found.
In some studies, the data were collected more than a decade ago. Although midwifery management may have changed since then, we have no reason to believe that practices with regard to assisting births in various positions have changed. Therefore, the findings of the studies are still relevant today.
In some studies, data were colllected from women retrospectively. Although women tend to remember many birth details accurately, some recollection bias may have occurred[61;62].
In the qualitative studies, socially desirable comments may have been made because participants knew that the researchers had an interest in birthing positions. Although many advantages of the supine position and disadvantages of non-supine positions have been mentioned by women and midwives, some bias may have occurred.
Women who originate from countries where non-supine positions are still widely used, may experience birthing positions differently than women who have grown up in societies where the supine position is used routinely[63-65]. However, ethnic minority women were underrepresented in our studies. Because of the low numbers, we combined them as one group ignoring the differences between minority groups. Studies

with larger numbers of minority women are needed to examine obstetric outcomes and experiences in these groups.

Recommendations for future studies

Although several randomised controlled trials have been conducted into birthing positions, the value of this type of research for comparing different positions is questionable.

First, research into how we can help women find positions that are suitable for them is complex. Complex research questions are not easily studied by randomised controlled trials[66]. We have to use other forms of research, which take into account the relationships among the various factors that influence each birth[66].

Second, two important strengths of randomised controlled trials are randomisation and blinding, both of which reduce biases in a study. Through randomisation confounding factors are randomly distributed over the experiment and control group and therefore should not interfere with the association between independent and dependent variables under study[67]. Blinding ensures that neither women nor practitioners or researchers know whether a woman belongs to the experiment or control group. This will reduce observer bias. However, blinding is obviously not possible in birthing position studies. Furthermore, randomisation raises the ethical question whether women should be asked to consent to allocation to a particular birthing position while they do not know how they will feel during labour. The low compliance rates in some studies confirm that women may find it difficult to maintain the allocated position and it undermines the power of the study to show effects[7;8]. Even if women in the study comply, those who consent to take part may be atypical of the wider population which would limit the study's external validity[67]. The exclusion rate was not always given but in some studies many women did not take part because of a preference for a particular birthing position[7;8].

Good quality observational studies can capture all positions used during the entire second stage, the influence of obstetric factors on position change and the effect of these changes on obstetric outcomes. A combination of observational and qualitative studies can give more insight into women's experiences of having an informed choice in birthing positions and into the midwife-client dynamic during labour.

Randomised controlled trials may be useful in evaluating the effect of a change in midwifery practice. For example, midwifery practices can be randomised into an intervention and control group. In intervention practices midwives may receive training in birthing positions and give women informed choice according to a research protocol supported by evidence based information material and clinical audit. The effects on women's labour outcomes and experiences can be compared to those of women in control practices who receive usual care.

Implications for other midwifery practices during the second stage of labour

In this thesis we critically examined the routine use of the supine position and found no justification for this practice. The same critical revision is needed of other routine practices during the second stage of labour. Sustained valsalva instead of spontaneous pushing remains common practice although there is increasing evidence of its adverse maternal and fetal effects[1]. Equally, women are often not allowed to push before full dilatation to prevent a oedematous or torn cervix[57;68]. Although this may be necessary when the cervix is very tight, there is no evidence that this should be the rule without assessment of other obstetric factors[57]. On the other hand, delaying active pushing when the cervix is fully dilated until a woman has the urge to bear down and removing arbitrary time limits to the duration of the second stage are likely to be beneficial[1].
Research into these interventions that are common practice in the care of low risk women should be a priority for midwives and scientists who claim 'normal birth' as their area of expertise. Yet, women's experiences of the second stage of labour are largely ignored and little is known about the aspects of care that help them in the process of giving birth[54].

Giving women informed choice in birthing positions and in other aspects of midwifery care requires a woman-centred approach[69]. Midwives are extremely powerful, especially during the second stage of labour, and they should use this power wisely[54]. By using scientific evidence and adjust it to each individual's preferences and needs a midwife can help every woman achieve the birth that is optimal for her.

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Chapter 10

Summary/Samenvatting

Summary

The supine position became popular because of its convenience for health professionals, but its widespread use was not based on sound scientific research. If women feel free to choose, they use a variety of supine and non-supine positions. The routine use of the supine position in the western world can therefore be regarded as a medical intervention in the natural course of labour. However, the supine position has become so common that neither health workers nor women regard this as an intervention.
Even if a health professional does not tell a woman to lie down, she will often do so because she assumes this is what is expected of her. Also, the prominence of the delivery bed in labour rooms implicitly tells women that the supine position is 'normal'. In view of the importance to practice evidence based midwifery, it is necessary to examine the evidence for the continuation of this intervention.
The central aims of this thesis were to gain insight into the advantages and disadvantages of the routine use of the supine position during the second stage of labour and into the factors that influence the use of birthing positions.

A variety of study designs were used to answer the following research questions:

1. What are the benefits of the routine use of the supine position for the second stage of labour compared to other positions, in terms of maternal morbidity and comfort and perinatal morbidity?
2. What is the influence of semi-sitting and sitting compared with recumbent birthing positions, net of other factors, on the risk of severe blood loss, when accurate measurements of blood loss are used?
3. What is the influence of position at the time of birth (recumbent, semi-sitting or sitting) on perineal damage, controlled for other factors?
4. Does the use of only the supine position during the second stage of labour influence long-term birth satisfaction, level of self-esteem and level of well-being in low risk women net of other influencing factors?
5. What are women's experiences with and views on various birthing positions during the second stage of labour?
6. What is the influence of socio-demographic and labour factors on the use of birthing positions during the second stage of labour and at the time of birth?
7. How do midwives deal with birthing positions and which factors influence their use of various positions?

In *Chapter 2* the results are pesented of a meta-analytic review into the benefits of the routine use of the supine position compared to other positions in terms of maternal morbidity and comfort and perinatal morbidity. Nine randomised controlled trials and one cohort study were included. A meta-analysis indicated a higher rate of instrumental deliveries and episiotomies in the supine position. A lower estimated blood loss and lower rate of postpartum haemorrhage were found in the supine position, however it is

not clear whether this was a real or only an observed difference. Heterogeneous, non-pooled data showed that women experienced more severe pain in the supine position and had a preference for other birthing positions.
Many methodological problems were identified in the studies and the appropriateness of a randomised controlled trial to study this subject was called into question. Objective labouratory measurements were advised to examine the difference in blood loss.

In *Chapter 3* results are given of our secondary analysis of data from a large randomised controlled trial conducted in primary care midwifery practices in the Netherlands. The aim was to assess whether the risk of severe blood loss is increased in semi-sitting and sitting positions and, if so, to which extent blood loss from perineal damage is responsible for this finding.
Sixteen hundred and forty-six low risk women were included who had a spontaneous vaginal delivery. Blood loss was measured using a weighing scale and measuring jug. Mean total blood loss and the incidence of blood loss greater than 500 ml and 1000 ml were increased in semi-sitting and sitting position. In logistic regression analysis, the interaction between birthing position and perineal damage was almost significantly associated with an increased risk of blood loss greater than 500 ml. Semi-sitting and sitting position were only significant risk factors among women with perineal damage (OR 1.30, 95% CI 1.00 - 1.69 and OR 2.25, 95% CI 1.37, 3.71 respectively). Among women with intact perineum no association was found. The conclusion was that semi-sitting and sitting birthing positions only lead to increased blood loss among women with perineal damage.

In *Chapter 4* a study is described into the influence of position at the time of birth on perineal damage among low risk women. The same data were used for secondary analysis as in chapter 3.
Sixteen hundred and forty-six low risk women were included who had a spontaneous, vaginal delivery and who did not need obstetric interventions.
Perineal outcomes were compared between women in recumbent, semi-sitting and sitting position. Logistic regression analysis was used to examine the effects of these positions controlled for other factors.
No significant differences were found in intact perineum rates between the position groups. Women in sitting position were less likely to have an episiotomy and more likely to have a perineal tear than women in recumbent position. After controlling for other factors the odds ratios were OR 0.29 (95% CI 0.16-0.54) and OR 1.83 (95% CI 1.22-2.73) respectively. Women in semi-sitting position were more likely to have a labial tear than women in recumbent position (OR 1.43, 95% CI 1.00-2.04). Based on the results, no particular birthing position can be strongly recommended or discouraged to prevent perineal damage.

In *Chapter 5* a study is presented into women's long-term psychological outcomes of childbirth. The long-term influence was examined of birthing positions during the second stage of labour, as well as other factors, on birth satisfaction, self-esteem and emotional well-being.
Three to four years after delivery, a postal questionnaire was sent to all 3200 women who received care in eight midwifery care practices from all over the country in 2001. Of those who responded (44%), 591 were low risk and were included in the analysis. The Rosenberg Self-esteem Scale and the Edinburgh Depression Scale were used.
Regression analyses showed that birthing positions were not related to childbirth satisfaction, self-esteem or emotional well-being. Age between 26 and 35 years was associated with being very satisfied. Pain, fear for own or baby's life and negative experience with the midwife were associated with reduced satisfaction. Age between 26 and 35 and higher education were related to higher self-esteem. Age between 26 and 35 years was associated with enhanced emotional well-being.
Concern about long-term psychological outcomes is not a reason to recommend either supine or non-supine positions. Further research should clarify whether having a choice in the use of birthing positions rather than the type of position influences psychological outcomes.

In *Chapter 6* the findings are shown of a qualitative study, using in-depth interviews, which aimed to gain insight into the influences on women's use of birthing positions and into the labour experiences of women in relation to the positions they used.
The advice given by midwives was found to be the most important factor influencing the choice of birthing positions. If medically possible, women benefited from having the autonomy to find the positions that were most useful for them. They varied greatly in their choices and in their experience of pain in relation to the type of position. Women, regardless of ethnicity, were most familiar with the supine position but valued practical information on other options.
Because the supine position is dominant in westernised societies, midwives have an important role to play in widening the range of women's choices. Midwives should empower women to find the positions that are most suitable for them, by giving practical advice during pregnancy and labour.

In *Chapter 7* the results are described of a study into the factors that are associated with birthing positions during the entire second stage of labour and at the time of birth. The same data were used as in chapter 5. Six hundred and sixty five low risk women were included who received midwife led care.
The number of women using only the supine position during the second stage varied between midwifery practices, ranging from 31.3% to 95.9% ($P < 0.001$). The large majority of women pushed and gave birth in supine position. For positions used during the entire second stage, a logistic regression analysis was used to examine effects con-

trolled for other factors. Women of 36 years and older and highly educated women were less likely to use only the supine pushing position (OR 0.54, 95% CI 0.31–0.94 and OR 0.40, 95% CI 0.21–0.73 respectively). Women who pushed longer than 60 minutes and who were referred during the second stage of labour were also less likely to use only the supine position (OR 0.32, 95% CI 0.16-0.64 and OR 0.44, 95% CI 0.23-0.86).
Bivariate analyses were conducted for effects on position at the time of birth. Age of 36 years and older, higher education and homebirth were associated with giving birth in non-supine position.
The finding that highly educated and older women were more likely to use non-supine birthing positions suggests inequalities in position choice. Although the Dutch maternity care system empowers women to choose their own place of birth, many may not be encouraged to make choices in birthing positions.
Education of women, midwives and obstetricians and perhaps of the public in general is necessary to make alternatives to the supine position a logical option for all women. Future studies need to establish midwife, clinical and other factors that have an effect on women's choice of birthing positions and identify strategies that empower women to make their own choices.

In *Chapter 8* a focusgroup study is presented into the way primary care midwives deal with birthing positions during the second stage of labour.
To reverse the routine use of the supine position, many authors recommend encouraging women to use positions that are most comfortable to them. Others advocate encouragement of non-supine positions because offering 'choice' is not enough to reverse the strong cultural norm of giving birth in supine position.
Based on the theory of Thachuk, we investigated whether using a relational approach to women's autonomy, by giving them informed choice, enables midwives to help women find positions that are most appropriate for them. Six focus groups were conducted with a total of 31 midwives.
The midwives in our study showed that they operated on a continuum between giving women informed consent and giving them informed choice when dealing with birthing positions.
Giving women informed consent means that the use of positions is based on the midwife's own position preferences.
When midwives give women informed choice, they help them find positions that are most suitable for them. They give women information during pregnancy and discuss their preferences regarding positions. Subsequently, a midwife will assist women during labour in finding positions that are most appropriate for them. A woman's preference is the starting point but the midwife will suggest other options, if this is in her interest. Women need to be prepared for the unpredictability of their feelings in labour and for obstetrical factors that may play a role. Midwives' working conditions need serious consideration if informed choice is to be given to all women. In addition, (student) mid-

wives need to be able to gain experience in conducting labour in non-supine positions.

In *Chapter 9* the main findings are discussed.
The findings of this thesis did not show that the supine position is superior to using other positions during the second stage of labour. There is no evidence for the continuation of the routine use of the supine position.
More women in supine position had an instrumental delivery in our meta-analytic review. Due to methodological problems the results need to be interpreted cautiously and therefore not all women should be dissuaded from using the supine position. Two common indications for an instrumental delivery are prolonged duration of the second stage of labour and fetal distress. When labour progress is not satisfactory, position change should be used to facilitate rotation and descent of the fetal head and encourage effective pushing. Equally, women should be discouraged from lying flat on their back too long unless they are tilted upwards or laterally to take the uterine weight off their main blood vessels. When fetal heart rate abnormalities occur, a woman should be encouraged to adopt a non-supine position.
The results from the secondary analysis of trial data, using accurate blood loss measurements, showed an increased blood loss in sitting and semi-sitting compared to supine positions. Because the increased blood loss was only found in women with perineal damage, oedema exacerbated by obstructed venous return was the likely cause. To reduce blood loss, alternative non-supine positions can be offered, whereby the venous return is not obstructed. In addition, oedema can be prevented by alternating positions during the second stage of labour.
No differences were found in intact perineum rates between women in recumbent, semi-sitting and sitting position. At the moment no particular birthing position can be recommended because of the risk of perineal damage.
The effect of birthing positions on psychological outcomes seems complex. The emerging evidence suggests that choice in position matters more to women than which type of position is used.

In order to make an informed choice, women need to know about the various position options and their advantages and disadvantages. The fact that older and highly educated women use more non-supine positions suggests inequalities in choice of birthing positions. Giving women informed choice should start with giving all women adequate information. Women's preferences need to be discussed and women need to be prepared that the midwife will suggest position options during labour if this is in their interest. If there is a need to give direction this can be done in such a way that a woman still feels in control. More evidence is needed on how women should be informed about birthing positions and the effect of this information on women's experiences. Studies into the midwife-client dynamic during the second stage of labour can help define strategies to assist women in finding positions that are most suitable for them.
Findings in this thesis confirmed that midwives play an important role in the use of

birthing positions. Convenience for health professionals was the main reason for the increasing popularity of the supine position in the past and is still an important factor in maintaining its routine use. If working conditions of midwives in assisting births in non-supine positions are not addressed, many women will remain deprived of a choice in birthing positions.
Lack of knowledge and experience is another reason for midwives not to offer choice. Students and midwives need to learn the necessary skills for assisting births in non-supine positions.

In future, good quality observational studies can capture all positions during the entire second stage, the influence of obstetric factors on position change and the effect of these changes on obstetric outcomes. A combination of quantitative, observational and qualitative studies can give more insight into women's experiences of having an informed choice in birthing positions and into the midwife-client dynamic during labour. Randomised controlled trials whereby randomisation takes place at midwifery practice level may be useful in evaluating the effect of a change in the practice of midwives.
Studies with large numbers of ethnic minority women are needed to examine obstetric outcomes and experiences in different ethnic groups.
The justification of other routine practices during the second stage of labour also needs critical examination. Examples are sustained valsalva instead of spontaneous pushing, not allowing women to push before full dilatation and not delaying active pushing until a woman has the urge to bear down.
Giving women informed choice in birthing positions and in other aspects of midwifery care requires a woman-centred approach. By using scientific evidence and adjust it to each individual's preferences and needs a midwife can help every woman achieve the birth that is optimal for her.

Samenvatting

De rugligging is populair geworden vanwege het gemak voor hulpverleners, maar het wijdverbreid gebruik ervan was niet gebaseerd op wetenschappelijke evidence. Als vrouwen zelf kunnen kiezen, gebruiken ze zowel de rugligging als andere houdingen. Het routinematige gebruik van de rugligging in de westerse wereld kan daarom beschouwd worden als een medische interventie in het natuurlijk verloop van de baring. De rugligging is echter zo vanzelfsprekend geworden dat noch hulpverleners, noch vrouwen dit als een interventie beschouwen.

Zelfs als een hulpverlener een vrouw niet vraagt om te gaan liggen, zal ze dat vaak toch doen omdat ze ervan uit gaat dat dit van haar wordt verwacht. Daarnaast is het bed prominent aanwezig in verloskamers en dit geeft vrouwen impliciet het signaal dat het normaal is om te gaan liggen. Gezien het belang van evidence based verloskunde, is het noodzakelijk de evidence te onderzoeken voor het voortzetten van deze interventie.

De belangrijkste doelstellingen van dit proefschrift waren om inzicht te krijgen in de voor- en nadelen van het routinematige gebruik van de rugligging tijdens de uitdrijving en in de factoren die van invloed zijn op het gebruik van baringshoudingen.

Verschillende onderzoeksmethoden zijn gebruikt om de volgende onderzoeksvragen te beantwoorden:

1. Wat zijn de voordelen van het routinematige gebruik van de rugligging tijdens de uitdrijving vergeleken met andere houdingen met betrekking tot maternale morbiditeit en comfort en de perinatale morbiditeit?
2. Wat is de invloed van de halfzittende en zittende houding vergeleken met de liggende houdingen, gecontroleerd voor andere factoren, op het risico op ernstig bloedverlies als nauwkeurige methoden worden gebruikt voor het meten van het bloedverlies?
3. Wat is de invloed van houding op het moment van de geboorte (liggend, halfzittend of zittend) op perineumletsel, gecontroleerd voor andere factoren?
4. Heeft het gebruik van alleen de rugligging tijdens de uitdrijving invloed op lange termijn tevredenheid over de bevalling, het gevoel van zelfwaardering en gevoel van welbevinden, gecontroleerd voor andere factoren?
5. Hoe hebben vrouwen de verschillende baringshoudingen ervaren en wat is hun mening over de verschillende houdingen?
6. Wat is de invloed van sociodemografische en bevallingsfactoren op het gebruik van baringshoudingen tijdens de uitdrijving en op het moment van de geboorte?
7. Hoe gaan verloskundigen om met baringshoudingen en welke factoren zijn van invloed op hun gebruik van verschillende houdingen?

In *Hoofdstuk 2* worden de resultaten gepresenteerd van een meta-analytische review van de voordelen van het routinematige gebruik van de rugligging vergeleken met andere houdingen met betrekking tot maternale morbiditeit en comfort en perinatale

morbiditeit. Negen randomised controlled trials (RCT's) en één cohort studie zijn geïncludeerd. Een meta-analyse toonde aan dat instrumentele bevallingen en episiotomieën vaker voorkwamen in rugligging. In rugligging was het geschatte bloedverlies gemiddeld lager en kwam een haemorrhagie postpartum minder vaak voor. Het was echter onduidelijk of het ging om een werkelijk verschil of een meetverschil. Heterogene, niet gepoolde data lieten zien dat vrouwen vaker hevige pijn ervaarden in rugligging en een voorkeur hadden voor andere baringshoudingen.
Er waren veel methodologische problemen in de studies en het is de vraag of een RCT geschikt is voor onderzoek naar dit onderwerp. Daarnaast zijn objectieve meetmethoden wenselijk om het verschil in bloedverlies te onderzoeken.

In *Hoofdstuk 3* worden de resultaten gegeven van een secundaire analyse van data van een grote RCT die plaatsvond in eerstelijns verloskundige praktijken in Nederland. Het doel van de studie was vast te stellen of het risico op ernstig bloedverlies verhoogd is in halfzittende en zittende houding en, als dat het geval is, in welke mate perineumletsel hiervoor verantwoordelijk is.
Zestienhonderd en zesenveertig laag risico vrouwen werden geïncludeerd die spontaan, vaginaal bevielen. Bloedverlies werd gemeten met een weegschaal en een maatbeker.
Het gemiddelde bloedverlies en het risico op bloedverlies van meer dan 500 cc en 1000 cc was verhoogd bij vrouwen die in halfzittende of zittende houding bevielen. Na logistische regressie analyse was de interactie tussen baringshouding en perineumletsel bijna significant geassocieerd met een toename in het risico op bloedverlies van meer dan 500 cc. Halfzittende en zittende houding waren alleen significante risicofactoren bij vrouwen met perineumletsel (OR 1,30; 95% BI 1,00 – 1,69 en OR 2,25; 95% BI 1,37 – 3,71 respectievelijk). Onder vrouwen met een intact perineum werd geen associatie gevonden. De conclusie was dat halfzittende en zittende baringshoudingen alleen tot een toename in bloedverlies leiden bij vrouwen met perineumletsel.

In *Hoofdstuk 4* wordt een studie beschreven naar de invloed van de houding op het moment van de geboorte op het optreden van perineumletsel onder laag risico vrouwen. Dezelfde data werden gebruikt als in de studie beschreven in hoofdstuk 3.
Zestienhonderd en zesenveertig vrouwen werden geïncludeerd die spontaan, vaginaal waren bevallen zonder obstetrische interventies. Het perineumletsel werd vergeleken tussen vrouwen in liggende, halfzittende en zittende houding. Door middel van een logistische regressie analyse werd het effect van deze houdingen op het ontstaan van perineumletsel onderzocht, gecontroleerd voor andere factoren.
Er werden geen significante verschillen gevonden in het voorkomen van een gaaf perineum tussen de verschillende groepen. Vrouwen in zittende houding hadden minder vaak een episiotomie en vaker een perineumruptuur dan vrouwen in liggende houding. Gecontroleerd voor andere factoren waren de odds ratio's respectievelijk OR 0,29 (95% BI 0,16 – 0,54) en OR 1,83 (95% BI 1,22 – 2,73). Vrouwen in halfzittende

houding hadden vaker een labiumruptuur dan vrouwen in liggende houding (OR 1,43; 95% BI 1,00 – 2,04). Op grond van deze resultaten is het voorkomen van perineumletsel geen reden om een bepaalde houding aan te bevelen.

In *Hoofdstuk 5* wordt een studie gepresenteerd naar lange termijn psychologische uitkomsten na de bevalling. Wij onderzochten de lange termijn gevolgen van baringshoudingen tijdens de uitdrijving voor tevredenheid over de bevalling, gevoel van eigenwaarde en emotioneel welbevinden.
Drie tot vier jaar na de bevalling werd een vragenlijst per post verstuurd naar alle 3200 vrouwen die in 2001 in zorg waren in acht verloskundige praktijken verdeeld over het hele land. Van de vrouwen die reageerden (44%), hadden 591 een laag risico en deze werden geïncludeerd in de analyse. Er werd gebruik gemaakt van de Rosenberg Self-esteem Scale en de Edinburgh Depression Scale.
Regressie analyses lieten zien dat baringshoudingen niet gerelateerd waren aan tevredenheid over de bevalling, gevoel van eigenwaarde of emotioneel welbevinden. Leeftijd tussen 26 en 35 jaar was geassocieerd met een hoge mate van tevredenheid. Pijn, angst voor eigen leven of dat van de baby en negatieve ervaringen met de verloskundige waren geassocieerd met verminderde tevredenheid. Leeftijd tussen de 26 en 35 en hogere opleiding waren gerelateerd aan een groter gevoel van eigenwaarde. Leeftijd tussen 26 en 35 was geassocieerd met groter emotioneel welbevinden.
De lange termijn psychologische uitkomsten zijn geen reden om de rugligging of andere houdingen aan te bevelen. Meer onderzoek moet duidelijk maken of een keuze hebben in het gebruik van baringshoudingen in plaats van het type houding van invloed is op psychologische uitkomsten.

In *Hoofdstuk 6* worden de bevindingen getoond van een kwalitatieve studie, door middel van diepte interviews. Het doel van de studie was inzicht te krijgen in de factoren die van invloed zijn op het gebruik van baringshoudingen door vrouwen en hoe zij de houdingen, die zij tijdens de bevalling gebruikten, ervaren hadden.
Wij constateerden dat het advies van verloskundigen de allerbelangrijkste factor was in de keuze van baringshoudingen. Als het medisch verantwoord was, hadden vrouwen er veel aan als ze de autonomie kregen om houdingen te vinden die voor hen het prettigst waren. Er was een grote variatie in de keuzes die vrouwen maakten en in hun ervaring met pijn in relatie tot het type houding. Ongeacht hun etniciteit, waren vrouwen het meest bekend met de rugligging. Wel waardeerden ze praktische informatie over andere opties.
Aangezien de rugligging zo dominant is in de westerse wereld, hebben verloskundigen een belangrijke rol in het vergroten van keuzemogelijkheden van vrouwen. Verloskundigen zouden vrouwen in staat moeten stellen houdingen te vinden die het meest geschikt voor hen zijn, door praktische adviezen te geven in de zwangerschap en tijdens de bevalling.

In *Hoofdstuk 7* worden de resultaten beschreven van een studie naar de factoren die geassocieerd zijn met baringshoudingen gedurende de hele uitdrijving en op het moment van de geboorte. Dezelfde data werden gebruikt als in hoofdstuk 5. Zeshonderd en vijfenzestig vrouwen werden geïncludeerd die in zorg waren bij de eerstelijns verloskundige aan het begin van de uitdrijving.
Het aantal vrouwen dat alleen de rugligging gebruikte tijdens de uitdrijving varieerde tussen verloskundige praktijken van 31,3% tot 95,9% ($P < 0,001$). De overgrote meerderheid van de vrouwen perste en beviel in rugligging. Voor houdingen tijdens de hele uitdrijving werd een logistische regressie analyse uitgevoerd om effecten te onderzoeken, gecontroleerd voor andere factoren. Vrouwen van 36 jaar en ouder en hoog opgeleide vrouwen gebruikten minder vaak alleen de rugligging (OR 0,54; 95% BI 0,31 – 0,94 en OR 0,40; 95% BI 0,21 – 0,73 respectievelijk). Vrouwen die langer persten dan 60 minuten en die werden verwezen tijdens de uitdrijving gebruikten ook minder vaak alleen de rugligging (OR 0,32; 95% BI 0,16 – 0,64 en OR 0,44; 95% BI 0,23 – 0,86).
Het feit dat hoog opgeleide en oudere vrouwen vaker andere houdingen gebruikten dan de rugligging suggereert een ongelijkheid in keuzemogelijkheden. Hoewel vrouwen in het Nederlanse verloskunde systeem kunnen kiezen waar ze willen bevallen, worden velen mogelijk niet aangemoedigd om zelf keuzes te maken in baringshoudingen.
Educatie van vrouwen, verloskundigen, gynaecologen en wellicht van het algemene publiek is noodzakelijk om een andere houding dan de rugligging een logische optie te maken voor alle vrouwen. Toekomstig onderzoek moet vaststellen welke verloskundige factoren, bevallingsfactoren en andere invloeden een rol spelen in de keuze van vrouwen in baringshoudingen. Ook kan onderzocht worden hoe vrouwen de autonomie kunnen krijgen om zelf keuzes in houdingen te maken.

In *Hoofdstuk 8* wordt een focus groep studie gepresenteerd naar de manier waarop eerstelijns verloskundigen omgaan met baringshoudingen tijdens de uitdrijving.
Om het routinematig gebruik van de rugligging terug te dringen, hebben veel auteurs aanbevolen om vrouwen aan te moedigen houdingen te gebruiken die het meest comfortabel voor hen zijn. Anderen bepleitten het aanmoedigen van andere houdingen omdat het aanbieden van een 'keuze' niet voldoende is om de sterke norm van bevallen in rugligging om te buigen.
Gebaseerd op de theorie van Thachuk, onderzochten we of een meer relationele benadering van de autonomie van vrouwen, door hen een geïnformeerde keuze te geven, verloskundigen in staat stelt om vrouwen te helpen houdingen te vinden die het best bij hen passen. Zes focus groepen werden gehouden met in totaal 31 verloskundigen.
De verloskundigen in onze studie lieten zien dat zij opereerden op een continuüm tussen het geven van geïnformeerde toestemming en geïnformeerde keuze ten aanzien van baringshoudingen.

Het geven van geïnformeerde toestemming is gebaseerd op de voorkeur die de verloskundige zelf heeft op het gebied van baringshoudingen.
Als verloskundigen een geïnformeerde keuze geven helpen ze vrouwen om houdingen te vinden die het meest geschikt voor hen zijn. Ze geven vrouwen informatie in de zwangerschap en bespreken hun voorkeuren voor bepaalde houdingen. Vervolgens zal een verloskundige vrouwen tijdens de bevalling begeleiden in het vinden van houdingen die het meest geschikt voor hen zijn. De voorkeur van een vrouw is het beginpunt, maar de verloskundige zal andere houdingen voorstellen als dit in haar belang is. Vrouwen moeten voorbereid worden op de onvoorspelbaarheid van hun gevoelens tijdens de bevalling en op obstetrische factoren die een rol kunnen spelen. Er moet serieus aandacht geschonken worden aan de werkomstandigheden van verloskundigen omdat anders nooit alle vrouwen een geïnformeerde keuze zullen krijgen. Daarnaast moeten (student) verloskundigen ervaring kunnen opdoen in het begeleiden van bevallingen in andere houdingen dan de rugligging.
In *Hoofdstuk 9* worden de belangrijkste bevindingen besproken.
De bevindingen in dit proefschrift lieten niet zien dat de rugligging superieur is ten opzichte van andere houdingen tijdens de uitdrijving. Er is geen evidence voor voortzetting van het routinematige gebruik van de rugligging.
In onze meta-analytische review hadden meer vrouwen die in rugligging bevielen een instrumentele bevalling. Gezien de vele methodologische problemen in de studies moeten de resultaten voorzichtig worden geïnterpreteerd en er is geen reden om alle vrouwen te ontmoedigen de rugligging te gebruiken. Twee belangrijke indicaties voor een instrumentele bevalling zijn een langdurige uitdrijving en foetale nood. Als de bevalling niet naar wens vordert, kan een verandering van houding de rotatie en indaling van het caput vergemakkelijken en effectief persen bevorderen. Eveneens moet aan vrouwen aangeraden worden om niet te lang plat op de rug te liggen, tenzij ze iets naar voren of opzij gekanteld zijn waardoor het gewicht van de uterus niet op de grote bloedvaten drukt. Als cortonenpathologie optreedt, moet een vrouw aangemoedigd worden om een andere houding aan te nemen dan de rugligging.
De resultaten van de secundaire analyse, met gebruik van nauwkeurige methoden voor het meten van bloedverlies, lieten een toename zien in bloedverlies in zittende en halfzittende houding ten opzichte van de rugligging. Omdat de toename in bloedverlies alleen werd gezien bij vrouwen met perineumletsel, was oedeem veroorzaakt door belemmering van de veneuze terugstroom, de meest waarschijnlijke oorzaak. Om bloedverlies te verminderen kunnen alternatieve houdingen worden gebruikt, waarbij de veneuze terugstroom niet wordt belemmerd. Daarnaast kan oedeem voorkomen worden door het afwisselen van houdingen tijdens de uitdrijving.
In een secundaire analyse van dezelfde data werd geen verschil gevonden in het voorkomen van een gaaf perineum tussen vrouwen in liggende, halfzittende en zittende houding. Voor het voorkomen van perineumletsel kan vooralsnog niet een bepaalde baringshouding aanbevolen worden.
Het effect van baringshoudingen op psychische uitkomsten lijkt complex. De evidence

tot nu toe lijkt erop te wijzen dat een keuze kunnen maken in houdingen belangrijker is voor vrouwen dan welk type houding wordt gebruikt.

Om een geïnformeerde keuze te kunnen maken, moeten vrouwen op de hoogte zijn van de keuzemogelijkheden en van de voor- en nadelen daarvan. Het feit dat oudere en hoog opgeleide vrouwen vaker andere houdingen gebruikten dan de rugligging suggereert een ongelijkheid in het kunnen kiezen. Vrouwen een geïnformeerde keuze geven zou moeten beginnen met het geven van adequate informatie aan alle vrouwen. De voorkeuren van vrouwen moeten besproken worden en vrouwen moeten erop worden voorbereid dat de verloskundige houdingen aan zal raden tijdens de bevalling als dit in hun belang is. Als een verloskundige aanwijzingen moet geven kan ze dit op zo'n manier doen dat een vrouw nog steeds een gevoel van controle houdt. Meer evidence is nodig over hoe vrouwen het beste geïnformeerd kunnen worden en wat het effect is van die informatie op de bevallingservaringen van vrouwen. Onderzoek naar de verloskundige-cliënt dynamiek tijdens de uitdrijving kunnen helpen om manieren te vinden om vrouwen te begeleiden in het vinden van houdingen die het meest geschikt voor hen zijn.
De bevindingen in dit proefschrift bevestigen dat verloskundigen een belangrijke rol spelen in het gebruik van baringshoudingen. Het gemak voor hulpverleners was de belangrijkste reden voor de stijgende populariteit van de rugligging in het verleden en is nog steeds een belangrijke factor in de handhaving van het routinematige gebruik ervan. Als geen aandacht wordt besteed aan de werkomstandigheden van verloskundigen bij het begeleiden van vrouwen in andere houdingen dan de rugligging, zullen veel vrouwen verstoken blijven van een keuze in baringshoudingen.
Het gebrek aan kennis en ervaring is een andere reden waarom verloskundigen vrouwen niet actief laten kiezen. Studenten en verloskundigen moeten de noodzakelijke vaardigheden kunnen leren om bevallingen in andere houdingen dan de rugligging te kunnen begeleiden.

In de toekomst kunnen met observationele studies van goede kwaliteit alle voorkomende houdingen tijdens de hele uitdrijving bestuderd worden, de invloed van obstetrische factoren op het veranderen van houding en het effect van deze veranderingen op obstetrische uitkomsten. Een combinatie van kwantitatief observationeel en kwalitatief onderzoek kan inzicht geven in de ervaringen van vrouwen met het maken van een geïnformeerde keuze en in de verloskundige-cliënt dynamiek tijdens de bevalling. RCT's, met randomisatie op verloskundige praktijk niveau, kunnen nuttig zijn voor het evalueren van het effect van een verandering in de verloskundige praktijkuitoefening.
Studies met grote aantallen vrouwen uit etnische minderheidsgroepen zijn noodzakelijk om obstetrische uitkomsten en ervaringen te onderzoeken in verschillende etnische groepen.
De rechtvaardiging van andere routinematige verloskundige handelingen tijdens de

uitdrijving zou ook onderzocht moeten worden. Voorbeelden hiervan zijn het geïnstrueerd in plaats van spontaan persen, vrouwen niet laten persen als ze nog geen volledige ontsluiting hebben en beginnen met actief persen zonder op persdrang te wachten.
Het geven van een geïnformeerde keuze in baringshoudingen en andere aspecten van verloskundige zorg vereist een benadering waarin de vrouw centraal staat. Door gebruik te maken van wetenschappelijke evidence en deze toe te spitsen op de voorkeuren en behoeften van elk individu, kan een verloskundige iedere vrouw helpen de voor haar meest optimale bevalling te bereiken.

Appendices

Appendix 1. Rosenberg Self-esteem Scale (RSE)[1;2]

Women were asked to indicate one of four options for each statement: strongly agree (0), agree (1), disagree (2) or strongly disagree (3). The score of positively worded questions was reversed (0=3, 1=2, etc). A higher score indicates a higher level of self-esteem.

1. On the whole, I am satisfied with myself
2. At times I think I am no good at all
3. I feel that I have a number of good qualities
4. I am able to do things as well as most other people
5. I feel I do not have too much to be proud of
6. I certainly feel useless at times
7. I feel I am a person of worth, at least on an equal plane with others
8. I wish I could have more respect for myself
9. All in all, I am inclined to feel that I am a failure
10. I take a positive attitude toward myself

(1) Kienhorst CW, De Wilde EJ, Van den Bout J, Diekstra RF. Psychometrische eigenschappen van een aantal zelfrapportage-vragenlijsten over "(on) welbevinden": Een onderzoek bij 9,393 leerlingen van het voortgezet onderwijs. [Psychometric characteristics of a number of self-reporting questionnaires about "(un) well-being": A study of 9.393 secondary school students.]. Nederlands Tijdschrift voor de Psychologie en haar Grensgebieden 1990; 45(3):124-133.

(2) Rosenberg M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press; 1965.

Appendix 2: Edinburgh Depression Scale (EDS)[1;2]

Women were asked to score the following items from 0 to 3 depending on how true they were for them. The score of positively worded questions was reversed (0=3, 1=2, etc). A higher score indicates a lower level of emotional well-being.

- I have been able to laugh and see the funny side of things
- I have looked forward with enjoyment to things
- I have blamed myself unnecessarily when things went wrong
- I have been anxious or worried for no good reason
- I have felt scared or panicky for no very good reason
- Things have been getting on top of me
- I have been so unhappy that I have had difficulty sleeping
- I have felt sad or miserable
- I have been so unhappy that I have been crying
- The thought of harming myself has occurred to me

(1) Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry 1987; 150:782-786.

(2) Pop VJ, Komproe IH, Van Son MJ. Characteristics of the Edinburgh Post Natal Depression Scale in The Netherlands. Journal of Affective Disorders 1992; 26:105-110.

Appendix 3: Guideline qualitative interview study

(main questions only, probes are left out)

1. Labour experiences
   a. Was your labour as you had expected?
   b. Which positions did you use during the first stage of labour and which during the second stage?
   c. Who gave you advice to adopt certain positions?
   d. Did your place of birth (home/ hospital) influence the positions you adopted during labour?
   e. How do you look back on your birth?

2. Influence of birthing positions
   a. Was the pain any different when you adopted a different position?
   b. Did you feel more in control in certain positions?
   c. Was your partner better able to support you in certain positions?
   d. Did you find it easier to communicate with your midwife in certain positi ons?
   e. Did the position at the time of birth influence your first contact with your baby?

3. Preparation for labour
   a. What did you think of the way the midwife prepared you for labour?
   b. How much did the midiwfe explain about birthing positions?
   c. How did the antenatal classed prepare you for labour?
   d. How much explanation was given on birthing positions during antenatal classes?
   e. Did you get advice from others about birthing positions before labour?
   f. Did you get ideas about birthing positions from television, books or magazines?

4. Postnatal health
   a. How much did you suffer from pelvic pain and does this still bother you?
   b. To which extent do you think birthing positions during labour had an influence on these complaints?
   c. Did you suffer from urine or faecal incontinence and do you still suffer from this now?
   d. To which extent do you think birthing positions during labour had an influence on these complaints?
   e. How much difficulty do you have in carrying out your daily tasks?

f. To which extent do you think birthing positions during labour had an influence on this?
g. How was your mood during pregnancy, labour, postnatally and how is it now?
h. To which extent do you think birthing positions during labour had an influence on these complaints?
i. Do you have any other health problems?
j. To which extent do you think birthing positions during labour had an influence on these complaints?

5. Next birth
   a. Which position(s) would you want to use if you would give birth again?
   b. Does your preference of positions play a role in your choice of place of birth?
   c. What would you recommend other women regarding birthing positions during labour?

6. Do you have any other remarks?

Appendix 4: Guideline focusgroup study

Introduction

1. Explanation about the aim of the focusgroup

Experiences with birthing positions

2. Which associations does the word 'birthing positions' evoke in you?
    a. Positive/ negative experiences with certain positions
3. In which positions do women in you midwifery practice give birth, what is the predominant position?
    i. Who influences the positions that a woman adopts?
        1. The woman
        2. The midwife
        3. Others
    ii. Is the use of positions related to a certain type of woman?
        1. Ethnic background
        2. Education level
        3. Other

Information about birthing positions

4. Which information do women receive about birthing positions?
    a. Do you give information to women about birthing positions? When (pregnancy, labour)?
    b. Do you give information to all women or only if they ask about it?
    c. If somebody wants to give birth in a certain position (e.g. supine or on a birthing stool), do you then also give information about other positions?
    d. Which information?
    e. Do you use information materials such as video's, leaflets?
    f. Which influence do antenatal classes have on women's choice of positions?

Factors and expectations that influence the use of birthing positions

5. What are reasons for you to encourage or discourage certain birthing positions?
    a. Preference of the woman
    b. Fast or slow progress of labour
    c. View of the perineum
    d. Abnormal foetal heart rate pattern

e. Embarrassment
f. Hygiene
g. Own working conditions
h. Influence of partner, maternity care assistant, nurse, obstetrician
i. Midwives with children: own labour experiences
j. Other

6. What is the influence of the place of birth on the use of positions?
   a. Presence of devices, available space
   b. Influence of official and unofficial rules and regulations
   c. Influence of the hospital environment on women's decision making
7. What do you think is the influence of birthing positions on the course of labour?
   a. Duration of labour/ need for augmentation/ chance of instrumental delivery
   b. Perineal damage
   c. Blood loss
   d. Foetal and neonatal condition
   e. Other
8. What do you think is the influence of birthing positions on psychological outcomes?
   a. Birth satisfaction
   b. Feeling of control during labour
   c. Pain
   d. Other

Knowledge and experience

9. How did you obtain your knowledge and experience regarding birthing positions?
   a. During classroom teaching in midwifery training
   b. During placements in midwifery training
   c. In post-registration and refresher courses
   d. Other
10. To what extent do you feel competent in assisting births in various birthing positions?
   a. Are there positions that you would like to offer if you felt more competent in assisting births in that position?
   b. What do you need to become competent?
   i. Professional literature
   ii. Post-registration and refresher courses
   iii. Other
11. Which items would you like to see covered in course activities on birthing positions?

12. Are there any birthing positions you would never want to use and why not?

Finally

13. What is important regarding this topic and has not been mentioned yet?

Dankwoord

Geen enkel proefschrift is het resultaat van de inspanningen van één persoon. Maar in mijn promotietraject zit wel bijzonder veel goodwill van anderen.

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Je bent een enorm voorbeeld voor mij, voor onderzoekers, voor eerstelijners en, niet te vergeten, voor vrouwen. Jij hebt me geleerd hoe je ambitieus kunt zijn zonder het welzijn van de mensen om je heen uit het oog te verliezen.

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degenen die deze prachtige dataset bij elkaar hebben gebracht: Kathy Herschderfer, Mariet van Diem, Mieke Aitink, Simone Buitendijk en nog vele anderen bij TNO.

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Er loopt nog een enorme dataverzameling waar alle opleidingen tot verloskundige en veel verloskundige praktijken aan meewerken. Heel veel dank aan alle verloskundigen, student verloskundigen, leerkrachten en medewerkers van de opleidingen voor de hulp bij het verzamelen van deze data.
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Mijn lief, geen artikel gaat de deur uit of jij hebt er kritisch naar gekeken. Maar je bent ook degene die het meest onvoorwaardelijk in mijn kunnen gelooft. Ik vraag me wel eens af hoe ik dit gedaan zou hebben als je niet voor mij naar Nederland was verhuisd en ik het alleen had moeten doen. Zonder iemand die bij elke SPSS stress roept: 'Is heel normaal schat, dat hoort erbij'. En zonder man die het huishouden door laat draaien, ook als ik het af laat weten.

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Curriculum vitae

Janke (Ank) de Jonge werd geboren op 5 januari 1967 in Creil (N.O.P.). In 1985 behaalde zij het eindexamen VWO aan het Menso Alting College in Hoogeveen. Van 1985 tot 1989 volgde zij de Hogere Beroepsopleiding voor Verpleegkunde in Zwolle. Vervolgens heeft ze enkele jaren in de verpleging gewerkt in Nederland en Engeland. Van 1992 tot 1994 volgde zij de verloskunde opleiding aan de Suffolk and Great Yarmouth College of Nursing and Midwifery in Ipswich terwijl zij werkte als student verloskundige in Bury St Edmunds in Engeland. Daar bleef ze als verloskundige werken in het West Suffolk Hospital tot 1995.

Van 1995 tot 1998 werkte ze als wijkverloskundige en verloskundig docent in Nigeria. Van 1998 tot 2000 volgde ze de Master opleiding in Public Health in Edinburgh, waar zij haar partner Charles Agyemang heeft ontmoet. Daarnaast werkte ze als verloskundige in Edinburgh en Livingston. Van 2000 tot 2003 werkte ze in Verloskundige Praktijk Nijmegen-West en vanaf 2003 in verschillende eerstelijns praktijken in het westen van het land.

Daarnaast werd in 2001 een promotietraject gestart bij Vrouwenstudies Medische Wetenschappen op de afdeling Huisartsgeneeskunde van het Universitair Medisch Centrum St Radboud te Nijmegen. Van 2003 tot 2006 heeft Ank gewerkt op de afdeling richtlijnontwikkeling van de KNOV.

Sinds januari 2006 is zij werkzaam bij TNO Kwaliteit van Leven, Sector Voortplanting en Perinatologie en daarnaast als waarnemend verloskundige in de eerstelijn.