The second stage of labour - the use of interventions and women's experiences

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LUND UNIVERSITY

DOCTORAL DISSERTATION

By due permission of the Faculty of Medicine, Lund University, Sweden.
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Abstract

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Methods: Study I is a retrospective cohort study where 764 medical records from 2017 were reviewed. Women in Robson group 1 were included. Descriptive and analytic statistics were used to describe the use of oxytocin and to compare mode of birth in Robson group 1. Study II included 21 women with spontaneous vaginal births from 37 gestational weeks who were interviewed about their experiences of the second stage of labour four to ten weeks after birth. Thematic analysis based on descriptive phenomenology was used to analyse data. In study III and IV data from a follow-up questionnaire sent to women one month after birth were used. Inclusion criteria were women opting for their first vaginal birth from 37 gestational weeks with a singleton pregnancy. Study III is a multicentre randomised controlled trial which included 2221 women who were randomised to being assisted by one or by two midwives in the late second stage of labour with the aim of reducing severe perineal trauma. Women's experiences of the second stage of labour were measured using Likert scales and were analysed according to intention to treat. Study IV is an observational study using data from 2233 women who responded to the follow-up questionnaire sent to women one month after birth. Midwifery practices and interventions used during the second stage were evaluated in relation to informed consent and experiences of the second stage of labour. Analyses were performed with univariate and multivariable logistic regression.

Main findings: In study I, oxytocin for labour augmentation was used in 64.1% of the births. Adherence to recommendations and a shorter time treated with oxytocin was associated with a greater likelihood of vaginal birth. In study II women's experiences of the second stage of labour were described in three themes: "An experience of upheaval", representing intensity, power and pain. "The importance of trusting relationships" emphasizes the meaning of relationships. "Becoming a mother" describes feelings during the final moments of birth. Study III showed that women's experiences of the second stage of labour did not differ between women who were randomised to assistance by one or by two midwives in the late second stage of labour. In study IV, provided informed consent to midwifery practices and interventions during the second stage was reported by 17.6% of the women. Informed consent was associated with more positive experiences of the second stage and less discomfort and/or pain from vaginal examinations, episiotomy, perineal massage and catheterization of the bladder.

Conclusions: This thesis provides evidence about how the second stage of labour can be experienced by women and how provided informed consent affects women's experiences during this stage. Being assisted by an additional midwife during the late second stage did not to affect women's experiences which is of importance as this intervention reduces severe perineal trauma. The findings from this thesis also shed light on a routine use of interventions as well as an overuse of oxytocin for labour augmentation. In conclusion, this thesis contributes to a deeper understanding of how individualized care can be enabled in the significant and transformative life-event of becoming a mother.

Key words: Birth experience, interventions, midwifery practices, synthetic oxytocin, the second stage of labour

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"You are a midwife, assisting at someone else's birth. Do good without show or fuss. Facilitate what is happening rather than what you think ought to be happening. If you must take the lead, lead so that the mother is helped, yet still free and in charge. When the baby is born, the mother will rightly say, 'We did it ourselves!'

— Lao Tzus Tao Te Ching, 2 500 B.C.

Table of Contents

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shed light on a routine use of interventions as well as an overuse of oxytocin for labour augmentation. In conclusion, this thesis contributes to a deeper understanding of how individualized care can be enabled in the significant and transformative life-event of becoming a mother.

Populärvetenskaplig sammanfattning

Att föda barn är en omvälvande upplevelse som kvinnan bär med sig under hela livet och som har betydelse för hälsa och välmående på både kort och lång sikt. Faktorer som påverkar förlossningsupplevelsen är stöd under förlossningen, delaktighet i beslut, förlossningssätt och användningen av interventioner. Utdrivningsskedet är den sista delen av förlossningen som startar när modermunnen är retraherad och slutar när barnet föds. Detta skede har beskrivits som ett kraftfullt skede då den födande kvinnan har ett ökat behov av stöd och delaktighet. Barnmorskans uppgift under utdrivningsskedet är att säkerställa kvinnans och barnets välmående, att skydda mellangården mot förlossningsbristningar och att ge stöd för att optimera kvinnans förlossningsupplevelse.

Det övergripande syftet med denna avhandling var att studera kvinnors upplevelser av förlossningens utdrivningsskede samt metoder och interventioner som används av barnmorskor.

Studie 1 är en retrospektiv studie med granskning av förlossningsjournaler avseende handläggning av värkstimulering med syntetiskt oxytocin och dess samband med förlossningssätt. I studien ingick kvinnor som födde sitt första barn och hade en spontan förlossningsstart i fullgången graviditet. Resultatet analyserades med deskriptiv och jämförande statistik. I studie 2 undersöktes kvinnors upplevelser av förlossningens utdrivningsskede. Tjugoen kvinnor som haft en spontan vaginal förlossning intervjuades fyra till tio veckor efter att de fött barn. Materialet analyserades med tematisk analys baserat på deskriptiv fenomenologi. Studie 3 och 4 baseras på data som samlades in i en randomiserad multicenter-studie, the Oneplus trial, där 3059 kvinnor från fem olika förlossningsavdelningar deltog. Frågeformulär skickades till kvinnor en månad efter att de fött barn. Syftet med the Oneplus trial var att undersöka om två barnmorskor närvarande under den sista delen av utdrivningsskedet kunde minska risken för förlossningsbristningar som omfattar ändtarmsmuskulaturen. I studie 3 jämfördes kvinnors upplevelser av utdrivningsskedet mellan kvinnor som haft en (standardvård) respektive två barnmorskor (intervention) närvarande. Inklusionskriterier var kvinnor som födde barn för första gången spontant vaginalt i fullgången graviditet. Kvinnors upplevelser mättes genom frågor som besvarades på fyragradiga och sjugradiga skalor. Analys gjordes med deskriptiv och jämförande statistik. I studie 4 undersöktes kvinnors upplevelser av metoder och interventioner som används under utdrivningsskedet för att främja och påskynda förlossningsförloppet samt för att skydda mellangården mot förlossningsbristningar. Upplevelser av utdrivningsskedet samt av åtta olika metoder och interventioner analyserades i relation till om kvinnan gett informerat samtycke. Till studien användes deskriptiv statistik samt univariat och multivariabel logistisk regsression.

Resultatet visade att värkstimulering med syntetiskt oxytocin användes vid 64% av förlossningarna och att 40% av de kvinnor som fick infusionen inte hade en förlängd

förlossningsprogress, dvs det saknades indikation för att påskynda förlossningen. Kejsarsnitt var vanligare hos kvinnor där infusionen inte höjts enligt befintliga rekommendationer, när infusionen startade tidigt i förlossningsförloppet samt när infusionen pågick under lång tid (studie 1). I intervjustudien (studie 2) beskrev kvinnorna utdrivningsskedet som ett överväldigande och intensivt skede där förtroende och tillitsfulla relationer var avgörande för upplevelsen. Den ökande smärtan och trycket nedåt gjorde att kvinnorna kunde känna samexisterande känslor av rädsla och fascination och de använde olika strategier för att behålla kontrollen. Kvinnorna uttryckte tacksamhet och tillfredsställelse med vården, men beskrev också brist på information och delaktighet. Frågeformuläret som skickades ut en månad efter förlossningen inom the Oneplus trial, besvarades av 2233 kvinnor (78,9%). Kvinnors upplevelser av utdrivningsskedet var överlag positiva och känslan av att vara stark, trygg och ha kontroll skiljde sig inte mellan kvinnor som haft stöd av en barnmorska jämfört med de som haft stöd av två barnmorskor (studie 3). Resultatet av den fjärde studien visade att drygt 80% av kvinnorna som besvarade enkäten och upplevde metoder och interventioner använda av barnmorskor under utdrivningsskedet, inte fick möjlighet att ge sitt informerade samtycke till dessa. Den grupp kvinnor som gett informerat samtycke upplevde metoderna och interventionerna mer positivt och kände sig signifikant mer starka och trygga och mindre utlämnade under utdrivningsskedet jämfört med de kvinnor som inte gett informerat samtycke.

Sammanfattningsvis visar avhandlingsarbetet hur utdrivningsskedet kan upplevas av kvinnor samt hur informerat samtycke till metoder och interventioner kan påverka kvinnors upplevlser under detta skede. Stöd av två barnmorskor under utdrivningsskedet, jämfört med stöd av en barnmorska, påverkade inte kvinnors upplevelser av utdrivningsskedet. Detta resultat är betydelsefullt eftersom resultaten från the Oneplus trial visade att med två barnmorskor närvarande minskade andelen förlossningsbristningar som omfattar ändtarmsmuskulaturen med 30%. Vidare så visar avhandlingen på en rutinmässig användning av interventioner och en överanvändning av värkstimulering med syntetiskt oxytocin. Resultaten belyser vikten av att ge vård under förlossningen med fokus på varje kvinnas individuella behov och delaktighet i beslutsfattande. Detta kan uppnås genom att kvinnor ges kontinuerligt stöd och kvinnocentrerad vård.

List of Papers

Paper I

Häggsgård, C., Persson, E. Management of oxytocin for labour augmentation in relation to mode of birth. *Midwifery*. 2020 Nov; 90:102822.

Paper II

Häggsgård C., Nilsson C., Teleman P., Rubertsson C., Edqvist M. Women's experiences of the second stage of labour. *Women and Birth*. 2022 Sep;35(5):e464-e470.

Paper III

Häggsgård, C., Edqvist, M., Teleman, P., Tern, H., Rubertsson, C. Impact of collegial midwifery assistance during the second stage of labor on women's experience: A follow-up study from the Oneplus randomized controlled trial. *Submitted.*

Paper IV

Häggsgård, C., Rubertsson, C., Teleman, P., Edqvist, M. Informed consent to midwifery practices and interventions during the second stage of labour – An observational study within the Oneplus trial. *Submitted.*

Additional work

Edqvist, M., Dahlen HG., **Häggsgård C.**, Tern H., Ängeby K., Tegerstedt, G., Teleman P., Ajne G., Rubertsson C. One Plus One Equals Two—will that do? A trial protocol for a Swedish multicentre randomised controlled trial to evaluate a clinical practice to reduce severe perineal trauma. *Trials.* 21.1 2020: 1-9.

Edqvist M., Dahlen HG., **Häggsgård C.**, Tern H., Ängeby K., Teleman P., Ajne G., Rubertsson C. The effect of two midwives during the second stage of labour to reduce severe perineal trauma (Oneplus): a multicentre, randomised controlled trial in Sweden. *Lancet.* 2022 Mar 26;399(10331):1242-1253.

Tern, H., Edqvist, M., Ekelin, M., **Häggsgård, C**., Rubertsson, C. Women's experiences of being assisted by two midwives during the active second stage of labour: Secondary outcomes from the Oneplus trial. *Submitted.*

Thesis at a glance

Study I. Management of oxytocin for labour augmentation in relation to mode of birth in Robson group 1	
Aim	To describe the use of oxytocin and to compare mode of birth in Robson group 1.
Methods	A retrospective cohort study (n=724) including data collected from medical records of women in Robson group 1. Descriptive and analytic statistics were used to describe the use of oxytocin and to compare mode of birth.
Results	Oxytocin for labour augmentation was used in 64.1% of the women. Adhering to recommendations and receiving a shorter duration of oxytocin treatment were associated with a greater likelihood of vaginal birth.
Conclusion	Augmentation with oxytocin was over-used in Robson group 1. According to increased risks for adverse outcomes when using augmentation with oxytocin, care-givers should implement strict protocols for its use.
Study II. Women's experiences of the second stage of labor	
Aim	To explore women's experiences of the second stage of labour in spontaneous vaginal birth.
Methods	A qualitative study (n=21) was conducted using qualitative thematic analysis based on descriptive phenomenology to analyse the data. Women with a spontaneous vaginal birth at term pregnancy were interviewed four to ten weeks after birth.
Results	Three themes emerged: "An experience of upheaval", "The importance of trusting relationships" and "Becoming a mother"
Conclusion	The second stage of labour was characterized by overwhelming sensations connected with an importance of having trusting relationships during this stage. It was crucial for women to be informed, involved, and guided. Women should be offered continuous support during the second stage of labour.
Study III. Impact of collegial midwifery assistance during the second stage of labor on women's experience: A follow-up study from the Oneplus randomized controlled trial	
Aim	To compare experiences of the second stage of labour between women assigned to collegial midwifery assistance or to standard care during the late second stage of labour in the Oneplus trial.
Methods	Multicentre randomised controlled trial (n=2221). Women were randomly assigned to be assisted by one by or two midwives during the late second stage of labour in the Oneplus trial. One month after birth women received a study specific questionnaire. Inclusion criteria were women opting for their first vaginal birth, ≥ 37 gestational weeks with a singleton pregnancy. Women's experiences were measured using Likert scales and analysed according to intention to treat.
Results	The total response rate was 78.5%. There were no significant differences in women's experiences of pain, feelings of vulnerability or of being in control and the length of the second stage. Women who were randomised to two midwives agreed to a lesser extent that they could handle the situation. The mean difference was small.
Conclusion	The similar results between the groups, imply that collegial midwifery assistance is acceptable to women. This is of importance as the intervention reduces severe perineal trauma.

Study IV. Informed consent to midwifery practices and interventions during the second stage of labour – an observational study within the Oneplus trial	
Aim	To study informed consent to midwifery practices and interventions during the second stage of labour and to investigate the association between informed consent to these practices and interventions and women's experiences of the second stage of labour.
Methods	Observational study with data from a follow-up questionnaire sent to women one month after birth (n=2233). Women's experiences of the second stage of labour and of eight practices used during the second stage were evaluated in relation to informed consent. Analyses were performed with univariate and multivariable logistic regression.
Results	Informed consent to all practices was reported by 17.6% of the women. Informed consent was found to be associated with more positive experiences of the second stage of labour and with less discomfort and/or pain from interventions involving physical penetration of the genital area..
Conclusion	Informed consent during the second stage was associated with feelings of safety and of being in control. The results emphasize the need for taking further action to enhance midwives' knowledge and motivation in obtaining informed consent prior to performing interventions.

Abbreviations

BMI	Body mass index
CMA	Collegial midwifery assistance
CTG	Cardiotocography
DAG	Directed acyclic graph
ICM	International confederation of midwives
MD	Mean difference
MiMo	A midwifery model of woman-centred care
M-RCT	Multicentre randomised controlled trial
OR	Odds ratio
RCT	Randomised controlled trial
SBF	Swedish Association of Midwives
SD	Standard deviation
SFOG	Swedish Society of Obstetrics and Gynecology
SPT	Severe perineal trauma
WHO	World Health Organization

Introduction

The second stage of labour has been described as the momentous culmination of the childbearing process[1] where the need for support from caregivers is enhanced.[2,3] According to the International Confederation of Midwives (ICM), the birth experience is considered as a profound and significant experience and the role of the midwife is to promote, protect and support women's human, reproductive and sexual health and rights. Furthermore, the midwife is charged with building women's self-confidence in their ability to cope with childbirth.[4]

In Sweden, midwifery care during labour and birth takes place in hospitals where midwives are independently responsible for uncomplicated normal births with assistance from a nursing assistant. Midwives are often responsible for more than one woman in active labour. In cases of complications or deviations from the normal, obstetricians assume responsibility, but the midwife remains involved in the woman's care. Care during pregnancy, birth and the postnatal period is fragmented, and the choices are few for women and midwives due to centralized care with no midwifery-led units. Almost all women in Sweden give birth in a hospital and planned homebirths are not included in the maternity care system.[5]

Sweden is one of the safest countries in the world when it comes to pregnancy, labour and birth with a low maternal mortality rate (4/100 000), neonatal mortality rate (1.3/1000) and a low rate of stillbirths (3.2/1000).[6] A drastic reduction in mortality rates has been achieved in the last century because of developments in medical treatments. The use of interventions such as caesarean sections and augmentation of labour with synthetic oxytocin have consequently increased. Medical treatment and interventions in childbirth are crucial to ensure better outcomes for women and their babies.[7] However, the World Health Organization (WHO) has raised concerns about a trend of rising childbirth interventions being used in the absence of clear indications.[7] Even though childbirth interventions are doubtlessly saving lives, they may also be harmful if used inappropriately, and could affect women's birth experiences negatively.[8-11] During the second stage of labour a variety of interventions and midwifery practices are used, however, little is known about their impact on women's experiences.

The focus of this thesis is women's experiences of the second stage of labour, interventions and midwifery practices used during birth, in particular in the second stage of labour.

Women's birth experiences

To give birth and become a mother is a profound life event and one of the most significant experiences in a woman´s life which has long-term consequences for her health and wellbeing.[12,13] According to the WHO, a positive birth experience is the primary outcome for all pregnant women.[7] The birth experience has been described as multidimensional and dependent on several factors with a relation between the outcome for the mother and baby and the birth experience.[14-16] Women tend to clearly remember their experiences of giving birth over time.[12,13,17,18] However, the experience can vary and be remembered more positively or more negatively as time passes.[16,19-21]

A positive birth experience is related to an affirmative mother-child relationship and a positive start of motherhood which has been connected to women's confidence and feelings of accomplishment.[13,22-24] Factors associated with positive birth experiences include having an uncomplicated birth, trusting relationship with caregivers, the opportunity to participate in decision-making during labour and feelings of being in charge and to have control when managing labour pain. This has further been explained as a part of experiencing own ability and strength.[25-29] In contrast, women who experience lack of emotional and practical support and loss of control could be at high risk of having a negative birth experience.[30] Furthermore, negative birth experiences are associated with medical procedures such as operative births (birth by vacuum extraction, forceps or caesarean section), epidural analgesia and augmentation of labour with synthetic oxytocin and when complications occur for the mother and child.[25,31-34]

A negative birth experience is a risk factor for developing postnatal depression, fear of childbirth and post-traumatic stress syndrome.[35-40] The birth experience has an impact on the time-interval between children and on the number of children women give birth to.[41-44] It can also impact women's preferences of mode of birth for subsequent births where caesarean sections become more common after a previous traumatic birth experience.[44,45]

Quality of care in labour and birth is most often assessed based on medical outcomes. However, it has been described that women's experience of birth as positive or negative is not necessarily connected to actual adverse events[37] and that safety and psychosocial wellbeing is equally valued by birthing women.[46] As the medical and technological focus increase, it may entail that women's experiences become overlooked. Being taken care of, feeling safe and to have supportive relationships are crucial in shaping the overall experience notwithstanding any complications.[36] Thus, even a woman who has had an uncomplicated birth, may have a negative experience if she did not feel safe and taken care of.[36]

Women's experiences of the second stage of labour

The second stage of labour has been considered the most intensive part of labour for both the mother and the baby. Changes occur in the woman's emotional state as feelings of fear and panic arise due to increased pain and labour.[1,47] Some women experience that they want to give up and express fears of death at this stage.[23] To be able to cope and to feel safe during the second stage, women have described an enhanced need for support and involvement.[3]

As the birth of the baby approaches with urges to push, women have described becoming more alert and active[23] yet also vulnerable and that the body is being ripped apart in an uncontrollable process.[48] In a qualitative study by Lupton and Schmied, women further described how they became surprised by a powerful physicality and senses that they were splitting apart as the baby protruded from the body.[48] In a another qualitative study by Anderson women reported overwhelming feelings of bulging, cracking, splitting, opening and breaking.[3] The women further described a sense of fear which became a barrier in the inevitable process of losing control that prevented them from pushing. In this vulnerable phase, the midwife was described as playing a crucial role in creating an atmosphere of safety and calm that allows the women to feel secure enough to let go.[3] However, there is little knowledge about women's experience during the second stage of labour and how midwifery practices may affect these experiences.[49]

Woman-centred care

Woman-centred care is a central concept for midwifery that carries a holistic philosophy of care.[50] In the ICM core document, it is stated that midwifery care is based on the philosophy that childbearing is a profound experience for the woman and her family, which carries a significant meaning.[4] Furthermore, midwifery care takes place in partnership with women, recognising the right to self-determination, and is respectful and personalised.[4] The WHO's recommendations for intrapartum care emphasizes the significance of woman-centred care to enhance women's experiences of labour and birth by a holistic, human-rights-based approach.[7] An essential element of woman-centred care is the woman's right to have choice and control in decision-making. To facilitate decision-making, the woman should be offered evidence-based information and knowledge in combination with respectful communication based on mutual participation.[51] Woman-centred care implies a focus on the woman's individual needs and expectations and not those of the institution or the professionals. Another important component is continuity of care throughout labour and birth by a known caregiver as the building of partnership and relationship is a central aspect of woman-centred care.[50] Although woman-centred care can be practiced in all birth settings, those that are dominated by medical care

with lack of time to establish relationships, and routines that hinder the woman's own choice, are identified as barriers to the key principles of woman-centred care.[52]

Different theoretical models in relation to midwifery care exists. Depending on countries and settings, various models have been developed. One model that has been developed in a Nordic context to improve midwifery care, is a midwifery model of woman-centred care (MiMo).[53]

A midwifery model of woman-centred care (MiMo)

MiMo is a woman-centred theoretical and evidence based midwifery model of care which seeks to involve the woman in the care, to support normal birth and focus on aspects of the relationship between the midwife and the woman.[53] The model is based on a synthesis of twelve qualitative studies with focus on either women's or midwives' experiences of birth and care during birth.[53]

The model includes three central themes, that are intertwined in the middle (Figure 1). The central theme of a *Reciprocal relationship*, involves being present with the woman, focusing on the first encounter, to give and receive information, affirming the woman's wishes, being available and participating throughout the birth according to the needs of the woman and her partner. The theme of a *Birthing atmosphere* involves observing the birth and provide safety for the woman and to support normality. To have focus on a calm environment, sharing responsibility, building trust and allowing the woman to feel safe and in control of her own environment are fundamental to a birthing atmosphere. The theme of *Grounded knowledge* describes the midwives' embodied knowledge that is essential in the care of the woman. It includes theoretical, practical, and intuitive knowledge. The midwife can assess embodied knowledge in the relationship with the woman and use it when cooperating with other health professionals.

Two themes surround the central themes; *Cultural context* and a *Balancing act* that includes both promoting and hindering norms for conducting a woman-centred care.[53] The different norms within the context requires the midwife to perform a balancing act between organizational demands and meeting the individual needs of the woman to maintain woman-centred care.

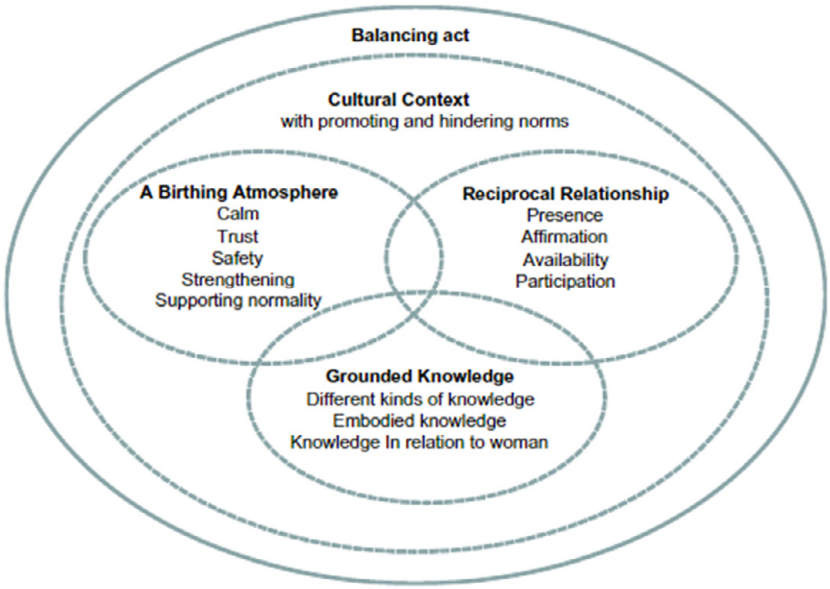


Figure 1. A midwifery model of woman-centred care (MiMo)[53] (p. 83)

Physiology of birth

Normal birth

The role of the midwife is crucial in providing support for normal birth.[54] Promoting normal birth is a central aspect of midwifery care as the philosophy is that birth is a normal, physiological life event.[55] The care from the midwife can strengthen the woman and enhance her belief in her own capability by creating safety and making her feel cared for.[56] According to the Lancets series on midwifery, the most important factors in promoting normal birth are preventive and supportive care provided by midwives.[57]

Consensus is lacking regarding the definition of normal birth. The WHO defines normal labour and birth as a low-risk singleton pregnancy with a spontaneous onset of labour between 37+0 – 41+6 gestational weeks with one foetus in the vertex presentation. The pregnancy is low risk at the start of labour and remains so throughout labour and birth. The baby is born spontaneously and after the birth, mother and baby are in good condition.[58]

The definition used by ICM is where the woman commences, continues and completes labour with the baby being born spontaneously at term in the vertex presentation without any surgical, medical, or pharmaceutical intervention.[59]

In Sweden, criteria for normal birth largely corresponding to those laid out by the WHO, which were last summarised in a state-of-the art document in 2001.[60] The document does not state whether interventions such as augmentation with synthetic oxytocin and epidural analgesia should be included in the definition of a normal birth. However, new national guidelines for care during labour and birth are currently being developed by the Swedish National Board of Health and Welfare.

An increased use of interventions in childbirth has challenged the debate of how to define normal birth. It has been suggested that women's own perspectives may be used in defining normality, taking into account outcomes such as maternal and neonatal wellbeing, own capacity and self-efficacy.[56]

Endogenous oxytocin

The physiological process of birth is influenced by several hormones. One of the main hormones is endogenous oxytocin which plays an important role by stimulating the frequency and intensity of uterine contractions. This in turn contributes to the dilation of the cervix and the descent of the foetus. Endogenous oxytocin is produced in the hypothalamus and pulsatile released into the blood circulation, activated by parasympathetic fibres from the uterus to the brain.[61] The rise of levels of oxytocin during birth has been shown to increase three to four-fold as labour progresses. Maximum levels occur during the second stage of labour when the foetal head is pressed down against the cervix and the vaginal wall, which causes an effect that increases oxytocin release, known as the Fergusons reflex.[61]

Endogenous oxytocin not only stimulate labour contractions, but it also lowers stress and pain levels, enhances emotional well-being, and prepares the woman for motherhood by making her relaxed and happy when meeting the baby after birth. However, if the stress system becomes high, the sympathetic nervous system may be activated, causing lower levels of oxytocin and prolonged labour.[61] Physical contact, encouragement, a calm environment, and safety are known to increase levels of endogenous oxytocin thus helping women to feel trust in their own ability by reducing stress, anxiety and pain in labour.[2] This is further associated with childbirth satisfaction. Research suggests that effects induced by endogenous oxytocin during birth could have long-lasting consequences. Endogenous oxytocin has amnesic effects which may reduce memories of the intensity of labour in the days after birth.[2,61]

The progress of labour

Labour is usually divided into three stages.[7] The first stage of labour is characterized by effacement and dilation of the cervix and ends at full cervical dilation. The second stage is the time period from full cervical dilation until the birth of the baby, and the third stage includes the birth of the placenta.[7]

The first stage of labour

The first stage of labour is divided into the latent phase and the active phase. The latent phase is characterized by painful, irregular uterine contractions with slow cervical effacement and dilation of up to 5 cm.[7] The median duration of this phase has been reported as being between 6-7.5 hours for nulliparous women with spontaneous onset of labour.[62] In the active phase, the contractions are longer, more intense and the change in cervical dilation and foetal descent is more rapid.[7] The duration of the latent as well as the active phase, depends on the starting reference point of the active phase. A systematic review by the WHO reported the median duration of the active first stage as ranging between 3.7-5.9 hours when the starting reference point was 4 cm cervical dilation and as 3.8-4.3 hours with 5 cm as the starting reference point.[62] However, findings reported by Zhang et al showed an individual transmission to the active phase, between 3 and 5 cm for most women and that the progress during the active first phase varies between women.[63,64] The threshold used to categorize the active phase is important for determining the level of care.[62,65-67]

The second stage of labour

The second stage of labour is often described as a continuous phase, starting at full cervical dilation and ending with the birth of the baby. However, it has been suggested that the second stage could be divided into two phases.[68,69] The passive phase includes descent and rotation of the presenting part in the maternal pelvis until it reaches the pelvic floor. It is followed by the active phase, also called the expulsive phase, when uterine contractions leading to an involuntary urge to bear down and includes the birth of the baby.[69] In the expulsive phase, the contractions are longer and more frequent than in the passive phase, causing a reduction of uteroplacental circulation.[70,71] Different guidelines suggest different timelines for normal length of the second stage of labour. According to the WHO, it is considered normal for nulliparous women to have a second stage of labour up to 3 hours, while parous women have up to 2 hours.[7] The National Institute for Health and Care Excellence (NICE) in the United Kingdom, proposes time limits of two hours of active second stage for nulliparous women.[69] This duration may be extended however based on individual circumstances such as foetal malposition or the use of epidural analgesia.[72] There is no clear definition of prolonged passive phase of the second stage of labour, and the optimal length is unknown.[68] However, Bjelke et al defined

prolonged passive second stage as ≥2 hours and reported an incidence of 38% among nulliparous women.[68]

The division of birth into stages and phases does not necessarily correspond to how labour is perceived by women. The urge to bear down may or may not appear at full cervical dilation and women may experience an urge to push before the cervix is completely dilated.[73]

Different definitions for the onset of the active phase of labour are used in local and national guidelines. The guidelines have been updated in recent years and include descriptions of cervical dilation as well as other parameters such as cervical effacement and the frequency of contractions. In 2021 the Swedish association of Midwives (SBF) and the Swedish society of Obstetrics and gynaecology (SFOG) assumed a new definition of the active phase of labour. The current and previous Swedish definitions and definitions from the WHO, the American College of Obstetricians and Gynaecologists (ACOG) and NICE guidelines are shown in table 1.

Table 1. Current and previous definitions of the active phase of labour

	Sweden	**WHO**	**ACOG *(American College of Obstetriciams and Gynecologists)***	**NICE Guidelines, United Kingdom**
Current guidelines	Regular painful contractions and cervical dilation of 5 cm (2021)[74]	Regular, painful uterine contractions, a substantial degree of cervical effacement and more rapid cervical dilatation from 5 cm until full dilatation for first and subsequent labours (2018)[7]	Cervical dilation of 6 cm (2014)[72]	Progressive cervical dilation from 4 cm cervical dilation. (2014)[69]
Previous guidelines	Two of three criteria are met: -2-3 contractions in 10 minutes -Ruptured amniotic membranes -Cervix ≥ 4 cm dilation or cervix effaced and ≥ 1 cm dilation. *In addition to these criteria, a progress should be seen in the following two hours* (2015)[75]	Cervical dilation of 3 cm (1994)[76]	Cervical dilation of 3-4 cm (2003)[77]	

Prolonged labour

Prolonged labour refers to a slower progression of labour than what is considered normal. Prolonged labour is also described using the terms delayed labour, labour dystocia, arrested labour and failure to progress.[78] There is however a lack of consensus regarding a definition of normal progress and duration of labour.[7,79] The WHO defines prolonged labour as when the active phase of labour lasts for over 18

hours.[80] The National Swedish recommendations[79] defines prolonged labour as shown below. The definition is also an indication for augmentation of labour if one of the conditions are met. However, this definition of prolonged labour has not been updated since 2011.

> *Expected normal progress during the active phase of the first stage of labour (mean cervical dilation 1 cm/h) is protracted by 3 hours.*
>
> Or
>
> *Expected normal progress during the second stage of labour has ceased for at least 1 hour during the descending phase, or for 30 minutes during the expulsive phase.*

A partogram is a graphical instrument used to visualize the progress of labour. It allows midwives and obstetricians to plot the cervical dilation and the descent of the foetal head.[81] The criteria for normal labour progression in the first stage of labour used in the partogram were first suggested by Friedman in the 1950's, and later by Philpott & Castle, to include cervical dilation of a rate of 1 cm per hour.[82,83] This rate corresponds to the alert line in the partogram.[7] An action line is placed after the alert line to be able to detect deviations from normal progress. If the action line is crossed, treatment of slow labour progress is recommended. The placement of the action line varies between 2-4 hours after the alert line. In the Swedish partogram an action line is placed three hours after the alert line, accompanied by guidelines for interventions as shown above.[79]

In 2010 Zhang et al stated that the progress of labour is not a linear process and that the progression of labour could be much slower up to 6 cm cervical dilation, but faster after 6 cm, suggesting that the caesarean section rate due to prolonged labour could be lowered.[63] More recently, Lundborg et al found that labour progression during the first stage varies widely and that the progress can be both faster as well as significantly slower than 1 cm per hour.[84]

Prolonged labour mainly affects nulliparous women.[85,86] A Danish multicentre study including women with spontaneous labour onset found that 37% of nulliparous women had a prolonged labour[87] but evidence is varying between one in five women up to 44%.[86,88,89] Additional factors associated with prolonged labour are high maternal age, short stature, gestational diabetes, hypertensive disorder, birth after 41+6 gestational weeks, high BMI, use of epidural analgesia, birth weight over 4000 gram, abnormal vertex presentation, induction of labour, premature rupture of membranes, prolonged latent phase and fear and stress during birth.[86,90-104]

Prolonged labour has been associated with an increased risk of interventions and complicated births such as caesarean section, severe perineal trauma, low apgar scores, maternal and neonatal infections and increased postpartum haemorrhage.[87,105-109] In Sweden the rate of caesarean sections has risen from 5% in 1973 to 18.6% in 2021.[6,110] Caesarean section is associated with maternal morbidity,

extended post-partum recovery, challenges in establishing breast feeding and increased need for neonatal care.[111-113] Furthermore, caesarean section is strongly related to complications in subsequent pregnancies and births.[113,114] In 2015 the WHO stated that caesarean section rates higher than 10-15% are not associated with reductions in maternal and neonatal mortality rates.[115]

Studies regarding the duration of labour and women's birth experiences have shown various results. Quantitative studies using the Childbirth experience questionnaire (CEQ), and the CEQ 2, found that women with labours >12 hours had an increased risk of a negative birth experience[32,116-119] In a study by Kempe and Vikström-Bolin, women who rated their birth experiences shortly after the birth on a visual analogue scale, showed that women with labours >12 hours scored lower than women with shorter labours.[120] A cross-sectional study including survey results from 829 women, showed that the incidence of a negative experience was significantly higher among women with a prolonged labour. However, the factor contributing most to a negative experience was caesarean section.[88] A qualitative study by Nystedt et al reported on negative experiences connected with prolonged labour that significantly impacted the transition to motherhood and the women's ability to be emotionally available for the new-born. The authors suggested that prolonged labour is a challenge for caregivers and that improvement of the quality of care to these women is needed.[121]

When studying the treatment of slow progress in labour, Bergqvist et al found no differences in women's birth experiences when they were randomly assigned to receive early treatment with oxytocin as opposed to those who were randomly assigned to a three hour postponed treatment. However, operative births were connected with more negative experiences in both groups.[122] Gaudernack et al used the CEQ to determine the impact of prolonged labour on birth experience and the wish for caesarean section in subsequent pregnancies. The result showed that women with labours >12 hours were at risk of having a negative birth experience, but longer labours did not predict a wish for caesarean section in a subsequent pregnancy. However, operative birth, which is strongly connected to long labours, were a risk factor for a later wish for caesarean section.[123]

Women's experiences of a prolonged second stage of labour have been scarcely investigated. A recent Swedish unpublished qualitative study on women's experiences of a prolonged passive phase of the second stage found that some women had self-reliance in their body's capacity to give birth, while others experienced loss of control, mistrust, and doubt in their ability to give birth.[124]

Interventions in childbirth

Obstetric interventions have been defined as therapeutic measures taken to safeguard or improve the health of the pregnant woman and the fetus.[125] As a consequence of growing knowledge about how to induce, accelerate and control the physiological labour process, an increased use of interventions in labour and birth has been seen worldwide.[8]

The trend of rising rates of childbirth interventions in recent years has been identified as a clinical area of concern and the WHO recommends avoidance of interventions without a clear indication.[8,126] Interventions such as caesarean section are doubtlessly beneficial and life-saving when they are truly required but are potentially harmful if used inappropriately, a practice referred to as over-medicalisation.[8-11] In 1996 the WHO stated, that the aim of intrapartum care is a healthy mother and child and a positive birth experience for the women, with the least possible level of intervention compatible with safety.[58] A minimum of interventions in intrapartum care is connected with a positive birth experience.[28]

"Too little, too late – too much, too soon" is a concept that was coined in the Lancet series of midwifery.[8] It refers to two extremes found in the organisation of maternity care worldwide. "Too little, too late" signifies the risk faced by women in low-income countries that lack resources, as they are not provided with the required care, resulting in high morbidity and mortality rates. In high- and middle-income countries the opposite occurs and is referred to as "too much, too soon". This describes an overuse of interventions in normal pregnancies and births, leading to an increased risk of complications for women and their babies.[8] Every intervention carries a risk of negative effects, which can in turn trigger the need for additional interventions which can cause further risks and negative effects. As one intervention is often followed by another intervention, this can result in what has been referred to as the "cascade of interventions".[127] This approach could undermine the woman's own ability to give birth and negatively impact her experience.[128]

In 2005, Van Teijlingen presented two contrasting schools of thought on pregnancy and childbirth - the medical model and the social model.[129] In brief, the medical model emphasizes the potential risks associated with birth and pregnancy, while the social model considers pregnancy and birth as normal life events. In the medical model, the emphasis is on risk and reducing risk and the woman is considered as a passive part. It promulgates the idea that normal births require medical control and monitoring, allowing for early interventions in case of signs of pathology. The medical model does not see risk selection as possible. On the contrary, the social model takes on a woman-centred ideology with focus on normality and social support, where the woman is involved as an active part. The social model considers birth as a natural event where most women will have a normal and safe childbirth without the need for medical interventions, and that women at risk can be identified.[129]

It has been suggested that there is a need to identify and highlight aspects of care that optimise, but not disturb, the physiological processes during childbirth.[130]

Synthetic oxytocin

Infusion of synthetic oxytocin is used to induce or augment labour, to treat prolonged labour and also to prevent and treat postpartum haemorrhage.[131,132] Augmentation with synthetic oxytocin is a very common intervention, used in more than half of labours around the world, and is the most common obstetric intervention in Sweden.[110,132] In line with other obstetric interventions, there is large variation in its use among different Swedish hospitals. According to the Swedish pregnancy register, the rate of augmentation with oxytocin differed between 46% and 70% for primiparous women with a spontaneous onset of labour in 2021.[110]

In a Cochrane review by Bugg et al the potential effect of synthetic oxytocin on natural childbirth, was evaluated. The authors concluded that labour duration was shortened in women who were treated with synthetic oxytocin early in labour.[133] However, the exact extent to which it affects labour duration is not fully known due to variations in individual response. Uvnäs-Moberg et al suggested that long-term exposure to synthetic oxytocin might lead to reduced uterine contractility as oxytocin receptors may be desensitised.[61] According to the review by Bugg et al, augmentation with synthetic oxytocin did not improve outcomes for women and babies or reduce the rate of caesarean sections.[133]

Infusion with synthetic oxytocin does not fully replicate the endogenous oxytocin. It does not have the same positive effects on maternal mood and behaviour since it does not pass the blood brain barrier from the circulation.[61] Furthermore, it may cause longer and more painful contractions compared to normal labour, especially at high doses.[61] High doses of synthetic oxytocin during labour, can result in very frequent or prolonged contractions that can increase the risk for the foetus due to reduced uterine blood supply during contractions.[134] Synthetic oxytocin has been classified as a high alert medication in the USA[135] which may cause adverse neonatal outcomes such as asphyxia and acidaemia at birth if used inappropriately.[136,137] Despite the negative side-effects, a trend of increased use of oxytocin use has been seen worldwide.[132]

Prolonged labour tend to be over-diagnosed meaning synthetic oxytocin is often administered despite normal progress in labour.[138-141] In a Norwegian study by Bernitz et al including 327 women who received augmentation with oxytocin, 42% of the women did not fulfil the criteria for labour dystocia when the infusion was initiated.[138] A Swedish observational study showed that synthetic oxytocin for augmentation during labour was used in an unstructured manner.[140]

According to a recent review, the use of synthetic oxytocin should be limited to situations where the intervention clearly will do more good than harm, suggesting a conservative use at lowest possible infusion rates.[134]

Midwifery practices and interventions during the second stage of labour

During the second stage of labour, midwifery care aims to optimize women's birth experiences by working in partnership with women, providing continuous support and focusing on the woman's individual needs and preferences in accordance with the concept of woman-centred care.[3,57] When making a decision about intervening in the second stage of labour, several factors need to be considered. These include parity, maternal and foetal status, women's preferences and the effects of epidural analgesia.[1] However, evidence is lacking relating to the use of woman-centred practices during the second stage of labour.[49]

Prevention of perineal trauma

During the active phase of the second stage of labour, prevention of perineal trauma is of utmost importance as the most severe form of perineal trauma, affecting the anal sphincter complex, may cause both short- and long term morbidity in affected women.[142-145] Severe perineal trauma (SPT) is a major global issue including physical morbidity such as pain, anal incontinence, and dyspareunia.[142,143] Psychologically SPT can have a profound impact on women's quality of life after giving birth by causing distress, changes in self-identity and affecting their relationships with partners.[144,146-148] Severe perineal trauma affected 3.7% of first time mothers with a spontaneous vaginal birth in Sweden in 2021.[110] In 2018 the Swedish Agency for Health Technology Assessment and Assessment of Social Services identified priority research areas for the prevention of maternal birth injuries.[149] The group concluded that it was necessary to acquire more knowledge regarding methods for preventing perineal trauma and asserted that the focus should extend beyond specific outcomes to consider the overall effect on the woman. Furthermore, it stressed the importance of implementing effective preventive strategies.[149] During the second stage of labour, several midwifery practices and interventions are used to prevent perineal trauma but also to facilitate birth and to accelerate labour. Below is a description of midwifery practices and interventions that are being investigated within this thesis. It is important to note that each practice and intervention has its benefits and disadvantages.

Midwifery practices to prevent perineal trauma during the second stage of labour

Warm packs

The midwifery practice of holding warm packs at the perineum is a standard technique for pain relief and for minimizing perineal trauma that is also highly acceptable by women.[150,151] There is high level evidence that this practice significantly reduces the incidence of SPT.[152]

Manual perineal protection

A variety of different techniques for manual perineal protection exists, including multifactorial models, such as the Finnish intervention[153] and the MIMA prevention model.[154] These models are used in many birth settings in Sweden, and include not only manual perineal protection, but also communication with the woman in order to achieve a slow birth of the baby to allow the perineum to stretch. In a meta-analysis by Aasheim et al, eight randomised controlled trials were evaluated regarding techniques used to prevent perineal trauma. The use of hands-on or hands-off perineal protection showed no difference in the incidence of SPT.[152] Even though the hands-on technique was not shown to be protective in the meta-analysis by Aasheim et al, other non-randomised trials have shown an association with less SPT[155] and the practice is recommended for all births in Sweden.[156]

Massage of the perineum

Massage of the perineum during the second stage of labour with lubricant or oil is a recommended method to reduce perineal trauma.[7] In a meta-analysis including 3374 women, perineal massage was found to have a significant association with an increased rate of intact perineum and a decrease in SPT and episiotomy rates.[157] The reduction in SPT was also shown in a Cochrane review including over 15 000 women.[152] Some women may appreciate the technique while others can experience it as painful and embarrassing.[7]

Collegial midwifery assistance

Collegial midwifery assistance (CMA) is a practice that has been adopted in many Swedish obstetric units. A rise in the incidence of SPT in Scandinavian countries in the early 2000s,[158] led to quality improvement initiatives aimed at reducing the occurence.[156] One initiative adopted in many labour wards was to implement CMA. The practice involves the attendance of a second midwife at the last phase of the second stage of labour with the purpose of reducing perineal trauma. The effectiveness of the practice was evaluated in a multicentre randomised controlled trial, the Oneplus trial.[159] The trial was conducted at five Swedish obstetric units between 2018 and 2020, where 3059 women were randomly assigned to either being assisted by one or by two midwives (CMA) during the late second stage and gave birth spontaneously. The hypothesis was that CMA during the last phase of the

second stage of labour in spontaneous vaginal birth, with the purpose of preventing SPT, would result in a lower incidence of SPT than if attended by one midwife.[159] The midwives at the participating obstetric units were instructed to work according to existing models to prevent SPT, and that the second midwife should assist the midwife responsible for the birth if asked to. The result showed a 30% lower incidence of SPT in women randomised to receive CMA.[159]

In the trial, the mean time for the second midwives to be present in the birthing room was 15 minutes. The most common support was just to be present in the room, followed by the provision of active support which included communication with the woman, interpretation of cardiotocography (CTG) patterns, giving feedback on methods to prevent perineal trauma or assisting with manual perineal protection.[159]

A qualitative study that was carried out to explore midwives' experiences of CMA, concluded that the practice is multifaceted and influenced by factors such as workplace norms, culture and personal relationships.[160] The midwives in the study experienced that some women were easily disturbed and physically affected when the second midwife suddenly appeared.[160] Midwives experiences of the interventions were further explored in a quantitative study involving responses from 1430 midwives.[161] The results showed that a majority of the primary midwives felt confident and positive toward the practice. Experience of the intervention as positive was further associated with time spent together with the second midwife in the birthing room. Midwives with less than 2 years' work experience were more likely to feel confident and to experience the practice as positive.[161] Women's experiences of CMA are under analysis within the research project.

Interventions during the second stage of labour

Vaginal examinations

Vaginal examinations during labour are used to assess labour progress with a recommended interval of four hours in the first stage of labour according to the WHO,[7] but in many contexts it has become a more frequently used routine intervention.[9,162] The NICE guidelines suggest that vaginal examinations should be offered every hour in the active second stage of labour or according to women's wishes.[69] In addition they emphasize the importance of making sure that the examination is necessary and will add information that is important for the decision-making process. Research has shown that most women are satisfied with their experiences of vaginal examinations[163] and that some women may request vaginal examinations because they want to know what is happening to their bodies.[73] However, some women may have more negative experiences of the intervention such as discomfort and feelings of being exposed and out of control.[164-166] The experience of vaginal examinations has also been associated with more negative

experiences as the number of examinations and the number of caregivers performing the examinations increase.[162]

Levator pressure

Levator pressure is a method that has been scarcely investigated but was described by Edqvist et al as a vaginal examination involving stretching of the perineum and applying pressure to stimulate the Ferguson's reflex.[167] It is used to enhance maternal pushing efforts during the second stage of labour.[167] In a cohort study reporting on the prevalence of SPT no associations were found between digital stretching of the vagina and SPT.[168]

Catheterization of the bladder

Catheterization of the bladder is often used during labour due to voiding difficulties. A prolonged labour, epidural analgesia and primiparity are factors associated with urinary retention.[169] As urinary retention entails a danger of an overdistended bladder which has the potential to cause persistent urinary retention and irreversible damage to the bladder,[170] it is of great importance to offer catheterization of the bladder to women with voiding difficulties during labour. There is a lack of knowledge regarding women's experiences of catheterization during labour. However, a Turkish study of 242 women, found that catheterization of the bladder during labour was associated with post-traumatic stress syndrome.[164]

Fundal pressure

Fundal pressure means manual pressure applied to the upper part of the uterus, in the direction of the vagina to push the foetus further down in the birth canal with the intention of accelerating the time to a vaginal birth and reducing the need for an instrumental birth.[171] However, a Cochrane review from 2017 found no difference in mode of birth or duration of the second stage of labour for women who received fundal pressure.[171] A systematic review by Farrington et al concluded that the procedure has no evidence or benefit and that it may cause harm to women and their babies.[172] In other studies the method has been associated with women's dissatisfaction with the birth experience and SPT and it is not recommended.[7,173,174]

Episiotomy

Episiotomy is a surgical cut to the woman's perineum to facilitate birth by enlarging the diameter of the vaginal outlet.[175] Rates of episiotomy vary across Europe from 3.7% in Denmark to 75% in Cyprus.[176] In Sweden, the use of episiotomy was 6.9% for primiparous women with a spontaneous vaginal birth in 2021.[110] The authors of a Cochrane review on episiotomy in vaginal birth, found no evidence for a routinely use,[177] and Begley argued that the intervention should be viewed as interference when used routinely or too frequently.[10] A restrictive approach is suggested in Sweden, and only recommended to be performed in the occurrence of foetal

distress.[156] A longitudinal cohort study from the United Kingdom found that episiotomy was associated with decreased sense of control and negative birth experiences.[178] Additionally, it has been reported that women have experienced lack of information about the procedure and have not been given the option to decline it.[179,180]

Informed consent and shared decision-making

Consent to care during childbirth, and access to information, are fundamental rights for birthing women[181,182] and important principles of woman-centred care.[54,183] There is a substantial body of evidence that the woman's participation in decision-making, along with behaviours and attitudes of caregivers have a more powerful influence on women's childbirth experiences than other factors such as labour pain and medical interventions.[184-186] The woman's involvement in the decision-making process is further connected with empowerment and feelings of being in control,[187] whereas a lack of participation and not being given the opportunity to consent to procedures performed by caregivers, has been shown to contribute to a negative or traumatic birth experience.[31,188] There has been growing focus in the last decade to situations during childbirth where informed consent to the use of interventions is lacking and where women's autonomy has been disregarded.[126,180,189-191]

Informed consent is defined as "A competent individual's intentional and voluntary authorization of a medical intervention, given through a process in which a health care provider discloses information regarding the risks and benefits of the proposed intervention."[192] Informed consent to care during childbirth is a legal requirement in most countries,[182] including Sweden, where it has been regulated in the Patient act since 2014.[193]

As informed consent implies that the women makes her own decision based on information provided by the caregiver, the concept of shared decision-making rather proposes an approach whereby the caregiver and the patient share the best available evidence when decisions need to be made, and where the patient is supported to consider options.[194]

Rationale

A positive birth experience is of utmost importance for women as giving birth and becoming a mother are significant events in a woman's life. The second stage of labour has been referred to as the momentous culmination of the birth process with an increased physical intensity for the woman giving birth. However, women's experiences of this stage are scarcely investigated. During the second stage, a variety of practices and interventions are used to facilitate the process of birth and to prevent perineal trauma. Given the wide use of interventions and practices during the second stage of labour, there is a need to investigate how they impact women's experiences. Research is also needed on whether provided informed consent during the second stage of labour has an impact on the experience.

Augmentation with synthetic oxytocin is the most common medical intervention in obstetric care and has been described as being overused in many settings. As the use is widespread, there is a need to understand how the management of the infusion is affecting the mode of birth in first time mothers. This is because the mode of birth affects the birth experience and is of importance for women's forthcoming pregnancies and births.

Aims

Overall aim

The overall aim of this thesis was to explore women's experiences of the second stage of labour, midwifery practices and the use of interventions.

Specific aims

Study I

To describe the use of oxytocin and to compare mode of birth in Robson group 1.

Study II

To explore women´s experiences of the second stage of labour in spontaneous vaginal birth.

Study III

To compare experiences of the second stage of labour between women assigned to collegial midwifery assistance or to standard care during the late second stage of labour in the Oneplus trial.

Study IV

To study informed consent to midwifery practices and interventions during the second stage of labour and to investigate the association between informed consent to these practices and interventions and women's experiences of the second stage of labour.

Methods

Study design

Overview of the papers

This thesis involves four different study designs. **Study I** is a quantitative retrospective cohort study, analysing data obtained from medical records. **Study II** is a qualitative interview study using thematic analysis based on descriptive phenomenology. **Study III** is a randomised controlled trial (RCT), and **study IV** is an observational study within an RCT. An overview of the papers included in the thesis is shown in Table 2.

Table 2. Overview of the four papers included in the thesis

Study	Design	Data collection	Sample/participants	Data analysis
I	Retrospective cohort study	Review of medical records	724 medical records from women in Robson group 1	Descriptive and comparative statistics
II	Qualitative	Individual interviews	21 women with a spontaneous vaginal birth	Thematic analysis based on descriptive phenomenology
III	Randomised controlled trial	Questionnaires	2221 women	Descriptive and comparative statistics
IV	Observational	Questionnaires	2233 women	Descriptive statistics, univariate and multivariable logistic regression

Epidemiological aspects

Epidemiology is a quantitative discipline used to describe and analyse determinants of health and disease.[195] It is related to demography and relies on statistics, probabilities, comparison of relations between groups and testing hypotheses.[195] The epidemiological approach is common in medical research, public health research and in research within the health sciences.[196] One example of an epidemiological research method is when a medical outcome is compared between exposed and unexposed groups while adjusted for explanatory variables such as sociodemographic factors.[196] There are two different types of epidemiological studies; observational and experimental. In the observational design, the researchers observe exposures and outcomes in a population, which is mainly performed in a

cohort study or a case-control study.[195] An experimental study is often a randomised controlled trial, which is used to study causal relationships between interventions and outcomes. A randomised controlled trial (RCT) is suggested to provide the most rigorous method to minimise factors influencing the outcome.[197,198]

In this thesis, both observational and experimental methods were used. **Study I** is a retrospective cohort study which is a type of observational study[195] where mode of birth was compared according to administration of augmentation with synthetic oxytocin. **Study III** and **IV** are follow-up studies exploring secondary outcomes within a multicentre RCT, the Oneplus trial.[199] **Study III** has a randomised design and **Study IV** is a study with an observational design.

Using a questionnaire to investigate experiences

Measuring experiences in a clinical trial enables the researchers to compare experiences among those who were exposed to an intervention with those who were not exposed. Since respondents differ in ability to read and perceive a text, it is important to use questions that are comprehensive and easy to understand. Quality in questionnaires can be assessed through psychometric evaluation. However, sometimes there is a need for questions regarding a specific context, where no validated questionnaires are suitable, and a more pragmatic approach is therefore needed.[200]

Intention-to-treat

The intention-to-treat (ITT) analysis is acknowledged as the most appropriate approach for analysing outcomes in an RCT. The ITT includes participants in the groups they were originally randomized to, regardless of adherence to the allocated intervention or treatment.[201] The ITT ignores any deviations from protocols and noncompliance. The analysis thereby acknowledges that deviations from protocol and noncompliance will be likely in clinical practice and therefore avoids estimating the efficacy of the treatment without considering these factors.[201]

Thematic analysis based on descriptive phenomenology

Study II is a qualitative interview study using thematic analysis based on descriptive phenomenology and has an inductive approach. A descriptive approach with focus on lived experiences was chosen, as described by Sundler et al.[202]

Husserl (1859-1938) was an important philosopher for the foundation of modern phenomenology. Husserls idea of "going to things themselves", is fundamental in phenomenology, and means to focus on the studied phenomenon rather than rely on scientific theories.[203] The descriptive approach in phenomenology finds its roots in Husserl's writings and was later developed by Merleau-Ponty. Thematic analysis based on descriptive phenomenology focuses on lived experiences, referring to our

experience of the world, and is understood from a lifeworld approach as described by Husserl.[202,203] The lifeworld is the foundation for the understanding of lived experiences. To understand our experiences in the lifeworld, they need to be seen in the light of the body and lifeworld of a person. This means, one cannot reduce humans to a biological or psychological being. Phenomenology and the lifeworld are about gaining deeper understanding of individual experiences.[203]

Sundler et al suggest that the research process is guided by the methodological principles of emphasizing openness, questioning pre-understanding and adopting a reflective attitude.[202] This approach shares similarities with the approaches of Dahlberg et al[203] and is further discussed under methodological considerations.

Participants and data collection

Study I

Study I included all women in Robson group 1[204] who had given birth at a University hospital in the south of Sweden between January and October 2017 (n=767). The women were identified through medical birth records. Robson group 1 include nulliparous women with a singleton pregnancy at or beyond 37 gestational weeks, a spontaneous onset of labour and a foetus in the vertex presentation.[204] Exclusion criteria were severe maternal or foetal diseases that may have affected the birth process, malposition as indication for caesarean section, stillbirths, intrapartum fever and assisted vaginal births and caesarean sections for foetal indication in women without augmentation with oxytocin. All medical records from women giving birth in Robson group 1 were reviewed. Twenty-four women met one or more of the exclusion criteria and were excluded. Criteria considered at the review were the current criteria in Sweden in 2017 for the start of the active phase of labour[75] as shown in table 1. National and local guidelines for augmentation with oxytocin were considered for assessing administration of oxytocin. The management of synthetic oxytocin infusions were assessed retrospectively during the data collection. All medical records were closely scrutinized by reviewing partograms, journal entries and CTG patterns. Local guidelines suggested 20 minutes intervals between increases of oxytocin infusion. However, intervals of 30 minutes were considered adequate, due to the uncertainty of documentation.

Nineteen women were initially included after being diagnosed with spontaneous onset of labour by their midwives. However, following a review of their medical records, it was evident that those women had their labours stimulated by an amniotomy or by augmentation with synthetic oxytocin prior to the active labour phase. As a result, they were considered to have been induced and were therefore excluded.

The final group was stratified into two groups where one group consisted of women who gave birth spontaneously without augmentation by synthetic oxytocin. The other group included women who had their labours stimulated with synthetic oxytocin during labour. This group was further divided into three groups; those who had given birth vaginally, those who had an assisted vaginal birth (births by vacuum extraction or forceps) and finally those who gave births by caesarean section.

Study II

Data were based on interviews with 21 women ranging in age from 24 to 37 years of age with various educational levels. The inclusion criteria for participating in the study were a spontaneous vaginal birth at or beyond 37 gestational weeks. In order to ensure variation among the participants and their experiences, a purposive sampling method was used. Recruitment took place firstly at two different university hospitals during the women's postnatal stay, either by a researcher or a midwife in the ward. Moreover, women were recruited through a follow-up questionnaire used in the Oneplus trial,[159] where women could state whether they were interested in participating in an interview. Thirteen women were recruited from the university hospitals and eight women were recruited through the follow-up questionnaire.

The interviews were conducted between March 2019 and January 2020, approximately one to three months after the women had given birth. The interviews took place in the private homes of the women, except one who preferred to be interviewed at the hospital. The first author, CH, interviewed seventeen women, the last author, ME, interviewed three women, and one woman was co-interviewed by CH and ME. The duration of the interviews ranged between 20 and 82 minutes. The women experienced the duration of the second stage of labour between two contractions and seven hours.

As the thematic analysis was underpinned by a phenomenological perspective, which requires rich and nuanced data, three pilot interviews were conducted to assess whether this design was appropriate to answer the research question. It became evident that it was difficult to attain in-depth descriptions of the women´s experiences if the women were only asked about the second stage of labour and not related to the entire birth experience. This resulted in the subsequent interviews starting with a question regarding the entire experience of giving birth. The pilot interviews did, nevertheless, turn out to contribute to the variation in lived experiences of the second stage of labour, and were thus included in the results.

Study III and IV

For the purpose of **study III** and **IV**, a study specific questionnaire sent out to women who participated the Oneplus trial one month after the birth was used. In the Oneplus trial, women were screened for eligibility when admitted to the obstetric unit for labour and birth. Inclusion criteria for participation in the trial were women between 18-47 years old, at or beyond 37+0 gestational weeks, opting for their first vaginal birth, either pregnant with their first child or with a previous caesarean section, with a singleton live foetus in vertex presentation. Exclusion criteria were planned caesarean section, multiple pregnancy and intrauterine foetal demise. Participants needed to understand oral and written information given in either Swedish, English, Arabic, or Farsi to be able to give their written informed consent. Written informed consent was obtained before randomisation. Randomisation, 1:1, was performed when the woman entered the second stage of labour.

Out of 3059 women giving birth spontaneously in the Oneplus trial, consent to receive the questionnaire was provided by 2831 women who mastered the Swedish or English language, which was an inclusion criterion for participating in **study III** and **IV**. Women who had provided e-mail addresses received a web-based questionnaire and women who had not provided e-mail addresses received a paper questionnaire, as did women who received an English questionnaire. Four reminders were sent out to non-responders with intervals of one week between the reminders (Figure 2). In total 2233 (78.9%) women responded to the questionnaire, of which 1937 (86.7%) responded within two months after the birth and 284 (12.7%) responded after 2-4 months. All 2233 responses were included in **study IV**. In **study III**, twelve women were excluded as they had answered the questionnaire after more than four months and were therefore considered as late responders. Thus, the answers from 2221 women (78.5%) were included in the analysis for **study III**. In **study III** the response rates were equal in intervention and standard care group (Figure 3).

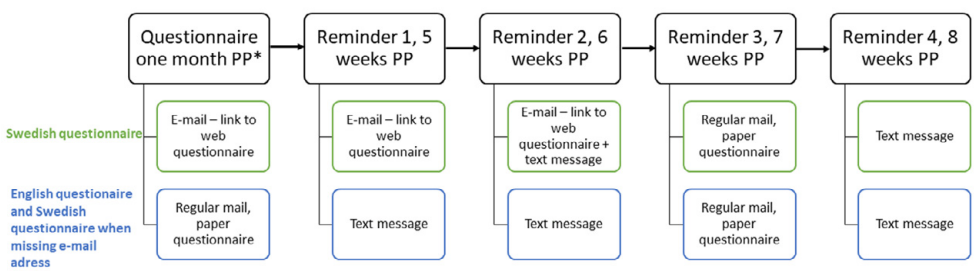


Figure 2. Flowchart over distribution of the follow-up questionnaire sent to women one month after birth with reminders. *Post partum.

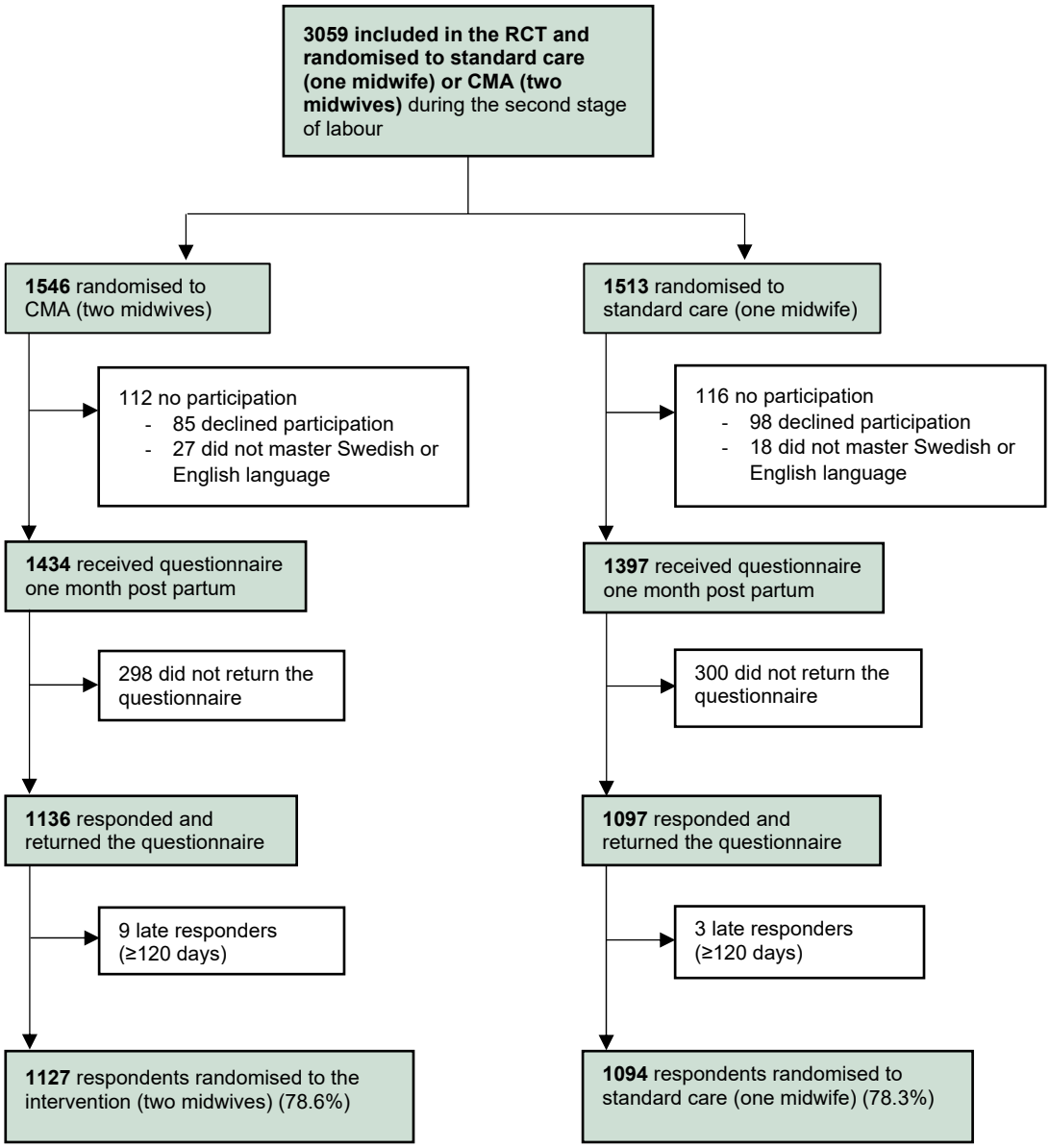


Figure 3: Flowchart of the women who were randomised in the Oneplus trial and asked about consent to the follow-up questionnaire, study III

Description of the follow-up questionnaire sent to women one month after birth

A search for validated questionnaires that captured women's experiences of the second stage of labour and experiences of interventions and midwifery practices used during this stage yielded no results. The research group therefore constructed study-specific items to include in the follow-up questionnaire. The items were tested for face validity before the start of data collection. Cognitive interviewing and the think aloud method, was carried out.[205,206] The purpose of face validity is to determine whether the items are relevant and actually measure what they intend to.[205,207] The face validation was performed in separate interviews with ten women who had Swedish as their native language and who had given birth in the last one to three months. Each woman was asked to read the items and think out loud as they went through the questionnaire, and to tell everything they were thinking. The interviewer asked probing questions in order to find out how the woman was thinking while reading the questions, for example "Can you repeat the question in your own words?".[205] All comments were written down, and the items were altered according to the women's suggestions.

In total, the questionnaire consisted of 83 questions and items comprising sociodemographic background, physical and mental health, pain and pain medication at one month after birth, experiences of the second stage of labour and of interventions used, the first breastfeeding session and postpartum depression measured with the Edinburgh postnatal depression scale.[208] For the purpose of **study III** items regarding women's experiences of the second stage of labour were used. In **study IV**, additional items regarding midwifery practices and interventions used during the second stage and whether the women were given information and had the option to decline the proposed intervention, were used. The questionnaire was developed in Swedish and then translated into English by a bilingual translator. The items regarding experiences of the second stage of labour were inspired by existing questionnaires regarding birth experiences[25,32] and further developed for the purpose of investigating women's experiences of the second stage of labour.

Variables used in study III and IV

Data on background, labour and birth characteristics in **study III** and **IV** were collected from the follow-up questionnaire sent to women one month after birth, case report forms used in the Oneplus trial and from each participating unit's database. Box 1 shows a list of data sources and variables used in **study III** and/or **IV**.

Box 1. List of data sources and background, labour and birth characteristics included in study III and/or IV

Background characteristics used from the follow-up questionnaire sent to women one month after birth	
Level of education	History of mental health issues
Swedish as native language	Fear of birth
Background, labour and birth characteristics from case report forms	
Ethnicity	Augmentation with synthetic oxytocin
Group allocation	Duration of the second stage of labor
Background, labour and birth characteristics from medical records	
Maternal age	Birth position
Marital status	Episiotomy
BMI	Severe perineal trauma
Parity	Post partum hemorrhage
Onset of labour	Apgar
Epidural	Birth weight
Duration of the active second stage of labour	

In **study III**, 15 items regarding experiences of the second stage of labour were used as outcome variables (Box 2). Ten of the items were rated on a 4-point Likert scale ranging from Strongly agree (1) to Disagree (4). Another five items were rated on 7-point scales ranging between two anchor values.

Box 2. Items from the follow-up questionnaire measuring women's experiences of the second stage in study III

Items rated on a 4-point Likert scale
➢ I felt strong during the second stage of labour
➢ I could handle the situation during the second stage of labour
➢ I was tired during the second stage of labour
➢ I have positive memories from the second stage of labour
➢ I have negative memories from the second stage of labour
➢ I felt vulnerable during the second stage of labour
➢ I was afraid during the second stage of labour
➢ I was concerned about my child's health during the second stage of labour
➢ The midwife understood my needs during the second stage of labour
➢ I felt included in decision about birth position
Items rated on a 7-point Likert scale
➢ How much of a feeling of being in control did you experience during the second stage of labour? *not in control (1) – completely in control (7)*
➢ During the second stage of labour I felt: *no pain at all (1) – worst imaginable pain (7)*
➢ I experienced the pain as: *very negative (1) – very positive (7)*
➢ How did you experience the length of the second stage of labour? *drawn out (1) – fast (7)*
➢ When you look back on the birth now, how safe did you feel during the second stage of labour? *very unsafe (1) – totally safe (7)*

The 4-point Likert scales range from 1 (Strongly agree) to 4 (Disagree). The 4-point Likert-scales responses were reversed in order for higher scores to indicate greater agreement with the statement.

For the purpose of **study IV**, women were asked about eight different midwifery practices and interventions used during the second stage of labour (Box 3). The questions started with a statement about whether they had experienced a specific practice or intervention, with the response options "yes", "no" and "cannot recall". Women who responded "yes" were further asked to answer five statements regarding the intervention, rated on a 4-point Likert scale ranging between Strongly agree (1) and Disagree (4). The first three statements regarded women's experiences of the practices and interventions as positive, painful and unpleasant. Two outcome variables were used; "The experience was positive" and "It was unpleasant and/or painful", created as a combined variable from the two statements "It was unpleasant" and "It was painful".

Box 3: Items in the follow-up questionnaire regarding midwifery practices and interventions during the second stage of labour

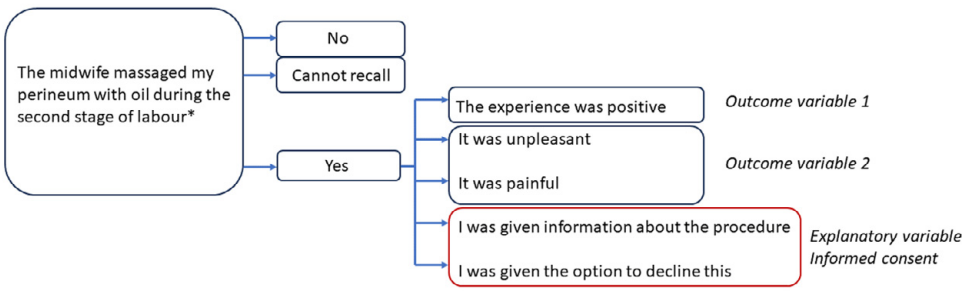
➢ The midwife used warm compresses during the second stage of labour
➢ The midwife applied perineal support with her hands and supported the baby's head during the second stage of labor
➢ The midwife massaged my perineum with oil
➢ The midwife performed vaginal examinations several times during the second stage of labour
➢ The midwife showed me how to push by putting her fingers in my vagina and pressing down during the second stage of labor
➢ The midwife used catheterization to empty my bladder during the second stage of labour
➢ The midwife pressed down on my uterus to assist in shortening the second stage of labour
➢ The midwife performed an episiotomy (cut to the perineum with scissors)
Each of the statements above was followed by another five statements rated on 4-point Likert scales ranging between strongly agree and disagree:
➢ The experience was positive*
➢ It was unpleasant†
➢ It was painful†
➢ The reason for this procedure was explained to me*
➢ I was given the option to decline this*

*Dichotomized (strongly agree/mostly agree, agree in part, disagree)
†Dichotomized (strongly agree, mostly agree, agree in part/disagree)

Furthermore, eight items about women's experiences of the second stage of labour, also used in study III, were used as outcome variables. The following items rated on a 4-point Likert scale ranging between Strongly agree (1) and Disagree (4), were used: "I felt strong during the second stage of labour", "I felt vulnerable during the second stage of labour", "I have positive memories from the second stage of labour", "I have negative memories from the second stage of labour", "The midwife understood my needs during the second stage of labour" and "I felt that I could handle the situation during the second stage of labour". Dichotomization of positively worded items were performed as "Strongly agree" compared with "Mostly agree", "Agree in part" and "Disagree". Negatively worded items were dichotomized as "Strongly agree", "Mostly agree" and "Agree in part" compared with "Disagree". Furthermore, two of the items rated on a 7-point scale ranging between two anchor values, were used as outcome variables: "How much of a

feeling of being in control did you experience during the second stage of labour?" and "When you look back on the birth now, how safe did you feel during the second stage of labour?". These items were dichotomized comparing the response options 1-5 with 6-7.

As an exposure variable in **study IV**, a combined variable of the two statements "The reason for this procedure was explained to me" and "I was given the option to decline this", was created. The answer "Strongly agree" on both statements correspond to informed consent (Figure 4). Among the women who reported that they had experienced any or all of the eight midwifery practices or interventions, two groups were formed: "Informed consent" and "No informed consent". The "Informed consent group" included women who had provided informed consent to all midwifery practices and interventions they had been exposed to. The "No informed consent group" were formed by those who did not respond "Strongly agree" on one both of the statements (Figure 5).



*Example of a question regarding an intervention used during the second stage of labour

Figure 4. Overview of exposure and outcome variables in study IV.

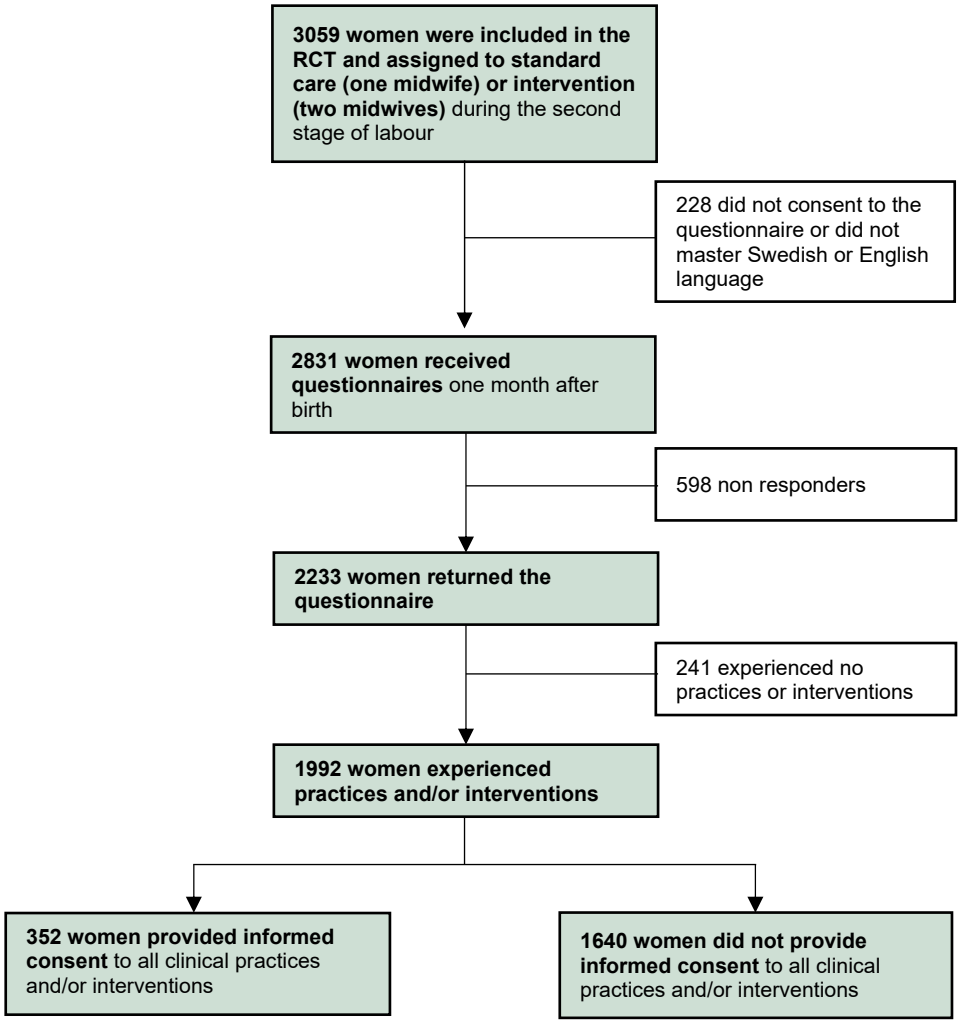


Figure 5. Flowchart over the participants in study IV

Data analysis

Descriptive statistics were used to present the data in all the quantitative studies (**study I, III** and **IV**). Chi square tests were used to calculate p-values to compare study groups for dichotomous variables. In **study I** ANOVA tests were used for continuous variables. In **study III** and **IV** the Student's *t*-test was used to compare differences between the groups for continuous variables when normally distributed and the Mann Whitney U test when non-normally distributed. The level of

significance was set at 0.05 for the statistical analyses in **study I, III** and **IV**. In **study I** statistical analyses were performed using IBM SPSS software version 24.0, and in **study III** and **IV**, version 28 was used.

Study I

Outcome variables were mode of birth, the use of synthetic oxytocin, increases of the oxytocin infusion according to recommendations and presence of prolonged labour when initiating the infusion.

Statistical analyses to estimate p-values were performed using Chi square test to compare cervical dilation in relation to prolonged labour when starting augmentation with oxytocin, and the cervical dilation when starting oxytocin augmentation in relation to mode of birth. Furthermore, to compare adherence to recommendations for administration of oxytocin for labour augmentation in relation to mode of birth and to compare mode of birth in relation to presence of prolonged labour or normal progress when initiating infusion with oxytocin. A Mann-Whitney U test was used to estimate p-value with a 95% confidence interval for the duration of augmentation with oxytocin in relation to mode of birth.

Study II

The data in the qualitative study were analysed according to qualitative thematic analysis based on descriptive phenomenology.[202] Firstly, the interviews were audio recorded and listened to and thereafter transcribed verbatim. To attain familiarity with the text and a sense of the whole, the transcribed interviews were read and re-read open-mindedly. The interviews were entered into the software program NVivo. In the next phase, meanings of lived experiences related to the aim of the study, were abstracted, and the work to understand the meanings was initiated. In the search for meanings, openness to the phenomenon and the lifeworld was sought. In accordance with the method described by Sundler et al, meanings related to each other were organized into patterns.[202] From the patterns, preliminary themes were formulated and finally three themes emerged. The themes were extensively discussed among all authors to achieve consensus. During the analysis, the authors moved between the whole and the parts of the text, meaning that the parts were understood in terms of the whole and the whole could be understood by its parts.[202]

Study III

Data were analysed according to intention to treat. Mean differences (MD) with 95% confidence intervals were calculated for all items with the Student's *t*-test. Even though the women's responses were not normally distributed on the Likert

scales, a Student's *t*-test was chosen as it has been shown to be a robust test for both normally and non-normally distributed data, especially when the sample size is large.[209] A subgroup analysis was conducted using the Student's *t*-test to compare differences between study sites for items with statistically significant differences between the groups.

Study IV

To compare women's experiences between the groups "Informed consent" and "No informed consent", univariate and multivariable logistic regression were performed to calculate crude and adjusted odds ratios with a 95% confidence interval (CI). Potential confounding variables were chosen based on previous research, clinical reasoning in the research group and the use of directed acyclic graphs (DAG).[210] Creating DAGs enables researchers to illustrate hypothesized causal effects. A complete DAG includes any variable that has a causal effect on both the exposure and the outcome.[210] The models were adjusted for Swedish as native language, fear of birth, level of education and length of the second stage. The interventions fundal pressure and episiotomy included few observations, why the number of observations needed to be limited in the regression models for these interventions.[211] Analysis of experiences of fundal pressure were adjusted for level of education and fear of birth, and experiences of episiotomy were adjusted for level of education, fear of birth and Swedish as native language.

Ethical considerations and approval

The research within this thesis was conducted in accordance with the World Medical Association's Declaration of Helsinki of 2013,[212] with regard to the ethical principles of autonomy, non-maleficence and beneficence, and justice.[192] All possible precautions were taken to protect the participants privacy and all data were handled according to the General Data Protection Regulation (2016/679/EU).[213] Approval for **study II-IV** was granted by the Regional Ethical Board in Lund (number 2018/476). When planning **study I**, the Swedish law for governing research concerning humans (SFS 2003:460) was followed.[214] At that point the study was conducted within the master program in medical science at Lund university, which is why an advisory statement was provided by The Advisory Committee for Research Ethics in Health Education at Lund University prior to the study (VEN 49-17). Approval for the study was granted by the head of the department of obstetrics and gynaecology at the hospital where the data collection was carried out.

Autonomy

The Declaration of Helsinki's principle of autonomy refers to the right of an individual to make an informed and voluntary decision about participation without interference from caregivers or researchers.[192] Furthermore, it aims to protect the individual's integrity, dignity and vulnerability. The participants in **study II-IV** all gave their written informed consent to participation. They were informed that participation was voluntary and that they had the possibility to discontinue their participation at any time. However, in **study III** and **IV** it can be argued that it is unethical to ask women in labour about participation in research as they could be considered as being in a vulnerable situation, feeling pressured to participate. As the women were provided with the researchers' contact details, they had the option to withdraw their participation before they received the questionnaire, one month after the birth.

Informed consent refers to the process where a person, after being informed, voluntarily decides to participate in a study.[215] A retrospective review of medical records (**study I**) poses challenges in obtaining informed consent and informing individuals about participation in a study. Information was therefore collected without consent.[216] To collect data from medical records might lead to a derogation of privacy. Confidentiality was maintained as data without any personal information was first coded and then transferred from a study protocol into SPSS. The result from the study was presented on a group level, thus it is not possible to identify individual participants. Only CH had access to the data during the record review.

Non-maleficence and beneficence

The meaning of the principles of non-maleficence and beneficence is that the benefits of the research are expected to outweigh the inconvenience and risks for the participants.[192] The outcomes of the studies included in this thesis will hopefully contribute to greater knowledge about how women experience the second stage of labour, how different interventions were used and how it may affect women's experiences. In accordance with the principle of beneficence, the findings can be useful and contribute with important knowledge for the future care of women giving birth.

Giving birth, the transition to motherhood, and forming a family is a sensitive period in a woman's life. At the same time, there is a significant need to evaluate and improve the quality of care for birthing women. To assure that women in **study II** did not feel pressured to participate, when asked about participation shortly after their births, they were contacted again four to six later, which gave them an opportunity to consider their participation. The women who were selected based on their responses in the follow-up questionnaire had already stated that they wished to participate by providing their phone numbers. The women were given the option to

choose location for the interviews, to ensure they felt secure in the environment where the interviews took place. To address the concern that a woman who have had a traumatic birth experience might experience distress during the interview, the opportunity to talk and ask questions to the researcher after the interviews was given. Referrals to a childbirth counsellor or a psychologist could be offered if needed.

Confidentiality was ensured in all studies by giving a code number for each participant, and a code list was created. The code list could only be accessed by the authors of the study. In **study II**, obstetric details of the women were presented along with pseudonyms to prevent the women from being recognized and quotations were presented with the pseudonyms.

The presented findings from all four studies were not linked to the individual women. All data is stored according to guidelines at Lund University.

Justice

The principle of justice refers to the avoidance of any form of discrimination when recruiting participants.[192] Despite this, women in **study II** were not asked for participation if they did not master the Swedish language, due to the risk of communication uncertainty. In **study III** and **IV** women needed to be able to answer the questionnaire in either Swedish or English, since the questionnaire was only available in these two languages. Women lacking proficiency in Swedish may form a vulnerable group with increased risk of not receiving adequate care and to have mistrust towards health care professionals.[217,218] The limited opportunities for these women to participate in the studies, contradict the principle of justice.

Results

Study I

In the cohort of 724 women, a majority (64.1%) received synthetic oxytocin during labour. Maternal age, the use of epidural analgesia, foetal presentation at birth and birth weight differed significantly between the groups regarding mode of birth (Table 3). The groups of women who received augmentation with oxytocin were further analysed according to the different outcomes.

Table 3. Background and birth characteristics in relation to mode of birth

	Total study poputation N=724	Vaginal birth without augmentation n=260	Vaginal birth with augmentation n=379	Instrumental birth n=62	Caesarean section n=23	p-value
Maternal age at birth (mean, SD)	28.6 (4.39)	27.6 (4.70)	28.9 (3.70)	30.1 (4.7)	30.4 (4.36)	<0.001
Height (mean, SD)	166.8 (6.46)	167 (6.41)	167.0 (6.35)	166.0 (6.9)	165.0 (7.53)	0.37
BMI (mean, SD)	23.7 (4.02)	23.8 (4.20)	23.5 (3.83)	23.9 (3.81)	25.3 (5.32)	0.17
Epidural analgesia n (%)	269 (37.2)	38 (14.6)	184 (48.5)	27 (43.5)	20 (87.0)	<0.001
Presentation n(%)						<0.001
Occiput anterior	684 (94.5)	254 (97.7)	370 (97.6)	54 (87.1)	6 (26.1)	
Occiput posterior	19 (2.6)	4 (1.5)	9 (2.4)	4 (6.5)	3 (13.0)	
Other/missing	21 (2.9)	2 (0.8)	0 (0.0)	4 (6.5)	14 (60.9)	
Birth weight (mean, SD)	3507 (433)	3371 (412)	3557 (409)	3637 (416)	3870 (588)	<0.001

Data are n (%) or mean (SD). BMI = body mass index. Comparisons between groups are calculated using ANOVA (continuous variables) and Chi square test (dichotomous variables).

The rate of women who had a spontaneous vaginal birth or an instrumental birth was similar between those who received oxytocin according to recommendations compared to those who did not. However, there was a significant difference for women who gave birth by caesarean section where 9% of the women who were not treated according to recommendation had a caesarean section, compared to 3.4% of those who received oxytocin according to recommendations (Table 4).

Table 4. Administration of oxytocin for labour augmentation according to recommendations in relation to mode of birth

	Augmentation with oxytocin according to recommendations n=325	Augmentation with oxytocin not according to recommendations n=134	p-value	OR (95%)
Vaginal birth n(%)	270 (83.1)	105 (78.4)	0.24	0.74 (0.45-1.22)
Instrumental birth n(%)	44 (13.5)	17 (12.7)	0.81	0.93 (0.51-1.69)
Caesarean section n(%)	11 (3.4)	12 (9.0)	0.01	2.81 (1.21-6.53)

Data are n (%). p-value calculated with Chi square test.

Mode of birth did not differ between women who had a normal labour progress when the infusion with oxytocin was initiated compared with women who had a prolonged labour. When the infusion was started between 5-9 cm cervical dilation, significantly more women had a normal progress than a prolonged labour (Table 5).

Table 5. Cervical dilation in relation to normal progress or prolonged labour when initiating augmentation with oxytocin

	Normal labour progress at initiation of augmentation with oxytocin n=186	Prolonged labour at initiation of augmentation with oxytocin n=277	p-value	OR (95% CI)
Cervical dilation ≤ 4cm	12 (6.5)	32 (11.6)	0.07	1.89 (0.95-3.78)
Cervical dilation 5-9 cm	102 (54.8)	116 (41.9)	0.01	0.59 (0.41-0.86)
Cervical dilation 10 cm	72 (38.7)	129 (46.6)	0.09	1.38 (0.95-2.01)

Data are n (%). p-value calculated with Chi square test.

Initiation of augmentation with oxytocin at 10 cm dilation was significantly associated with vaginal birth (p=0.03) whereas an early initiation at 4 cm dilation or less was associated with caesarean section (p≤0.001). The duration of augmentation with oxytocin and mode of birth differed significantly regarding mode of birth (vaginal birth: 2.7 hours, 95% CI 2.50-2.97; instrumental birth 3.7 hours, 95% CI 3.02-4.31; caesarean section 6.20, 95% CI 4.81-7.59).

Study II

This qualitative study, with the aim of describing women's experiences of the second stage of labour is presented in the themes "*An experience of upheaval"*, "*The importance of trusting relationships"* and "*Becoming a mother"*. The meaning of the themes is visualised in Figure 6. The second stage of labour included experiences of extreme pain, fear, fascination and being two in one body. This meant that involvement, guidance and continuous support was crucial. The second stage was further described as being in a transformative state between pregnancy and motherhood.

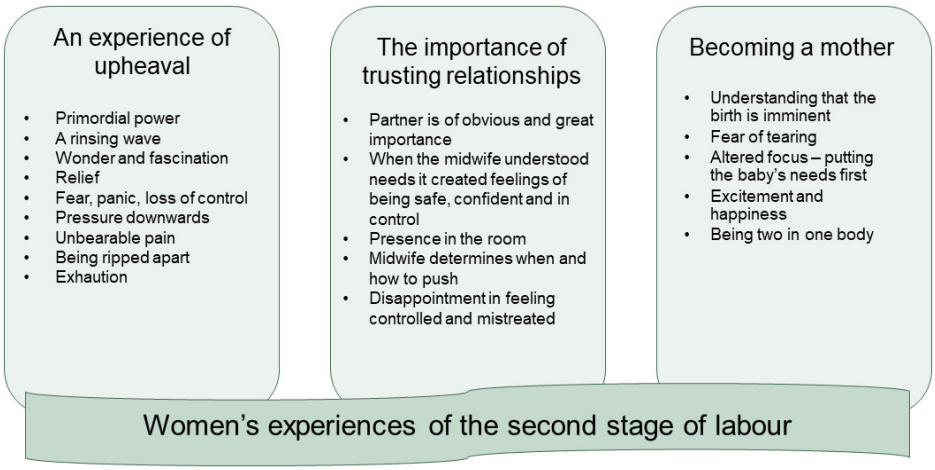


Figure 6. Description of the themes in Study II

An experience of upheaval

The second stage of labour was by the women described as entering a powerful phase of the birth. The women experienced wonder and fascination but also unbearable pain, fear, panic, and loss of control. Entering the second stage of labour could include a pressure downwards and an urge to bear down. For some women it meant having it confirmed by a midwife after a vaginal examination, but it could also be experienced as a continuous process and not as entering a specific phase. The women described using strategies to gain control and to cope with pain and exhaustion, helping them to find strength and trust in their own ability. Entering the second stage of labour was also described as a relief, as contractions became easier to cope with when urges to push made it possible to follow bodily impulses.

The importance of trusting relationships

Owing to the intensive experience trusting relationships with the midwives during the second stage of labour were found to be of utmost importance. Furthermore, the partner's role was described as being of great importance. Women who experienced that the midwives understood their needs described how this understanding made them feel safe, confident and in control. The women emphasized the importance of the midwife being present in the room in order for them to feel safe. The midwife was sometimes described as taking on a leading role and managing a situation that was difficult for the woman to handle herself. Such situations could entail senses of assurance and safety but could also generate feelings of being exposed and out of control. Situations were experienced when the women became disappointed, felt

controlled and mistreated as the midwives took the lead in an unsympathetic manner, not letting the woman agree on actions taken. Difficulties in establishing a relationship with new staff after shift change during the last moments of birth were experienced, but more positive experiences were also described as new staff could bring energy and hope by clear instructions and information.

Becoming a mother

Becoming a mother included for the women an understanding that the birth was imminent which could entail fear of pain, of tearing and of not knowing if they would be able to carry on. It meant an altered focus by putting the wellbeing of the baby before one's own needs. Feelings of excitement and happiness of meeting the baby were also described. Some women did not experience bodily signals such as pressure downwards and urges to push, making them unprepared for the moment of birth, doubting in their own ability to give birth which to some extent hindered them from experiencing happiness. A strong sense of becoming a mother was experienced by those women who were guided touch the baby's head or actively embraced the baby with their hands while it emerged from the body. The feeling of being two in one body and that the baby was being born through them helped them to realise the imminence of birth. The first moments after birth could be hard to grasp and included overwhelming feelings for the baby but also a fascination and pride over possessing unexpected strength.

Study III

In this follow-up of a multicentre RCT, 2831 women had consented to participate, and the total response rate was 78.5% after exclusion of late responders (Figure 3). Among the responders, background characteristics were well balanced between intervention and standard care with no significant differences between the groups. Labour and birth characteristics differed between the groups regarding the length of the active second stage (intervention group 35.0 minutes *vs* standard care 33.0 minutes, p=0.01) and the rate of SPT (intervention group 3.8% *vs* standard care 5.8%, p=0.01).

Women's experiences of the second stage of labour did not differ between intervention and standard care regarding feelings of being in control, experiences of pain, feeling vulnerable and afraid during the second stage of labour. The highest mean scores were rated by the women for the item "The midwife understood my needs during the second stage of labour" (intervention: mean 3.43; SD 0.79; standard care: mean 3.46; SD 0.81; MD 0.03, 95% CI -0.04-0.10) (Figure 7 and 8). Median did not differ between the groups for any of the items regarding women's experiences of the second stage of labour. However, women allocated to the

intervention scored significantly lower on the item "I could handle the situation during the second stage of labour" compared to women allocated to standard care (mean 3.18, SD 0.87 *vs* mean 3.26, SD 0.84; MD 0.08, 95% CI 0.01-0.15). A subgroup analysis showed a significant difference between the groups at one of the five study sites for this item (intervention group: mean 3.11, SD 0.90 *vs* standard care group: mean 3.32, SD 0.78; MD 0.21, 95% CI 0.08-0.35) (Table 6).

The distribution of women's ratings on the Likert scales are shown in the Supplementary appendix Figure S1 and Figure S2.

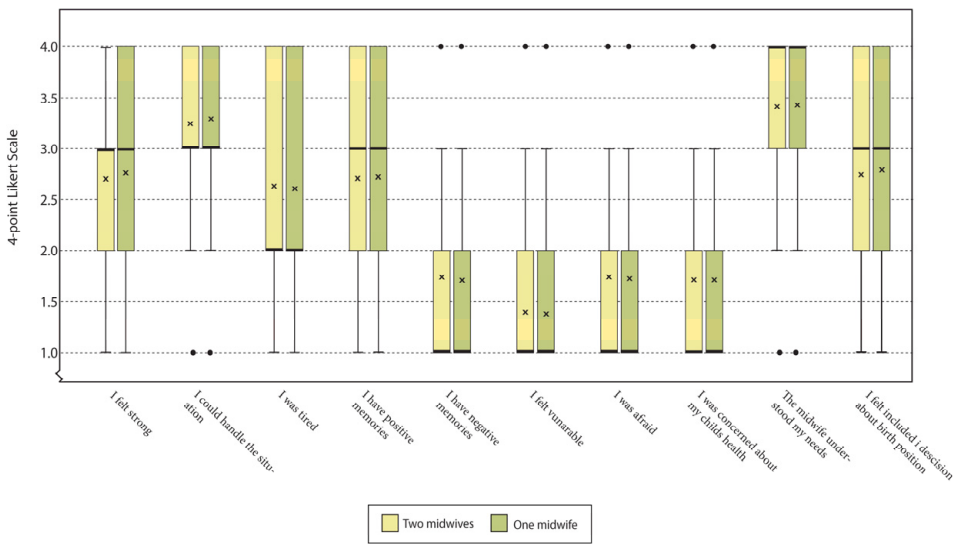


Figure 7. Women's experiences of the second stage of labour with two midwives and one midwife, rated on 4-point Likert scale. The thick line in the box refers to the median, and the x refers to the mean.

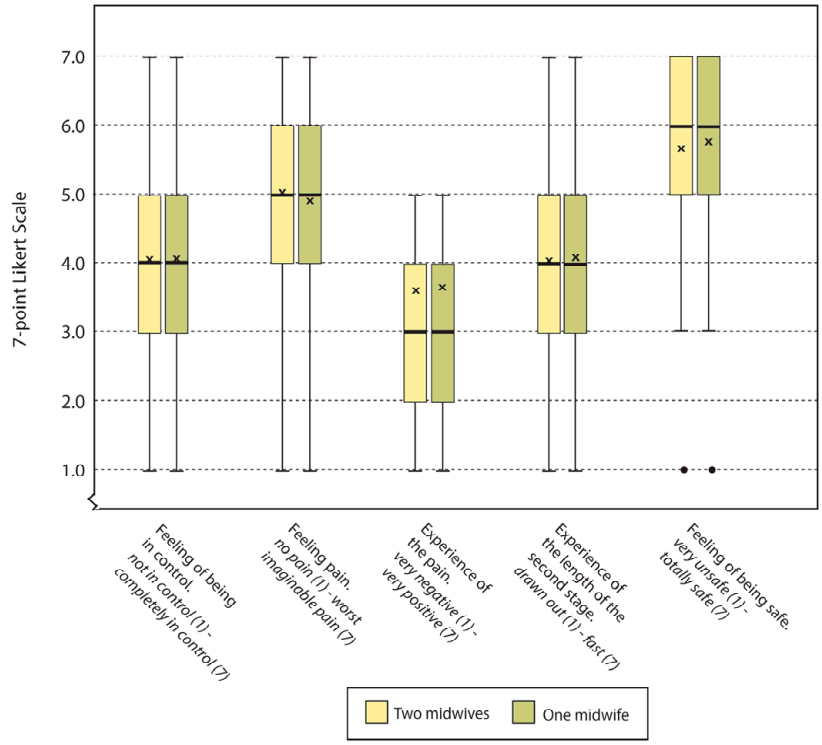


Figure 8. Women's experiences of the second stage of labour with two midwives and one midwife, rated on 7-point Likert scale. The thick line in the box refers to the median, and the x refers to the mean.

Table 6. Subgroup analysis for the item "I could handle the situation during the second stage of labour".

	Randomised to two midwives (intervention) (n=1127)	Randomised to one midwife (standard care) (n=1094)	Mean difference (95% CI)
Total study population (Mean SD)	3.18 (0.87)	3.26 (0.84)	0.08 (0.01-0.15)
Study site 1	3.25 (0.86)	3.27 (0.84)	0.02 (-0.11-0.15)
Study site 2	3.11 (0.90)	3.32 (0.78)	0.21 (0.08-0.35)
Study site 3	3.10 (0.91)	3.18 (0.90)	0.08 (-0.09-0.24)
Study site 4	3.18 (0.81)	3.24 (0.90)	0.06 (-0.11-0.24)
Study site 5	3.29 (0.87)	3.26 (0.84)	0.03 (-0.30-0.23)

Mean differences with 95% CI are calculated with Students *t*-test

A drop-out analysis of non-responders was performed, showing that non-responders were significantly younger (27.9 years *vs* 30.0 years, p<0.001), less often lived with their partner (80.9% *vs* 90.7%, p<0.001) and were less often of Nordic ethnicity (40.3% *vs* 75.8%, p<0.001) than responders. Late responders had a significantly higher BMI than early responders (supplementary Table S1).

Study IV

In total 2233 out of 2831 (78.9%) women responded the questionnaire and were included in study IV. Women who provided informed consent were less likely to have a university education (65.3% vs 74.8%; p<0.001) than women who had not provided informed consent.

Of the responding women, 1992 (89.2%) answered that they had experienced at least one midwifery practice or intervention. In total 352 (17.7%) of the women had provided informed consent to all midwifery practices or interventions performed by the midwives. This rate differed significantly between the study sites, ranging between 13.7% and 22.4% (p<0.001). Furthermore, the rates of provided informed consent differed between the interventions with the highest rate for perineal massage (48.4%) and the lowest for episiotomy (20.1%) (Figure 9).

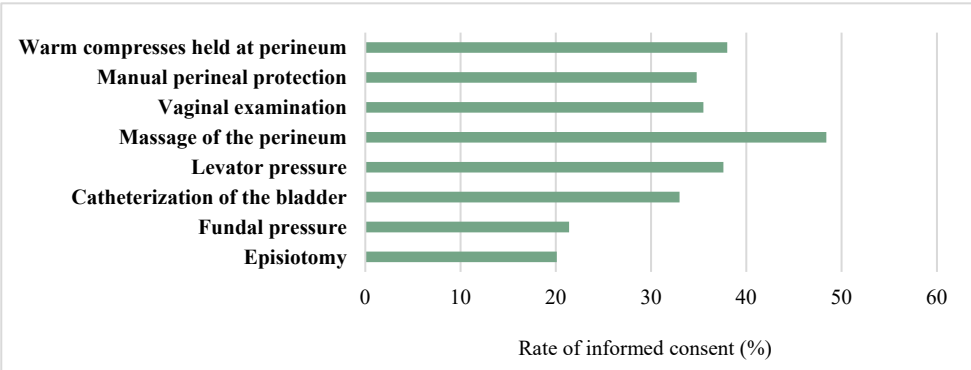
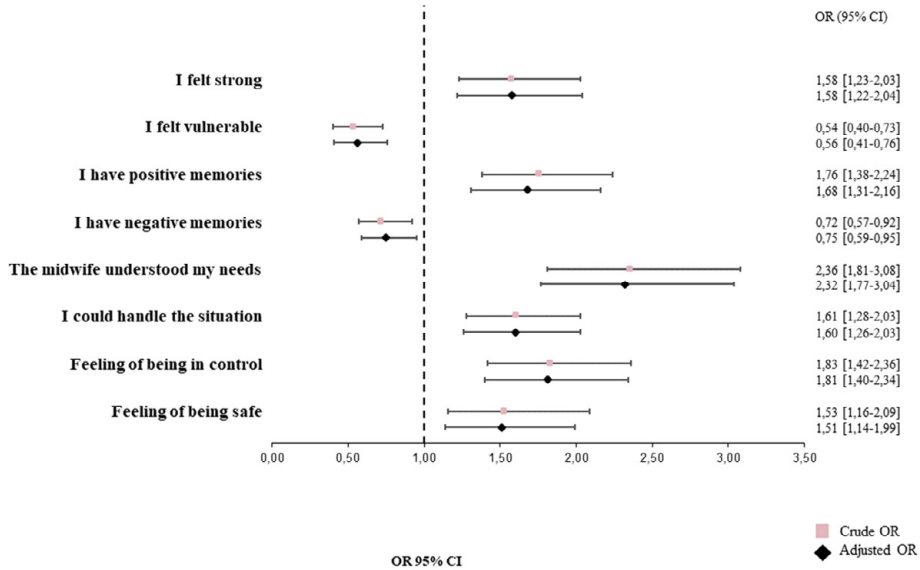


Figure 9. Rate of informed consent (%) to midwifery practices and interventions during the second stage of labour in study IV.

Women reporting that they could not recall whether they had experienced a specific practice or intervention or not, varied between 9.7% (episiotomy) and 52.6% (manual perineal protection).

When adjusted for potential confounders, all midwifery practices and interventions, except fundal pressure, were experienced as significantly more positive when informed consent had been provided, than when not provided. Vaginal examinations, episiotomy, perineal massage and catheterization of the bladder were experienced as more unpleasant and/or painful when the women had not provided informed consent.

When studying different aspects of women's experiences of the second stage of labour in relation to provided informed consent, all were associated with significantly more positive experiences (Figure 10).



All outcomes were adjusted for Swedish as native language, fear of birth, level of education and length of the second stage.

Figure 10. Forest plot over the association between informed consent and experiences of the second stage of labour

Analyses were performed for background variables among women who could recall and not recall that they had experienced vaginal examinations. Women who could recall that they had experienced vaginal examinations during the second stage had a significantly longer total length of the second stage than women who could not recall (Table 7).

Table 7. Labour and birth characteristics for women who could recall and not recall vaginal examinations

	Remember vaginal examination (Y/N) (n=1207)	Cannot recall vaginal examination (n=1020)	p-value
Parity			
Nulliparous	1123 (93.0)	963 (94.4)	0.19
VBAC	84 (7.0)	57 (5.6)	
Onset of labour			
Spontaneous	878 (72.7)	756 (74.1)	0.46
Induction	329 (27.3)	264 (25.9)	
Epidural analgesia/spinal	757 (62.7)	633 (62.1)	0.75
Birth position			
Lateral	430 (35.6)	377 (37.0)	0.49
Lithotomy/recumbent	421 (34.9)	346 (33.9)	0.66
Sitting	215 (17.8)	188 (18.4)	0.69
Kneeling/standing	61 (5.1)	50 (4.9)	0.89
Birth chair/squatting	49 (4.1)	26 (2.5)	0.05
All four	20 (1.7)	22 (2.2)	0.38
Missing	11 (0.9)	11 (1.0)	
Augmentation with oxytocin	849 (70.3)	696 (68.2)	0.28
Second stage of labour - minutes (median, IQR)	111 (61.0-174.0)	95 (56.0-160.0)	**<0.001**
Missing	4 (0.3)	1 (0.1)	
Active second stage - minutes (median, IQR)	35.0 (23.0-53.0)	33.0 (23.0-49.5)	0.21
Missing	34 (2.8)	23 (2.3)	

Data are n (%) or mean (SD). Comparisons between groups are calculated using Students *t*-test (continuous variables) and $\chi 2$ test (dichotomous variables).

Discussion

Methodological considerations

In this thesis, qualitative and quantitative methods have been used. All the methods have strengths and limitations. The qualitative study is discussed considering trustworthiness, and the quantitative studies are discussed in relation to validity and reliability.

Trustworthiness

Validity and reliability are used to assess the quality in quantitative research, but it has also been claimed that the term validity suits all paradigms as a generic term to indicate the quality of being just, sound, and well founded. However, in qualitative studies, trustworthiness is most often used to reflect the quality, and includes the aspects of credibility, dependability, confirmability and transferability.[219]

Credibility

Credibility refers to the meaningfulness of the findings, and the extent to which the analyses and data address the intended aim.[219,220] Credibility involves the choices of appropriate methods and participants, but also transparency in the report of study procedure.

The women in **study II** were chosen by purposive sampling, which is a suitable method to select respondents that are most likely to yield appropriate and useful information.[221] By using different approaches to recruit women, a variation in experiences was attained. Through the recruitment by using the follow-up questionnaire, it was possible to identify women with positive as well as negative birth experiences. Furthermore, purposive sampling was considered as a suitable method to attain a variation in age and parity. However, a wider variation could have been achieved by including more women of other ethnicities than Swedish. This needs to be considered when interpreting the findings of the study.

Individual interviews were chosen, as the topic was considered sensitive to share in a group.[222] To obtain rich data in interviews, it is important to establish trust. This was sought by letting the respondent choose the time and place for the interviews. Furthermore, the interviewers personally recruited all participants. Through this

approach, the women were afforded the opportunity to ask questions regarding the study directly to the interviewer, thereby potentially increasing the likelihood of participants opening up and sharing their experience.[223]

Thematic analysis based on descriptive phenomenology was chosen in order to gain a deep understanding of women's lived experiences of the phenomenon, the second stage of labour. A phenomenological approach is appropriate to explore and deepen the understanding of a phenomenon.[203] The organization of meanings into patterns are crucial for the outcome in the chosen method.[202] The first and last author identified the themes. During the analysis a deeper understanding of the data was achieved by discussions in the research group which increased credibility. The findings were also discussed at several research seminars. Including more researchers in analysing the data is considered a strength, since more than one person's perspective is included.

The thematic analysis in **study II** focuses on organizating patterns of meaning into themes. It could be argued that rather than fragmented themes, an essential, general structure of meaning, is preferred and would have been a strength. However, according to Sundler et al, meaning-oriented themes can provide robust research findings.[202]

Dependability

Dependability is a concept used to describe the consistency and stability of data under different conditions or over time.[219,220] To increase dependability, one of the first interviews was carried out by the last author, while the first author was observing. Another three interview were conducted by the last author and transcribed by the first author. However, conducting interviews is an evolving process that may lead the researcher to gain new insights and shape the questions posed to participants as data collection progresses. Thus, it is likely that more follow-up questions were used during the latter interviews, but the analysis was performed after data collection was completed.

Confirmability

Confirmability is connected to the objectivity and interpretation of data.[219,220] Quotations were used in order to illustrate the description of the themes and to increase transparency.

Openness to the lifeworld and the phenomenon needs to be emphasized in the research of lived experiences. This means having curiosity and being open minded in the search for meaning but also to be attentive, observant and sensitive to the expression of experiences.[203] Striving for openness means that the researchers need to question their pre-understanding, i.e. to become aware of preconceptions that may influence the analysis.[203] Preconceptions include own experiences, previous research, and education that might influence the choice of methods. There is a need

to reflect on the pre-understanding and make sure that the analysis reflect the responders perceptions, and not those of the researcher.[203] As a midwife and researcher, exploring women´s experiences of the second stage of labour, there was a risk of drawing conclusions too quickly and forgetting to further explore the experience through probing questions. Being aware of one's pre-understanding means to understand when this happened and go back to focus on the phenomenon. The researchers were aware that the pre-understanding differed among them, which was discussed during the data collection and the analysis.

Transferability

The term transferability is used for external validity or generalizability in qualitative studies and refers to the extent to which the findings or conclusions can be transferred to contexts, settings or groups beyond the participants in the study.[219,220] This was assured by providing thorough descriptions of the context and the participants, as well as how data was collected and the analysis process. However, the findings need to be understood in the context which was women giving birth at obstetric units in Sweden. This needs to be taken into consideration if the results are transferred to other contexts. Yet, the bodily experience of giving birth might be easier to transfer.

Furthermore, transferability measures the soundness of the findings and their contribution to existing knowledge.[202] The researchers observed a lack of knowledge regarding women's experiences of the second stage of labour, making the findings significant in providing important insights.

Validity

External validity refers to whether the results from a study can be applied in settings beyond the controlled research setting, whereas internal validity refers to whether a study accurately measures what it was intended to measure and to what extent conclusions can be trusted or valid.[219]

External validity

Selection bias constitutes a threat to external validity, which is why it is important to consider the sample's representativity in relation to the population.[219] Only including women who were proficient in Swedish and English in **study III** and **IV** can be considered as a threat to the external validity and does limit the generalizability of the findings. However, the multicentre approach and the fact that the trial was conducted in different parts of Sweden strengthens the external validity. Among the responders, there was a variation regarding pain relief, augmentation with oxytocin, length of the second stage of labour and birth position. Hence, the result can be generalized to women giving birth for the first time vaginally in a hospital-based setting.

A drop-out analysis was performed for non-responders in **study III**, which showed that women of non-Nordic ethnicities had a lower response rate to the questionnaire. This could have created some selection bias in **study III** and **IV**. Translating the questionnaire to more languages might have increased the response rate.

The high response rate in **study III** and **IV** contribute to an increased validity and enable generalizability of the findings. To achieve a high response rate, web-based questionnaires were used, as well as hard copy questionnaires when e-mail addresses were missing. Furthermore, four reminders were sent out to non-responders including text messages and the possibility of contacting a member of the research team for questions.

Internal validity

The associations found in observational studies are not as robust as those found in hypothesis-testing research, yet they can shed light on new research questions. In observational studies, the direction of causality is not clear, and the main limitation is the existence of alternative explanations of the result due to confounding factors.[219] A confounder is a factor that has the potential to disturb or confuse the effect of both the exposure (independent variable) and the outcome (dependent variable).[195] The effect from confounding variables can be controlled through adjustments in multivariable regression analysis, using stratification, restriction or matching.[224] In **study I** the study population was restricted to women in Robson group 1.

Statistical conclusion validity refers to whether the research design and the statistical methods are able to detect a true relationship. In the retrospective cohort study (**study I**) associations between exposures and outcomes must be interpreted with caution since associations found within observational studies are considered weak and causality cannot be proved.[219] Potential confounders were only presented descriptively since the decision was taken not to adjust for confounders in a multivariable regression model, as it was not considered possible due to the low rate of caesarean section and the high use of epidural analgesia in this group. This is a limitation of the study, and the results need to be interpreted with this in mind. In **study IV**, multivariable logistic regression was used to adjust for potential confounders. However, parameters that may influence the experience such as continuous support and women's expectations, were not considered, which is a limitation.

Systematic information bias may occur if exposures or outcomes are incorrectly classified, or if the data is collected inaccurately.[225] In **study I**, there was a risk that the cervical dilatation had occurred before or after the vaginal examination and that vaginal examinations are not giving the exact dilation. For example, a cervical dilation of 4.5 cm can be documented as either 4 or 5 cm in the chart. Moreover, information bias can also occur regarding the increase in oxytocin infusion, which

might not be precisely documented. According to this, intervals of 30 minutes were chosen for correct administration, instead of 20 minutes which was according to the recommendations. Yet, this reasoning does not reduce the risk for information bias. However, all data collection in **study I** was done by the same researcher and a protocol was used in order to systematically collect the data.

Randomised controlled trials are considered to provide the most robust level of evidence, have good internal validity, and avoids systematic differences between the groups.[197] The randomised design is a strength of **study III**. The inclusion rate in the Oneplus trial was 63% which was considered high and indicates that the intervention (collegial midwifery assistance) was acceptable to the women. Previous research has reported on reasons for pregnant women to participate in a randomised controlled trial.[226-228] When women considered an intervention as favourable, and only available within the trial, it could be a reason for participation. This is relevant to women in the Oneplus trial, since the hypothesis was that the presence of a second midwife to prevent perineal trauma, would result in a lower rate of SPT than women attended by one midwife.[159] However, it has also been reported that preferences for an intervention had little or no impact when recruiting women to an RCT.[229] There might however, be a possibility that participation in the Oneplus trial could have affected women's experiences of the intervention positively as they had positive expectations of the intervention. The fact that all women were informed and had consented to participation, made them well prepared which might have affected their experiences in a more positive way than if the intervention had been routine care at the obstetric units. Threats to the internal validity can be minimised through blinding. However, due to the nature of the intervention, it was not possible to blind the participants.

Questionnaire to women one month after birth

The items and questions used in **study III** and **IV** were study specific and not used previously. They were created by the research group and tested for face validity. Using questions formulated by the researchers in a questionnaire study has both advantages and disadvantages. Using a group of experts (in this case women who had given birth for the first time vaginally) to validate a questionnaire is often the first step in the validation process.[206] The purpose with the face validation was to test the questionnaire for content validity, i.e. investigate the relevance of the questions and how they were perceived by the women. Further steps when validating a questionnaire is to perform psychometric testing which was not undertaken and could be considered as a limitation.[206]

The research group discussed the possibility of using a validated instrument to assess women's experiences in the Oneplus trial. Instruments usually consist of multiple items that can be combined to produce an overall score or be grouped in different dimensions. One example of this is the Childbirth experience questionnaire which is a validated instrument that has been used in numerous studies.[32] However,

since the childbirth experience questionnaire and other validated scales report on the overall birth experiences and not specifically on the second stage of labour,[230] they were not considered suitable as it was considered unlikely that the intervention during the late second stage of labour would affect the entire birth experience. However, when constructing the items in the questionnaire, the research group was inspired by existing instruments to measure birth experiences.[25,32]

In **study III**, the item "I felt vulnerable during the second stage of labour" had a high ceiling effect, >70%, why it could have been considered for exclusion. The same counts for the item "The midwife understood my needs", which had a ceiling-effect of approximately 60%. High floor and ceiling effects carries a risk of a potential loss of important information and the ability to demonstrate variations.[231]

In both **study III** and **IV**, four- and seven-point Likert scales were used. A scale that is even-point compels the respondent to choose between positive and negative options, whereas an uneven scale allows for a neutral opinion to be expressed. In **study III**, the ratings on the Likert scales were analysed as continuous and not ordinal variables. This means an assumption was made that the difference between each step in the Likert scales were identical. However, when measuring experiences this is seldom the case. Strong ceiling effects and limited variability are typically seen, which should be taken into consideration when implementing the results. Despite this, parametric tests were used in **study III** and the result was presented as means, mean differences and standard deviations. Although there may be concerns about using parametric tests for Likert-type scale measurements, the robustness of these tests implies it can be used for this type of data.[232] The large sample size in **study III** gives further support to the use of parametric tests.[209] However, a Mann Whithey U test was initially performed, and the results were similar to the result from the Student's *t*-test.

In **study IV** the Likert scales were dichotomized, comparing the most positive statements with all other statements. The reason for this decision was based on the importance of all women's rights to informed consent and a positive birth experience. However, the use of dichotomized variables entails a loss of information of variations, which is a limitation.[233]

No item in **study IV** considered the possibility that some women may have declined the proposed practices and interventions which could have been the case. Hence, this is a limitation as it would have added valuable information about women's preferences.

Reliability

Reliability refers to the accuracy and consistency, i.e. the absence of variation of study results in repeated measures. One approach to assess reliability is to administer the same measure to the same people on two occasions, known as test-

retest reliability. Another way to test the reliability of an instrument is to measure the internal consistency, which involves the respondents responses to multiple items during a single administration.[219] The purpose of measuring internal consistency is to capture consistency across items. Single items, which were used in **study III** and **IV**, are often considered to have a low reliability and are inadequate for measuring a construct. Constructing multi-item scales could therefore have strengthened the reliability in those studies.[219]

Women's birth experiences

It is not known at what time point it is optimal to measure experiences of the second stage of labour and the optimal time point for measuring the overall birth experiences has been thoroughly discussed.[21,234,235] The choice of time point for sending out the questionnaire (**study III-IV**), as well as conducting the interviews in **study II**, need to be considered. The research group wanted the women to be able to recall the birth in detail, why a time close to the birth was chosen. However, it has been discussed, that if the overall birth experience is measured too soon after the birth, the experience may be influenced by the immediate relief of the baby being born, which tend to lead women to rate their experiences more positively.[234,236] Previous research has shown that the birth experience changes over time.[16,19-21] This needs to be considered, as the time point for the interviews in **study II** ranged between 4 and 10 weeks after the birth. The questionnaire used in **study III and IV** was sent out one month after birth, but some women did not answer until they were reminded. The reminders were sent out up until two months after the birth for non-responders.

General discussion

Summary of the findings

This thesis aimed to explore women's experiences of the second stage of labour, midwifery practices and the use of interventions. Qualitative research findings in **study II** show that the second stage of labour was experienced as a transformative state between pregnancy and motherhood. Women experienced the second stage as an overwhelming and intensive phase where trusting and safe relationships were crucial. The increasing pain and pressure downwards meant that the women could feel coexisting feelings of fear and fascination and they used various strategies to take control. Gratitude and satisfaction with the given care were expressed, but also lack of information, involvement, and compassion. Participation in decision-making and continuous support were important factors to women during the second stage of

labour. In **study III**, the experiences of the second stage of labour were investigated among women who were randomly assigned to be assisted either by one or by two midwives during the late second stage of labour to prevent SPT in the Oneplus trial. Overall women's experiences of the second stage of labour were reported as positive with no differences between the randomised groups. However, women who were randomly assigned to receive assistance from two midwives reported that they were less able to handle the situation during the second stage. Results from **study IV** showed that a vast majority of the women who experienced midwifery practices and interventions during the second stage of labour in the Oneplus trial, were not given adequate information and the possibility to decline interventions performed by midwives. The provision of informed consent to the use of midwifery practices and interventions was significantly associated with women's experiences of feeling strong, safe, in control and vulnerable during the second stage of labour. In **study I**, management of augmentation with oxytocin during labour was investigated and showed that it was used in a majority of the births and in many cases in an unstructured manner for women in Robson group 1, not according to the national guidelines. The results further indicates that initiation of oxytocin before reaching 4 cm cervical dilation, a long duration of the infusion and a slower increase than recommended may be associated with caesarean section.

Women's experiences

In **study II** it became evident that women were aware of when the second stage started either because of a bodily feeling of an urge to bear down, or by a vaginal examination by the midwife who established that they were in the second stage. Yet, the stages of labour were experienced as a single entity by some women. It has been suggested that the definition of stages and phases in labour may appear as an abstract concept to birthing women as it may not correspond to their own experiences.[73] This may be a reason to why there is a limited number of studies on women's experiences of the second stage as a separate phenomenon.

Overall, women who participated in the Oneplus trial and who responded to the follow-up questionnaire sent one month after birth had positive experiences of the second stage of labour. In **study III** this was evident as the mean value of women's responses on the items aimed towards the most positive statements for all items, including feelings of being safe, in control and that the midwives understood their needs. Furthermore, feelings of vulnerability and negative memories were reported by few women.

In **study II** experiences of being two in one body was described in the theme "Becoming a mother" where the women's focus shifted from herself to the baby. The phase between pregnancy and birth has been referred to as a liminal stage, involving a profound opening of body and soul in preparation for the baby and mother to be born.[237] The word "liminal" derive from the Latin "limen" referring to

a transitional point between two conditions in life.[238] It has been described as being in a space which is neither the starting point nor the destination. By using *Grounded knowledge*,[53] midwives can enhance women's experience of liminality by guiding them to touch the baby's head as it emerges from the body, thus helping them to find strength and to connect with the baby.

The liminal phase in childbirth involves an increased vulnerability where women tend to accept suggestions from authorities.[237] This was reflected in **study II** where women described that they trusted the midwife's expertise and did not question their instructions even though they might contradict their own impulses. Similarly Bjelke et al found that women described how they had to deny their bodily instincts to push based on the midwives' instructions.[124] In **study IV** it was observed that the perceptions of the caregiver as superior seemed to be reinforced by the midwives as a majority of the women reported not providing informed consent to proposed interventions, which in turn affected their experiences. This was confirmed in the study by Bjelke et al where the midwives' instructions were described as creating confusion and feelings that the women's bodily signals had deceived them.[124] The findings can be further be viewed in light of research from Reed who described that words and actions from people surrounding the women in the liminal phase, may have powerful effects.[237] This highlights the need for caregivers to be able to provide individualized support during the second stage and to be perceptive and respond sensitively to the women's needs.

A majority of the women in **study IV** could not recall whether they had experienced the specified practices and interventions. Previous research shows that women tend to remember their birth experiences very well.[12] It is therefore possible that when a woman does not remember whether she has been exposed to a practice or intervention or not, it is not of significance for her birth experience. In **study II**, the intensified labour during the second stage was experienced as overwhelming. During this stage, women have described that they tend to withdraw from the outer world and focus on the physical task of handling increasing levels of pain.[2] This might explain why women in **study IV** who had a shorter, thus more intensive, second stage could not recall whether they had experienced vaginal examinations compared to women who remembered. The intensiveness during the last part of the birth could explain why many women did not remember the use of practices such as manual perineal protection, which was the midwifery practice that most women in **study IV** could not recall.

Support and relationship with caregivers

The importance of feeling safe and having trustful relationship with caregivers during the second stage of labour was evident in **study II** and has previously been described as significant for a positive birth experience.[184,239-241] Continuous support during the second stage was considered crucial for gaining control and trust in

oneself. It has been shown that continuous support during birth improves several outcomes for the baby and the mother, including the childbirth experience.[184] According to MiMo, a *Reciprocal relationship*[53] involves continuous support where the midwife is present and available. However, the results from **study II** shows that continuous support was not always maintained. The women experienced change of caregivers which was appreciated in cases when the new staff brought energy and hope into a difficult situation, but it was also experienced as difficult to establish a relationship with new staff as they could come with new ideas and have another approach than the previously responsible midwife. It might be difficult for midwives to create a *Birthing atmosphere*[53] including calm, trust and safety under such circumstances. Disruptions by caregivers during the birth may have a negative impact on women's childbirth experiences and could force women to concentrate on the environment rather than the birth.[239,242] Furthermore, a stressful environment can lead to activation of the woman's defence and stress system.[243] When introducing CMA during the Oneplus trial, some midwives expressed concerns that the intervention could disrupt the women and that too many people would be present in the birthing room. It could be inferred that being attended by an additional midwife during the late second stage might have a negative effect on women's experiences. The findings in **study III** however showed that overall, women's experiences did not differ between women who were assisted by one or two midwives. In the groups, women's experiences that the midwife understood their needs during the second stage, were equal, indicating that trustful relationships were maintained regardless of whether a second midwife was attending or not. A reason for why no differences were found between the groups could be that all women included in **study III** were informed and had provided consent to be assisted by two midwives in the late second stage. Furthermore, the intervention may have been viewed positively as the aim was to prevent perineal trauma, hence improving the outcome for women. The negative impact that a midwifery practice or intervention may have on women's experiences, seems to be able to be alleviated by a *Reciprocal relationship*[53] which includes information and the woman's involvement in decision-making. This was evident in **study IV** where informed consent was shown to mitigate women's feelings of vulnerability and enhance feelings of being strong and in control.

Feelings of being in control were crucial for women in **study II** and the midwife played an important role in helping them achieve this sense of control. Being in control has been described as important for feeling satisfaction with the birth experience.[15,244,245] The results from **study III** showed no differences between the intervention and standard care group in terms of feelings of being in control, feeling safe and understanding of their needs by the midwives. This is an important finding as it is vital that the implementation of a new clinical practice is accepted by women.[246] Yet, women in the intervention group experienced to a lower extent that they could handle the situation during the second stage. Even though the small mean difference was not considered as being of clinical relevance, and only significant at

one of the study sites, it might imply that CMA could have a negative impact on the birth experience for some women. Therefore, when providing CMA, it is important to maintain a woman-centred perspective with a *Reciprocal relationship* and a *Birthing atmosphere*[53] i.e focus on maintaining calm, safety and involvement while supporting women during the second stage of labour.

In **study II**, women expressed negative experiences of feeling as if they were not trusted to make decisions when they were sometimes excluded from participating in making decisions regarding their births. **Study IV** revealed that women who were not included in decision-making processes regarding midwifery practices and interventions felt significantly less strong, safe and in control and more vulnerable compared to women who had provided informed consent. However, women in **study II** also expressed that they sometimes expected and wished for the midwives to take charge and make decisions. The women experienced a relief when the midwife took the lead in situations when the second stage of labour was too overwhelming for them to be able to cope and retain control. These findings are confirmed by Bringedal and Aune who found that women may have different views regarding how much information they wish to receive during labour and to what extent they want to be "interrupted".[247] Time-critical situations during childbirth, such as when an episiotomy is performed, could pose a challenge to obtaining informed consent.[248-250] However Stohl argued that childbirth is not such a medical emergency where women lose their ability to make decisions.[250] To facilitate informed consent in labour, Van der Pijl et al discussed that information exchange regarding time-critical interventions can be started in the antenatal period.[251] However, the fragmented model of care in Sweden might be challenging, with difficulties in the building of relationships since continuity of care can seldom be offered.[252] Women's needs during birth are individual, and what is experienced as positive or negative may differ greatly. Therefore, it could be challenging to midwives to use *Grounded knowledge*[53] and to know when a woman wants to take part in decision-making, and when she wishes for the midwife to take the lead.

Midwifery practices, interventions and the context of care

In the four studies comprising this thesis, all women gave birth at hospitals. It is important to discuss the context of care as it may have a great impact on how birth is managed, which could have implications for women's experiences. The transfer of childbirth from women's homes to hospitals in the 20th century, has been criticised as it increased the medicalization with an increased risk orientation. The hospital environments are often designed to easily enable the use of interventions which may contribute to creating a pathological space for birthing women, which could be negatively experienced.[253-256] Women giving birth in hospitals have been described as being more passive compared to women giving birth in a birth center or at home where they tend to be more active and to claim ownership of the space,

retaining their position as being most important.[257] It is also known that the use of interventions is lower in alternative birth settings.[258]

The result from this thesis shows an overuse of synthetic oxytocin for labour augmentation (**study I**) and that interventions during the second stage of labour were performed without women's consent in a majority of the births (**study IV**). There is no doubt that some interventions during labour are beneficial and could be potentially lifesaving when they are truly required. However, there is a need to discuss the disadvantages of intervening in a normally progressing labour. Ignoring the knowledge of the physiology of birth involves a potential risk for increased risk-taking.[259] Management of labour and birth in hospital-based settings, often follows the medical model, as described by van Teijlingen (2005), with an active approach towards monitoring, controlling and intervening in the birth process.[129] As the studies in this thesis were carried out in hospital-based settings, it can be argued that midwives working at the obstetric units were task-oriented and affected by a stressful work environment which could force them to demonstrate that their labours were progressing. Hindering norms in the *Cultural context*[53] could imply that midwives have to struggle in a *Balancing act*[53] to allow nature to take its course and to view birth as normal. This can further be interpreted in light of Newnham's research, which describes the lack of capacity within a labour ward to allow women time, and that this made the institution propel women into unnecessary interventions.[259] Midwives have reported feeling overburdened due to heavy work-loads, and being unable to provide sufficient support during labour.[260,261] This could be an explanation for why the midwives in **study I** started infusions with oxytocin despite normal labour progress. This management stands in contrast with midwives' professional responsibility which is grounded on the perspective that pregnancy and birth are normal physiological processes.[4] When prolonged labour is managed only through the administration of synthetic oxytocin, the knowledge of how to enhance the release of endogenous oxytocin by providing woman-centred care such as continuous support, physical contact and a calm and safe environment, may not be maintained.[2] A systematic review on women's experiences of labour augmentation with synthetic oxytocin, revealed that augmentation of labour was the point at which they had to abandon their desire of a non-medicalized birth and that informed consent regarding the intervention was often absent.[262] Involving women in decision-making regarding augmentation with oxytocin is therefore important.

Data collection in **study I** was performed in 2017 and the active phase of labour was assessed according to the recommendations at that time. In 2021, new recommendations for the start of the active phase were developed in Sweden where the criteria of cervical dilation was changed from 4 cm to 5 cm.[74] This might imply a more expectant approach to the use of augmentation in early labour potentially leading to a more restrictive use of oxytocin. Using intervention thresholds could be helpful to caregivers, but it must be remembered that one guideline does not fit all

women. Individual preferences for support during birth need to be highlighted more and incorporated in line with the principles of woman-centred care.

A routine use of interventions with lack of informed consent was observed in **study IV**, where in a majority of the births, women were not included in decisions regarding interventions. Thus, it can be argued that interventions were performed due to the midwives' preferences. This follows the "with institution" ideology as described by Hunter, which involves a medicalized approach and a decreased focus on the midwife-woman relationship.[263] There is a challenge for midwives in medicalized settings to maintain a woman-centred approach because of hindering norms within the *Cultural context*,[53] such as clinical guidelines, expecting control over the process of birth. There is large variation in the use of interventions between different hospitals in Sweden.[110] This likely owes itself to differences in workplace culture and attitudes towards interventions such as augmentation with oxytocin and episiotomy. **Study IV** showed that labour ward culture was associated with the obtainment of informed consent, as the rate of provided informed consent differed significantly between the study sites. However, the decision not to obtain consent was taken by the individual midwife in each situation and was shown to occur not only in interventions performed in time-critical situations where the nature of the situation may be a hinder, but also when performing routine actions such as the use of warm compresses and vaginal examinations. **Study III** also revealed a further indication of cultural differences among the labour wards as the results showing that women to a lesser extent could handle the situation when two midwives were present, derived mainly from one of the study sites.

Viewed from a psychological perspective, interventions during birth could pose a risk of undermining the woman's confidence in her own capacity. An ethnographic study by Goldkuhl et al found that birthing women were dispositioned as passive in the birth environment, which was influenced by their perception of birth as a critical event with needs for advanced medical control.[255] In the study, women described how interventions and repeated checks could be experienced as providing a sense of safety in situations when bodily signals such as pushing reflexes were experienced as hard to cope with. In these situations, they accepted procedures performed by caregivers as they relied on their expertise and viewed the procedures as "normal management of labour".[255] Similarly Shabot argued, that many women in labour accept vaginal examinations even though they might experience pain and embarrassment.[264] Shabot meant that this indicates an institutional authority, that the intervention is normalized and that many women do not consider that they can question or decline it.[264] This was described by women in **study II** who accepted the midwives' decisions and instructions as being superior to their own impulses.

Being able to provide informed consent to midwifery practices and interventions was significantly impacting women's experiences in **study IV**. Findings from a systematic review by Downe et al, showed that women would only prefer interventions when necessary for their safety and that they want to retain a sense of

control and personal achievement by being active in decision-making.[46] The involvement in decision-making is not only proven as being of utmost importance for a positive birth experience, but is also a legal requirement in Sweden.[193] The high rate of non-consented procedures in **study IV** indicates a power-imbalance between women and caregivers on a structural level and high-lights the issue that care providers do not always uphold their legal obligations. The fragmented model of care has been criticized for hindering woman-centred care and for being a barrier to decision-making processes, with lower levels of autonomy and respect compared to women provided with continuity of care.[252,265] Being supported by a known midwife, has been connected with increased feelings of control and satisfaction with the care during birth.[266-268] The facilitation of relationship building has been suggested as the reason why women appreciate continuity of care, as it contributes to confidence, predictability and trust in the midwife.[269] The vulnerability characterizing the second stage of labour, explains the importance of a *Reciprocal relationship*[53] and of being supported by a midwife who knows the woman, her preferences and needs. Continuity of care could be a way to achieve more positive experiences and increased involvement in decision-making for birthing women in Sweden.

Conclusion

Overall, this thesis has presented new knowledge and support for previous research findings. It provides evidence about how women experience the second stage of labour and how provided informed consent to interventions affect women's experiences during this stage. Collegial midwifery assistance did not to affect women's experiences of the second stage of labour. This is of importance as this intervention reduces severe perineal trauma. The findings from this thesis also shed light on a routine use of interventions and an overuse of oxytocin for labour augmentation. The results emphasize the importance of providing care during labour and birth with a focus on the individual woman and her needs and involvement in decision-making. This can be achieved by providing continuous support and woman-centred care. In conclusion, the studies in this thesis contribute to a deeper understanding of how individualized care can be enabled in the significant and transformative life-event of becoming a mother.

Future perspectives

- The routine use of interventions needs to be further investigated to explore underlying reasons for unnecessary use. Furthermore, techniques and methods to enhance endogenous oxytocin need to be implemented.
- It would be interesting to investigate midwives' attitudes to and experiences of the use of interventions and obtainment of informed consent and how they perceive that it can impact the birth experience.
- A psychometrically validated scale for experiences of the second stage of labour could be useful when conducting research regarding the second stage of labour.
- There is a need to develop strategies to increase women's participation in care during labour and birth.

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Appendix

Table S1. Background characteristics for late and early responders in study III

	Late responders (n=12)	Early responders (n=2221)	p-value
Maternal age at birth (mean, SD)	31.0 (5.82)	30.0 (4.28)	0.44
BMI (mean, SD)	27.8 (7.50)	24.4 (4.50)	0.02
Missing	1 (8.3)	107 (4.8)	
Parity			
Nulliparous	11 (91.7)	2080 (93.7)	
VBAC	1 (8.3)	141 (6.3)	
Marital status			
Married or living with a partner	11 (91.7)	2015 (90.7)	
Not living with a partner or other life situation	0 (0.0)	92 (4.1)	
Missing	1 (8.3)	114 (5.1)	
Ethnicity			
Nordic	11 (91.7)	1684 (75.8)	
European	0 (0.0)	215 (9.7)	
African	0 (0.0)	37 (1.7)	
Middle Eastern	1 (8.3)	122 (5.5)	
South American	0 (0.0)	33 (1.5)	
Asian	0 (0.0)	117 (5.3)	
Missing	0 (0.0)	13 (0.6)	

Data are n (%) or mean (SD). BMI = body mass index. Comparisons between groups are calculated using Student's *t*-test.

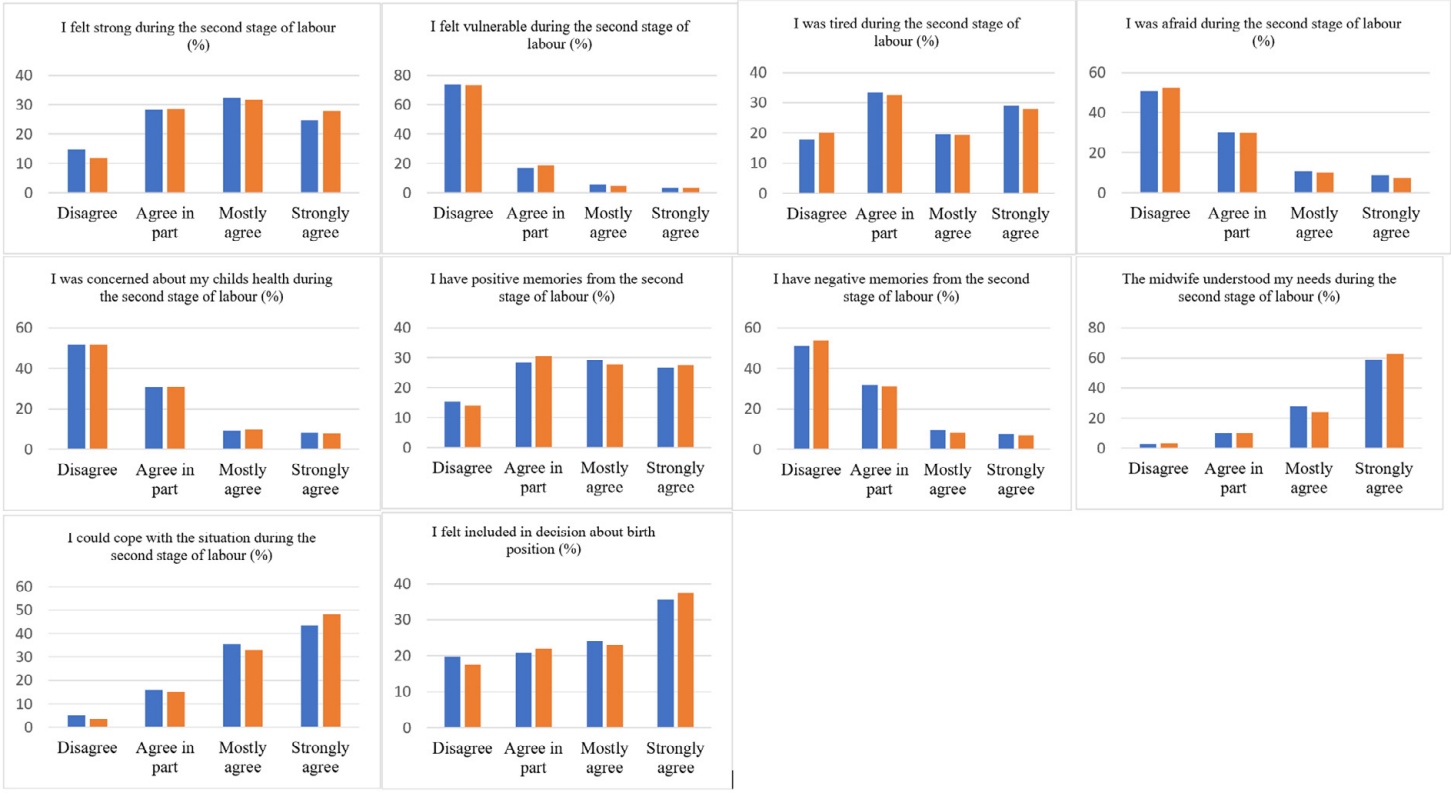

Figure S1. Women´s experiences of the second stage of labour rated on a 4 point Likert scale with two midwives (blue) and one midwife (orange)

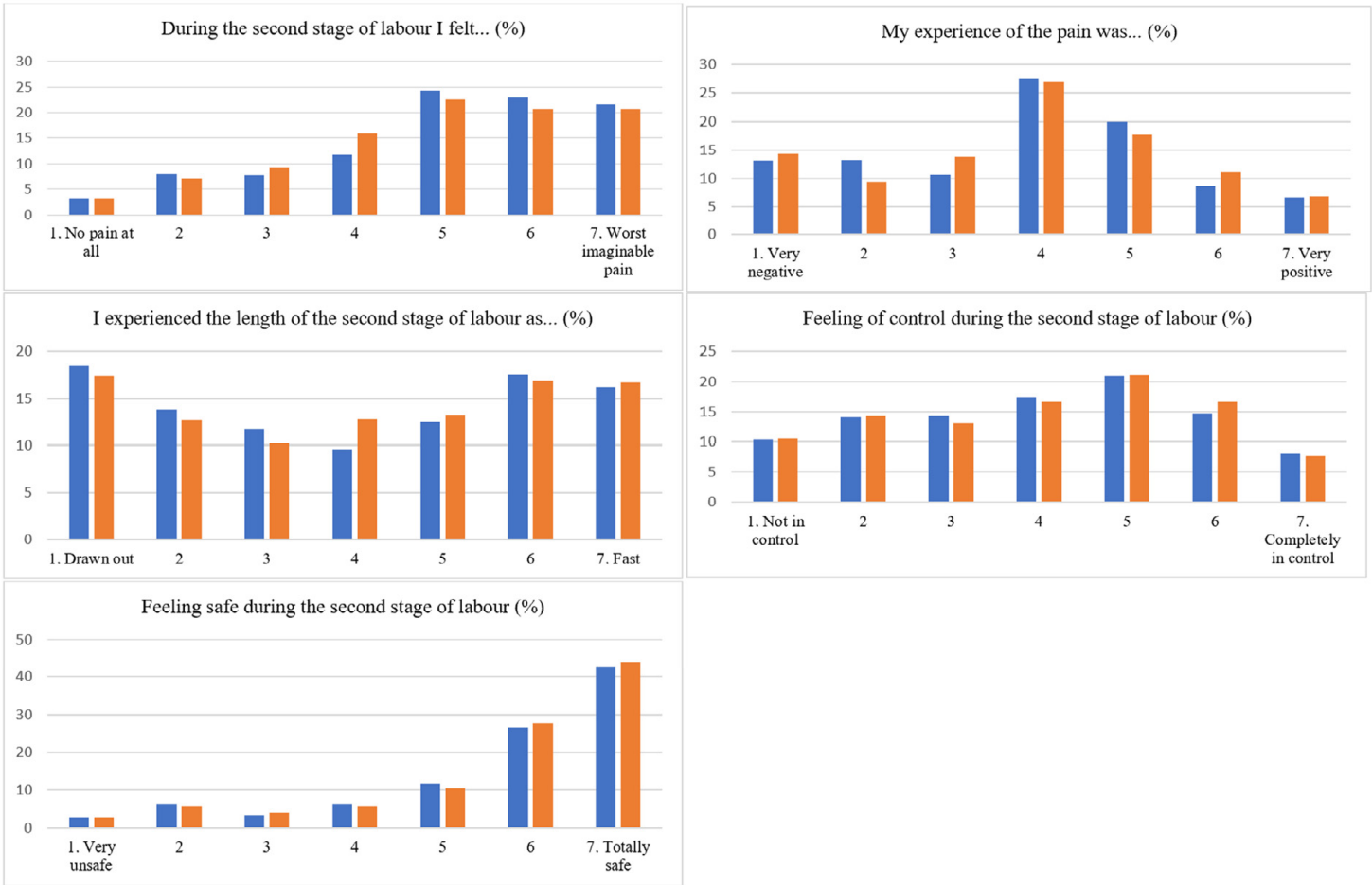

Figure S1. Women´s experiences of the second stage of labour rated on a 4 point Likert scale with two midwives (blue) and one midwife (orange)

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