

UNINTERRUPTED PHYSIOLOGICAL AND NATURAL CHILDBIRTH

Evidence and Clinical Outcomes

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Evidence and Clinical Outcomes

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ABSTRACT

Physiologic natural childbirth is fast disappearing amongst the myriads of interventions in our modern day obstetric units.

The aim of this study was to review available research regarding physiological childbirth and create awareness regarding benefits and improved outcomes for mother and newborn as well as to determine what newborns needed most at the moment of birth and soon after.

The methodology undertaken was an exploratory-descriptive qualitative study, aimed at exploring and promoting a deeper understanding of the topic. The data collection was sourced from evidence-based, peer-reviewed electronic sources and the inclusion criteria encompassed the themes of physiological birth, ejection reflex, seeding the microbiome of the newborn, delayed cord clamping, bonding and skin-to-skin, breastfeeding and continuous labour support.

The themes researched and reviewed, confirmed that an uninterrupted, physiological and natural birth, without the use of artificial interventions, and leading up to the spontaneous ejection of the newborn, was indeed a safe and viable option. The benefits to mother and newborn as well as the needs of the newborn were confirmed and presented through each theme in this thesis.

In conclusion reduced interventions and more spontaneous labour progress was associated with improved outcomes to mother and newborn.

The final product of this work was a booklet to be shared amongst midwives, nurses, student nurse/midwives and expectant parents to disseminate the information gathered.

Key words: Physiological birth, ejection reflex, seeding of newborn gut, delayed cord clamping, bonding, skin-to-skin, breastfeeding, childbirth support, doula.

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TIIVISTELMÄ

Fysiologinen, luonnollinen synnytys on pian katoamassa lukemattomien interventtioiden saatossa nykyaikaisissa synnytysympäristöissä.

Tämän tutkimuksen tavoite oli katsastaa käytettävissä olevaa tietoa, joka liittyy fysiologiseen luonnolliseen synnytykseen ja luoda tietoisuutta koskien hyötyjä ja parempia tuloksia äidille ja vastasyntyneelle ja myös määrittää, mitä vastasyntynyt tarvitsee eniten heti synnytyksen jälkeen.

Tämän työn tutkimusmenetelmä oli tutkiva-deskriptiivinen laadullinen tutkimus, jonka tavoite oli tutkia ja edistää syvempää ymmärrystä tästä aiheesta. Koottu tieto kerättiin sähköisistä lähteistä, jotka olivat vertaisarvioitu ja näyttöön perustuvia tutkimuksia. Sisällyttämiskriteerien teemat olivat fysiologinen synnytys, spontaaninen alatiesynnytys, äidin luonnollisen mikrobikannan siirtyminen vastasyntyneen suolistoon, viivästyneen napanuoran katkaisu, kenguruhoito ja vuorovaikutuksen kehittyminen, imettäminen ja jatkuva tuki synnytyksen aikana.

Nämä teemat, jotka olivat tässä työssä tutkittu ja tarkistettu vahvistivat sen, että keskeyttämätön fysiologinen luonnollinen synnytys, joka etenee ilman minkäänlaisia keinotekoisia interventioita ja joka johtaa spontaaniseen alatiesynnytykseen on turvallinen ja kannattava synnytysvaihtoehto. Tämän hyödyt äidille ja vastasyntyneelle vahvistettiin ja esiteltiin tämän työn jokaisen teeman kautta.

Tämän työn tuloksena nähtiin, että vähennetyt interventiot synnytyksen aikana ja spontaanisempi synnytys johti parempiin tuloksiin äidille ja vastasyntyneelle. Tämän työn lopputuote on kirjanen, jonka voi jakaa kätilöiden, sairaanhoitajien, sairaanhoitaja-, kätilöopiskelijoiden ja lasta odottavien vanhempien kesken, tässä kerättyjen tietojen levitykseen.

Asiasanat: fysiologinen synnytys, ejektio-refleksi, vastasyntyneen suoliston kylväminen, viivästynyt napanuoran sidonta, äidin ja lapsen välinen sidonta, ihokontakti, imetys, synnytys tukea, doula.

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1 INTRODUCTION

There have been huge improvements in the health sector over the last thirty years. Maternity care, in an attempt to keep abreast with progress, has also availed itself with the most updated and advanced technology possible. Yet despite all these technological advancements, researchers find that unnaturally high levels of complications are still occurring. These include: increased maternal postpartum haemorrhage due to loss of contractility of the uterus from overuse of induction agents; increased multiple caesarean sections leading to higher morbidity and mortality risks for mother and newborn; perineal damage leading to urinary and sexual dysfunction as a result of forceful pushing; greater numbers of neonatal hypoxia due to induction, forceful pushing and prematurity. (Umarani & Shilpa 2013, 224-229, Buckley 2015)

In our quest to modernise our maternity wards we have overlooked our main objective: the safe delivery of a newborn into a strong and capable family unit. We have lost sight of protecting those that turn to us for care. In our maternity units, new families experience almost immediate separation between newborn and mothers. (Moore, Anderson, Bergman & Dowswell 2012, 3.) Authors Crossland & Dykes (2011) reveal that supplementary feeding and routine care have been the norm for years. Thus, instead of the physiological norm of breastfeeding and skin-to-skin, we see a concerted effort being made, in the name of safeguarding newborn health, to interrupt the emotional attachment that occurs spontaneously within the first hour of life. According to Moore et al (2012, 3-5) intimate contact i.e. skin-to-skin, established as soon as possible after birth, evokes several neuro-behaviours that ensure the fulfilment of basic biological needs and interrupting or even just delaying these, has a domino effect on other processes and behaviours.

Childbirth organizations focus on how to medically define birth practices as a way of promoting natural or normal birth. (Akrich, Leane, Roberts & Nunes, 2012). However, the word “Natural birth” in the 1930’s was synonymous with “normal birth” and according to the scholars, referred to

births without medication or obstetric interventions, whereby women were educated about their bodies and laboured in supportive environments, thus allowing for their innate capacity to birth spontaneously (Dick-Read 1956 cited by Akrich et al 2014). Today “natural” and “normal” are no longer synonymous since a “normal birth” entails routine and systematic interventions and “natural birth” is viewed as an unachievable pipe dream to all but the most dedicated proponents (Brunt 2005, 96).

The physiological childbirth experience is surely individualized and can have positive and negative effects on the mother and fetus. The goal of maternity specialists is to deliver safe care during the childbearing years. However, when interfering with the normal and natural physiologic process of labour and childbirth, in the absence of medical necessity, we place both mother and child in greater danger, as we are forced onto a slippery slope of cascading interventions in order to maintain safety. (Romano & Lothian, 2008.) Interfering in a natural physiological childbirth is not supported by the evidence and goes against the imperative to “first, do no harm” (Jansen, Gibson, Bowles & Leach 2013, 84-91).

The history of childbirth illustrates how we have moved a once natural process, such as childbirth, out of the home and into hospital wards. Whilst the medicalization of birth has certainly brought with it numerous benefits, we have also lost the innate ability to trust the natural process. Pregnancy and birth is treated today as an illness and something to be managed, because it is believed that otherwise it will not proceed safely or adequately. Birthing professionals have lost the ability to observe and support this event, without interfering to make it conform to graphs and timelines. Pregnant women are viewed as ticking time bombs, on the verge of catastrophic disaster yet the evidence shows that when women are supported, educated and participants in their own care, pregnancy and birth can be safe and natural. (Brodsky 2008.)

If we are to trust that new parents are capable of going home and continuing to care for their newborn, adequately and successfully, then we need to also trust that new parents and most especially women, are just as

capable of being participant in their own care. We need to acknowledge that women are qualified, as experts of their own lives, to make decisions regarding their own wellbeing and that of their unborn children. We aim to empower new parents with adequate evidence-based information so that they can clearly inform their caregivers of the support they hope to receive during their pregnancy and birth.

Our research has highlighted a gap in the education of healthcare professionals relating to the understanding of natural childbirth. We see a lack of confidence in the process, possibly due to limited exposure to a normally progressing, non-interventive labours and births during training. Healthcare education is mainly focused on pathogenesis and how to treat what is wrong. We proposed that childbirth and the education thereof should be viewed rather from a salutogenic point of view.

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2 BACKGROUND

2.1 Concepts and definitions

In understanding the activities and processes associated with uninterrupted physiological childbirth and its clinical outcomes, reviews were done to include several relevant scientific journals. First of all, there is a comprehensive discussion on pregnancy, the overall delivery processes and the immediate postpartum, the benefits for mother and baby and to larger extent on hospital protocols and then in each section the factors interfering with the natural outcome are explored and discussed so as to highlight how best to avoid such interferences.

In our research the following concepts and their definitions are explored and explained in greater detail: Physiological childbirth; Ejection reflex; Seeding the newborn gut; Delayed Cord Clamping; Bonding; Breastfeeding and Continuous support.

We also have researched Finnish databases for experiences pertaining to the Finnish population regarding childbirth and the support thereof, to give a broader context to our research as it is understood in Finland.

2.2 Abbreviations

The following abbreviations and acronyms are in the thesis:

AAP	American Academy of Paediatrics
ABM	Academy of Breastfeeding medicine
ACOG	American College of Obstetricians and Gynecologists
APGAR	Appearance, Pulse, Grimace, Activity and Respiration
CA	Catecholamine
CINAHL	Cumulative Index to Nursing and allied Health Literature
DCC	Delayed Cord Clamping
EBSCO	Elton B. Stephens Co.
ELACTA	European Lactation Consultants Alliance

IBFAN	International Baby Food Action Network
ICC	Immediate Cord Clamping
ILCA	International Lactation Consultant Association
IV	Intravenous
IVH	Intraventricular Haemorrhage
KMC	Kangaroo Mother Care
LAMK	Lahden Ammattikorkeakoulu
LLLI	La Leche League international
NEC	Necrotizing enterocolitis
NICE	National Institute for Health and Care Excellence
PPH	Postpartum Haemorrhage
RCOG	Royal College of Obstetricians and Gynaecologists
SSC	Skin-to-skin contact
STS	Skin-to-skin
UCC	Umbilical Cord Clamping
UNICEF	United Nations children's fund
WABA	World Alliance for Breastfeeding action
WHO	World Health Organization
WI	Wellstart international

2.3 Finnish perceptions of childbirth and support

Increasing in general awareness, are the effects that childbirth expectations, plans and consequent experiences have, in the short and long term, on expectant women. These experiences are largely dependant on the psychological background, awareness and support given to the pregnant mother during the prenatal, intrapartum and postnatal phases. A study interpreting the data collected by Melender (2006, 333) outlines what constitutes a good birth in Finland, and demonstrates the link between support given and the perception of the experience. The resulting feedback shared by Finnish couples reveal the following aspects as most important: an unhurried atmosphere characterized by peace and harmony whilst giving birth; a sense of normality, whereby birth was seen as a normal, uncomplicated and natural event; a sense of security by having

qualified, experienced and supportive labour attendants; control over what was done to them with information and discussions about procedures and decisions; and a reasonable duration of labour. These perceptions highlight the need to critically analyse local procedures and possibly begin to emphasize and support more of what the literature on an uninterrupted physiological childbirth entails.

Many expectant mothers usually like to meet and discuss the role of the health professionals that would be present at the delivery however, as the study highlights, this is often limited or completely absent in Finland (Melender 2006, 333). Previous studies carried out in United Kingdom, highlight that many pregnant women wish to meet the midwife that will attend to them while in labour. As a result of this understanding, steps have been taken in the United Kingdom to implement this but sadly, on the other hand, this opportunity is not offered in the Finnish maternity health care system. Based on the numerous studies regarding quality of care in childbirth, this aspect should be better addressed and steps taken to implement similar protocols in the Finnish health care system as this could allay fear and aid expectant mothers in expressing their thoughts and feelings regarding the pregnancy and postpartum phase. (Melender 2006, 332-334; Nikula, Laukkala & Pölkki 2015, 374. THL 2013, 242-256.)

Recently, Jouhki, Suominen & Åstedt-Kurki (2015, 425-428) discovered that Finnish fathers perceived local hospitals to be a controlling environment and that women and fathers were not included or involved in the birthing processes and decisions. Fathers felt therefore that homebirth would afford them better control and involvement. Most of the fathers interviewed believed strongly in natural childbirth and felt that the routines of the hospital disturbed the birthing process or at the very least altered the course of childbirth to include too many interventions and procedures. In other words, the home environment was felt as a safe and known place, which could aid the woman into a more spontaneous and natural childbirth unlike the unsettling noise and smells and bustle of a busy hospital ward. It was important to fathers that they were able to participate more actively, in a physical and emotional way, as well as play their role as spouse.

Fathers felt that this would best be achieved when childbirth is conducted in a familiar environment such as their own home or with a known team of caregivers.

Conversely, home birth services, such as organizing skilled birth attendances, are not a part of the public health care system in Finland. Hence, families are responsible for all arrangements and costs because midwives offering home births are scarce, and since homebirth is not a supported birth choice in Finland, the local health insurance does not cover this option at all. (THL 2013, 256.) These findings provide evidence that home birth or at the very least, a more home like setting, should be considered as an option in antenatal education and that both health professionals and parents should be adequately prepared and educated as to the merits and benefits of reducing interventions and increasing the confidence in natural childbirth. Central hospitals that provide birthing services should pay attention to family and client centred care, families' autonomy and their personal wishes regarding their choices in birth. (Hemminki, Heino & Gissler 2011, 1192; Jouhki et al 2015, 425-428.)

Furthermore, a disturbing picture arises from research into Finnish births. Several studies have been conducted relating to fear of childbirth in women that have already experienced childbirth. Typically research highlights higher levels of fear in first time mothers yet in Finland fear is greater in women that have a previous history of childbirth. Risk factors associated with increased fear were found to be possibility of depression following unfulfilled expectations and difficult deliveries, caesarean sections and lack of support. (Räisänen, Lehto, Nielsen, Kramer & Heinonen 2014, 965-970.) These findings illustrate it is essential for maternity care givers to support, educate and allay anxiety where needed, which can be achieved by continuous midwifery care throughout pregnancy and continuing into the delivery, as this then channels many opportunities for the health caregivers and mothers to establish an interpersonal patient-nurse relationship of trust and support. Childbirth education is another way to prepare mothers psychologically for normal physiologic childbirth as well as what to expect should there be a need for

medical interventions. In order to achieve a physiologic birth, both caregivers and expectant parents need to be working in tandem, with the same knowledge and information, creating a calm and supportive environment for labour and birth to progress as naturally as possible.

(Haapio, Kaunonen, Arffman & Åstedt-Kurki 2016, 1.)

In Finland, continuous care is not the norm. Health care professionals who care for mothers during pregnancy are different from those who care for her during delivery. In many, if not all cases, the pregnant couple do not meet the team before labour has begun. This adds to the anxiety and fear parents already have regarding childbirth. Hence it is foreseeable that the local Finnish maternity healthcare system might inadvertently complicate parent preparedness for labour with inconsistencies between pregnancy care and guidance offered and then the resulting care given during labour. As a result of this disjointed care, expectant couples/mothers would be unable to discuss during their pregnancy, their fears, worries, concerns or problems with the midwife that will be delivering them. As a result of the dual nature of the Finnish maternity system the benefits of the continuous relationship between expectant mothers and their midwife is not achieved. It is advisable to implement strategies that will allow for expectant couples to forge relationships of trust and understanding with their caregivers and place of birth so as to positively affect them and help overcome fear of the unknown. (THL 2013, 16-325; Haapio et al 2016, 8.)

3 TARGETS, AIMS AND RESEARCH QUESTIONS

The main targets for this thesis are Finnish women of childbearing age as well as health care professionals involved in the antenatal through to postpartum care of these women, more specifically, obstetricians, midwives, nurses and student nurse/midwives to enhance the gap in education surrounding natural birth. We aim to reignite the flame of knowledge within health care providers so that they are more confident and supportive of a more natural approach to childbirth in the interest of better outcomes for mothers and newborn infants.

The aims are to create evidence-based awareness and knowledge about the benefits of non-interventive, physiological birth followed skin-to-skin contact and initiation of breastfeeding within the first hour of birth and the associated processes that go with this natural process. We also seek to enhance and deepen our own understanding of this topic so that we can begin to apply these approaches, based on evidence, in our future as nurses and midwives.

This study considers the following questions in each section:

1. What does the newborn need most at the moment of birth and soon after?
2. How can reducing artificial interference encourage natural childbirth and improve outcomes for mothers and newborns?

4 METHODOLOGY

4.1 Data search, review and collection

The data search for this thesis is based on relevant keywords related to the topic as it entails more of working life practical applications. Our search has been focused on the latest research wherever possible, limiting our research to 2006-2017, but we reserve the right to use older data where the research is warranted and is applicable. The reasons for using older research is that the authors are considered to be experts in their specific field or the work is the primary source upon which all other research is conducted. Data collection is based on the databases provided by LAMK via Mastofinna such as:

- EBSCO
- MEDLINE/Pubmed
- Sage
- CINAHL
- Cochrane database
- Search engines such as Google Scholar.

Keywords used include:

- Physiological childbirth
- Natural birth
- Ejection reflex
- Microbiome
- Seeding newborn gut
- Delayed cord clamping
- Bonding
- Skin-to-skin
- Breastfeeding
- Continuous labour support
- Doula

- Midwife
- Obstetrician
- Maternity care
- Perceptions of birth in Finland

The methodology for this research is an exploratory-descriptive qualitative study, as it aims at exploring and promoting understanding of the topic of interest. Qualitative technique of data collection such as use of books, articles, journals and dissertations were taken into consideration, as this is often common in nursing researches (Grove, Gray & Burns 2015, 21). As a basis for our functional thesis we used a review of the available literature so that we could focus our research within a broader context in the field of obstetrics. These materials were assessed and reviewed for relevant information, which is in line with the thesis topic. Data was also gathered from Finnish research papers, which serves as a basis of childbirth practices in Finland and Finnish hospitals.

Peer-reviewed electronic sources of data from available databases are proving to be an important way of developing nursing knowledge for evidence-based nursing practices. Moreover, evidence that has been gathered this way is contributing significantly to how clinical practice is evolving in our everyday work life. This is simply because it generates questions that need asking, backed by knowledge that is sourced from actual real-life concerns, relating to human conditions and potential health concerns. Since we seek to enhance the medical management of labour and birth we have made ample use of these sources. (Miller 2010, 192.)

4.2 Functional thesis

A functional thesis was selected, based on the explanation given by Virtuaaliamk (2006) that it is comprised of a theoretical knowledge part and a written report such as a book, guide, pamphlet or PowerPoint. This study has been proposed to increase and promote awareness about the overall effectiveness of an uninterrupted physiological childbirth by illustrating the positive and healthy outcomes on the mother and newborn.

This Bachelor's thesis produced as a final product an informative booklet, detailing the evidence-based research collated in the theoretical part of this thesis. The booklet is a brief summary of the evidence and outcomes and includes topic related photographs. The choice to use real life photographs is to attract the reader's attention, to involve the reader, to promote the concepts and to further educate on the topic being read. (Balm 2014.)

5 EVIDENCE AND OUTCOMES OF PHYSIOLOGICAL BIRTH

5.1 Understanding labour progress to achieve a spontaneous physiological childbirth

The World Health Organization (WHO) defines normal childbirth as: “spontaneous in onset, low-risk at the start of labour and remaining so throughout labour and delivery. The infant is born spontaneously in the vertex position between 37 and 42 completed weeks of pregnancy. After birth mother and infant are in good condition.” (WHO 1996, 4.)

Natural childbirth is defined and understood to be when childbirth follows a physiological pattern whereby the commencement of labour begins without any artificial induction agents or mechanical interventions and continues spontaneously. Labour is allowed to commence within its own time frame and proceeds at its own pace. No chemical or artificial means are used to either induce or to augment labour. Labour then concludes with the spontaneous ejection of the neonate and commencement of breastfeeding. (Stone 2012, 574.) The physiological childbirth experience is individualized as it can have positive and negative effects on the mother and fetus, however, interfering with normal physiologic process of labour and childbirth in the absence of medical necessity poses a danger to mother and child (Romano & Lothian 2008, 102). Also, a woman’s well-being and functional capacity would easily influence the method and effects of childbirth. A physiologic childbirth is characterized by a spontaneous onset and progression of labour; it promotes physiological and biological conditions that support effective labour.

To comprehensively understand a physiological birth process, we need to follow the natural preparations that occur in the maternal body, as it gets ready for the spontaneous onset of labour. There is a complex hormonal interplay that is at work, which activates the entire process. Although knowledge of these hormones is still limited, caregivers in the field of maternity care need to comprehend the basics of this complex hormonal orchestration to be proficient in understanding and trusting of the process

for labour to unfold spontaneously. This understanding and trust will, in turn, lead to a safer, easier and much more satisfying birth outcome. Initially the uterus begins preparations by commencing low-grade contractions due to the elevation of oestrogen levels in the weeks leading up to labour. Concurrent with these uterine contractions begins the slow ripening of the cervix that is under the influence of prostaglandins and oxytocin. The cervix begins to soften from its' harder pregnant state and as term approaches, the cervix begins to also shorten somewhat. This process, called effacement, can take several weeks or a matter of hours. The process of dilation, whereby the cervix starts to open to enable the ejection of the baby, may differ somewhat between nulliparous (never birthed) and multiparous (previously birthed) women. The latter multiparous cervix is able to efface and dilate concurrently, whilst the nulliparous cervix begins dilation only after a certain amount of effacement. As labour draws closer, there is a sharp rise in oxytocin that will peak and enable the uterus to begin contracting effectively. Oxytocin is also responsible for uterine contractility after delivery, to expel the placenta, and to minimize the risk of postpartum haemorrhage. Oxytocin has been called the hormone of love and is a vital part of the physiologic birth process. It is also responsible for: helping to cope with stress and pain; reducing postpartum haemorrhaging; facilitating mother-child bonding; breastfeeding; as well as enhancing pleasure and excitement, making this hormone vital for continued social interactions of all kinds. (Buckley 2015, xi.) We can understand from this that there is a specific set of actions and reactions that need to occur for labour to begin spontaneously.

Authors Neal & Lowe (2012, 319) determine that the best outcomes occur when labour is initiated and continues spontaneously, without additional interferences. Increased interventions have shown to lead to a much higher incidence of caesarean sections and therefore elevated risk for morbidity and mortality. The authors further attest that safer outcomes occur when the caesarean rate is at about 15%, as corroborated by the World Health Organization in their annual reports.

In scheduled births (induction of labour or caesarean section) we find a higher incidence of complications occurring to both mother and baby. In the executive summary of Childbirth Connection's document entitled *Hormonal Physiology of Childbirth*, Buckley (2015, xii) states that whilst there are certainly benefits to both mother and baby in situations that could put either at risk, the risks of carrying out unnecessary scheduled births are nonetheless serious and may have detrimental consequences. Buckley finds, that for mothers, scheduled births increase the incidence of loss of contractility of the uterus leading to further interventions such as instrumental births; postpartum haemorrhage; reduction in pre-labour oxytocin and prolactin receptors leading to breastfeeding and bonding issues. The impact on the infant may include 'fetal distress' due to labour hypoxia; breathing difficulties post-birth especially in infants born too early; hypoglycaemia and hypothermia caused by the lack of exposure to certain necessary hormones that ready the immature system to adapt to the external world.

In support of the normal, physiologic process of childbirth, the American College of Obstetricians and Gynecologists (ACOG) as well as the Society for Maternal-Fetal Medicine directed evidence-based guidelines that recognise labour and birth as having their own timetable that cannot be rushed. In an unprecedented and groundbreaking statement these organisations declared that the various stages of normal childbirth take longer to unfold than was previously believed. Their recommendation was to allow more time for the first and second stages of labour therefore reducing the need for additional and artificial intervention when the birth "appeared" to take too long. (Lothian 2014b, 175.) This is a significant statement that changes how birth professionals will manage the length of labour in the future. Many labours will be afforded the time to unfold more naturally as a consequence, and lead to fewer interventions and complications occurring.

In order to facilitate a natural and normal progression of childbirth, labour attendants need to comprehend intimately the role of oxytocin and other labour hormones, not just in the immediate benefits of causing labour

contractions. Oxytocin plays a key role also in the fetus and milk ejection reflex; reducing postpartum haemorrhage; bonding and breastfeeding, and also as a stress reducer or enhancer. Oxytocin activates the parasympathetic nervous system and assists in lowering fear, stress and tension. When a labouring mother is in an environment that causes her no fear or reasons for stress, such as a familiar, darkened, warm and nurturing place, her body is better able to produce oxytocin, which in turn will create effective contractions. Effective contractions lead to the stable and regular progression of labour. (Buckley 2015, 26-52.) Caregivers should strive for ways to enhance the effects of oxytocin in labouring women by creating a warm, dark, nurturing environment with very little unnecessary movement, interactions and interventions. The safer and more undisturbed the labouring woman feels, the more effective her contractions will be, leading to a successful labour process.

Naturally occurring oxytocin differs greatly from artificial oxytocin otherwise known as Syntocinon or Pitocin. The pituitary gland is responsible for releasing oxytocin in a pulsatile wave action into the maternal system. Oxytocin is released in the last few weeks of pregnancy and begins readying the receptor sites, leading up to childbirth. As labour is initiated, the receptor sites are washed in oxytocin, promoting stronger and more effective contractions up until, at the peak of labour, the Ferguson reflex action is activated and the huge expulsive force is present to push the fetus out of the womb efficiently and quickly. (Sakala, Romano & Buckley 2016, 265-267.)

With induced labours we can expect to see a cascade of interventions, more often than not, that will necessitate the use of further interventions in order to safeguard mother and baby. Usually with an induced labour, contractions are more uniform and do not slowly increase in power, therefore creating the need for increased pain relief, usually in the form of an epidural, an anaesthetic inserted directly into the epidural space of the spine to create a regional block in pain transmission. With epidural use the mother is strapped to a fetal heart monitor to trace both the baby's well-being and maternal contractions. Due to the possibility of her blood

pressure dropping from the epidural medication, she will also have a blood pressure cuff taking regular blood pressure measurements and extra I.V. fluids. The extra fluid will create a full bladder that can impede the descent of the fetal head, and being mostly immobile and not feeling the urge to urinate, an indwelling catheter will be inserted. These necessary interventions will decrease maternal movements and have the potential to increase fetal distress as mothers are more likely to be placed on their back, reducing fetal oxygen flow and causing maternal blood pressure to dip dangerously low therefore further affecting fetal well-being. Furthermore the pelvic floor is further relaxed and does not encourage the fetal head to stay in a good position for delivery, augmenting the need for an instrument delivery such as a vacuum extraction and/or an episiotomy (a surgical cut to the perineum muscle to enlarge the vaginal opening). Prolonged epidural use can increase the likelihood of fever in the mother, with possible transference to the infant, therefore delaying bonding and breastfeeding as caregivers will need to observe the infant and perform blood tests and possibly initiate antibiotics. (Jansen et al 2013, 84-91; Lothian 2014a, 198–206.) The overuse of induction agents is creating the very real risk of increased near-term births as opposed to full-term births. Near-term babies may appear to be normal in physical appearances but their physiology and development is remarkably retarded compared to full-term infants. This can and does increase the risk for mortality and morbidity. (Lothian 2006, 44; Amis 2014, 179.) Whilst interventions used in a timely fashion can save lives, we need to remember that the unchecked use of these interventions can actually cause the very situations we are hoping to avoid in the first place.

Assisting the labouring women in continuing to cope with the increasing forces of the mounting contractions, are other hormones called Beta-endorphins. These have been compared to opiates because of the similar properties and action on the same receptor sites of the brain. Beta-endorphins act as the body's own painkiller and work towards reducing stress and increasing euphoria and pleasure. The interplay in the maternal system during labour ensures that she falls deeper and deeper into an

altered state of awareness and in this altered state she is better able to transcend the physical pain of increased contraction strength. (Buckley 2011, Amis 2014, 179-180.) The beta-endorphins also offer protection to the fetus from hypoxia ensuring, that during the final stages of labour, the child is shielded from the pressure of the contractions. Negative impact from the environment surrounding the labouring mother can bring about an excessive surge of endorphins leading to a reduction in contraction strength and therefore alter the course of the labour. Artificial analgesia also impacts on the beta-endorphin levels and can cause an alteration in the reward centre, reducing instinctive maternal behaviour and attachment to the newborn. (Buckley 2015, 94-100.) The hormonal interactions occurring in the maternal body are precisely balanced to ensure maximal benefit and when interferences disrupt this balance, we observe alterations to the normal progression. These alterations can occur in subtle or more obvious ways yet we are powerless to predict what occurrence may manifest. It would be advisable therefore to leave the process well enough alone so it can unfold naturally without complications.

The goal of childbirth is to create effective uterine contractions that bring about the natural expulsion of the child. When a labouring woman experiences a negative emotion or reaction, a complex hormonal cascade begins. Epinephrine, norepinephrine and cortisol are hormones that change their behaviour when stress is present. It has been observed that situations, which cause feelings of fear, anxiety and lack of control, are linked with a higher incidence of decreased and/or dysfunctional uterine activity. (Odent 1987, 104-105; Alehagen, Wilma, Lundberg & Wilma 2005, 162-163; Buckley 2015, 113-120.)

What might the survival function of slowing down labour be? In situations of extreme excitement, fear, stress or danger the body responds by secreting higher doses of adrenaline and noradrenaline otherwise known as catecholamines (CAs) or the 'fight or flight' hormones. This is a safety mechanism to enable a person in danger to either flee from danger or to fight the danger with heightened senses and reactions. (Newton 1987, 107-108.) In order for the human body to function in moments of danger or

stress the catecholamines divert blood volume away from non-essential organs and shunt them towards the organs that require a greater blood volume to function more efficiently. (Odent 1987, 105; Alehagen et al 2005, 153-154; Buckley 2011.) A labouring woman is vulnerable at the moment of birth therefore if a danger is present, her body would activate its defence mechanism of fight/flight and decrease blood flow to the uterus therefore effectively slowing labour down whilst shunting the blood flow to the heart, lungs and larger muscles enabling her to run to safety or confront her attacker, with her baby safely inside of her instead of vulnerably in her arms, reducing her capacity to defend herself and her baby.

When high levels of CAs are present in early labour, as opposed to during the transition phase of labour, these have an adverse effect of slowing down contractions or possibly even stalling labour (Lothian 2004, 5). During the transition phase the higher levels of CAs contribute to stimulating stronger uterine contractions therefore assisting in the ejection reflex of the newborn. This is mostly noticeable in an undisturbed birth where the mother is given every effort to follow her labour instinctively. (Odent 2000, 12.) The hormonal orchestration that occurs throughout labour and birth is precisely determined to utilise these different hormones to the best effect possible. When labour is left largely undisturbed the balance between hormones happens spontaneously. Labour works best when left alone.

The increase of CAs in advanced labour, on the other hand, is visible in a variety of maternal behaviours that seemingly portray a woman that is out of control. The labouring mother will display a sudden increase in energy and alertness; she may have deeper vocalizations and verbalise fears or become irrational; her posture will change as she instinctively seeks a position to birth her baby; and finally a series of stronger, more focused contractions will begin, with the peaking of the oxytocin hormone, that assists in the quick and instinctive expulsion of the baby. (Odent 1987, 105; Lothian 2004, 5; Buckley 2011.)

5.2 Facilitating the pushing stage of labour by understanding the ejection reflex

The term ejection reflex was rescued by Dr. Michel Odent to describe the effect of the environment on labour and birth. It was first used by Niles Newton in the 1960's during her study of mice in labour. It describes the spontaneous, uninterrupted and instinctive process of expelling the fetus from the maternal body. This can occur either in response to a huge surge of adrenaline in the maternal system from panic or fear, or alternately during a completely undisturbed labour. (Odent 2000, 12.)

As understood previously, the ejection reflex can be triggered by the presence of high epinephrine or norepinephrine levels in the maternal bloodstream in advanced labour, leading to a sudden and easy delivery of the newborn. Labour attendants facilitating a physiological birth, observe specific behaviours that indicate that this stage is imminent: a sudden change in posture to a more upright/squatting position with a need to grasp or hold on to something; increase in strength and a more alert appearance: irrational fear of impending doom or death with accompanying vocalizations; dilated pupils and dry mouth with deep thirst. This phase is only observable in an undisturbed birth and therefore quite a rare happening in today's medicalized atmosphere. When such behaviour is observed, most attendants will seek to resolve the fear or at least alleviate it by offering pain relief and engaging in unnecessary discussions therefore delaying and/or halting the progress of the labour. It is not uncommon to find labour stalling in such an advanced stage therefore necessitating further augmentation or interventions. (Buckley 2015, 35-37.)

The ejection reflex is not the Ferguson reflex that is observed in a labouring mother, whereby upon reaching full cervical dilation and pressure is applied to the perineum, the urge to push is heightened. The ejection reflex appears to be triggered by hormonal and psychological

factors inciting the sudden ejection of the fetus whereas the Ferguson reflex is brought about by physical factors. With the ejection reflex there are no voluntary movements, it is a sudden expulsive force that literally ejects the newborn out of the womb through a series of irresistible contractions. There is no need for the labouring woman to assist the delivery with any form of forceful pushing. Undisturbed birth followed by the ejection reflex is most common in homebirths, yet if attendants are diligent and attentive enough, the same may be observed in hospital births whereby the privacy and space of the labouring woman is protected from unnecessary intrusions or interventions. (Newton 1987, 107-108; Odent 1987, 105; Odent 2009, 697-699; Buckley 2015, 35-37.)

Whilst the ejection reflex is a rare occurrence, one may find more evidence of spontaneous pushing versus coached or forced pushing in our modern day hospitals. Research has shown that when a labouring woman reaches full dilation of the cervix and is coached to bear down and push extensively, there is a marked deceleration in the fetal heart tones with accompanying hypoxia. This evidence would suggest the need for understanding better the benefits of a physiologic birth leading to spontaneous bearing down. The benefits include a healthy, vigorous baby at birth, reduced trauma for mother and child and a more positive and empowered birth for the mother. (Roberts, Goldstein, Gruener, Maggio & Mendez-bauer 1987, 48; Prinz, Boxem, Lucas & Hutton 2011, 663.) Furthermore the traditional use of the Valsalva technique, still extensively used today, whereby labouring women are told to hold their breath for 10 seconds whilst pushing and closing off their glottis, has been found to negatively affect both mother and baby. We begin to notice in the baby adverse effects in acid-base balances, lower APGAR scores at birth and decreased brain oxygenation due to the immense strain they are under during directed pushing. On the maternal behalf, we notice increased fatigue, accompanied by decreased ability to pursue labour, higher incidence of pelvic floor dysfunction and damage as well as bladder impairments postpartum. (Roberts & Hanson 2007, 239-241; Yildirim &

Kizilkaya 2008, 29; Prinz et al 2011, 663; Lemos, Amorim, Dornelas de Andrade, de Souza, Cabral Filho & Correia 2017.)

Many observers and researches have observed that spontaneous pushing is more in line with what the body instinctively does when the mother is self-directed. Spontaneous or instinctive pushing can be accompanied by vocalizations deep in the throat, short bursts of self-directed pushing with minimally short breath holding patterns. Also noted in various studies, was the position adopted by the labouring mother. When an upright posture is used the time of pushing was reduced compared to the groups that were in the lithotomy or supine position. (Roberts et al 1987, 53; Roberts & Hanson 2007, 238-241; Prinz et al 2011, 663; Lemos et al 2017.)

Relevant to the discussion on pushing is the moment upon which labouring women are actually desirous or commanded to bear down. It has long been determined that in our medicalization of birth, birthing professionals have sought to control every aspect of the birthing process, including when the labouring woman should push or bear down. It has all but become commonplace to expect a woman in labour to begin immediately bearing down when she has reached full cervical dilation, yet not all women experience this urge to bear down at this stage. What is more relevant to the desire or the urge to push is whether the presenting part of the foetus's head is at a lower station in the pelvis therefore setting off the urge to push. (Roberts & Hanson 2007, 240; Odent 2009, 697-699; Yildirim & Kizilkaya 2008, 29; Hanson 2009, 33-35.) Trial studies have observed that the time of bearing down is significantly reduced in the spontaneous bearing down group versus the Valsalva type pushing. Satisfaction levels increased and overall maternal and infant outcomes were more positive. Of major interest though is the need to further educate women and birth professionals on the benefits of spontaneous pushing versus directed pushing. (Yildirim & Kizilkaya 2008, 29-30.)

Returning to the concept of ejection reflex coined by Dr Michel Odent, it becomes evident that spontaneous pushing is an element of the ejection reflex but it is not the reflex itself. To create an true ejection reflex in a

labouring woman, one needs to not only allow for the labouring woman's natural urge to push to surface unhindered, but also to facilitate a distraction free environment whereby the woman can feel unobserved and empowered to follow her body's own natural design, for her to allow her mammalian brain to overcome the neocortex enabling her to experience a near-transcendent emotional state during the first meeting and bonding with her baby. (Newton 1987, 107-198; Odent 1987, 105; Odent 2009, 697-699; Buckley 2015, 35-40.)

5.3 Increased health benefits from natural seeding of the newborn gut

Evidence has been collected and researched, indicating that microbial colonization occurs simultaneously with the immune system maturation and that human intestinal microbiota is seeded before birth with increased diversity through the process of passing through the maternal birth canal. It is explained as the process whereby approximately 160 different bacteria, which in turn play a vital role in human health, colonize the newborn gut. The disruption of this process has shown to increase susceptibility to disease throughout the lifespan of the individual. (Rodriguez, Murphy, Stanton, Ross, Kober, Juge, Avershina, Rudi, Narbad, Jenmalm, Marchesi & Collado 2015.)

Gut bacteria has been studied extensively from an adult perspective but little is known about the newborn gut rendering research in this area vital to understanding long-term health implications. New research has begun surfacing in the last few years detailing more understanding of when and how the newborn's gut is seeded with its complex microbiota to form an evolving microbiome similar to other body system microbiomes. It has been understood that gut health has huge repercussions on overall health: by promoting and stimulating the immune system; promoting the processing and use of nutrients in the system; regulating intestinal homeostasis and enabling resistance to pathogens. As newer research surfaces, we understand that early colonization may provide long-lasting

effects. (Azad, Konya, Maughan, Guttman, Field, Chari, Sears, Becker, Scott & Kozyrskyj 2013, 385-386.)

Until recently it has been believed that the uterus, placenta and membranes were completely sterile and that the newborn gut was also sterile, yet new emerging data suggests that there is a microbiome in the placental site itself that feeds through the umbilical cord to the infant therefore changing the composition of the meconium within the infant's gut already before birth. (Arrieta, Stiemsma, Amenyogbe, Brown, & Finlay 2014, 3.) Further insights reveal that the placental microbiome is more similar to the oral microbiome than to the vaginal microbiome. In this new light we begin to understand that different systems impact on pregnancy, such as the placenta, vagina, cervix, gut and oral areas, all with their own unique microbiomes. These different microbiomes, with their specifically enriched microbiota help colonize the new infant's system before being born. Implications of this research indicate a need to consider not only maternal health during pregnancy, since this affects the flora of the vaginal and intestinal tract, but also the mode of delivery. (Neu & Rushing 2011, 322; Aagaard, Ma, Antony, Ganu, Petrosino & Versalovic 2014, 237; Martin, Makino, Yavuz, Ben-Amor, Roelofs, Ishikawa, Kubota, Swinkels, Sakai, Oishi, Kushiro & Knol 2016, 8-9; Vinturache, Gyamfi-Bannerman, Hwang, Mysorekar & Jacobsson 2016, 95.)

Delivery by vagina versus caesarean section, breastfeeding, formula or mixed feeding, antibiotic use, probiotic enrichment and physical environment all contribute to the richness and diversity of the infant's microbiome (Azad et al 2013, 392; Martin et al 2016, 2). During pregnancy, the placenta begins laying the foundation for the infant's gut microbiome, and during a vaginal delivery, the infant comes into contact with the maternal vaginal and intestinal microbiota before continuing to harvesting from the maternal skin microbiota during breastfeeding. The acquisition of the maternal intestinal bacteria seems to be a vital step in the development of a healthy immune system. Bypassing this crucial step in the infant's development could cause a different development to occur. (Neu & Rushing 2011, 323-326.)

Research data indicates that the mode of delivery will determine the type and the timeframe of the bacteria to colonize the infant's gut. Vaginal delivery confers maternal vaginal and intestinal strains whilst caesarean delivery allows for environmental colonization such as maternal skin, hospital staff and other individuals in the newborn's space. It has been studied that the bacterial count is higher and more diverse in the gut of newborns delivered vaginally versus caesarean delivered. Furthermore caesarean delivered infants had delayed colonization from as long as 6 months to 2 years after birth with several studies showing this difference still discernible after 7 years. This altered composition and delay to fully form the gut microbiome, in caesarean delivered infants, has lead researchers to initiate further investigations into the possibility of a higher risk of allergy, asthma, type 1 diabetes, obesity and other immune health complications in such infants. (Aagaard et al 2014, 237; Rautava 2015, 6; Martin et al 2016, 2.)

The type of feeding also influences the gut microbiota. Breastfed infants differ from formula fed infants in the early composition of the gut microbiome with the latter displaying similar microbiomes to older children. Noticeable differentiation is seen with the presence of aktinobacteria and bifidobacteria in breastfed infants. These are believed to prime and help the gastrointestinal system mature. They also help combat risk for allergic diseases and excessive weight gain. Research studies investigating how the infant's exposure to specific microbes in succession, after exposure to the maternal vaginal microbiota and/or human breast milk, could lead to further understanding what influences immune deficiencies and disease risks. The reasoning for this is the ability of the fully colonised gastrointestinal tract to easily organise and optimally metabolize nutrients necessary for continued health. (Rautava 2015, 7; Madan, Hoen, Lundgren, Farzan, Cottingham, Morrison, Sogin, Li, Moore & Karagas 2016, 13; Martin et al 2016, 2.)

Considering the diverse colonization of bacteria in infants exposed to maternal vaginal microbiota versus those that were not exposed, and the resulting differences and possible health implications, researchers found it

necessary to consider the possibility of introducing and restoring maternal vaginal bacteria to those infants that were not exposed due to caesarean delivery (Dominguez-Bello, De Jesus-Laboy, Shen, Cox, Amir, Gonzalez, Bokulich, Song, Hoashi, Rivera-Vinas, Mendez, Knight & Clemente 2016, 251). As previously stated, caesarean delivered infants display a microbiome rich in skin microbiota differentiated by those born vaginally, which furthermore determines how the infant's immune system develops (Neu & Rushing 2011, 323-326; Azad et al 2013, 392; Martin et al 2016, 2). Dominguez-Bello et al (2016, 250-253) explored restoring maternal vaginal microbiota to caesarean delivered infants immediately after birth. The scope was to determine if caesarean delivered infants could colonize similarly to vaginal delivery infants if exposed to maternal vaginal swabs. The procedure involved inserting a sterile gauze in the mother's vagina prior to caesarean delivery. Mothers were tested negative for group B streptococcus and vaginosis and additionally had a pH level of less than 4.5 in the hour preceding the caesarean section. The infants were subsequently swabbed in the oral, facial and full body sites within a few minutes after birth. To conclude the testing the infants were sampled 6 times during the first month of life in the oral, anal and skin sites. Bacterial source tracking displayed that those infants exposed to vaginal swabbing were basically similar to the vaginally delivered infants in the first week of life, confirming that the mode of delivery and exposure to maternal vaginal bacteria shapes and informs the infant's microbiota and microbiome. Further research is on going to discover if vaginal swabbing should be offered to all caesarean delivered infants in an effort to stem the risk for immune and metabolic diseases.

Further factors that influence the development of the gut microbiota include the overuse of antibiotics in both the pregnant mother and the newborn to toddler stage. Maternal use of antibiotics during gestation is an important consideration due to the new understanding of prenatal microbial exposure through the placenta and cord. (Azad et al 2013, 392; Martin et al 2016, 2.) Overuse of broad-spectrum antibiotics in the developing infant can, not only cause resistance but can also interfere with

the growth of optimal microbiota. These disruptions and alterations caused less gut microbial diversity, which in turn can lead to potential susceptibility later in life to asthma, inflammatory bowel disease and obesity. (Arrieta et al 2014, 6.)

Evidence suggests therefore that caregivers need to be aware of the potential for life-long detrimental effects on health and wellbeing when the microbiome is disrupted. Disruption can occur as early as in utero due to the new understanding of mother to child transmission of microbiota and can continue to be affected via mode of delivery, feeding, overuse of antibiotics and the environment. The goal should now shift to creating a healthy intestinal environment during the critical period when the infant's microbiome is forming and defining itself. (Dominguez-Bello et al 2016, 253; Arrieta et al 2014, 12.)

5.4 Decreased complications with delayed cord clamping

Another thing very injurious to the child is the tying and cutting of the navel string too soon, which should always be left till the child has not only repeatedly breathed but till all pulsation in the cord ceases. As otherwise the child is much weaker than it ought to be, a part of the blood being left in the placenta which ought to have been in the child and at the same time the placenta does not so naturally collapse, and withdraw itself from the sides of the uterus, and is not therefore removed with so much safety and certainty. Dr. Erasmus Darwin, 1794. (Dunn 2003, 347.)

Delayed cord clamping involves leaving the cord to continue pulsating attached to the placenta for a determined amount of time or even until the blood flow has ceased. Growing evidence suggests there are multiple benefits in delayed cord clamping. It has been common practice to separate the newborn infant from the cord immediately upon expulsion from the womb. This was initially done to allow for immediate transfer to the neonatologist for newborn check. It is an active part of the third stage management done with the hope of reducing maternal haemorrhage. Studies reveal however that delaying the separation of the cord from the newborn does not affect the incidence of haemorrhage in mothers and

presents several advantages to healthy infants such as higher birth weight, early haemoglobin concentration and increased iron reserves up to six months after birth. (McDonald, Middleton, Dowswell & Morris 2013, 2.)

The transition from fetal life to neonate is a complex physiological process that takes but a few minutes to accomplish after birth. Much has been debated in the last century on the timing of cutting the umbilical cord, because of the potential impact this practice can have on the infant's immediate and long-term well being. In the last few years we have seen revisions made to many of the policies that guide birth caregivers in their management of the third stage of labour. The World Health Organization (WHO) updated their guidelines in 2014 to reflect this and recommend that all infants, preterm and term, who do not require positive-pressure ventilation, should benefit from having the umbilical cord clamped later than the first minute after birth. This included a special remark on one minute being the lower limit supported by published evidence and that it should not be cut earlier than is necessary to apply cord traction, which would normally be around 3 minutes. Late cord clamping, determined to be approximately 1-3 minutes after birth, is strongly recommended for all births, both vaginal and caesarean, preterm and term, concurrent with essential neonatal care. (WHO 2014, 9-10.) The National Institute for Health and Care Excellence (NICE) provides national guidance and advice to improve health and social care. In its clinical guidelines regarding intrapartum care, they outline that the physiological management of the third stage of labour should involve leaving the cord to completely finish pulsating before cutting. During an active management of the third stage, when a uterotonic drug is used, the cord should not be clamped earlier than 1 minute unless there is a heart rate of below 60 beats/min that is failing to increase or if there is concern regarding the integrity of the cord, otherwise the cord can be clamped before 5 minutes so as to continue with controlled cord traction. In this document they advocate to support women in their choice to delay cord cutting past 5 minutes if it is her wish to do so, in the absence of the disqualifying criteria mentioned above. (NICE 2014, 64-66.)

The Royal College of Obstetricians and Gynaecologists (RCOG) in 2015 also amended their opinion in their scientific impact paper 14, to reflect the global acceptance of deferred cord clamping practices, based on evidence from systematic reviews detailing increased health benefits for preterm and term infants (RCOG 2015, 7). Just recently, in January 2017, the American College of Obstetricians and Gynecologists (ACOG) also released a committee opinion, endorsed by the American Academy of Pediatrics and the American College of Nurse-Midwives reflecting the emerging clinical and scientific advances acquired to date. The ACOG's opinion also considers the numerous health benefits and therefore advocates for delayed cord clamping. (ACOG 2017,684 e5)

Understanding the physiology that occurs in the infant's system at the moment of birth is important for further comprehending the need for delayed cord clamping. It has been established that delayed or deferred cord clamping has numerous beneficial health effects such as increased weight and haemoglobin levels at birth; improved iron stores in the months following birth for up to 6 months, with decreased anaemia in later infancy; improved transitional circulation; better red blood cell volume therefore decreasing the likelihood of morbidities such as intraventricular haemorrhage (IVH) and necrotizing enterocolitis (NEC) and improving cardiopulmonary adaptations. It also reduces the need for blood transfusions especially in preterm infants. Transfusion from the placenta can be as much as a 20% increase, approximately 80 ml of blood at 1 minute after birth and 100 ml after 3 minutes. The concerns proposed for avoiding the practice of deferred clamping involves the risk of postpartum haemorrhage (PPH) and increased likelihood of neonatal jaundice. These have been successfully proven to be unfounded concerns, as the use of a uterotonic, should a PPH develop, and the use of bilirubin lights, should neonatal jaundice levels be elevated (demonstrated only in a small percentage of cases observed in the study groups), can both be utilized timeously and this should not be a reason for denying delayed cord clamping. Furthermore PPH was not statistically significant, as the research showed no increase in PPH compared to the routine immediate

cord-clamping group. (McDonald et al 2013, 4-15; Chiruvolu, Tolia, Qin, Stone, Rich, Conant & Inzer 2015, 676 e1; Kluckow & Hooper 2015, 225-231; ACOG 2017, 648 e5.)

Further confirming the benefits of delayed cord clamping is noted in the physiological transition of the infant to newborn life. One of the first steps in newborn life involves aeration of the lungs. In prenatal life, fluid distends the lungs, in preparation for full maturation requiring airflow. The fetus is dependent on the placenta as a means for receiving oxygenation at this stage. Gas exchange, in the lungs occurs only once the airways are cleared of fluid and this in turn occurs when the newborn infant takes its first independent inspiration, forcing the liquid into peri-alveolar tissue to be cleared away by blood vessels and lymphatics. Recent studies have demonstrated that clamping the cord, before the child has begun breathing independently, results in a decrease of cardiac output, venous return and ventricular preload, leading to increased risk for a hypoxic/ischaemic insult. The subsequent sudden onset of ventilation thereafter increases the cardiac output and the ventricular pressure and flow, placing the newborn at risk for an intraventricular haemorrhage or even perinatal brain injury. The newborn is shielded from these physiologic upsets if ventilation occurs before UCC. (Kluckow & Hooper 2015, 226.)

Standard practice to date to prevent PPH has been to administer an uterotonic upon the birth of the anterior shoulder. Following the full delivery of the infant, immediate UCC is performed with gentle cord traction. This active management of the third stage would appear to interfere with physiological cord clamping, as these prolonged and powerful uterine contractions reduce or stop blood flow through the umbilical cord, therefore potentially reducing birth weight due to reduced blood volume and placing the infant at risk for requiring resuscitation, if spontaneous ventilation has not yet occurred. Studies have shown, that the administration of the uterotonic after placental delivery has been equally effective at preventing PPH. Implications for delivery practice dictate that delayed cord clamping is beneficial even in the event of neonatal resuscitation and with appropriate planning and care, can be

performed at the bedside, whilst the infant is still attached to the placenta. (McDonald et al 2013, 15; Kluckow & Hooper 2015, 229.)

Delayed cord clamping with standardized protocols should be encouraged as feasible and effective in most birth settings. Even in very preterm infants, whereby the circulatory transition is slower due to immaturity, evidence shows that delayed cord clamping lowers the need for intubation and resuscitation and encourages a more natural, spontaneous and physiologic transition from intrauterine to extra uterine life. The reduction in red cell transfusions, the relatively quick exchange from placental oxygenation to pulmonary oxygenation and the 'hands off' approach also encouraged more spontaneous bonding in the 'golden hour' after birth. The success of this method is dependent on clear policies and standardized protocols in place, interprofessional coordination, comprehensive staff education and training, simulation exercises and regular monitoring of staff progress and compliance. (Chiruvolu et al 2015, 67 e5-6.)

5.5 Facilitation of bonding, attachment and other processes with Skin-to-Skin

Bonding is a concept and term popularized by Klaus and Kennell (1976) referring to the immediate contact of skin-to-skin between mother and baby after birth. This period is known to be a sensitive period where the beginning stages of attachment occur. When referring to bonding at birth we will take into account those actions, which promote and those that delay bonding. We will also explore what complications, such as breastfeeding difficulties, arise as a result of delayed bonding and how the bonding relationship can be repaired. (Benoit 2004, 41-42.)

The period immediately following birth has become the focus of many studies in the last few decades. Elements such as the hormonal interplay between mother and child, physiological imperatives, psychosocial interactions and attachment have all been observed, analysed and researched to a greater extent, to better understand the short and the long

term consequences. Very little attention was afforded to newborns and young infants prior to 50 years ago, in the medical setting, simply because the understanding, at that time, did not allow for such a young human to be able to feel pain, recall or understand what was happening to them. In the century of scientific research, we witness how infants have been denied their ability to feel pain by reducing their cries to 'random sounds and reflexes' and denied their ability to feel pleasure by reducing their smiles to 'gas or muscle spasms'. Simply put, it was firmly believed, that a young infant could not have an experience, be that of pain or pleasure, since it lacked the capacity to comprehend the experience. (Chamberlain 1999, 145-160.)

Only once this conventional erroneous belief was challenged, with evidence that individuals did indeed recall later in life, memories as early as birth, and that the pain of procedures and feelings of separation could be measured and documented, did the medical fraternity start to explore the psychosocial and emotional world of newborns and to genuinely take into account the infant's experiences as an authentic occurrence. What emerged has been an astounding wealth of information yet this information is still today not being fully utilized to create a better environment into which to birth and care for a child. (Chamberlain 1990; Rodkey & Riddell 2013, 338-350; Roofthoof, Simons, Anand, Tibboel & van Dijk 2014, 218-22.)

With more investigations into the pre- and perinatal psychology of infants, we begin to uncover that the first impressions that happen to a newborn upon entering life outside the womb are vitally important. The first hour after birth, known also as the 'sacred hour' in terms of bonding and the 'golden hour' in terms of breastfeeding, is a sensitive period in which the newborn infant begins to orient to what life outside the womb is about. (Phillips 2013, 67-68.) This sensitive period is defined as a vulnerable period of time whereby specific developmental behaviours can be exhibited. These periods contribute to the acquirement of specific competences and are vulnerable to outside influences that can disrupt the process. A new skill acquired during the sensitive period is much more

readily acquired than if it is missed. When this sensitized period has passed, considerable attention and effort is required to then master the skill. (Girish, Mujawar, Gotmare, Paul, Punia & Pandey 2013, 291).

Before birth, the placenta and the womb provided the natural habitat for the infant, but upon entering the outer world, the infant needs to connect and bond with the primary source of nutrition and nurturance: the mother. The maternal breasts and body now take over the function of the placenta and uterus. This is the new natural habitat or environment of the infant. Yet in modern obstetrics, everything is geared to removing the child from this natural habitat and delaying the process of maternal-infant bonding. (Bergman & Bergman 2013, 8-9; Phillips 2013, 67-68)

The concept of bonding is important from a psychosocial perspective, as it is believed to be the basis for human attachment and relationships. The concept of bonding gained medical recognition in the mid seventies, due to the work of Klaus & Kennell (1976), yet currently this important period is still lacking the support and attention it deserves. The potential exists for nursing interventions to improve the quality of mother-baby bonding. When a supportive environment is fostered in the sensitive period, where mother and infant are primed for bonding, the benefits are observable and quantifiable. Bonding is defined as an intense emotional tie between the mother-child dyad, enhanced by the huge oxytocin release that occurs during childbirth, occurring most intensely after a natural birth, through the first week and into the first year of the infant's life. (Kinsey & Hupcey 2013, 1314-1320.)

The newborn brain is primed with noradrenaline after a natural vaginal birth, causing the infant to be alert and responsive to ensure that bonding with the mother occurs early. When a newborn is placed, uninterrupted and continuously, on the mother's abdomen, there is ample opportunity for the infant to smell, touch, lick and be comforted by the warmth of maternal skin, which is in turn primed to respond to her own infant's touch. The infant brain then fires a pathway from the amygdala directly to the frontal lobe, the site that connects these first emotional and social experiences.

This wiring occurs fastest in the hours closest to birth and continues to wire the brain to all new experiences when the same conditions are met later on i.e. close proximity to mother, safe and nurturing atmosphere and low stress levels. (Bergman 2014, 1.)

This continuous skin-to-skin contact (SSC) is called Kangaroo Mother Care (KMC) and the WHO defines it as having four main components: early, continuous and prolonged SSC between mother and child, exclusive breastfeeding, early discharge from hospital and close follow-up at home. KMC has been especially useful in low-income settings, where access to first world technology is not available. (Boundy, Dastjerdi, Spiegelman, Fawzi, Missmer, Lieberman, Kajeepeta, Wall & Chan 2016, 2; Cillessen & Zijlmans 2016, 59-63)

The benefits observed from numerous researches include: improved maintenance of the infant's temperature, heart rate and other vital signs; lower pain measurements reducing stress levels resulting in further optimization of growth; promotion of exclusive breastfeeding up to 4 months; reduced risk of sepsis, hypothermia, hypoglycaemia and readmission to hospital. The benefits have shown to improve overall outcomes in all infants but it is especially advantageous to preterm infants. Due to these well documented benefits, all major organizations responsible for the well-being of newborns and mothers, such as the WHO, American Academy of Paediatrics, Academy of Breastfeeding Medicine and the Neonatal Resuscitation Program, advocate SSC and KMC immediately after birth and for up to 24 hours thereafter. (Bigelow, Littlejohn, Bergman & McDonald 2010, 364-371; Phillips 2013, 68-72; Beijers et al 2016, 59-63; Boundy et al 2016, 4-10; Moore, Bergman, Anderson & Medley 2016, 22-27; Shorey, Hong-Gu, & Morelius 2016, 207-217.)

How can hospital staff and parents encourage and even facilitate early mother-child SSC? It is usually believed that the mother initiates contact with her baby, yet careful behavioural observations of newborn infants show that they also seek contact with their mothers soon after birth.

Immediately after a non-interventive, non-medicated, spontaneous birth the infant is primed and alert, so when they are placed securely, naked and unwashed, upon the mother's abdomen they are able to locate the breast and crawl towards it, latch and suckle on the breast, unassisted. This is only observed in cases where there is zero separation and no handling from staff to perform newborn checks. In a regular, uncomplicated birth the need for separation and newborn checks should be delayed until after the first breastfeeding has been completed, usually after the first hour or two. (Henry, Richard-Yris, Tordjman & Hausberger 2009, 5; Bergman & Bergman 2013, 9; Preer, Pisegna, Cook, Henri & Philipp 2013, 489)

SSC is not exclusively the domain of mothers as the research by Shorey et al (2016, 210) demonstrates. Fathers are just as effective in providing SSC and raising infant temperature as mothers. The research determined that SSC with a parent resulted in significantly higher body temperatures and heat conservation than if placed in a cot or incubator, therefore SSC should be considered, as a first option, in the event that heat modulation is required. Furthermore fathers also found that it promoted bonding and increased daily care behaviours. Paternal SSC, in both preterm and term infants, is feasible and important and caregivers need to begin considering this aspect in the routine care of neonates after birth.

5.6 Improve health outcomes in the short and long term with Breastfeeding

Breastfeeding is the latching and suckling of maternal milk of a newborn on its mother's breast. Breastfeeding in newborns is an instinctive response, however this is found to be true only when the newborn is left undisturbed after birth to find their way to the maternal breast. We explore what spontaneous and instinctive breastfeeding looks like, what conditions promote and hinder it and what healthcare professionals need to know to enhance this moment after birth. (Romano & Goer 2008, 58-59.)

The World Health Organization (WHO) and UNICEF are two large and well-known organizations that work to bring forward international recommendations and standards in matters relating to health. Their stance on breastfeeding is as follows: breastfeeding should commence within the baby's first hour of life; breastfeeding should continue exclusively for the first 6 months; and continued breastfeeding with the introduction of complementary food from 6 months with extended breastfeeding till 2 years or beyond. (UNICEF 2015, WHO 2016.)

Exclusive breastfeeding is understood as breast milk being the primary and sole source of infant nutrition. This excludes artificial milk supplementation, water, tea, and juice and only allows for oral rehydration solutions and liquid supplements when and if necessary to maintain optimal health. (WHO 2016.)

Six months of exclusive breastfeeding confers many documented health benefits and protection against diseases and conditions such as: necrotizing enterocolitis; otitis media; respiratory tract infections; urinary tract infection; bacteraemia; diarrhea, type 1 and type 2 Diabetes; lymphoma, leukaemia, Hodgkin's disease and childhood overweight/obesity. Mothers are also afforded health benefits through longer duration of breastfeeding such as: decreased risk of breast and ovarian cancers; reduction in postpartum haemorrhage; earlier return to pre-pregnancy weight and increased natural child spacing through lactational amenorrhea. (AAP 2012.)

Other well known international organizations that also support the same message as the WHO and UNICEF are the American Academy of Paediatrics (AAP); Academy of Breastfeeding medicine (ABM); European Lactation Consultants Alliance (ELACTA); International Baby Food Action Network (IBFAN); International Lactation Consultant Association (ILCA); La Leche League international (LLLl) and the World Alliance for Breastfeeding action (WABA), and Wellstart international (WI). (AAP 2012; ABM 2008; ELACTA 2015; IBFAN 2016; ILCA 2012; LLLl 2016; WABA 2016; & WI 2016.)

It is known that the most sensitive period for initiation of breastfeeding and bonding occurs strongest in the first hour and day following childbirth (Girish et al 2013, 291; Aghdas, Talat & Sepideh 2014, 40). Breastfeeding and bonding are closely linked as they both occur on the mother's skin and chest. What makes the breast area so inviting and ideal for a newborn baby? Thermo-graphic imaging has shown that the area surrounding the nipple, the areola, has a higher temperature than the surrounding tissue. In response to preparing for breastfeeding, the infant crying triggers this thermal feature of the areola. We know that the areola contains an abundance of blood vessels and sebaceous skin glands that serve to produce chemical signals that help guide the newborn infant towards the breast site. The higher temperature of the areola acts as a diffuser of the breast odours, which guide newborn attempts to locate and suckle from the breast. (Crenshaw 2014, 212; Zanardo & Straface 2015, 2.)

The newborn infant, under the influence of the sensitive period, has a heightened and increased awareness, causing them to be especially receptive to odour and other cues. These cues, emanating from the mother's breast area, inevitably draw the infant towards it. We can observe in the awake and aware infant, born without the inhibiting agents of maternal pain relief, an instinctive behaviour that incites them to crawl towards the source of nourishment. The breast crawl is now accepted as the newborn's natural behaviour after birth when placed in SSC with the mother. (Henderson 2011, 296; Girish et al 2013, 291.)

Why is the breast crawl so seldom seen in maternity wards? Recalling the delicacy of the sensitive periods described above, there are a number of factors that inhibit this from occurring spontaneously. Foremost, babies are almost always routinely separated from the mother after birth, before breastfeeding is initiated, for cleaning, washing, newborn checks and other hospital policies. Furthermore infant feeding is considered a factor on a checklist and this drives the nursing care to focus on the completion of a task rather than to focus on the biological and behavioural process that should be occurring. It has been shown that settings whereby nursing staff understand and value the biological imperative process, have higher

success rates for breastfeeding, in hospital and in the long term after discharge. (Henderson 2011, 297-298.) The early support and education by understanding and motivated nursing staff impacts directly on the initiation and duration of breastfeeding.

What are the cues that nursing staff can observe in newborns ready to breast crawl? Once the newborn infant has been quickly dried after birth and placed immediately skin-to-skin, prone between the breasts, and covered with a cloth and hat, observers will notice several cues to indicate that the infant is ready. Initially the infant will lift their head to visually inspect their surroundings (Gangal, Bhagat, Prabhu & Nair 2007, 12). This is facilitated also by the heightened olfactory system cueing in to the maternal odours emanating from the nipple area. The substance secreted by the glands in the nipple is similar in smell to the amniotic fluid that surrounded the infant in the womb, further guiding the infant towards the nipple (Zanardo & Straface 2015, 4). Though eyesight is limited, it is capable of focusing clearly the distance from the maternal breast to the maternal visage. From this position between the breasts, the infant has several advantages: reduced risk of infections due to colonization of maternal skin bacteria; instinctive stimulation; thermo regulated warmth; love; security and food as well as the promotion of bonding. Soon after, the infant will give a few strong kicks and sensing food is nearby, start salivating. This is apparent by the tongue protruding continuously. The infant may even lick the maternal skin surface. As baby kicks and shuffles their way onto the breast, gently massaging it, oxytocin production is increased therefore contracting the uterus and increasing the sense of wellbeing and love in the mother. The massage of the breast also allows the nipple area to contract therefore further facilitating latching. Upon reaching the areola and nipple baby will start mouthing movements and keep opening the mouth wider so as to latch on to the breast. (Gangal et al 2007, 12; Nyqvist, Anderson, Bergman, Cattaneo, Charpak, Davanzo, Ewald, Ludington-Hoe, Mendoza, Pallás-Allonso, Peláez, Sizun & Wiström 2010, 812-819; Henderson 2011, 297-299.)

Research shows that whilst mothers are in favour of SSC and breast crawl, obstetricians and labour and delivery nurses expressed concern about the feasibility of implementing this approach in a busy labour unit. Reasons that were expressed included: fear of infant falling, increased workload, concern about episiotomy care should mother be moving and delayed observations. Research illustrated that these concerns could all be overcome with increased education and exposure to the experience of regular breast crawl as a routine in the birth setting. (Girish et al 2013, 291.)

Education is a key component for a successful breastfeeding outcome. Education needs to be imparted to medical staff in contact with expectant parents, as well as those attending to them during the birthing and immediate postpartum period. Society needs to be informed on the latest research outlining evidence but more importantly, where on going support and help can be found. It is imperative that one message is given when promoting breastfeeding. Peer counselling, lactation consultants and formal breastfeeding education and promotion in pregnancy dramatically increases the success rate and the duration of exclusive breastfeeding in the first 6 months. Breastfeeding success is not only mother driven but is dependent on cultural and societal promotion as well. (Haroon, Das, Salam, Imdad & Bhutta 2013, 1-18.)

5.7 Continuous support as a means of protecting the natural birth process

Since the early 1970's researchers neonatologist Dr. Marshall H. Klaus and paediatrician Dr. John H. Kennell, have worked extensively to understand, and bring to light, the information crucial to bonding of mother and infant and to re-introduce the concept of continuous labour support or 'mothering the mother' as they termed it. The term 'doula' was borrowed from an ancient Greek term referring to a servant and has become the term used today, most usually for a lay woman, that supports and nurtures

pregnant mothers before, during and after birth. (Klaus, Kennell & Klaus 2012, 3-4.)

Why have doulas become more popular in recent years? Birth, as we know it today, has become a medicalized event. In earlier times women often laboured and birthed in the comfort of their homes, with the support of other knowledgeable women such as their mother's sisters and other more experienced women such as a midwife. The handover to a more medicalized birth brought with it certain changes in the management of labour and birth and one of the core changes we notice is the lack of continuous support by a chosen familiar person. (Fortier & Godwin 2015, e286.) Even in the event that one-to-one nursing is provided to a labouring woman in today's hospitals, the myriad of nursing responsibilities will ensure that it is almost impossible for a nurse to provide continuous support during labour and birth (Gruber, Cupito & Dobson 2013, 56).

Sadly the popularization of doulas is also in response to the growing concern about the dehumanization of the modern day woman's birth experience. This has lead more and more women to seek out the emotional and psychosocial comfort of one-on-one continuous support of an experienced person such as a doula. Support that is sought as a comfort measure to complement and supplement the medicalized care they receive in hospitals. (Hodnett, Gates, Hofmeyr & Sakala 2014, 2.)

Doulas are trained to provide the continuous support that is needed during this time. Their training includes emotional and physical support for women and their partners during pregnancy, childbirth and the postpartum period. They offer reassurance, advice and information about the labour process, proven coping and comfort measures, breastfeeding information and most of all, assistance to empower women to better express their desires and wishes. (Hodnett et al 2014, 3; Fortier & Godwin 2015, e286.)

Research studies have shown that the impact of continuous support by a trained doula, for women of all income groups, reduces the need for caesarean, instrumental and medicated births, as well as shortening the

duration of labour. Overall satisfaction regarding the birthing experience was considered higher for women that received continuous care by someone other than an attending nurse. (Declercq, Sakala, Corry, Applebaum & Herrlich 2013, 16; Gruber et al 2013, 50; Hodnett et al 2014, 2-3.) When comparing the overall impact of doulas on healthy birth outcomes Gruber et al (2013) concluded that doulas focused on individualized support before, during and after birth therefore empowering and motivating women to improve their overall health prenatally, to make informed decisions and therefore to achieve the best birth outcomes possible. When medical professionals, hospital administration and nursing staff understand the beneficial involvement of doulas in the overall care of pregnant women, financial and personal costs of adverse birth outcomes can be significantly reduced.

6 INFORMATION BOOKLET

Following our theoretical findings, we created a booklet as our final functional product. The booklet is aimed at midwives, labour and delivery nurses, and obstetricians in understanding, educating and developing medical skill competences needed for labour and delivery. It is furthermore aimed at newly pregnant couples to aid them in making informed choices concerning childbirth, breastfeeding and postpartum care.

We have developed the booklet at our own cost and have made it available as a PDF. Permission is granted to download, print and distribute it as widely as possible, in any setting whereby this information would be useful. Permission and recognition has been given for images and sources used. Acknowledged references and ethical consideration in our research work have been considered adequately and faithfully.

The booklet encompasses and summarizes our aim and purpose for the thesis, which is to highlight what the newborn needs most at the moment of birth and soon after. It also details how reducing artificial interferences can encourage natural childbirth and improve outcomes for mothers and newborns.

Research into how to create an effective educational booklet was done and our creation was based on the guidelines outlined on a handbook titled: 'How to create effective written patient learning materials'. Special attention was given to developing the content by using, as suggested, evidence-based materials, photos to supplement our text, using the objectives and outcomes to structure the content, informing readers what knowledge will be gained from reading this booklet and having the booklet proof-read by more than one person. (JGH 2008.)

The images used are relevant to physiological natural childbirth and breastfeeding. Photographs were sourced directly from interested contributors, through online social media such as Facebook. The request included the main themes of this thesis: physiological childbirth, ejection

reflex, seeding the newborn gut, delayed cord clamping, bonding, skin to skin, breastfeeding and continuous labour support. The images chosen are intended to be visually appealing and thought provoking since research shows that images help educate and tell a story as well as help the reader to engage become involved (Balm 2014). Permission was granted for the use of a non-commercial educational booklet and acknowledgement has been given for all photographs used.

The booklet had several draft copies and at each stage a peer-review was undertaken with feedback from fellow nursing students, experienced midwives and lay parents. The choice to use a sample from these different demographics was in keeping with the target audience intended for this thesis.

The outline chosen is a simple A5 page. The font chosen was Economica, for its simplicity and ease of reading. It is freely available to download on the Internet. The colour scheme was kept simple and has a light red overtone to the images and the headings as this created a diffused yet appealing feel to the booklet.

The language used is deliberately academic as we are intending for this booklet to be read by professionals as well as informed parent-to-be. We have kept the definitions simple yet relevant to medical language used in interactions between pregnant couples and their obstetric caregivers. The booklet therefore clearly reflects the reliable facts about a normal uninterrupted physiological childbirth with non-medical interventions, essential benefits to mother and baby and why it should be embraced and practiced in the Finnish system.

In the interest of creating a culturally appropriate work, the perceptions of Finnish parents, about normal birth, was included as it draws out what important information to share with the local population. Furthermore the booklet will be shared, in conjunction with the thesis, on theseus.fi. At a later date it will be translated into Finnish and made available after the initial publication on one of the author's website at www.birth.fi.

7 DISCUSSION

7.1 Explaining a contextual case of uninterrupted physiological childbirth

This thesis aims to clearly outline the increased beneficial outcomes for the mother/newborn dyad by reducing unnecessary artificial interferences as well as determining what the newborn needs the most at the moment of birth and soon thereafter. Through a review of the available research literature, various results and conclusions have been found and outlined below.

The success of a physiological childbirth has been summarised by Romano and Lothian (2008, 96; 2014b, 175) in their paper using evidence based care practices that promote the normal physiological process of labour and childbirth in the absence of medical interferences. In their research, they identified unnecessary medical induction of labour as a direct cause to poor outcomes and emergency interventions such as caesarean section, instrumental deliveries and neonatal resuscitation.

Medical interference in pregnancy and childbirth, according to Buckley (2009) has basically eroded the traditional way of birthing. This is done in the name of reducing maternal and infant morbidity and mortality, without any long-term vision to the emotional and psychological damage it is posing on our current and future generations of women and families. Citing Odent (2001) Buckley posits, that the bonding stage that occurs after delivery, represents the first or primal contact experience, creating the basis for one of the most powerful relationships an individual will ever have, the bond between mother and baby. So much is happening during this vulnerable moment, yet, instead of protecting this unique moment in time, our modern day medical guidelines dictate that we hold fast to separating baby and mother in favour of proceeding with injections, examinations, clamping and pulling of the cord and other interventions that are both painful as well as mostly unnecessary in a normal physiological childbirth.

New guidelines, acknowledged by the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine, corroborate that labour has its own timeline. These organizations therefore recommend giving more time to labouring women during the first and second stage of labour. This will allow for a more natural progression of labour and spontaneous pushing effort therefore resulting in fewer iatrogenic complications. (Lothian 2014b, 175; Amis 2014, 179.)

When medical professionals begin to understand the research presented here, we will notice that there will be a true understanding of the specific actions and reactions that occur in the maternal body for labour to commence spontaneously. Understanding of how the delicate orchestrations of oxytocin, catecholamines, noradrenaline, adrenaline and endorphin release can so easily be disrupted and lead to a cascade of interventions that will alter the course of the labour. We might also begin to see a change in the hospital policies and environments. We would expect to witness a call for more privacy, eliminating the need to move a labouring women through various rooms crowded with strangers, well-intentioned as they may be. Birthing rooms akin to nurturing home environments, that have adjustable lighting settings, accommodating the entire birthing entourage from partner to doula and that allow for all the stages of labour including the postpartum rooming in period. The safer and more undisturbed the labour process is, from the early beginnings, the more effective the labour efforts will be and the outcomes will be much improved for mother and newborn. Labour works best when left alone. (Odent 1987, 105; Odent 2000, 12; Alehagen et al 2005, 153-154; Buckley 2011; 2015, 26-52.)

When such home-like settings, and the accompanying mind-set of protecting the labour space, become available to pregnant women, we would be called to witness more spontaneous birthing processes. A supportive environment would encourage upright posture for labour and delivery as well as adopting whatever position the mother instinctively adopts to birth her child. This would reduce the time of pushing and also improve overall maternal and fetal outcomes with reduced need for

episiotomy or assisted deliveries and faster neonatal recuperation time. (Roberts et al 1987, 53; Roberts & Hanson 2007, 238-241; Prinz et al 2011, 663; Lemos et al 2017.)

The more undisturbed the process the more intense the final ejection reflex becomes. With minimal effort, strong labour contractions urge the descending fetus to be ejected spontaneously from the maternal body. Labour attendants that are knowledgeable would need to perform fewer invasive interventions, leading to a safer outcome for mother and child. Reduced interventions leads to reduced cost and higher overall satisfaction and well-being. (Newton 1987, 107-108; Odent 1987, 105; Odent 2009, 697-699; Buckley 2015, 35-37.) Yildirim & Kizilkaya (2008, 29-30) confirms this increase in satisfaction and positive birth outcomes but they also elevate our understanding to include advocating for the education of both the pregnant woman as well as all birth professionals. They call for a more natural approach to the second stage of labour allowing spontaneous pushing efforts instead of the traditional method of directed pushing.

As we have shown, natural birth continues to bring further benefits via the colonization of the neonate's microbiome. Early colonization of the infant's gut may provide long-lasting effects on health. (Azad et al 2013, 385-386.) The infant's microbiome is seeded with a rich microbiota already before birth via the maternal placenta and is then further colonized via the passage through the maternal vagina. The implications of this understanding indicates the need to consider both maternal diet in pregnancy as well as the mode of delivery, since both are crucial in the correct seeding of the newborn gut. (Neu & Rushing 2011, 322; Martin et al 2016, 8-9; Vinturache et al 2016, 95.)

Caesarean delivered infants displayed a marked difference in microbiota composition and research is still on going to determine the possibility of a higher risk for diseases such as allergies, asthma, type 1 diabetes, obesity and other immune health complications. As a result further investigations are warranted in effecting vaginal swabbing at all caesarean deliveries in

an effort to increase the potential for the gastrointestinal tract to easily organise and optimally metabolize nutrients necessary for continued health. (Aagaard et al 2014, 237; Rautava 2015, 6-7; Madan et al 2016, 13; Martin et al 2016, 2.)

To continue with improving health outcomes in the short and long term for the newborn infant, several professional bodies have started adhering to newer guidelines with regard to the timing of clamping the umbilical cord. Higher haemoglobin concentrations, increased iron reserves for up to 6 months post-birth and increased birth weight all indicate that this should be a valid practice in modern day obstetrics. The concerns for increased maternal postpartum haemorrhage and/or the need to perform neonatal resuscitation have also been investigated and are alleviated by adequate planning and execution of routine protocols already in place at the birth site. (McDonald et al 2013, 2.)

NICE guidelines regarding intrapartum care outlines clearly that the physiological management of the third stage of labour should involve leaving the cord to completely finish pulsating and all blood flow to cease before cutting the cord. These guidelines also state that during an active management of the third stage, with concurrent use of a uterotonic drug, the cord should be allowed to continue pulsating for up to 5 minutes. Only in the event of a neonatal heart rate below 60 beats per minute with no signs of increasing, or concern with cord integrity, should the cord be clamped after a full minute has passed and not before. (NICE 2014, 64-66.) Chiruvolu et al (2015, 67 e5-6) further challenge, that the success of this method is dependent on clear hospital policies, standardised protocols, interprofessional cooperation and coordination as well as comprehensive staff training and education with regular monitoring of compliance and progress.

Aghdas et al (2014, 40) illustrates clearly that what the baby needs most at the moment of birth and soon after are mother-infant skin-to-skin contact and immediate breastfeeding. The sensitive period, which is the first 2 hours after delivery is highly important as this has proven to help in

the successful initiation of breastfeeding. In their paper, it was noted that skin to skin contact initiates the first bonding between mother and child, increases the maternal confidence and satisfaction in nursing exclusively, encourages mother in their routine care of their infants as well as prevent premature discontinuation of breastfeeding.

Similarly, with the evidence currently available by Crenshaw (2014, 212) immediate, uninterrupted skin-to-skin care following vaginal birth, during and after caesarean surgery for stable mothers and babies, regardless of feeding preference is needed by mothers and baby. Owing to the fact that skin-to-skin care and breastfeeding promotes optimal maternal and child outcomes and bearing it in mind that any disruption or delay of skin-to-skin care during the magical, golden or sensitive hour may suppress a newborn's protective behaviours. Not only that, it could lead to behavioural disorganization and make self-attachment and breastfeeding difficult, reduce the mother's prompt response to the baby's need and negatively affect the maternal behaviour. Hence it was notably observed that newborns who had bonding and skin to skin contact with their mother had more stable blood glucose level, thermal regulation, more blood glucose level, enhanced cardio-respiratory stability as well as oxygen saturation level. (Bigelow et al 2010, 364-371; Phillips 2013, 68-72; Beijers et al 2016, 59-63; Boundy et al 2016, 4-10; Moore et al 2016, 22-27; Shorey et al 2016, 207-217.)

Through extensive research and observations Bergman (2013, 67-68; 2014, 1) concludes that the maternal body and breasts take over the function of the womb and the placenta and that these are now the natural habitat for the newborn infant. It is in this location that the newborn brain is able to wire and process new experiences. Yet we still find in modern day labour wards, infants being removed from their mothers at birth and soon thereafter for weighing, measuring, bathing and other invasive interferences with no regard to the damage that is occurring to the bond between mother and child. (Henry et al 2009, 5; Bergman & Bergman 2013, 9; Preer et al 2013, 489)

Interlinked with skin-to-skin and bonding is the initiation of breastfeeding. When a newborn is in close contact with the maternal skin, on their stomach, and allowed to follow their own innate biological imperative, observers will note how the newborn will crawl towards the source of nourishment, through a series of inborn reflexes and following external cues from the olfactory, thermal and visual senses. This breast crawl is considered to be the newborn's natural behaviour and when this is absent it is to be considered a deviation from the norm. Highly interventive and medicated births will suppress this natural behaviour further reinforcing our determination to strive for physiological childbirth. (Henderson 2011, 296; Girish et al 2013, 288-291.) It has been shown that settings whereby nursing staff understand and value the biological imperative process, have higher success rates for breastfeeding, in hospital and in the long term after discharge. (Henderson 2011, 297-298.) Therefore the early support and education by understanding and motivated nursing staff impacts directly on the initiation and duration of breastfeeding (Haroon et al 2013, 1-18).

In our busy, modern day obstetric units, support for the labouring woman has become quite a rarity. In the effort to streamline the birthing process and to curtail costs, women in labour are increasingly subjected to being left unattended for large portions of her labour. The outcome of this practice has clearly been observed: increased fear of the unknown journey ahead; increased demand for medicated pain relief; decrease in functionality and progression of labour necessitating further medical interventions and ultimately the dehumanization of one of women's greatest rites of passage: childbirth. In an effort to stem this tide, more and more expectant women are turning towards hiring a trained labour companion or doula. Significantly, the essence of a doula is seen as support for the woman during all stages of labour and after birth, whilst the nurse and/or doctor focus's on the baby and general wellbeing of the woman in labour. Other practices include: encouraging bonding of mother and newborn as well as immediate breastfeeding; delivering in non-supine positions; Alternative birthing methods such as water birth; free movement

of the woman in labour with different positions to encourage progress and descent; comfort measure and pain relief techniques. (Gruber et al 2013, 50; Hodnett et al 2014, 2-3.)

The effect of continuous labour support from a trained provider, given as emotional and psychological support, not only reduces maternal anxiety but also the effects of stress hormones on the mother. Research has clearly proven the multitude of benefits of having a trained doula but the overall higher satisfaction in women that have additional support other than an attending nurse should give us reason to pause. If introducing a lay person can improve the education and motivation of expectant mothers to improve their overall health prenatally, as well as making informed decisions to improve birth outcomes, should birth professionals and hospital administrators not therefore consider using these lay people to better birth outcomes and to reduce the costs and the financial burden for hospitals? (Klaus et al 2012, 3-4; Declercq et al 2013, 16.)

Finally our research concludes that to overcome unnecessary medical intervention during childbirth, an expectant mother should familiarize herself with the place of birth and the health care provider she will encounter, as this encourages mothers to make better decisions about their birth. Also, in the effort of assisting women to make better decisions, childbirth education should be emphasize, as it encourages women to prepare and plan psychologically for labour and birth. The study carried out by Lothian (2009, 51- 53) identified how natural childbirth should be encouraged with no artificial interference. The available evidence from the study suggests the importance of childbirth education in facilitating safe pregnancy and birth as well as aiding women to navigate the maze of modern obstetrics. In other words, good childbirth education can aid women to learn how simple birth can and should be, how to be confident in their ability to birth and nurture their babies, and how to avoid worry and fear during pregnancy and childbirth.

Empowering women with this knowledge means that we meet women as co-creators and investors of their care instead of being subjected to blindly

following protocols. In the same vein, childbirth education helps women choose wisely and communicate effectively with health providers. It aids them in knowing their choices and rights for safe and healthy childbirth options, therefore preserving their rights for informed consent and/or informed refusal. (Lothian, 2009, 52.)

7.2 Ethical considerations, validity and reliability

Ethics is a key element in nursing education and practice. Ethical considerations are also applicable while conducting research and the development of evidence as it helps to promote scientific advancement. Ethics is defined as the rules and regulations guiding human behaviour. From a historical point of view, research ethics has had a chequered past and without due cognizance, there is always the potential for research to do harm. When carrying out a research, researchers need to have an understanding and knowledge of research ethics and carefully plan how to address ethics within their research in order to avoid risk and harm to research participants. (Doody and Noonan 2016, 803-806.) In this study, we respect the authorship of the various writers by rightfully citing them in the correct order and we also avoid plagiarism by citing all references used based on the thesis guidelines given by Lahti University of Applied Sciences. Full consent was obtained from all individuals that contributed to this work and acknowledgement has been given where it was due. Any exaggeration, deception or bias regarding the aims and objectives set out in this thesis have been avoided as much as consciously possible. (Carver, Dellva, Emmanuel & Parchure 2011, 124.)

Reliability is defined as the consistency with which a result or outcome can be replicated again using the same conditions. The results need to be repeatable and must generate the same conclusions when performed by other parties. When research contains a high level of reliability then it is usually considered less biased and is better accepted in the scientific community. (Shuttleworth 2008.) Reliability can be compromised when a subjective approach is adopted. This is increased if there is only one

observer or researcher as the provider of information and data. (Dudovskiy 2017.) This thesis has a good reliability value since all the results can be replicated by performing a search using the same keywords. All the sources used are from reputable and reliable scientific journals, books and reviews. In most cases more than one source was utilised to increase the reliability of the message we wished to convey. Furthermore this study was undertaken by two nursing students, that individually interpreted the data collected based on the predetermined keywords. Every effort was made to convey the true meaning, with minimal alteration, of the various authors' words therefore holding true to the original sources.

Validity determines the accuracy of what has been studied and whether the results conform to the requirements of the research method (Shuttleworth 2008). To determine if our thesis satisfied the validity criteria for a research, we followed guidelines proposed by Dudovskiy (2017):

1. Selecting an appropriate time scale for the study
2. Choosing an appropriate methodology, bearing in mind the characteristics of the study

In conclusion we can attest that this thesis followed an appropriate time scale with regards to researching, obtaining and reviewing the materials needed. We began in January 2017 and we concluded in May 2017. We chose an appropriate methodology for our research as we believed that creating a functional booklet of the literature researched would be more widely accepted and easier to distribute therefore reaching a wider audience.

8 CONCLUSIONS

Based on the study undertaken for this research thesis, several important conclusions have been drawn, that could benefit the health care system and population as well as improve childbirth practices for the Finnish population. It has been found that the Finnish child-care management is centralised, with very little or no support offered to birthing outside of the hospital system. This severely restricts the choices of Finnish people and impedes the training of experienced and supportive home-birth attendants. In recent years, most outlying home-like birthing centres have been shut down and births shepherded into main hospital districts. This thesis has demonstrated that current birthing practices, worldwide as well as in Finland, are falling short of achieving safer outcomes for mothers and babies. In the interest of normalizing birth and improving outcomes we should be encouraging the existence of smaller birthing units and the training of qualified staff educated in the benefits of natural and physiological birth.

Supportive care by a familiar person has shown to reduce fear. This small step alone can improve the outcomes of birth for mothers and newborns. We have established how the reduction of fear allows the maternal hormones to work more effectively. We have also revealed how the choice of environment will enhance the labour progress. When labour is allowed to follow its own timeline and interventions are used only in cases of necessity we also notice a reduction in iatrogenic complications. It is our belief that an educated and informed birth team will see this happening spontaneously during a physiologic birth as outlined in this thesis. Furthermore the engagement of a doula could help bridge the huge gap that currently exists in Finland but ultimately women should be allowed to choose both her caregivers and the place of birth so as to fulfil her sense of self.

It is thereby our hope that the short and long-term positive outcomes and patient's satisfaction of an uninterrupted childbirth will be taken into consideration before any hurried or routine medical interventions are

performed. Natural childbirth is a safe and viable option as opposed to a medicalized, interventive birth and it should be encouraged as a first approach rather than an abnormality. We are cognisant of the fact that complications do occur in childbirth and we do not expect that lives should be placed at risk in the attempt to carry out more natural and physiological deliveries but we have shown in our research that, wherever possible, a hands off approach should be adopted to avoid creating a cascade of events that will therefore necessitate further interventions.

Another key point for obstetricians, midwives and all other health practitioners to keep in mind is that the goal of any prenatal education is to care for, encourage, educate and build a woman's confidence on how to give birth as normally as possible alongside an individualized care plan. Evidenced based practices supporting a normal physiological childbirth should be embraced and implemented by focusing on offering holistic nursing care and not only the medical care and management during childbirth. It would behoove us all to keep in mind, that the main purpose of caregivers is to support, guide and provide an holistic nursing and midwifery care in the pursuit of the woman's satisfaction, happiness and positive outcomes for the newborn and family.

In conclusion, the authors have found that the goal of this thesis has been adequately achieved as it provides useful insights into the evidence and benefits associated with physiological childbirth and what is most necessary to mother and newborn. We hope that the clear conclusions drawn from our research will impact the Finnish health care environment and practitioners, teachers and students and most of all mothers during childbirth. We hope that childbirth educators and practitioners would support these physiological needs through formal education, advocacy and implementation of evidence-based maternity practices. Expectant mothers would also be encouraged to make informed choices regarding childbirth, as options in Finland are limited.

8.1 Implications for further studies

This study, being an exploratory-descriptive qualitative research, raises opportunities for further study both in terms of theory and practice with regards to healthcare. The in-depth evidences from this study have proved positive outcomes of an uninterrupted physiological birth for mother and newborn, that if applied to practice, more women will have the opportunity to experience normal physiologic birth. This study therefore offers the opportunity to refine and validate the concepts, availability and evidences of home birth as well as continuity of care with a single chosen midwife in Finland, as it was observed from this research that informed choices concerning birth are limited in Finland.

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APPENDICES: THE BOOKLET

The Booklet titled “Natural birth, guidelines for having a physiological natural birth” written by Rosalia Pihlajasaari and Omolola Akala is part of this thesis and has been uploaded as a PDF to www.theseus.fi separately from the main paper.

IGOR STEPOVIK (RUSSIA)



Natural Birth

This booklet was created in conjunction with a Bachelor Thesis in Nursing at the Lahti University of Applied Sciences (LUAS) / Lahden Ammattikorkeakoulu (LAMK) by Rosalia Pihlajasaari and Omolola Akala

It may be printed and shared for free in any setting where people may benefit from the knowledge and research contained herein without alteration.

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Publication date 2017

Guidelines for having
a natural physiologic birth

LOKELANI PHOTOGRAPHY (USA)



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Introduction

Science and technology have had huge advances in the last few decades and we have seen many innovations and advancements in maternity as well. However, we are still experiencing unnaturally high levels of complications. ⁽¹⁾

One of the main reasons for the high levels of complications is the increase of interventions in childbirth, in the absence of medical necessity. This poses greater risks to mothers and babies. Interfering in a natural physiological childbirth is not supported by the evidence collected and goes against the imperative to “first, do not harm!” ⁽²⁾

The history of childbirth illustrates how we have moved a once natural process, such as childbirth, out of the homes and into hospital wards. Whilst the medicalization of birth has certainly brought with it numerous benefits, we have also lost the innate ability to trust the natural process. Pregnancy and birth is treated today as an illness and something to be managed, because it is believed that otherwise it will not proceed safely or adequately. ⁽³⁾

Birthing professionals and parents need to rediscover and find the joys in safe natural childbirth. Medical interventions can save lives when there is a valid and justified cause but the evidence clearly shows, that when women are supported, educated and participants in their own care, pregnancy and birth can be safe and natural. ⁽³⁾

We have taken into account the Finnish people’s perspective of birth so that this booklet may fulfil it’s aim of empowering new parents with adequate evidence-based information so that they can clearly inform their caregivers of the support they hope to receive during their pregnancy and birth. We aim to reignite the flame of knowledge within health care providers to offer and support more natural approaches to childbirth in the interest of better outcomes for mothers and babies.

MEAGAN LE COQ (SOUTH AFRICA)



Finnish perceptions on childbirth

Several Finnish studies illustrate that Finnish couples value: an unhurried birthing atmosphere, characterised by peace and harmony; a sense of normality whereby the birth is viewed and treated as a normal, natural and uncomplicated event; a sense of security by having qualified, experienced and supportive labour attendants; having control over what is done to them via informative discussions regarding procedures and decisions; and a reasonable duration of labour. These perceptions highlight the need to analyse local procedures and adapt to incorporate more natural and physiological methods for birthing. ⁽⁴⁾⁽⁵⁾

Homebirth is not a supported birth choice in Finland yet Finnish researchers find that it is something that is hoped for by many people. ⁽⁶⁾⁽⁷⁾ These findings provide evidence that home birth or at the very least, a more home like setting, should be considered as an option in antenatal education and that both health professionals and parents should be adequately prepared and educated as to the merits and benefits of reducing interventions and increasing the confidence in natural childbirth. Central hospitals that provide birthing services should pay attention to family and client centred care, families' autonomy and their personal wishes regarding their choices in birth. ⁽⁸⁾

Typically research highlights higher levels of fear in first time mothers yet in Finland fear is greater in women that have a previous history of childbirth. Risk factors associated with increased fear were found to be: possibility of depression following unfulfilled expectations and difficult deliveries, caesarean sections and lack of support. ⁽⁹⁾

These findings illustrate it is essential for maternity care givers to support, educate and allay anxiety where needed, which can be achieved by continuous midwifery care throughout pregnancy and continuing into the delivery. This channels many opportunities for the health caregivers and mothers to establish an interpersonal patient-nurse relationship of trust and support. Childbirth education is another way to prepare mothers psychologically for normal physiologic childbirth as well as what to expect should there be a need be for medical interventions. ⁽¹⁰⁾

In order to achieve a physiologic birth, both caregivers and expectant parents need to be working in tandem, with the same knowledge and information, creating a calm and supportive environment for labour and birth to progress as naturally as possible. ⁽¹⁰⁾

As a result of the nature of the Finnish maternity system the benefits of the continuous relationship between expectant mothers and their delivery midwife is not achieved. It is advisable to implement strategies that will allow for expectant couples to forge relationships of trust and understanding with their caregivers and place of birth so as to positively affect them and help overcome fear of the unknown. ⁽⁷⁾⁽¹⁰⁾

Evidence and Outcomes of Physiologic Birth

Natural childbirth is defined and understood to be when childbirth follows a physiological pattern whereby the commencement of labour begins without any artificial induction agents or mechanical interventions and continues spontaneously. Labour is allowed to commence within its own time frame and proceeds at its own pace. No chemical or artificial means are used to either induce or to augment labour. Labour then concludes with the spontaneous ejection of the neonate and commencement of breastfeeding. ⁽¹¹⁾

Hormones

To comprehensively understand a physiological birth process, we need to follow the natural preparations that occur in the maternal body, as it gets ready for the spontaneous onset of labour. There is a complex hormonal interplay that is at work, which activates the entire process.

Low-grade contractions begin when the oestrogen levels in the body increase in the weeks leading up to labour. These Braxton-hicks contractions serve to help prepare for labour and with the addition of prostaglandins and oxytocin the mouth of the womb (cervix) is softened and helped to shorten.

The more effective labour contractions finish the job of fully softening, shortening and opening the cervix. Oxytocin levels keep rising as labour approaches and begins. This hormone is an important hormone that is responsible for many different aspects of birthing, bonding and breastfeeding. It helps create effective contractions as well as to cope with the stress and pain of birth, it helps with the ejection reflex when baby is born and for the milk ejection after birth, it reduces postpartum haemorrhaging, it facilitated mother-child bonding, breastfeeding and it is vital for all social interactions. ⁽¹²⁾

Oxytocin production is enhanced when the labouring woman is in an environment that causes her no fear or reason for stress, such as a familiar, darkened, warm, nurturing and supportive place. Effective contractions lead to the stable and regular progression of labour. ⁽¹²⁾

Natural oxytocin differs from artificial oxytocin (syntocinon) as it acts upon the pituitary gland, sending pulsatile waves of hormone into the maternal system. This wave-like action allows the mother's receptor sites to be washed in the hormone and to continuously adapt to the increasing force of the contractions until the expulsive force urges the baby out of the womb. ⁽¹³⁾

Important to note that with induced labours, artificial oxytocin create strong and uniform contractions. These contractions usually are too intense to continue coping with, so pain relief is often given in the form of an epidural. The course of labour is notably altered as a result, and a cascade of interventions becomes necessary to keep mother and baby safe. ⁽¹⁴⁾

Cascade of interventions

Induction of labour → stronger, longer contractions → increased need to monitor mother and baby → restricting movements → increasing pain and discomfort → slowing progress of labour → increasing additional need for artificial oxytocin → increasing contraction strength and decreasing coping → creating need for more pain relief - epidural → additional monitoring to keep mother and baby safe → relaxing of pelvic floor → baby doesn't descend into position properly or is not coping well → instrument or surgical delivery to assist birth. (15)

Another of the important hormones of labour are the beta-endorphins. These are compared to opiates and function as the body's own painkillers. They also assist in reducing stress and increasing euphoria and pleasure. This special hormone is responsible for creating the deep altered state that helps women during active labour when the contractions are strongest. It is also involved with instinctive maternal behaviour and attachment to the new baby. Negative impact and artificial analgesia can impact on the release of beta-endorphins altering the course of labour and derailing mother-child bonding. It is important to ensure that labouring women are encouraged and supported to allow the body's own natural resources to flow and guide the labour process. This ensures not only that she is coping but also that she is primed to bond and attach to her new baby as instinctively as possible, easing her transition into motherhood. (16)(17)

It is important to have good and effective contractions that help with birthing the baby. The hormones adrenaline and noradrenaline can impact on the nature of the contractions and make them weaker or even stop altogether. In an environment where the labouring woman does not feel safe and supported and she experiences fear, anxiety or stress, a complex hormonal cascade begins. (18)

The release of adrenaline and noradrenaline, also known as the 'flight or fight' hormones, is a safety mechanism to enable a person to flee or fight off any danger presenting to them. This is generally a good thing if we want to avoid danger but in early labour these hormones have the effect of slowing down or even stopping contractions altogether. (19)

Conversely, adrenaline in the transition phase (when the labouring woman is well in advanced labour and ready to start to deliver her baby) assists the uterus to eject the newborn through a series of powerful contractions. This is noticeable in an undisturbed birth where the mother is given every possibility to follow her labour instinctively. Labour works best when left alone. (20)

Experienced birth attendants will recognise that the labouring woman is under the influence of these powerful hormones when her behaviour changes suddenly. The labouring mother will display a sudden increase in energy and alertness; she may have deeper vocalizations and verbalise fears or become irrational; her posture will change as she instinctively seeks a position to birth her baby; and finally a series of stronger, more focused contractions will begin, with the peaking of the oxytocin hormone, that assists in the quick and instinctive expulsion of the baby. (12)(18)(20)

Ejection Reflex

The ejection reflex is a term that French obstetrician and well-known writer and researcher Michel Odent revived to describe the spontaneous and instinctive process of expelling the fetus from the maternal body. This power is harnessed in response to the surge of adrenaline in the mother's body during a completely undisturbed labour. (21)

Labour attendants facilitating a physiological birth, observe specific behaviours that indicate that this stage is imminent: a sudden change in posture to a more upright/squatting position with a need to grasp or hold on to something; increase in strength and a more alert appearance: irrational fear of impending doom or death with accompanying vocalizations; dilated pupils and dry mouth with deep thirst. This phase is only observable in an undisturbed birth and therefore quite a rare happening in today's medicalized atmosphere. When such behaviour is observed, most attendants will seek to resolve the fear or at least alleviate it by offering pain relief and engaging in unnecessary discussions therefore delaying and/or halting the progress of the labour. It is not uncommon to find labour stalling in such an advanced stage therefore necessitating further augmentation or interventions. (12)

It is important to differentiate the difference between the ejection reflex and the Ferguson reflex. The Ferguson reflex happens when the cervix reaches full dilation and pressure from the baby's head is pressing on the perineum. This pressure triggers an urge to push, similar to the urge to pass a bowel movement. The difference between the ejection reflex, brought about by hormonal and psychological factors, and the Ferguson reflex, brought on by physical factors, is the mode of expelling the baby. The ejection reflex is an involuntary action that expels the newborn out of the womb through a series of irresistible contractions. With the Ferguson reflex the labouring mother needs to assist the delivery with forceful and directed pushing. (12)(18)(22)

Furthermore the traditional use of the Valsalva technique, still extensively used today, whereby labouring women are told to hold their breath for 10 seconds whilst pushing and closing off their glottis, has been found to negatively affect both mother and baby. We begin to notice in the baby adverse effects in acid-base balance, lower APGAR scores at birth and decreased brain oxygenation due to the immense strain they are under during directed pushing. On the maternal behalf, we notice increased fatigue, accompanied by decreased ability to pursue labour, higher incidence of pelvic floor dysfunction and damage as well as bladder impairments postpartum. (24)(25)(26)(27)

The benefit of a physiologic birth leads to spontaneous bearing down. The outcomes include a healthy, vigorous baby at birth, reduced trauma for mother and child and a more positive and empowered birth for the mother. (23)(24)

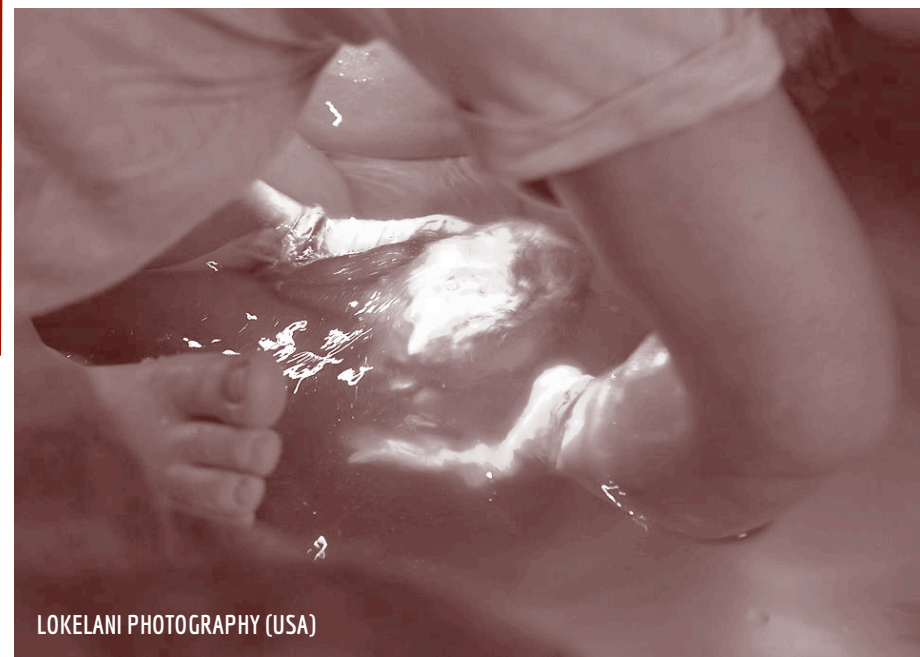
Spontaneous pushing has been noted, by many observers and researchers, as being more in line with what the body instinctively does when the mother is self-directed. Spontaneous or instinctive pushing can be accompanied by vocalizations deep in the throat, short bursts of self-directed pushing with minimally short breath holding patterns. Also noted in various studies, was the position adopted by the labouring mother. When an upright posture is used the time of pushing was reduced compared to the groups that were in the lithotomy or supine position.

(23)(24)(25)(27)

Relevant to the discussion on pushing is the moment upon which labouring women are actually desirous or commanded to bear down. It has become commonplace to expect a woman in labour to begin immediately bearing down when she has reached full cervical dilation, yet not all women experience this urge to bear down at this stage. What is more relevant to the desire or the urge to push is whether the presenting part of the foetus's head is at a lower station in the pelvis therefore setting off the urge to push. (22)(25)(26)(28)

Trial studies have observed that the time of bearing down is significantly reduced in the spontaneous bearing down group versus the Valsalva type pushing. Satisfaction levels increased and overall maternal and infant outcomes were more positive. Of major interest though is the need to further educate women and birth professionals on the benefits of spontaneous pushing versus directed pushing. (26)

Returning to the concept of ejection reflex coined by Dr Michel Odent, it becomes evident that spontaneous pushing is an element of the ejection reflex but it is not the reflex itself. To create an true ejection reflex in a labouring woman, one needs to not only allow for the labouring woman's natural urge to push to surface unhindered, but also to facilitate a distraction free environment whereby the woman can feel unobserved and empowered to follow her body's own natural design, for her to allow her mammalian or instinctive brain to overcome the neocortex enabling her to experience a near-transcendent emotional state during the first meeting and bonding with her baby. (12)(18)(22)



LOKELANI PHOTOGRAPHY (USA)

Seeding the Newborn gut

New research is highlighting the importance of microbial colonization in the newborn gut. We are beginning to understand how this occurs simultaneously with the immune system maturation and that human intestinal microbiota is seeded before birth with increased diversity through the process of passing through the maternal birth canal. It is explained as the process whereby approximately 160 different bacteria, which in turn play a vital role in human health, colonize the newborn gut. The disruption of this process has shown to increase susceptibility to disease throughout the lifespan of the individual. ⁽²⁹⁾ Gut integrity and health promotes and stimulates the immune system; promotes the processing and use of nutrients in the system; regulates intestinal homeostasis and enables resistance to pathogens. ⁽³⁰⁾

Until recently it has been believed that the uterus, placenta and membranes were completely sterile and that the newborn gut was also sterile, yet new emerging data suggests that there is a microbiome in the placental site itself that feeds through the umbilical cord to the infant therefore changing the composition of the meconium within the infant's gut already before birth. ⁽³¹⁾

Further insights reveal that the placental microbiome is more similar to the oral microbiome than to the vaginal microbiome. In this new light we begin to understand that different systems impact on pregnancy, such as the placenta, vagina, cervix, gut and oral areas, all with their own unique microbiomes. These different microbiomes, with their specifically enriched microbiota help colonize the new infant's system before being born. Implications of this research indicate a need to consider not only maternal health during pregnancy, since this affects the flora of the vaginal and intestinal tract, but also the mode of delivery. ⁽³²⁾⁽³³⁾⁽³⁴⁾⁽³⁵⁾



During pregnancy, the placenta begins laying the foundation for the infant's gut microbiome, and during a vaginal delivery, the infant comes into contact with the maternal vaginal and intestinal microbiota before continuing to harvesting from the maternal skin microbiota during breastfeeding. The acquisition of the maternal intestinal bacteria seems to be a vital step in the development of a healthy immune system. Bypassing this crucial step in the infant's development could cause a different development to occur. ⁽³²⁾



Research data indicates that the mode of delivery will determine the type and the timeframe of the bacteria to colonize the infant's gut. Vaginal delivery confers maternal vaginal and intestinal strains whilst caesarean delivery allows for environmental colonization such as maternal skin, hospital staff and other individuals in the newborn's space. It has been studied that the bacterial count is higher and more diverse in the gut of newborns delivered vaginally versus caesarean delivered. Furthermore caesarean delivered infants had delayed colonization from as long as 6 months to 2 years after birth with several studies showing this difference still discernible after 7 years. This altered composition and delay to fully form the gut microbiome, in caesarean delivered infants, has lead researchers to initiate further investigations into the possibility of a higher risk of allergy, asthma, type 1 diabetes, obesity and other immune health complications in such infants. ⁽³³⁾⁽³⁶⁾

The type of feeding also influences the gut microbiota. Breastfed infants differ from formula fed infants in the early composition of the gut microbiome with the latter displaying similar microbiomes to older children. Noticeable differentiation is seen with the presence of aktinobacteria and bifidobacteria in breastfed infants. These are believed to prime and help the gastrointestinal system mature. They also help combat risk for allergic diseases and excessive weight gain. Research studies investigating how the infant's exposure to specific microbes in succession, after exposure to the maternal vaginal microbiota and/or human breast milk, could lead to further understanding what influences immune deficiencies and disease risks. The reasoning for this is the ability of the fully colonised gastrointestinal tract to easily organise and optimally metabolize nutrients necessary for continued health. ⁽³⁴⁾⁽³⁶⁾⁽³⁷⁾

Overuse of broad-spectrum antibiotics in the developing infant can, not only cause resistance but can also interfere with the growth of optimal microbiota. These disruptions and alterations caused less gut microbial diversity, which in turn can lead to potential susceptibility later in life to asthma, inflammatory bowel disease and obesity. ⁽³¹⁾

Evidence suggests therefore that caregivers need to be aware of the potential for life-long detrimental effects on health and wellbeing when the microbiome is disrupted. Disruption can occur as early as in utero due to the new understanding of mother to child transmission of microbiota and can continue to be affected via mode of delivery, feeding, overuse of antibiotics and the environment. The goal should now shift to creating a healthy intestinal environment during the critical period when the infant's microbiome is forming and defining itself. ⁽³⁸⁾

Delayed Cord Clamping

“Another thing very injurious to the child is the tying and cutting of the navel string too soon, which should always be left till the child has not only repeatedly breathed but till all pulsation in the cord ceases. As otherwise the child is much weaker than it ought to be, a part of the blood being left in the placenta which ought to have been in the child and at the same time the placenta does not so naturally collapse, and withdraw itself from the sides of the uterus, and is not therefore removed with so much safety and certainty.”

Dr. Erasmus Darwin, 1794.



DIELDA MIENIE (SOUTH AFRICA)

Delayed cord clamping involves leaving the cord to continue pulsating attached to the placenta for a determined amount of time or even until the blood flow has ceased. Growing evidence suggests there are multiple benefits in delayed cord clamping such as increased weight and haemoglobin levels at birth; improved iron stores in the months following birth for up to 6 months, with decreased anaemia in later infancy; improved transitional circulation; better red blood cell volume therefore decreasing the likelihood of morbidities such as intraventricular haemorrhage (IVH) and necrotizing enterocolitis (NEC) and improving cardiopulmonary adaptations. ⁽³⁹⁾

It also reduces the need for blood transfusions especially in preterm infants. Transfusion from the placenta can be as much as a 20% increase, approximately 80 ml of blood at 1 minute after birth and 100 ml after 3 minutes. The concerns proposed for avoiding the practice of deferred clamping involves the risk of postpartum haemorrhage (PPH) and increased likelihood of neonatal jaundice. These have been successfully proven to be unfounded concerns, as the use of a uterotonic, should a PPH develop, and the use of bilirubin lights, should neonatal jaundice levels be elevated (demonstrated only in a small percentage of cases observed in the study groups), can both be utilized timeously and this should not be a reason for denying delayed cord clamping. Furthermore PPH was not statistically significant, as the research showed no increase in PPH compared to the routine immediate cord-clamping group. ⁽³⁹⁾⁽⁴⁰⁾⁽⁴¹⁾

The World Health Organization (WHO) 2014 guidelines were updated to reflect the recommendation that all infants, and especially preterm infants, who do not require positive-pressure ventilation, should benefit from having the umbilical cord clamped later than the first minute after birth. This included a special remark on one minute being the lower limit supported by published evidence and that it should not be cut earlier than is necessary to apply cord traction, which would normally be around 3 minutes. Late cord clamping, determined to be approximately 1-3 minutes after birth, is strongly recommended for all births, both vaginal and caesarean, preterm and term, concurrent with essential neonatal care. ⁽⁴²⁾

Furthermore the National Institute for Health and Care Excellence (NICE) provides guidance and advice to improve health and social care. In its clinical guidelines regarding intrapartum care, they outline that the physiological management of the third stage of labour should involve leaving the cord to completely finish pulsating before cutting. During an active management of the third stage, when a uterotonic drug is used, the cord should not be clamped earlier than 1 minute unless there is a heart rate of below 60 beats/min that is failing to increase or of there is concern regarding the integrity of the cord, otherwise the cord can be clamped before 5 minutes so as to continue with controlled cord traction. In this document they advocate to support women in their choice to delay cord cutting past 5 minutes if it is her wish to do so, in the absence of the disqualifying criteria mentioned above. ⁽⁴³⁾



Studies have shown, that the administration of the uterotonic after placental delivery has been equally effective at preventing PPH. Implications for delivery practice dictate that delayed cord clamping is beneficial even in the event of neonatal resuscitation and with appropriate planning and care, can be performed at the bedside, whilst the infant is still attached to the placenta.

⁽³⁹⁾⁽⁴¹⁾

Baby can be placed on the mother's abdomen after birth and the cord can be left intact to continue pulsating. When the cord has finished pulsating, it is white and limp and contains no blood as illustrated in the photographs.





The success of this method is dependent on clear policies and standardized protocols in place, interprofessional coordination, comprehensive staff education and training, simulation exercises and regular monitoring of staff progress and compliance. ⁽⁴⁰⁾

Delayed cord clamping with standardized protocols should be encouraged as feasible and effective in most birth settings. Even in very preterm infants, whereby the circulatory transition is slower due to immaturity, evidence shows that delayed cord clamping lowers the need for intubation and resuscitation and encourages a more natural, spontaneous and physiologic transition from intrauterine to extra-uterine life. The reduction in red cell transfusions, the relatively quick exchange from placental oxygenation to pulmonary oxygenation and the 'hands off' approach also encouraged more spontaneous bonding in the 'golden hour' after birth. ⁽⁴⁰⁾

Bonding & Skin-to-Skin

Bonding is a concept and term popularized by Klaus and Kennell (1976) referring to the immediate contact of skin-to-skin between mother and baby after birth. This period is known to be a sensitive period where the beginning stages of attachment occur. ⁽⁴⁴⁾

The first hour after birth, known also as the 'sacred hour' in terms of bonding and the 'golden hour' in terms of breastfeeding, is a sensitive period in which the newborn infant begins to orient to what life outside the womb is about. This sensitive period is defined as a vulnerable period of time whereby specific developmental behaviours can be exhibited. These periods contribute to the acquirement of specific competences and are vulnerable to outside influences that can disrupt the process. A new skill acquired during the sensitive period is much more readily acquired than if it is missed or delayed. When this sensitized period has passed, considerable attention and effort is required to then master the skill. ⁽⁴⁵⁾⁽⁴⁶⁾

The concept of bonding is important from a psychosocial perspective, as it is believed to be the basis for human attachment and relationships. The concept of bonding gained medical recognition in the mid seventies, due to the work of Klaus & Kennell, yet currently this important period is still lacking the support and attention it deserves. The potential exists for nursing interventions to improve the quality of mother-baby bonding. ⁽⁴⁷⁾

When a supportive environment is fostered in the sensitive period, where mother and infant are primed for bonding, the benefits are observable and quantifiable. Bonding is defined as an intense emotional tie between the mother-child dyad, enhanced by the huge oxytocin release that occurs during childbirth, occurring most intensely after a natural birth, through the first week and into the first year of the infant's life. ⁽⁴⁷⁾

When a newborn is placed, uninterrupted and continuously, on the mother's abdomen, there is ample opportunity for the infant to smell, touch, lick and be comforted by the warmth of maternal skin, which is in turn primed to respond to her own infant's touch. The infant brain then fires a pathway from the amygdala directly to the frontal lobe, the site that connects these first emotional and social experiences. This wiring occurs fastest in the hours closest to birth and continues to wire the brain to all new experiences when the same conditions are met later on i.e. close proximity to mother, safe and nurturing atmosphere and low stress levels. This continuous skin-to-skin contact (SSC) is called Kangaroo Mother Care (KMC) and the WHO defines it as having four main components: early, continuous and prolonged SSC between mother and child, exclusive breastfeeding, early discharge from hospital and close follow-up at home. ⁽⁴⁸⁾

The benefits observed from numerous researches include: improved maintenance of the infant's temperature, heart rate and other vital signs; lower pain measurements reducing stress levels resulting in further optimization of growth; promotion of exclusive breastfeeding up to 4 months; reduced risk of sepsis, hypothermia, hypoglycaemia and readmission to hospital. The benefits have shown to improve overall

outcomes in all infants but it is especially advantageous to preterm infants. Due to these well documented benefits, all major organizations responsible for the well-being of newborns and mothers, such as the WHO, American Academy of Paediatrics, Academy of Breastfeeding Medicine and the Neonatal Resuscitation Program, advocate SSC and KMC immediately after birth and for up to 24 hours thereafter.

(45)(49)(50)(51)(52)

How can hospital staff and parents encourage and even facilitate early mother-child SSC? It is usually believed that the mother initiates contact with her baby, yet careful behavioural observations of newborn infants show that they also seek contact with their mothers soon after birth. Immediately after a non-interventive, non-medicated, spontaneous birth the infant is primed and alert, so when they are placed securely, naked and unwashed, upon the mother's abdomen they are able to locate the breast and crawl towards it, latch and suckle on the breast, unassisted. This is only observed in cases where there is zero separation and no handling from staff to perform newborn checks. In a regular, uncomplicated birth the need for separation and newborn checks should be delayed until after the first breastfeeding has been completed, usually after the first hour or two. (53)(54)(55)

SSC is not exclusively the domain of mothers as the research demonstrates. Fathers are just as effective in providing SSC and raising infant temperature as mothers. The research determined that SSC with a parent resulted in significantly higher body temperatures and heat conservation than if placed in a cot or incubator, therefore SSC should be considered, as a first option, in the event that heat modulation is required. (56)

Furthermore fathers also found that it promoted bonding and increased daily care behaviours. Paternal SSC, in both preterm and term infants, is feasible and important and caregivers need to begin considering this aspect in the routine care of neonates after birth. (56)

DEBBIE WALTON (SOUTH AFRICA)



Breastfeeding

The World Health Organization (WHO) and UNICEF are two large and well-known organizations that work to bring forward international recommendations and standards in matters relating to health. Their stance on breastfeeding is as follows: breastfeeding should commence within the baby's first hour of life; breastfeeding should continue exclusively for the first 6 months; and continued breastfeeding with the introduction of complementary food from 6 months with extended breastfeeding till 2 years or beyond. Exclusive breastfeeding is understood as breast milk being the primary and sole source of infant nutrition. This excludes artificial milk supplementation, water, tea, and juice and only allows for oral rehydration solutions and liquid supplements when and if necessary to maintain optimal health. (57)(58)

It is known that the most sensitive period for initiation of breastfeeding and bonding occurs strongest in the first hour and day following childbirth. Breastfeeding and bonding are closely linked as they both occur on the mother's skin and chest. (46)(59)

What makes the breast area so inviting and ideal for a newborn baby? Thermographic imaging has shown that the area surrounding the nipple, the areola, has a higher temperature than the surrounding tissue. The infant crying, in response to preparing for breastfeeding also triggers this thermal feature of the areola. We know that the areola contains an abundance of blood vessels and sebaceous skin glands that serve to produce chemical signals that help guide the newborn infant towards the breast site.

The higher temperature of the areola acts as a diffuser of the breast odours, which guide newborn attempts to locate and suckle from the breast. (60)(61)

The newborn infant, under the influence of the sensitive period, has a heightened and increased awareness, causing them to be especially receptive to odour and other cues. These cues, emanating from the mother's breast area, inevitably draw the infant towards it. We can observe in the awake and aware infant, born without the inhibiting agents of maternal pain relief, an instinctive behaviour that incites them to crawl towards the source of nourishment. The breast crawl is now accepted as the newborn's natural behaviour after birth when placed in skin-to-skin with the mother. (46)(62)





What are the cues that nursing staff can observe in newborns ready to breast crawl? Once the newborn infant has been quickly dried after birth and placed immediately skin-to-skin, prone between the breasts, and covered with a cloth and hat, observers will notice several cues to indicate that the infant is ready. Initially the infant will lift their head to visually inspect their surroundings. ⁽⁶³⁾

This is facilitated also by the heightened olfactory system cueing in to the maternal odours emanating from the nipple area. The substance secreted by the glands in the nipple is similar in smell to the amniotic fluid that surrounded the infant in the womb, further guiding the infant towards the nipple. ⁽⁶¹⁾

Though eyesight is limited, the infant is capable of focusing clearly the distance from the maternal breast to the maternal face. From this position between the breasts, the infant has several advantages: reduced risk of infections due to colonization of maternal skin bacteria; instinctive stimulation; thermo regulated warmth; love; security and food as well as the promotion of bonding. ⁽⁶³⁾⁽⁶⁴⁾

Soon after, the infant will give a few strong kicks and sensing food is nearby, start salivating. This is apparent by the tongue protruding continuously. The infant may even lick the maternal skin surface. As baby kicks and shuffles their way onto the breast, gently massaging it, oxytocin production is increased therefore contracting the uterus and increasing the sense of wellbeing and love in the mother. The massage of the breast also allows the nipple area to contract therefore further facilitating latching. Upon reaching the areola and nipple, baby will start mouthing movements and keep opening the mouth wider so as to latch on to the breast. Caregiver interference should be kept to a minimum. ⁽⁶²⁾⁽⁶³⁾⁽⁶⁴⁾

Continuous Labour Support

Since the early 1970's researchers neonatologist Dr. Marshall H. Klaus and paediatrician Dr. John H. Kennell, have worked extensively to understand, and bring to light, the information crucial to bonding of mother and infant and to re-introduce the concept of continuous labour support or 'mothering the mother' as they termed it. The term 'doula' was borrowed from an ancient Greek term referring to a servant and has become the term used today, most usually for a lay woman, that supports and nurtures pregnant mothers before, during and after birth. (65)

Why have doulas become more popular in recent years? Birth, as we know it today, has become a medicalised event. In earlier times women often laboured and birthed in the comfort of their homes, with the support of other knowledgeable women such as their mother's, sisters and other more experienced women, such as a midwife. The handover to a more medicalised birth brought with it certain changes in the management of labour and birth and one of the core changes we notice is the lack of continuous support by a chosen familiar person. Even in the event that one-to-one nursing is provided to a labouring woman in today's hospitals, the myriad of nursing responsibilities will ensure that it is almost impossible for a nurse to provide continuous support during labour and birth. (66)(67)



"If a doula were a drug it would be unethical not to use it!"
John H. Kennell M.D.

Doulas are trained to provide the continuous support that is needed during this time. Their training includes emotional and physical support for women and their partners during pregnancy, childbirth and the postpartum period. They offer reassurance, advice and information about the labour process, proven coping and comfort measures, breastfeeding information and most of all, assistance to empower women to better express their desires and wishes. ⁽⁶⁶⁾⁽⁶⁸⁾

Research studies have shown that the impact of continuous support by a trained doula, for women of all income groups, reduces the need for caesarean, instrumental and medicated births, as well as shortening the duration of labour. Overall satisfaction regarding the birthing experience was considered higher for women that received continuous care by someone other than an attending nurse. ⁽⁶⁷⁾⁽⁶⁸⁾⁽⁶⁹⁾

When comparing the overall impact of doulas on healthy birth outcomes recent research has concluded that doulas focus on individualized support before, during and after birth, therefore empowering and motivating women to improve their overall health prenatally, to make informed decisions and to achieve the best birth outcomes possible. When medical professionals, hospital administration and nursing staff understand the beneficial involvement of doulas in the overall care of pregnant women, financial and personal costs of adverse birth outcomes can be significantly reduced. ⁽⁶⁷⁾

Benefits of using a doula at a birth ⁽⁶⁸⁾ :

- 9% Drop in pain medication use
- 12% More spontaneous vaginal births
- 28% Fewer caesarean deliveries
- 31% Less use of Syntocinon
- 34% fewer negative birth experiences
- 40 min Shorter labour
- ↑↑ Higher Apgar scores
- ↑↑ Increased breastfeeding rates

Conclusion

Research has shown us, that Finnish people value a home-like environment, with continuous support and open and informative communication. When women are given care that is supportive and directed, fears and other potentially damaging emotions are alleviated. This will have a direct impact on the quality of her gestation as well as the outcome of her labour.

It is thereby our hope that the short and long term positive outcomes and patient's satisfaction of an uninterrupted childbirth will be taken into consideration before any hurried or routine medical interventions is performed. Natural childbirth is a safe and viable option as opposed to a medicalised, interventive birth and it should be encouraged as a first approach rather than an abnormality.

We are cognizant of the fact that complications do occur in childbirth and we do not expect that lives should be at risk in the attempt to carry out more natural and physiological deliveries but we have shown in our research that, wherever possible, a hands off approach should be adopted to avoid creating a cascade of events that will therefore necessitate further interventions.

Another key point for obstetricians, midwives and all other health practitioners to keep in mind is that the goal of any prenatal education is to care for, encourage, educate and build women's confidence on how to give birth as normal as possible alongside individualized care plan. Evidenced based practices supporting a normal physiological childbirth should be embraced and implemented by focusing on offering holistic nursing care and not only the medical care or management during childbirth. It would behoove us all to keep in mind, that the main motive of labour and delivery is to support, guide and provide an holistic nursing and midwifery care in the pursuit of the woman's satisfaction, happiness and positive outcomes on the baby and family.



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Igor Stepovik (Russia)
Lokelani Photography (USA)
Meagan Le Coq (South Africa)
Jane Fraser in memory of Natey (South Africa)
Anna Riita Kässi (Finland)
Doddie Boer (South Africa)
Dielda Mienie (South Africa)
Mira Laitinen (Finland)
Vania Truter (South Africa)
Debbie Walton (South Africa)
Nuance Maternity Photography (South Africa)
One Heart Maternity Photography (South Africa)

pg Cover Mother holding babies feet
pg 1, 14, 23, 31 & 34 Caregiver support waterbirth
pg 4 & 38 Breastfeeding and bonding
pg 6 & 17 Spontaneous ejection reflex and seeding
pg 11 & 30 Ejection reflex and breastfeeding
pg 16 Seeding newborn gut with vaginal delivery
pg 19 Delayed cord clamping - lotus birth of placenta
pg 22 Delayed cord clamping homebirth in Finland
pg 25 Twin skin-to-skin with mother
pg 28 Skin-to-skin with father
pg 35 Doula support at a homebirth
pg 39 Home water birth

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