



NEW ZEALAND  
COLLEGE OF  
MIDWIVES (INC)

# JOURNAL

A case of anencephaly: integrated palliative care

Creating a better work-life balance

The emotional and hormonal pathways of labour and birth: integrating mind, body and behaviour

Pethidine - to prescribe or not to prescribe? A discussion surrounding pethidine's place in midwifery practice and New Zealand prescribing legislation

The safety-net: what influences New Zealand first-time mothers' perceptions of safety for self and unborn child?

Partnership and reciprocity with women sustain Lead Maternity Carer midwives in practice

COMBINED ISSUES 48 & 49



NEW ZEALAND COLLEGE OF  
MIDWIVES (INC) JOURNAL

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- Promote the view of childbirth as a normal life event for the majority of women, and the midwifery profession's role in effecting this.
- Provoke discussion of midwifery issues.
- Support the development of New Zealand midwifery scholarship and research.
- Support the dissemination of New Zealand and international research into midwifery and maternal and child health.

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# Nourishing the relationship and encouraging the heart

Jean Patterson  
Sub-Editor  
NZ College of Midwives Journal



Each Easter for the last four years I have had the privilege to tramp with good friends through some of the most breath taking areas of Southland and Fiordland. This year in Milford we began the track with 36 strangers, with whom we shared in close proximity the challenges and joys of the walk, the bathrooms, bunkrooms and eating areas; curiously observing what each other wore, packed and ate. Tips and jokes were shared along with blister management and the virtues of different dehydrated meals and how long they needed to steep before eating.

On the steep climb to the pass, my colleague and I compared the challenge of the track and how it is akin to that of labour. The knowledge that only you can do it and that getting to the end requires persistence, sometimes courage, but always with the promise of the reward and sense of achievement at the end. And while the journey is our own it is less arduous with the company and care of friends encouraging the heart and lending logistical support when the challenge threatens to overwhelm us.

The vital role of relationships and caring support for successful childbirth experiences is a theme that emerges in the journal's articles in this issue. While dealing with vastly different topics the authors acknowledge how important this aspect of human behaviour is in the way in which birth is experienced by women and their families. This learning and relationship is shown in the first of our articles where Belinda Chapman shares with us the journey of a family who welcomed their baby Hope with anencephaly into their family. The experience was enhanced by the multidisciplinary team who facilitated wrap-around care freeing the family to use their energy to welcome and enjoy their brief time with Hope.

Relationships are also identified in El Banna and Jutel's article where support for women managing the distress and struggle to continue breastfeeding with a baby experiencing gastro-oesophageal reflux. This discursive review provides a new way of looking at the literature and finds a gap in the primary research for management strategies where pharmacological or formula feeding is not used. For this self-limiting condition encouragement and practical support with advice regarding postural strategies are advocated.

This role of support and information is also highlighted in Dixon, Skinner and Foureur's article, which provides a comprehensive overview of the emotional and hormonal pathways of labour and birth. The article explores

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emerges in the journal's  
articles in this issue.

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how the emotions orchestrated by the neuro-hormones prepare the woman and her body for the challenges of birth. Midwives able to share these processes and the signposts in labour enable women to have some sense of control, boosting their confidence in their physiology and ability to safely give birth.

As midwives, we are ideally placed to influence labour and support the physiological processes for normal birth, alert to processes and interventions that will interfere with this complex mix of emotional chemistry. This role of walking with women to help them discover their inner strength is the moral purpose of midwifery and helps keep women and their babies safe; a central concern for the women in final article.

Such information and support has the potential to contribute also to the woman's sense of safety; a topic addressed in the article by Howarth, Swain and Treharne. In this New Zealand study a small sample of first time mothers shared what they saw as a 'safety net' for them and their babies. They aspired to keep birth normal, make choices about their birthplace and to establish a relationship with a skilled midwife who would make timely decisions about their care.

So welcome to this the 48th edition of our own New Zealand College of Midwives journal. I hope you enjoy reading and considering the knowledge and challenges explored in the articles. Thank you also to the authors who took the time and effort to engage our interest in this diverse range of topics, which together address core aspects of our midwifery context. And just as we need the relationships and support of friends and colleagues in other aspects of our lives to achieve our goals, so too we are reminded of the vital importance of our midwifery partnerships and relationships with women and their families.

# A case of anencephaly: integrated palliative care

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## ABSTRACT

Following a diagnosis of anencephaly at the 24 week anatomy follow-up scan this case study exhibits an approach that integrates the primary, secondary and community services while maintaining the family unit at the centre of care, when an outcome to a pregnancy is not what was originally envisaged. Hope's journey illustrates how integration of the multidisciplinary hospital team and community care can assist and support the family when planning a way forward, tailored to the family's personal, physical, emotional and spiritual needs. After her mother's full term pregnancy and vaginal birth after caesarean section (VBAC), Hope was discharged home seven hours after her birth as her parents wished for palliative care. She lived 14 hours, a life filled with love, dying in her family home as her parents wished. This pregnancy and outcome was a highly emotional journey. The care the family received was compared to that of a perinatal palliative care model and identifies strategies that could be adopted by maternity teams for similar cases in the future.

## INTRODUCTION

Diagnosis of a fetal condition in pregnancy that is incompatible with life, such as anencephaly, presents a challenge for practitioners. Families faced with these situations need unbiased, sensitive and complete information to enable them to make informed decisions and plan for their pregnancy, labour and birth care.

This case study describes the journey for a family when they decided to continue the pregnancy and build a support network to meet their personal, physical, emotional, cultural, religious and spiritual needs. The parents have given consent for the author to tell their story and to use the photograph of Hope. For this story the parents will be referred to as Sally and Harry.

The decisions made, the planned care pathways, and the outcomes achieved, are described. Possible frameworks of care and improvements for future cases are described.

## ANENCEPHALY

Anencephaly occurs in around 1 in 10,000 pregnancies and is a neural tube defect that results from failure of the neural tube to close around

25-27 days following conception. This leaves the developing forebrain and brain stem exposed. The forebrain is either destroyed or fails to develop. This means the cerebrum and cerebellum are reduced or absent, but the brain stem is present (Blackburn, 2003). If the babies are born alive, they are most likely to live only for a few hours and at the most no longer than 2 weeks. Anencephaly is usually diagnosed by maternal serum screening (raised serum alpha-fetoprotein) and/or ultrasonography and usually results in a termination of pregnancy, stillbirth or early neonatal death (Tadanori & Hideki, 2013).

## BACKGROUND

Sally is a 32 year old mother of two, married and in a stable, well supported relationship. Her first child, a boy, was a normal birth at term, and weighed 3325gms. A daughter was born later that same year by elective Caesarean section. Sally felt there had been too short a time since her last birth and did not feel resilient enough to proceed with a vaginal birth following the third degree tear she sustained during her first birth. Sally had experienced miscarriages in 2006, 2010 and 2011, is a non-smoker and has a Body Mass Index (BMI) of 23. During her pregnancy, Sally took Sertraline tablets, 50mg daily, because of her history of postnatal depression. There is no other significant family or medical history.

When pregnant with Hope, Sally had a 20 week anatomy scan which stated "poor views of the fetal skull" and a repeat scan was suggested at 24 weeks. This subsequently diagnosed anencephaly. The World Health Organization (WHO), (2013), suggest where the fetus has anencephaly that early identification and ongoing assessment, which includes the family, reduces suffering within the family structure and this is where the palliative care pathway begins in this case.

## PALLIATIVE CARE PATHWAYS

In 20-40% of pregnancies where fetal abnormality is identified as being incompatible with life, parents choose to continue with the pregnancy rather than agreeing to termination (Engelder, Davies, Zellinger & Rutledge, 2012). Perinatal palliative care is an option for parents who wish to continue with the pregnancy. It commences at antenatal diagnosis, or prior to discharge from hospital. The National Association of Neonatal Nurses (NANN) position statement on palliative care for newborns and infants focuses on maximizing the quality of end-of-life care to support a "Peaceful, dignified death for the infant and the provision of loving support to the family and healthcare providers" (NANN, 2010, p. 287).

The British Association of Perinatal Medicine (2010) framework covers routine pre- and postnatal birth planning to include survival, or end-of-life by natural causes, and post end-of-life care. The framework covers family care, communication, documentation and the importance of flexible parallel care planning. Additionally, the Association for Children's Palliative Care (ACT, 2009) describes a neonatal pathway for babies needing palliative care with the aim of ensuring that appropriate care is given at the right place, at the right time. It consists of three stages and is guided by six standards to ensure the baby and the family is always

positioned at the core of the care planning process. This was the pathway chosen in the case described here.

## STAGE ONE: ENTRY TO THE PALLIATIVE CARE PATHWAY (ACT, 2009)

### FIRST STANDARD OF BREAKING THE NEWS:

Breaking the news to the family (including siblings) may require emotional, religious and spiritual support. Discussion needs to cover future baby care needs, preparation for the place of birth, and identification of people who will be involved in future care e.g. General practitioner (GP), midwife, hospital team, social worker and information about legal requirements for registering the birth.

In this case the ultrasonographer informed the parents that their baby was anencephalic at the 24 week ultrasound scan. This diagnosis was followed by a visit to the private obstetrician. However, this relationship broke down as the obstetrician was not prepared "to journey with us in the way that we wanted" (parents of baby). Thus they felt unsupported to continue the pregnancy under the obstetrician's care. This highlights Sumner, Kavanaugh & Moro's (2006) recommendation that parents need an environment where they can experience open communication and information about care options.

Leuthner (2004) believes there are three important discussions to have with parents when breaking devastating news. These are: certainty of diagnosis, prognosis, and the meaning of the prognosis for the family. This latter includes describing to parents how their baby will look and act (Engelder et al., 2012). For Sally and Harry, a follow-up appointment was made to see a visiting Maternal Fetal Medicine (MFM) specialist who reconfirmed the diagnosis and explained to the parents it was unlikely their baby would survive birth, or live for very long after birth. He also discussed the choice of continuing or terminating the pregnancy and the option of VBAC to assist an earlier recovery for Sally. Once the decision to enter the palliative care pathway was made, then the plans for the birth, and the anticipation of both a birth and a loss could begin. This included hellos and goodbyes in the grief process as suggested by Sumner et al. (2006).

Sally and Harry returned to their GP for advice, information and choices in care. They required a team that would listen and respect their decision making and personal needs during this special and sensitive chapter of their life. Their GP accessed a midwife Lead Maternity Carer (LMC) to provide care in partnership and, most importantly, to support the parents' wishes to give birth to their baby, and to take her home should she survive. An obstetrician who was willing to support them was also nominated in case complications developed. Discussion took place as recommended by the referral guidelines (MOH 2012) and it was agreed it was appropriate for the midwife to continue as LMC in order to achieve the requested outcomes even though in reality the care would be shared. Together the midwife and parents developed a birth plan which involved discussion, open communication and documentation in the clinical records. This fulfilled the second standard of the palliative care pathway of "Planning for going home". Below Sally describes the care she received during this waiting period.

*I was offered endless help, meals, childcare, and given gifts. Hope was given gifts and people respected our decision and looked forward to Hope's arrival. She was a very much wanted baby not just by us but also by our extended family "our village"! So many lovely things were coming our way, cards, flowers, well wishes and warm words of encouragement; I decided to start a journal to record such acts. By the time of Hope's expected due date, there were over 100 items listed in my 'Book of Hope'.*

Pictures that tell the baby's story remind parents how much their baby was loved, and how their life had a purpose (Rosenbaum, Smith &

Zollfrank, 2011). Similarly, Sumner et al. (2006) found that gathering keepsakes, along with the experience of compassionate quality care, stays in the memory of families forever. Further, bereaved parents with positive memories were more likely to have experienced effective palliative care according to Rooy, Aladangady & Aidoo (2012).

## DECISION MAKING

Harry and Sally felt it essential that the health professionals caring for them maintained their family at the centre of care but also attended to their personal emotional, spiritual, cultural, and physical needs. They requested support to continue their pregnancy; they wanted a plan in case of misdiagnosis; and a plan for neonatal palliative care with a wish to take their baby home if she were to survive labour. ACT (2009) identifies that around 90% of neonatal deaths occur in the clinical hospital environment and recommends that some of the babies, especially the ones with no cure, be transferred to their own home or a children's hospice with appropriate support. This small District Health Board (DHB) does not have a designated children's hospice or perinatal palliative care policy but it can tailor care to the individual's needs, which happened in this case. Sumner et al., (2006) discuss the importance of caring for the family and baby with dignity and respect and recommend that integrated palliative care programs be introduced into institutions. Following this event the DHB is reviewing its palliative care policy with the intention to include perinatal palliative care in the new policy document.

## STAGE TWO: LIVING WITH A LIFE THREATENING OR LIFE LIMITING CONDITION (ACT, 2009)

Sally and Harry were both aware of the probable outcome of stillbirth or early neonatal death for their baby so vaginal birth was chosen rather than a repeat Caesarean section because this would allow them to spend more precious hours with their baby if she survived. It would also increase the likelihood of taking her home alive in the hours following her birth. They were fully informed and aware of complications that may be a consequence of having an anencephalic baby such as polyhydramnios, prolonged pregnancy and stillbirth, but they did not want to discuss a plan for a funeral for their baby. Sally said,

*We decided we would continue with the pregnancy, she was ours and we would not give up on her existence despite the obvious painful journey ahead. The odds were not in our favour; however we decided to face the situation with courage and love. We focused on bringing our little girl home alive, she would (in our minds) survive birth, breastfeed, be held by loving friends and family and her life would be celebrated. She was chosen for us and we for her. We would give her a birthday and not plan for a funeral.*



## COMMUNICATION

Verbal and written communication with Sally and Harry, the GP, obstetrician and midwife allowed the professionals to understand the parents' wishes which were to ensure *"a seamless and united approach to my care"* (Mother of baby). Even though they did not want to discuss the death of their baby, Sally and Harry were fully aware this was going to be what they faced at some stage. They made it clear they wanted to address the positive aspects of this pregnancy and birth by having a plan in place for all eventualities. They declined social work referral but their situation was discussed and documented in the minutes of the monthly complex care meeting which the maternal social worker, obstetricians (including the visiting MFM specialist) and neonatal team attend. The multidisciplinary team was thus fully aware of the parents' wishes and plan of care. This multi-agency assessment of the family's needs and care plan addresses stage two of the perinatal palliative care pathway (ACT 2009).

Sally and Harry agreed to make a birth plan but did not want to meet personally with the neonatal or paediatric team. They were happy for this communication to be carried out by the midwife (LMC). A written referral was sent to the neonatal team to inform them of the impending birth and the wish of the parents to take their baby home alive should vaginal birth be achieved. To do this it was necessary to be listened to and have a plan for palliative care and support in place. The neonatal team responded by reassuring the midwife, GP and parents that they were aware of the upcoming birth and they were happy to meet the parents and discuss their needs after the birth, if desired.

Discussion surrounding the birth plan included questions such as: what happens if Sally has a prolonged pregnancy? What happens if labour does not commence spontaneously? Would she continue with the pregnancy and further the risk of stillbirth or would she choose the risks of elective caesarean section over the risks of induction of labour? Induction methods such as stretch and sweep, homeopathy or cervical balloon ripening techniques would be offered as opposed to pharmacological induction using prostaglandins or oxytocin. This was in view of Sally's previous Caesarean section. The potential advantages and risks were discussed for Sally and her baby.

Auscultation of the fetal heart in labour was also discussed. In view of the previous caesarean section continuous cardiotocography (CTG) would normally be recommended. However, there was no advantage given that her baby was expected to die in labour or shortly after the birth. Should the fetal heart be recorded what would happen if abnormal patterns were detected? Would the parents want to listen to the fetal heart to know whether their baby was still alive in labour? The parents were unsure, so the birth plan said that they would decide on the day if they wished to hear the fetal heart beat. Sally believed that she was very well tuned in to her baby's movements and did not see auscultation as a priority.

At term plus nine days Sally and Harry attended the hospital for assessment with a view to inducing labour but, during their journey to the hospital, Harry informed Sally that he felt they should wait a little longer and after further discussion this was agreed the best way forward if Sally was still keen for a VBAC. The very next day, at term plus ten days Sally was admitted in spontaneous labour with her support crew. The parents declined the use of the nominated hospital room for labouring couples expecting baby loss. They had personal baby clothes ready to dress baby Hope and the family and the minister were on call in case they were required.

During labour Sally played spiritual music and positive affirmations collected during her pregnancy were displayed on the walls surrounding her. She also had a book of spiritual scripts that could be read if she requested. The atmosphere was relaxed. There were times of laughter and joy, and times of quiet and tears. Sally's labour progressed normally with her using the birth pool for pain relief only. She breathed through

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Further plans would be made on a day by day basis tailored to the family's individual needs.

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the birth to try to avoid a further third degree tear and, four hours after admission, baby "Hope" was born in good condition, covered in vernix. She had good tone, was dusky in colour and attempted to cry. The midwife was unsure how long she would live so Hope was passed to mum and dad for skin to skin contact; normalizing and celebrating the birth being the priority. Sally had a small first degree tear which did not require suturing. The photographer had taken pictures of every detail of the room and captured the moment of birth; photos that are now everlasting memories.

There was a gradual change in Hope's appearance as she began "pinking up" beautifully and mouthing for the breast which was amazing to see. Sally latched her to her breast unassisted and we all observed an amazing breast feed. Siblings and the rest of the family came to meet baby Hope shortly after her birth. They watched Hope being checked, measured, weighed and dressed. Following her feed she was cuddled by all. The paediatrician was informed of Hope's birth and the fact that Sally and Harry planned to stay in the hospital overnight before heading home with Hope the next morning.

## STAGE THREE: END OF LIFE AND BEREAVEMENT (ACT, 2009)

This stage includes the 2 standards of an end of life plan and continuing bereavement support. The paediatrician visited Hope on the Delivery Suite and planned her discharge home with the staff, LMC and family. Assessment of pain and signs of distress were discussed with the parents and paracetamol was prescribed to be administered to Hope if the parents thought there were signs of distress. Kangaroo nursing and comfort measures were also encouraged. Further plans would be made on a day by day basis tailored to the family's individual needs. A neonatal home care nurse would also be available if necessary. Plans were also made for the maternal social worker to visit the family at home to provide social, financial and counseling support. The family church minister was in contact with the family to address their religious and spiritual needs.

During that evening Hope continued to feed at the breast. She passed urine and meconium. However, she did have a mucousy, dusky episode. This event reminded the parents of their intention to return home with baby Hope alive if they could. The core midwives were aware of the family's wishes and assisted the LMC to organize a prompt discharge. Sally and Harry were given the direct telephone numbers for their LMC midwife, the ward and the consultant paediatrician so they could phone or text if they had any concerns overnight. The night staff were also aware of these arrangements.

At the family home Sally's parents and sister as well as her children and husband took turns to rest, love and hold baby Hope. Unexpectedly,

without warning, Hope stopped breathing and died some 14 hours after her birth. A phone call to the hospital ward to inform the staff of the events resulted in the consultant paediatrician driving the half hour to Sally and Harry's home to certify baby Hope as having died at 5.30am.

The community, local church minister, friends and family provided food and support for Hope's service of celebration and remembrance. Some 200 members of the community rallied around the following few days to set up and attend a memorable service to say "good bye" to baby Hope, with a final balloon release before she set out on her last journey.

## CONTINUING BEREAVEMENT SUPPORT

This town has an active Stillbirth and Neonatal Death Society (SANDS) which works closely with the maternity unit. The organization has raised funds to provide 'keepsake' boxes to parents who experience baby loss. These boxes contain patchwork quilting, baby charms and keepsakes, inkless foot/handprint sets, as well as contacts for support from their group, along with suggested readings.

Long term follow-up of families who experience perinatal loss is recommended and may last for up to a year (Engelder et al., 2012). The New Zealand model of maternity care assists with continuity of care within this palliative care model and often LMCs remain in contact with these families beyond the 6 weeks allocated to the postnatal module, providing support rather than care. The benefit of having the GP involved manifested in that on-going treatment and care occurred with the knowledge of the journey the family had been on. Additionally the maternal social worker was available for ongoing support. Interestingly Branchett & Stretton (2012) found that experiences of bereavement care were more positive where many staff participated in the care rather than one specific midwife/nurse. This would seem to support the need for multidisciplinary support for the family and the LMC.

## PARENTAL REFLECTION

When Sally reflected on her care and experience, she said she appreciated the 'team approach' with the multidisciplinary collaboration that took place and the offer of follow up appointments, extra support and information. She felt heard, respected and supported by the professionals involved in her care, as well as by the community that surrounded her in hospital and at home. Having unlimited access to friends and family who visited in hospital, meals supplied, offer of childcare and acts of kindness assisted Sally in her grieving process.

The GP and midwife LMC had both thought about having a discussion in the antenatal period on baby organ donation and having student doctor and student midwife involvement. However, these discussions did not take place with the parents because of their strong desire to take their baby home. A further barrier to these discussions may have been the late involvement of the midwife LMC in the pregnancy, who may have assumed that these discussions had already taken place. However, this has given rise to a question from Sally following the birth. Having had a positive experience, she now, in hindsight, would have liked to have been offered the opportunity for students to learn through her experience, as well as to have had the opportunity to consider organ donation.

Not participating in organ donation may have been a lost opportunity, but would the experience have been the same? Sally suggests that, in the future, if she were to birth another anencephalic baby she would like to explore the option of consenting to organ donation when the baby is about 10 hours of age in order to help the survival of other babies. However, it is recognized as being a sensitive and difficult subject that may not be appropriate to address in all situations or cultures.

## CONCLUSION

The decision for these parents to continue the pregnancy to full term after the diagnosis of anencephaly remains in their opinion the right decision. They feel it has given them comfort in the fact that they had a positive bereavement experience and will not be wondering "what if?" if the decision had been to terminate the pregnancy.

This case illustrates how perinatal palliative care pathways can support and assist professionals working in maternity units when parents decide to continue a pregnancy with a baby with a terminal condition. It also provides a framework to facilitate the parents to have the option of taking their baby home to die with appropriate support in place.

This case study illustrates how the parents can be kept at the centre of care providing space for them to make informed choices with the support of integrated care from both the hospital and community. The key to this family's positive bereavement experience was having an identified person to coordinate care as well as a multidisciplinary support network for the midwife LMC and family. The midwifery partnership and the continuity of care model is the ideal model within which to lead and provide coordination of care for these families and can be achieved with discussion and agreement between the woman, midwife and obstetrician.

## ACKNOWLEDGEMENTS

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# Gastro-esophageal reflux in breastfed babies: what's missing?

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**ABSTRACT**

Breast milk is the food of choice for babies under six months. However, babies experiencing gastro-esophageal reflux (GER) are often prematurely weaned from the breast. A discursive literature review method was used to identify how research available to health care professionals considers the place of breast milk and breastfeeding (BF) in the presence of GER. Searching PubMed and CINAHL for the terms “gastroesophageal reflux” OR “gastroesophageal reflux” in healthy babies, and in articles that discuss non-pharmacological management of babies with GER, 54 articles were located and 27 articles related to babies with GER met the inclusion criteria. The articles are divided into three groups: those that make frequent reference to breastfeeding/breast milk, those that mention breastfeeding/breast milk briefly, and those that make no mention at all—resorting to management strategies that focus on the formula-fed baby. This discursive literature review demonstrates that breast milk and breastfeeding are not widely considered in publications about GER. Formula milk would appear to be the default food for babies who have GER. There is a need for more research, new recommendations and support for breastfeeding mothers who have babies experiencing GER.

**KEY WORDS**

Breastfeeding, breast milk, gastro-esophageal reflux, thickened formula, cow's milk allergy

**INTRODUCTION**

The health benefits of breastfeeding for mothers and babies are numerous with an impact lasting till adulthood (Allen & Hector, 2005; Gartner et al., 2005; Godfrey & Lawrence, 2010; Ip et al., 2007). According to the World Health Organisation (WHO) (World Health Organisation, 2011) and the American Academy of Pediatrics (AAP) (Gartner et al., 2005) breast milk is the food of choice for babies. They strongly recommend breastfeeding infants exclusively for the first six months of their lives and ongoing breastfeeding for the first year or longer. “Exclusive breastfeeding” means that babies take no other food or liquid, including water, with the exception of vitamins, minerals and medicines or oral rehydration salts, during these first six months (World Health Organisation, 2011).

Breast milk has short- and long-term benefits that protect babies and mothers (Allen & Hector, 2005; Gartner et al., 2005; Godfrey & Lawrence, 2010). Breast milk provides antibodies for newborns and babies to help fight infections. Babies who are exclusively breastfed for the first six months of their lives have a 64% lower incidence of gastrointestinal infections, a 72% reduction in the risk of hospitalisation due to lower respiratory tract infection and a 23% decrease in otitis media prevalence (Ip et al., 2007). Furthermore, breastfed babies have a reduced incidence of sudden unexplained death syndrome (Gartner et al., 2005). As for the long-term benefits, breastfeeding is associated with reduced incidence of other diseases such as insulin-dependent and non-insulin-dependent diabetes, lymphoma, leukemia, Hodgkin's disease, obesity and hypercholesterolemia (Gartner et al., 2005; Ip et al., 2007; Kwan, Buffler, Abrams, & Kiley, 2004). Breastfeeding during the first year of life has a strong association with improved neurodevelopment, attributed to the long-chain, polyunsaturated, fatty acids found in breast milk (Guxens et al., 2011).

GER is the physiologic regurgitation of stomach contents into the esophagus with or without expulsion to the outside, with no other existing medical problems (Vandenplas et al., 2009). Babies experiencing GER are usually irritable, in pain, and unsettled at the breast or bottle, leading parents to seek medical advice (Indrio, Riezzo, Raimondi, Cavallo, & Francavilla, 2009). GER can be categorized as primary or secondary (Salvatore & Vandenplas, 2002). Primary GER is thought to occur in babies owing to the relaxation of an immature lower esophageal sphincter (LES). It is also theorized to be due to the relaxation of LES as a result of gastric distention through a default in the neural pathways. The relaxation of LES leads to the back-flow of gastric contents into the esophagus. This normal physiological reflux accounts for 50% of babies three months old and younger who have GER. As the baby gets older, the LES matures and tightens (Douglas, 2005). By the time they reach their first year, the GER in 95% of these babies will have resolved spontaneously (Sherman et al., 2009). Secondary GER is associated with cow's milk allergy (CMA) or hypersensitivity. Italian research has identified that CMA is responsible for up to 21% of all GER (Salvatore & Vandenplas, 2002).

The primary medical approach for managing symptoms of GER is non-pharmacological interventions, like lifestyle changes and the management of feedings. The goal is to ensure babies with GER continue to gain weight despite being restless during feeding time (Vandenplas et al., 2009). When babies fail to respond to conventional therapies and complications like esophagitis, respiratory problems and failure to thrive arise, they are known to suffer from gastro-esophageal reflux disease (GERD) and more intensive management like pharmacological therapy and even surgery might be needed. (Vandenplas et al., 2009). Given the importance of breast milk for babies and mothers, this review focuses on how breast milk and breastfeeding are considered in medical approaches to GER. GER and GERD are sometimes used interchangeably; this article will focus only on GER.

We have used a discursive literature review method in order to ascertain the literature available to health professionals around GER and how breastfeeding enters into discussions of GER. Although we have followed a typical method of searching the literature, our focus here was different. We are not interested in the findings of these studies, or in the evaluation of the robustness of their recommendations. Instead, we wanted to explore the

explicit and implicit positions the authors take on the issue of breastfeeding in their studies of babies with GER. This question emerged from the fact that a standard literature search revealed a paucity of information about the management of primary GER in breastfed babies. This is thought to be because health care practitioners do not know enough to advise breastfeeding mothers (Hogan, 2001; Kirkland & Fein, 2003; Sherman et al., 2009).

## METHOD

We used a method pioneered by one of our authors (AJ), entitled a “discursive systematic review method” (Jutel, 2010). This method uses the conventional methods of the systematic review to establish a sample. However, there it leaves the systematic method. The focus of the subsequent analysis is on the discursive positions adopted by the authors, rather than on the research findings. The intent of this approach is to obtain insight into the beliefs and positions of the authors in relation to the subject of study—in this case, breastfeeding of a baby with GER. However, we were specifically interested in articles likely to contribute to the evidence base of practice recommendations around breastfeeding babies with GER, so we only retained research-based articles focusing specifically on non-pharmacological interventions.

We therefore searched the PubMed database for core clinical journals with date or language restriction using the search terms: (“gastroesophageal reflux” OR “gastroesophageal reflux”) NOT (“premature” OR “preterm” OR “congenital”), without restricting the terms to field. We limited our search to infants aged 0-23 months, and to articles published within the last ten years, as our intent was to capture current positions. We restricted our search to the English language, but included articles from non-English speaking countries. We also undertook a hand search of the articles cited in these studies for other relevant work.

We then read each study to decide its suitability for the review. We retained all articles that presented research-based, non-pharmacological management strategies for GER (independent of the author’s method), intended for health professionals. We excluded articles that were not research-based, were not directed at health professionals, were not discussing management of GER, focused on GERD as opposed to GER, or sought to validate a non-breastfeeding management approach (Table 1). The reason for excluding validating studies of non-breastfeeding approaches was that it would weight the body of the articles towards a discourse not intended by the authors.

All articles located by this method were then read thoroughly to get a sense of how breastfeeding figured in the authors’ reckoning and recommendations. Via a process of reading and re-reading, we identified common ways in which breastfeeding and breast milk were considered in the non-pharmacological management of the babies with GER, and we then classified all the articles accordingly.

## RESULTS

The search method described above retrieved 54 articles in total, of which 27 met the inclusion criteria (Table 2). All of the articles approached breastfeeding and breast milk for non-pharmacological interventions in one of three ways:

- Frequent reference to breastfeeding (12 papers).
- Passing reference to breastfeeding (9 papers).
- No reference to breastfeeding (6 papers).

### Frequent reference of breastfeeding/breast milk for non-pharmacological interventions

Twelve articles out of the 27 mentioned breastfeeding or breast milk, although there were no research articles focusing specifically on the issue of managing GER in breastfed babies. (There were, however, brochures and guidelines written by lactation consultants who discussed breastfeeding. However, these were practical guidelines, not research-based and, consequently, were excluded from consideration in this study). One article

proposed a theoretical argument to underpin future research. Using an evolutionary biological approach, Douglas (2005) presented numerous theoretical links between formula feeding and the unsettled baby with reflux (Douglas, 2005). The core reason behind gastro-esophageal distress, she suggested, was the discrepancy between the baby’s biological expectations and Western practices around feeding. In other words, the newborn digestive system is sensitive and immature, requiring frequent feeding. Longer gaps lead to a considerable increase of acid secretions and to an increase in esophageal acid exposure. This is because the amount of residual milk in the stomach is not enough to neutralize gastric acids. In modern society women do not expect to feed frequently, exacerbating the underlying cause. Another factor that contributes to reflux, she postulated, is milk formula itself. Formula milk takes twice as long to digest than breast milk, resulting in distention of the stomach, back-flow of milk-acid mixture into the esophagus and increased incidence of GER.

Douglas, Hill and Brodrigg (2011) emphasize the importance of supporting parents with unsettled babies experiencing GER, since it is a self-limiting condition, which is usually resolved within a few months. Even though the joint recommendations of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) mention that breastfeeding should not be discontinued because of GER, they propose no breastfeeding specific management recommendations beyond a maternal dairy-free, egg-free diet (Vandenplas et al., 2009).

Three of the reviewed articles (Hegar et al., 2009; Nevo, Rubin, Tamir, Levine, & Shaoul, 2007; Osatakul, Sriplung, Puetpaiboon, Junjana, & Chamnongpakdi, 2002) emphasized to parents, who were enrolled in their study, the importance of exclusively breastfeeding their babies. Nevo et al. (2007) argued that milk formula with added thickening agents provides babies with empty calories without the additional nutrition that is found in breast milk. This in turn may lead to obesity and diet-related chronic diseases later in adult life. They advised parents against supplementing their breastfed babies with formula (unless the babies were failing to thrive) because it may lead to early cessation of breastfeeding (Nevo et al., 2007).

Only two of the 12 articles provided non-pharmacological management suggestions for dealing with reflux in the preferably-breastfed babies. Osatakul et al. (2002) advised parents to avoid sudden changes in baby’s position or abdominal compression after feeding, and Yalcin and Kuskonmaz (2011) highlighted the importance of health care providers observing babies during breastfeeding in order to determine underlying problems, such as latching or sucking issues, yet did not make further suggestions.

Four of the reviewed articles that discussed cow’s milk allergy (CMA) and GER (De Greef, Hauser, Devreker, Veereman-Wauters, & Vandenplas, 2012; Ewing & Allen, 2005; Palumbo, Dolen, & Good, 2003; Salvatore & Vandenplas, 2002) were slightly more directive. They encouraged mothers to continue breastfeeding their babies, and recommended eliminating cow’s milk and eggs from the woman’s diet along with taking a calcium supplement. In addition, they advised supervision by appropriate health care professionals like lactation consultants, allergists, and nutritionists. However, Ewing and Allen (2005) warned mothers that if they were unable to follow the elimination diet and the baby’s growth was compromised owing to persistency of symptoms, breastfeeding should be stopped. A study, conducted by Parilla Rodriguez, Davilla Torres, Gonzalez Mendez and Gorrin Peralta (2002) to identify the knowledge of mothers about breastfeeding babies and their experience of GER, reported that GER was one of the reasons for stopping breastfeeding. This could be attributed to a recommendation from pediatricians, with 53.3% found to recommend that mothers change to infant formula, as a means of improving reflux.

### Passing reference to breastfeeding/breast milk for non-pharmacological interventions

Nine of the 27 articles including reviews and clinical guidelines were quasi-silent on breastfeeding. These articles mentioned breastfeeding, but did not

focus on breastfed babies. One article recommended an alginate preparation mixed with water to help with the symptoms of GER. An alginate preparation is a medication used to increase the consistency of gastric contents to a gel like substance once it gets in contact with gastric acid, thus preventing the backflow into the esophagus (Gaviscon infant oral powder, 2012) (Managing gastro-oesophageal reflux in infants, 2009). Other authors dismissed the idea of thickened feedings as an option for breastfed babies outside of formula feeding (Arguin & Swartz, 2004; Carroll, Garrison, & Christakis, 2002; Henry, 2004).

Two articles advised the increased frequency of winding (burping) of babies during feeds, or keeping them upright following a feed with head of bed elevated to 30 degrees (Gremse, 2009; McPherson & Towner Wright, 2005).

Another article made brief mention of the differences that were inherent in breastfeeding such as breastfed babies having a lower esophageal acid exposure than formula-fed infants owing to faster gastric emptying rate (Bhatia & Parish, 2009). Others observed that breastfed babies regurgitate their feeds but they do so less often than formula fed babies (Hegar et al., 2009; Lawson, 2003) and one suggested that they stop vomiting earlier (Campanozzi et al., 2009). McPherson and Towner Wright (2005) suggested that they could not recommend an optimum treatment for breastfed infants with GER owing to the lack of evidence.

#### **No reference to breastfeeding/breast milk for non-pharmacological interventions**

There were six articles that did not discuss breastfeeding at all when considering the non-pharmacological management of babies with GER. Instead they considered care from a formula fed perspective (Falconer, 2009; Indrio et al., 2009; Sandritter, 2003; Vandenplas, Salvatore, & Hauser, 2005). These articles described conservative, dietary and non-pharmacological management, not including breastfeeding, as the first line of management. The treatments promoted included changing from formula to thickened formula or adding thickening agents to formula, despite a lack of convincing evidence about the therapeutic use of thickening agents (Indrio et al., 2009; Vandenplas et al., 2005). Thickening agents like guar gum, carob bean gum, rice cereal and soybean polysaccharide can cause a decrease in intestinal absorption of nutrients and minerals and an increase in cough incidence (Vandenplas et al., 2005). Another mode of management discussed was the use of hydrolysate amino-acid based formula, where there is CMA (Falconer, 2009; Indrio et al., 2009; Sandritter, 2003; Vandenplas et al., 2005). Indrio et al. (2011) discuss the use of low-fat formula, probiotic and prebiotic, to aid in faster gastric emptying. This is achieved through the use of formula supplemented with prebiotics and is not considered in relation to the breastfed babies. A study conducted by Myazawa et al. (2002) in Japan about prevalence of GER, showed that regurgitation was almost resolved by the age of 10-12 months compared to 12-14 months in Western countries. However, the rate of continuing and managing breastfeeding are not mentioned.

## **DISCUSSION**

This discursive literature review demonstrates a gap in the literature where health care research and guidelines do not consider breastfeeding in the context of supporting babies experiencing GER. This lack of information leads to the potential risk that babies with GER might be weaned from breastfeeding, thus missing out on the health benefits of breast milk and breastfeeding (Yalcin & Kuskonmaz, 2011). The review has found that instead of breast milk, either thick formulas or regular formulas with added thickening agents, are the feeding methods advised within the majority of recently published literature. Most of the articles located do not advise/support breastfed babies with GER. Not surprising then is the deduction that health practitioners have little understanding and knowledge of how to support breastfeeding when breastfed babies experience GER (Hogan, 2001; Kirkland & Fein, 2003; Sherman et al., 2009; Vandenplas et al., 2009). The exceptions are the articles that discussed the management of breastfed babies with cow's milk allergies and GER as a symptom and/or studies conducted

in non-western countries. Lack of knowledge and support have been identified as two of the reasons for early cessation of breastfeeding.

Despite the recommendations of the NASPGHAN and the ESPGHAN which call the symptoms of GER in infants "...almost never so severe" that the mother cannot continue breastfeeding (Vandenplas et al., 2009), the authors (members of these societies) did not provide a management plan for breastfed babies diagnosed as experiencing GER (Vandenplas et al., 2009). This makes continuing breastfeeding challenging and harder to successfully maintain in the presence of GER symptoms—the goal that these two societies identify in their recommendations.

Breastfeeding remains the optimal nutrition for babies in developed and developing countries. The WHO recommends exclusive breastfeeding for a minimum of six months and up to two years as a complementary food (World Health Organisation, 2011). Babies experiencing GER, are not only missing out on the benefits of breastfeeding and breast milk, but also are disadvantaged as current management strategies are not clear. Thickened formula and thickening agents are not without risk and are controversial. Yet in the absence of research on non-pharmacological support of breastfeeding in GER, they remain the first-line therapeutic measure in relieving regurgitation (Chao & Vandenplas, 2007; Vandenplas et al., 2005). The important point here is that there is little current research on how to support babies to continue to breastfeed when they have GER. Additionally, it is at odds with the aims of the WHO and professional bodies supporting pediatric practice. Given the importance of breastfeeding and the high prevalence of GER, we argue that exploring the optimum management of breastfed babies with GER should be a research priority.

Not surprisingly, breastfeeding and GER does feature amongst information and discussions generated by lactation consultants. For example, Kombol (2009) and Bonyata (2011) discuss in detail the non-pharmacological management of breastfeeding a baby with GER. Whilst not able to claim it is research evidence based, they do provide some practical advice based on physiology which may improve symptoms of GER for breastfed babies. Management advice includes: holding a baby in an upright position while breastfeeding, giving the baby short and frequent breastfeeds, avoiding sudden movements, wearing the baby upright in a sling for 20-30 minutes after a feed, and assessing for allergies.

Health professionals need to provide evidenced-information for parents who have a baby with GER. This is difficult when there is so little evidence published which supports breastfeeding for babies with GER and when research analysis and critique are absent in the literature. Critiquing and analyzing research involve more than simply evaluating the quality of the research summaries provided in the literature. They also involve assessing the research question itself for its cultural and social content. This is particularly applicable in areas where there are contests or tensions about different approaches to the management of GER.

Without a critical review of the literature, such as the one we have undertaken, it is difficult to see absences. When the authors of studies or guidelines do not explore particular treatment modalities, or ask questions about a particular set of individuals (in this case, breastfed babies experiencing GER), the proposed solutions may not provide a perspective of the full armory of possibly managements.

This discursive literature review has identified the urgent need for primary research to identify the best non-pharmacological and therapeutic management approach for breastfed babies experiencing GER. It is clear that caring for a newborn with GER can be very tiring especially when there is a lack of guidance for parents. Therefore, it is essential to reassure, educate, and support parents that GER is usually a self-limiting disorder that improves as the baby gets older and the lower esophageal sphincter matures. This in itself may be a reassurance for some women, enabling them to continue to breastfeed.

**Table 1:** GER Discursive Literature Review – Excluded Articles

Reason	Reference
Studies testing one particular approach	<ul style="list-style-type: none"> <li>• Horvath, A., Dziechciarz, P., &amp; Szajewska, H. (2008). The effect of thickened-feed interventions on gastroesophageal reflux in infants: systematic review and meta-analysis of randomized, controlled trials. <i>Pediatrics</i>, 122(6), e1268-1277.</li> <li>• Chao, H. C., &amp; Vandenplas, Y. (2007). Effect of cereal-thickened formula and upright positioning on regurgitation, gastric emptying, and weight gain in infants with regurgitation. <i>Nutrition</i>, 23(1), 23-28.</li> <li>• Ostrom, K. N., Jacobs, J. R., Merritt, R. J., &amp; Murray, R. D. (2006). Decreased regurgitation with a soy formula containing added soy fiber. <i>Clinical Pediatrics</i>, 45(1), 29-37.</li> <li>• Puntis, J.W. (2005). Re: Effect of locust bean gum in anti-regurgitant milk on the regurgitation in uncomplicated gastroesophageal reflux. <i>Journal of Pediatric Gastroenterology and Nutrition</i>, 40(1), 101-102.</li> <li>• Vandenplas, Y. (2009). Thickened infant formula does what it has to do: decrease regurgitation. <i>Pediatrics</i>, 123(3), e549-e550.</li> <li>• Vanderhoof, J.A., Moran, J.R., Harris, C.L., Merkel, K.L., Orenstein, S.R. (2003). Efficacy of a pre-thickened infant formula: a multicenter, double-blind, randomized, placebo-controlled parallel group trial in 104 infants with symptomatic gastroesophageal reflux. <i>Clinical Pediatric</i>, 42(6), 483-495.</li> <li>• Wenzl, T. G., Schneider, S., Scheele, F., Silny, J., Heimann, G., &amp; Skopnik, H. (2003). Effects of thickened feeding on gastroesophageal reflux in infants: a placebo-controlled crossover study using intraluminal impedance. <i>Pediatrics</i>, 111(4 Pt 1), e355-e359.</li> <li>• Xinias, I.F., Mouane, N., Le Luyer, B., Spirolou, K., Demertzidou, V., Hauser, B., Vandenplas, Y. (2005). Cornstarch thickened formula reduces oesophageal acid exposure time in infants. <i>Digestive and Liver Disease</i>, 37(1), 23-27.</li> <li>• Barak, M.F., Lahav, S., Mimoun, F.B., Dollberg, S. The prevalence of regurgitations in the first 2 days of life in human milk- and formula-fed term infants. <i>Breastfeeding Medicine</i>, 1(3), 168-171.</li> <li>• Martin, A.J., Pratt, N., Kennedy, J.D., Ryan, P., Ruffin, R.E., Miles, H., Marley, J. (2002). Natural History and Familial Relationships of Infant Spilling to 9 Years of Age. <i>Pediatrics</i>, 109(6), 1061-1067.</li> <li>• Heine, R.G. (2008). Allergic gastrointestinal motility disorders in infancy and early childhood. <i>Pediatric Allergy and Immunology</i>, 19(5), 383-391.</li> </ul>
Studies discussing GERD but not GER	<ul style="list-style-type: none"> <li>• Al-Adnani, M.F., Cohen, M.C., Scheimberg, I. (2011). Gastroesophageal reflux disease and sudden infant death: mechanisms behind an under-recognised association. <i>Pediatric and Development Pathology</i>, 14(1), 53-56.</li> <li>• Mir, A. (2010). Gastro-oesophageal reflux. Issues in clinical practice. <i>British Medical Journal</i>, 341.</li> <li>• Orenstein, S.R. (2008). Crying in infant GERD: acid or volume? Heartburn or dyspepsia? <i>Current Gastroenterology Report</i>, 10(5), 433-436.</li> </ul>
Studies which are not treatment oriented	<ul style="list-style-type: none"> <li>• Barbosa, L., Vera, H., Moran, S., Del Prado, M., Lopez-Alarcon, M. (2005). Reproducibility and reliability of the 13C-acetate breath test to measure gastric emptying of liquid meal in infants. <i>Nutrition</i>, 21(3), 289-294.</li> <li>• Castell, D.O., Mainie, I., Tutuian, R. (2005). Non-acid gastroesophageal reflux: documenting its relationship to symptoms using multichannel intraluminal impedance (MII). <i>Transaction of the American Clinical and Climatological Association</i>, 116, 321-333.</li> <li>• Cresi, F., Sanctis, L., Savino, F., Bretto, R., Testa, A., Silvestro, L. (2006). Relationship between gastro-oesophageal reflux and gastric activity in newborns assessed by combined intraluminal impedance, pH metry and epigastric impedance. <i>Neurogastroenterology and Motility</i>, 18(5), 361-368.</li> <li>• Woodley, F.W., Fernandez, S., Mousa, H. (2007). Diurnal variation in the chemical clearance of acid gastroesophageal reflux in infants. <i>Clinical Gastroenterology and Hepatology</i>, 5(1), 37-43.</li> <li>• Woodley, F.W., Hayes, J., Mousa, H. (2009). Acid gastroesophageal reflux in symptomatic infants is primarily a function of classic 2-phase and pH-only acid reflux event types. <i>Journal of Pediatric and Gastroenterology and Nutrition</i>, 48(5), 550-558.</li> <li>• Woodley, F.W., Mousa, H. (2009). "pH-Only" acid reflux events in infants during later phases of the feeding cycle are less acidic and cleared more efficiently than classic 2-phase acid reflux events. <i>Journal of Pediatric and Gastroenterology and Nutrition</i>, 48, 41-47.</li> <li>• Sifrim, D., Castell, D., Dent, J., Kahrilas, R.J. (2004). Gastro-oesophageal reflux monitoring: review and consensus report on detection and definitions of acid, non-acid, and gas reflux. <i>Gut</i>, 53(7), 1024-1031.</li> </ul>
Comments, opinions or news articles	<ul style="list-style-type: none"> <li>• Declich, V.F., Badina, L.F., Ventura, A. Does infant gastro-oesophageal reflux really deserve medical attention? <i>Archives of Disease in Childhood</i>, 95(9), 26-30.</li> <li>• Ballantyne, R. (2004). Gastric reflux support network helps parents. <i>Nursing New Zealand</i>, 10(3), 4.</li> <li>• Sondheimer, J.M., Finkel, Y., Molleston, J., Alonsom, E., Olivia-Hemker, M. Am I a heretic if I don't believe in GERD. <i>Journal of Pediatric Gastroenterology and Nutrition</i>, 43(1), 3-4.</li> </ul>
Studies not directed at health professionals	<ul style="list-style-type: none"> <li>• Cameron, F.L., Hansen, R., Abdelhadi, A. (2009). The vomiting baby. <i>British Medical Journal</i>, 339.</li> <li>• Gracey, K., Henry, S.M. (2004). Parent's guide to gastroesophageal reflux. <i>Advanced Neonatal Care</i>, 4(4), 248-249.</li> <li>• Barmby, L.C. (1999). Breastfeeding the baby with reflux. <i>La Leche League International</i>, 1-18</li> </ul>

**Table 2:** GER Discursive Literature Review – Included Articles

Category	Article Type	Article
Substantive Mention of BF (n=12)	Guidelines	Vandenplas, Y., Rudolph, C. D., Di Lorenzo, C., Hassall, E., Liptak, G. Mazur, L., ... Wenzl, T.G. (2009). Pediatric gastroesophageal reflux clinical practice guidelines: Joint recommendations of the North American society for pediatric gastroenterology, hepatology, and nutrition (NASPGHAN) and the European society for pediatric gastroenterology, hepatology, and nutrition (ESPGHAN). <i>Journal of Pediatric Gastroenterology and Nutrition</i> 49(4), 498-547. Ewing, W. M., & Allen, P.J. (2005). The diagnosis and management of cow milk protein intolerance in the primary care setting. <i>Pediatric Nursing</i> , 31(6), 486-493.
	Cohort	Hegar, B., Dewanti, N. R., Kadim, M., Alatas, S., Firmansyah, A., & Vandenplas, Y. (2009). Natural evolution of regurgitation in healthy infants. <i>Acta Paediatrica</i> . 98(7), 1189-1193. Osatakul, S., Sriplung, H., Puetpaiboon, A., Junjana, C. O., & Chamnongpakdi, S. (2002). Prevalence and natural course of gastroesophageal reflux symptoms: a 1-year cohort study in Thai infants. <i>Journal of Pediatric Gastroenterology and Nutrition</i> , 34(1), 63-67.
	Descriptive Surveys	Nevo, N., Rubin, L., Tamir A., Levine A., & Shaoul, R. (2007). Infant feeding patterns in the first 6 Months: An assessment in full-term infants. <i>Journal of Pediatric Gastroenterology and Nutrition</i> , 45(2), 234-239 Yalcin, S. S., & Kuskonmaz, B. B. (2011). Relationship of lower breastfeeding score and problems in infancy. <i>Breastfeeding Medicine</i> , 6(4), 205-208. Parrilla Rodriguez, A. M., Davila Torres, R. R., Gonzalez Mendez, M. E., & Gorrin Peralta, J. J. (2002). Knowledge about breastfeeding in mothers of infants with gastroesophageal reflux. <i>Puerto Rico Health Science Journal</i> , 21(1), 25-29.
	Reviews	De Greef, E., Hauser, B., Devreker, T., Veereman-Wauters, G., & Vandenplas, Y. (2012). Diagnosis and management of cow's milk protein allergy in infants. <i>World Journal of Pediatrics</i> , 8(1), 19-24. Salvatore, S., & Vandenplas, Y. (2002). Gastroesophageal reflux and cow milk allergy: is there a link? <i>Pediatrics</i> , 110(5), 972-984. Douglas. (2005). Excessive crying and gastro-oesophageal reflux disease in infants: misalignment of biology and culture. <i>Medical Hypotheses</i> , 64(5), 887-898. Douglas, Hill, P., & Brodrribb, W. (2011). The unsettled baby: how complexity science helps. <i>Archives of Disease in Childhood</i> , 1-5.
	Case Study.	Palumbo, M., Dolen, W. K., & Good, R. A. (2003). A 16-month-old with persistent vomiting. <i>Annals of Allergy Asthma and Immunology</i> , 90(4), 380-382.
PPassing Mention of BF (n=9)	Reviews.	Managing gastro-oesophageal reflux in infants. (2009). <i>Drug and Therapeutics Bulletin</i> , 47(12), 134-137. Gremse, D. (2009). Managing the pediatric patient with GERD: special challenges and considerations. Medscape CME Gastroenterology. Retrieved from <a href="http://www.medscape.org/viewarticle/705430">http://www.medscape.org/viewarticle/705430</a> . Arguin, A. L., & Swartz, M. K. (2004). Gastroesophageal reflux in infants: a primary care perspective. <i>Pediatric Nursing</i> , 30(1), 45-51. Bhatia, J., & Parish, A. (2009). GERD or not GERD: the fussy infant. <i>Journal of Perinatology</i> , 29, s7-s11. Carroll, A. E., Garrison, M. M., & Christakis, D. A. (2002). A systematic review of non-pharmacological and nonsurgical therapies for gastroesophageal reflux in infants. <i>Archives of Pediatric and Adolescent Medicine</i> , 156(2), 109-113. Retrieved from <a href="http://archpedi.ama-assn.org/cgi/content/full/156/2/109">http://archpedi.ama-assn.org/cgi/content/full/156/2/109</a>
	Clinical Inquiries	McPherson, V., & Towner Wright, S. (2005). What is the best treatment for gastroesophageal reflux and vomiting in infant? <i>Journal of Family Practice</i> , 54(4), 372-375.
	Guideline Management Review.	Henry, S. (2004). Discerning differences: gastroesophageal reflux and gastroesophageal reflux disease. <i>Advances in Neonatal Care</i> , 4(4), 235-247. Lawson, M. (2003). Gastro-oesophageal reflux in infants: an evidence-based approach. <i>British Journal of Community Nursing</i> , 8(7), 296-301.
	RCT.	Campanozzi, A., Boccia, G., Pensabene, L., Panetta, F., Marseglia, A., Strisciuglio, P., Staiano, A. (2009). Prevalence and natural history of gastroesophageal reflux: pediatric prospective survey. <i>Pediatrics</i> , 123(3), 779-783.
No Mention of BF (n=6)	Reviews	Falconer, J. (2009). GOR and GORD in infants. <i>Community Practitioner</i> , 82(10), 42-43. Indrio, F., Riezzo, G., Raimondi, F., Cavallo, L., & Francavilla, R. (2009). Regurgitation in healthy and non healthy infants. <i>Italian Journal of Pediatrics</i> , 35(1), 1-12. Vandenplas, Y., Salvatore, S., & Hauser, B. (2005). The diagnosis and management of gastro-oesophageal reflux in infants. <i>Early Human Development</i> , 81(12), 1011-1024.
	Clinical Report.	Sandritter, T. (2003). Gastroesophageal reflux disease in infants and children. <i>Journal Pediatric of Health Care</i> , 17, 198-203.
	RCT	Indrio, F., Riezzo, G., Raimondi, F., Bisceglia, M., Filannino, A., Cavallo, L., & Francavilla, R. (2011). Lactobacillus reuteri accelerates gastric emptying and improves regurgitation in infants. <i>European Journal of Clinical Investigation</i> , 41(4), 417-422.
	Cohort	Miyazawa, R., Tomomasa, T., Kaneko, H., Tachibana, A., Ogawa, T., & Morikawa, A. (2002). Prevalence of gastro-oesophageal reflux-related symptoms in Japanese infants. <i>Pediatric International</i> , 44(5), 513-516.

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# The emotional and hormonal pathways of labour and birth: integrating mind, body and behaviour

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### ABSTRACT

**Background:** Women have described normal labour and birth in terms of their emotions. Major advances in knowledge have occurred within the sciences resulting in an understanding of emotions as prime directors of human behaviour which is orchestrated by neurohormones. **Method:** This paper focusses on key aspects of contemporary knowledge of childbirth physiology, neuroscience and behaviour. It integrates this understanding with women's descriptions of their emotions during labour. **Findings:** Neurohormones associated with labour and birth are designed to trigger a transformation in the body and behaviour and create an environment which supports both the mother and the baby. Hormones and emotions are intertwined and interconnected. Labour hormones are linked to the woman's emotions and behaviour during labour and birth as well as the physical signs of labour. An interactive model is presented which explains labour in terms of both the physical effects and the emotional affects that women have described as part of their labour experience. The hypothesis for this model is that the hormones that initiate and sustain labour also cause the instinctual emotions that women feel, and the behaviour they exhibit, during spontaneous labour and birth. **Conclusions:** Hormonal changes are necessary to support the physical and emotional changes during labour and birth. The neurohormones which operate during pregnancy and during labour and birth also support

parenting behaviour. This paper integrates the contemporary scientific understanding of the role of neurohormones and their association, with the woman's behaviour and emotions during labour. It argues for, and provides the foundations of, a new conceptual framework for understanding labour and birth, one which integrates mind, body and behaviour.

### KEY WORDS

Emotions, neurohormones, physiology, labour and birth

### INTRODUCTION

When women discuss and describe normal labour and birth they often do so in terms of their feelings, their thoughts and their actions, with labour considered to be a continuous process and not one marked by stages or phases (Dixon, Foureur & Skinner, 2012). Research studies exploring the woman's experiences of childbirth have identified that women have a need for information, control and support during birth (Dahlen, Barclay, & Homer, 2010; Gibbins & Thomson, 2001; Halldorsdottir & Karlsdottir, 1996; Lavender, Walkinshaw, & Walton, 1999). There is a range of social, psychological, environmental and cultural factors which may impact on the woman's perceptions and experiences of birth (Hodnett, Gates, Hofmeyr, & Sakala, 2003; Nolan, Smith, & Catling, 2009).

A previous paper has outlined a qualitative research project which explored the woman's perceptions of labour as she moved towards birth (Dixon, Skinner & Foureur 2013). In this study, the 18 women interviewed described labour predominantly in terms of their emotions. Women's emotions appeared to move from excitement at the start of labour, along with feelings of calm and confidence, to a need to focus on themselves and each contraction as the labour became more intense and painful. This led to descriptions of a need for internal focus and disconnection with those around them, a finding consistently uncovered amongst studies exploring childbirth experiences (Burvill, 2002; Duff, 2005; Halldorsdottir & Karlsdottir, 1996; Leap, 2000; Machin & Scamell, 1997). Additionally the women described becoming fearful and overwhelmed or tired and sleepy as the birth became imminent, followed by feelings of happiness, awe and joy once the baby was born. Birth was considered a powerful process and the women described a sense of connectedness to their baby and surprise at the power of their own body's ability to take them through the birth. These emotions were surprisingly consistent and linear and have been found to some extent in other research studies (Table 1).

**Table 1:**

Emotions during labour identified by Dixon, Skinner and Foureur (2013)	Other research identifying the same emotions
At the start of labour – women reported excitement & anticipation	Burvill (2002). Midwifery diagnosis of labour onset. <i>British Journal of Midwifery</i> , 10(10), 600 – 605 Nolan, M., Smith, J., & Catling, J. (2009). Experiences of early labour (1) Contact with health professionals. <i>The Practising Midwife</i> , 12(7), 21-24
This was followed by a period of calm & peace - women felt confident to carry on with normal life	Burvill (2002). Midwifery diagnosis of labour onset. <i>British Journal of Midwifery</i> , 10(10), 600 – 605
As labour became more intense women described 'The Zone' where they had to really focus on the intensity of the contractions – time passed differently; they felt in a different place in space and time	Halldorsdottir, S., & Karlsdottir, S. (1996). Journeying through labour and delivery: perceptions of women who have given birth. <i>Midwifery</i> , 12, 48-61. Machin, D., & Scamell, M. (1997). The experience of labour: using ethnography to explore the irresistible nature of the bio-medical metaphor during labour. <i>Midwifery</i> , 13, 78-84. Leap, N. (2000). Pain in labour: towards a midwifery perspective. <i>MIDIRS Midwifery Digest</i> , 10(1), 49-53. Burvill, S. (2002). Midwifery diagnosis of labour onset. <i>British Journal of Midwifery</i> , 10(10), 600 - 605. Duff, M. (2005). <i>A study of Labour</i> . Unpublished PhD dissertation. University of Technology, Sydney.
Some women reported becoming tired and sleepy	Not found in other studies
Women reported becoming fearful, overwhelmed and out of control	Cheyne, H., Dowding, D., & Hundley, V. (2006). Making the diagnosis of labour: midwives' diagnostic judgement and management decisions. <i>Journal of Advanced Nursing</i> , 53(6), 625-635. Escott, D., Spiby, H., Slade, P., & Fraser, R. (2004). The range of coping strategies women use to manage pain and anxiety prior to and during first experience of labour. <i>Midwifery</i> , 20, 144-156. Halldorsdottir, S., & Karlsdottir, S. (1996). Journeying through labour and delivery: perceptions of women who have given birth. <i>Midwifery</i> , 12, 48-61.
After the birth women described feelings of euphoria and joy or shock and disbelief	Halldorsdottir, S., & Karlsdottir, S. (1996). Journeying through labour and delivery: perceptions of women who have given birth. <i>Midwifery</i> , 12, 48-61. Carter, S. (2009). Gender and childbearing experiences: revisiting O'Brien's dialectics of reproduction. <i>NWSA Journal</i> , 21(2). Retrieved from <a href="http://search.rdsinc.com.helicon.vuw.ac.nz">http://search.rdsinc.com.helicon.vuw.ac.nz</a> Fenwick, J., Hauck, Y., Downie, J., & Butt, J. (2005). The childbirth expectations of a self-selected cohort of Western Australian women. <i>Midwifery</i> , 21, 23-35.

The studies shown in Table 1 raise the question of whether the emotions identified by women during labour and birth are a possible indicator of normal labour physiology. What is currently known about emotions and hormones and their links to human parturition? Over the last few decades there have been revolutionary changes in knowledge and understanding of human brain structures and functions. Advances in brain imaging and measurement of neurochemical changes have improved researchers' ability to investigate the role of the neural structures in the brain and their link to behaviour (Brizendine, 2006). This paper will focus on the links between contemporary knowledge of neuroscience and parturition (childbirth) physiology. It will integrate contemporary scientific understandings with the descriptions from women of their emotions during labour and birth. An interactive model will be presented which explains labour in terms of the physical effects and the emotional affects that women have identified during labour and birth (Figure 1). The hypothesis for this model is that the hormones that initiate and sustain labour also cause the instinctual emotions, the behaviour and the feelings women exhibit during spontaneous labour and birth. It suggests that the woman's emotional and physical reactions to labour may be the drivers and signs of progress and that interruption to or intervention of women's instinctual behaviours may delay or slow labour.

## UNDERSTANDING EMOTIONS

It has been known for some time that hormones influence the functions of organs within the human body but scientific advances have led to an understanding that neurohormones are also intricately intertwined with emotions (Pert, 1997). Hormones are chemical substances (messengers) secreted into the blood or body fluid that exert a physiological effect on other cells in the body (Blackburn, 2007). They facilitate the maintenance of an optimal internal environment, initiate corrective and adaptive responses to any deviations from normal physiology and direct human behaviour. Neurohormones are hormones which are synthesised and released from neurones; as such they are secreted within the brain to work both on the neurones in the brain and on different sites within the body via the blood stream (Douglas & Ludwig, 2008). These hormones have subsequently been found to influence behaviour because they have an effect on how the body adapts physiologically (Cacioppo & Berntson 2006).

Pert's (1997) discovery of neurohormones, which link human physiology and emotions, led to the construct that hormones are biochemical molecules of emotion; thoughts and emotions are diffused throughout the body and the mind, and can cause physiological changes. The alternative is also true that physiological changes affecting the body's functions can also cause emotions. There is a vital link between the mind and the body

and 'emotions and bodily sensations are intricately intertwined in a bi-directional network' (Pert, 1997, p. 142).

## THE BRAIN AND CHANGING NEURAL STRUCTURES

The human brain is a complex and intricate structure with many differing functions and systems. The neocortex is divided into several regions which include the parietal, occipital, frontal and temporal lobes which interact through the thalamus and the thalamus interacts with the limbic system (Amthor, 2011). The limbic system is made up of differing structures (such as the hypothalamus and amygdala) working together to support an overall function which is to regulate autonomic and endocrine function and ensure self-preservation (Swenson, 2006). The neocortex is often conceptualised as the thinking part of the brain and the limbic system as the feeling and reacting part of the brain (Swenson, 2006).

It would appear that the neural structure within the brain is continually developing and changing throughout life, starting during the intrauterine period (Swaab & Garcia-Falgueras, 2009) and continuing into old age (Brizendine, 2006). This ability to change is termed plasticity and it is thought that the human brain has a high degree of plasticity over short and long term intervals. These changes are directly influenced by the hormones: oestrogen, progesterone, testosterone, oxytocin and prolactin, all of which can have a strong influence on behaviour (Blackburn, 2007; Brizendine, 2006).

During pregnancy there are substantial changes in maternal brain structure and physiology. Nevo, Soustiel and Thaler (2010) found a gradual increase in the cerebral blood flow as pregnancy progresses which they suggest may be due to the impact of oestrogens and progesterone. During the postpartum period Kim, Mayes, Leckman, Feldman, & Swain, 2010 described changes to the brain structure in certain regions of the brain. Using MRI scanning they compared the brain structure and activity of 19 postpartum women (with healthy babies) at two points in time – between two and four weeks postpartum and three and four months postpartum. They found structural changes and increased grey matter within certain regions in the women's prefrontal cortexes, parietal lobes and midbrain areas. These regions are thought to be implicated in maternal motivation and maternal behaviour.

Little is currently known about whether the hormones that instigate and regulate labour and birth have an effect on neonatal and infant neural development. More importantly perhaps is the parallel lack of knowledge as to whether intervention (and interruption) of normal labour hormones could have an effect on the neural development of the infant. There is however substantial evidence that oxytocin and vasopressin (produced within the brain) have a key role in social behaviour (Heinrichs, Dawans, & Domes, 2009).

## INFLUENCES ON BEHAVIOUR

Social neuroscience is an emerging field which is attempting to examine and integrate how the nervous, endocrine and immune systems influence social processes and behaviour (Harmon-Jones & Winkielman, 2007). Evolving theories are now outlining the apparently innate need humans have, to behave in ways that are socially acceptable. Social co-operation has ensured improved survival of the species and is reliant on reciprocity, cooperation, communication and collective action (Norris & Cacioppo, 2007).

Humans are fundamentally social beings and it is argued that emotions have evolved as an adaptive process to ensure protection from predators (fear of snakes, etc.) but also to encourage social co-operation and collective action (Norris & Cacioppo, 2007). When an individual perceives a situation that is new, uncontrollable or unpredictable there is an increased stress response. This response can also be caused by social interactions that threaten the social self – for example, when performance can be judged negatively by others (Kudielka, Hellhammer, & Kirschbaum, 2007).

Norris and Cacioppo (2007) and many others suggest that we ensure affiliation with other members of our group through engaging in behaviours that contribute to attachment, and that healthy social relationships are important for emotional and physical wellbeing. Social interactions often lead to social bonds which are defined as behavioural processes in which there is a tendency to prefer and seek contact with others and to seek a partner (Carter, 2007).

The hormones that are thought to affect social behaviour, social bonding and sexual behaviour are: oxytocin, vasopressin, corticotrophin-releasing hormone (CRH) and corticosterone, along with oestrogen and testosterone (Carter, 2007). Oxytocin regulates a variety of intertwined behaviours and whilst much of the research advances have come from animal studies, there is evidence to support similar behavioural effect for humans. The effects of oxytocin are presented in Table 2.

### **Table 2: Effects of Oxytocin (Pederson & Boccia, 2002)**

- Suppresses appetite
- Stimulates sexual arousal, receptivity and grooming behaviours
- Reduces anxiety
- Increases mothering behaviour
- Improves social memory
- Reduces stress and anxiety (Neumann, 2008)
- Increases generosity to others (Zak, Stanton, & Ahmadi, 2007)
- Increases trust in others (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005)

#### **During labour:**

- Enhances growth, expulsion (during labour) sociability, curiosity and reduces stress (Uvnäs-Moberg, 2003)
- Binds with oxytocin receptors in the myometrium to initiate rhythmic uterine contractions during labour (Challis, Matthews, Gibb, & Lye, 2000)
- Oxytocin is released in pulses (Leng, Meddle, & Douglas, 2008).
- The pulses increase in frequency, amplitude and duration (Fuchs et al., 1991)
- Works with and enhances levels of beta-endorphin
- Has a strong analgesic hypnotic effect (Gimple & Fahrenholz, 2001)
- Enhanced expulsion during the second stage - also known as the Ferguson reflex (Blanks & Thornton, 2003; Buckley, 2010).

Oxytocin is produced within the hypothalamus and is mediated by other neurohormones. The full effects of this naturally produced hormone are complex and still not fully understood.

What we do know is that oxytocin enhances maternal behaviour and is supported by prolactin. Prolactin works on many different cell types; it does not have a single endocrine function but a range of distinct, and what appear to be unrelated, functions. Grattan and Kokay (2008) suggest that the many and widespread functions of prolactin can be considered as a single function – that of inducing or regulating a variety of neuroendocrine adaptations to pregnancy and lactation (Grattan & Kokay, 2008). Prolactin is the only hormone that remains elevated throughout pregnancy and lactation (Grattan, Steyn, Kokay, Anderson, & Bunn, 2008). It is thought that these elevated prolactin levels in conjunction with oxytocin contribute to maternal behaviour (Grattan & Kokay, 2008; Grattan et al., 2008).

Thus it appears that neurohormones have both a physiological function (acting on the body) and a behavioural function (acting on the brain and behaviour); these dual functions enhance maternal behaviours that will ensure optimal survival for the baby following birth. All mammals have

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The hormones which support pregnancy and trigger labour and birth are also designed to trigger a transformation in the behaviour of the mother and baby and create an optimal environment which supports them.

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an innate need to ensure survival of their offspring and to do this there is a need for a change in behaviour (Winberg, 2005). The hormones which support pregnancy and trigger labour and birth are also designed to trigger a transformation in the behaviour of the mother and baby and create an optimal environment which supports them (Schmid & Downe, 2010).

### THE PHYSIOLOGY OF PARTURITION (CHILDBIRTH)

Recent advances in knowledge about human physiology suggest that pregnancy, labour and birth are a continuous physiological process (Baddock, 2010; Challis, Matthews, Gibb, & Lye, 2000; Douglas & Ludwig, 2008). Parturition relies on complex and highly co-ordinated behaviours involving a myriad of endocrine, neuro-endocrine and immunological responses with complex interrelated signalling between the maternal and fetal systems (Challis et al., 2000; Douglas & Ludwig, 2008). The initiation of labour remains poorly understood although it is thought that there may not be a single pathway to the onset of labour in humans but several pathways suggestive of a failsafe system (Power & Schulkin, 2005). Before these pathways can occur however, there is a need for different maternal cells to change their behaviour. With the cells of the uterine myometrium undergoing the most dramatic changes from early pregnancy, through labour and into the postpartum period (Shynlova, Tsui, Jaffer, & Lye, 2009).

Myometrium regulation during pregnancy and parturition is a necessary part of birth which is achieved as a continuum of four distinct physiological phases (Challis et al., 2000; Norwitz, Robinson, & Challis, 1999; Smith, 2007; Terzidou, 2009). These phases involve uterine quiescence, activation, stimulation and involution. During uterine quiescence the contractility of the myometrium is suppressed, to enable the baby and uterus to grow. It occurs for the majority of pregnancy and is mediated by corticotrophin releasing hormone, progesterone, and a variety of uterotonic inhibitors working together to promote uterine relaxation. The activation phase prepares the myometrium to respond to stimulation. This involves an increase in myometrial receptors (oxytocin and prostaglandin) and gap junctions and occurs over several days or weeks. During the labour stimulation phase the myometrium contracts in response to uterotonic stimulators such as oxytocin, prostaglandins and cytokines. The final phase is myometrial involution which involves tissue remodelling, apoptosis and cell growth.

The changes between these phases evolve and are dependent on an integrated response between hormones and neurohormones. Pregnancy and childbirth are a physiologically continuous process, with a gradual

transition between the end of pregnancy and the start of labour moving through to the birth and into the postpartum period (Baddock, 2010).

### THE NEUROHORMONES IMPLICATED IN LABOUR AND BIRTH

The full physiology of labour and birth is not yet fully understood but evidence to date suggests that the hormone prostaglandin and the neurohormones oxytocin and CRH are necessary for labour initiation and progression (Challis, Matthews, Gibb, & Lye, 2000). Activation of the stress response (increasing levels of CRH) stimulates the secretion of hypothalamic beta-endorphin resulting in an increased stress-induced analgesic response (Charmandari, Tsigos, & Chrousos, 2005). These neurohormones are mediated by other hormones such as oestrogen and progesterone, and influence the production of prostaglandin which has a direct effect on the myometrium to stimulate contractions. These hormones also have an important role in the woman's emotional, physical and social responses to labour, birth and motherhood.

### THE ROLE OF CORTICOTROPHIN RELEASING HORMONE

CRH has a fundamental role in events that require a flight or fight response and therefore has an important role in survival and adaptation (Charmandari et al., 2005; Grammatopoulos, 2008). There is a complex set of interactions between the hypothalamus, the pituitary and the adrenal glands (HPA axis). CRH is released from the hypothalamus and travels to the anterior pituitary to orchestrate an integrated stress response (Brunton, Russell, & Douglas, 2008; Grammatopoulos, 2008). It stimulates the release of beta-endorphin and adrenocorticotropin hormone (ACTH). ACTH regulates glucocorticoids and cortisol production with the HPA axis working alongside the sympathetic-adrenal-medullary (SAM) axis to regulate the autonomic nervous system (Charmandari et al., 2005). During pregnancy the role of maternal secreted CRH is unclear but it is hypothesised that it integrates the homeostatic mechanisms that enable the mother and baby to adapt to an increasingly stressful environment (Grammatopoulos, 2008; Brunton, Russell, & Douglas, 2008; Ochedalski, Zylinska, Laudanski, & Lachowicz, 2001).

During labour increasing levels of CRH stimulate an increase in myometrial prostaglandin receptors, prostaglandin release, oxytocin release, fetal cortisol and beta-endorphin release (Blackburn, 2007; Petraglia, Florio, & Vale, 2005). The maternal plasma CRH levels of seven women during labour who gave birth vaginally were compared with those of 10 women who had elective caesarean sections (Petraglia et al., 1990). The results indicated that for the women who had a caesarean section the maternal plasma levels did not differ significantly from those found prior to the birth. However, for those women who had a vaginal birth the maternal plasma CRH increased progressively during labour reaching a peak at 8 and 9 cm of cervical dilatation and at the

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birth, followed by a significant reduction in the two hours postpartum. The effects of CRH are described in Table 3.

**Table 3:** The role of CRH

CRH controls and regulates reactions to fear and stress:

- There is a complex set of physical influences and feedback interactions between the hypothalamus, the pituitary and adrenal glands.
- The hypothalamus releases CRH which travels in the blood to the anterior pituitary to orchestrate an integrated stress response (Brunton, Russell, & Douglas, 2008; Grammatopoulos, 2008).
- CRH stimulates the release of beta-endorphin and adrenocorticotrophic hormone (ACTH)
- ACTH stimulates the secretion of glucocorticoids and causes the release of cortisol from the adrenal glands (Greenstein & Greenstein, 2000; Kudielka, Hellhammer, & Kirschbaum, 2007).
- The HPA works alongside the sympathetic-adrenal-medullary (SAM) axis which regulates the release of adrenaline and noradrenaline.

During pregnancy CRH:

- Supports the physiological adaptation to pregnancy (Grammatopoulos, 2008)
- Increases the numbers of prostaglandin receptors in the myometrium

During labour CRH stimulates the release of (Petraglia, Florio, & Vale, 2005):

- Prostaglandin
- Oxytocin
- Beta-endorphin

## THE STRESS RESPONSE

Increasing levels of CRH stimulate the stress response. Stress is defined as a threat or perceived threat to the body's dynamic state of equilibrium or homeostasis (Charmandari et al., 2005). The stress response is a complex cascade of physiological and behavioural adaptive responses which support homeostasis. It involves responses such as enhanced analgesia, elevations in core temperature, adaptive redirection of energy and increases in cardiovascular and respiratory rates. Enhanced analgesia occurs through other central nervous system components such as the opioid peptide producing neurones resulting in the production of beta-endorphin and its derivatives.

During the 1980s and early 1990s several studies found that beta-endorphin was released during labour (Mauri et al., 1990; Pancheri et al., 1985; Sasaki et al., 1987). It was hypothesised that the increased stress of labour supported and co-ordinated the body's response to stress. Maternal plasma concentrations of CRH and beta-endorphin were seen to have a correlated rise during labour which was thought to be a response to pain perception (Mauri et al., 1990; McLean, Thompson, Zhang, Brinsmead, & Smith, 1994; Pancheri et al., 1985). The levels of beta-endorphin and CRH during labour were found to reach values similar to those found in athletes during maximal exercise (Laatikainen, 1991).

More recently and due to improved testing techniques, the relationship between authentic beta-endorphin and labour stress has not been established (Harbach et al., 2008). Harbach and colleagues (2008) have found that there is a stress response which results in rising levels of some endorphin derivatives but only minimal increases of what is called the 'authentic beta-endorphin'. They have yet to clarify the specific function of the endorphin derivatives (B-endorphin IRM and B-LPH) although beta-endorphin is still considered to play a role in supporting an enhanced analgesic response during labour. A fuller understanding of this response is yet to be reached. One of the problems of testing for neurohormones relates

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## THE ROLE OF OXYTOCIN DURING PARTURITION

Oxytocin is produced in the hypothalamus and transmitted along secretory neurones to be stored in the posterior pituitary; it is released from the hypothalamus following neural stimulation (Leng, Meddle, & Douglas, 2008). Oxytocin has an affinity to oxytocin receptors which are expressed in the uterus during labour, the myoepithelium of the breasts during lactation (milk let down), and also on neurones within the central nervous system (Leng et al., 2008). The oxytocin neurones become less sensitive to stressful stimuli in late pregnancy, and it is theorised that this hypo-responsiveness may allow the pituitary to build stores of oxytocin in readiness for labour and breastfeeding (Leng et al., 2008). Oxytocin is the prime initiator of rhythmic uterine contractions during labour (Blackburn, 2007; Buckley, 2005; Challis et al., 2000) and is released from the maternal pituitary in pulses resulting in synchronous uterine contractions (Fuchs et al., 1991). The oxytocin neurones fire in bursts during labour and birth and breastfeeding, but at all other times oxytocin is discharged in a sustained release (Leng et al., 2008). These pulses increase in frequency, amplitude and duration during labour and are necessary for the maintenance of spontaneous labour (Fuchs et al., 1991). As the baby's head descends and the cervix and associated soft tissues begin to stretch, receptors within these tissues create a feedback loop to increase oxytocin production - resulting in strong expulsive contractions also known as the Ferguson reflex (Blanks & Thornton, 2003; Buckley, 2010). Oxytocin increases levels of beta-endorphin and also appears to have a strong analgesic effect itself (Gimble & Fahrenholz, 2001).

## DISCUSSION

These, then, are the molecular structures that are flooding the woman's body during labour and birth. They will have a direct action on the cells and tissues but simultaneously will influence the woman's emotions and behaviour during labour and following the birth. What do these advances in scientific understanding mean when considered in the context of the emotions women have described during labour and birth? We now know that hormones and especially neurohormones influence and enhance the ability of the woman's body to adapt to the necessary physiological changes. These emotions and feelings are probably representations of some of the necessary drives and biological bodily functions that occur during parturition.

The onset of labour is characterised by specific physical signs such as period-type pains, a bloody mucous 'show', ruptured membranes,

contractions, backache, and stomach upsets (diarrhoea, nausea, vomiting). With these physical manifestations of labour some women have reported positive feelings of excitement and anticipation. It is uncertain whether these positive emotions cause or are caused by a neurohormone such as dopamine providing a positive feedback to the limbic system. This may enhance the production of oxytocin (Uvnäs-Moberg, 2003) which works with the hormone prostaglandin to stimulate continued rhythmic uterine contractions. The neurones of the hypothalamus release oxytocin in pulses which build in frequency. The woman's cognitive abilities are unimpaired and she continues with her normal daily activities. Some women have described feeling calm and peaceful at this time and able to interact normally with the world (Dixon, Skinner, & Foureur, 2013). Oxytocin is known to reduce anxiety and this effect may be enhanced by the earlier release of a neurohormone such as dopamine (Uvnäs-Moberg, 2003).

## 'THE ZONE'

The hormones oxytocin and prostaglandin work together to ensure increasing frequency, length and strength of myometrial contractions (Challis et al., 2000; Fuchs et al., 1991). Physically therefore women experience contractions which gradually increase in strength and intensity. These contractions become more painful as the baby descends, the cervix dilates and the myometrium retracts. With increasing pain an increased stress response occurs and CRH levels rise. Simultaneously, the hormone beta-endorphin or a derivative is produced, and these hormones work together to mediate stress (Mauri et al., 1990; McLean et al., 1994; Pancheri et al., 1985). With rising levels of beta-endorphin (or its derivative) and oxytocin there will be an increased hypnotic and analgesic effect. As each of these hormones increases it is possible that there is a reduced functioning of the neocortex, and the neural pathways between the limbic system and the body act as dominant fluent highways of information. This may be the point at which some women describe feeling that their world is 'shrinking' and that they are 'on a different planet', or in 'the Zone'. It would also account for the different temporal experience of time and the inability to focus on events or people around them. The cognitive part of the brain is still able to function but at this point the limbic system is dominating so the body can proceed with the full physiological adaptation that is required for birth. If the cognitive part of the brain is engaged at this point it is possible that the limbic system will lose dominance and labour will stall or slow. This is sometimes seen when women move from their home environment to hospital – with the change in environment resulting in a need to evaluate for threats and therefore a need for re-engagement with the neocortex.

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The way a woman feels and behaves during labour may provide an understanding and an indication of the hormones that are exerting an effect on the woman's body during labour.

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## BECOMING SLEEPY, FEARFUL OR OVERWHELMED

As the levels of oxytocin, CRH and endorphin (or derivative) rise, women experience strong and sustained contractions. The stress response and oxytocin neurohormones work in balance exerting strong analgesic properties and a powerful anti-stress response (Gimble & Fahrenholz, 2001). These hormones can also cause reduced gastric functioning which may in turn cause vomiting during labour. There may also be a sedative effect making the woman feel very tired and sleepy at this point.

Alternatively, the level of pain may be increasing faster than the anti-stress response can mediate, causing a temporary imbalance – this would result in high levels of the neurohormone CRH resulting in feelings of fear and overwhelming pain. Thus women will feel fearful, panicky or overwhelmed – these feelings frequently occur prior to pushing, they may also be due to, or the cause of, a surge in oxytocin levels leading to the Ferguson reflex and expulsive contractions.

## PUSHING

The urge to push may be due to the stretching of the birth canal resulting in increased oxytocin production (Blanks & Thornton, 2003; Buckley, 2010). Nulliparous women have described becoming more focused at this point with a need to concentrate on 'how' and 'whether' they should push (Dixon, Skinner & Foureur, 2013). This is suggestive of a re-engagement of the neocortex and may be a mechanism that supports the woman's safety in that the neocortex becomes more dominant so that danger or threats can be more fully assessed.

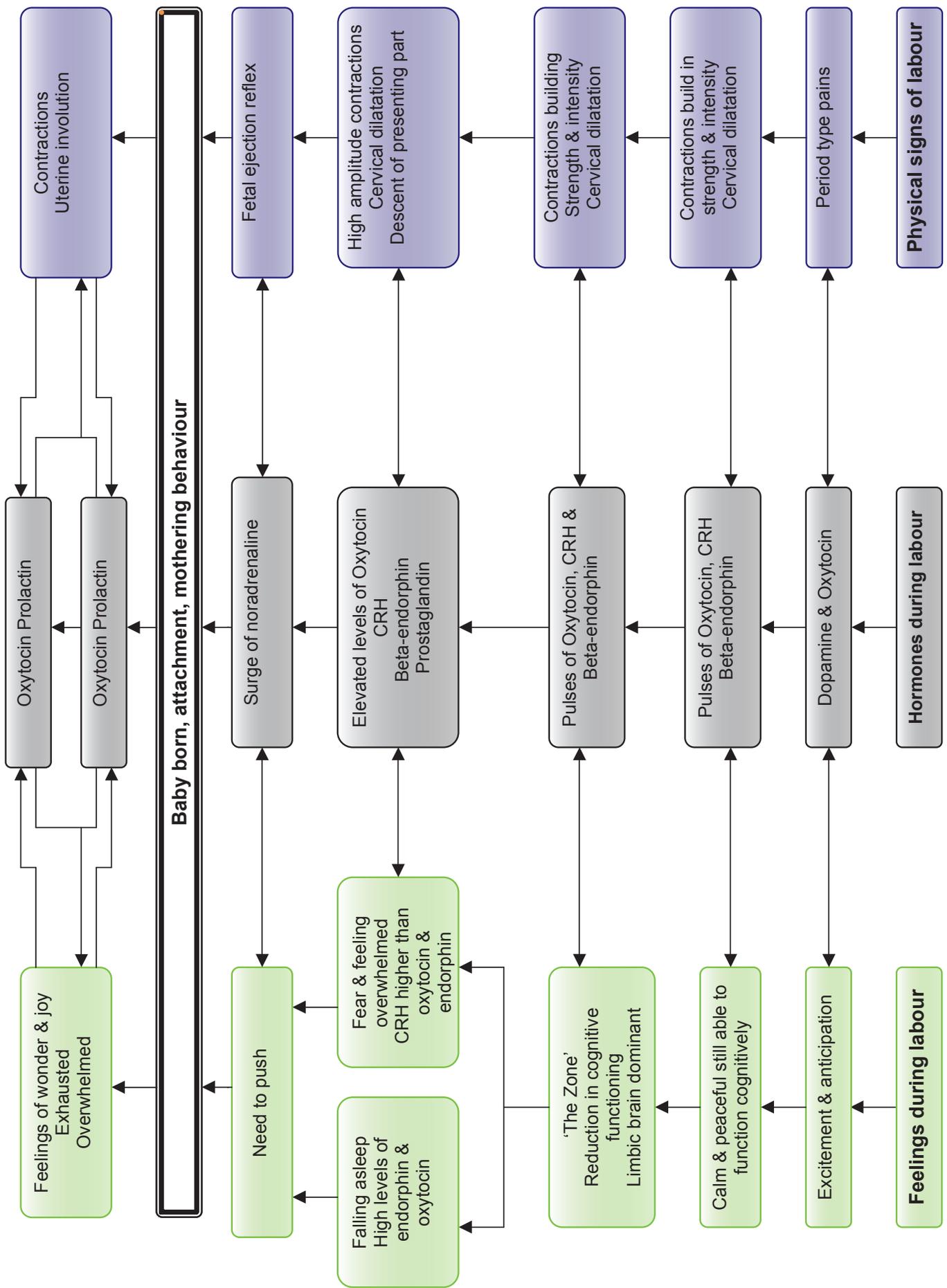
## AFTER THE BIRTH

Immediately following the birth some women have described feeling shocked and a little disconnected from reality, whilst others have described feeling wide awake, alert and euphoric (this response may be due to the high levels of oxytocin and beta-endorphin). The differences between these reactions require research into whether both are indicative of a normal adaptive response. These feelings continue into the third stage of labour where a high level of oxytocin is necessary to ensure the successful completion of the birth of the placenta and involution of the myometrium.

## A MODEL FOR WOMEN

A model of this description is provided as a means of representing how the woman's hormones may work to facilitate labour and birth whilst also simultaneously having an effect on how the woman feels and behaves during labour. It is suggested that these hormones and feelings work in an integrated way to support and facilitate labour and birth (Figure 1). This model seeks to integrate the women's feelings with the associated hormonal actions alongside the physical process. It has been built from what is currently known about women's feelings and integrated with the contemporary knowledge of the hormones of labour and birth.

The way a woman feels and behaves during labour may provide an understanding and an indication of the hormones that are exerting an effect on the woman's body during labour. A woman's feelings and behaviour are instinctive and may be due to the dominance of the limbic system as it enables and supports the woman's physiologically driven requirement to give birth. The feelings women have described may be an indication of normal undisturbed neuro-physiology. Each neurohormone that is released will have an impact on both the woman's body and the way she feels; the alternative may also be true that the woman's feelings may inhibit or support the release of the neurohormone. This way of understanding and theorising labour is new and may be oversimplified. It is useful and important however, because as midwives working in partnership with women it is fundamental that we inform them about the nature of labour - not so much in clinical terms, but in terms meaningful to them. To do so we must increase our understanding about the interconnecting roles of feelings, hormones and behaviour.



**Figure 1:** Integration of feelings, hormones and physical signs of labour and birth

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# The feelings and behaviour women exhibit during labour may be strong indicators of normal labour physiology and that labour and birth are proceeding normally.

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## IMPLICATIONS FOR PRACTICE

Walsh (2003, 2007, 2010) and Schmid and Downe (2010) argue for a change in our way of conceptualising labour with a move away from a linear understanding of stages and phases to one of cycles and rhythms. Midwives have long observed women's behaviour and considered that the behaviour provides indicators that labour is moving towards birth (Burvill, 2002; Duff, 2005). We now know that behaviour can be seen as an adaptive response and the manifestation of the drives and instincts of biological processes (Damasio, 1994). As such behaviour is driven by feelings and feelings are derived from, and initiate, neurohormones which act on both the brain and the body to ensure the maintenance of an optimal internal environment and corrective adaptive responses.

Integrating contemporary scientific knowledge with women's descriptions of their feelings during labour improves our ability to theorise, and to comprehend the complexity of the physiological, emotional and physical changes that occur during labour and birth. This mind/body/behaviour concept supports health professionals and women to a better understanding of labour physiology. Midwives need to explore ways of maximising and enabling the instinctive drives that support the woman's physiology. This may include reviewing the birthing environment to ensure the woman can go into 'The Zone'. There are simple but key environment enablers such as keeping the lights low, staying quiet during contractions and not making eye contact. Ensuring women maximise the limbic brain connection is about supporting them to 'disconnect' with others during labour whilst also maintaining the usual physical and emotional midwifery care. This may be a difficult concept for partners and family/whānau present during labour. As an example: it involves explaining the intrusive nature of cell phones, videos, games, cameras, bright lights and background conversation. When we explain how the labouring woman's emotions and behaviour women can be signposts to the progress of labour and how important it is to ensure the woman is able to labour 'undisturbed', we can provide women, their partners, families/whānau with ways of understanding what is happening. This can both reassure and support the woman's confidence in her own physiology.

## CONCLUSION

The functioning of the human brain is complex although with advances in technology scientists are uncovering new insights to help us understand. Pregnancy and the process of labour and birth are designed to bring about behavioural changes which culminate at the birth in maternal attachment and mothering behaviour. The hormones that are necessary for social and maternal bonds are also those responsible for the initiation and continuation of labour (Challis et al., 2000; Taylor et al., 2000; Uvnäs-Moberg, 2003). As such the process of pregnancy, labour and birth is not just a physical process but also a transitional process in which the woman is prepared (biologically and emotionally) to become a mother and exhibit

maternal behaviours. The feelings and behaviour women exhibit during labour may be strong indicators of normal labour physiology and that labour and birth are proceeding normally.

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# The safety-net: what influences New Zealand first-time mothers' perceptions of safety for self and unborn child?

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### ABSTRACT

**Background:** Pregnancy, labour and birth are times when a mother wants to ensure both her, and her developing baby's, safety. An objective of the present study was to investigate New Zealand (NZ) primiparous mothers' perceptions of what contributes to a sense of safety for themselves and their unborn babies.

**Method:** A qualitative method was used to obtain an insight into childbearing experience and new mothers' concept of safety. Ten New Zealand first-time mothers aged 24 to 38 years (median 31.5 years) participated. These women took part in a semi-structured face-to-face interview within 11 days to 16 weeks of giving birth (median 13.5 weeks). The interviews were audio-recorded, transcribed verbatim and then analysed using thematic analysis informed by Interpretive Phenomenological Analysis (IPA).

**Method:** A core theme identified across transcripts was designated 'safety-net'. This theme incorporated the four subthemes: care of self and unborn child; the importance of midwife skills; the availability of a hospital facility and its resources; and the availability of medical expertise and intervention.

**Conclusions:** The present study highlights what influences first-time mothers' perceptions of safety for self and unborn baby. Women sought out relevant information and managed important lifestyle changes. They took care over selection of a midwife. Additionally, the availability of a local tertiary care facility with highly skilled obstetricians, obstetric registrars, anaesthetists, paediatricians and hospital support staff increased

participants' perception of safety and gave them the confidence to select birth options suited to their needs.

### KEY WORDS

Birth, labour, midwife, pregnancy, safety

### INTRODUCTION

An important requisite of motherhood is keeping self and baby safe (Rubin, 1984). In the New Zealand Maternity Services Consumer Satisfaction Survey, 203 mothers who had recently given birth identified feeling safe as the "best [thing] about women's maternity care" (Ministry of Health, 2007, p. 72) in New Zealand, but what contributed towards a mother's sense of safety was not explored. When the outcome, or actual birth experience matches, or is better than, a woman's expectations of how her labour and birth will progress, her satisfaction with her birth experience is enhanced (Howarth, Swain, & Treharne, 2010; Manning & Wright, 1983). However, unexpected medical interventions or the necessity of admitting the newly born infant to an intensive care unit are challenging outcomes, which lead to women perceiving their birthing experiences negatively (Waldenstrom, Hildingsson, Rubertsson, & Radestad, 2004). This raises an important question. What do women need to enable them to feel safe during pregnancy, labour and birth? This study seeks to determine what behaviours, environments and care options women perceived as creating a sense of a safety for themselves and their unborn child.

In the words of Smythe (2003):

*Understanding the meaning of being safe ... would be of no consequence if childbirth were always safe. Experience teaches us, that even with the best of intentions, childbirth is not always safe. Things go wrong. Death is always a possibility.* (p. 202).

New Zealand mortality rates for mothers and babies are low (Oza, Cousens, & Lawn, 2013; Statistics New Zealand, 2011; 2012). However, this offers little consolation to those mothers who experience the loss of a baby. Most women are aware that labour and birth are an unknown journey which may not always go as planned.

Safety and feeling safe is an 'interpretative act' (Smythe, 2010). Therefore feeling safe is affected by cultural, emotional, social, psychological and spiritual aspects which vary from person to person, situation to situation. All these factors must be considered in a discussion of an issue as complex as the perception of what is safe and what is not (Dahlen, 2012).

In New Zealand, a woman has choices over who provides care and where she will give birth. These choices may be guided in part by a woman's perceptions of safety (Boucher, Bennett, McFarlin, & Freeze, 2009). Most will choose a case load midwife as their Lead Maternity Carer (LMC) (91.6% of pregnant women who register with an LMC in this country do

so) (Ministry of Health, 2012). Perceptions of safety may be influenced by the relationship of trust and partnership she builds with her midwife (Howarth, Swain, & Treharne, 2012). Perceptions of safety may also be affected by media reports of those few situations when midwifery care resulted in complications, and by magazine articles which unjustifiably sensationalise such events (Newick et al., 2013). As yet there is minimal research into the influences of media reporting of adverse outcomes and women's perceptions of maternity care.

In a review of relevant literature, Howarth, Swain and Treharne (2010) identified a lack of New Zealand studies examining what influences New Zealand women's perceptions about what constitutes a sense of safety for self and unborn child during pregnancy, labour and birth.

## METHOD

A phenomenological approach informed by IPA was used to examine the birthing experiences of ten first-time mothers living and giving birth in New Zealand, to gain an insight into what makes them feel safe during pregnancy, labour and birth.

### Participants

The inclusion criteria were: 1) primiparous mothers (with singleton pregnancies) who had given birth to a healthy baby within the 4 months prior to the interview; 2) being aged 18-42 years; 3) having registered with and received care during pregnancy from an LMC who was a midwife; 4) living in a stable relationship; and 5) having the prerequisite English language skills.

### Procedure

Ethical approval for this study was given by New Zealand Lower South Regional Ethics Committee (reference number: LRS/08/22/EXP). Posters, newspaper advertisements and snowballing (information passed from person to person) were used to recruit participants. A total of ten first-time mothers self-selected to participate in a semi-structured face-to-face informal interview at a place of their choosing. Information sheets, consent forms and study questions were emailed to participants prior to the interview. While the questions were useful in commencing the interview, participants were encouraged to tell their stories in their own way, allowing them to cover the relevant questions in ways that made sense for them. This allowed the interviewer to explore pertinent issues further.

Informed consent was obtained at the beginning of the interview at which time participants were asked if they had any questions. Interviews lasted between 57 minutes and 106 minutes (mean 76 minutes). The recorded interviews were transcribed verbatim. For each participant, a birth story that aimed to encapsulate the essence of the woman's experience was compiled and sent to her so she could check for errors or omissions. Once it was clear the interviewer had captured each woman's experience as she herself saw it, analysis began. Each participant was assigned a pseudonym and other identifying material was removed or altered to protect anonymity of individuals and organizations. Participants were provided with a \$20 petrol voucher for taking part in the study.

### Data Analysis

Thematic analysis informed by IPA was used to examine the data (Smith, 1995; 1996; Smith, Flowers, & Larkin, 2009; Smith, Jarman, & Osborn, 1999). By using this technique women were given the opportunity to bring up and explain topics of importance to them and which may have remained hidden in a questionnaire approach. This methodology allowed for themes to emerge from the data (Reid, Flowers, & Larkin, 2005).

Three major core themes emerged from the interviews across all transcripts. These core themes were isolated along with subthemes and their relationship to the core themes. A full description of the analysis process is given in Howarth, Swain, & Treharne (2011). The core themes were named: 1) taking personal responsibility; 2) relationship issues; and 3) the 'safety-net'. This article will focus on the core theme 'safety-net'.

## RESULTS

### Demographic characteristics

Participants were aged 24-38 years (median 31.5 years). The mean age in New Zealand for women giving birth to their first child was 28 years for the year ending March 2008 (Statistics New Zealand, 2008). The babies were born between the beginning of April 2009 and the end of September 2009 at between 36 and 42 weeks gestation. Seven of the 10 births were within one week of estimated due date. Three babies were born at home; all babies were born vaginally.

One baby suffered bruising during a forceps birth. Two early and small babies spent a few days in the neonatal intensive care unit where they were monitored for jaundice. No baby was considered to have had serious issues. Difficulties establishing breastfeeding and two instances of the mother requiring further care accounted for the longest hospital stays. All babies and mothers had been discharged from hospital by the end of eight days.

Educationally, participants varied from being school leavers through to university post-graduates. Three participants were recent immigrants (within the past six years) of European or Australian origin. Three participants identified as both Māori and New Zealand European. The four remaining identified as New Zealand European. Eight participants lived within a 10 minute drive to the local tertiary care public hospital; the other two participants lived within a 30-40 minute drive. All participants were in stable relationships. At the time of the mother's interview, babies were aged 11 days to 16 weeks (mean age 11.5 weeks) and all mothers were confident their babies were breastfeeding successfully and were thriving.

### The safety-net theme

Feeling safe was a concern for all ten participants. Their perceptions of what felt safe influenced their behaviours and decisions at every stage of pregnancy and birth. The theme of creating a 'safety-net' incorporated the subthemes: care of self and unborn child; the importance of midwife skills; and the availability of a hospital facility with resources, medical expertise and intervention.

#### Safety-net: Care of self and unborn child

All ten participants used the internet and books to inform their decisions regarding risk related behaviours, for example, drinking alcohol or smoking is risky to fetal development (Einarson & Riordan, 2009; Flynn & Chermack, 2008; Henderson, Gray, & Brocklehurst, 2007). They also consulted with their midwives about keeping their unborn baby safe. They made changes to their then current behaviours to ensure the safety of their developing babies. No woman in the study smoked cigarettes and all participants stopped consumption of alcohol once pregnancies were suspected and confirmed, because of their concern that alcohol could damage the developing fetus:

*I wasn't a smoker but I used to drink quite a lot. [...] [I] gave up the drinking from the day that I found out I was pregnant. (Sara)*

Special care was given to nutrition and exercise regimes so women kept healthy and fit as this was seen as pro-actively supporting the baby's health and thus giving the baby the safest possible environment in which to develop and grow:

*My midwife [...] recommended having a really balanced diet [...] we'd have fish twice a week and steak. (Wendy)*

*I'd stayed pretty active [...] I tried to carry on walking as much as I could. (Carol)*

Women in the study who suffered issues such as morning sickness sought out information about 'cures' on the internet. Ngairé was deeply concerned that her frequent vomiting was having a severe impact on her own health and that this could mean her baby would be starved of essential nutrients. As well as checking for information on the internet, she also sought assistance from her midwife:

*My midwife was a naturopathic midwife sort of, um, for homebirth and she was awesome and she, we tried so many different things [...] because I*

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## Participants in this study were satisfied that the care they received from their midwives made them feel their care was safe for themselves and their unborn babies..

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*wanted to do everything natural [...] I had ginger tea and, what else was I using? I was using all kinds of stuff.* (Ngaire)

When these products did not bring relief and her midwife suggested she try prescription medicines when the naturopathic options were unsuccessful. Ngaire responded:

*She even suggested something along the lines of (propriety brand) [...] and I was really anti that.* (Ngaire)

This concern to do 'everything natural' during pregnancy, driven by a need to keep self and baby safe, was common to all ten of the women in the study. While so-called 'natural remedies' were perceived as safe to take, potential side effects from prescribed medication were regarded as potentially dangerous to the developing fetus, and considered best avoided at all times if at all possible.

### **Safety-net: The importance of midwife skills**

Participants and their partners were concerned that their midwives had the professional skills to ensure safe and responsible antenatal care and they asked probing questions. While none of these women expected to have any issues, they were aware that sometimes things did go wrong, and they wanted assurance that their midwives would act in a timely and appropriate manner if a problem developed. This was an important quality in a midwife if her client was to feel safe and secure:

*I think the professional skills, um, because knowing if, if something went wrong she knew.* (Beth)

All these women wanted their partner included and kept informed, and they also wanted him to feel confident his partner was being appropriately and safely cared for. In particular, Ngaire's partner was very anxious because he felt a hospital birth was a safer option than the homebirth she planned:

*My partner and I were just battling over my decision to have a homebirth.* (Ngaire)

Ngaire had very clear ideas about the type of environment she wanted her baby to be born into. She viewed with disquiet what she regarded as the unnatural environment of the hospital and was concerned for her baby's future emotional development and stability if she gave birth in any other space than the gentle and calm home environment she had planned for. While she felt that the birthing suite at the local hospital could give her the conditions she required, she knew that it was in demand and there was no guarantee it would be available when she needed it. Consequently, Ngaire was only prepared to consider going to hospital if the labour and birth deviated from the normal and medical intervention became essential for her baby's health. Ngaire discussed her problem concerning her partner's anxiety with her midwife:

*In fact it was quite a healing journey that all three of us went on, because he was really, really resistant to my homebirth and he fought pretty much all the way and, um, she, yeah she helped turn him around.* (Ngaire)

Ngaire's midwife took special care to address his need to feel Ngaire was in safe hands during her labour at home by explaining to him as she laid out her equipment what it was for, and what she was doing. Consequently, he felt reassured that the midwife had the necessary resources and knew when and how to use them to ensure that Ngaire would receive whatever emergency care she might need appropriately and skillfully at home, or she would be safely transferred to hospital if the need arose:

*[The midwife] had also laid out all her [equipment], like the oxygen and all this medical stuff, really professionally [...] Cos he was like, "She looks really professional".* (Ngaire)

As a consequence of her partner's confidence in their midwife's ability to keep their baby safe, Ngaire and her partner then went on to have the birth that she had planned for:

*They [midwives] knew that it was his and my journey and they were just going to guide us [...] I pushed her out [...] And then when he brought her up she just kind of did a little tiny bit of a wah and then, um, he passed her to me and I just breastfed her straight away, um, in the water [...] In the days after that, he was blown away. He was like, he was like "Oh I respect you so much now, thank you for standing strong with your beliefs," and, um, like he still goes on about that day.* (Ngaire)

All participants wanted to feel confident that their midwives could monitor the progress of their labour and take appropriate action if required, even though it was not explicitly part of the birth plan:

*I was absolutely exhausted [...] it was my midwife actually who said, "I think you need an epidural".* (Vinnie)

If specialist care was required, women wanted to feel that their midwives were still involved and able to support them during labour, even though obstetricians had taken over care. These women had developed trusting relationships with their midwives and their presence increased the women's sense of safety in the midst of an unexpected and often frightening situation amongst people who were usually strangers. The midwives' continued support and continuity of care gave reassurance and greater confidence in a safe outcome:

*One of them (the obstetricians) did the forceps birth and the other one did the delivery of the placenta [...], but [midwife's name] was really good in that she [...] told me what to do and when I needed to do it and, um, and she, and she told [partner's name] what he needed to be doing as well and, cos I think he, at times he was quite concerned about me.* (Sara)

This continued for the first six weeks after baby was born when the reassurance midwives gave helped the mothers develop confidence in their own abilities to keep their baby safely cared for:

*I used to hang out, even though things were good for those six weeks, I used to hang out for [midwife's name] to come visit [...] it was just the whole reassurance that we were doing a good job.* (Carol)

Participants in this study were satisfied that the care they received from their midwives made them feel their care was safe for themselves and their unborn babies. Beth and her partner had returned from overseas for her to give birth in New Zealand, because they held the New Zealand model of midwifery care in so high regard and she was not disappointed. Her midwife acted promptly when, in early labour, an issue developed with the baby's heart rate. The midwife gave good advice which enabled Beth to make informed decisions and feel she and her baby were safe throughout labour and birth:

*We came back to New Zealand from [other country], um, to have [baby's name] here, [...] because we knew that midwives were so big, [...] It's [New Zealand] an amazing place to have a baby.* (Beth)

### **Safety-net: The availability of a hospital facility, with its resources, medical expertise and intervention**

Having a tertiary care hospital facility close at hand was an important safety consideration for all participants. Participants were confident that surgical

facilities and medications were available if they became necessary for a safe birth. Five participants chose to give birth in the hospital because they felt the hospital was the safest place to give birth:

*I was actually pretty keen on having a hospital birth, [...] just so that there was always help there. (Carol)*

For the other five participants, the closeness of the hospital gave them the confidence to feel safe enough to try for a homebirth. They felt that if difficulties developed, they had time to get to the hospital for any specialist care they or their babies needed. The closeness of the hospital gave them a sense of a 'safety-net':

*I knew the prep time for the, for a caesar is approximately 40 minutes. And I live five minutes from the hospital; I'm going to get there before they're ready for me. [...] So if I needed to go, I knew I was well within a time frame that was gonna be fine. [...] I think had I lived further away it would've been a harder decision. (Anita)*

When complications developed for Beth, the distance she lived from the hospital (a 30 minute drive) influenced her decision to abandon her plan to attempt a homebirth. She chose to remain at the hospital after the midwife's check-up indicated her baby may have required continuous monitoring. While this was a very difficult and disappointing decision for Beth to make, she and her partner both felt that safety of mother and baby was the priority and better served by being close to the resources needed just in case an emergency arose:

*It was just new terrain, you know, [...] and [we] didn't quite expect it, that there would be complications [...] then I felt much more aware of the fact that [suburb] was a half hour drive from the hospital [...] in the winter. (Beth)*

Whenever complications arose, participants were grateful for the 'safety-net' provided by obstetricians, obstetric registrars, anaesthetists, paediatricians and hospital support staff. While the ten women hoped to have uncomplicated births, they had faith that, in the event of an emergency, the expertise of local medical personnel would ensure that they and their babies would be safe. Those who required assistance were grateful for the care that they felt kept them safe and brought their babies safely into the world:

*He [the obstetrician] pulled him out, just one, one, um, gentle pull and while I pushed [...] I really appreciate what he did, in that he did, you know, he got, got [baby's name] out very efficiently and very safely and, and very, you know, no damage to him and no damage to me. (Beth)*

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Their midwives supported the women's sense of safety by keeping them and their partners included in choices about care and by keeping them both fully informed throughout pregnancy, labour and birth.

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In contrast, Sara's baby was severely bruised by his forceps delivery. One of her friends asked if she was going to make a complaint about the extent of his bruising. While Sara was distressed by the bruising and found it very difficult to accept that this had happened to her baby, her reply illustrates her awareness that her baby could have suffered much more if medical expertise had not been available when she and her baby needed it. She herself had required emergency treatment for the removal of her placenta and she was overwhelmingly grateful that she and her baby were both alive and well because the obstetricians had the skills to keep them safe:

*And I said, "Well, no, I'm not, because the, the, the [obstetrician] that delivered him was only doing what [obstetrician][...] thought was best and safest [...] So, yeah, I'm just really grateful and really thankful that, that [...] everything worked out and everything was fine. (Sara)*

The women who required medical assistance to give birth felt that they and their babies had been kept safe in circumstances which were not straightforward.

## DISCUSSION

Feeling safe was a central issue identified by participants in this study of first-time mothers' birthing experiences in New Zealand. The women took the following steps to increase their perception of safety. They modified their behaviours to optimise health once they knew they were pregnant. They took care in selecting a maternity care provider. They explored birth setting options which reflected their cultures and expectations and, in choosing, revealed the importance of the proximity of a well-equipped and staffed hospital that they felt ensured their choices were safe.

This finding was consistent with previous NZ research where feeling safe ranked sixth on the mothers' list of what was best about NZ maternity care (Ministry of Health, 2007). For the ten first-time mothers taking part in this study, pregnancy, labour and birth were new terrain and they were not sure what to expect. They were aware that there are instances when things can go wrong at any stage (Smythe, 2003). As a result, once pregnancy was confirmed, each woman interpreted what safety of self and unborn child meant for her (Smythe, 2010). Each woman took the steps she considered necessary to feel she and her developing baby would be as safe as was humanly possible.

Participants in this study were aware of findings that alcohol consumption could damage a developing fetus. All ten women were already non-smokers. To further safeguard their health they made changes to diet and exercise, took vitamin and mineral supplements and used herbal remedies. All participants wanted the best for their babies and were prepared to modify their behaviours to ensure this.

Participants wanted to feel confident in their midwives' professional expertise. When engaging their midwives women had also wanted assurance that their partners would be fully included. Their midwives supported the women's sense of safety by keeping them and their partners included in choices about care and by keeping them both fully informed throughout pregnancy, labour and birth. This became especially important if one partner was not sure about the choices made, or if changes to the birth plan became necessary.

Five women needed assistance from obstetricians in the form of forceps or ventouse births; two of these women had planned homebirth. In these situations the women felt that their midwives had kept them and their babies safe by not delaying in seeking assistance once concerns arose, thus confirming the women's faith in their midwives' ability to provide a 'safety-net'. Although clinical responsibility for care many have been transferred to the medical team the women wanted their midwives to continue to be there for them. The midwives' presence, support and awareness of their needs and wishes, increased the women's emotional sense of being in safe hands. Their midwives were expected to advocate for them in unfamiliar and often scary situations. The continuity of care women received from their midwives, and the trust women placed in their midwives' abilities to do all of this, gave the women a sense of safety that they relied on during pregnancy, labour and birth and in those first weeks of post-birth care.

The availability of highly skilled obstetricians, obstetric registrars, anaesthetists, paediatricians and hospital support staff, in conjunction with the availability of the local tertiary hospital facility, provided an essential part of the woman's 'safety-net'. It enabled these women to feel they had a greater range of choices they could safely make. The knowledge that the hospital was not far away gave some mothers the confidence to feel safe in choosing the homebirth option. There was apprehension expressed by these women that obstetricians could be too quick to offer interventions while there was still a possibility of an unassisted vaginal birth. There is research to suggest that, in some cases, this may be a valid concern. Maassen et al. (2008) found that birthing women, who were considered low risk, had a significantly higher rate of medical intervention when they birthed in a secondary care facility when compared to other low risk women birthing in a primary care facility with the support of a midwife. While most births are likely to take place without complications, it is not possible to predict with absolute certainty that any birth will be complications free (Olsen & Clausen, 2013). Those mothers who chose a hospital birth did so because for them a hospital birth felt like the safer option.

There are several limitations immediately evident in this study. Interviews were conducted retrospectively. The sample was self-selected and included only ten first-time mothers. Consequently, such a small sample is not representative of all women who live in and give birth in NZ. Participants came from one urban area in New Zealand and their perspectives reflect the conditions of that area only. While one woman had a 40 minute drive to the hospital, women living in isolated rural areas may have very different perspectives regarding safety of self and baby. Women who have already experienced childbirth may have different perspectives of the birth experience and safety as they give birth to subsequent children. There are a variety of differing situations and experiences that have not been explored in this study and that merit further research. This study describes these women's perspectives only and the authors acknowledge when others are involved, including professionals, there may be other perspectives that could be considered.

## CONCLUSIONS

For these ten women, throughout their pregnancies and during their labours and births, what made them feel they and their babies were safe was an important motivator for behavioural change and an important influence in the development their birth plans. How they interpreted what would make them feel safe, and the actions they took based on these interpretations, provided them with a 'safety-net' which enabled them to make the choices they made. Firstly, the women were aware of changes they needed to make to support both their and their babies' health and well-being. The women chose their midwives carefully, needing to feel confident in the midwives' professional skills. Also important to these women birthing in New Zealand was the availability of a tertiary care facility within close proximity to their homes staffed by highly skilled maternity health professionals. This availability increased their sense of safety and gave them the confidence to select birth options (e.g. home or hospital birth) suited to their own particular needs. This all contributed towards the women's confidence that both they and their babies would safely negotiate pregnancy, labour and birth, resulting in a good outcome – a healthy baby and a healthy mother.

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