"AD-MIRE Breastfeeding" Study: Antenatal Diabetes- Mothers Improving Rates of Exclusive Breastfeeding

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Antenatal Diabetes- Mothers Improving Rates of Exclusive Breastfeeding

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Statement of Authorship and Sources

I, *Leanne Cummins*, declare that this thesis, submitted in fulfilment of the requirements for the conferral of the degree Doctor of Philosophy, from the Australian Catholic University, is wholly my own work unless otherwise referenced or acknowledged. This document has not been submitted for qualifications at any other academic institution.

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Verification

This statement verifies that the greater part of the work in the named manuscripts is attributed to the candidate. *Leanne Cummins* conceived and designed the research project and undertook data collection and analysis. She prepared the first draft of each of the manuscripts for publication and responded to the editorial comments of co-authors. *Leanne Cummins* prepared articles for submission to the relevant journals and responded to reviewer and editor comments to finalise the manuscripts for publication.

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Time out with those you love, animal or human, is so extremely important.

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Abstract

Background

Women with Gestational Diabetes Mellitus (GDM) and their babies are at a high risk for developing health conditions that can be reduced if they breastfeed on discharge from hospital. The numbers of women with GDM around the world are rising, yet despite help from health professionals, women with GDM consistently have lower breastfeeding rates on discharge from hospital than women without GDM, and often introduce formula within the first few days of birth.

The early introduction of formula is known to affect exclusive breastfeeding, both on discharge from hospital and in the long-term. One reason for this may lie with the shortage of interventions to improve exclusive breastfeeding rates where the needs of women with GDM have been considered. This study aimed to develop a new strategy, in collaboration with women and staff at a regional Australian hospital, to improve rates of exclusive breastfeeding (EBF) on discharge from hospital for women with GDM.

Methods

Using a person-centred, participatory action research approach, the study had four phases. In phase one, background information was collected from hospital data and surveys of women with GDM and hospital staff to identify baseline data prior to any intervention. In phase two, person-centred workshops were conducted using practice development principles to identify women's concerns and ideas for changing hospital practice for improved breastfeeding support when they had GDM. In phase three, the findings from phases one and two were disseminated to the hospital staff to develop an intervention. In phase four, the impact of the intervention was evaluated to compare exclusive breastfeeding outcomes on discharge from hospital, pre and post intervention. Thematic analysis was used for analysing qualitative data. Quantitative data were analysed by descriptive and inferential statistical tests using Statistical Package for the Social Sciences (SPSS, version 29).

Findings

In phase one, hospital data demonstrated low exclusive breastfeeding on discharge from hospital among women with GDM compared to women with no GDM. Although staff believed that women with GDM did not need extra support, the survey from women demonstrated a high level of need for support. In phase two, women requested three changes in practice: (1) online hospital-based information, (2) an opportunity to connect with other mothers who have GDM via community support, and (3) continuity of care models. In phase three, working within COVID restrictions, staff decided to implement online hospital-based information via a hospital website as the intervention. Four months

after implementing the intervention, post-intervention data on breastfeeding outcomes demonstrated no significant change in exclusive breastfeeding on discharge from hospital compared to pre-intervention data.

Conclusion

Asking women what they want, and tailoring education to their specific needs cannot be achieved if only one of three recommendations they suggested are implemented. There is a need, therefore, to investigate the entirety of women's suggestions to fully tailor an intervention to their needs to improve EBF rates on discharge from hospital.

Publications from this research

1. Cummins, L., Meedya, S., & Wilson, V. (2021). Factors that positively influence in-hospital exclusive breastfeeding among women with Gestational Diabetes Mellitus: An integrative review. *Women and Birth*. Mar 18: S1871-5192(21)00040-8. doi: 10.1016/j.wombi.2021.03.005.

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2. Cummins, L., Wilson, V., & Meedya, S. (2022). What do women with Gestational Diabetes Mellitus want for breastfeeding support? A participatory action research study. *Breastfeeding Review*, *30*(3), 27-36.

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3. Cummins, M. L., Meedya, S., & Wilson, V. (2022). Standing together at the top – Working with women to provide breastfeeding support in a regional hospital. *Women and birth: journal of the Australian College of Midwives*, *35*, 19. https://doi.org/10.1016/j.wombi.2022.07.052

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Manuscripts under review from this research

4. Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). Evaluation of the impact of a hospital-based online breastfeeding resource for women with gestational diabetes. *Women and birth: journal of the Australian College of Midwives, under review.*

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Author agreement re CRediT in papers cited within this thesis

I agree with the CRediT contribution in the papers published or under review and believe it is a fair recognition of all authors' contributions to this work.

Signed and dated: 26.10.23

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Associate Professor Shahla Meedya

Professor Valerie Wilson

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Professor Sara Bayes

Doctor Kate Dawson

Other publications from this research

6. Elder, T., Cummins, L., Tait, C., & Kuzela, W. (2023). Website redesign in a maternity setting: Co-designing a resource for consumer support and education. *Health Education in Practice: Journal of Research for Professional Learning*, *6*(1). https://doi.org/10.33966/hepj.6.1.17086 *Presented in Appendix P, p 208.*

Conference presentations and posters

2023 - International Confederation of Midwives (ICM), 33rd Triennial Conference, Bali, oral presentation (June) – Working with women to turn their experiences into a resource to support breastfeeding in an Australian hospital.

2023 – International Confederation of Midwives (ICM), Virtual International Day of the Midwife (VIDM), poster presentation (May) – Impact of hospital-based online information for women with GDM

2023 - 6th Australian Nursing and Midwifery Conference, Newcastle, NSW, oral presentation (May) – Transforming consumer experiences into a well-utilised resource to support breastfeeding.

2022 – International Practice Development Conference, 'Enhancing Practice', Wollongong, NSW, oral presentation (April) – Co-designing interventions in midwifery, engaging consumers.

2021 – Illawarra Shoalhaven Local Health District – Antenatal Shared Care GP Update, online oral presentation (November) – Lactation Update: results from AD-MIRE Breastfeeding Staff surveys.

2021 – Australasian Diabetes in Pregnancy Society (ADIPS) – online video-poster presentation (August) - GDM connect: what women want from technology when they have GDM.

2021 – International Confederation of Midwives, 32nd ICM Virtual Triennial Congress, online oral presentation (June) - Supporting exclusive breastfeeding among women with Gestational Diabetes Mellitus (GDM).

2021 – Illawarra Shoalhaven Local Health District – Nursing and Midwifery forum, Wollongong Hospital, oral presentation (June) – What women want, what can we do about it? – presentation and discussion regarding interventions for AD-MIRE Breastfeeding study.

2019 – University of Wollongong, School of Nursing, Wollongong, NSW, oral presentation (November) - Factors that influence exclusive breastfeeding practices in hospital for women with GDM.

2019 – Illawarra Shoalhaven Local Health District, Wollongong Hospital Childbirth Education Forum, oral presentation (May) – Asking women what they want (person-centredness) – a new concept for childbirth education? The AD-MIRE breastfeeding study.

2019 – Illawarra Shoalhaven Local Health District Nursing & Midwifery Forum, Wollongong Hospital, oral presentation (February) – Factors that influence exclusive breastfeeding practices in hospital for women with GDM, oral presentation

2018 - International Center for interprofessional practice and education, 27th European Diabetes Congress, Rome, Italy, oral presentation (June) – Reducing Type 2 diabetes with breastmilk (presenting background to AD-MIRE Breastfeeding study).

Funding for courses and conferences

- ISLHD – International Practice Development Collaborative: Foundational PD School
- ISLHD - International Confederation of Midwives, 32nd ICM Virtual Triennial Congress, online
- ISLHD – Enhancing Practice 2022 Conference

Awards

- ISLHD finalist – Quality Awards – *Designing a new maternity website*

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List of Names or Abbreviations

Keywords

Exclusive Breastfeeding, Gestational Diabetes Mellitus, person-centred, practice development, participatory action research, antenatal, pregnancy

Acronyms

AD-MIRE Breastfeeding- Antenatal Diabetes - Mothers Improving Rates of Exclusive Breastfeeding

ANE – Antenatal expressing

AR – Action Research

BAPT – Breastfeeding Attrition Prediction Tool

EBF – Exclusive breastfeeding

GDM – Gestational Diabetes Mellitus

TWH – The Wollongong Hospital

PAR – Participatory action research

PD – Practice Development

Chapter One Introduction

1.1 Chapter introduction

This chapter explains the significance of the study reported in this thesis; the AD-MIRE Breastfeeding (Antenatal Diabetes – Mothers Improving Rates of Exclusive Breastfeeding) study. It begins with defining and describing this study to discuss the importance of supporting antenatal mothers with Gestational Diabetes Mellitus (GDM) to improve their rates of exclusive breastfeeding (EBF) on discharge from hospital. The study's aims and objectives follow, concluding with an overview of the structure of this thesis.

1.2 Antenatal Diabetes – Mothers Improving Rates of Exclusive Breastfeeding

Diabetes mellitus is one of the largest challenges to health and health care systems across the world and the fastest growing chronic health condition in Australia (Australian Institute of Health and Welfare, 2023b). There are three types of diabetes that can affect antenatal women: Type 1, Type 2, and Gestational Diabetes Mellitus (GDM). Type 1 diabetes is an autoimmune condition representing approximately 10% all diabetes, whereas almost 1.2 million (4.6%) Australians currently live with Type 2 diabetes, a condition defined by insulin resistance and associated with modifiable lifestyle factors (Australian Institute of Health and Welfare, 2023b). While Type 1 and Type 2 are pre-existing conditions of diabetes affecting women that do not resolve, one form of diabetes affects women purely during their pregnancy: Gestational Diabetes Mellitus (GDM). According to Diabetes Australia (2022), GDM affects one in six women antenatally, and places women and their babies at a high risk for developing Type 2 diabetes in the future, a risk that is reduced if mothers breastfeed (Pinho-Gomes et al., 2021). This research focused on working collaboratively with women with GDM, for staff to develop an intervention that improves their rates of EBF on discharge from The Wollongong Hospital (TWH), on the south-eastern coast of Australia, in a region called the Illawarra. The Illawarra is located on the south-eastern coast of Australia (see Figure 4-3, p. 56) and home to almost 140,000 women aged 15-44 years (Australian Bureau of Statistics, 2021c).

1.2.1 Gestational Diabetes Mellitus (GDM)

Gestational diabetes mellitus (GDM), detected during pregnancy, was estimated to affect 16.2% (21.3 million) births around the globe in 2017 (International Diabetes Federation, 2019) and the WHO estimates that these rates will continue to rise (WHO, 2016, 2022). In December 2022, Australia's National Diabetes Service Scheme (NDSS) reported that 132 women were registered with GDM in Australia every day (NDSS, 2022), which is 18 more women per day compared to September 2020

(NDSS, 2020) and 36 more per day than in 2016 (NDSS, 2016). In 2016, the prevalence of GDM in NSW was reported to be 12.6% (NSW Ministry of Health, 2017) and in the Illawarra the actual value was 15.0% in a private hospital (Zheng et al., 2016). At TWH, rates of GDM were 15.8% in 2020, rising to 16.1% in 2022 (see Table 5-1, p.94).

Women with GDM and their babies have higher risks for developing health conditions after birth which may be mitigated by breastfeeding. Table 1-1 highlights the higher risks for women with GDM and their babies, and whether breastfeeding reduces these risks. For example, women with GDM have a ten-fold higher risk for developing Type 2 diabetes (Vounzoulaki et al., 2020), whereas a longer duration of breastfeeding markedly reduces these risks for mothers (Gunderson et al., 2018). Additionally, babies of women with GDM have a higher risk for developing Type 2 diabetes in later life (Gray et al., 2018), whereas EBF at hospital discharge reduced the odds for a cohort of adolescents (Horta & de Lima, 2019).

Table 1-1 *Health risks reduced by breastfeeding.*

Higher risk of this condition from exposure to GDM for:	Mother	Baby	Breastfeeding reduces risk for mother	Breastfeeding reduces risk for baby
Type 2 diabetes	(Gray et al., 2018; Vounzoulaki et al., 2020)	(Gray et al., 2018; Mitanchez et al., 2014)	(Aune et al., 2013; Gunderson et al., 2018)	(Horta & de Lima, 2019)
Cardiovascular Disease	(Gray et al., 2018; Kramer et al., 2019)	(Gray et al., 2018; Mitanchez et al., 2014)	(Kirkegaard et al., 2018; Tschiderer et al., 2022)	(Umer et al., 2019)
Hypertension	(Gray et al., 2018)	(Lu et al., 2019)	(Kirkegaard et al., 2018)	(Umer et al., 2019)
Obesity	-	(Choi et al., 2022; Gray et al., 2018; Mitanchez et al., 2014)	(Shearrer et al., 2015; Tahir et al., 2019)	(Mitanchez et al., 2014; Wang et al., 2017)
Hypoglycaemia	-	(Mitanchez et al., 2014)	-	(Mitanchez et al., 2014; Ponnapakkam et al., 2021)

However, women with GDM do not breastfeed as often as women without diabetes in their pregnancy (Chamberlain et al., 2017; Finkelstein et al., 2013; Oza-Frank et al., 2014; Victora et al., 2016). They are therefore more likely to give their babies infant formula in the first few days after birth (Chamberlain et al., 2017; Oza-Frank & Gunderson, 2017) due to diverse personal, antenatal, intrapartum, and postnatal factors (see Chapter 2, literature review, p. 13).

1.2.2 Exclusive breastfeeding

Exclusive breastfeeding (EBF) is highly recommended for all women for six months after birth by the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) to reduce infant mortality and improve overall health for mothers and their babies (UNICEF, 2018; WHO, 2018). EBF is defined when a newborn infant receives only breastmilk after birth (WHO, 2017a). In Australia, a national health survey in 2020-1 showed that EBF occurred amongst two-thirds (66%) babies at four months, and around one-third (35%) at six months (Australian Institute of Health and Welfare, 2023a). In NSW, the 'Mothers and Babies 2021' report shows rates of EBF on discharge from hospital were falling, reporting a reduction from 82.5% in 2017 to 73.1% in 2021 (NSW Ministry of Health, 2023).

Introducing infant formula in hospital as an additional/ supplementary feed will "nearly double the risk of not fully breastfeeding between days 30–60 and triple the risk of breastfeeding cessation by day 60" (Chantry et al., 2014, p. 9). Mixed feeding limits the early protective factors of EBF such as recurrent otitis media and respiratory tract infections (American Academy of Pediatrics, 2012) for babies and increases the rate of early weaning (Chantry et al., 2014; Hector et al., 2013; McAllister et al., 2009; Morrison et al., 2015; Parry et al., 2013). The early introduction of formula, while sometimes medically indicated, is known to have a negative impact on breastfeeding (Chantry et al., 2014; Morrison et al., 2015; WHO, 2018). It is associated with reduced initiation of breastfeeding, a reduction in EBF on discharge from hospital (Chantry et al., 2014; Kramer & Kakuma, 2002; WHO, 2017a, 2018) and the early termination of breastfeeding by 2-3 months of age (Chantry et al., 2014; Morrison et al., 2015).

Promoting, protecting, and supporting breastfeeding is a global challenge (WHO, 2017b). To aid this challenge, interventions such as BFHI (see page 4) have been developed. By improving EBF on discharge from hospital we can markedly reduce the risk of weaning at six months after birth (Li et al., 2021; McDonald et al., 2012). Implementing strategies to improve EBF rates for women with GDM must involve strategies that are tailored to their specific needs (Cummins et al., 2021; Cummins et al., 2022; Stuebe et al., 2016). This research project will examine the rates of GDM in one regional Australian hospital in Wollongong (TWH), NSW. Amongst women with GDM, rates of EBF will be measured, and antenatal women will be asked for their experiences of breastfeeding support at TWH with their recommendations to improve EBF rates on discharge from hospital.

The Baby Friendly Health Initiative (BFHI).

The Baby Friendly Health Initiative (BFHI) is an intervention recommended by the World Health Organisation (WHO, 2017b, 2019) to support institutions to sustain EBF rates through the Ten Steps of successful breastfeeding (see Table 1-2, p. 4). To be a BFHI accredited hospital, EBF rates of at least 75% are required on discharge (BFHI Australia, 2020; WHO, 2018). Evidence demonstrates that BFHI strategies have been successful for improving initiation and short-term breastfeeding rates, however, to March 2023, there were only 70 BFHI accredited facilities around Australia (11 within NSW). Not all of these accredited facilities are maternity services, of which there are 251 in Australia (Australian Institute of Health and Welfare, 2022; BFHI Australia, 2023), which highlights the need for effective

Table 1-2 *BFHI Ten Steps to successful breastfeeding*

(https://www.who.int/nutrition/bfhi/ten-steps/en/)
Critical management procedures
1a. Comply fully with the International Code of Marketing of Breast-milk Substitutes and relevant World Health Assembly resolutions.
1b. Have a written infant feeding policy that is routinely communicated to staff and parents.
1c. Establish ongoing monitoring and data-management systems.
2. Ensure that staff have sufficient knowledge, competence, and skills to support breastfeeding.
Key clinical practices
3. Discuss the importance and management of breastfeeding with pregnant women and their families.
4. Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth.
5. Support mothers to initiate and maintain breastfeeding and manage common difficulties.
6. Do not provide breastfed newborns any food or fluids other than breast milk, unless medically indicated.
7. Enable mothers and their infants to remain together and to practise rooming-in 24 hours a day.
8. Support mothers to recognize and respond to their infants' cues for feeding.
9. Counsel mothers on the use and risks of feeding bottles, teats, and pacifiers.
10. Coordinate discharge so that parents and their infants have timely access to ongoing support and care.

strategies to support women who have their babies in non-BFHI hospitals. TWH is not an accredited BFHI hospital.

BFHI strategies have been adopted into the Australian National Breastfeeding Strategy for all breastfeeding women through the Ten Steps of successful breastfeeding (COAG Health Council, 2019a; WHO, 2018, 2019). It has also become part of NSW health breastfeeding policy (NSW Health, 2018). However, despite recent educational programs, governmental health policies and support from health professionals toward EBF, rates for women with GDM have not improved (Oza-Frank & Gunderson, 2017), subsequently these women introduce more formula to their babies in hospital (Oza-Frank et al., 2016).

Considering GDM is a major health concern and the fastest growing type of diabetes in Australia (Diabetes Australia, 2022), there needs to be close attention to developing new strategies, such as this study, to support women with GDM to initiate breastfeeding after birth and reduce the unnecessary introduction of formula during their hospital stay.

1.2.3 Rates of exclusive breastfeeding on discharge from hospital for women with GDM

Improving EBF rates on discharge from hospital is a concern as women with GDM continue to have reduced rates compared to women with no-diabetes in Australia and around the world. The prevalence of EBF for US women with GDM on discharge from hospital was 62.2% compared to 75.4% for women without GDM in 2016 (Haile et al., 2016). In Norway, 5% more mothers ended predominant breastfeeding in the first week of birth if they had GDM (Bærug et al., 2018). In Australia, rates of EBF for women with GDM in 2017 were 53% (indigenous) and 60% (non-indigenous) compared to 80% for women with no-GDM (Chamberlain et al., 2017) in Queensland. Additionally, Longmore et al. (2020) found differences of 8% and 9% for EBF on discharge from hospital for Indigenous and non-Indigenous women with GDM respectively in the Northern Territory compared to women with no-GDM.

At TWH in 2020, there was a 10% difference in rates of EBF on discharge from hospital with 68.4% women with GDM, compared to 78.4% for women with no diabetes (see Table 5-2, p. 95). This research aimed to reduce this discrepancy by improving rates of EBF on discharge from hospital for women with GDM at TWH.

The low EBF rates among women with GDM may be attributable to high rates of obesity which predispose women to more caesarean section (C/S) birth (Cordero et al., 2016; Kim, 2010; Morrison et al., 2015; Oza-Frank et al., 2016; Pettersen-Dahl et al., 2018), and delayed lactogenesis II (Galipeau et al., 2012; Morrison et al., 2015; Preusting et al., 2017). In turn, one third women who birth via C/S

experience delayed lactogenesis II (Lian et al., 2022). Further, babies of women with GDM may require additional feeds due to neonatal hypoglycaemia or hyperbilirubinemias/jaundice (Cordero et al., 1998; Hawdon, 2011) following a pregnancy complicated by GDM, which may delay the establishment of breastfeeding.. However, there may also be non-medicalised reasons such as women feeling they need more information (Hirst et al., 2012) or more support for breastfeeding challenges (Jagiello & Chertok, 2015) that may be attributable to their GDM.

1.2.4 'Usual care' for women with GDM at TWH

Gestational Diabetes Mellitus can be diagnosed at two points in a pregnancy at TWH. For women deemed "at risk for hyperglycaemia" in pregnancy (Nankervis A, 2014) (see Table 1-3, p. 6), screening during pregnancy occurs with an early 75mg oral Glucose Tolerance Test (GTT) at 12-24 weeks gestation. If this test is negative, these women will be re-screened at 28 weeks gestation with all other pregnant women as part of regular maternity screening at the hospital. If women test positive to the GTT at either test, they are referred to the Diabetes Services where they are invited to attend 2 education classes where a dietitian discusses healthy diet for GDM, and a diabetes educator gives equipment and training for women to monitor their blood glucose levels at home.

Table 1-3 *Risk factors for hyperglycaemia In pregnancy (Nankervis A, 2014)*

- Previous hyperglycaemia in pregnancy
- Previously elevated blood glucose level
- Maternal age ≥40 years
- Ethnicity: Asian, Indian subcontinent, Aboriginal, Torres Strait Islander, Pacific Islander, Māori, Middle Eastern, non-white African
- Family history diabetes (1st degree relative with diabetes or a sister with hyperglycaemia in pregnancy)
- Pre-pregnancy BMI > 30 kg/m2
- Previous macrosomia (baby with birth weight > 4500 g or > 90th centile)
- Polycystic ovarian syndrome
- Medications: corticosteroids, antipsychotics

Maternity care for women diagnosed with GDM falls into 2 categories: high risk and low risk. Low risk women with GDM includes those able to control their blood glucose levels (maintaining within targets set by diabetes team) with diet alone. These women may choose to see midwives at the hospital, or their GP through an Antenatal Shared Care continuity program, while their blood glucose levels remain stable. If their levels become unstable at any time, or women require medication such as insulin to help maintain their levels, women are deemed 'high-risk,' and required to see the doctors at the hospital (non-continuity model) or in the high-risk clinic, where a continuity of care midwife clinic runs along-side the doctor's clinic.

Women with GDM are also able to access the 'Diabetes Midwife' for one information session about how their pregnancy care differs when they have GDM. This session was often under-utilised by women at TWH with six spaces available per week that were rarely booked out. No statistics have been kept on the outcomes for this strategy. Information presented in the sessions included what might happen when baby is born (e.g., hypoglycaemia), and antenatal expressing (ANE); how to hand express in the last four weeks of pregnancy.

ANE is an initiative trialled within hospitals to reduce formula supplementation for women with GDM (Casey, Banks, et al., 2019; Forster et al., 2011; Forster et al., 2017; Soltani & Scott, 2012). Research has found it to be a safe practice for women in late pregnancy to collect breastmilk before birth (Forster et al., 2017). The aim is to use mother's own milk instead of formula if it is required in hospital. However, while some benefits have been shown, there have been no statistically significant results to show an improvement in EBF rates among studies due to the small numbers of women in the cohorts (Forster et al., 2011; Forster et al., 2017; Soltani & Scott, 2012).

1.2.5 Improving exclusive breastfeeding rates amongst women with GDM

Improving EBF rates amongst women with GDM has been attempted in diverse ways with varying results. While BFHI and ANE can be used as strategies to improve EBF rates on discharge from hospital, rates are yet to improve on a global scale (WHO, 2018). Different approaches to antenatal education are required to place women with GDM in the centre of their own care and empower them to achieve what they intended to do regarding their infant feeding choices (Mizrak et al., 2017; Schellinger et al., 2017). For example, You et al. (2020) achieved positive breastfeeding results by tailoring individualised breastfeeding support to breastfeeding self-efficacy scores for women with GDM.

Improving women's intention to exclusively breastfeed has been recognised as a strategy to improve EBF rates on discharge from hospital (Weisband et al., 2017; WHO, 2017b, 2018). However, there have been no effective interventions to strengthen women's intention to exclusively breastfeed (Wen et al., 2009). For women with GDM at TWH in 2020, there was a 15% reduction between intending to breastfeed (83.3%) and actual EBF on discharge from hospital (68.4%) resulting in 31.6% babies being given formula (19% exclusively formula fed) on discharge from hospital (see Table 5-1, p. 94 and Table 5-2, p. 95).

New ways to encourage women with GDM to reflect on their health and make positive choices regarding breastfeeding need to be discovered (Much et al., 2014). Development of a new strategy in collaboration with women is required so that women can be at the centre of their own decision-making, working with staff to implement approaches that women will use to improve their own breastfeeding experiences. Hall et al. (2018) advocates active involvement of consumers to enable change must

include their assessments about what improvements should be made and how to achieve them, going beyond the usual consumer representation on advisory committees and patient experience surveys.

1.3 Aims and objectives of the AD-MIRE Breastfeeding Study

1.3.1 Aim

The aim of this study was to develop a new strategy, in collaboration with women and staff at TWH, to improve rates of exclusive breastfeeding (EBF) on discharge from hospital for women with GDM. The question the study was designed to answer was:

1.3.2 Research question

Can implementation of an intervention recommended by women with GDM and implemented by staff at TWH improve exclusive breastfeeding rates on discharge from hospital?

1.3.3 Objectives

The objectives of the study were to work with women with GDM and staff at TWH and gather evidence for outcome measures listed below:

- Uncover breastfeeding attitudes, confidence, and perception of support for breastfeeding decisions for women with GDM and staff at the study hospital.
- Identify EBF rates at discharge from hospital for women with GDM at TWH.
- Discover infant feeding patterns for women with GDM at 4–6-week postnatal Child and Family Health visit.
- Explore women's experiences of antenatal breastfeeding support and their ideas to take to staff to improve.
- Evaluate and compare EBF rates at discharge from hospital for women with GDM before and after implementation of the intervention.

1.3.4 Outcome Measures

Primary

- EBF rates on discharge from hospital.

Secondary

- Rates of any breastfeeding on discharge from hospital.
- Rates of any breastfeeding at six weeks postpartum.

Other outcome measures

- EBF rates at birth.
- Women's intention to exclusively breastfeed during pregnancy.

1.3.5 Significance of study

The cost of improving breastfeeding rates is much less than the costs associated with the burden of disease (personal and financial) attributable to GDM and its long-term complications (International Diabetes Federation, 2019). Women with GDM and their babies have an 18.9% increased risk of developing Type 2 diabetes within nine years of GDM diagnosis alone, and this rate increases if women become heavier (International Diabetes Federation, 2019; Malcolm, 2012). This is the first study to my knowledge to incorporate a close consumer-based approach to develop strategies to improve EBF practices with women with GDM.

Infant feeding decisions for women with GDM are highly influenced by the attitudes and beliefs of others (Doughty et al., 2018), particularly health professionals (WHO, 2018), as well as by health concerns, specifically those related to their babies (Hirst et al., 2012; Jagiello & Chertok, 2015). This study unpacked the concerns of women with GDM in a person-centred participatory workshop to explore a woman's understandings and challenge some of their myths about breastfeeding when women have GDM. The information gleaned from the data was then themed and disseminated to staff at TWH to inform the development of an intervention that aimed to improve EBF rates on discharge from hospital. This intervention was then evaluated within the research site for its influence on EBF rates at discharge from hospital.

1.3.6 Overview of thesis

Within the seven chapters of this thesis there are two peer-reviewed publications and two papers submitted to journals and are under review (evidence Appendix Q, p. 218) . Each manuscript was submitted to journals with careful consideration to the purpose of the paper and the journal's intended audience. As requirements for submission differ between each journal, all papers have been re-styled for submission in this thesis. Each chapter (see Figure 1-1) contains an introduction and conclusion to maintain a consistent flow between chapters.

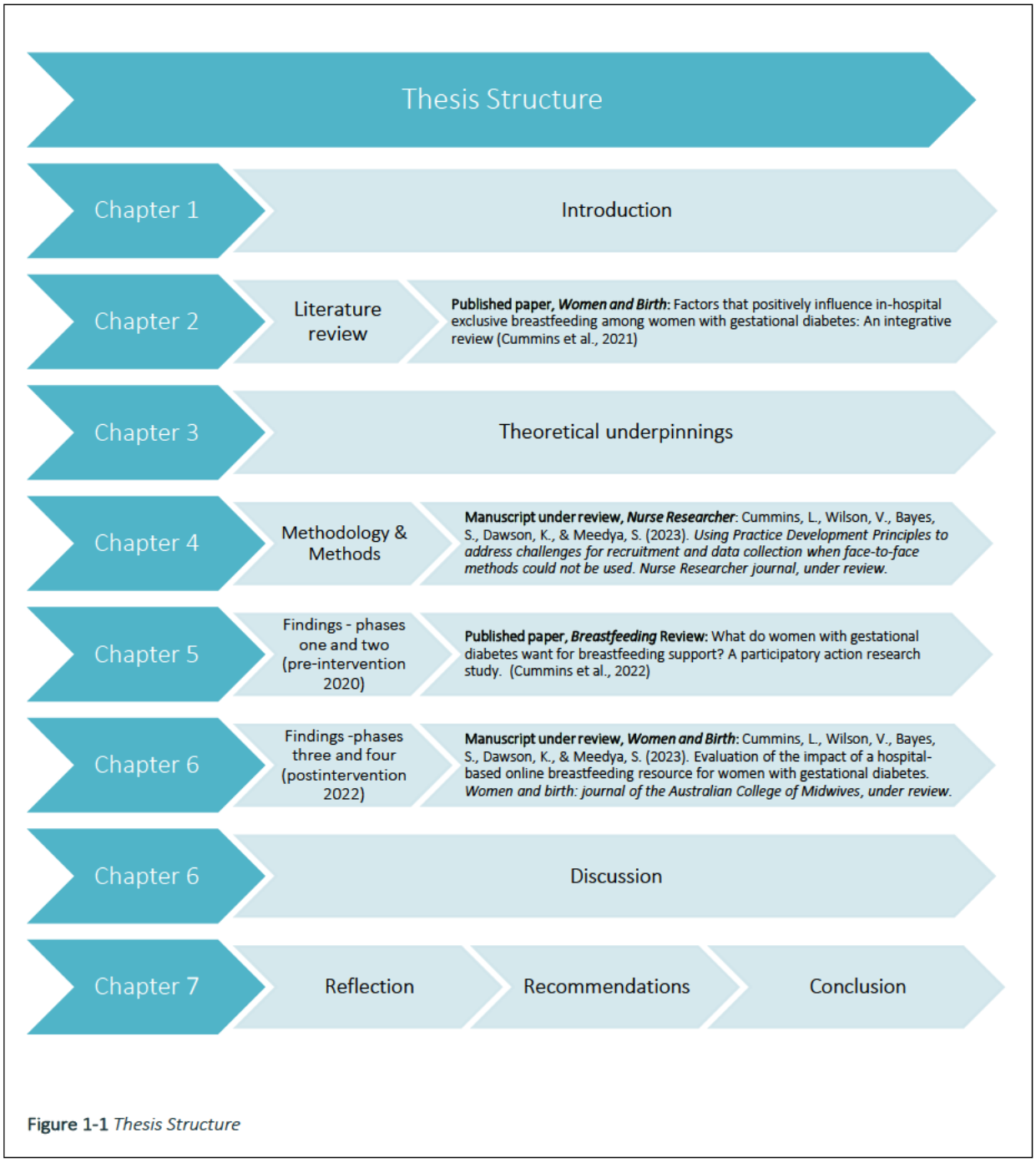

Figure 1-1 *Thesis Structure*

Chapter 1 (p. 1) provides an overview of the need for the AD-MIRE Breastfeeding study. It defines GDM and EBF and provides evidence for the significance of this study with an overview of thesis structure.

Chapter 2 (p. 13) provides current evidence surrounding EBF for women with GDM to inform the study. A published paper highlights the need for developing educational and supportive interventions that are tailored specifically for women with GDM: Cummins L, Meedya S, Wilson V. *Factors that positively influence in-hospital exclusive breastfeeding among women with Gestational Diabetes Mellitus: An integrative review.* Women and Birth*. 2021 Mar 18: S1871-5192(21)00040-8. doi: 10.1016/j.wombi.2021.03.005.*

Chapter 3 (p. 42) describes my theoretical underpinnings to provide information about my ontology and epistemology, giving me insight into my person-centredness and which methodology best suited the question I was posing.

Chapter 4 (p. 50) includes three sections to outline my methodology and the methods used across four phases to answer my questions. It justifies why this study uses participatory action research, giving a clear outline of the study design and approaches used to collect data. It includes a manuscript under review: Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). *Using Practice Development Principles to address challenges for recruitment and data collection when face-to-face methods could not be used*. Nurse Researcher journal, *under review.*

Chapter 5 (p. 93) presents the findings of the study pre-intervention (2020), where background information was collected in phase one from hospital data, staff, and women with GDM, and phase two workshops were undertaken. Workshops explored experiences and recommendations from women with GDM and were published: Cummins, L., Wilson, V., & Meedya, S. (2022). *What do women with Gestational Diabetes Mellitus want for breastfeeding support? A participatory action research study*. Breastfeeding Review, 30(3), 27-36.

Chapter 6 (p. 116) presents the post-intervention (2022) findings for this study, where the impact of the staff-implemented intervention was evaluated. It includes a manuscript under review: Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). *Evaluation of the impact of a hospital-based online breastfeeding resource for women with gestational diabetes*. Women and birth: journal of the Australian College of Midwives, *under review.*

Chapter 7 (p. 135) offers a discussion of the key findings that emerged from this study and reasons why the primary outcome of improving rates of EBF on discharge from hospital may not have been met. It also provides recommendations for future practice and research to better support women with GDM to exclusively breastfeed on discharge from hospital.

Chapter 8 (p. 149) offers my reflections as a novice researcher, strengths and limitations, and final conclusion to this research.

1.4 Conclusion of chapter

This chapter was an introduction to the AD-MIRE Breastfeeding study, outlining GDM (antenatal Gestational Diabetes Mellitus) and the importance of EBF to improve the health of these women and their babies. It included the importance of developing a strategy in collaboration with women so they can be involved in decision-making when staff work toward change.

Chapter Two Literature Review

2.1 Chapter introduction

The previous chapter (introduction) highlighted the importance of support for breastfeeding practices in the hospital setting among women with Gestational Diabetes Mellitus (GDM), both worldwide and within Australia, where rates of exclusive breastfeeding (EBF) after birth are low and many women with GDM introduce formula to their babies during the hospital stay. This chapter presents literature that supports a participatory action research study, utilising practice development strategies, that aimed to develop a new strategy, in collaboration with women and staff at a regional Australian hospital, to improve rates of exclusive breastfeeding (EBF) on discharge from hospital for women with GDM. This chapter is in two parts, the first being an integrative review of literature undertaken between January 2009 and May 2020. The aim of the integrative review was to identify factors that positively influence in-hospital exclusive breastfeeding practices among women with GDM and was published in *Women and Birth* (Impact factor 3.349) in 2021. The second part includes findings of an updated literature review conducted in May 2023 to identify any new information since May 2020. The findings of the review highlighted the need for support that is specifically tailored for women with GDM in addition to the breastfeeding support and education currently available to all women who intend to breastfeed.

2.2 Part 1 - Factors that positively influence in-hospital exclusive breastfeeding among women with Gestational Diabetes Mellitus: An integrative review.

Cummins, L., Meedya, S., & Wilson, V. (2021). Factors that positively influence in-hospital exclusive breastfeeding among women with Gestational Diabetes: An integrative review. *Women and birth: journal of the Australian College of Midwives*. https://doi.org/10.1016/j.wombi.2021.03.005

Permission to reproduce this paper in my thesis is available in Appendix A (p. 172).

2.2.1 Abstract

Problem: Women with Gestational Diabetes Mellitus have higher rates of introducing infant formula before leaving hospital.

Background: Despite health professional support, less women with Gestational Diabetes Mellitus exclusively breastfeed in hospital.

Aim: To find factors that positively influence in-hospital exclusive breastfeeding practices among women with Gestational Diabetes Mellitus.

Methods: An online search was performed in Medline, Scopus, Pubmed, CINAHL and Cochrane databases. Studies containing the keywords Gestational Diabetes Mellitus and breastfeeding were retrieved.

Findings: Authors identified 1935 papers from search criteria. Twenty-six papers with no restrictions on research design met inclusion criteria and were included in the review. Factors were divided into personal, antenatal, intrapartum, and postnatal factors. The main modifiable factors that were associated with improved in-hospital exclusive breastfeeding rates were having a strong intention to breastfeed, being confident, feeling supported and having continuity of education and support. Women's main reasons to introduce formula were related to baby's hypoglycaemia, delayed lactogenesis II and perceived low milk supply. Skin-to-skin contact after birth combined with frequent breastfeeds were effective ways to improve in-hospital exclusive breastfeeding rates.

Conclusion: Influencing factors such as women's breastfeeding intention, confidence and ongoing support are no different to the general population of women. However, promoting skin-to-skin contact after birth combined with frequent feeds are crucial for women with Gestational Diabetes Mellitus who are more likely to introduce formula due to delayed lactogenesis II and fear of neonatal hypoglycaemia. There is a need for developing educational and supportive interventions that are tailored specifically for women who have Gestational Diabetes Mellitus.

Statement of significance

Problem

Women with Gestational Diabetes Mellitus have higher rates of introducing infant formula before leaving hospital.

What is already known?

Despite health professional support, less women with Gestational Diabetes Mellitus exclusively breastfeed in hospital.

What this paper adds

The main reasons women with Gestational Diabetes Mellitus introduced formula were baby's hypoglycaemia, Delayed Lactogenesis II, and low milk supply.

Skin-to-skin contact after birth, frequent breastfeeds and continuity of education and support were effective strategies to overcome women's concerns and improve in-hospital exclusive breastfeeding rates for women with Gestational Diabetes Mellitus.

Educational and supportive interventions that are tailored specifically for women with Gestational Diabetes Mellitus can improve in-hospital exclusive breastfeeding.

2.2.2 Introduction

Due to the immense benefits of breastfeeding for both women and children, the World Health Organization (WHO) recommends exclusive breastfeeding for six months after birth (WHO, 2018). However, many women introduce formula to their baby after they initiate breastfeeding (American Academy of Pediatrics, 2012; Australian Government, 2018; Victora et al., 2016; WHO, 2017a). Supplementary feeding with infant formula in hospital is more common among new mothers who have Gestational Diabetes Mellitus (GDM) (Bærug et al., 2018), a temporary form of diabetes during pregnancy (Kramer & Kakuma, 2002; WHO, 2016, 2018). In the USA, the incidence of exclusive breastfeeding at discharge from hospital was 62.2% for women with GDM compared to 75.4% for women without GDM ($p < 0.01$) (Haile et al., 2016). In Norway, women with GDM had 5% less predominant breastfeeding rates at one week postpartum compared to women without GDM (86% vs 91%) (Bærug et al., 2018). In Australia, the discrepancy in predominant breastfeeding rates in hospital was 20% between women with GDM and without GDM (60% vs 80%) (Chamberlain et al., 2017).

The early introduction of formula as a supplementary feed impacts on breastfeeding outcomes and mitigates breastfeeding benefits for women and children (Chantry et al., 2014; Morrison et al., 2015; WHO, 2018). The early introduction of formula is associated with the following risks: reduced initiation of feeding at the breast within the first two days of birth (Oza-Frank et al., 2016; WHO, 2018), a reduction in exclusive breastfeeding on discharge from hospital (Chantry et al., 2014; Kramer & Kakuma, 2002; WHO, 2017b, 2018), and the early termination of breastfeeding by 2-3 months of age (Chantry et al., 2014; Morrison et al., 2015).

Women with GDM have higher rates of obesity (Gray et al., 2018; Mielke et al., 2013) and a higher chance of developing major health conditions such as Type 2 diabetes (Aune et al., 2013; Gray et al., 2018; Malcolm, 2012; Mielke et al., 2013), hypertension during pregnancy (Gray et al., 2018; Mielke et al., 2013) and cardiovascular disease in the years following birth (Gray et al., 2018; Mielke et al., 2013). Babies of women with GDM are also at risk of developing Type 2 diabetes, cardiovascular disease, and

obesity in later life (Gray et al., 2018; Mielke et al., 2013; Mitanchez et al., 2014). However, breastfeeding can reduce the risks of these medical conditions for the mother and her baby (Aune et al., 2013; Gunderson, 2014; Mitanchez et al., 2014). Consequently, for some women who may need to give their babies extra fluids at birth, some hospitals encourage women to express their breastmilk while pregnant (antenatal expressing), for their own milk to be used as a supplementary feed after birth if required instead of infant formula (Australian Breastfeeding Association, 2017; East et al., 2014). Research has provided opportunities to recognise factors that influence in-hospital breastfeeding rates for all women, e.g., WHO Baby Friendly Health Initiative (BFHI) guidelines (WHO, 2017b, 2018, 2019). However, women with GDM have less breastfeeding initiation rates (Oza-Frank & Gunderson, 2017) in hospital and cease breastfeeding earlier than the general population (Bærug et al., 2018). Identifying the positive factors among women with GDM is crucial to find the best strategies to support these women and to give the best start to their babies.

This paper will examine the literature to find factors that positively influence in-hospital exclusive breastfeeding practices among women with GDM. Key terms related to breastfeeding are defined based on the WHO Baby Friendly Health Initiative (BFHI) guidelines (WHO, 2018) (see Table 2-1). The BFHI includes the Ten Step strategies towards successful breastfeeding, which takes a whole-of-organisation approach to promoting, supporting, and prolonging breastfeeding for all women (WHO, 2018).

Table 2-1 *Definition of terms*

Terms	Definitions
Breastfeeding initiation	The baby's first intake of breastmilk is defined as breastfeeding initiation (Webb, 2001, p. XII). According to BFHI guideline, early breastfeeding initiation refers to initiating breastfeeding within the first hour of birth at the breast (WHO, 2018, p. 1)
Exclusive breastfeeding in-hospital	Exclusive breastfeeding in-hospital refers to feeding a newborn baby only human breastmilk throughout their stay (allowing for medicines), until discharge from the facility (Webb, 2001; WHO, 2008).
Supplementary feeding	Supplementary feed refers to feeding a newborn with any food or fluids other than breast milk (WHO, 2018, p. 19).
Predominate breastfeeding	Predominant breastfeeding refers to a feeding method where the source of nourishment has been breastmilk, but the baby may also have received water and water-based drinks except other food-based fluids such as non-human milk (Webb, 2001, p. XII; WHO, 2008).

2.2.3. Methods

The integrative review guidelines by Whittemore and Knafl (2005) and Hopia et al. (2016) were used to conduct this literature review. Integrative reviews summarise the literature from observed and theoretical research methods to improve awareness of healthcare problems and to inform practice (Whittemore & Knafl, 2005). All papers in this review, regardless of their study design, were sourced from peer reviewed databases. In addition, quality appraisals were attended using seven items from the Mixed Methods Appraisal Tool (MMAT) (Hong QN et al., 2018) to evaluate the methodological quality of quantitative, qualitative, mixed method and secondary research papers in this review by two authors (Supplementary Table 2-2, p. 31). Papers appraised with the MMAT tool for each study design scored zero if the answer was negative, or one point for an affirmative answer (total seven points).

Search strategy.

An online search was performed in Medline, Scopus, Pubmed, CINAHL and Cochrane databases. The key MESH terms searched were GDM or Gestational Diabetes Mellitus or Gestational Diabetes Mellitus or diabetes in pregnancy AND breastfeeding or breast-feeding or infant feeding or lactation or lactating (including exclusive breastfeeding and related strings i.e., breast fed, breastfeed). Relevant papers published between January 2009 and May 2020 were reviewed to answer the search question: What are the factors that influence in-hospital exclusive breastfeeding practices among women with Gestational Diabetes Mellitus? After duplicates were removed, two reviewers independently screened search results based on inclusion criteria which combined all studies relating to breast-feeding in hospital among women who have GDM or babies whose mothers had GDM. Exclusion criteria were research protocols, papers that were published in non-English language, related to adiposity, targeted women with pre-existing diabetes in pregnancy (Type 1 or Type 2 diabetes) or had no data pertaining to women with GDM breastfeeding in hospital. This paper defines in-hospital exclusive breastfeeding as exclusive breastfeeding at initiation, during hospital stay and at discharge.

2.2.4 Findings

There were 1935 studies extracted from five databases. After duplicates were removed, 1239 studies remained. Sixty full-text studies were screened for data to determine factors that affected in-hospital exclusive breastfeeding for women with GDM. Only 26 studies met the inclusion criteria and were assessed for the quality of their methodology prior to the final review (see Figure 2-1). No study was excluded based on the quality appraisal. Based on the MMAT tool, 22 studies scored 7/7 and four studies scored 6/7 with a mean score of 6.8.

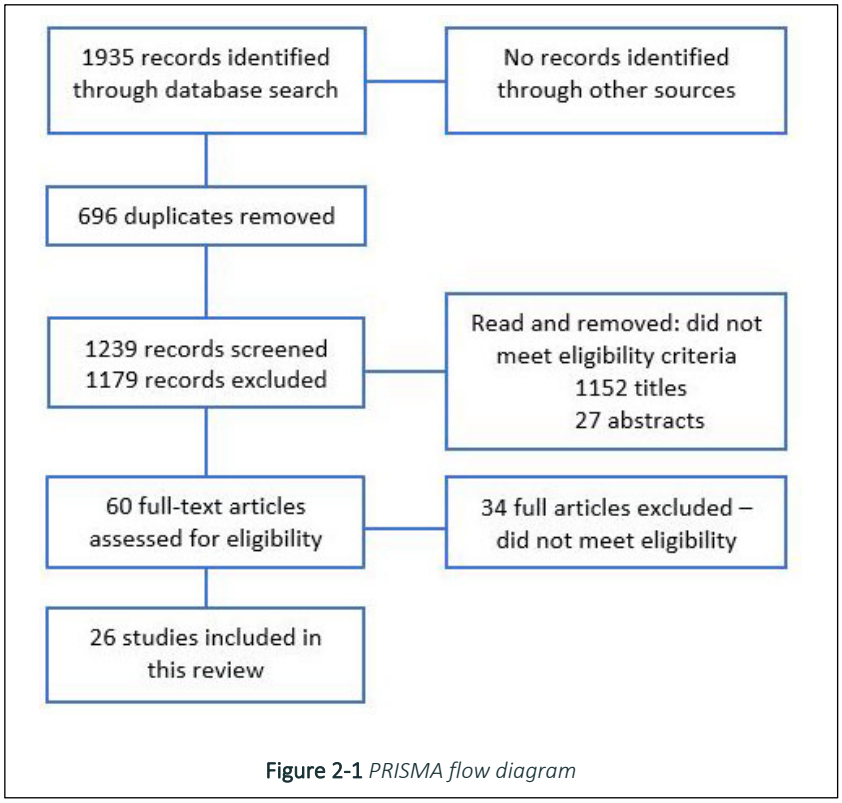

Figure 2-1 *PRISMA flow diagram*

Factors that influenced in-hospital exclusive breastfeeding practices among women with GDM were grouped into four major categories: personal factors, antenatal factors, intrapartum factors, and postnatal factors. Personal factors were further categorized into three groups, two of which were deemed non-modifiable during pregnancy. These included demographic factors such as age, education, parity and race/ethnicity, and lifestyle/physiologic factors such as BMI and smoking. The third sub-category were psychophysiologic factors which grouped potentially modifiable factors together such as perceptions of milk supply, attitudes, beliefs, and intentions. The three other major categories were

related to the timing of the factors that influenced exclusive breastfeeding for women with GDM: antenatal, intrapartum, and postnatal factors (see Figure 2-2).

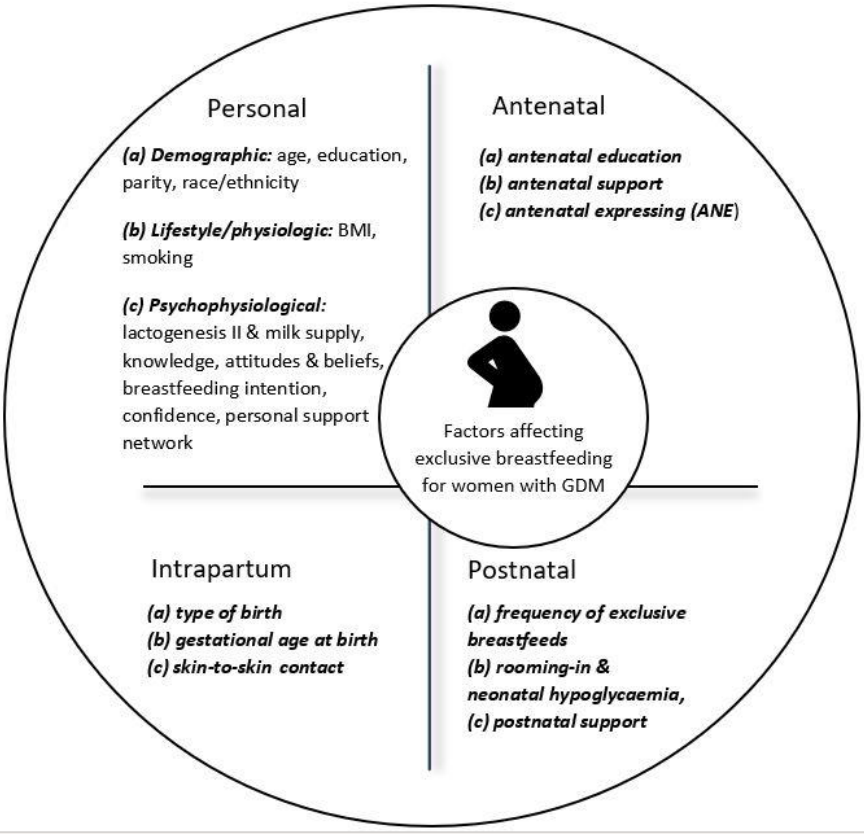

Figure 2-2 *Factors affecting exclusive breastfeeding for women with GDM.*

2.2.4.1. Personal factors.

Personal factors were divided into three categories: (a) demographic factors, (b) lifestyle/physiologic factors, and (c) psychophysiological factors. Supplementary Table 2-2 (p. 31) provides a summary of the studies.

(a) Demographic factors

Demographic factors affecting exclusive breastfeeding practices in hospital among women with GDM encompassed age (Cordero et al., 2013; Kachoria & Oza-Frank, 2014), level of education (Cordero et al., 2013; Kachoria & Oza-Frank, 2014), parity, (Cordero et al., 2013; Forster et al., 2017; Kachoria & Oza-Frank, 2014) and race/ethnicity (Chamberlain et al., 2017; Cordero et al., 2013; Haile et al., 2016; Kachoria & Oza-Frank, 2014; Stevens et al., 2019).

i) Age, education

Older age and high education were positive predictors of in-hospital exclusive breastfeeding among women with GDM (Cordero et al., 2013; Kachoria & Oza-Frank, 2014). In a study of 303 American women with GDM, women younger than 30 years of age were less likely to initiate exclusive breastfeeding after birth (OR 0.60, 95% CI 0.38-0.94) (Cordero et al., 2013). Another predictor for initiation of exclusive breastfeeding in this study was women's higher education (Cordero et al., 2013; Kachoria & Oza-Frank, 2014). Women who graduated from college initiated breastfeeding more than those who finished their education at high school or 11th grade (OR 4.20, 95% CI 2.33-7.56) (Cordero et al., 2013).

ii) Parity

Being primiparous was associated with higher breastfeeding initiation rates among women with GDM after birth (Cordero et al., 2013; Forster et al., 2017; Kachoria & Oza-Frank, 2014). In a retrospective study, primiparous women with GDM initiated exclusive breastfeeding twice more than multiparous women (OR 2.10, 95% CI 1.27-3.46) (Cordero et al., 2013).

A high in-hospital exclusive breastfeeding rate was also reported among Australian primiparous women with GDM (Forster et al., 2017). In a randomised controlled trial (RCT) of 635 Australian pregnant women with diabetes (n = 589 women with GDM), more primiparous women exclusively breastfed their babies in the first 24 h after birth compared to multiparous women when they provided expressed milk to initiate breastfeeding (RR 1.21, 95% CI 1.03–1.4) (Forster et al., 2017).

iii) Race/ethnicity

The effect of race or ethnicity on breastfeeding was controversial (Chamberlain et al., 2017; Cordero et al., 2013; Haile et al., 2016; Kachoria & Oza-Frank, 2014; Stevens et al., 2019). A secondary data analysis of 2038 women (GDM n = 118 and no-GDM n = 1920) revealed a significant association between GDM and reduced rates of exclusive breastfeeding on discharge from hospital for Hispanic (aOR 0.36, 95% CI 0.24-0.54), Non-Hispanic-Black (aOR 0.47, 95% 95% CI 0.28-0.77), and other ethnicities (aOR 0.39, 95% CI 0.24-0.54) compared to Non-Hispanic-White women (Haile et al., 2016). However, after adjustment for Body Mass Index (BMI), Non-Hispanic-Black women with GDM were more likely to initiate breastfeeding than their peers with no GDM (OR 1.07, 95% CI 1.02-1.12) (Stevens et al., 2019). In an Australian population with diverse ethnic backgrounds, being from an Aboriginal or Torres Strait Islander background was negatively associated with exclusive breastfeeding during the hospital stay among women with GDM (OR 0.78, 95% CI 0.70-0.88) (Chamberlain et al., 2017).

(b) Lifestyle/physiologic

Lifestyle and physiologic factors such as BMI (Cordero et al., 2013; Haile et al., 2016; Kachoria & Oza-Frank, 2014; Pinheiro & Goldani, 2018) and smoking status (Chamberlain et al., 2017; Cordero et al., 2013; Oza-Frank et al., 2014) were the factors that affected exclusive breastfeeding rates for women with GDM.

i) BMI

Having a normal BMI was a positive factor that influenced the initiation of exclusive breastfeeding after birth (Cordero et al., 2013; Haile et al., 2016; Kachoria & Oza-Frank, 2014; Pinheiro & Goldani, 2018). A data analysis of over 41,000 women with GDM showed women who had a BMI over 30 (obese) were less likely to exclusively breastfeed on discharge from hospital than women with a normal BMI (OR 0.9, 95% CI 0.8-0.9) (Kachoria & Oza-Frank, 2014). Low weight gain during pregnancy was also reported as a risk factor for exclusive breastfeeding at hospital discharge. The results of a cross-sectional analysis of 2038 women (n = 118 GDM) showed that women whose weight gain during pregnancy was less than normal were less likely to exclusively breastfeed at hospital discharge compared to women with normal weight gain (aOR 0.71, 95% CI 0.53-0.95) (Haile et al., 2016).

ii) Smoking

Women's smoking status had different influences on breast-feeding initiation (Chamberlain et al., 2017; Cordero et al., 2013; R. Kachoria & R. Oza-Frank, 2014). In one large secondary data collection study (GDM n = 6402), women with GDM who were smokers were more likely to initiate breastfeeding, however authors suggested this may be due to healthy lifestyle counselling given to women with GDM (OR 1.31, 95% CI 1.03-1.65) (Oza-Frank et al., 2014). Results in two smaller cohort studies demonstrated that smoking was associated with lower rates of breastfeeding initiation among women with GDM in the USA (OR 0.26, 95% CI 0.14-0.49) (Cordero et al., 2013) or among Indigenous women in Australia (OR 0.39, 95% CI 0.15-1.00) (Chamberlain et al., 2017).

(c) Psychophysiological factors

Lactogenesis II (Chertok & Sherby, 2016; Doughty et al., 2018; Galipeau et al., 2012; Jagiello & Chertok, 2015), perceived milk supply (Chertok & Sherby, 2016; Jagiello & Chertok, 2015), breast-feeding knowledge, attitudes and beliefs (Casey, Mogg, et al., 2019; Doughty et al., 2018; Jagiello & Chertok, 2015), breastfeeding intention (Cordero et al., 2013; Jirakittidul et al., 2019; Weisband et al., 2017), confidence (Chertok & Sherby, 2016; You et al., 2020), and personal support network (Casey, Mogg, et al., 2019; Doughty et al., 2018; Hirst et al., 2012; Jagiello & Chertok, 2015) were the psychophysiological factors that influenced exclusive in-hospital breastfeeding for women with GDM.

i) Lactogenesis and milk supply

Normal lactogenesis II and perception of adequate milk supply were factors that positively influenced in-hospital exclusive breastfeeding practices (Chertok & Sherby, 2016). Delayed lactogenesis II (DLII) and low milk supply, however, were repeatedly reported to be a major reason for early formula supplementation among women with GDM (Chertok & Sherby, 2016; Doughty et al., 2018; Galipeau et al., 2012; Jagiello & Chertok, 2015).

Delayed lactogenesis II (DLII) is defined as a physiologic delay in the onset of copious (plentiful) milk production more than 72 h after birth (Doughty et al., 2018; Galipeau et al., 2012). In a Canadian study, increased breastmilk sodium (Na+) levels were used as an indicator to identify true physiological DLII. In this study women with GDM had significantly higher Na+ levels in their milk compared to women without GDM ($p < 0.01$) (Galipeau et al., 2012). However, DLII was reduced by increasing the frequency of breastfeeding which decreased sodium levels in breastmilk compared to women who did not breastfeed frequently ($p < 0.05$) (Galipeau et al., 2012). Other factors that were associated with high sodium levels in milk were using insulin ($p = 0.02$), being older (mean age of participants was 29.5 years) ($p = 0.03$) and having a high BMI (obese) (CI 1.07–2.29) (Galipeau et al., 2012).

Women with GDM also perceived they had DLII and low milk supply which negatively influenced their exclusive breastfeeding practices (Chertok & Sherby, 2016; Jagiello & Chertok, 2015). In a qualitative study of 27 women with GDM who initiated breastfeeding after birth, almost half (40.7%) reported a delay in producing mature milk and low milk supply (Jagiello & Chertok, 2015). These women reported strategies such as postnatal pumping of breastmilk, use of medication or herbs, and frequent feeding to increase their milk supply (Jagiello & Chertok, 2015). In another study, women with high self-efficacy scores perceived less DLII ($p = 0.05$) (Chertok & Sherby, 2016).

ii) Knowledge, attitudes, and beliefs

Breastfeeding knowledge, attitudes, and beliefs of women with GDM were found to affect exclusive breastfeeding rates in hospital (Casey, Mogg, et al., 2019; Doughty et al., 2018; Jagiello & Chertok, 2015). In a qualitative study, women with GDM reported that a belief in giving the best start for their babies motivated them to express breastmilk antenatally and initiate exclusive breastfeeding in the hospital (Casey, Mogg, et al., 2019). However, in a large American cohort study (n = 3010), women with GDM (n = 195) reported fewer positive attitudes or knowledge towards breastfeeding (Doughty et al., 2018). Women with GDM were less likely to believe that breastfeeding was the best way to feed their baby (aOR 0.62, 95% CI 0.46-0.85) and they also considered formula to be as good as breastmilk (OR 1.43, 95% CI 1.05-1.94) (Doughty et al., 2018).

iii) Breastfeeding intention

Having an intention to breastfeed was the most significant predictive factor for breastfeeding in the first 24 h among women with GDM (Casey, Mogg, et al., 2019; Cordero et al., 2013; Weisband et al., 2017). Still, many women with GDM did not have a strong prenatal intention to breastfeed exclusively (Doughty et al., 2018; Haile et al., 2016). In a cohort study, women with GDM (n = 118) were six times more likely not to intend to breastfeed exclusively compared to women without GDM (n = 1920), (aOR 6.46, 95% CI 5.13–8.14) (Haile et al., 2016). Women with and without GDM who did not intend to exclusively breastfeed had similar increased odds of hospital supplementation (GDM: aOR 3.52, 95% CI 1.44–8.57, without GDM (NGDM): aOR 3.66, 95% CI 2.93–4.56) (Weisband et al., 2017). Evidence demonstrated that women's intention to breastfeed was influenced by their knowledge, attitudes and beliefs, and their confidence in breastfeeding (Casey, Mogg, et al., 2019; Chertok & Sherby, 2016; Doughty et al., 2018; Jagiello & Chertok, 2015; You et al., 2020).

iv) Confidence

Confidence is a significant positive factor for early initiation of exclusive breastfeeding in the hospital (Chertok & Sherby, 2016; You et al., 2020). In an RCT with 226 Chinese women with GDM, individualised support was offered to the intervention group after their self-efficacy was scored as a measure of their breastfeeding attitudes, knowledge, and overall confidence (You et al., 2020). Addressing incorrect breastfeeding knowledge, giving tailored/individualised education for breastfeeding skills and providing additional support materials improved self-efficacy scores and demonstrated a significant improvement in exclusive breastfeeding rates at hospital discharge (25.2% vs 13.5%, $p < 0.05$) (You et al., 2020). In a prospective case control study, women with GDM who had low breastfeeding self-efficacy scores (BSES) (mean 47.1) perceived more problems with their milk supply when compared to those with higher BSES scores (mean 54) ($p = 0.036$) (Chertok & Sherby, 2016). High BSES was also correlated to high assessment of breastfeeding scores for women before they discharged from hospital ($r = 0.61$, $p < 0.001$) (Chertok & Sherby, 2016).

Factors that influenced women's confidence in the literature were: (a) antenatal breastmilk expressing (Casey, Mogg, et al., 2019; Forster et al., 2011), (b) women's fears about GDM-specific problems (Hirst et al., 2012; Jagiello & Chertok, 2015), and (c) their baby's health concerns (Casey, Mogg, et al., 2019; Hirst et al., 2012; Jagiello & Chertok, 2015). In Australian studies, some women with GDM who were engaged in antenatal breastmilk expressing felt more confident (Casey, Mogg, et al., 2019; Forster et al., 2011). However, other women reported that they felt anxious and less confident when they expressed their milk antenatally (Forster et al., 2011). In a cross-sectional study, women with GDM (n = 195) were less confident than women without GDM as they perceived their babies had more trouble

breastfeeding (aOR 1.66, 95% CI 1.08–2.54) (Doughty et al., 2018) or that their babies were not interested in breastfeeding (aOR 2.06, 95% CI 1.07–3.98) (Doughty et al., 2018).

v) Personal support network

The support from family and friends plus web-based sources of support were important factors that influenced women's decisions toward exclusive breastfeeding when they had GDM (Casey, Mogg, et al., 2019; Doughty et al., 2018; Hirst et al., 2012; Jagiello & Chertok, 2015). Women with GDM who intended to, and initiated breastfeeding felt more supported by their family, friends, and partners (Jagiello & Chertok, 2015). When women's partners preferred infant formula, the rates of exclusive breastfeeding in the early days after birth was low (Doughty et al., 2018). Web-based sources of support such as social media support groups and YouTube videos positively impacted on women with GDM (Casey, Mogg, et al., 2019; Hirst et al., 2012; Jagiello & Chertok, 2015).

2.2.4.2. Antenatal factors.

Positive antenatal factors that influenced exclusive breastfeeding in hospital for women who had GDM during their pregnancies were in preparation for breastfeeding through antenatal education (Schellinger et al., 2017; Stuebe et al., 2016; You et al., 2020), professional antenatal support (Casey, Mogg, et al., 2019; Doughty et al., 2018; Hirst et al., 2012; Jagiello & Chertok, 2015), and antenatal expression of breastmilk prior to birth (Casey, Banks, et al., 2019; Casey, Mogg, et al., 2019; Forster et al., 2011; Forster et al., 2017; Soltani & Scott, 2012).

(a) Antenatal education

Antenatal education specifically for women with GDM demonstrated positive effects on breastfeeding rates at discharge from hospital (Schellinger et al., 2017; Stuebe et al., 2016; You et al., 2020). Evidence demonstrated that Hispanic women with GDM who attended targeted antenatal classes with their native language had higher breastfeeding rates on discharge from hospital compared with women who attended standard care (91% vs 69.4% control) ($p < 0.001$) (Schellinger et al., 2017). The results of an RCT with self-efficacy enhancing strategies also demonstrated a significant improvement in exclusive breastfeeding rates at hospital discharge among women with GDM (25.2% Intervention group vs 13.5% control, $p < 0.05$) (You et al., 2020).

(b) Antenatal support

In a qualitative study, women with GDM reported that professional antenatal support assisted them to develop strategies for successful exclusive breastfeeding and gain the confidence to seek help after birth (Casey, Mogg, et al., 2019). However, women expressed the need for consistent advice and

support from their midwives and caregivers during the antenatal period (Casey, Mogg, et al., 2019; Doughty et al., 2018; Hirst et al., 2012; Jagiello & Chertok, 2015). For instance, in a Vietnamese study, (n = 35) women with GDM expressed their need for extra professional support (Hirst et al., 2012). These women felt guilty, confused, and anxious about their GDM diagnosis, but did not feel that they received enough explanation to help themselves or their babies: "My doctor did not explain much" (Hirst et al., 2012). Findings from in-depth interviews of women with GDM showed that women had fears about breastfeeding challenges stemming from their GDM diagnosis (Casey, Mogg, et al., 2019). In other studies women's fears were amplified by lack of support and negative attitudes of staff regarding their GDM diagnosis (Hirst et al., 2012; Jagiello & Chertok, 2015).

(c) Antenatal expressing (ANE)

The influence of antenatal expressing of breastmilk on exclusive breastfeeding rates varied among the studies (Casey, Banks, et al., 2019; Casey, Mogg, et al., 2019; Forster et al., 2011; Forster et al., 2017; Soltani & Scott, 2012). In a retrospective study (n = 303), there was a significant reduction in the number of babies receiving infant formula when their mothers with GDM expressed colostrum during the antenatal period (HR 0.40, 95% CI 0.21–0.74) (Casey, Banks, et al., 2019), whereas in a large Australian RCT (n = 635), there was a small association between ANE and exclusive breastfeeding in the first 24 h (aRR 1.15, 95% CI 1.02-1.28) with no effectiveness on increasing exclusive breastfeeding rates on discharge from hospital (aRR 1.16, 95% CI 0.99-1.33) (Forster et al., 2017). Women stated that ANE was the best way for them to avoid feeding their babies formula (Casey, Mogg, et al., 2019; Forster et al., 2011). Women who found ANE difficult, were very concerned about the amount of time they spent expressing and felt a constant fear about having an inadequate milk supply (Casey, Mogg, et al., 2019; Forster et al., 2011). Some health professionals in a quasi-experimental study also stated they were uncomfortable helping women to hand-express breastmilk (Tozier, 2013).

2.2.4.3. Intrapartum factors.

Birth events that positively impacted on the initiation of breastfeeding for women with GDM were: (a) vaginal birth (Chamberlain et al., 2017; Chertok & Sherby, 2016; Jagiello & Chertok, 2015), (b) full-term gestational age of the baby (Chamberlain et al., 2017), and (c) skin-to-skin contact at birth (Dalsgaard et al., 2019; Tozier, 2013).

(a) Type of birth and (b) gestational age

In one Australian study having a vaginal birth and a full-term baby were independently associated with increased rates of predominant breastfeeding at discharge (Chamberlain et al., 2017). In this study, Indigenous and non-Indigenous women with GDM who had a caesarean birth were less likely to

predominantly breastfeed in hospital compared to women who had a vaginal birth (Indigenous women OR 0.53, 95%CI 0.30-0.91, non-Indigenous OR 0.63, 95%CI 0.41-0.96, p = 0.03) (Chamberlain et al., 2017). Additionally, pre-term Indigenous babies were less likely to receive predominant breastmilk in hospital compared to full-term Indigenous babies (OR 0.22, 95%CI 0.07-0.7) (Chamberlain et al., 2017).

(c) Skin-to-skin contact

Skin-to-skin contact at birth was one of the important events that had a positive influence on initiation of breastfeeding in hospital for women with GDM (Dalsgaard et al., 2019; Tozier, 2013). In a quasi-experimental Danish study, babies of women with diet controlled GDM who had skin-to-skin contact for two hours breastfed more frequently (IG M = 2.4 feeds in 6 h vs CG M = 1.3 feeds in 7 h, $p < 0.001$) and had less hypoglycaemic events (IG 22.7% vs CG 10.2% within four hours after birth, $p < 0.001$) (Dalsgaard et al., 2019). Early skin-to-skin contact combined with frequent feedings was a positive factor in increasing exclusive breastfeeding rates prior to discharge from hospital (Tozier, 2013).

2.2.4.4. Postnatal factors.

Postnatal practices such as frequency of exclusive breastfeeding (Galipeau et al., 2012; Oza-Frank et al., 2016; Tozier, 2013), rooming-in and managing neonatal hypoglycaemia (Casey, Banks, et al., 2019; Casey, Mogg, et al., 2019; Chamberlain et al., 2017; Dalsgaard et al., 2019; Jagiello & Chertok, 2015; Tozier, 2013) were common influencing factors with in-hospital exclusive breastfeeding.

a) Frequency of exclusive breastfeeding

Frequent exclusive breastfeeding positively influenced exclusive breastfeeding practices in the hospital (Galipeau et al., 2012; Tozier, 2013). The result of an interventional study (n = 139) revealed that babies whose mother had GDM and fed every 2-3 h (with collected colostrum) in addition to skin-to-skin contact at birth were less given formula in hospital (Tozier, 2013). The same study also found that babies exposed to the intervention had less admissions to the neonatal intensive care unit (NICU) for glucose stabilization (6.5% vs 18.8%, p = 0.02) (Tozier, 2013). Frequent exclusive breastfeeding (8–12 times per day) was found to independently reduce breastfeeding problems such as DLII in the early post-partum period ($p < 0.05$) (Galipeau et al., 2012).

b) Rooming-in and neonatal hypoglycaemia

Keeping mother and baby together and preventing hypoglycaemia were factors that positively influenced breastfeeding initiation and exclusive breastfeeding at discharge from hospital (Casey, Banks, et al., 2019; Chamberlain et al., 2017; Dalsgaard et al., 2019; Tozier, 2013). In a phenomenological study (n = 27), some women with GDM mentioned that staff's concerns for their

baby's low sugar level (hypoglycaemia) was a reason to introduce formula even if they had an adequate milk supply (Jagiello & Chertok, 2015). Others believed that the baby's hypoglycaemia (14.8% of their cohort) contributed to separation from their baby, delayed the initiation of breastfeeding, and led to further challenges such as low milk supply (Jagiello & Chertok, 2015). At the same time some women persevered with exclusive breastfeeding by collecting and storing colostrum, even if this caused them distress (Casey, Mogg, et al., 2019).

c) Postnatal support

In a large study across 16 US states (GDM n = 6402), the implementation of BFHI principles improved breastfeeding initiation rates among women with GDM by 15% (73% before BFHI vs 88.2% after BFHI) (Oza-Frank & Gunderson, 2017). However, there was less exclusive breastfeeding on discharge from hospital (41% before BFHI recommendations to 39.4% after BFHI) (Oza-Frank & Gunderson, 2017). Although health professionals' support during the postnatal period is important to promote exclusive breastfeeding, some studies demonstrated that women with GDM did not receive adequate hospital professional support (Doughty et al., 2018; Hirst et al., 2012; Jagiello & Chertok, 2015; Oza-Frank & Gunderson, 2017; Tozier, 2013). Women in some studies alleged that healthcare professionals encouraged formula supplementation (Doughty et al., 2018; Jagiello & Chertok, 2015; Oza-Frank & Gunderson, 2017) and gave inconsistent or incorrect information (Hirst et al., 2012; Jagiello & Chertok, 2015; Tozier, 2013). For instance, some women with GDM reported that their postnatal experience included suggestions from staff to formula feed: "why are you doing this (breastfeeding)?" (Jagiello & Chertok, 2015).

2.2.5 Discussion

This integrative literature review was conducted with the aim of identifying factors that could positively influence in-hospital exclusive breastfeeding among women with GDM. These were presented in four categories: personal, antenatal, intrapartum, and postnatal factors. Positive personal factors were being older, having higher education, having first baby, normal antenatal weight gain, having a strong intention to breastfeed, being confident and feeling supported. Antenatal factors included education, support, and antenatal expressing. Having a vaginal and full-term birth with early skin-to-skin contact after birth were positive intrapartum factors. Postnatally, frequent feedings of human milk and support from health professionals also improved exclusive breastfeeding practices on discharge from hospital for women with GDM.

Many of the positive factors found in this review for women with GDM have also been found to have positive effects on in-hospital breastfeeding rates among the general population of women. For example, being older (McDonald et al., 2012), having high education (Hackman et al., 2015), gaining

normal weight during pregnancy (Jevitt et al., 2007) and being a non-smoker (Hughes et al., 2015; McDonald et al., 2012) are positive breastfeeding factors for women regardless of their GDM status. Being a primiparous woman with GDM positively influenced exclusive breastfeeding in hospital, however, primiparity among the general population is considered at risk for higher rates of mixed method feeding at hospital discharge compared to multiparous women (39% vs. 23%; $p < 0.001$) (Hackman et al., 2015). Higher rates of exclusive breastfeeding among primiparous women with GDM could be related to their concerns for baby's health or feelings of anxiousness and guilt after a diagnosis of GDM in this review (Casey, Mogg, et al., 2019; Jagiello & Chertok, 2015).

Breastfeeding intention, confidence and support are major modifiable factors for both women with GDM and in the general population (Meedya et al., 2010), however, women with GDM have less confidence in their milk supply due to their concerns about possible risks for neonatal hypoglycaemia and delayed lactogenesis II leading to the early introduction of formula (Chertok & Sherby, 2016; Doughty et al., 2018; Jagiello & Chertok, 2015). These factors are deeply intertwined with available social networks and professional support available for women with GDM.

Evidence demonstrated that women's concerns can be alleviated by appropriate education and adequate support where they become more confident in their ability to breastfeed (Chertok & Sherby, 2016; You et al., 2020). Additionally, many women use online resources including breastfeeding apps, websites, and YouTube videos to find information about breastfeeding (Almohanna et al., 2020; Hopkins et al., 2021; Meedya et al., 2019). Nevertheless, many of these apps and websites are not tailored specifically for women with GDM (Meedya et al., 2019), therefore the role of family and healthcare professionals becomes more critical as they influence a woman's intention and confidence to breastfeed (Blyth et al., 2002). Women who have positive support from their partners toward breastfeeding feel more confident to breastfeed their baby (Doughty et al., 2018; Swanson & Power, 2005). At the same time, women with GDM need reassurance and close support from their healthcare providers to understand the changes in their body and its influences on their baby, and to help women feel supported to breastfeed in-hospital and then at home.

Intrapartum factors essential to enhance in-hospital exclusive breastfeeding for women with GDM include skin-to-skin contact at birth combined with frequent breastfeeds (Tozier, 2013). Skin-to-skin contact, and frequent feeds are recommended for all women in the general population (Kellams et al., 2017), however this practice is crucial for women with GDM who are more likely to introduce formula after birth (Oza-Frank et al., 2016). More specific to women with GDM is that some health professionals encourage women toward antenatal expressing to reduce the possible risk of introducing formula to the baby (Forster et al., 2017). Evidence demonstrated, however, that antenatal expressing had a small

effect on exclusive breastfeeding in the first 24h and no effect on increasing exclusive breastfeeding rates at hospital discharge (Forster et al., 2017). Therefore, there is a need to change the spotlight from antenatal expressing to support more skin-to-skin contact and frequent feeds from birth together (Dalsgaard et al., 2019). Skin-to-skin contact, and frequent feeds are practices that are often missed for women who have a caesarean birth (Guala et al., 2017) especially for women with GDM who have higher incidences of caesarean birth (aOR 1.37, 95% CI 1.12–1.68) (Koivunen et al., 2020).

There are no interventional studies where women have expressed their own needs and preferred aspects of assistance to improve breastfeeding attitudes, and enhance their breastfeeding intention, confidence, and feelings of support. Participatory action research and co-designed interventions are required to develop new interventions by involving women, their family, friends, and health care professionals where women build a relationship based on trust and respect for shared decision-making. Strategies may include creating specific social media, developing apps, videos and websites that are tailored for women with GDM, targeting their concerns. Targeting women's concerns and implementing co-designed strategies through antenatal and postnatal education and support may offer new insights to healthcare that can improve rates of in-hospital exclusive breastfeeding for women with GDM.

2.2.6 Limitations

The exclusion of non-English articles is a limitation for this review considering GDM is high among countries where English is not their primary language. I may therefore have missed some related articles.

2.2.7 Conclusion

Personal factors that positively influence exclusive breastfeeding practices in-hospital for women with GDM include a woman's intention to breastfeed, support and confidence. Intrapartum factors include early skin-to-skin contact with frequent breast-feeds to overcome any delay in Lactogenesis II or possible risk of neonatal hypoglycaemia. Antenatal and postnatal support that addresses women's fears and specific needs are required to strengthen their intention and confidence to exclusively breastfeed in hospital. Developing an intervention that employs woman- centred education and support can help to build a relationship where women with GDM can trust and respect in the shared decision-making process and co-design educational and supportive interventions that are tailored specifically for women who have Gestational Diabetes Mellitus.

Conflict of interest

None declared.

Ethical approval

No ethical statement has been made for this review of the literature.

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All authors have seen and approved the manuscript being submitted and abide by the copyright terms and conditions of Elsevier and the Australian College of Midwives.

Table 2-2 *Supplementary Table - Review of Literature*

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
Non-interventional quantitative studies							
Casey, Mogg, et al., 2019, Australia	Retrospective cohort study	Women with GDM n=303 (n=80 expressed antenatally)	To compare rates of neonatal hypoglycaemia in babies whose mothers expressed colostrum in antenatal period to those who did not.	- Babies born to mothers who expressed were less likely to receive formula in hospital (HR 0.40, 95% CI 0.21–0.74) but there was no significant difference in rates of hypoglycaemia or median BGLs between groups. - Aboriginal and Torres Strait Islander women were less likely to express than Caucasian women (OR 0.10, 95% CI 0.01–0.77)	Antenatal expressing did not change rates of neonatal hypoglycaemia; however, women were more likely to breastfeed if they practiced antenatal expressing. Those women also had a consultation with a lactation consultant which may have influenced their practices.	Personal - Demographic race/ethnicity Antenatal - ANE Postnatal - hypoglycaemia	7/7
Chamberlain et al., 2017, Australia	Retrospective cohort study **	Infants whose mother had GDM n=617.	To investigate rates of 'any' and 'predominant' breastfeeding in hospital among Indigenous and non-Indigenous women with and without Gestational Diabetes Mellitus (GDM).	- Women with GDM were less likely to predominantly breastfeed (OR 0.32, 95% CI 0.27-0.38, $p < 0.0001$) on discharge from hospital. - Predominant breastfeeding rates were lower among - Indigenous women (OR 0.78, 95% CI 0.70-0.88, $p < 0.0001$) - All women having a caesarean birth (C/S); Indigenous (OR 0.53, 95% CI 0.30-0.91), non-Indigenous (OR 0.63, 95% CI 0.41-0.96) - Indigenous pre-term infants (OR 0.22, 95% CI 0.07-0.70) - *Any* breastfeeding rate was less likely among Indigenous women who smoked during pregnancy (OR 0.39, 95% CI 0.15-1.00)	Rates of predominant in-hospital breastfeeding were lower among women with GDM, particularly among Indigenous women and women having a caesarean or pre-term birth. However, smoking during pregnancy is a strong negative influencing factor for breastfeeding rates at discharge. Extra support for women who are at risk of introducing formula can improve breastfeeding practices in the hospitals.	Personal - Demographic race/ethnicity Intrapartum - type of birth - gestational age	7/7
Chertok and Sherby, 2016, Israel	Prospective case control study	Women with GDM n=32 and no-GDM n=35 (total n=67)	To identify factors that may contribute to maternal breastfeeding self-efficacy according to GDM status.	- Less women with GDM initiated breastfeeding (GDM 32.1% vs no-GDM 67.9%, $p = 0.017$) - Women with GDM perceived more delayed lactogenesis II (DLII) than women with no-GDM ($p = 0.029$). - Lower breastfeeding self-efficacy scores (BFSES) (mean 47.1±10.5) was associated with perceived delayed lactogenesis II compared with the higher score (mean 54.8±11.8) ($p = 0.036$) - Higher LATCH scores were highly correlated with higher BFSES scores ($r = 0.61$, $p < 0.001$). - Higher BFSES showed a significant reduction in perceived delayed lactogenesis II ($p = 0.05$) and earlier initiation of BF ($p = 0.011$). - Less women with GDM breastfed in the first half hour of birth (29%GDM vs 58.8% no-GDM, $p = 0.016$)	Improving self-efficacy of women with GDM may reduce perceived delayed lactogenesis II and improve breastfeeding initiation at birth. The reasons for caesarean births and women's birth experiences can be evaluated to identify the needs for support.	Personal - Psycho-physiological lactogenesis II, attitudes/ beliefs, confidence Intrapartum - type of birth	7/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
				- C/S birth is significantly associated with lack early initiation of breastfeeding for all women ($p < 0.001$).			
Cordero et al., 2013, USA	Retrospective cohort study	Women with GDM n=303	To examine feeding practices and factors associated with breastfeeding initiation (BFI) in women with GDM.	- Predictors for Breastfeeding Initiation (BFI) were intention (OR 9.87, 95% CI 4.96–19.64), higher education (OR 4.20, 95% CI 2.33–7.56), normal BMI (OR 2.60, 95% CI 1.47–4.58), and primiparous (OR 2.10, 95% CI 1.27–3.46). - Low breastfeeding initiation was associated with race (African-American OR 0.40, 95% CI 0.22-0.73), age ≤30 years (OR 0.60, 95% CI 0.38-0.94), lower education level (College OR 4.20, 95% CI 2.33-7.56), smoking (OR 0.26, 95% CI 0.14-0.49), obesity (BMI<29 OR 1.47, 95% CI 1.47-4.58), baby admission to NICU (OR 0.33, 95% CI 0.14–0.80) and preference for formula feeding (intention to breastfeed OR 9.87, 95% CI 4.96-19.64)	Although there were many factors associated with low breastfeeding initiation rates, the main significant predictors were intention to breastfeed, normal BMI and being primiparous.	Personal - Demographic Age, education, parity, race/ethnicity - Lifestyle BMI, smoking - Psycho-physiological intention Postnatal - Frequent feeds -exclusive breastmilk - rooming in	7/7
Doughty et al., 2018, USA	Secondary data analysis IFPS II cohort study 2005-2007	Women with GDM n=195 and no-GDM n=2815 (total n=3,010)	To explore knowledge, attitudes, beliefs, and experiences of GDM women towards exclusive breastfeeding compared to non-GDM (identifying barriers to exclusive breastfeeding).	Women with GDM: - were less likely to believe breastfeeding is best way to feed infant (aOR 0.62, 95% CI 0.46-0.85) - were less likely to keep babies in their rooms (aOR 0.55, 95% CI 0.36-0.85) - felt uncomfortable breastfeeding in front of female friends (aOR 0.70, 95% CI 0.50-0.98) - were more likely to say fathers of infant prefers formula (aOR 0.74, 95% CI 1.02-2.97) or mixed feeding (aOR 1.78, 95% CI 1.21-2.61) - were more likely to say physicians prefer formula (aOR 2.82, 95% CI 1.17-6.79). - report babies had trouble suckling (aOR 1.66, 95% CI 1.08-2.54) - believe baby not interested in breastfeeding after birth (aOR 2.06, 95% CI 1.07-3.98) - believe formula is just as good as breastmilk (OR 1.43, 95% CI 1.05-1.94)	This study identified differences in breastfeeding perceptions-knowledge, attitudes, and beliefs, between women with GDM and no-GDM that could be targets for further research and interventions. However, women's social supports are important determinants for their breastfeeding outcomes, i.e., partners and GPs preferences were the main influencers for women's attitudes towards breastfeeding.	Personal - Psycho-physiological lactogenesis II, knowledge/ attitudes/ beliefs, confidence, personal support network Postnatal - rooming in - support	7/7
Galipeau et al., 2012, Canada	Prospective cohort study	Women with GDM n=95 and no-GDM n=157 (total n=252)	To identify factors related to breastmilk sodium (Na+) and delayed lactogenesis II (DLII).	Delayed lactogenesis II (DLII), measured by increased breastmilk Na+, is reported significantly more among women with GDM vs no-GDM ($p < 0.01$) Higher frequency of breastfeeding (7 to 8 times a day) is associated with lower breastmilk Na+ ($p < 0.05$).	High Na+ in breast milk indicates DLII among women with GDM. Frequent feeding is associated with reduced levels of Na+ and subsequent less DLII.	Personal - Demographic Age, race/ethnicity - Psycho-physiological lactogenesis II Postnatal - frequent feeds	7/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
Haile et al., 2016, USA	Secondary data analysis IFPS II cohort study 2005-2007	Women with GDM n=118 and no-GDM n=1,920 (total n=2,038)	To examine association between GDM and exclusive breastfeeding at discharge.	Women with GDM were less likely to exclusively breastfeed on discharge from hospital according to: - Race/ethnicity (African American* (aOR 0.47, 95% CI 0.28-0.77); Hispanic (aOR 0.36, 95% CI 0.24-0.54); Other (aOR 0.39, 95% CI 0.68-2.54)) - Educated to high school level or less (Some college aOR 1.53, 95% CI 1.12-2.09/ graduate aOR 1.72, 95% CI 1.2-2.45) - High BMI - Obese (aOR 0.71, 95% CI 0.53-0.95) - Weight gain less than guidelines (aOR 0.62, 95% CI 0.45-0.85) - Baby in NICU 3 days or less (aOR 0.44, 95% CI 0.23-0.85) - Not intending to exclusively breastfeed (Prenatal Intention aOR 6.46, 95% CI 5.13-8.14) - Had a history of GDM (aOR 0.59, 95% CI 0.39-0.92)	The main influencing factors for low exclusive breastfeeding at discharge from hospital were ethnicity/race, education, BMI, weight gain in pregnancy, intention, NICU admission, gained weight below the recommended guidelines for pregnancy. However, normal weight gain during pregnancy can be a modifiable factor to improve exclusive breastfeeding rates in the hospital for women with GDM.	Personal - Lifestyle BMI	7/7
Jirakittidul et al., 2019, Thailand	Prospective study	Women with GDM n=229	To determine prevalence and factors associated with breastfeeding among women with GDM up to 6 months postpartum.	- All babies were sent to NNU and received an early formula feed to prevent hypoglycaemia. - Intention to breastfeed for 6 months was predictive of exclusive breastfeeding at 6 months (RR 16.38, 95% CI 2.29-116.99) and any breastfeeding at 6 months (RR 2.65, 95% CI 1.65-4.25) - Initiation of breastfeeding within 24 hours was predictive of any breastfeeding at 6 months (RR 1.38, 95% CI 1.08-1.76) - Within 24hrs of birth, 28.8% infants had any breastmilk.	Women's intention to BF for 6 months is the strongest predictor for initiation of breastfeeding, especially when medical advice for giving formula as routine hospital care is associated with high supplementary feeds and reduced breastfeeding rates on discharge from hospital.	Personal - Psycho-physiological intention	7/7
Kachoria et al., 2014, USA	Secondary data analysis Ohio Vital Statistics 2006-2011	Infants born to women with GDM n=41,599 and no-GDM n=751,131 (total n= 792,730)	To investigate factors associated with breastfeeding initiation in mothers with diabetes in pregnancy vs no diabetes.	Among mothers with GDM: - less breastfeeding at discharge from hospital was demonstrated by: - BMI>30 (obese) (OR 0.9, 95% CI 0.8-0.9), - infants in NNU (OR 0.8, 95% CI 0.7-0.9), - high school education or less (OR 0.4, 95% CI 0.4-0.6) - had previous children (OR 0.6, 95% CI 0.5-0.6). - more likely to be breastfeeding on discharge: - Immigrants to the US (OR 2.6, 95% CI 2.2-3.0).	High BMI, admission to NICU, low education levels and multiparity negatively influence breastfeeding on discharge from hospital. Immigration has a positive association with breastfeeding on discharge for both women with GDM and without GDM.	Personal - Demographic Age, education, parity, race/ethnicity - Lifestyle BMI Postnatal - rooming in	7/7
Oza-Frank et al., 2014, USA	Secondary data analysis PRAMS study 2009-2011	Women with GDM n=6,402 and no-GDM n=66,353 (total n=72,755)	To examine prevalence and associations between initiation and continuation of breastfeeding and reasons for this, by maternal diabetes status.	Compared to women who did not have diabetes, women who had GDM were: - Non-smokers - less likely to initiate breast-feeding (OR 0.83, 95% CI 0·72-0·97) - Smokers - more likely to initiate breastfeeding (OR 1.31, 95% CI 1·03-1·65)	Women with GDM who smoked were more likely to initiate breastfeeding compared to those with no-GDM. Authors suggested that healthy lifestyle education for women with	Personal - Lifestyle smoking - Psycho-physiological attitudes/ beliefs	7/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
				Main reasons for not initiating breastfeeding for women with GDM were: - I didn't want to (47.1%) - I didn't like breastfeeding (30.6%) - I had other children to take care of (28.3%).	GDM may have influenced the smoker's being more likely to breastfeed for the benefit of baby's health.		
Oza-Frank et al., 2016 USA	Cohort study (M2M study 2011-2012)	432 women with 1-year old baby: Women with GDM n=34 and no-GDM n=398	To examine breastfeeding practices by GDM history for 12 months postpartum.	Women with GDM: - initiated breastfeeding as often as women without any diabetes (97.1% GDM vs 98% no-GDM). - were more likely to report introduction of formula within the first 2 days of life (79.4% GDM vs 53.8% no-GDM, $p < 0.01$) - initiated postnatal pumping 4 days earlier than women without diabetes ($p < 0.05$). There was no difference in the proportion of breastfeeding difficulties in hospital between women who did or did not have GDM (OR 2.08, 95% CI 0.78-5.52).	Women with GDM had similar breastfeeding practices as non-GDM however they were supported to put their babies to the breast more often and initiated postnatal pumping to overcome perceived reduced milk supply. Good practical support could explain why numbers of breastfeeding difficulties between groups in this paper were not significant.	Personal - Psycho-physiological lactogenesis II Postnatal - exclusive breastmilk	7/7
Oza-Frank and Gunderson, 2017, USA	Secondary data analysis PRAMS study 2004-2008 vs 2009-2011	Women with GDM n=6,402 and no-GDM n=150,785 (total n=157,187)	To determine changes in breastfeeding experiences pre and post Baby Friendly Hospital Initiative (BFHI) recommendations for women with GDM between 2004–2008 and 2009–2011.	After BFHI recommendations, breastfeeding practices improved for both women with GDM and no-GDM. However, women with GDM had still significantly less positive breastfeeding practices compared to women with no-GDM: - breastfeeding within one hour of birth (aOR 0.83, 95% CI 0.73-0.94) - exclusively breastfeeding in hospital (aOR 0.73, 95% CI 0.65-0.82) - breastfeeding on demand (aOR 0.86, 95% CI 0.74-0.99).	Among women with GDM after BFHI recommendations in the USA: Breastfeeding rates among women with GDM remained low, however, women with GDM were significantly more likely to report receiving a pump (OR 1.28, 95% CI 1.07–1.53) and a formula gift pack (OR 1.17, 95% CI 1.03–1.34) compared to women with no-GDM.	Postnatal - frequent feeds - exclusive breastmilk - rooming in - support	7/7
Pinheiro et al., 2018, Brazil	Prospective cohort study (IVAPSA study) **	Women with GDM n=70 and no-GDM n=149 (total n=219)	To investigate the interaction between maternal overweight/obesity and GDM on breastfeeding initiation.	- Women with GDM who had a high BMI had higher rates of delayed initiation of breastfeeding in 24 hours after birth (RR 1.072, 95% CI 1.006-1.141) - Women with GDM who had normal pre-pregnancy BMI had higher breastfeeding initiation rates 24hrs after birth compared to women with GDM who had high BMI (94.1% vs 92.5%, $p = 0.021$)	Normal pre-pregnancy BMI is a positive factor for breastfeeding initiation within 24hrs after birth. Women who had both higher-than-normal BMI and GDM presented the highest risk for delayed breastfeeding initiation.	Personal - Lifestyle BMI	7/7
Soltani and Scott, 2012, UK	Retrospective cohort study	Women with GDM n=68	To investigate the pattern of antenatal breast expression uptake and its relationship with birth outcomes in women with diabetes.	There was no statistical difference in breastfeeding initiation between women who expressed colostrum antenatally and women who did not (100% n=15 vs 86% n=70, $p = 0.19$).	ANE does not influence breastfeeding initiation. Less than half the women who recalled being advised to express breast milk complied: 37% women were advised to express and 17% did.	Antenatal - ANE	7/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
					Quality and quantity of expressing breastmilk is not reported.		
Stevens et al., 2019, USA	Retrospective cohort study 2004-2016	Women with GDM n= 42,770 and no-GDM n=465,827 (total n= 508,597, includes pre-diabetes)	To examine association between race/ethnicity, maternal diabetes, and breastfeeding initiation.	- African American* mothers with GDM were more likely to initiate breastfeeding than non-diabetic African American* mothers (OR 1.07, 95% CI 1.02-1.12). No significant differences in breastfeeding initiation among mothers with GDM versus no diabetes.	Groups were classed as Hispanic, Non-Hispanic white and African American*. There was an increase in breastfeeding initiation for all groups over time. GDM was not associated with low breastfeeding initiation. Factors that influenced BF initiation for all women were: Maternal age, education, excessive gestational weight gain, year of birth, gestational age.	Personal - Demographic race/ethnicity	7/7
Weisband et al., 2017, USA	Secondary data analysis IFPS II cohort study 2005-2007	Women with GDM n=160 and no-GDM n=2,139 (n=2299)	To assess intention to exclusively breastfeed with hospital supplementation and breastfeeding duration for women with GDM.	- Compared with women with no-GDM, women with GDM had: - lower intention to breastfeed (aOR 0.71, 95% CI 0.51-0.99) - were more likely to supplement ($p < 0.001$) - Mean duration of breastfeeding was longer for all women who intended to exclusively breastfeed (95% CI 16.6-28.0, $p < 0.001$) - Women with GDM and with no-GDM who did not intend to exclusively breastfeed had similar increased odds of hospital supplementation (GDM: aOR 3.52, 95% CI 1.44– 8.57, NDM: aOR 3.66, 95% CI 2.93–4.56) .	Intention to breastfeed exclusively is a factor that positively influences women with GDM or no-GDM. However, women with GDM have lower intention to breastfeed exclusively (aOR 0.71, 95% CI 0.51–0.99).	Personal - Lifestyle BMI - Psycho-physiological intention Postnatal - exclusive breastmilk	7/7
Interventional studies							
Dalsgaard et al., 2019, Denmark	Quasi-experimental study	Infants of women with diet controlled GDM n=533 (Control group n=132, Intervention group n=401)	To examine whether two-hour uninterrupted skin-to-skin contact and early frequent breastfeeds can affect infants BGLs after birth. Intervention= prenatal- written information and education postnatal - skin-to-skin care (SSC) with early breastfeeding or expressed colostrum for 2 hours	- Breastfeeding frequency increased by 80% in the intervention group (IG): during the first six hours post-partum IG averaged 2.4 feeds (95% CI 2.2-2.6) compared to 1.3 feeds (95% CI 1.1-1.5) within the first seven hours in the control group ($p < 0.001$) - Infants in the IG group had less hypoglycaemic events within four hours after birth compared to the CG (22.7% (n = 30/132) vs 10.2% (n = 41/401), $p < 0.001$) - Hypoglycaemic infants in the intervention received much less formula than those in the control group (median 5.5 ml/kg vs. 19 ml/kg, data not shown)	Uninterrupted skin-to-skin care (SSC) was associated with improved breastfeeding frequency in the hospital, reduced supplementary feeds and improved neonatal BGLs after birth. There was 80.8% exclusive breastfeeding at 6 hours postpartum in the IG (vs 0% in CG), thereby reducing the amount of formula infants received.	Antenatal - education - support Intrapartum - skin to skin Postnatal - frequent feeds - exclusive breastmilk - hypoglycaemia	7/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
			after birth with repeated SSC for up to 12 hours or more.	- The percentage of infants not breastfed in the first 2 hours of birth was significantly lower in the IG (6.6%) than in the CG (36.9%). - There was no exclusive breastfeeding in the CG at 7 hours postpartum (0%) due to hospital protocol vs 80.8% exclusive breastfeeding at 6 hours postpartum in the IG.			
Forster et al., 2011, Australia	Cohort pilot study	Women with GDM or pre-existing diabetes requiring insulin n=43 Intervention Group (IG) Vs audit Control Group (CG) n=89	To establish the feasibility of conducting an adequately powered randomised controlled trial impact of antenatal expressing (ANE) on breastfeeding outcomes. *Intervention*= individual instruction on ANE (2 times per day for 10mins, from 36 weeks pregnant until birth). ANE was brought to birthing unit frozen.	- 60% infants in the intervention group (IG) received only breast milk 24hrs prior to discharge vs 44% control group (CG) (RR 1.36, 95% CI 0.96-1.92) - 40% infants in the IG received any formula in first 24 hours vs 56% CG (RR 0.72, 95% CI 0.48–1.09) - 63% infants in IG received formula vs 73% CG during hospital stay (RR 0.86, 95% CI 0.66–1.12) - None of the differences found were statistically significant. - Reasons for giving artificial milk were low true blood glucose (66%), insufficient colostrum (18%), mother's preference (11%), and feeding issues (15%).	There was no statistical difference in breastfeeding outcomes among infants whose mothers expressed breastmilk antenatally compared to infants whose mothers did not express breastmilk. Women who expressed antenatally had mixed feelings: Positive (30% felt more confident about breastfeeding and 26% were confident in their supply) vs Negative (26% felt anxious that they did not have enough milk and 26% found it difficult to find time to express).	Personal - Psycho-physiological confidence Antenatal - education - support - ANE Postnatal - exclusive breastmilk - hypoglycaemia - support	7/7
Forster et al., 2017, Australia	Randomised Controlled Trial (RCT)	Women with diabetes in pregnancy n=635 (GDM n=589) Intervention group (IG) n=319 vs control group (CG) n=316	To explore the safety and efficacy of antenatal expressing (ANE) during pregnancy. *Intervention*= individual instruction on ANE (2 times per day for 10mins, from 36 weeks pregnant until birth). ANE was brought to birthing unit frozen.	Women who expressed breastmilk antenatally: - Exclusive breastfeeding in first 24 hours (aRR 1·15, 95% CI 1·02-1·28) - Primiparous women (RR 1.21, 95% CI 1.03-1.4) - Multiparous (RR 1.07, 95% CI 0.89-1.25) - Exclusive breastfeeding during hospital stay (aRR 1·16, 95% CI 0·99 to 1·33) - Primiparous women (RR 1.21, 95% CI 0·96–1·47) - Multiparous (RR 1.11, 95% CI 0·89–1·34). - Allocation to ANE was not associated with increased admission to NICU for women having first baby (RR 0.83, 95% CI 0·45–1·21) or subsequent babies (RR 1.80, 95% CI 0·57–3·03) vs standard care.	ANE demonstrated very small improvements in exclusive breastfeeding in first 24 hrs for primiparous women and no changes for multiparous women. There was no improvement in exclusive breastfeeding on discharge from hospital for either group. Encouraging antenatal expressing (ANE) must therefore be revisited.	Personal -Demographic parity Antenatal - education - support - ANE Postnatal - exclusive breastmilk - rooming in	6/7
Schellinger et al., 2017, USA	Retrospective cohort study	Hispanic women with GDM n=460	To determine the impact of Centering Pregnancy-based group prenatal care for Hispanic women with GDM. Intervention/Program=	The Centering program showed improved rates of: - initiation of breastfeeding (91% vs 69.4%, $p < 0.001$) - breastfeeding at discharge (91% vs 69.4%, $p < 0.001$) - exclusive breastfeeding at 4–6 weeks postpartum (63.1% vs 46.3%, $p = 0.04$)	Hispanic Centering Program participants had better breastfeeding outcomes compared to Hispanic women in traditional GDM care. Group antenatal visiting	Antenatal - education - support Postnatal - exclusive breastmilk	6/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
			Prenatal- attend breastfeeding class and weekly text messages. Postnatal- weekly text messages and 13-week group classes with phone calls from IBCLC if required.		can be a good way to support women from diverse cultures.		
Stuebe et al., 2016, USA	Cluster Randomized Trial	Women with GDM who have high BMI n=100	To determine the efficacy of breastfeeding education and support program for women with GDM. Intervention/Program= Prenatal- breastfeeding class and breastfeeding pillow + weekly text messages. Postnatal- weekly text messages and 13-week group classes with phone calls from IBCLC if required.	At 4 weeks postpartum, women allocated to the intervention group were less likely to: - stop breastfeeding (aHR 0.40, 95% CI 0.21–0.74) or - introduce formula (aHR 0.50, 95% CI 0.34–0.72). Women in the experimental group were more likely to be breastfeeding ($p < 0.01$) and be breastfeeding exclusively ($p = 0.06$) throughout the follow-up period (to 10 months).	This study showed that targeted breastfeeding education for women with GDM is feasible, efficacious and can improve in-hospital breastfeeding.	Antenatal - education - support Postnatal - exclusive breastmilk - support	6/7
Tozier, P 2013, USA	Quasi-experimental study	Infants of women with diabetes in pregnancy n=139 (pre- n=86), (post- n=77)	To describe a practice change intervention designed to facilitate breastfeeding while maintaining glucose stabilization in infants born to women with diabetes in pregnancy. *Intervention*= early 2-3 hourly colostrum feeds, delayed glucose testing and 'early and prolonged' skin-to-skin contact at birth.	- Infants in the intervention group: - had a 53.6% drop in requiring formula supplementation: 58% infants required formula pre practice change vs 27.3% post change. Rate of exclusive breastfeeding doubled. - had less admission rates to the neonatal intensive care unit (NICU) for glucose stabilization: 18.8% pre change vs 6.5% post change ($p = 0.02$). - There were no significant differences between glucose values for infants given formula versus colostrum supplementation.	Early colostrum feeds, delayed glucose testing and 'early and prolonged' skin-to-skin contact at birth could improve breastfeeding rates for women with GDM.	Antenatal - ANE Postnatal - exclusive breastmilk - rooming in - hypoglycaemia	6/7
You et al., 2020, China	Randomised Controlled Trial (RCT)	Women with GDM n=226	To improve breastfeeding self-efficacy and breastfeeding rates through individualised educational interventions. Intervention= Prenatal – self-efficacy scores obtained and discussed/corrected individually, breastfeeding skills taught 'by hand' and given	Compared to control group, the women in the intervention group had: higher rates of exclusive breastfeeding at discharge (25.2% vs 13.5%, $p < 0.05$) higher rates of exclusive and any breastfeeding at 4 months postpartum (exclusive: 68.9% vs 43.3%, $p < 0.01$ and any: 94.3% vs 83.7%, $p < 0.05$) higher rates of exclusive and any breastfeeding at 6 months postpartum (exclusive: 55.8% vs 36.9%, $p < 0.01$ and any: 88.5% vs 64.1%, $p < 0.05$)	Perinatal individualised breastfeeding education based on the self-efficacy theory had significant positive effects on women's self-efficacy and rates of breastfeeding on discharge from hospital and beyond.	Personal - Psycho-physiological confidence Antenatal - education Postnatal - exclusive breastmilk	7/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
			written literature for GDM designed by team and invitation to '*wechat*' support (social software in China) Postnatal – individualised help with breastfeeding within 24hrs of birth and prior to discharge, telephone counselling available for up to 6 months postpartum if required.	higher breastfeeding self-efficacy scores at hospital discharge (mean 112 vs 108, $p = 0.01$)			
Qualitative studies							
Casey et al., 2019, Australia	Qualitative study	Women with diabetes in pregnancy, n=6 (GDM n=5)	To explore experiences and perspectives of antenatal collection and storage of colostrum for women who had diabetes in pregnancy.	6 themes: - wary of medicalisation - underlying altruism - internal pressure to succeed - self-management and ownership - frustration with waste - building fortitude for motherhood.	Women experience guilt and stress regarding risks of hypoglycaemia to their baby and strive to provide the best for them by collecting and storing colostrum, even if this leads to distress to themselves.	Personal - Psycho-physiological knowledge/ attitudes/ beliefs, intention, confidence, personal support network Antenatal - ANE Postnatal - exclusive breastmilk - hypoglycaemia - support	7/7
Hirst et al., 2012, Vietnam	Qualitative Study	Women with GDM n=35	To determine attitudes and health behaviours of pregnant women with GDM in Vietnam.	All women felt they needed more information. Current sources of information included friends, magazines, a health phone line, or the internet. Women felt small group sessions and information leaflets could benefit them.	Highlights the need for culturally appropriate clinical education and health promotion activities for women with GDM in Vietnam. Doctors/ healthcare professionals and friends/family influence women's breastfeeding experiences	Personal - Psycho-physiological confidence, personal support network Antenatal - support	7/7

Author, Year, Country	Study Design	Participants	Aim/ Intervention	Key findings	Comments	Factors	M-MAT
Jagiello and Chertok 2015, USA	Phenomenological study	Women with GDM n=27	To explore the experience of early breastfeeding for women who had GDM in pregnancy.	Three themes emerged: - Breastfeeding challenges and support - Milk supply challenges (46% used formula, 22% ceased breastfeeding) - Concern for infant health (14.8% babies had hypoglycaemia).	Women expressed a need for consistent lactation advice, education, assistance, and strategies to address breastfeeding challenges and milk supply issues.	Personal - Psycho-physiological lactogenesis II, attitudes/ beliefs, confidence, personal support network Postnatal - frequent feeds - exclusive breastmilk - support	7/7

* African American women were reported as Black or Non-Hispanic-Black women
** BFHI accredited facility

2.3 Part 2 - An updated review of the literature (2020-2023)

As the original literature review included available literature from January 2009 to May 2020, another search with the same search strategy was conducted in May 2023 to identify any additional literature since the last review. Two studies were identified through the updated search that addressed the same question as the integrative review presented at the beginning of this chapter: What factors positively influence in-hospital exclusive breastfeeding practices among women with GDM?

One of the studies was a retrospective study on 517 women with GDM who had received a postpartum consultation from a lactation consultant (IBCLC) during their stay in hospital (Griffin et al., 2022). The findings of this study demonstrated that women with GDM who had received consultation from a IBCLC during their postpartum stay in the hospital were more likely to breastfeed on discharge from hospital (aOR 4.87; 95% CI [2.67, 8.86]). However, there were no differences in EBF rates on discharge from hospital between women who did see the IBCLC, and women who did not (Griffin et al., 2022).

The second study was a randomised control trial with 300 newborn babies whose mothers had GDM. The findings of the study (Ling et al., 2022) demonstrated that an intervention involving skin-to-skin contact after birth with early and frequent breastfeeding for women with GDM improved neonatal hypoglycaemia levels within 2 hours of birth (Ling et al., 2022). While EBF rates on discharge from hospital were not measured, the findings of this study aligned with the prior literature review, where skin to skin contact (an intrapartum factor) and frequency of exclusive breastfeeds (a postnatal factor) were key factors to improve rates of EBF prior to discharge from hospital for women with GDM. In this study, neonatal hypoglycaemia, and subsequent separation from mothers through further hospitalisation were reduced to improve breastfeeding (Ling et al., 2022).

This updated exploration of literature, adding only two papers across 3 years, showed the importance of exploring interventions to improve in-hospital EBF rates for women with GDM.

2.4 Conclusion of chapter and implications for research

The findings of the integrative literature review demonstrate factors that positively influence breastfeeding outcomes for women with GDM during their hospital stay were similar to women without GDM. These factors include having a strong intention to breastfeed, being confident and feeling supported. Antenatal expressing was not an effective intervention to increase EBF rates during the hospital stay among women with GDM, whereas skin-to-skin contact after birth combined with frequent breastfeeds and continuity of education and support, from antenatal into the postnatal period, were effective ways to improve EBF rates in hospital. The main reasons for introducing formula

among women with GDM were related to baby's hypoglycaemia, perceived low milk supply, and Delayed Lactogenesis II.

The results from the literature review confirms that a gap remains in the literature whereby women with GDM need to be supported to improve EBF rates on discharge from hospital. Tailoring interventions to the needs of women with GDM is required where women are involved in decision-making and development of the intervention. The next chapter, in which the study's theoretical underpinnings are reported, will demonstrate how person-centredness was incorporated as a conceptual framework to involve women with GDM in decisions regarding ideas for an intervention they thought would help to improve EBF practices on discharge from The Wollongong Hospital.

Chapter Three Theoretical Underpinning

3.1 Chapter introduction

The previous chapter (literature review) provided the background for this research, the AD-MIRE Breastfeeding study. In this chapter I declare my ontological and epistemological positions, which informed my decision to take a person-centred approach to the study reported in this thesis. The chapter will also introduce me as a person, a midwife, and a midwife-researcher, and an explanation of how my research question evolved, and how this led to a participatory action research (PAR) study as the appropriate fit for me to engage with women at The Wollongong Hospital (TWH).

3.2 Developing an understanding of myself

Developing knowledge through research requires an understanding of research processes as well as an understanding of self, and how I, as a researcher, might bias any results of the research (Dewing et al., 2020). My reasons for wanting to examine breastfeeding experiences amongst a group of women with Gestational Diabetes Mellitus (GDM) were defined by my values and beliefs as a person and as a midwife-researcher. Reflecting on myself and the way I view the world gave me the insight I required to explore any influences my conscious or unconscious values may have on this study. Undertaking such reflective exercises led me to understand the philosophical and theoretical positions I hold about the world and helped me decide how to approach this study.

I explored my philosophical worldview by analysing the way I look at reality (ontology) and how I generate new knowledge (epistemology) to answer my questions. These would shape any decisions I made during the progress of the study, starting with my choice of methodology (Dewing et al., 2020).

3.2.1 Myself as a person

My happy place is with animals. As I sit writing this part of my thesis, I am surrounded by 20 orphaned eastern grey kangaroos, redneck wallabies and wombats (see Figure 3-1, p.43). As they graze on the grass, I feel their sense of peace and calm. They exist in the moment and react to situations in that moment. Sometimes I am envious of this notion as we humans tend to worry more about what has been and what is to come, rather than living in the present as they do. This highlights to me the differences between how we live as animals or humans and has led me to think about the differences in other people's lives. There are so many individual 'persons' in this world I enjoy learning about, with varying beliefs, values, and assumptions affecting their lives.

I feel privileged to have been born and educated in a country where I have choices, I am not scared for my life and I have opportunities to talk to different families from around the world, learning about their cultures, all so vastly different to mine. This love of learning about people is an integral part of who I am and the respect I have for them is where my 'person-centredness' dwells. Volunteering and experiencing the lives of other people is part of who I am, and I continue to share my medical skills in wildlife hospitals and volunteer my time amongst various organisations.

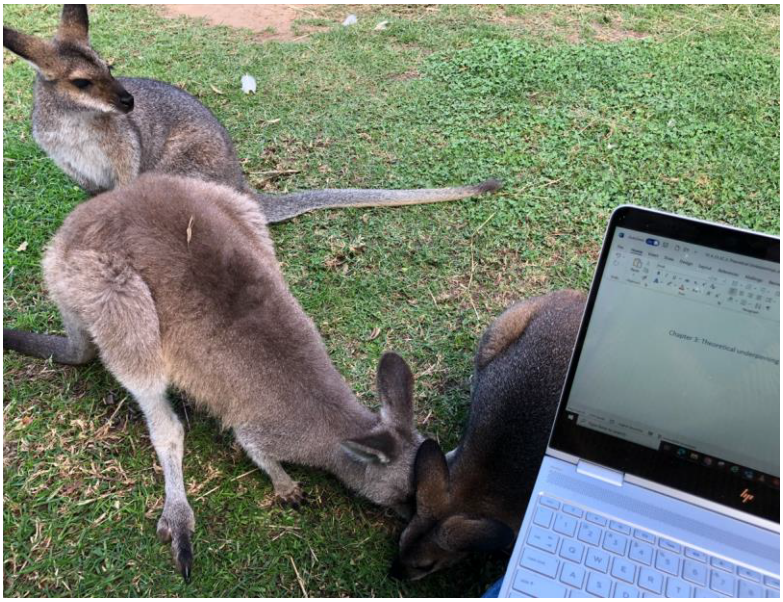

Figure 3-1 *My 'happy' (hoppy) place*

As a child, I volunteered with disabled children and advocated for anyone who was being bullied. I always loved first aid, so I began my nursing career in 1988. As an advocate for equality and kindness (towards animals and people), especially when people are in hospital, I strive to notice divisions of power and support people to make choices that suit their needs by helping to explain health-based situations to people I care for in hospital settings. I have been an intensive care nurse, helping people navigate death, supporting their loved ones as they leave this life, and a midwife since 1996, moving to the other end of the life spectrum, supporting women to bring life into the world.

3.2.2 Myself as a midwife-researcher

Midwives pride themselves on being 'woman-centred,' incorporating ideals and values for working 'with' women and their families (International Confederation of Midwives, 2011), which align with my own person-centredness. I have worked in all areas of midwifery, enjoying educational roles with families, working with them to understand their journeys through pregnancy and parenthood. The

relationships I built with women allowed the development of a trust for women to share information and make shared decisions about their health during pregnancy. I remember my first euphoric feeling when an Aboriginal woman called me 'Aunty.' I had noticed that our service *told* women what they *should* be doing, instead of taking their lifestyle and support systems into consideration. I had worked with this woman to find ways we could both achieve goals for her healthy pregnancy, and she valued and trusted our relationship.

A core assumption of midwifery, and the reason for me continuing as a midwife for over 25 years, is that the profession is underpinned by woman-centred care, where the woman and the midwife develop a relationship of trust (Bradfield et al., 2019; International Confederation of Midwives, 2011). While 'woman-centred care' is synonymous within maternity settings, there is a focus more on the woman's individual needs (Leap, 2009) than her relationship with her world.

My woman-centred approach drew me to advocating for women with GDM. Although advice given to women was guided by policy and any procedures were evidence based, at times it lacked individuality. For example, an Indian woman I assisted who was newly diagnosed with GDM, was confused as she had been given a menu to follow for her health (to maintain blood glucose levels) that included bread. However, as an Indian woman, she stated her family 'never' ate bread, instead they ate rice every day, so the menu made no sense to her. This lack of person centredness in the care drew me to investigate how women felt and whether they might have ideas for change we could implement at TWH.

My research question began formulating in 2016 while working extra shifts in the antenatal clinic and offering educational classes to women with GDM regarding antenatal expressing (ANE). My main role at the hospital was supporting General Practitioners (GPs) who looked after pregnant women in the community. I enjoyed this role as I felt I could better support more women by influencing the care GPs gave to women accessing the 'Antenatal Shared Care' continuity model of care. I was responsible for ensuring GPs were up to date with current pregnancy and breastfeeding guidelines. I had also been a Group Leader for the Australian Breastfeeding Association and an IBCLC (International Board-Certified Lactation Consultant) since 2000. I understood the importance of breastfeeding for all women, but particularly for women with diabetes. This interest was also driven by personal exposure as some of my family members have Type 1 diabetes.

My interest in diabetes meant I enjoyed doing extra work with pregnant women who have GDM as I understood the challenges of dietary changes, blood glucose level (BGL) monitoring and the pressure felt to 'achieve' BGL targets, especially while pregnant. I felt I could provide extra support for breastfeeding as I had a grasp of some of these extra challenges, also understanding that many women in this high-risk cohort give their babies more infant formula in hospital, and subsequently breastfeed

less, putting themselves and their families at increased risk for Type 2 diabetes (amongst other diseases) in the future.

I felt a need to help women, by helping them to help themselves. I didn't want to tell them what to do, I wanted them to convey a plan, armed with evidence-based knowledge (which I had), but which also resonated with a lifestyle they lived, so they would be more likely to achieve their health goals. I also wanted something measurable regarding breastfeeding. My research question was therefore beginning to take shape: Can implementation of an intervention designed with women with GDM and staff at TWH improve exclusive breastfeeding rates on discharge from hospital?

3.3 My research question and underpinning theory

Asking women with GDM about their own individual experiences would allow me to find out what *they thought* about their breastfeeding support, what *they thought* was different for them, and what *they thought* the hospital could improve to mitigate the differences in breastfeeding rates for women with GDM compared to pregnant women with no-diabetes. Working *with* women, as a person-centred midwife, was important to me. Pregnancies today are influenced by our society; through media, friends/family, and medical institutions.

Since the 1950's the notion of a patient being a person who is legally responsible for their own health behaviours has precipitated a move from the person as a 'target' of medical interventions to one where the person can participate in decisions regarding their own care (Leplege et al., 2007). The notion of the person (and personhood) has been defined by Kitwood (1997, p. 8) as a status people bestow upon one another, where social relationships are dependent upon shared contexts and include 'recognition, respect and trust.' These are inherently important for health consumers to feel 'accepted' by their caregivers, who understand a person's emotions and individual experiences, for healthcare relationships to be strengthened, and to translate person-centredness into clinical practice (Ekman & Swedberg, 2022). Person-centred healthcare is now embedded in healthcare policy (NSQHS, nd), however the implementation of such is recently new in research. Edgar et al. (2020) suggest the significant contributions of person-centred care are primarily through theory development and implementation research. It therefore became the natural platform to develop my research question and to underpin my study design.

3.3.1 Person-Centredness

Person-centredness is a way of 'being' for healthcare workers that focusses on how their person-centred practice puts the person at the centre of their own care to achieve healthful outcomes. The Person-Centred Practice Framework (McCormack & McCance, 2016) has been described as a mid-range

theory that has been expanded from a nursing base to incorporate a broader array of healthcare professions. It emphasises the main domains that need to be considered for person-centred outcomes to be effective and has been used in Chapter 7 (see 7.5.1, p.142) to outline how support for exclusive breastfeeding (EBF) was practiced across the service domains at The Wollongong hospital.

Person-centredness values respect and trust and allows for the development of therapeutic relationships to enable engagement and empowerment of all individuals involved (McCance et al., 2011; McCormack, 2020). To elaborate, Phelan et al. (2020) describes person-centredness as:

> persons, situated in their own lived culture, time, places and relationships… (where the care provider) is concerned about what the service user as a person wants, their perspective on their own health and the meaningful outcomes in their health journey, … based on the person's right to make independent, informed choices, free from paternalism, undue influence, or discrimination. (p. 3)

In research, person-centredness involves an understanding and respect for individual's values, beliefs, and their feelings toward change (Dewing et al., 2020; McCormack, 2003) and includes the researcher as a central part of the research. McCormack (2003) offers five conditions for a person-centred approach to research (see Table 3-1, p. 47). These include informed flexibility, sympathetic presence, negotiation, mutuality, and transparency, all of these align with person-centredness and are conditions required for my methodology.

Table 3-1 *Conditions for Person-Centred Research (McCormack, 2003)*

1. Informed flexibility	Researcher is an active facilitator in decision-making. Information is shared amongst participants for decision making with integration of new knowledge incorporated into these decisions.
2. Sympathetic presence	Researcher is sensitive to participant's opportunities for inclusion in decision-making, maximising individual opportunities to contribute.
3. Negotiation	Valuing views of participants and recognising interdepence of people in society.
4. Mutuality	Recognises the equal value of everyone's contribution to the research, including researcher's willingness to be involved and learn from others.
5. Transparency	Researcher must make intentions of research clear to participants, including any boundaries to data collection and decision-making.

Manley (2021) advocates that to transform healthcare, involving stakeholders in person-centred ways is required to begin change. Framing this research with person-centredness enabled the exploration of all therapeutic relationships affecting women with GDM from interpersonal relationships to the hospital processes, including staff thoughts and feelings (McCormack & McCance, 2016; McCormack et al., 2017).

My personal values of being open, honest, respectful, and compassionate aligned closely with the philosophical foundations of person-centredness and represents my approach to the women I work with as well as my peers, the staff at TWH. I understood staff work challenges as I had been a part of the team for over 20 years. As such, my underpinning person-centred lens had to include staff as well. I hoped with their own woman-centred values, they would work with me to initiate changes based on women's experiences that they could apply within their own work contexts.

Clearly, I required an approach to research that enabled me to work with people and taking their lived experiences into consideration, would answer my question. A person-centred research lens would offer the opportunity to do that and guide me toward a methodology that best fit my research.

3.4 Finding the right methodological fit for my research

A major challenge for me would be the implementation of participant women's ideas as an intervention within the hospital system. I felt I needed to present staff with all localised statistics and information from the women we cared for, then commence a dialogue where staff throughout the maternity service knew more about the needs of women with GDM. To enable me to gather knowledge about breastfeeding at TWH when women have GDM, and be person-centred, this study needed to produce a range of data sets to 'set the scene' and take women's and staff experiences into consideration. This

would include quantitative data from hospital databases, and qualitative data from talking with women, and gaining staff perspectives of support for breastfeeding for women with GDM at the hospital. I also needed the methodology to enable to me to introduce women's ideas, develop an intervention based on those and the other evidence I gathered, and evaluate whether that co-designed intervention had any effect on breastfeeding outcomes and experiences at TWH.

My choice of methodology was therefore driven by my question and the amount of knowledge I felt was required to answer it, through my person-centred lens. I felt the best way to achieve this was to utilise action research (see 4.2-4.3, p. 50-51), a form of inquiry that enables researchers to develop information in partnership with participants and address problems to facilitate improvement (Bradbury & Reason, 2003). I was looking for a methodology that would allow me to work in phases, collect background information, explore women's experiences and capture their views, then collaborate with staff (to ensure they had ownership over any change that may occur at the hospital), and evaluate any impact of the change. The right fit for my research, therefore, needed to be able to include me as a part of the team, working with women with GDM and the staff at TWH that support them to achieve change.

One type of action research, participatory action research (PAR), matched my research aims (see 4.4, p. 51) through the inherent human connection required through participation, and allowed for the study to be designed across multiple phases. Phases could include gathering both qualitative and quantitative knowledge from women and staff, and evaluation after staff had developed and implemented strategies from women's ideas. The phases of PAR allowed for collaboration between myself as researcher and women/staff in cycles, where the experiences of previous groups informed subsequent groups for outcomes that would provide a better overall picture of the breastfeeding experiences of support women with GDM have at TWH. AR and the four phases of this person-centred PAR study are described in detail in the next chapter.

In PAR, the researcher works with participants and is person-centred, lending their own experiences and listening to others', trusting, discussing, and learning together (Manley et al., 2021; Reason & Bradbury, 2008). I believe being a person-centred midwife-researcher was a major strength of this maternity care study. A person-centred lens permitted this study to incorporate women and the people that support them, including family, friends, and professionals (staff at TWH) to provide a broad picture of some of the issues surrounding breastfeeding experiences for women with GDM. Guided by the conditions for person-centred research above and for PAR methodology, I felt I could recognise my own biases, incorporate my knowledge into women's decision-making, and talk objectively to staff about women's ideas for change at TWH.

3.5 Conclusion of chapter

Developing and exploring my understanding of my ontological and epistemological stances has provided the groundwork and insight for me to define person-centredness as the theoretical underpinning to my study. It has driven me toward a research question and generated insight into selecting an appropriate methodology (PAR) to address the research question. The next chapter (Chapter 4, Methodology and Methods) will further define PAR in (see 4.4, p. 51) and provide detailed methods for each of the four phases of the study with ethical considerations and a manuscript for the greatest challenge for recruitment and data collection for the study: the COVID-19 pandemic.

Chapter Four Methodology and Methods

4.1 Chapter introduction

The person-centred theoretical underpinning to this study, described in the previous chapter, was formed from my personal epistemological and ontological principles. My values as a person, midwife and researcher led me to an aim which required a participatory action research (PAR) approach, a form of action research (AR) methodology.

This chapter is separated into four sections: Section one restates the aim of this study (4.2) to show how an action-oriented approach best fit my aim. I will then give a brief history of action research (AR) in 4.3, and why participatory action research (PAR) was the design of choice for this study (4.4). Section two provides the study's setting and population (4.5), and data collection and data analysis methods (4.6), including a detailed method for each phase of the study. Ethical considerations, rigour and reflexivity are discussed in section three (4.7) and in section four, I present a manuscript that is under review with *Nurse Researcher* journal (4.8). In this manuscript, I share how PD principles were used to deal with COVID-19 pandemic restrictions that forced re-evaluation of the study, and amendments to face-to-face recruitment and data collection methods.

Section one: AD-MIRE Breastfeeding study methodology

4.2 Study Aim

The aim of this study was to develop a new strategy, in collaboration with women and staff at Wollongong Hospital (TWH), to improve rates of exclusive breastfeeding (EBF) on discharge from hospital for women with GDM. It is the first study incorporating a close consumer-based approach, engaging with women and staff, to develop strategies for the improvement of EBF practices for women with GDM. The study design needed to engage with both staff and women with GDM, explore their experiences and work with them to develop ideas for change. An AR methodology (see 4.3, p. 51) was therefore most appropriate for the aim. Across four phases, AR includes planning, action, observing and reflecting phases (see Figure 4-1, p. 52), and allows for the integration of frameworks that incorporate person-centredness to guide facilitation of groups, for example, practice development principles (see manuscript 4.8, p. 80), to enhance collaboration, inclusiveness, and participation of participants.

4.3 Brief history of Action Research (AR)

In 1929, philosopher Professor John Dewey published '*A quest for certainty*', advising "Action is the means by which a problematic situation is resolved" (Dewey, 1929, p244), and pronounced that change will only occur when knowledge is gathered through action as opposed to knowledge gathered through theory and practice. Action research (AR) challenged the norms of research at the time advocating for studying social reality with the researcher as an engaged participant and observer (Coghlan & Brannick, 2005).

In the 1940's, post-war social reformists challenged the habits and rules of community members for pro-active social action (Glassman et al., 2013). Kurt Lewin, a social psychologist who is "sometimes described as the 'father of action research'" (Kemmis et al., 2014, p. 18), believed that changing destructive tensions within groups needed to begin with action, and challenged the habits of the minority groups he studied through collaboration of all community members, utilising open dialogue and engagement of all participants (Glassman et al., 2013; Lewin, 1946). According to Reason & Bradbury (2008, p. 77), Lewin's methods included "the values, objectives, and powers of the parties involved", stressing participation of individuals to define their situation, choose new options, and evaluate results.

Used across areas such as health, education and political activism, the purposes of AR has meant the methodology diverged into three sub-groups, explained by Kemmis et al. (2014) as; technical AR where the group works toward an improved outcome, practical AR, a self-directed project where participants have a voice (also known as participatory AR), and critical AR, which is used to emancipate groups from injustice. For my research, participatory action research (PAR) allowed me to direct the project, ensuring the voices of participants were heard, explore women's experiences and potential outcomes, while being part of the conversation as a midwife who worked within the study hospital.

4.4 Participatory Action Research (PAR)

Participatory action research (PAR) became a popular method to tackle problems in minority groups such as maternal and infant health in South America during the 1980-1990s (Baum et al., 2006). More recently, PAR has been used as a successful method of research within maternity settings, enabling ideas for improvements in services, through the engagement of researchers with participants, and developing trust (through person-centredness) for critical reflection and learning (Brady & Lalor, 2017; Hickey et al., 2018; O'Brien et al., 2021).

Lewin's research methods transformed research when new knowledge and meaning were generated from participant experiences. He asserted that knowledge created through PAR could generate

successful change as participants and researchers work together to learn and gather more information, when the design of the study follows a 'spiral of steps' (see Figure 4-1) that can be repeated to gather more knowledge as part of the overall study (Coghlan & Brannick, 2005; Jacobs, 2018; Lewin, 1946). The spiral of steps includes a) planning (to investigate the 'problem' and identify areas of need), b) acting (implementing changes), c) observing, and d) reflecting (evaluating) (Titchen & Binnie, 1994; Titchen & Manley, 2006).

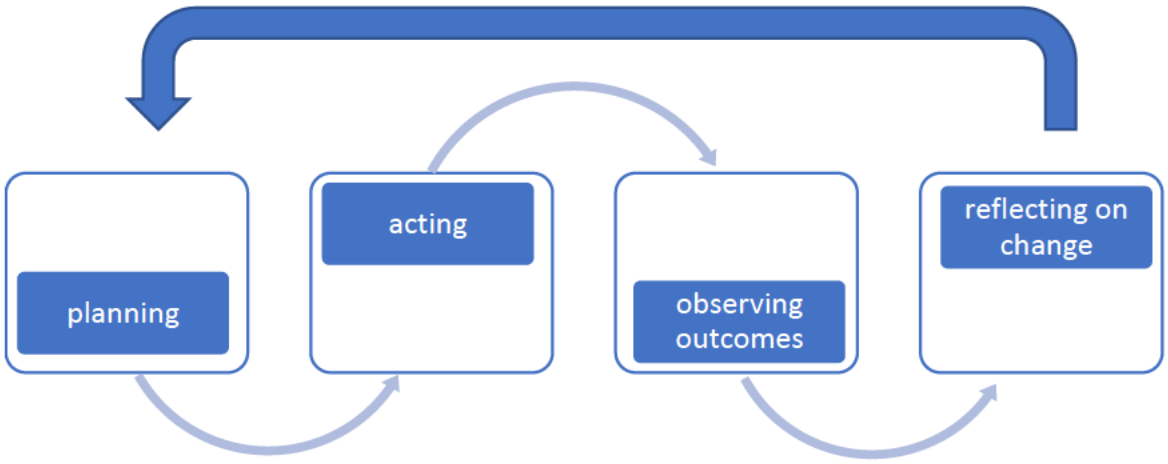

Figure 4-1 *Spiral of steps in a PAR phase.*

PAR is an approach where the researcher listens to the lived experiences of participants and becomes involved due to the common interest being researched (De Chesnay, 2014). Different researchers have described the PAR methodology as an extremely successful model to engage group members to improve maternity services through reflection and collaboration (Hickey et al., 2018). Working with people to find reliable and legitimate outcomes, PAR researchers recruit participants who will benefit from the results, developing relationships where mutual trust increases engagement and information sharing (Reason & Bradbury, 2008; White et al., 2004).

PAR studies generally use one group of consumers to plan, act, observe outcomes and reflect on changes (Reason & Bradbury, 2008). However, this study is a form of multi-faceted four phased research that is unique, because the development of an intervention occurred over a year which was longer than the duration of a pregnancy. Therefore, I decided to involve two groups of women who had GDM in their pregnancies (consumers): one group to develop the ideas for the change (phase two: PAR

workshops), and another group of women with GDM (phase four) to evaluate breastfeeding outcomes after implementing the change.

PAR has been used in a wide variety of healthcare settings to affect change (McCormack et al., 2017; Reason & Bradbury, 2008). With its focus on working *with* users of a service, PAR fits well within midwifery to promote ways of working with and for the needs of people who use their services (Titchen & Binnie, 1994). In turn, midwives are in an advantageous position to develop PAR studies as they are a profession that develops an early rapport with women and pride themselves on being 'woman centred' (International Confederation of Midwives, 2011; Rayment-Jones et al., 2020).

In this study, the four-phase PAR cycle involved the collaboration of women with GDM across 2 years, staff at the study setting, and myself as midwife-facilitator and researcher, to engage and develop recommendations for change at the study hospital and encourage staff to develop an intervention for change in practice to improve exclusive breastfeeding on discharge from hospital for women with GDM. The four phases of the AD-MIRE breastfeeding study therefore allowed for qualitative and quantitative data collection to generate new knowledge for reflection and creation of ideas by participants, implementation by staff, and then evaluation through the spiral of steps toward change.

A strength of using PAR as the methodology for this study is that it utilises my theoretical underpinning for person-centred research (see 3.3, p. 45), working with women with GDM to understand problems within the study hospital through their eyes. In turn, the use of Practice Development (PD) principles within the PAR groups meant this study was able to continue despite COVID-19 restrictions mid-way through recruitment and data collection. PD principles are also underpinned by person-centred theory, therefore fits within my worldview, and the aims of the study as a method of facilitation to ensure group collaboration, inclusiveness, and participation (Manley et al., 2021). PD principles as a method used in this study, working with people's values and beliefs, are discussed more fully in 4.6.2.2.1 (p. 65), and a manuscript currently under review (see 4.8, p. 80).

Section two: Methods used in each phase.

Each of the phases of this study will be discussed in more depth in this section (see 4.6, p. 57). To summarise (see Figure 4-2, p.55), phase one involved gathering background information, including a survey among women with GDM (n=175) and staff (n=150), to understand their knowledge and attitudes toward breastfeeding. Baseline data such as breastfeeding rates at discharge from hospital were collected prior to any change in practice (planning), and infant feeding rates at 6-8 weeks postnatal were available for 101 women. The second phase involved workshops for women with GDM (n=30) to identify their needs for receiving better support from the maternity service toward their breastfeeding journey (planning). Then in phase three, the staff were informed about the outcome of the initial survey and workshops with women. During phase three, staff agreed to implement hospital based online resources as their intervention for change (acting). In phase four, hospital based breastfeeding data were collected to compare breastfeeding outcomes before and after implementation of the change (observing).

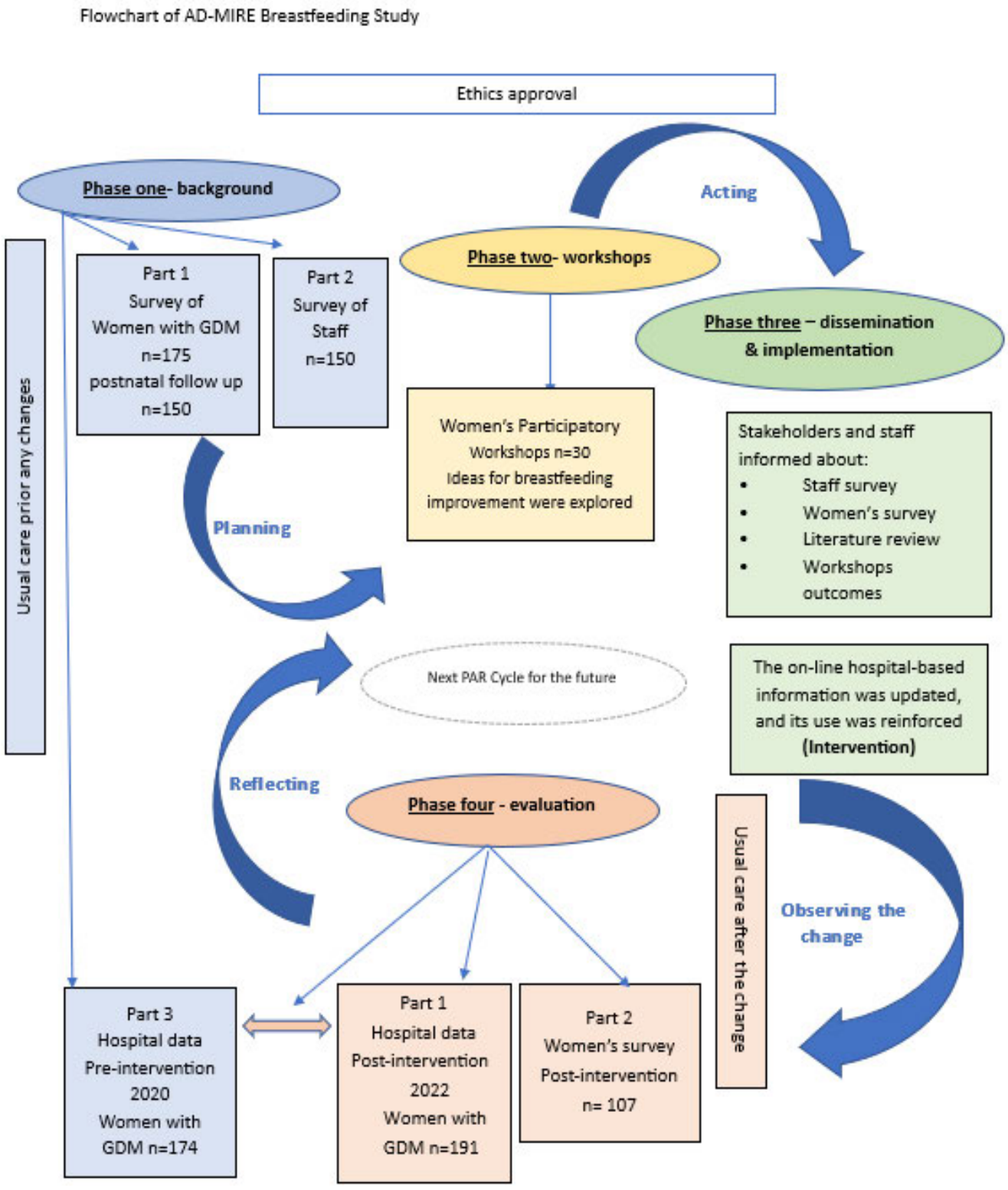

Figure 4-2 *Flowchart of AD-MIRE Breastfeeding study*

4.5 Study setting and population

The study was conducted in a maternity service based in The Wollongong Hospital (TWH), a Level 5 institution in the Illawarra Shoalhaven Local Health District (ISLHD). Level 5 Australian maternity facilities in NSW deliver collaborative antenatal, intrapartum, and postnatal care for women from 32 weeks gestation by midwives, GPs, hospital doctors and specialist obstetricians and neonatologists (NSW Ministry of Health, 2021). Models of maternity care included a) Doctors clinics, b) Midwifery clinics, and c) GP Shared Care.

Images from:
https://ontheworldmap.com/australia/city/wollongong/
https://www.health.nsw.gov.au/lhd/Pages/islhd.aspx

Figure 4-3 *Illawarra Shoalhaven Local Health District*

Providing services to high-risk pregnant women across the Illawarra and Shoalhaven region (see Figure 4-3), ISLHD spans approximately 250 km from Helensburgh in the north, to North Durras in the south. TWH's maternity services include an antenatal clinic (business hours six days a week), 24-hour birthing unit and after hours on-call operating theatres, a level-5 neonatal unit, 24-hour obstetric ward and midwifery in the home service during business hours for women up to 4-5 days post-partum. Included is 24-hour access to specialist obstetricians and paediatricians.

According to the NSW Mothers and Babies Report in 2020, 2546 babies were born at TWH and within the ISLHD, 41.8% women were overweight or obese, 31.1% had a caesarean birth (32.3% at TWH), and 75% women exclusively breastfed on discharge from hospital (71.6% at TWH) (NSW Ministry of Health, 2022). The average length of stay at TWH was 2.1 days in 2020, and 54% women were considered 'selected primipara' (age 20-34years having their first single, cephalic, term pregnancy). TWH was selected for the study as it was the referral hospital for the region.

In 2019, the AD-MIRE Breastfeeding study gained Human Research Ethics Committee approval (2019/ETH12108) to conduct the PAR study reported in this thesis. Initially, approval was sought and granted for the first two phases of the PAR cycle, and as evidence emerged, an amendment was sought for the completion of the PAR cycle.

4.5.1 Adaptations during COVID-19 pandemic restriction from March 2020

When the COVID-19 pandemic restrictions started in March 2020, it impacted on this study as recruitment and data collection had already commenced. The initial face-to-face method of data collection I started with had to cease, and as a researcher, I was challenged to find new ways to continue. There was limited information available at the time around using the telephone for recruitment and focus groups, however as pregnant women were a busy cohort (even during the periods of movement restrictions enforced by COVID-19- related lockdowns), the practice development principles used for face-to-face communication was honed for use over the telephone. Interestingly, the number of recruited participants in the study improved when I moved from face-to-face to non-traditional telephone engagement during COVID-19 restrictions. Data collection during phases one and two were also unhindered by the changes when practice development principles were used to enable engagement, collaboration, and reflection amongst participants. A manuscript on this development, how I dealt with it, and what the impact was, is presented in 4.8 (p.80).

4.6 Data collection and analysis

Each of the four phases of this study had its own aims for data collection, requiring either qualitative or quantitative data, to give greater insight into a strategy that would support EBF rates on discharge from TWH for women with GDM. Hospital data was used, and permission was granted through ISLHD (see Appendix B, p. 173). This section will outline the methods that were used within each phase. A summary of these, with aims, questions and outcome measures are provided in Table 4-1.

Table 4-1 *Aims and data collection for PAR phases.*

Overarching aim of AD-MIRE Breastfeeding study: To develop a new strategy, in collaboration with women and staff, to improve rates of exclusive breastfeeding on discharge from hospital for women with GDM.					
	Phase and Research question	**Data – Collection, method, source**	**Main Outcome measure**	**Data analysis method**	**Ancillary Outcomes measured**
Phase one - *Background information*	***Background information*** *- Phase one – Part 1* Women with GDM **Aim:** To identify breastfeeding attitudes, confidence, and perceived support among women with GDM and assess breastfeeding attrition	Survey – women with GDM Quantitative data: attitudes, confidence, and support to breastfeed. Breastfeeding Attrition Prediction Tool (BAPT) survey – a validated reliable tool to predict	Breastfeeding attitudes, confidence, and perception of support for their breastfeeding decision	Descriptive statistics – incidence and trends	Breastfeeding Attrition Scores

	Primary Question: What were women with GDM's breastfeeding attitudes, confidence, and support? **Secondary Question**: What is rate of breastfeeding cessation (attrition) for women with GDM at around 6-8 weeks postpartum?	breastfeeding attrition (Gill et al., 2007) Quantitative data: postnatal breastfeeding rates for women with GDM at TWH *eMR* data Women with GDM	Infant feeding patterns for women with GDM at postnatal Child and Family Health visit	Descriptive statistics – incidence and trends	Any breastfeeding at 6-8 weeks postnatal
	Phase one – Part 2 Staff at TWH **Aim**: To explore staff attitudes and confidence concerning their support of breastfeeding for women with GDM. **Secondary Questions**: What were staff attitudes and confidence about supporting breastfeeding for women with GDM?	Anonymous survey - Staff at TWH Quantitative data: attitudes, and confidence to support to women to breastfeed.		Descriptive statistics – incidence and trends	- Staff attitudes toward breastfeeding - Staff confidence supporting breastfeeding women with GDM - Staff belief in the need for supporting exclusive breastfeeding
Phase one – *Background*	*Phase one – Part 3* Women with GDM **Aim**: To explore baseline information about breastfeeding practices among women with GDM during their hospital stay and discharge. **Secondary Questions**: What were the baseline breastfeeding practices in TWH among women with and without GDM?	Quantitative data: *eMaternity* data- January to June 2020 All women; comparison data for pre and post-intervention.	Exclusive breastfeeding rates at discharge from hospital for women with GDM and no-diabetes	Descriptive statistics – incidence and trends	
Phase two -	***Participatory workshops***- Phase two – women with GDM **Aim**: To explore the experiences and challenges faced by women with GDM regarding	Qualitative data: PD workshops Researcher notes Women with GDM	Themes identified women's experiences of antenatal breastfeeding support and ideas to take to staff to improve.	Inductive thematic analysis (Braun & Clarke, 2006, 2020)	N/A

	antenatal breastfeeding support and discover their recommended strategies for change. **Primary Question**: What are women's experiences of challenges regarding antenatal breastfeeding support? **Secondary Question**: What are the women's recommendation for change?				
Phase three - *Presentations*	***Presentations-*** *Dissemination of results to* TWH staff *Phase three –* **Aim**: To report findings from previous phases back to staff to allow them to decide on the best ways to provide supportive interventions that are tailored specifically for women with GDM. **Secondary Questions**: After dissemination of the findings, what would be the staff consensus in changing the practice?	Qualitative data: Presenting findings of phase one and 2 to TWH staff Researcher notes from presentations	No outcome measures	No data analysis required	Anonymous feedback was received by night duty staff
Phase four - *Evaluation*	***Evaluation*** *Phase four – Part 1* Women with GDM **Primary aim:** To explore breastfeeding practices after the new strategy (online hospital-based resources) was implemented. **Primary Question:** What were the breastfeeding practices in TWH, after implementation of online hospital-based resources?	Quantitative data: breastfeeding rates for women with GDM at TWH *eMaternity* data-January to June 2022 Women with GDM	Exclusive breastfeeding rates at discharge from hospital for women with GDM vs no-diabetes	Descriptive statistics – incidence and trends	- Skin-to-skin contact after birth - Rates of any breastfeeding at discharge from TWH

	Phase four – Part 2 Women with GDM **Secondary Aim:** To explore the use of the new strategy (online hospital-based resources) amongst women with GDM. **Secondary Questions:** 1) Did women with GDM use the online hospital resources? 2) Was there any differences in breastfeeding for women who used the online resources compare to women who did not?	Quantitative data: Post-intervention survey regarding use of online hospital-based resources Online anonymous survey, sent 4-12 weeks after birth for women with GDM who birthed January to June 2022	Breastfeeding rates at discharge from hospital for women with GDM who used online resources	Descriptive statistics – incidence and trends	- Experiences and infant feeding practices of women with GDM who used online hospital-based resources vs those who did not - 4–12-week postnatal rates of infant feeding among women with GDM

4.6.1 Phase one - Background information

Phase one of the study had three parts, designed to gather background information: 1) breastfeeding attitudes, confidence, and perceived support among women with GDM and their breastfeeding attrition rates at 6-8 weeks postpartum, 2) staff attitudes and confidence about supporting breastfeeding for women with GDM, and 3) breastfeeding practices among all women with GDM during hospital stay and discharge prior to designing any intervention or change (pre-intervention).

4.6.1.1 Phase one – Part one: Women's breastfeeding attitudes, confidence, and perceived support, and their breastfeeding attrition rates at 6-8 weeks postpartum.

4.6.1.1.1 Part 1 participants.

Pregnant women who were aged above 18 years, diagnosed with GDM during the current pregnancy, and planned to give birth in the study setting were invited to participate in this study. Women with pre-existing Type 1 or Type 2 diabetes, or multiple pregnancies were excluded from the study.

4.6.1.1.2 Part 1 recruitment and data collection method.

Between January to March 2020, posters were available in the antenatal clinic (see Appendix C, p. 174) and women with GDM who were waiting in the antenatal clinic were approached by myself to ascertain their GDM status, and given a Participant Information Sheet (PIS, see Appendix D, p. 175). After discussion, women were invited to participate in a survey (see Appendix E, p. 179) which included a written consent (see Appendix F, p. 182) for me to access their postnatal breastfeeding information via the hospital's electronic Medical Record (eMR) database, and their interest to participate in phase two

workshops. In March 2020, however, COVID-19 pandemic restrictions were enforced, and all forms of face-to-face research activities were ceased by the local health district. After an amendment to the ethics application, women were recruited via a telephone call, offered a PIS, and survey questions were asked by myself as researcher via telephone interview. Participants were asked for verbal consent to follow-up their postnatal information via hospital data and their interest to participate in phase two workshops.

4.6.1.1.3 Part 1 data collection tool.

Survey questions asked women about basic demographic information, their breastfeeding attitudes, confidence, and perceived support via a revised version of the Breastfeeding Attrition Prediction Tool, BAPT (Edmunds et al., 2017; Gill et al., 2007). The original BAPT was a validated and reliable tool which was developed by Janke (1992) based on Ajzen's (1991) theory of planned behaviour to recognise women at risk of early weaning in the postnatal period. Since then, the tool was modified and retested by Dick et al. (2002), Evans et al. (2004), and Edmunds et al. (2017) and is used in the antenatal period to predict breastfeeding attrition in the eight weeks after birth. In the AD-MIRE breastfeeding study, I used the revised version of the tool (Edmunds et al., 2017) to determine the breastfeeding attitudes, confidence, and perceived support for antenatal women with GDM (see Appendix G, p. 184). Their breastfeeding attrition at 6-8 weeks after birth were assessed by accessing postnatal data from the hospital's eMR database, which showed infant feeding at a Child and Family Health visit after discharge.

The BAPT can be self-administered, may be positively or negatively biased toward breastfeeding, and women answer questions with 'agree,' 'disagree' or 'neither.' Answers to individual questions are scored and totals range 0-38, revealing which women are more likely to cease breastfeeding in the eight weeks following birth. BAPT scores are based on attitudes, support, and confidence to breastfeed, and women who score 20 or less require intensive support from staff, based on their responses and perceptions, to meet their breastfeeding goals (Edmunds et al., 2017).

4.6.1.1.4 Part 1 data analysis.

Quantitative data were analysed with SPSS (Statistical Package for the Social Sciences). Descriptive statistics were used to determine percentages, frequencies, means and averages for cohort data. Inferential statistics used to compare breastfeeding outcomes at six to eight weeks between the group of women who scored high or low with their BAPT score during pregnancy. Pearson's Chi square (χ^2) two tailed t-test examined changes in breastfeeding within groups across time with statistical significance level $p < 0.05$.

4.6.1.2 Phase one – Part two: Staff attitudes and confidence on supporting breastfeeding women with GDM.

The aim of the second part of phase one was to evaluate staff attitudes and confidence for supporting breastfeeding for women with GDM prior to any design for change.

4.6.1.2.1 Part 2 participants.

Participants were maternity and/or neonatal staff at the hospital, or GPs who provided breastfeeding education and support for women with GDM during their antenatal, birth or postnatal periods. No medical staff at the hospital participated.

4.6.1.2.2 Part 2 recruitment and data collection.

Eligible staff were offered PIS (see Appendix H, p. 185) and asked to fill in an anonymous survey (see Appendix I, p. 188) between July and September 2020. Implied consent was assumed with completion and sealed boxes were used to collect paper surveys from meeting rooms. Online surveys via *Qualtrics*^{TM} were made available to include staff outside Maternity Services, such as General Practitioners, as their education sessions were run online instead of face-to-face during COVID-19 restrictions when surveys were distributed. Qualtrics is an online survey tool used by the university that allowed for flexible flow of questions with password protected security (Lau et al., 2015).

4.6.1.2.3 Part 2 data collection tool in phase one.

The survey for staff at TWH included the breastfeeding attitude questions from the BAPT (see Appendix G, p. 184) with extra questions from the Baby Friendly Health Initiative Handbook for Maternity Facilities (BFHI Australia, 2020, p. 20), and clinical points advised by the district's clinical IBCLC (Lactation Consultant). The extra questions were aligned with the BFHI core competencies for staff to help women establish breastfeeding, including helping mothers with skin-to-skin contact after birth, positioning and attachment, monitoring milk transfer, knowing when baby is getting enough milk, and assisting the new mother to express her milk (BFHI Australia, 2020). This staff survey included questions about staff confidence in their ability to help mothers with these competencies. Survey questions asked for agree/disagree answers to "I am confident" providing or discussing methods known to support breastfeeding as per BFHI initiatives. Based on the advice of the IBCLC, I added questions about supporting finger feeding (see Appendix I, p. 188) which has supported pre-term babies to breastfeed in special care nurseries (Glenn & Oddy, 2003).

4.6.1.3 Phase one – Part three: breastfeeding practices among all women with GDM during hospital stay and discharge prior to intervention or change (pre-intervention).

The aim of part three in phase one was to explore baseline information about breastfeeding practices among all the women with GDM during their hospital stay and discharge, prior to designing any intervention or change (between January to June 2020)

4.6.1.3.1 Part 3 participants.

The participants were all women with the same eligibility criteria outlined in part one, and had a live, full-term birth in the study setting.

4.6.1.3.2 Part 3 recruitment and data collection.

The Wollongong Hospital uses information systems known as *eMaternity* to collect birth data for all women. With permission from ISLHD data management department and the Human Research Ethics Committee, information was collected via the hospital's Maternity Data Manager to assess infant feeding rates for all women who discharged from the hospital prior to implementing any changes in practice (January to June 2020).

4.6.1.3.2 Part 3 data collection tool.

Women's demographic data including age, place of birth, parity, BMI, smoking status, intention to breastfeed, any complication during pregnancy, type of birth, model of care, and breastfeeding outcomes including skin-to skin contact, breastfeeding initiation, EBF, mixed method and formula feeding at birth and discharge from hospital were measured.

4.6.1.3.3 Part 3 data analysis.

Collection of quantitative data in part three of phase one provided a general understanding of demographic and breastfeeding data as a baseline to interpret the impact of the intervention implemented at phase three of the study. Quantitative data was analysed with SPSS (Statistical Package for the Social Sciences). Descriptive statistics were used to determine percentages, frequencies, means and averages for cohort data. These data were compared with same date at phase four to compare breastfeeding outcomes prior to, and after implementing the change.

4.6.2 Phase two - Participatory workshops

With participatory action research (PAR) methodology (see 4.4, p. 51) and person-centredness underpinning this entire study (see 3.3.1, p. 45), it was important that I speak to women who had been diagnosed with GDM during their current pregnancy, to gain an understanding of their experiences regarding breastfeeding at TWH. I facilitated ten workshops for women with GDM to explore their experiences of any breastfeeding challenges they faced and whether they had any recommendations for change at TWH. A person-centred Practice Development (PD) approach to facilitation of groups (see 4.6.2.2.1, p. 65) was used to enable participants to focus on active learning and integrate evidence-based knowledge during the workshops.

4.6.2.1 Participants.

Participants in phase two were a sub-group of women who participated in phase one: aged over 18 years and diagnosed with GDM during their current pregnancy. Women with pre-existing Type 1 or Type 2 diabetes, or multiple pregnancies were excluded from the study.

4.6.2.2 Recruitment and data collection method.

Women were invited to participate in the workshops during the phase one survey. Those interested gave their contact details so that they could be contacted when workshop dates were announced. Person-centred participatory workshops with women were run with any participant able to take part on the designated day, implied consent was assumed with their participation. As the researcher participating in the workshops, I worked with women to discuss their current issues with breastfeeding information and support at the hospital and provided pseudonyms for all participants to maintain confidentiality. Women's conversations were recorded by the researcher for note-taking purposes and then deleted. Post-it notes, white board, and a retrospective personal researcher journal were also used for women to write their ideas and theme them to discuss potential recommendations for change.

Table 4-2 *Workshop attendance*

	Workshop	Mode	Month held (2020)	Number of participants	Pseudonyms
Prior to the COVID-19 pandemic	1	Face-to-face	Jan	2	Amy, Bea
	2	Face-to-face	Feb	3	Candice, Diedre, Ellen
	3	Face-to-face	Early - March	3	Fran, Grace, Heidi
	4	Face-to-face	Mid-March	3	Ida, Jill, Kylie
During the COVID-19 pandemic	5	Telephone	End March	2	Lucy, Meg
	Interview	Online virtual (videoconference)	April	1	Nat
	6	Telephone	April	4	Olive, Peta, Rose, Sue
	7	Telephone	May	3	Taylor, Robyn, Vera
	8	Telephone	June	2	Yasmine, Zena
	9	Telephone	July	4	Ashli, Emma, Katie, Audrey
	10	Telephone	Aug	3	Charlotte, Harri, Nina

Descriptive field notes were written in a journal after each workshop to enable reflection and learning between workshops. They also helped me to recognise my personal reactions and practice as a staff member, for example, "there was some 'midwife-bagging' today! I think they forgot I was a midwife as a couple of multiparous women complained about previous midwife experiences at TWH" (researcher notes 18.4.2020). As a participant in this person-centred PAR study, researcher field notes were used to add depth and perspective, add my thoughts at the time, and to enhance trustworthiness, adding integrity by including my involvement as a researcher (Phillippi & Lauderdale, 2018). The notes were also advantageous as an audit trail when workshops were scheduled, e.g., for pseudonyms to be recorded, and to unobtrusively supplement research data, e.g., documentation of how women worked and explored ideas individually and as a group.

4.6.2.2.1 Using Practice Development principles to collect data for phase two.

Practice Development (PD) principles were used to foster trust and gain critical information from women with GDM who participated in the workshops. PD is a healthcare-driven methodology that values experience and incorporates key concepts of collaboration, inclusion, and participation with a focus on person-centred practice as an approach to sustainable change (Manley et al., 2008). In the 1990's, PD was primarily used amongst groups of healthcare workers in the UK as an emancipatory practice through critical reflection (Manley et al., 2021). The PD approach includes eight principles that offer a guide to facilitate and engage discussion within groups, such as utilising creativity to enable

communication and transformation through the use of a skilled facilitator (Manley et al., 2021). Therefore, I attended a five-day PD school and practiced with one of my supervisors who is expert in PD facilitation models. Table 4-3 (p. 67), provides the details of the PD principles and the ways that I used them in workshops with women with GDM.

A PD approach to facilitation within workshops allowed me to maintain a consistent approach to data collection, even when COVID-19 pandemic restrictions were enforced. Data collection associated with supporting EBF for women with GDM across 10 workshops were not hindered by the restrictions when this study had to move from face-to-face workshops to telephone-based groups, confirming the PD principles were an integral part of the study's methodology. Section four of this chapter (p. 80) presents the manuscript currently under review with *Nurse Researcher* journal (impact factor 1.34): Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). *Using Practice Development Principles to address challenges for recruitment and data collection when face-to-face methods could not be used*. *Nurse Researcher journal*, *under review.*

Table 4-3 *PD principles approach to group facilitation*

Practice Development (PD) principles (Manley et al., 2021, pp. 110-114)		
Principle	**Definition**	**How principles were used in workshops**
Principle 1	Use of person-centred practice to promote safe and effective cultures where all people flourish	Focussing on the experiences of the individual regarding their GDM and their understanding of breastfeeding support in TWH, asking for their ideas for change.
Principle 2	Involves collaborative, inclusive and participatory (CIP) approaches	Respect for other's stories was orchestrated within groups by encouraging all women to share their stories and discussing these respectfully as a group.
Principle 3	Encourages blending of creativity with learning to achieve new ways of thinking, doing and being within groups	Embracing creativity such as craft (pre-covid) or visualisation during restrictions allowed women to reflect during workshop groups, share their stories and enable ideas to flow to solve perceived problems.
Principle 4	Utilises active work-based learning to facilitate individual, practice and cultural transformation	Working with users of a health service, I encouraged sharing of individual experiences within the antenatal service, collecting surveys during recruitment (face-to-face pre-covid, or via telephone surveys during restrictions), and using them for insight and further reflection during workshop groups.
Principle 5	A facilitated process seeking to promote critically informed action	To inform group discussions, participants identified what is happening now, where they would like to be (what they think should happen), and the process they believed needs to happen to achieve this (ideas for change), thinking critically about what may or may not work, and why.
Principle 6	Use of inclusive evaluation to integrate evidence from process and outcomes	Inclusive evaluation ensured recruitment survey data was available and all participants shared stories for collective agreement, drawing themes from women's stories for evidence to co-design interventions.
Principle 7	Supportive relationships to stimulate effective change	Focusing on the relationships and shared experiences of women in the group allowed for trust to be developed and respect for each other's stories irrespective of being face-to-face or in a telephone discussion.
Principle 8	Defines PD as a complex methodology that uses a variety of evidence to inform transformation for individuals, teams, and systems	Evidence brought to workshop from literature, women's surveys (from recruitment) and stories/recommendations for change from previous groups into workshops to help women feel heard, enabling collaboration and participation for ideas for transformational change.

4.6.2.3 Data analysis.

I used thematic analysis to analyse the qualitative data using Braun and Clarke's six phases of reflexive thematic analysis (Braun & Clarke, 2006, 2020). Thematic analysis provided a flexible guide to developing a valuable and comprehensive account of women's experiences. I believe it was the best way to reflect in a person-centred way, on the ideas that emerged from the data. New data was correlated as it became available, allowing for new themes to evolve across each of the ten workshops (Braun & Clarke, 2006, 2020). The six phases to guide thematic analysis are outlined in Figure 4-4, and each phase will be discussed further.

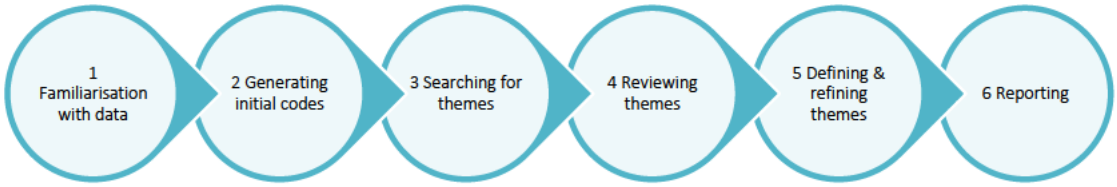

Figure 4-4 *Six phases of thematic analysis*

1) Familiarisation with data

As facilitator of all ten workshops, I immersed myself in the words of women by transcribing the recorded workshops I participated in. This allowed me to become familiar with the data, searching for meaning and patterns in the experiences women with GDM had at TWH. This process included revisiting transcripts and making notes from the first to the last workshop to ensure all content within the data (all women's words) had been heard.

2) Generating initial codes

Initial codes were generated from the data by looking at the ideas and experiences proposed by women. These were revisited, adapted, and collated until data collection was complete. Women's words were reflected upon by myself and my supervisors, and extracts of the words added to initial codes to ensure they matched with what other women were saying in subsequent workshops.

3) Searching for themes

Potential themes were developed from the compiled codes using mind-maps on paper and on whiteboards. For example, the words *worry, fear, anxiety, scared and stress* were compiled into one theme for further analysis (see Figure 4-5, p. 69). Codes were added to the narrative stored under

pseudonyms in an excel spreadsheet to enable filtering and easy access to change or add different codes. I then started adding them into assorted themes for further analysis.

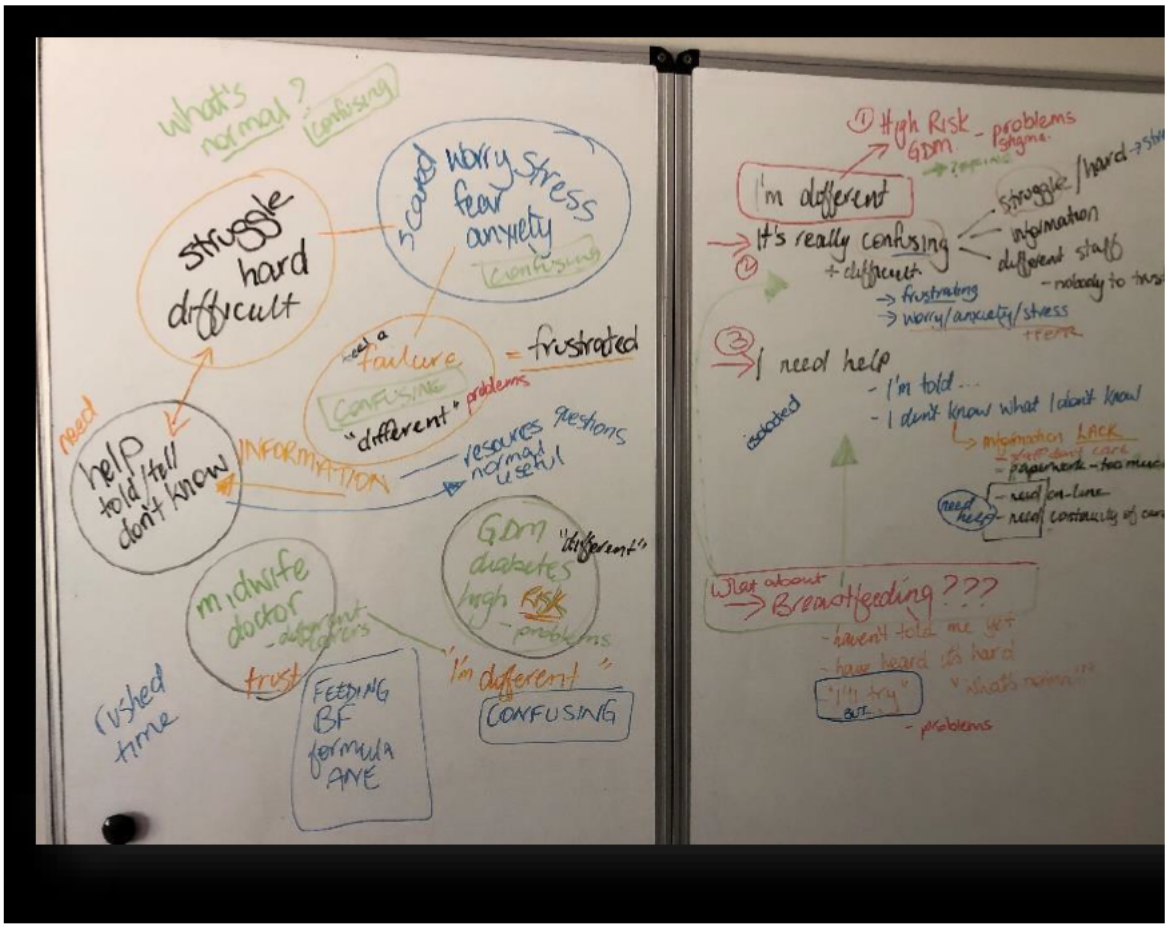

Figure 4-5 *Mind-map of women's words from workshops*

4) Reviewing themes

When themes were developed from the words of women with GDM, they were reviewed during monthly supervision meetings to draw further meaning from the extracts of women's experiences. I found white boards, post-it notes, and butcher's paper worked well for me to move words around within meetings to enable themes to be reviewed with my supervisors. During this stage, themes could be re-worked or new themes created to sort women's words into an accurate representation of their experiences.

5) Defining and refining themes

Themes were further defined and refined into sub-themes with associated narrative from extracts in this phase. The narrative was important to reconnect in this stage to ensure quotes were identified from the data to support the emerging themes and sub-themes, for example regarding breastfeeding confidence (see Figure 4-6, p. 70).

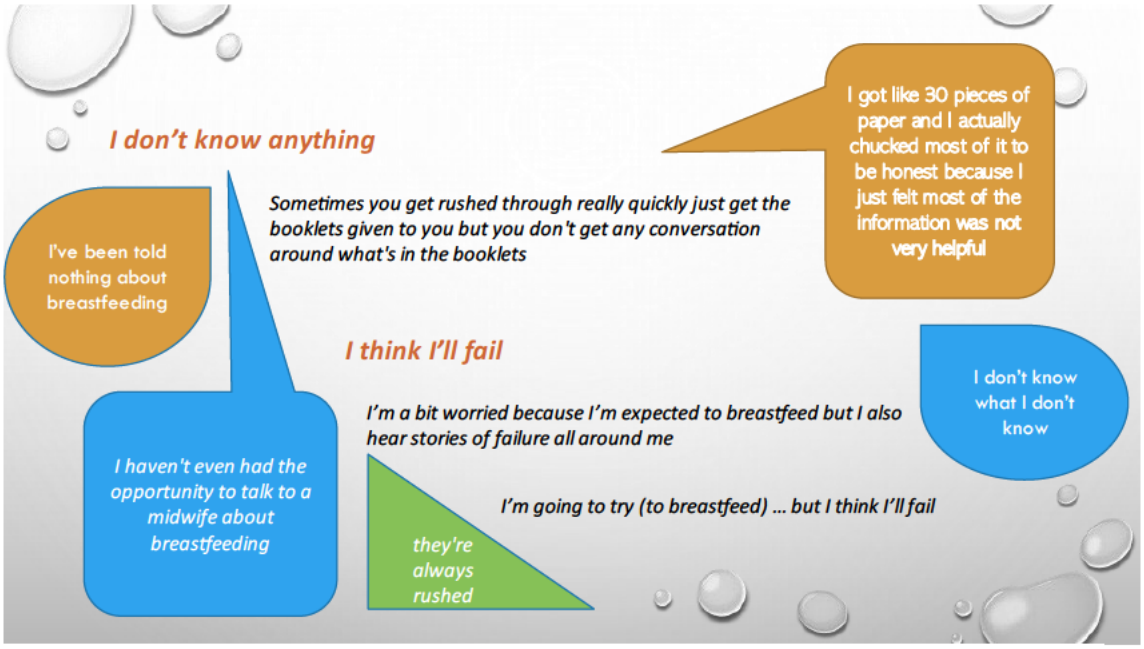

Figure 4-6 *Themes defined with narrative – Breastfeeding is hard.*

6) Reporting

The thematic analysis resulted in the development of four themes regarding breastfeeding support for women with GDM and their ideas for change at TWH. These have been published in *Breastfeeding Review* and are available in Findings Chapter (5.3.1, p. 101).

4.6.3 Phase three - Dissemination and implementation

In phase three, the findings of phases one and two were reported back to staff. The purpose of this phase was to provide information to staff that would inform their design of supportive interventions tailored specifically for women with GDM. This involved presentations to staff and maternity stakeholders. Presentations were didactic, via PowerPoint, and included results from baseline 2020 hospital breastfeeding data, women's surveys (attitudes, confidence, and perceived support to breastfeed), staff surveys and women's experiences and ideas for change from the phase two workshops. Descriptive field notes were written after each presentation. The findings from phase two informed this phase, and the main requests from women were a) having a continuity of care model, b) having online hospital-based information available, and c) having an opportunity to connect with other mothers who have GDM (see Figure 4-7).

Figure 4-7 *Women's phase two recommendations (slide from staff presentation)*

Staff members from TWH maternity services attended presentations between August 2020 and June 2021. Staff members were midwives, nurses who offered breastfeeding support and midwifery managers. Presentations were given as part of breastfeeding education days, antenatal clinic and maternity ward meetings, and a maternity forum which all staff are invited to attend.

Presentations of the findings were made to 67 staff across eight sessions. Researcher notes were taken at the end of each session capturing a brief description of discussion that staff had around which ideas they would be able to implement in a timely manner with the COVID-19 pandemic restrictions within the hospital, and current staff shortages.

During this phase, a box was made available for staff suggestions from August 2020 to June 2021. Staff were left to consider how they could tailor an intervention to improve breastfeeding practices for women with GDM at TWH. Staff members discussed the results of this study amongst themselves during the 10-month timeframe (extended due to COVID-19 restrictions and limited staff gatherings) and put forward ideas to managers, for example, nightshift staff submitted a website plan on butcher's paper after their team discussions (see Figure 6-1, p.118).

Finally, with an evidence-informed approach, staff decided they could implement new online hospital-based resources to improve breastfeeding rates on discharge from the hospital. In September 2021, the hospital-based website was completed and use of the website for antenatal women was reinforced by staff using posters and QR codes (see Figure 4-8). Due to shortages of staff and social restrictions, providing continuity of care models and community-based support for women with GDM were kept on hold.

Figure 4-8 *Poster advertising website for women with GDM at TWH*

4.6.3.1 The hospital-based website intervention.

The hospital-based website included information on pregnancy and diabetes including GDM, Type 1 or Type 2 diabetes. The following information on breastfeeding was provided specifically for women with GDM: antenatal hand expressing, skin-to-skin contact and frequent feeding after birth. A link to the Milky Way breastfeeding app was included on the web page. The Milky Way App is a mobile phone application to support breastfeeding, designed from the Milky Way program, BFHI requirements, Australian Infant Feeding Guidelines, and designed with persuasive system principles where human to computer interactions are used for health behaviour change (Meedya et al., 2020). Staff at TWH asked to include the App as it was a resource they were using to support breastfeeding at the time.

4.6.4 Phase four – Evaluation

Phase four of the study had two parts. The first part aimed at exploring breastfeeding practices after the change was implemented (January to June 2022) and comparing data with information gathered prior implementing the change (January to June 2020). The second part was to evaluate the feedback from women who used the online hospital-based information.

4.6.4.1 Part 1 – hospital data, evaluating the impact of the intervention.

The same inclusion criteria for participants, and data collection and analysis methods were used as in phase one, as the same data was collected from hospital systems to compare breastfeeding practices pre and post-intervention. The primary outcome measure was the rate of EBF at discharge from hospital between women with GDM prior to introducing online resources (pre-intervention, 2020) and post-intervention (2022). Other breastfeeding practices such as skin-to-skin contact, breastfeeding initiation, and any breastfeeding or formula feeding rates were also compared between the groups.

SPSS software provided descriptive and inferential statistical analysis for comparison of the data. As for phase one, descriptive statistics determined percentages and inferential statistics such as Chi square (χ^2) with a statistical significance level of $p < 0.05$ were used to compare the outcome measures between the groups of women before and after the change (pre-post intervention).

4.6.4.2 Part 2 participants and recruitment.

To evaluate women's experiences with the website (intervention) and ascertain whether women with GDM had any benefit from the online information, an anonymous online postnatal survey was sent via SMS to 191 women with GDM who birthed between January to June 2022. Participant Information Sheets were available (see Appendix J, p. 190) via a link at the beginning of the survey (see Figure 4-9). Implied consent was given by completing the anonymous survey (see Appendix K, p. 193).

4.6.4.3 Part 2 data collection tool and data analysis.

Women were asked demographic questions, antenatal expressing and infant feeding questions that were related to their hospital stay and at home. To assess the impact of the staff intervention (website), women were also asked whether they had used hospital-based online resources. Likert scale questions based on whether they found the online resources easy to use or helpful were asked, based on the MAUQ (mHealth App Usability Questionnaire, see Appendix L, p. 201). The MAUQ is a validated tool to evaluate the usability of mobile health apps, modified to assess the online resources (Zhou et al., 2019).

SPSS data analysis was used to compare breastfeeding outcomes between the women with GDM who used the hospital based online resources (n=29) compared to women with GDM who did not use the online resources (n=76).

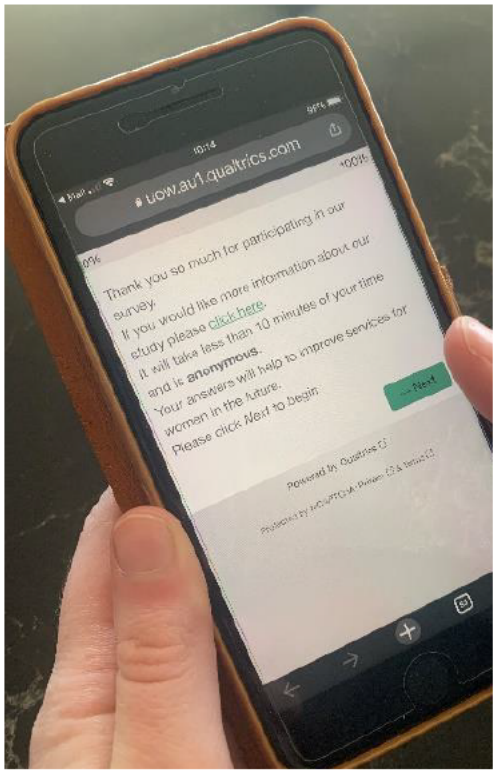

Figure 4-9 *Postnatal online survey for women sent via SMS (entry page)*

Section three: Ethical consideration

4.7 Ethics approval

Ethics in research aims to prevent harm to participants from the researcher and the research process through a series of guidelines that must be respected (NHMRC, 2007). Human Research Ethics Committee approval for the AD-MIRE Breastfeeding Study was initially obtained through the joint University of Wollongong (UOW) and Illawarra Shoalhaven Local Health District Health and Medical Human Research Ethics Committee (2019/ETH12108), and then approved by the ethics committee of the Australian Catholic University (ACU) when I transferred my study from UOW to ACU (2023-3075T, see Appendix M, p. 202-205).

Ensuring fair access for all women with GDM was achieved by inviting all women with GDM over a 6-12-month period to participate in the AD-MIRE Breastfeeding study. It was equally important that, as healthcare workers are in a position of power, participants were not coerced to consent to participate from their treating midwife or doctor. For this reason, recruitment was undertaken by myself as a researcher, not the woman's direct caregivers. I did not work within the antenatal clinic during this study and women were able to participate in their 'usual care' (see Introduction 1.2.4, p. 6). Staff did not know which women participated in the study as nothing was written in their notes and face-to-face workshops were attended outside the antenatal clinic (January-March 2020) or in telephone-based groups from March 2020. During the participatory workshops, no pregnancy consultations occurred and there was no additional burden for women who did not participate. There was no identified conflict of interest in this PhD research project and no financial funding required.

4.7.1 Research merit & integrity

Ethics committees need to be satisfied that research is worth undertaking and adds to the overall body of knowledge (Pieper & Thomson, 2011). Goal 1 of Australia's National Diabetes Strategy (Australian Institute of Health and Welfare, 2020) is to prevent people from developing Type 2 diabetes by improving rates of EBF. They represent part of the Breastfeeding Expert Reference Group which authors the Australian National Breastfeeding Strategy (COAG Health Council, 2019a). This strategy seeks to increase the rate of EBF in the first six months of life to at least 50%, however in July 2021, the ABS (Australian Bureau of Statistics, 2021b) reported this figure was only 35.4%.

EBF rates for women with GDM have been consistently reported to be less than women with no-diabetes. Across Australia the discrepancy in EBF at discharge from hospital was reported to be between 7 and 9% (Chamberlain et al., 2017; Longmore et al., 2020) which calls for action to be taken (BFHI Australia, 2020), and is the reason for me undertaking this study.

4.7.2 Risk and Benefit of the study

It is the researcher's responsibility to ensure the study does not affect participant's emotional well-being (NHMRC, 2007). Reducing harm for this cohort was of utmost importance in this study. The risk for harm to women from inclusion in this study was considered low risk as this study included questions that are usually asked by staff throughout their pregnancy. New mothers can access counselling at any time as part of their usual care, therefore this could be available as part of the study if women felt they required additional support, without affecting the results of this study. When discussing the study and on the Participant Information Sheet (see Appendix D, p. 175), women were advised there was no pressure to participate and withdrawal from the study was their right without affecting their care at any time.

4.7.3 Confidentiality and anonymity

Confidentiality in research is important to hide and protect the identity of participants, ensuring trust in the research process and maintaining relationships built with participants. Data from this study was analysed, maintaining the confidentiality of linked data sets. Data was collected, coded, and kept securely locked in drawers on hospital property (paper-based) and password protected computers (online data) as the project involved having access to the participant's contact details (see 4.7.5, p.78). Pseudonyms were used for women who participated in workshops and the study site was hidden for all presentations and published papers. All other data from staff and women's surveys did not contain identifying information.

4.7.4 Consent and information sheet

Consent is given for research projects to show that participants agree to participate voluntarily after being given adequate information for them to understand the study and any implications the study may have on them (NHMRC, 2007). In this study, I talked to women, offered the Participant Information Sheet, and encouraged questions before asking women whether they would like to participate.

4.7.4.1 Consent.

Participants consented to various parts of the study in the following ways:

1) Phase one:

- implied consent when initial surveys were completed (women and staff)
- written consent for researchers to contact women or access their hospital information when recruited face-to-face (see Appendix F, p. 182)
- verbal (oral) consent for researchers to contact them or access hospital information when recruited over the telephone during COVID-19 restrictions

2) Phase two:

- written consent for contact regarding face-to-face participation in pre-COVID-19 workshops (see Appendix F, p. 182)
- verbal consent for contact regarding telephone group workshops during COVID-19 restrictions
- implied consent for participation in workshops (after prior consent to contact)
- verbal (oral) consent for workshops to be recorded for notetaking

3) Phase four:

- implied consent for phase four with the online surveys for women with GDM (de-identified phone numbers provided by ISLHD)

Consent is implied when people fill out a survey (NHMRC, 2007). Across this study, there were three anonymous surveys within two phases. In phase one, women with GDM were offered surveys via paper in the antenatal clinic or via telephone during COVID-19 restrictions. Staff at TWH were offered paper-based anonymous surveys at their team meetings. A sealed box was available for completed paper surveys. In phase four, the telephone numbers for women with GDM who had birthed January to June 2022 were supplied by the hospital, for me to send an invitation to participate in an online anonymous survey.

Written or verbal consent for researchers to access women's hospital data or for further contact regarding PAR workshops, was obtained at the end of the paper-based or telephone anonymous surveys in phase one. Consent included the use of women's medical record number (MRN) to link data and telephone number. Access to women's hospital data included infant feeding and birth information, and to be contacted for a postnatal telephone call if required. As the AD-MIRE Breastfeeding study included the collection of feeding information for the baby, baby's implied consent was included in the mother's consent.

In the phase two participatory workshop, group discussions were recorded on a mobile device that was password protected. Verbal consent was requested prior to and during the recordings. Once transcription had occurred, the recordings were deleted.

4.7.4.2 Participant Information Sheets.

Three Participant Information Sheets were developed across the study to describe the research and give contact details for the research team. These are available in:

- Appendix D (p. 175): Phase one, part one - initial recruitment of women with GDM (2020)

- Appendix H (p. 185): Phase one, part two - anonymous survey among staff
- Appendix J (p. 190): Phase four, part two - online evaluation survey for women with GDM (2022)

Developed according to health literacy guidelines (Australian Commission on Safety and Quality in Health Care, 2014), participant information sheets were given to women with GDM and staff (as above) to ensure they had the appropriate information required to make an informed decision about whether to participate or not. The information sheets reminded participants that withdrawal from the study was allowed at any time without any impact on their care or work at TWH. The information sheets also included information about expected dissemination of results, likelihood for publication, and the methods used to protect any identifiable information.

4.7.5 Data management and storage

All paper-based information and data (consent forms and surveys) were kept in a locked drawer and information transferred into excel spreadsheets for analysis. Computer-based information was stored securely on a password-protected computer. As there was linked data, it was important that data was coded immediately for confidentiality, and links to identifying data kept separately to the coded data. Only data that was de-identified was shared with other researchers (supervisors) to reduce the risk of identifiable factors being shared and to uphold confidentiality. To prevent loss of data, regular back-ups were performed to protect for loss of data. The data collected holds no historical or cultural significance, so it will be overwritten (destroyed) after minimum retention period of seven years after publication (ISLHD, 2021).

4.7.6 Quality and Rigour

Ensuring data is as accurate and truthful as possible, following rigorous guidelines is important (De Chesnay, 2014), ensuring the approach to research maintained standards of quality and validity. Tobin and Begley (2004) replace the term 'rigour' with 'trustworthiness' for action researchers, a term synonymous with validity, and measured by credibility, transferability, dependability, and confirmability (Cope, 2014; Lincoln & Guba, 1985; Rolfe, 2006). Confidence in the quality of this study was therefore established through these criteria. Reflexivity is also discussed as a way to add further value to the quality of this study.

Credibility ensures the reader can have confidence in the truth of the findings in this study. This has been achieved through sharing women's experiences amongst all workshops and confirming the consistency of information across participants. The use of qualitative and quantitative data to support findings also offers credibility to the study.

Transferability enables the findings to be understood or replicated in different settings. This was established by detailing the research process in this chapter and within publications to assist researchers in different settings to determine similarities or differences amongst women with GDM. Within workshops in this study, transferability was achieved as ideas generated from a woman in one workshop group were confirmed not only amongst others in that workshop, but also resonated within other workshops. Because of this, data saturation was quickly achieved.

Dependability demonstrates that findings are consistent and repeatable. Quantitative data collected in this study regarding breastfeeding for women with GDM was consistent with other Australian studies. Qualitative data collected across workshops was consistent and revised by the research team every month with mind-maps. Resulting themes from the workshops have been published (Cummins et al., 2022) and include a description of participants and methods of data collection and analysis.

Confirmability occurs when findings represent what participants said, not what researchers wanted them to say. Using quotes and describing how conclusions were drawn, including researcher notes, assist with confirming the themes in this study.

Reflexivity adds further value to credibility and trustworthiness in this study. It is the awareness I bring to the study of my own beliefs and values and how they affect the study. In Chapter 3 I investigated my ontology and epistemology to find my theoretical underpinning to this study, identifying areas that may bias my interactions with women. I also reflected on data collection and analysis within my researcher notes. This reflection ensured I reflected on interactions to safeguard person-centredness and any ethical considerations, alerting me to make amendments to research, for example, during COVID-19 restrictions. The rich words collected from women with GDM allowed myself and my supervisors to analyse, reflect, interpret, and draw conclusions until themes were evident that I believe came directly from women with GDM. Avoiding bias, this team brought different perspectives to the interpretation of data from various areas of nursing and midwifery.

Section four: Challenges

4.8 Using Practice Development Principles to address challenges for recruitment and data collection when face-to-face methods could not be used.

The following publication will present all the challenges I had during recruitment and data collection when the face-to-face method changes to a telephone-based method.

Cummins, L., Dawson, K., Bayes, S., Wilson, V., & Meedya, S. (2024). Using the principles of practice development to address challenges in recruitment and data collection when face-to-face methods are unavailable. Nurse researcher, 32*(2), 22–30. https://doi.org/10.7748/nr.2024.e1898*

4.8.1 Abstract

Background: Researchers conducting studies involving pregnant women often find recruitment challenging. The COVID-19 pandemic added further complexity to studies requiring face-to-face participation.

Aim: To demonstrate how to maintain the principles of practice development (PD) when a study must switch from face-to-face to remote methods of collecting data.

Discussion: The number of participants in the authors' study increased when they moved from face-to-face to telephone engagement during the COVID-19 pandemic. They continued using PD principles when they changed method and the quality of the data they collected remained constant, even once lockdown restrictions were in place.

Conclusion: PD principles can offer ways for nurse researchers to engage, collaborate with and reflect with people for research projects, including when constraints compete with participation. They can also assist researchers in optimising and maintaining recruitment and data collection when face-to-face research methods are impossible.

Implications for practice: The telephone can be a valuable alternative medium for recruiting participants and collecting data when face-to-face methods are impossible to use. PD principles can be maintained and response rates and participation may even be greater when using it.

Keywords: data collection; interviews; online research; qualitative research; recruitment; research; research methods; study design; study recruitment.

4.8.2 Introduction

The COVID-19 pandemic had an extraordinary impact on global research (Ramanan et al 2020, Thornton 2020). Lockdown restrictions on physical meetings forced many researchers to look for alternative ways to recruit participants or collect data if they had relied on face-to face methods (Parker et al 2022). This article discusses how the authors maintained the use of practice development (PD) principles throughout the data collection phases of the Antenatal Diabetes – Mothers Improving Rates of Exclusive Breastfeeding (AD-MIRE) study (Cummins et al 2022) as well as supported the challenges faced in recruiting participants and collecting data when face-to-face methods had to cease due to COVID-19 lockdowns.

4.8.3 Background

Practice development

PD is an intervention that is used as a driver for organisational change across a variety of international healthcare settings. It uses emancipatory processes to support participants in being collaborative, inclusive and participatory (CIP), through person centred creativity, curiosity and reflection (McCormack et al 2006, van Lieshout and Cardiff 2015, Manley et al 2021). It provides healthcare professionals with the skills to improve therapeutic engagement with patients and provide better care (McCormack et al 2004, Manley et al 2014).

PD can be used in healthcare research to develop ideas for change to improve patient experiences and outcomes by examining service users' personal experiences, beliefs and values to discover their needs (Manley et al 2021). A PD approach provides a guide to facilitate and engage discussion in groups (Manley et al 2021).

Manley et al (2008) included nine main principles of PD activities that integrated emerging theoretical and philosophical ideas to establish successful workplace cultures. Members of the International PD Collaborative revised these principles (Foundation of Nursing Studies 2023), updating them to provide eight globally recognised PD principles as a framework for research and change in healthcare organisations (Manley et al 2021) (Table 4-4, p.83).

The AD-MIRE study

The aim of AD-MIRE is to collaborate with women with gestational diabetes mellitus (GDM) to develop an intervention to improve exclusive breastfeeding rates on discharge from hospital. The study site is a regional hospital in New South Wales, Australia, that saw 2,546 babies born in 2020, approximately 14% of whom had GDM (Centre for Epidemiology and Evidence 2021).

Inclusion criteria for AD-MIRE were that participants had to have been:

» Booked into the study site for their current pregnancy.

» Diagnosed with GDM. AD-MIRE has a four-phase design.

We wanted to ascertain experiences of support at the hospital of women with GDM and what they would recommend changing. The first stage involved recruiting women with GDM to participate in the study and administering a survey to them; the second involved group workshops with some of these women. We included the eight PD principles in the study's design, to ensure there was a framework to facilitate discussions. We hoped the participants would share their experiences of breastfeeding, as well as provide recommendations to staff about support strategies that could be tailored specifically to their breastfeeding needs.

Researchers have often found it difficult to recruit pregnant women to studies – potential participants have relayed challenges about taking part in studies, such as time constraints, childcare responsibilities or 'problems' in their pregnancies (Coleman-Phox et al 2013, van Delft et al 2013, Strömmer et al 2018, Wise and Cantrell, 2019). Wise and Cantrell (2019) offered pregnant women gifts and attempted to work around their schedules but found these measures to be ineffective.

One strategy that is effective in recruiting pregnant women is to develop a close, trusting relationship with them using face to-face methods such as group workshops (Coleman-Phox et al 2013, van Delft et al 2013, van Lieshout and Cardiff 2015, Wise and Cantrell 2019). We had intended to use face-to-face workshops in our study.

COVID-19 lockdown restrictions started in Australia in March 2020, making that impossible. The study site began to provide telehealth to women in the first two trimesters of their pregnancy after the introduction of COVID-19 restrictions, to reduce the number of pregnant women coming to hospital. Women newly diagnosed with GDM were stopped from attending face-to-face education groups and could only talk to midwives and doctors over the phone. We looked for alternative methods of recruiting participants and collecting data that would enable us to continue the study. However, there was little literature available to assist us.

Traxler and Smith (2020) discussed the shift in methodology required of researchers during the pandemic. The authors found online methods had advantages for interview transcription but that infrastructure needed to be improved to offset the cost of using mobile phones. However, they did not recommend any frameworks that would succeed when switching from face-to-face methods to online or the phone.

Researchers in one study who faced challenges from weather and distance joined four groups via telephone and another via video conferencing (Mollman et al 2022). The researchers ended the video group as people found it too intrusive. This suggests a project can remain viable if it uses the phone when there are barriers to face-to-face meetings or digital technologies (Mollman et al 2022).

We were concerned we would not be able to collect accurate data if the collaborative environment created through face-to-face rapport in the workshops could not continue. But our search of the

literature found telephone calls had aided an intervention programme for pregnant women, as only minimal effort was required for this busy cohort to participate (Ekambareshwar et al 2018).

We were encouraged by Ekambareshwar et al's (2018) success, so amended our processes for recruitment and data collection – we switched from recruiting and conducting surveys and group workshops face-to-face to recruiting and conducting surveys by phone and holding workshops online or over the phone. The human research ethics committee that originally approved the study supported the change in protocol.

We continued to use the PD principles we applied during face-to-face workshops, when we communicated with participants online or by phone. This helped us overcome the challenges of recruitment and data collection during the COVID restrictions.

Table 4-4 Practice Development (PD) principles used pre & post-COVID-19.

Practice Development (PD) principles (Manley et al., 2021)		
Principle	*Definition*	*How principles were used in the study*
Principle 1	Use of person-centred approaches to promote safe and effective cultures where all people flourish	Focussing on the experiences of the individual, understanding breastfeeding support in this institution, and asking women for their ideas for change, achieved via face-to-face and telephone-based workshops.
Principle 2	Involves collaborative, inclusive and participatory (CIP) approaches	Respect for other's stories - orchestrated by encouraging all women to share their story with respectful group discussion irrespective of face-to-face or telephone-based workshops.
Principle 3	Encourages blending of creativity with learning to achieve new ways of thinking, doing and being within groups	Embraced creativity in face-to-face workshops with post-it notes for participants to express and sort their experiences and ideas for change as a group. During telephone groups, using visualisation during covid restrictions allowed for group reflection and sharing of stories which enabled ideas to flow to solve perceived problems.
Principle 4	Utilises active work-based learning to facilitate individual, practice and cultural transformation	Working with users of a health service, we encouraged verbal sharing of individual antenatal clinic experiences. Data collected in surveys during recruitment were used to for insight and further reflection during groups irrespective of face-to-face or telephone-based workshops.
Principle 5	A facilitated process seeking to promote critically informed action	Verbal negotiation within groups defined where participants believe they are (what is happening now), where they would like to be (what they think should happen), and the process they believe needs to happen to achieve this (ideas for change), thinking critically about what may or may not work, and why. This was achieved irrespective of face-to-face or telephone-based workshops.
Principle 6	Use of inclusive evaluation to integrate evidence from process and outcomes	Inclusive evaluation ensured recruitment survey data was available to be discussed within all workshops (face-to-face and telephone-based). All participants shared stories for collective agreement, drawing themes from women's stories for evidence to design interventions.
Principle 7	Supportive relationships to stimulate effective change	Focusing on the relationships and shared experiences of women participating in all groups allowed for trust to be developed and respect for each other's stories irrespective of face-to-face or telephone discussions.
Principle 8	Defines PD as a complex methodology that uses a variety of evidence to	Researchers brought evidence from literature, women's surveys (from recruitment) and stories/recommendations for change from previous groups into workshops to help women

	inform transformation for individuals, teams, and systems	feel heard, enabling collaboration and participation for ideas for transformational change.

4.8.4 Method

Phase one

Pre-pandemic

Recruitment and data collection commenced face-to-face in January 2020. We exhibited posters around the antenatal clinic at the research site that invited people to participate in the study. We also used convenience sampling to recruit participants – researcher LC, a midwife, spoke to women attending high-risk antenatal hospital appointments, ascertained their GDM status before explaining the study to them, and asked them if they were interested in filling in a survey.

The survey collected demographic information from the participants we recruited, as well as information about their attitudes to breastfeeding, their confidence in breastfeeding and the support they received from family and caregivers. We based the survey on the Breastfeeding Attrition Prediction Tool (BAPT), which is a validated instrument for predicting beliefs about breastfeeding that contribute to its cessation by eight weeks postpartum (Gill et al 2007).

The survey asked participants if they consented to participate in the broader study and provide access to their postnatal breastfeeding information through hospital data. It also asked them if they were interested in participating in a group workshop in the second phase of the study to further explore their experiences of breastfeeding support at the hospital.

We received 30 responses to the survey in the first three months of the first phase. Recruitment was low, as only a few women with GDM attended the high-risk clinic on any given day. Research field notes from that time also captured: 'Women don't seem to be interested in participating if they have to come back on another day – even if we include lunch.'

Post-pandemic

We had hoped to recruit another 120 participants, and when COVID-19 restrictions were introduced in March 2020 we amended our protocol so we could instead recruit by telephone. The hospital gave the researcher a list of women with GDM and their contact details. She provided them with information about the study and a link to the participant information sheet. She also asked them if they would like to answer the survey questions over the phone, as well as give verbal consent to participate in the broader study and the group workshops.

We approached 128 women with GDM between April and May 2020, 94% of whom (n=120) answered the phone and consented to participate in a telephone based survey. We asked the first 40 of those who consented if they would participate in a workshop sometime in the following three months. All those we invited agreed to join the workshop if they were available at the scheduled time. We recruited enough participants for our study using this revised method.

Phase two

The researcher re-contacted those participants in the first phase who had consented to take part in the second phase, to ascertain whether they were available for a workshop on a particular day. Consent was implied if they attended a workshop.

We facilitated the workshops to be CIP and used PD principles to ensure the group facilitator (LC) had a guide for engagement and participation for all participants. LC had been trained to incorporate PD principles to facilitate inclusion, participation and collaboration. She kept descriptive field notes in a journal after each workshop to enable reflection and learning between workshops.

Pre-pandemic

We ran four face-to-face groups between January and March 2020. Participants used Post-it notes and craft items in the workshops to creatively share stories and arrange ideas into what they thought could be achieved to improve support for women with GDM. A shared respect for other people's stories and discussions of critically informed ideas for negotiating with healthcare services for change facilitated supportive group dynamics through inclusive and collaborative participation. Eleven women agreed to attend these workshops, so no group had more than three participants. Table 4-5 (p.87) shows attendance at the workshops.

Post-pandemic

LC continued to facilitate the workshops post-pandemic and to use the PD framework for group discussion. Group telephone calls were the main method of holding workshops during this period, with workshop participants added to a group call at a set time. The workshops used forms of creativity different from those used in face-to-face workshops. Participants were instead asked to imagine various scenarios, such as what 'great support from the hospital' looked like to them.

Eighteen of the 40 women who consented to participate were available for telephone based workshops and attended. The largest group had four participants.

We attempted to hold an online workshop in April, but only one participant could attend, so we gathered her thoughts through an interview instead. Participants were predominantly unable to take

part in online workshops because schools were closed and many women had children who were using the family's only computer or internet 'budget' for lessons. But phones gave participants the flexibility to participate in workshops wherever they were at the time, whether they were home-schooling, working, studying, or attending pregnancy or diabetes appointments at hospital or through telehealth at home.

As Olive explained in the sixth workshop: '*I would not have been able to do an online workshop during school time, but I can sit beside the kids while they do school [on our computer] and talk to you on the phone*.' Table 4-5 (p.87) shows attendance at the online interview and phone workshops.

Use of PD principles in AD-MIRE

Principle one

Using a person-centred approach facilitated an environment in which women felt they were listened to and understood, whether groups were face-to-face or telephone-based. Feelings of respect were strengthened during our telephone-based groups as women took turns to tell stories and felt open to sharing ideas for service improvement in a safe environment. Some participants in groups conducted over the phone felt they were '*more likely to answer questions*' (Zena).

Principle two

CIP approaches facilitated the establishment of trust and rapport between participants and researchers to support idea-sharing and reflection in all groups. This empowered participants to create potential interventions for sustainable and transformational change for improved breastfeeding support. The researcher noted in her journal after the May workshop that '*across all groups… women have opened up about their shared experience, supported each other and have a real interest in working together (with me) to improve… breastfeeding*'.

Principle three

Facilitating creativity through imagination supported participants' engagement. The use of Post-it notes in face-to-face workshops enabled participants to express and sort their experiences and ideas for change as a group.

The researcher was mindful of person centred facilitation during the telephone workshops, including active listening and acknowledgement of individual stories. This developed a sense of mutual trust and support to foster collaboration within the small groups. The telephone also offered participants a sense of anonymity that made them feel able to divulge information: '*It's a bit more anonymous as a phone*

call. I'm always a bit shy with people watching me, I think I'm more likely to answer questions if I'm not in front of a lot of people.' (Zena)

Table 4-5 Workshop attendance

	Workshop	Mode	Month held (2020)	Number of participants	Pseudonyms
Prior to the COVID-19 pandemic	1	Face-to-face	Jan	2	Amy, Bea
	2	Face-to-face	Feb	3	Candice, Diedre, Ellen
	3	Face-to-face	Early -March	3	Fran, Grace, Heidi
	4	Face-to-face	Mid-March	3	Ida, Jill, Kylie
During the COVID-19 pandemic	5	Telephone	End March	2	Lucy, Meg
	Interview	Online virtual (videoconference)	April	1	Nat
	6	Telephone	April	4	Olive, Peta, Rose, Sue
	7	Telephone	May	3	Taylor, Robyn, Vera
	8	Telephone	June	2	Yasmine, Zena
	9	Telephone	July	4	Ashli, Emma, Katie, Audrey
	10	Telephone	Aug	3	Charlotte, Harri, Nina

Principles four and five

Sharing similar stories and experiences also contributed to group trust, as similar ideas to improve hospital maternity services were gathered across the workshops (Cummins et al 2022). We found the use of creativity particularly supported collaboration, inclusion and participation when we asked participants to imagine scenarios and describe their feelings regarding the support for breastfeeding they initially felt and what they thought should be happening (principle five).

Person-centred and inclusive approaches to discussion during recruitment telephone calls and workshops fostered feelings of support for participants to contribute to the study. Respectful discussion and taking turns to speak within groups cultivated collaboration and participation as well as reassuring researchers, as this field note shows: '*I didn't have to worry about the non-face-to-face communication today – women chatted about their experiences, both good and bad. Everybody readily shared a story and reflected together to offer ideas for the hospital to provide better support.*'

Principles six, seven and eight

We shared relevant research literature, data from the surveys and ideas from previous groups to ensure actions for change were critically informed and agreed on in the workshops. Common themes for improved hospital support were shared across workshops – for example, asking for one main carer: '*I*

think it would be great to see one person all the way through' (Fran) [as women would] '*rather have one person that knows you and your situation.*' (Taylor).

Suggestions from the group were recapped at the end of workshops to confirm the women's ideas for change. Table 4-4 (p.83) outlines how we applied each of the eight PD principles in the second phase, including changes implemented before and after lockdown to encourage group dynamics supporting discussion.

4.8.5 Results

We collated the data from the surveys in an Excel spreadsheet and analysed them to calculate the BAPT scores and percentages for women's attitudes and confidence. We used Braun and Clarke's (2006, 2020) six phases of reflexive thematic analysis to analyse the workshop data, as this provided a flexible guide to developing a valuable and comprehensive account of women's experiences. We correlated new data after each group workshop, allowing for new themes to evolve.

Data saturation occurred soon after telephone groups commenced, which further confirmed for us that we could maintain PD principles in telephone-based as well as face-to-face groups. We analysed the richness of participants words in monthly meetings and found no differences between the main messages and depth of information disclosed in workshops before or after COVID-19 restrictions. For example, women having their first babies were concerned about a lack of helpful breastfeeding information from staff. Ida said in the fourth workshop, '*None of the paperwork I've been given has been very helpful really*,' while Yasmine suggested in the eighth workshop, '*Paperwork is good to read but I need real practical help'*.

The wish for more breastfeeding support was also evident from women who had previously breastfed. Bea suggested in the second workshop that women like her '*need more help with breastfeeding'*, while Olive stated in the sixth workshop: '*Support is needed in every pregnancy not just because it's your first or your fifth but every pregnancy is different and every baby feeds differently*.'

We observed no new themes after the sixth workshop. This suggests no new data or themes would have emerged if there had been more than ten workshops with additional participants (Guest et al 2006). It also suggests that women with GDM were similarly engaged in group discussions when PD principles supported the facilitation of groups (Table 4-4, p.83).

4.8.6 Discussion

Contact during lockdown

We had assumed pre-pandemic that women with GDM would agree to participate in AD-MIRE as a way of improving maternity services for other women with GDM. However, it became evident that they were busy with extra diabetes-related appointments on top of the usual antenatal visits and other commitments such as caring for small children, work and study.

Ida, who attended the fourth face-to-face workshop, commented: *'I have all these appointments and I'm juggling home life, work and uni and it's… interesting!*' We were then surprised during the pandemic to find more women agreed to participate in our survey over the phone than had agreed face-to-face. This was despite the fact the only additional incentive to participate was not having to make a trip to the hospital. It also showed the importance to participants of being heard or able to talk to others during lockdown. For example, Lucy said during the fourth workshop: '*She's not a professional like a midwife or anything so I've been talking to her and my mum but I don't know how helpful that is*.'

We considered whether this fourfold increase in recruitment was potentially also due to the person-centred discussion enabled by our PD framework. Pregnant women felt increased anxiety, fear and isolation due to COVID-19 societal lockdowns (Ceulemans et al 2020, Sakalidis et al 2021, Wilson et al 2022).

Our focus groups offered pregnant women the chance to talk to a midwife to reduce any fears about how COVID-19 might affect their pregnancies, when they were restricted from seeing other health professionals. As Lucy said: *'It's a bit scary, this COVID thing*.'

Seeking safe passage

Our participants' enthusiasm for meeting with a midwife-researcher and other pregnant women with GDM at a time when opportunities for human contact inperson were abruptly and severely reduced could also be attributed to two factors.

1. Having a midwife-researcher as facilitator for the groups. This may have given women a sense of security in times of increased anxiety, in case any questions about their care were raised (which did not occur).

2. Rubin's 'tasks of pregnancy'. Rubin (1976) theorised that a pregnant woman enacts four motivational behaviours to minimise threats or harm to herself and her unborn child. The first of these is 'seeking safe passage' for herself and her new baby – trying to obtain prenatal care from 'every form

available', such as reading, watching films and television programmes (Rubin 1976), or talking with other women who have experience in childbearing and consulting with maternity care professionals.

Rapport

It appeared the person-centred approach also fostered the establishment of trust. Sue said: 'It's always nice to hear… from the people… you can trust.' Participants believed the researcher wanted to help them and COVID-19 uncertainty meant they were willing to participate in the research to talk to a midwife when they had limited access to hospital staff. For example, Lucy said: '*You don't know whether the rules will change.*'

The small size of the workshops meant participants quickly developed a rapport with each other. The participants shared the bonds of a pregnancy complicated by GDM and working towards a common goal, which meant they felt they were assisting the researcher to improve services for other women. As Bea said in the first workshop: '*It's got to change*.'

Workshops conducted by phone were well attended, as they offered women the flexibility to attend from any setting. Some participants were more forthcoming and frank when they could be anonymous and share stories honestly over the telephone.

Authentic engagement

It has become common for research studies to use videoconferencing when face-to-face recruitment or data collection is impossible for any reason. Online methods present challenges in developing rapport and trust for information gathering (Weissman et al 2020, Strangfeld 2022). But we found we could maintain authentic engagement with groups of busy participants, by using the phone in conjunction with PD principles for recruitment and to collect data.

PD principles offer researchers new ways to enable engagement, collaboration and reflection among participants when face-to-face research methods are unavailable. They gave us a framework for eliciting knowledge in interviews and focus groups in which participants felt heard and were willing to take part; this was true regardless of interaction mode – the rich data we derived in this study were not compromised by moving from face-to-face to telephone-based group discussions (Cummins et al 2022).

Redesigning our study to incorporate telephone-based recruitment and data collection workshops during COVID-19 restrictions was not detrimental when we used PD principles to promote authentic engagement. Recruitment numbers for initial surveys were greatly improved with telephone calls to isolated women, all of whom agreed to participate in the broader study and to be contacted for participation in a telephone-based workshop.

PD principles supported our study's participants in openly discussing shared experiences of breastfeeding support at hospital. They could also reflect within their groups respectfully and collaboratively to suggest ways in which the hospital could provide improved support for women who have GDM. This was true irrespective of the method of data collection.

Use of PD methodology in this study showed person-centred and CIP principles could be maintained whether groups met face-to-face or via telephone. This highlights the importance of PD processes when researchers need to engage their participants to identify shared experiences to strive for improved evidence-based outcomes in any context (Manley et al 2011). Facilitation of focus groups that are not conducted face-to-face may result in valuable ideas for transforming health services, as there are still difficulties in face-to-face recruitment and data collection despite COVID-19 restrictions no longer being in place.

4.8.6 Conclusion

PD principles can offer ways for nurse researchers to engage, collaborate with and reflect with people for research projects, including when constraints compete with participation. They can also assist researchers in optimising and maintaining recruitment and data collection when face-to-face research methods are impossible.

4.9 Conclusion of chapter

This methodology and methods chapter outlined the aim, design and setting of the AD-MIRE Breastfeeding study, detailing the methods used for each phase and the ethical considerations. It also included a manuscript that was submitted to *Nursing Research* journal which explains how I dealt with COVID-19 pandemic restrictions that forced re-evaluation of recruitment and data collection methods mid-way through the study. The following two chapters describe the 2020 pre-intervention findings (Chapter 5, p. 93) and 2022 post-intervention findings (Chapter 6, p.116).

Chapter Five Findings: Pre-Intervention 2020-2021

5.1 Chapter introduction

The previous chapter outlined the aims, design, and methods of the AD-MIRE Breastfeeding study. This chapter is the first of two that will present findings from across the four phases of the study commencing with pre-intervention findings (2020-2021), including phases one and two of the study, and the next chapter (Chapter 6, p. 116) will present findings of phase three and four as the post-intervention findings (2022).

Beginning with phase one results, my report of the attitudes, confidence, and perceived support of women with GDM provide understanding of the challenges women with GDM face when intending to breastfeed at The Wollongong hospital (TWH). The phase two qualitative workshops are then presented as a peer reviewed publication that answers the question *What do women with Gestational Diabetes Mellitus want for breastfeeding support?*

5.2 Phase one – Background

Phase one of the study included three parts. In part 1, after evaluating the characteristics of the women in the study settings, 175 women with GDM participated in an anonymous survey to explore their attitudes, confidence, and perceived support regarding breastfeeding at The Wollongong Hospital (TWH). In part 2, I undertook a survey with staff (n=150) at the same hospital to capture attitudes and confidence to support women with GDM (June-July 2020). In part 3, baseline hospital data was collected to explore rates of exclusive breastfeeding (EBF) at discharge from hospital for women with GDM January-June 2020 (n=174), which was prior to implementing any change or intervention. I also analysed the hospital data on the same women at 6-8 weeks postnatal (n= 101) to check their breastfeeding attrition rates.

5.2.1 Findings of phase one- part 3: pre-intervention hospital data

To highlight the disparity in breastfeeding at TWH for women with GDM, the findings of phase one, part 3 are presented first in this chapter. With the hospital data collected during phase one, I compared the characteristics of all women who birthed at TWH between January and June 2020 (see Table 5-1, p. 94), and their infant feeding data (see Table 5-2, p. 95). At TWH in 2020, 15.8% women were diagnosed with GDM during their pregnancy (n= 174 GDM and n= 924 no-diabetes). Women with GDM were older (*p*

< 0.001), heavier $p < 0.001$), and less likely to have a normal vaginal birth ($p = 0.005$). They were also more likely to intend to feed their babies formula ($p = 0.007$). Women with GDM are therefore significantly less inclined to feed their babies breastmilk, where 10.9% intended to exclusively formula feed their babies compared to 4.9% of women with no-diabetes ($p = 0.007$).

Table 5-1 *Characteristics of women birthing at TWH Jan-June 2020*

Characteristics of women who birthed at TWH (birthed Jan-Jun 2020) n= 1098	2020 GDM n (%) 174 (15.8)	2020 No-diabetes n (%) 924 (84.1)	2020 GDM vs no-diabetes *p*
Country of birth			
- Australia (no ATSI)	126 (72.4)	702 (76.0)	NS
- ATSI	10 (5.7)	56 (6.1)	
- Asia	17 (9.8)	59 (6.4)	
- European	4 (2.3)	39 (4.2)	
- Middle Eastern	4 (2.3)	18 (1.9)	
- Pacific	4 (2.3)	17 (1.8)	
Maternal age			
- 24 years or less	15 (8.6)	138 (14.9)	0.027
- 25-35 years	111 (63.8)	637 (68.9)	0.181
- 36 years or older	48 (27.6)	149 (16.1)	<0.001
Parity-			
Primiparous	55 (31.6)	404 (43.7)	0.003
multiparous	119 (68.4)	520 (56.3)	0.003
Smoking	30 (17.2)	137 (14.8)	0.416
BMI			
- Healthy weight (18.5-24.9)	43 (24.7)	485 (52.5)	<0.001
- Overweight 25.0-29.9	52 (29.9)	222 (24)	0.101
- Obese ≥30	74 (42.5)	184 (19.9)	<0.001
Feeding Intention			
- Breastfeed	145 (83.3)	826 (89.4)	0.006
- Mixed feed	0	10 (1.1)	0.168
- Formula	19 (10.9)	44 (4.8)	0.007
Continuity of Care Model	66 (37.9)	396 (49.2)	0.227
Induction Of Labour	89 (51.1)	398 (43.1)	<0.001
Type of birth			
- Normal vaginal birth	80 (46)	532 (57.6)	0.005
- Instrumental birth	21 (12.1)	104 (11.3)	0.757
- Emergency Caesarean birth	29 (16.7)	286 (31)	0.024
- Elective Caesarean birth	43 (27.4)	156 (16.9)	<0.001
Complications during pregnancy			
- Endocrine disorder (non-diabetes)	43 (24.7)	123 (13.3)	<0.001
- Haematological	19 (10.9)	133 (14.4)	.223
- Respiratory	25 (14.4)	182 (19.7)	.099
- Hypertension	7(4)	34 (3.7)	.872
- Mental Health	60 (34.5)	292 (31.6)	.455

While continuity of one main caregiver through pregnancy was provided to just over one third of women with GDM, almost half of the pregnant women with no-diabetes received this type of care. Women with GDM are also more likely to have their labour induced (51.1% GDM vs 43.1% no-diabetes, $p < 0.001$) and have a caesarean birth; elective caesarean (27.4% GDM vs 16.9% no-diabetes, $p < 0.001$) or emergency caesarean (42% GDM vs 31% no-diabetes, $p = 0.024$).

Baseline breastfeeding data (see Table 5-2) showed a significant disparity between infant feeding rates for women with GDM compared to women with no-diabetes at TWH. Significant differences are shown for breastfeeding at birth where 10% less women with GDM exclusively breastfeed at birth ($p < 0.001$) or give any breastmilk at birth ($p = 0.003$). Subsequently, more infant formula is given to babies of women with GDM at birth ($p < 0.001$). Ten percent less women with GDM also exclusively breastfeed on discharge from hospital (68.4% GDM vs 78.4% no-diabetes, $p = 0.014$) with almost one in five (19%) women with GDM exclusively formula feeding their babies compared to 13.5% of women with no-diabetes on discharge from hospital. Rates of timing of the first feed within the first hour of birth with skin-to-skin were similar (73% GDM vs 70.5% no-diabetes, $p = 0.657$).

Table 5-2 *Women with GDM vs no-diabetes - TWH infant feeding data for Jan-June 2020*

Breastfeeding practices at TWH (2020 – pre-intervention)	GDM n=174 n (%)	No diabetes n=924 n (%)	*p* value
First feed (skin-to-skin) < 60 minutes	127 (73)	651 (70.5)	.657
Feeding method at birth			
- Exclusive breastmilk	124 (71.3)	750 (81.2)	<0.001*
- Breastmilk and formula	6 (3.4)	6 (0.6)	<0.001*
- Any breastmilk	130 (74.7)	756 (81.8)	0.003*
- Any formula	33 (19)	79 (8.5)	<0.001*
- Only formula	28 (16.1)	73 (7.9)	<0.001*
Feeding method at discharge			
- Exclusive breastmilk	119 (68.4)	724 (78.4)	0.014*
- Any breastmilk	141(81)	799 (86.5)	0.061
- Any formula	55 (31.6)	200 (21.6)	0.061
- Only formula	33 (19)	125 (13.5)	0.004*
* significant Pearson Chi-Square $p < 0.05$			

5.2.2 Findings of phase one- part 1: Survey of women with GDM

One hundred and seventy-five women with GDM completed an anonymous BAPT survey which explored women's breastfeeding attitudes, confidence, and perceived support using the Breastfeeding Attrition Prediction Tool (BAPT). If women consented, I collected their follow-up hospital data at 6 to 8 weeks postpartum.

Women's responses to the breastfeeding attitude questions (see Figure 5-1) showed women with GDM knew breastmilk was healthy for their baby (95%), however only 57% thought breastfeeding was *better* than infant formula. Over one third women with GDM thought breastfeeding was more time consuming than formula feeding and one in four women thought formula feeding mothers got more rest than breastfeeding mothers. Almost half of the mothers did not know whether their baby was getting enough milk if they breastfed (46.6%) and thought returning to work was made more difficult by breastfeeding (53.4%).

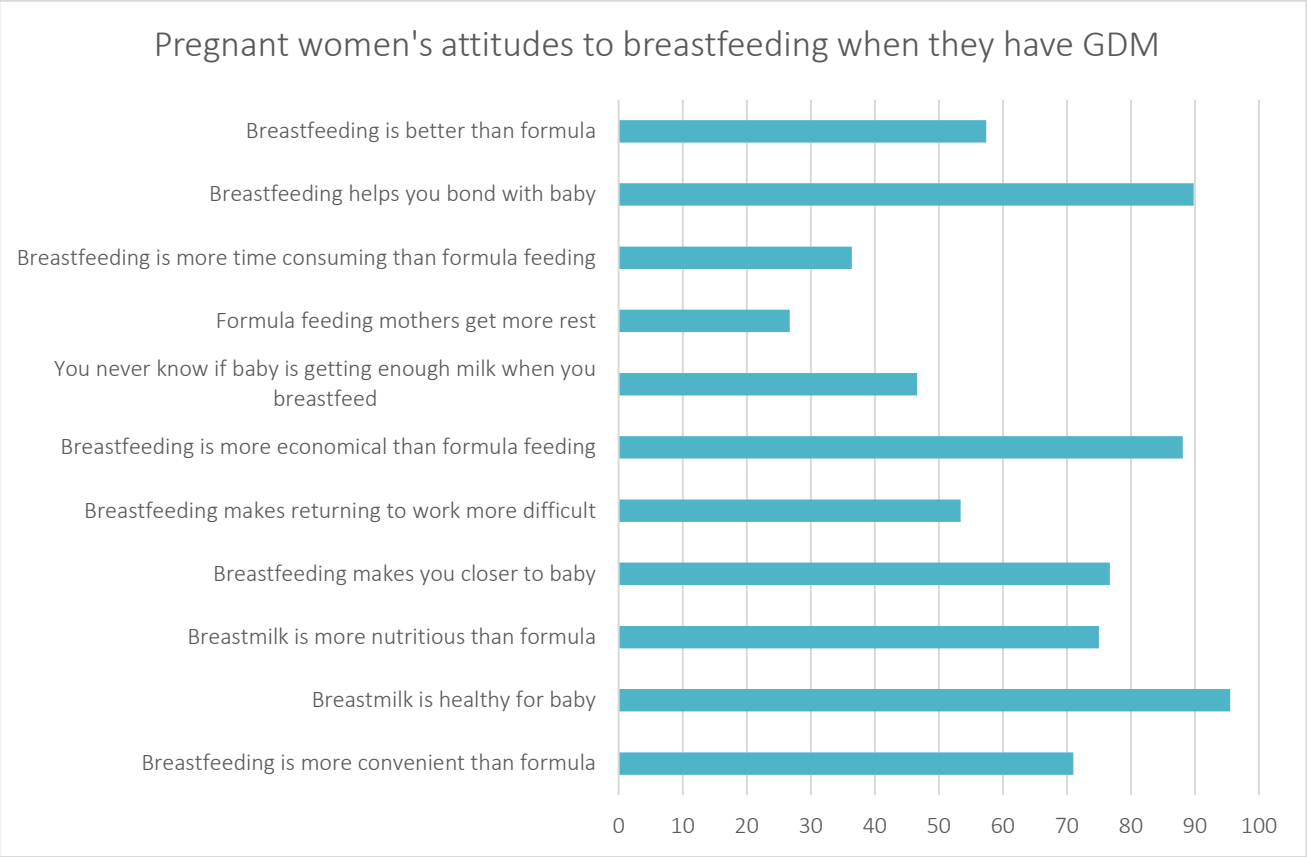

Figure 5-1 *Attitudes to breastfeeding (women with GDM)*

Breastfeeding confidence responses (see Figure 5-2, p.97) showed that overall, women with GDM were determined to breastfeed (80%) and thought they were physically able to breastfeed (79%). However only two thirds (67%) women were confident they could breastfeed and just 20% thought breastfeeding was easy. Most women (82%) felt they would need help to achieve their breastfeeding goals.

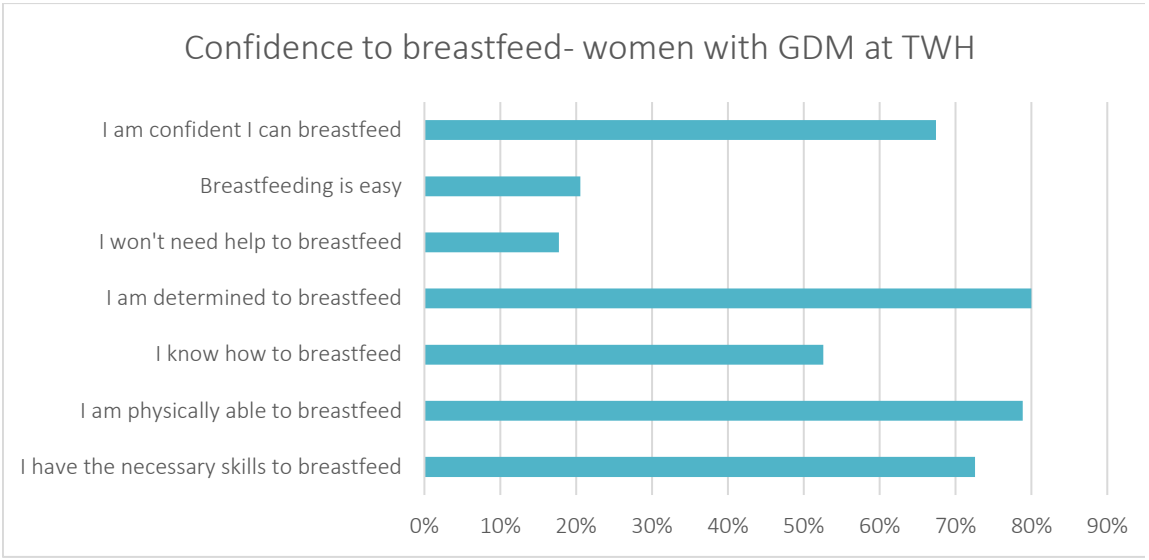

Figure 5-2 *Confidence to breastfeed - women with GDM at TWH*

Less than half of women with GDM felt supported to breastfeed (see Figure 5-3) by their caregiver (noted as 'doctor') and family members, including the baby's father. Only one in 3 women felt supported by a sister or mother-in-law to breastfeed.

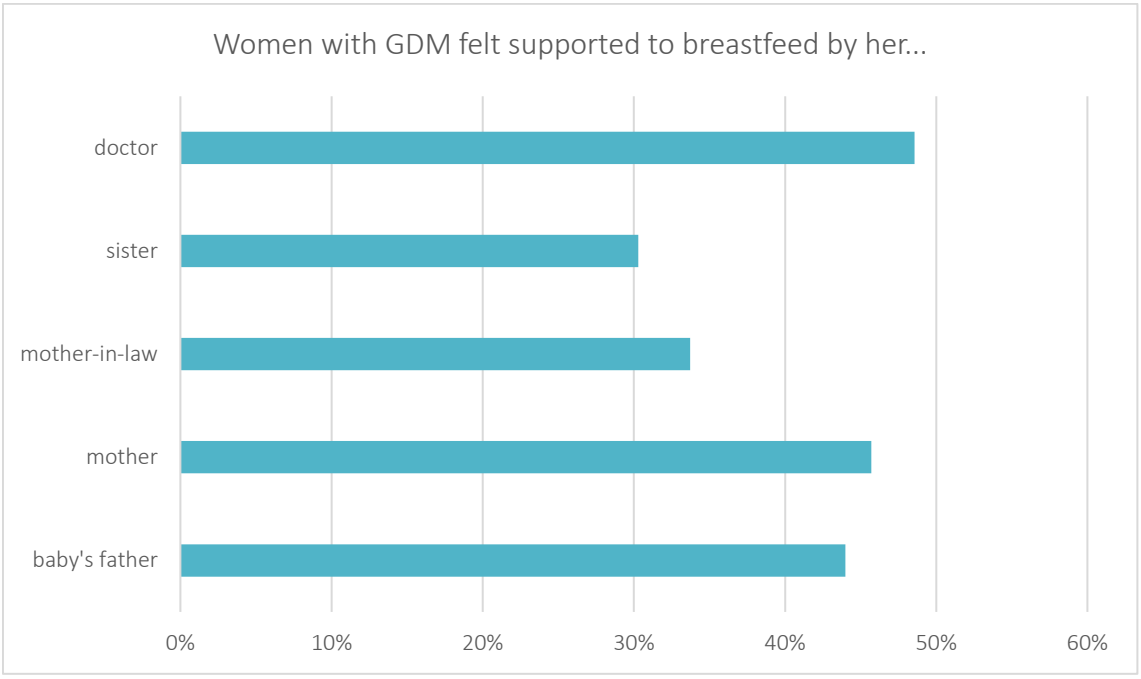

Figure 5-3 *Women with GDM felt supported to breastfeed by her …*

5.2.2.1 Breastfeeding attrition risk.

Forty percent of women with GDM at TWH had a BAPT score 20 or less indicating the need for extra support (see Figure 5-4). This suggests that two out of every five women with GDM felt they would require significant support to breastfeed in the first eight weeks after birth.

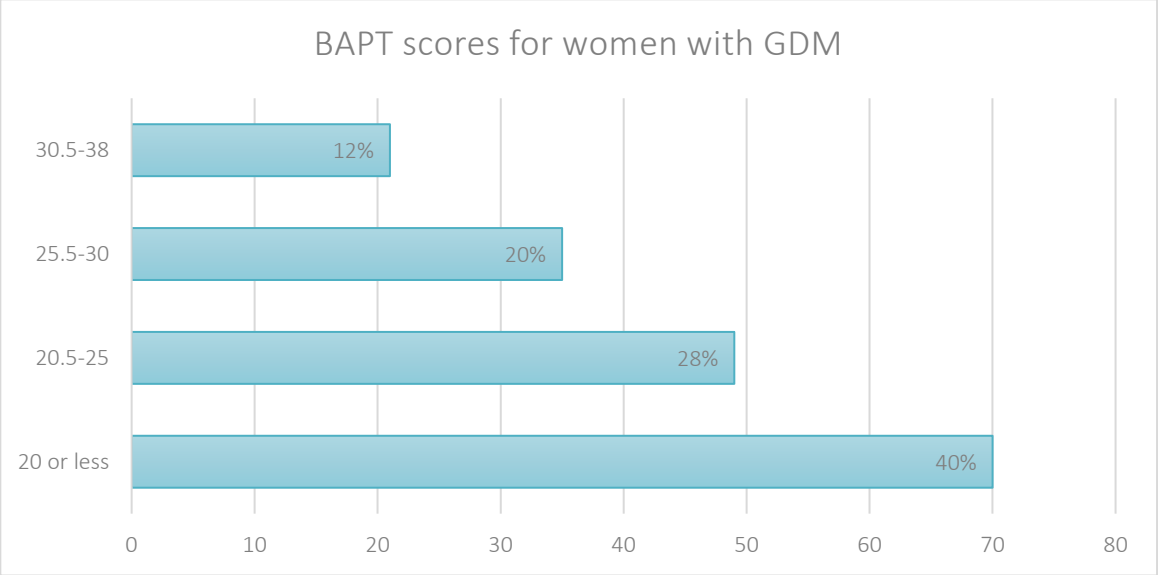

Figure 5-4 *Breastfeeding Attrition Scores for women with GDM at TWH (n=175)*

Postnatal follow-up

One hundred and fifty women with GDM consented to postnatal follow-up of infant feeding practices via hospital records, which were available if they attended Child and Family Health services. Data was available for 67% (n=101) participants at 6-8 weeks after discharge from TWH (see Table 5-3, p.99) and a BAPT score was calculated from the survey answers. One hundred percent of women who scored over 30 in their BAPT were still breastfeeding at 6-8 weeks post discharge. Over two thirds women who scored 20.5 to 30 (score 20.5-25, 62% and score 25.5-30, 70%) were still breastfeeding at 6-8 weeks postnatally, however in stark contrast, only 21% (n=8) of women with a BAPT score of 20 or less were still breastfeeding at 6-8 week postpartum.

Table 5-3 *6-8-week postnatal infant feeding and BAPT scores*

Breastfeeding women with GDM	BAPT 0-20 n=38 n (%)*	BAPT 20.5-25 n=34 n (%)*	BAPT 25.5-30 n=23 n (%)*	BAPT 30.5-38 n=6 n (%)*	Total n=101 n (%)*
Intention to breastfeed	22 (58)	32 (94)	23 (100)	6 (100)	83 (82)
Exclusive BF at birth	21 (55)	30 (88)	19 (83)	4 (67)	74 (73)
Any breastmilk at birth	22 (58)	30 (88)	19 (83)	6 (100)	77 (76)
Exclusive BF at discharge from hospital	15 (39)	26 (76)	19 (83)	5 (83)	65 (64)
Any breastmilk at discharge from hospital	20 (53)	30 (88)	22 (96)	6 (100)	78 (77)
Any breastfeeding 6-8wks postnatal	8 (21)	21 (62)	16 (70)	6 (100)	51 (50)
** Breastfeeding Attrition (Cessation at 6-8 weeks postnatal)	(20-8)/20 60%	30%	27%	0%	27%

* Percentages given from total participants within each column

** Calculated as percentage of attrition from any breastmilk at discharge in BAPT score group, to any breastmilk at 6-8 weeks postnatal

5.2.3 Findings of phase one- part 2: Survey of staff at TWH

Between July-September 2020, I surveyed staff who inform and support women with GDM regarding breastfeeding, from Diabetes services (n=10), GPs (n=49), nurses (n=21) and midwives (n=70) (see Table 5-4, p.100). Generally, staff had positive attitudes to breastfeeding, with only 4% revealing they do not know how much milk baby is getting if breastfed and 87% believing breastfeeding is better than formula feeding or is more nutritious (90%) for babies.

However, when staff were asked about their confidence to support women with various aspects of breastfeeding support, only 13% believed women with GDM need extra support to breastfeed. Less than half of surveyed staff (43%) believe systems are in place at the hospital for women to exclusively breastfeed on discharge from hospital. Less than 80% of staff were confident discussing how to manage low supply, frequent feeds after birth, hand expressing, finger feeding, or knowing community supports outside the hospital to assist with breastfeeding after discharge from hospital.

Table 5-4 *Staff surveys*

Staff surveys- n=150 **Agree with statement…**	**Staff** **n (%)**
Staff attitudes	
Breastmilk is healthy for baby	150 (100)
Breastmilk is more nutritious than formula	136 (90.7)
Breastfeeding makes you closer to baby	125 (84)
Breastfeeding makes returning to work more difficult	54 (36)
You never know if baby is getting enough milk when you breastfeed	6 (4)
Formula feeding mothers get more rest	26 (17.3)
Breastfeeding is more time consuming than formula feeding	24 (16)
Breastfeeding helps you bond with baby	143 (95.3)
Breastfeeding is better than formula	131 (87.3)
Staff support	
Women with GDM have more problems with breastfeeding	19 (13)
I offer more breastfeeding assistance to women with GDM	29 (19)
This hospital has systems in place to help all women to exclusively breastfeed on discharge from hospital.	65 (43)
I am confident discussing … with women who have GDM	
finger-feeding expressed breastmilk	86 (57)
hand expressing	114 (76)
machine expressing	120 (80)
I can tell when a baby is attached / positioned well to breast	119 (79)
baby to breast within an hour of birth	130 (87)
skin to skin in the first hour	133 (89)
breastfeeding 8-12 times in 24 hours	120 (80)
feed hourly (frequent feeds) for 3-4 feeds until BSL stable	108 (72)
I can tell when milk is being transferred to the baby	121 (81)
I can work with a woman to manage low supply	116 (77)
I know what community supports are available for breastfeeding and tell women about them	111 (74)

5.3 Phase two: Participatory workshops

Phase two aimed to explore the experiences and challenges faced by women with GDM regarding antenatal breastfeeding support and discover their recommended strategies for change. Over ten qualitative workshops, this phase explored the experiences of 30 women with GDM regarding their antenatal breastfeeding support at TWH. During the workshops, the women also developed strategies for change. The strategies would be shared with staff at TWH during phase three.

The findings of phase two are represented as a published paper. Careful consideration was given to the purpose of the paper and intended audience, and this led to my decision, made together with my supervisors, to submit it to a journal with a relatively low impact factor (0.63) but with the reach to readers that would find the information directly useful for their practice. Despite an impact factor of 0.63, I decided to publish this qualitative paper with Breastfeeding Review as it is the journal for the Australian Breastfeeding Association with a wide audience of community peer-support counsellors and community educators, and breastfeeding mothers across Australia. Permission to share the publication in its entirety was given from *Breastfeeding Review:*

Cummins, L., Wilson, V., & Meedya, S. (2022). What do women with Gestational Diabetes Mellitus want for breastfeeding support? A participatory action research study. *Breastfeeding Review*, *30*(3), 27-36.

Permission to reproduce this paper in my thesis is available in Appendix N (p. 206).

5.3.1 What do women with Gestational Diabetes Mellitus want for breastfeeding support? A participatory action research study.

Abstract

Mothers who have Gestational Diabetes Mellitus and their babies have higher risks for developing health conditions after birth which may be mitigated by breastfeeding. However, despite help from health professionals, these women do not breastfeed as often as pregnant women without diabetes. Asking women with Gestational Diabetes Mellitus for their recommendations for change regarding antenatal breastfeeding support may reveal essential areas for improvement. To explore the experiences of women with Gestational Diabetes Mellitus in relation to antenatal breastfeeding support and discover their recommendations for change, a participatory action research approach was used to generate meaning from the experiences of 30 women who participated in workshops in a regional Australian hospital. Key themes incorporated that women with Gestational Diabetes Mellitus feel marginalised and treated differently from other pregnant women. They believe breastfeeding is hard and are frustrated by inconsistencies in their care and the information they receive. Women with Gestational Diabetes Mellitus feel they would be better supported to breastfeed if hospitals provide

more consistent and relevant information with connections to other women. Digital breastfeeding educational resources such as a website and evidence-based links such as mobile phone applications and continuous professional support by one trusted caregiver throughout pregnancy would be better suited to support breastfeeding with their busy lifestyles.

Introduction

Gestational Diabetes Mellitus (GDM) is a common complication of pregnancy (Buchanan et al., 2012) that affected over 17 million births around the globe in 2019 (International Diabetes Federation, 2019). In 2020, Australia's National Diabetes Service Scheme (NDSS) reported that 114 women registered with GDM every day in Australia (NDSS, 2020), 12 more women per day compared to four years earlier (NDSS, 2016) and rates are expected to rise (International Diabetes Federation, 2019). According to a 2021 report in NSW, between 2015 and 2019 the numbers of women with GDM increased by over 5%, from 8.3% to 13.9% (Centre for Epidemiology and Evidence, 2021).

Mothers with GDM have unique challenges with breastfeeding that increase their risk of using infant formula at birth, such as delayed lactogenesis, perceived low milk supply and separation from infants due to neonatal hypoglycaemia (Cummins et al., 2021). Consequently, women with GDM do not breastfeed as often as women without diabetes (Cummins et al., 2021). In Australia, 64% of women with GDM exclusively breastfed in the 24 hours prior to hospital discharge compared to 80% for women with no diabetes ($p < 0.001$) (Chamberlain et al., 2017). Similar rates in the USA were 62.2% for women with GDM versus 75.4% for those with no diabetes ($p < 0.01$) (Haile et al., 2016). Breastfeeding support for this high-risk group of women is therefore important in the antenatal period to improve rates of breastfeeding (WHO, 2017b).

The Baby Friendly Health Initiative (BFHI) provides global guidance for institutions to improve breastfeeding rates around the world for all women, irrespective of diabetes status (WHO, 2017b). These initiatives have become part of hospital policies in Australia (NSW Health, 2018) which suggest facilities work toward BFHI accreditation and have processes in place to ensure antenatal women have tailored supportive breastfeeding information by 28 weeks gestation (BFHI Australia, 2020).

Mothers with GDM and their babies often have additional medical and physiological challenges that accompany the common co-morbidities of higher rates of obesity and advanced maternal age, affecting maternal outcomes, perinatal and neonatal morbidity, and perinatal mortality (Gray et al., 2018). Babies of women with GDM also have increased risk for developing obesity and type 2 diabetes (Bommer et al., 2017; Gray et al., 2018); and these risks can be lessened if the mother breastfeeds (Aune et al., 2013; Gunderson et al., 2015; Mitanchez et al., 2014). To influence behaviours such as breastfeeding initiation in hospital, evidence suggests that needs based supportive environments are required, where

women feel autonomous and empowered in their own decision-making (i.e., person-centred care) (Gillison et al., 2019). Antenatal education tailored to the individual needs of a woman with GDM, gathered from person-centred approaches, may be one way to find strategies which improve confidence and intention to breastfeed (Cummins et al., 2021). I aimed to explore the experiences of women with GDM regarding antenatal breastfeeding support and discover their recommendations for change.

Methods

Research design

Participatory action research (PAR) was considered the best approach due to the value it places on collaboration between researchers and participants to implement change. PAR studies enable action through reflective cycles where participants are empowered to determine actions for change to reduce health inequalities and improve health services (Baum et al., 2006). In this study, pregnant women diagnosed with GDM were recruited to participate in workshops to obtain a better understanding of their thoughts, concerns, and experiences in relation to their care and breastfeeding support in an antenatal clinic. Women were also invited to reflect on these experiences to uncover recommendations for change.

Methodological rigour

Confidence in the quality of our study was established through Lincoln and Guba's criteria for trustworthiness in qualitative research: credibility, dependability, confirmability, and transferability (Cope, 2014; Lincoln & Guba, 1985). Credibility (truth of data) was established by a midwife researcher who shared experiences of previous groups amongst workshops and confirmed consistency of information across participants. Dependability was established as researchers found data were replicated throughout workshops. Confirmability and transferability were established as ideas generated from a woman in one group were confirmed not only amongst others in that workshop, but also resonated within other workshops. Because of this, data saturation was quickly achieved. Reflexivity (holding researchers accountable) also adds value to this study as our research team brought different perspectives to data interpretation from various areas of nursing and midwifery. The rich words from women with GDM allowed researchers to analyse, reflect, interpret, and draw conclusions in monthly meetings until themes became apparent.

Setting

The study setting was a maternity service in regional Australia with around 2500 births per year. According to 2019 data, almost half the women were having their first baby, with an average stay of 2.4 days (Centre for Epidemiology and Evidence, 2021). The facility provides services for high-risk pregnancies including women with GDM. Routine care includes an antenatal clinic, 24-hour birthing and maternity units with home services four to five days postpartum, level-5 neonatal unit and after-hours on-call operating theatres (Centre for Epidemiology and Evidence, 2021). The clinical pathway at this hospital requires staff to encourage women with GDM to express colostrum from 36 weeks of pregnancy, called 'antenatal expressing' (ANE), to use to reduce the risk of neonatal hypoglycaemia after birth.

Recruitment and participants

Purposeful sampling was conducted from women attending a high-risk antenatal clinic who had a single pregnancy, were aged over 18 and diagnosed with GDM from November 2019 to July 2020. Women were recruited to participate in a workshop after completion of an anonymous survey as part of a broader study. Eligible participants for our workshops had attended at least one early-GDM education session with a dietitian or diabetes educator after their diagnosis (18 to 30 weeks) and intended to breastfeed. Women were reminded that they could withdraw from participation at any time without any effect on their pregnancy care.

Characteristics of the participants

Participants in the workshop intended to breastfeed and their mean age was 30 years. Most women (53%) were 29 to 35 weeks gestation when they participated in workshops, whilst 27% of women participated earlier, before 28 weeks gestation, and 20% of women participated later, between 36 and 40 weeks gestation. Of those who had participated in a workshop after 36 weeks, 50% had participated in an extra midwife led antenatal expressing (ANE) class (see Table 5-5, p.105)

Table 5-5 *Characteristics of participants*

Characteristic	Face-to-face (Dec 2019–March 2020) n=11	Group telephone (March–Sept 2020) n=19	Total participants n=30	Total participants (%)
Gravity				
Primiparous	4	7	11	37%
Multiparous	10	9	19	63%
Age range				
< 30 years	6	8	14	47%
≥ 30 years	5	11	16	53%
Gestation				
20–28 weeks	4	4	8	27%
29–35 weeks	5	11	16	53%
36–40 weeks	2	4	6	20%
Participated in:				
- Early-diabetes education (dietitian or educator)	11	19	30	100%
- extra 36-wk ANE midwife education	1	2	3	10%

Data Collection

Workshops were initially held face-to-face in a private room within the hospital (separate from the antenatal clinic) on days women attended the clinic. However, due to COVID-19 social restrictions in March 2020, telephone-based group workshops were implemented. Data were collected by one midwife-researcher. Group sizes ranged from one to four participants. Sessions lasted up to one hour and no incentive was offered to join groups. Open-ended questions were used to facilitate discussion around any breastfeeding support women had received during pregnancy and their ideas to improve this experience at the hospital.

Thirty women were able to attend workshops on allocated days and I ceased groups after 10 workshops. Data saturation was achieved after six workshops. However, women had been booked into subsequent dates and researchers felt it was important to respect women's intentions to participate. No new themes were observed, suggesting no new data or themes would be developed after the 10 workshops (Guest et al., 2006).

Ethical considerations

Workshops were conducted as part of a PhD study. Ethical approval was granted by the Research Ethics Committee in the research site and its affiliated university (ID number 2019/ETH12108).

Data analysis and interpretation

Workshops were recorded and transcribed by the first author who added pseudonyms to all notes. All files were kept confidential on a password-protected computer. Reflexive thematic analysis (see Table 5-6) was conducted following Braun and Clark's six phases of analysis (Braun & Clarke, 2006, 2020).

Table 5-6 *Phases of reflective analysis*

Authors familiarised themselves with data, immersing themselves in the words of women, searching for meaning and patterns within data and revisiting as more data became available.
Initial codes were generated from data extracted above; revisiting, adapting and collating codes until data collection was complete.
Potential themes developed from collected codes using mind-maps.
Themes reviewed as authors collaborated to draw meaning from extracts of women's experiences.
Themes defined and refined into sub-themes with associated narrative from extracts.
Further analysis of themes to provide a succinct and comprehensible account of the story presented by antenatal women with GDM.

When reporting findings, participants are identified by their pseudonym followed by two numbers signifying their pregnancy gestation (weeks) and the number of previous children, i.e., Amy (37/0) means the participant called Amy is 37 weeks and has no previous children.

Results

Analysis of the data generated four themes which demonstrated antenatal experiences of breastfeeding support for women diagnosed with GDM in a regional Australian hospital (see Figure 5-5, p. 107). Women felt stressed and worried by concerns and frustrations after a diagnosis of GDM, and felt their diagnosis caused them to be treated differently from other pregnant women. They believed breastfeeding was hard, compounded by an uncertainty of support for breastfeeding at the hospital through inconsistencies in breastfeeding information from various caregivers. On reflection, women offered ideas for what support they thought would help.

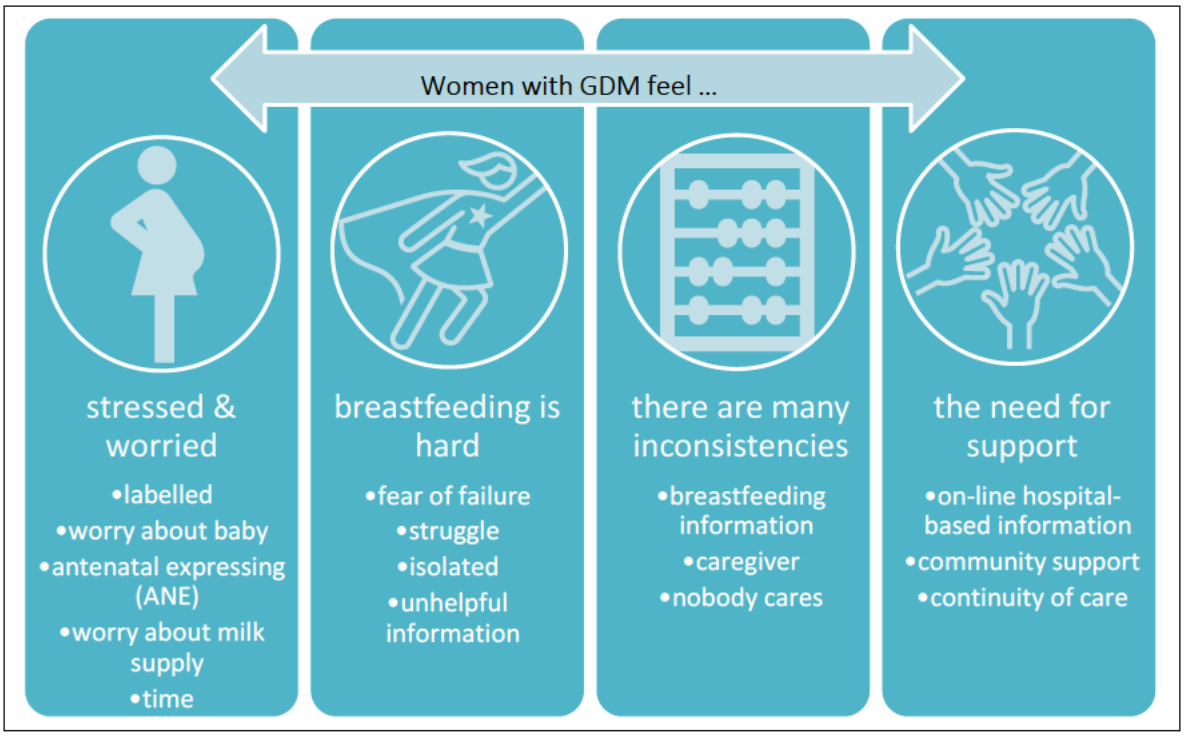

Figure 5-5 *Themes and associated sub-themes.*

Stressed and worried

Women with GDM felt they were treated differently from pregnant women without GDM, which precipitated stress and worry. They believed the 'label' from their GDM diagnosis caused more worry for their baby's health and for their perceived milk supply at birth. They were also concerned about the lack of time staff gave to them, particularly for breastfeeding support.

Women with GDM were aware their pregnancy was classified as 'high-risk' and that contributed to their feeling more stressed and anxious. Across all workshops, women felt '*there's almost like a stigma*' (Candice, 31/1). Fran (20/1) suggested '*I feel labelled … when I hear the words "high-risk", you think "bad", "danger", it gives me a certain level of anxiety that potentially something will go wrong*'. Women felt one of the reasons for the 'high-risk' label was to protect the health of their babies. Meg (35/0) shared, '*They (hospital staff) need to keep a closer eye on baby (therefore) you're treated differently*'.

The diagnosis of GDM contributed to women's stress and anxiety about their baby's health or size at birth. Grace (29/2) mentioned that she was '*worried about the diabetes, it's so overwhelming … is (my baby) going to be too big?*', while Taylor (33/2) stated, '*Everyone is worried about baby's size or my placenta and all that*'.

Additional concerns surrounded the potential for babies to have hypoglycaemia at birth and subsequently need additional milk feeds. At 37 weeks pregnant, Amy (37/0) suggested '*you get told*

that you could have problems (with breastfeeding) … baby might have problems with sugars (hypoglycaemia) … the milk might not come in straight away'.

At times, women shared negative opinions about ANE for either inducing labour or for their milk supply. Zena (37/2) was concerned about the safety of expressing, '*I've been told not to do that (ANE) because apparently it brings on labour*' while Lucy (30/0) was '*just a bit worried about if I can get anything (colostrum)*'. This highlights women still felt unsure about ANE and their milk supply even after early-GDM education. '*I think I have to do it (ANE); you sit there, and you get nothing, and you feel like a complete failure … they gave me all these syringes at 36 weeks and I'm like "OK I'll try", (I got told) "Don't be surprised if you don't get anything." I got nothing!*' (Ellen, 37/1)

Further stress and concern about milk supply was evident from all mothers. First-time mother Meg (35/0) was '*not going to go "what happens if I can't breastfeed?" … because I'm already stressed out as it is*' whereas Ellen, having her second baby (37/1) had '*mixed feelings (about breastfeeding) you know, anxious, fear … is everything gonna be okay? how am I gonna manage (milk supply)?*'.

Women's stress increased when they found staff too busy to make time to answer their questions. Asking staff for assistance with breastfeeding information was not considered helpful: '*they're always rushed*' (Yasmine, 34/0), '*the doctors just seemed too busy to answer medium or finicky questions*' (Nat, 36/0). Women accepted that staff were time-poor, Meg (35/0) sharing, '*I understand they're busy*' and Bea (33/4) observed '*they don't have time to help you*'. Opportunities for communication between women with GDM and staff is affected by the perceived lack of time, '*Sometimes you get rushed through really quickly, just get the booklets given to you, but you do not get any conversation around what's in the booklets*' (Peta, 32/2). Lucy (30/0) didn't know what questions to ask during her consultation, '*I really don't know what to ask the midwives 'cause I'm just so new*'.

Breastfeeding is hard

Women shared a perception that breastfeeding is hard and were overwhelmed by the subsequent stressors and worries that accompanied this awareness. They feared failure, assumed there is a struggle to succeed and felt isolated and unaware of how to find helpful information.

All participants intended to breastfeed and believed breastfeeding was important: '*I will kill myself trying to breastfeed this baby*' (Fran, 20/1); '*it's a no brainer*' (Peta, 34/2). Unfortunately, mothers also expected to fail due to perceived breastfeeding difficulties, '*Everyone I know has a go (at breastfeeding) but not everyone is successful*' (Charlotte, 20/0). Ashli (28/0) was '*a bit worried because I'm expected to breastfeed, but I also hear stories of failure all around me*'. After searching for additional information,

Emma (32/1) was not looking forward to breastfeeding a second time, explaining '*I've watched breastfeeding videos … it still looks terrifying and painful*'.

Feelings of stress were heightened as women navigated the effort required to manage perceived breastfeeding difficulties with limited support from hospital staff. Jill (26/1) stated, '*This is what your body is made for, and I just need to keep working harder and harder until that happens'* and Peta (34/2) '*struggled with breastfeeding each and every time … (but) I stuck with it*'. Breastfeeding was seen as an accomplishment to work toward, and women felt a pressure to 'succeed' as a determinant of parental competence, '*You feel guilty if you don't breastfeed so if you are struggling you feel like there's an assumption that you aren't a competent mother'* (Olive, 36/3).

Women felt they received little antenatal support for breastfeeding from staff, leaving them feeling isolated, '*I'm navigating my way through as I go'* (Peta, 34/2). At 28 weeks, Rose (28/0) had been '*told nothing'* about breastfeeding and by 36 weeks, Olive (36/3) stated '*I didn't have information given to me that I could physically use'*. First-time mothers close to birth felt '*in the dark'* (Meg, 35/0) and uncertain about what they need to know about breastfeeding: *'I don't know what I DON'T KNOW'* (Yasmine, 34/0 & Amy, 37/0).

Despite breastfeeding pamphlets given amongst pregnancy-related paperwork when women first booked into hospital, written material was perceived as being unhelpful, '*I got like 30 pieces of paper, and I actually chucked most of it to be honest because I just felt most of the information was not very helpful'* (Nat, 36/0). First-time mothers reported, *'It's a bit overwhelming when you're pregnant for the first time and you're given all these pamphlets and you're like, wow!'* (Meg, 35/0). Ashli (28/0) related *'I lose track of paper'* and Yasmine (34/0) stated, '*Paperwork is good to read but I need real practical help'*.

There are many inconsistencies

Inconsistencies in breastfeeding information and having different caregivers added to women's feeling that nobody cared about them. Women with GDM reported difficulties finding reliable information online and believed caregivers at the hospital were giving inconsistent advice or information.

The inconsistency in finding accurate and reliable online breastfeeding information left Robyn (33/2) feeling '*more confused, (you) get lost in all the information if you go through Google'*. Having her fifth baby, Harri (34/4) had '*been googling like crazy… it's been seven years since I had a baby, I remember some things, it's a bit hard to say what I need to know now, I've … bought a breast pump today!*'. Diedre (34/1) had also '*bought a pump this time 'cause I'm going to pump for her when I go back to work, but I don't know what I'm doing, I'm completely clueless*'.

Seeing different caregivers at pregnancy visits was a common inconsistency for women with GDM, amplifying feelings of stress and frustration, '*There's been a mixture of people. I don't think it's helpful at all*' (Taylor, 33/3). Ellen (37/1) stated, '*Seeing different people was a bit annoying because … you've gotta explain yourself over and over again*'. Zena (37/2) agreed, adding, '*It's really frustrating because they (doctors) all have different ideas, and they don't write it in your notes. You have to go over it again and again*.' Olive (36/3) elaborated, '*You're getting told different information every week (yeah that's very frustrating) … you come home and cry because I was told this last time and now, they're saying this and there's inconsistency in care'*.

Women felt isolated when staff were unapproachable, 'Some (staff) are very set in their ways, and they make you feel bad if you don't feel the same way they do' (Amy, 37/0). At 34 weeks, Peta (34/2) shared, 'Every single midwife you get will have a different opinion and every single doctor you get will have a different opinion, and sometimes it's easier just to smile and nod'. Having different caregivers contributed to perceptions that nobody cares about them. Rose (28/0) wondered, 'Why am I bothering turning up to these appointments when nobody is really taking any interest anyway?' and at 36 weeks gestation, Nat (36/0) shared, 'I haven't even had the opportunity to talk to a midwife about breastfeeding'. The need for support

In the workshops, antenatal women with GDM reflected upon their frustrations and shared ideas to improve breastfeeding information and support in the hospital. Suggestions arose directly from feeling different to other pregnant women, a sense that breastfeeding is hard, and concerns over inconsistencies in availability of helpful breastfeeding information from unsupportive, time-poor hospital staff. Women recognised hospital based online support, being supported by other mothers, and offering continuity of one trusted caregiver might be helpful.

Women reasoned hospital-based online information would be beneficial as '*Everything's on your phone … it might be an easier way for people to access (information)*' (Meg, 35/0). They believed a hospital-based website would ease confusion and untangle the amount of information currently on the internet; Lucy (30/0) wanted to know, '*How do you know what the right websites are?... (it's) been a bit overwhelming*.' Participants thought a website, or mobile phone application (app) could be used to reduce uncertainty if '*recommended sites from the hospital*' (Robyn, 33/3) were added, including links to resources such as *'having an app, so people can have all the information in one spot*' (Lucy, 30/0). Women also agreed that having reliable information online or on their phone would '*make it more accessible for people who lead busy lives … we're all so busy*' (Candice, 31/1). First-time mother Vera (35/0) wanted a hospital-based website '*to put the stuff on it that we can't remember 'cause there's always so much going on'* during appointments.

The inclusion of videos as an educational resource was important to women. First-time mother Katie (30/0) said, '*Videos can show me too, I'm not a great reader'* and Zena (37/2) suggested, '*Reading is not quite the same as watching videos especially when you're busy, like I can watch stuff while I'm cooking'*. Meg (35/0) agreed, '*Sometimes it's easier to watch something, people like to learn from visual other than reading'*. Videos were also suggested as one way to share breastfeeding stories to help women with GDM *'feel a lot better and you're not alone'* (Olive, 36/3).

To further reduce feelings of isolation, women felt links to local community-based support '*peer groups (or) an online group'* (Ida, 24/0) or to services where '*having someone 24/7 to answer our questions and address our concerns*' (Olive, 36/3) would be helpful. Community support had been used by women who had previous breastfeeding experiences; Peta (34/2) shared, '*It's really good for mums to be supported by other mums*'. Conversation within workshops included suggestions to have an area available in the hospital for antenatal women to talk. Olive (36/3) suggested, '*Meeting up at a coffee shop or at the hospital … having those conversations with other mums where expectant mums can go and hear relatable stuff … so they're prepared*'. Emma (32/1) agreed, '*Physically seeing a mother put her nipple into her baby's mouth helped me so much*'.

It was evident that trusted professional support was desired by women with GDM. There was clear evidence across all workshops that antenatal women were disappointed by having to see different caregivers at hospital visits and being unable to access 'continuity of care' (CoC). Participants knew CoC was an option available to women without GDM in the hospital. Fran (20/1) shared, *'I do know that my friends and people who have had continuity of care have much better birth outcomes'*. Women believed that having one trusted caregiver to help navigate pregnancy, especially for antenatal breastfeeding support, would help to reduce stress and confusion: '*If you have a midwife that's with you the whole way through and knows you and knows that you talked last week about your hips, they'll follow up and say how's your hips going instead of starting again each time with different kinds of advice'* (Peta, 34/2).

Women agreed that having one trusted caregiver would help them feel that someone cared about them as Nat (36/0) explains, 'That person already knows you and your journey up until that point 'cause I think there's a lot of factors that go into what's normal, what's happening to me is different to what's happening to someone who's breastfed three children before'.

At 35 weeks, Audrey (35/1) stated, 'I think continuity of your midwife is really important especially with breastfeeding, … they see you after birth as well … cause it's hard to get out sometimes to go to cottages (community support) for help'. Amy (37/0) was having her pregnancy followed by a student midwife who attended appointments with her. Unlike other participants, Amy was happy that she had one caregiver whom she trusted to let her know that everything was OK when she needed reassurance: 'So

I've been chatting to them and … been pretty much seeing the same midwife (and been able to say), hey is this normal?'

Discussion

Discussing the importance and management of breastfeeding by 28 weeks gestation is a key clinical practice for successful breastfeeding for all women (BFHI Australia, 2020) and the *Australian National Breastfeeding Strategy: 2019 and beyond* suggests women with GDM may require more support to breastfeed and maintain their milk supply (COAG Health Council, 2019a). Our PAR study indicated that antenatal women with GDM do not receive this support in the hospital used in this study. Feeling disconnected is counterproductive for breastfeeding (Schmied et al., 2011) and increases stress during pregnancy, having negative impacts on birth outcomes and long-term mental health (Rieger et al., 2004; Takahata & Shiraishi, 2020). Further, stress is a known inhibitor of lactation in both animal and human studies (Lau, 2018). Consequently, reducing stress and managing emotional wellbeing is an important part of health management for women with GDM (Diabetes Australia, 2022) who have more complications than women without GDM (Buchanan et al., 2012; Lowe et al., 2012). These workshops, asking women with GDM for recommendations for change regarding antenatal breastfeeding support, revealed essential areas for improvement.

Women with GDM in this study felt labelled and treated differently to other pregnant women, believed breastfeeding is hard and experienced isolation due to inconsistencies in information, lack of support and not having one trusted caregiver. The detrimental effect of receiving inconsistent information about breastfeeding is not unique to women who have GDM (Lau, 2018). However, antenatal women in this study expressed an array of stressful emotions from confusion, worry, frustration and feeling overwhelmed by their experiences of breastfeeding support (or lack thereof) which may have been amplified by having more complexities in their care.

Improving breastfeeding rates on discharge from hospital for women with GDM can be achieved through listening to what women want and tailoring breastfeeding support to meet individual needs (Cummins et al., 2021; You et al., 2020). Almost 50% of eligible women invited to attend workshops with no incentive did participate, illustrating the importance women placed on having their views heard. To improve breastfeeding support for women with GDM, this PAR approach presents women's recommendations for hospitals to better support women with GDM to breastfeed with a) online hospital-based information, b) community support and c) continuity of care.

a) Online hospital-based information

Providing for a variety of learning styles is important for health literacy (Prawesti et al., 2018). Women with GDM suggested videos and online information be available to help support them. Pregnant women with GDM lead busy lives which impacts on the way they seek information about the initiation and continuation of breastfeeding. Online information allows women to access knowledge on their mobile phones when convenient (Almohanna et al., 2020).

In 2014 it was estimated that over 97,000 health related apps were available to smartphone users with more than 1000 created every month (Becker et al., 2014). With hospital-based links, women can untangle the vast amount of information available and have relevant, evidence-based information available to promote and support EBF practice (Alianmoghaddam et al., 2019; Hopkins et al., 2021; Meedya et al., 2020; Meedya et al., 2019).

b) Community support

Support for breastfeeding from mothers in the community was desired by some women with GDM as they felt isolated and unsupported by staff at the hospital. Women with GDM asked for informal catch-up times to be available, for example at the hospital cafeteria. While COVID-19 restrictions made these interventions improbable in a hospital setting, community-based peer support groups already exist, for example, Australian Breastfeeding Association (ABA) online peer support, blogs, and phone counselling 24/7 (Australian Breastfeeding Association, 2021b), and Australian government-funded Community Health Centre breastfeeding support groups (COAG Health Council, 2019a). BFHI recommends linking women to existing breastfeeding support in the community (WHO, 2017b), however our data shows women are unaware of available peer support for new mothers.

c) Continuity of care (CoC)

Continuity of care with a 'known' caregiver has been identified as an area for improvement for antenatal care in Australia (COAG Health Council, 2019a). Women in our study realised that a lack of individualised care contributed to feelings that nobody cares about them, a large contributing factor to their stress and frustration as 'high-risk' women. Continuity models employ person-centred approaches (Laird et al., 2015) that enable trust in known caregivers to produce positive outcomes for healthcare (Cossette et al., 2015; Flugelman et al., 2020). Within maternity care, CoC models with a primary caregiver are known to help establish relationships of trust, improve breastfeeding outcomes through person-centred communication and reduce dissatisfaction with hospital services (Brown et al., 2014; Schmied et al., 2011).

Recommendations

Listening to and understanding what women with GDM want is essential to reduce stress and its impact on breastfeeding. Our findings show women will feel more supported if hospitals provide ways for women with GDM to connect with each other and offer consistent and relevant information by trusted online sources and caregivers. This may be achieved by establishing different CoC models where women have a primary caregiver through pregnancy, birth, and early postpartum period, and are further supported by online hospital-based information.

Feedback from this research will be given to the organisation's leaders and stakeholders as part of a broader study. Further research to investigate the effectiveness of these changes is required. Gaining staff members' thoughts and suggestions about the data presented, and eliciting ideas for improvement within their hospital, may help provide individualised care and breastfeeding support pertinent to the needs of women with GDM.

Strengths and Limitations

Our findings may not represent the views of all women with GDM as participants were from one regional hospital and services may differ in other hospitals. However, this study has implications for women with GDM within endocrinology, medical and midwifery services. Our creative PAR face-to-face workshops were interrupted by COVID-19, however data saturation occurred soon after telephone groups commenced, suggesting this did not interrupt the sharing of information from participants and our sample size was adequate for the aims of our study.

Conclusion

This PAR study has explored the antenatal experiences of breastfeeding support in a cohort of women attending a regional Australian hospital, so that caregivers have a better understanding of challenges faced by women with GDM who intend to breastfeed. The women with GDM felt they were treated differently because of their diagnosis and had fears and stressors that were different from other pregnant women such as concerns about baby's health and milk supply after birth. They believed breastfeeding is hard and wanted consistent and relevant information from the hospital in ways that are better suited to their busy lifestyles. Women with GDM will be better supported to breastfeed if hospitals provide digital breastfeeding educational resources such as a website with evidence-based links such as mobile applications, along with localised support as well as continuous professional support by one trusted caregiver throughout their pregnancy.

Conflict of interest

All authors declare that we have no conflict of interest. No funding was sought for the completion of research for this study.

5.4 Conclusion of chapter - Summary of pre-intervention findings 2020-2021

This chapter has outlined how this study set the scene, providing background information to illustrate that women with GDM at TWH need extra support to breastfeed on discharge from hospital. This included identifying baseline breastfeeding practices at TWH for women with GDM compared to women without-diabetes, and exploring women's perceptions of breastfeeding attitudes, confidence, and support. In summary, women with GDM knew breastfeeding was healthy for their babies, however only 57% believed breastfeeding was better than infant formula and 80% believed breastfeeding was difficult. Staff at TWH did not consider that women with GDM required extra support to breastfeed and less than 80% were confident to help with common breastfeeding challenges such as hand expressing and assisting those with perceived low milk supply.

In phase two, the experiences of women with GDM confirmed that women think breastfeeding is hard and complicated by added stressors about their baby's health and their own milk supply. Many women also believed there were many inconsistencies in the breastfeeding information supplied at TWH and felt that 'nobody cared' about them. Consequently, women recommended three areas for improved support: online hospital-based information, community support and continuity of care models.

The next chapter will show the results from phases three and four, where staff were presented with the study's pre-intervention findings and decided which intervention they could implement at the hospital (phase three), and the impact of the staff-led intervention (phase four).

Chapter Six Findings: Post-Intervention 2022

6.1 Chapter introduction

The previous chapter has outlined the findings of phases one and two to gain a better understanding of the support given to women with GDM, exploring their challenges as they navigate information and support about infant feeding at The Wollongong hospital (TWH), and the confidence of staff to support women to exclusively breastfeed on discharge. Additionally, phase two discovered women's recommendations for changes to breastfeeding support, for staff to tailor improvements to the needs of women with GDM at TWH. This chapter reports the findings from phases three and four, where dissemination of information to staff (phase three) culminated in their implementation of an intervention to support women: online hospital-based resources. Phase four is presented as a manuscript under review: Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). Evaluation of the impact of a hospital-based online breastfeeding resource for women with gestational diabetes. *Women and birth: journal of the Australian College of Midwives*, *under review.*

6.2 Phase three - Dissemination and implementation

I disseminated the pre-intervention findings (reported in the previous chapter) to staff through eight presentations at different times and locations to provide a better understanding for the majority of staff to discuss and build consensus amongst themselves on the best ways to provide supportive interventions tailored specifically for women with GDM.

6.2.1 Presentation of findings to staff

Eight discussion sessions through my formal presentations (see Table 6-1, p. 117) were conducted with TWH staff over a period of 10 months (August 2020 to June 2021), in which staff discussed the data collected from phases one and two, and reached consensus on how the women's ideas could be applied in practice. Researcher notes were taken regarding staff engagement and general discussion after the presentations. No data was collected during this phase while staff considered how best to work with women to improve breastfeeding support at the hospital. Information was shared with maternity managers at a maternity forum in June 2021 after staff were given time to discuss at their ward

meetings and provide feedback to managers to consider the practice change recommendations during this meeting.

Table 6-1 *Presentation meetings with staff*

Presentation	Date	No. participants	Stakeholders included
Breastfeeding Education Day 1	5/8/20	9	Midwives, Child & Family Nurses
Breastfeeding Education Day 2	18/2/21	20	Midwives, Child & Family Nurses
Antenatal Clinic ward education – 3 days	23-26/2/21	17	Midwives
Maternity Ward meeting (C2W)	3/3/21	12	Midwives
Maternity Forum	17/6/21	9	Nurse managers, Maternity Services
Total staff participants		67	

Staff discussed the outcomes of women's recommendations and whether they could implement any of the suggestions: continuity of care, online hospital-based support, and provide community support. The content of the discussions in all presentation sessions was similar. A Maternity Forum in March 2021 was the last meeting for the staff to reach consensus. Field note data in March 2021 exemplifies one aspect:

> *like antenatal staff, staff on the maternity ward are unsure about how to support women with less staff on the floor and more (COVID-19) restrictions and think a website is required for all women, not just GDM. They will discuss further at their ward meetings.*

COVID-19 restrictions impacted the way women were supported for breastfeeding during the period in which this study was conducted, as visits to the hospital for antenatal care (and education) were reduced and postnatal visitors were restricted. Staff shortages during the COVID-19 outbreaks meant continuity of care programs and community support could not be offered according to staff discussions. Staff also debated how they might support women with GDM with their peers, leaving suggestions for each other, and letting researchers know what they had discussed, for example, one group on a nightshift discussed a website plan and recorded it in written form, which they took to their managers for further discussion (see Figure 6-1, p. 118).

Consensus was achieved at the aforementioned maternity forum in June 2021 where managers supported a team of interested midwives to develop a hospital-based website for all women who utilise ISLHD Maternity Services, with specialised pages to support women with GDM. To ensure my data was included in staff development meetings, "*managers suggested that I be part of the website team to ensure the voices of women with GDM are heard*" (researcher notes, June 2021). A hospital maternity website project team completed the new web pages in September 2021 with specific pages for

breastfeeding support (*Feeding your baby)* and information for women with GDM (*Diabetes in pregnancy – gestational (GDM))*.

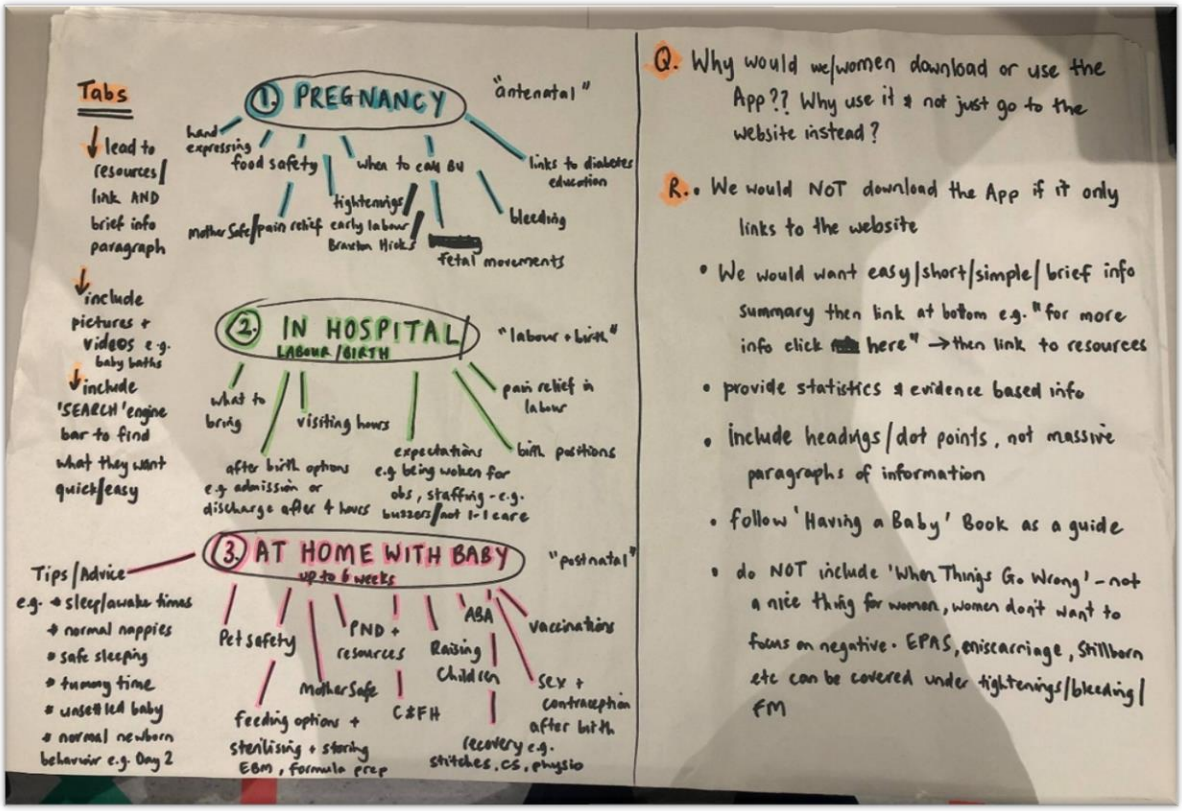

Figure 6-1 *Nightshift staff ideas for managers, for a website to support women.*

6.2.2 Findings of phase three: Building a website – a staff-led intervention

Despite being given three recommendations from women with GDM, this study was challenged by COVID-19 restrictions. During 2020 and 2021 TWH endured reduced staff numbers and managers felt the hospital could not support new models of care such as a continuity model for women with GDM. Community restrictions also meant community support could not be delivered in the hospital setting. They did, however, support a team of midwives to collaborate and support a staff-led maternity website development team to work with the information I presented.

An un-intended outcome of my research was to be invited to be a stakeholder in the website team. I was therefore able to participate in discussions regarding the content of pages as a representative for women with GDM when the website team invited consumer and staff input. The maternity website project team created information to include videos such as antenatal expressing (ANE), made by the project team, to assist women to express their milk from 36 weeks gestation, as recommended from

the Diabetes and Antenatal Milk Expression (DAME) study (Forster et al., 2017). The main page for breastfeeding information was created by the lactation support team of the local health district and a link to the Milky Way breastfeeding app was added into the website page that was prepared for women with GDM.

Additional consumer and staff focus groups were used by the ISLHD staff website development team to ensure the ISLHD met National Safety and Quality Health Service (NSQHS) Standards by implementing a project that improved quality of health service provision, partnered with consumers (Standard 2), and protected the public from harm (Australian Government, 2022). The website development team completed the new web pages by September 2021, and they were advertised to all pregnant women across the ISLHD with flyers displayed in the antenatal clinics (see Figure 6-2). For the development of this website, the team were finalists in ISLHD Quality Awards (Appendix O, p. 207) and published a paper, presented in Appendix P (p. 208): Elder, T., Cummins, L., Tait, C., & Kuzela, W. (2023). Website redesign in a maternity setting: Co-designing a resource for consumer support and education. *Health Education in Practice: Journal of Research for Professional Learning*, *6*(1). https://doi.org/10.33966/hepj.6.1.17086

Figure 6-3 *Maternity website flyers*

6.2.3 Summary

In Phase three, staff discussed the information collected in the previous two phases, including women's ideas for change at TWH. While COVID-19 restrictions contributed to reduced staff numbers, community restrictions also meant community support could not be delivered in the hospital setting. Maternity managers and staff collaborated to develop an online hospital-based website, as suggested by women in phase two, to try to improve exclusive breastfeeding rates on discharge from hospital. The next section will show the results of how this study evaluated the impact of the staff-developed intervention for women with GDM. This phase is reported in the form of a manuscript under review with '*Women and Birth*' journal (impact factor 3.7 in 2022) at the time of this thesis submission.

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6.3 Phase four: Evaluation of impact of hospital-based online resources

The findings of phase four of the study is presented in a paper format that was submitted to Women and Birth Journal.

Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). Evaluation of the impact of a hospital-based online breastfeeding resource for women with gestational diabetes. *Women and birth: journal of the Australian College of Midwives*, *under review.*

Evaluation of the impact of a hospital-based online breastfeeding resource for women with Gestational Diabetes Mellitus.

6.3.1 Abstract

Problem

It has been identified that women with Gestational Diabetes Mellitus often need greater support to exclusively breastfeed their newborn babies.

Background

Rates for exclusive breastfeeding on discharge from hospital are lower for women with Gestational Diabetes Mellitus than other new mothers. There is a need for interventions that are tailored to their individual needs.

Aim

To explore and compare women's exclusive breastfeeding rates at discharge from hospital when they have Gestational Diabetes Mellitus, before and after introduction of hospital-based online resources.

Methods

Authors report findings from phase four of a broader participatory action research study that implemented a hospital based online resource as a person-centred intervention to improve exclusive breastfeeding rates on discharge from hospital for women with Gestational Diabetes Mellitus. Breastfeeding outcomes were measured using hospital data before and after introducing the online resources. Women were asked for their feedback via an online postnatal survey 4-6 weeks after birth.

Findings

Exclusive breastfeeding at birth was significantly higher after introducing the online resources (71.3% pre vs 80.6% post-intervention, *p*,0.036), however, there was no significant improvement at discharge from hospital.

Conclusion

Giving women with Gestational Diabetes Mellitus access to online resources offers strong support to improve initiation of exclusive breastfeeding by providing relevant and consistent information. However, to improve exclusive breastfeeding rates during the hospital stay and at discharge, there is a need for extra education and support that is tailored specifically for women's needs when they have Gestational Diabetes Mellitus.

Table 6-2 *Statement of Significance*

Statement of Significance	
Problem or issue	Women with Gestational Diabetes Mellitus breastfeed less than new mothers without GDM
What is Already Known	There are many breastfeeding challenges for women with Gestational Diabetes Mellitus, and these are complicated by inconsistent information from caregivers.
What this Paper Adds	Improved breastfeeding outcomes may be achieved by combining localised online information with tailored support for women with Gestational Diabetes Mellitus.

6.3.2 Introduction

There is no contention about the importance of breastmilk for the health of women and their new babies. The World Health Organization (WHO) recommends ten steps for successful breastfeeding and provides Baby Friendly Health Initiative (BFHI) accreditation for institutions that comply (WHO, 2018). Exclusive breastfeeding (EBF), giving babies only human breastmilk, is highly recommended for six months after birth to reduce infant mortality and improve overall health for mothers and their babies (WHO, 2018; WHO/UNICEF, 2014). This is particularly the case for women with Gestational Diabetes Mellitus (GDM). Breastfeeding can reduce the risk of developing Type 2 diabetes for women with GDM (Aune et al., 2013; Gunderson, 2014; Mitanchez et al., 2014) and protect their babies from Type 2 diabetes during childhood and adolescence (Horta & de Lima, 2019). In fact, one of Australia's National Diabetes Strategies aims to prevent people from developing Type 2 diabetes by improving rates of breastfeeding during the first few months after birth (Australian Institute of Health and Welfare, 2020).

Despite the benefits of EBF, WHO's global target of 50% EBF at six months of age by 2025 (WHO/UNICEF, 2014) is still not universally attained. For instance, in upper middle-income countries the overall prevalence of EBF is about 24.3% at six months postpartum (Zong et al., 2021) and in Australia specifically, the rate of EBF at six months for 2020-2021 was 35.4% (Australian Bureau of Statistics, 2021b). The incidence among women with GDM is even lower in all contexts. Haile et al. (2016) reported a 13% difference in EBF between women with GDM (62.2%) and women with no-GDM (75.4%) amongst a US cohort. In a Norwegian study, women with GDM were less likely to be predominantly breastfeeding (breastmilk and water but no other fluids or foods) a week after birth in

a multi-ethnic cohort ($p < 0.01$) (Bærug et al., 2018). In Australia, Longmore et al. (2020) found that women with GDM were 9% less likely to EBF on discharge from hospital (57% GDM vs 66% no-GDM) and 14% less likely to predominantly breastfeed at six months of age (46% GDM vs 60% no-GDM).

Although the reasons for low EBF and early weaning is multifactorial (Matriano et al., 2022), women's intention, support and confidence are important factors among women with GDM (Cummins et al., 2021). Findings of this study's manuscript (see Chapter 2, p. 13) demonstrated that women with GDM are more likely to introduce formula due to delayed Lactogenesis II and fear of neonatal hypoglycaemia, whereas promoting skin-to-skin contact after birth with frequent breastfeeds are reportedly effective interventions to promote EBF rates during a woman's hospital stay (Cummins et al., 2021). However, within this broader study, (see 5.3.1, p. 101), Australian women with GDM perceived breastfeeding to be hard, complicated by receiving inconsistent information from caregivers, or limited practical help with breastfeeding during their hospital stay (Cummins et al., 2022). Initial steps toward long-term EBF, especially for women with GDM, may be realised in the hospital setting by supporting women to improve EBF rates on discharge from hospital (Li et al., 2021).

Underpinned by person-centred theory, we conducted a multiphase participatory action research (PAR) study, working with key stakeholders who had experienced or cared for those who experienced GDM, to explore how EBF rates in the immediate postpartum period could be improved. Person-centred theory values respect and trust between those involved in an individual's care, to enable engagement and the development of therapeutic relationships (McCance et al., 2011; McCormack, 2020). Due to the complexity of factors that influence breastfeeding practices among women with GDM, a person-centred approach, with a PAR design, allowed the study to work directly with participants, sharing experiences and listening to women, and enabling trust for truthful discussion, learning ways women with GDM believed may improve breastfeeding outcomes (Manley et al., 2021; Reason & Bradbury, 2008).

Study design of the main study

The main study involved four PAR phases (see Figure 6-3). In the first phase a literature review was conducted (Cummins et al., 2021), and we surveyed women with GDM and staff to identify their attitudes regarding breastfeeding and perceived support. In the second phase, through multiple workshops, we explored women's needs and ideas for improvement (Cummins et al., 2022). We found that women with GDM believe there is a need to provide three modes of support to improve breastfeeding: a) online hospital-based information, b), community support, and c) continuity of care models (Cummins et al., 2022). During phase three of the study, we consulted maternity service staff in a regional Australian hospital and reported the findings from the literature review, surveys, and workshops, to develop an intervention for improving EBF for women with GDM in the study setting. In phase four, which is the focus of this paper, we evaluated the effectiveness of the intervention by collecting women's EBF rates at discharge from hospital before and after its introduction.

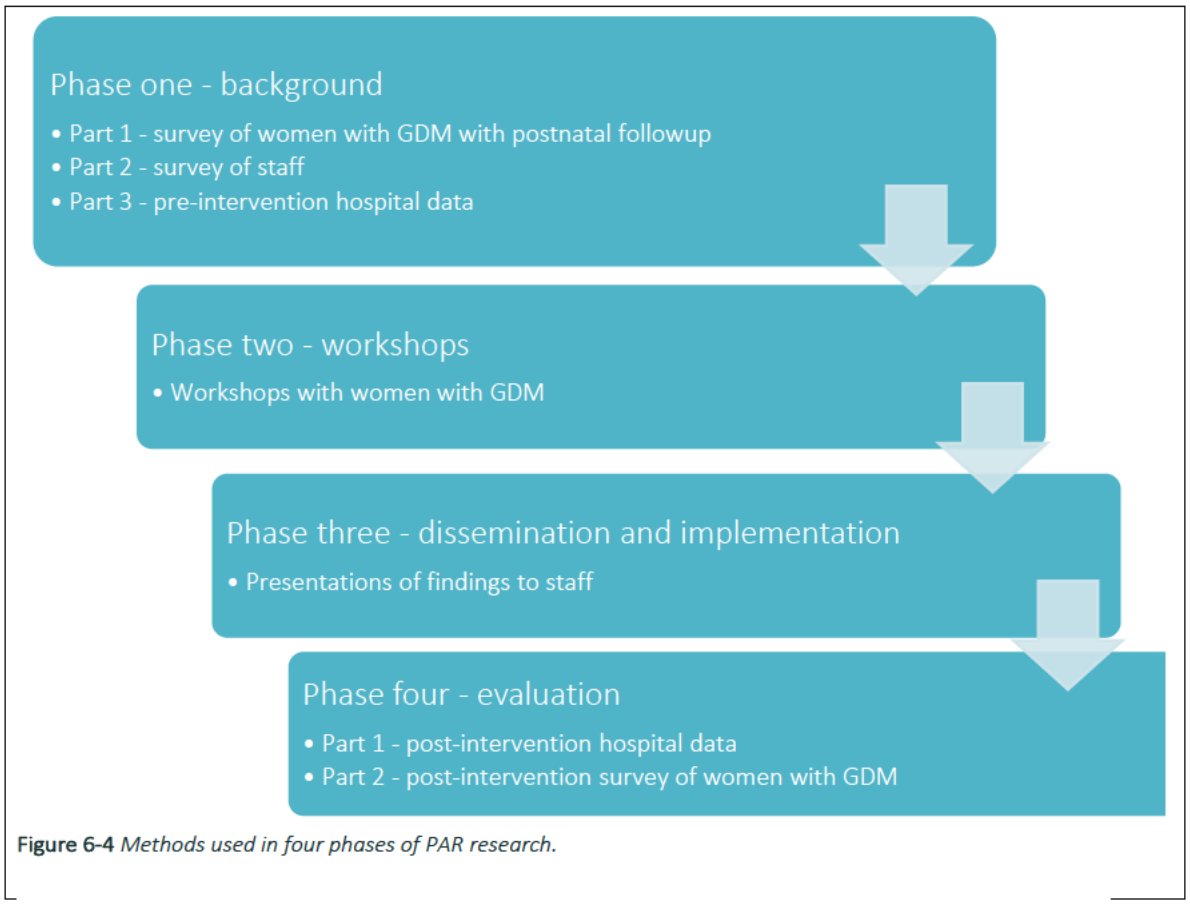

Figure 6-4 *Methods used in four phases of PAR research.*

Aim and objectives

The aim of phase four of the study was to explore and compare women's EBF rates at discharge before and after introducing the new hospital-based online resources to the maternity website. Objectives of the study were to: a) compare different breastfeeding practices among women who were diagnosed with GDM during pregnancy before and after introducing the online resources, and b) explore and compare women's feedback regarding use of the online resources, with breastfeeding practices during their hospital stay and early post-partum.

6.3.3 Methods

Study setting: The regional hospital for this cohort study was a Level 5 Australian maternity facility in NSW that delivers collaborative antenatal, intrapartum, and postnatal care for women from 32 weeks gestation by midwives, GPs, hospital doctors and specialist obstetricians and neonatologists (NSW Ministry of Health, 2021). The facility was not Baby Friendly (BFHI) accredited.

Study participants: Women with GDM who birthed a single baby at the study setting. Women who were not diagnosed with GDM during their pregnancy or had previous Type 1 or 2 diabetes were excluded from the study.

Participant recruitment: *eMaternity* data (hospital-based maternity information) were used to collect and compare study outcome measures. An anonymous post-intervention survey with a link to the participant information sheet was also sent via Short Message Service (SMS) at 4-6 weeks postpartum to the women with GDM with an implied consent assumed with participation.

Introducing the online educational resource (Intervention): All pregnant women in the study setting were given a link to hospital-based online resources via QR code when they attended their antenatal visits. This code linked to a hospital-based website developed by the study setting staff in consultation with a wide range of consumers, including women with GDM. The website included videos made by staff regarding breastfeeding and antenatal expressing (ANE), and a link to an evidence based breastfeeding mobile application called *The Milky Way* (Meedya et al., 2016). Women with GDM were directed to specific GDM-related pages.

Data collection: Maternity data were collected via the hospital's *eMaternity* information system for women who birthed January-June 2020 (pre-intervention) and January-June 2022 (post-intervention). The online postpartum survey included questions on women's demographic information, medical history, and infant feeding practices during their hospital stay, and at 4-6 weeks postpartum. Women who used the online resources were also asked for feedback about using the resources. Selected

questions from the mHealth App Usability Questionnaire (MAUQ) (Zhou et al., 2019) were used to check the usability of the online resources.

Data analysis*: IBM SPSS Statistics 27™* software was used to conduct descriptive and inferential statistical analyses of the data. Descriptive statistics determined percentages to compare users of online resources with women who did not use them. Inferential statistics compared groups before and after the intervention. Pearson's Chi square two tailed t-test examined changes in breastfeeding rates within groups across time with statistical significance level $p < 0.05$.

Data management:

All data remained anonymous and contained no identifying information. Data was managed on a password protected computer by the researcher as per National Health and Medical Research Council guidelines (NHMRC, 2007).

Ethical considerations:

Approval to conduct the study was obtained from the joint university and local health district's *Health and Medical Human Research Ethics Committee* (2019/ETH12108).

6.3.4 Results

Hospital data was used to collect characteristics of women with GDM before (2020) and after (2022) introducing the online educational resources. After introducing the online resources, a survey was sent to women with GDM (n=191) with a response rate of 56% (n=107). The survey compared infant feeding practices between women who used, and those who did not use, the online resources, and the usability of the hospital-based online resources were also checked.

Characteristics of women

Based on the hospital *eMaternity* data, the characteristics of women before and after introducing online resources were similar except for an increased intention for mixed method feeding (breastmilk and formula) (see Table 6-3, p. 127). There were no significant differences for women having their first baby, age, BMI, smoking, or type of birth.

Table 6-3 *Characteristics of women with GDM - pre and post-intervention*

Characteristics of women with GDM	Pre-intervention group Jan- Jun 2020 n (%) 174 (15.8)	Post-intervention group Jan- Jun 2022 n (%) 191 (16.1)	*p*
Country of birth			0.098
- Australia	126 (72.4)	130 (68.1)	
- ATSI	10 (5.7)	12 (6.3)	
- Asia	17 (9.8)	27 (14.1)	
- European	4 (2.3)	8 (4.2)	
- Middle Eastern	4 (2.3)	7 (3.7)	
- Pacific	4 (2.3)	6 (3.1)	
Maternal age			
- 24 years or less	15 (8.6)	14 (7.3)	0.649
- 25-35 years	111 (63.8)	117 (61.3)	0.617
- 36 years or older	48 (27.6)	60 (31.4)	0.424
Parity			
- Primiparous	55 (31.6)	73 (38.2)	0.186
- Multiparous	119 (68.4)	118 (61.8)	0.186
Smoking	30 (17.2)	24 (12.6)	0.209
BMI			
- Healthy weight (18.5-24.9)	43 (24.7)	43 (22.5)	0.621
- Overweight 25.0-29.9	52 (29.9)	47 (24.6)	0.257
- Obese ≥30	74 (42.5)	98 (51.3)	0.093
Complications during pregnancy			
- Endocrine disorder (non-diabetes)			
- Haematological	43 (24.7)	42 (22)	0.539
- Respiratory	19 (10.9)	27 (14.1)	0.355
- Hypertension	25 (14.4)	29 (15.2)	0.827
- Mental Health	7(4)	12 (6.3)	0.332
	60 (34.5)	64 (33.5)	0.844
Continuity of Care Model	66 (37.9)	75 (39.3)	0.793
Induction Of Labour	89 (51.1)	107 (56)	0.702
Type of birth			
- Normal vaginal birth	80 (46)	89 (46.6)	0.906
- Instrumental birth	21 (12.1)	16 (8.4)	0.243
- Emergency Caesarean birth	29 (16.7)	41 (21.5)	0.245
- Elective Caesarean birth	43 (27.4)	42 (22)	0.539
Feeding Intention			
- Breastfeed	145 (83.3)	162 (84.8)	0.082
- Mixed feed	0	11 (5.8)	0.001*
- Formula	19 (10.9)	14 (7.3)	0.170

* significant Pearson Chi-Square $p < 0.05$

Breastfeeding outcomes before and after introducing the online resources

According to *eMaternity* data, EBF rates at birth were significantly higher among the group of women with GDM who were given access to the online-resources antenatally compared to women who gave birth prior to the introduction of online resources (80.6% vs 71.3%, *p*,036) (see Table 6-4, p. 128). There were no significant differences in any other breastfeeding outcomes, including EBF at discharge, however almost 6% less mothers fed their babies only formula on discharge from hospital after the

intervention (13.1% vs 19%), while almost one in five new mothers with GDM left hospital mix-feeding their babies breastmilk and formula (12.6% vs 19.9%), an increase of 7.3%, signifying a move to mixed breast and formula feeding while in hospital over formula only feeds on discharge.

Table 6-4 *Feeding practices among women with GDM between pre and post introduction of the online resources.*

Feeding methods	Before introducing the online resources (2020) n (%) 174 (15.8)	After introducing the online resources (2022) n (%) 191 (16.1)	*p*
Skin to skin timing first feed - Within 60 minutes	127 (73)	152 (79.6)	0.138
Feeding method at birth - Exclusive breastmilk - Breastmilk and formula - Only formula	124 (71.3) 6 (3.4) 28 (16.1)	154 (80.6) 6 (3.1) 20 (10.5))	0.036* 0.870 0.113
Feeding method at discharge - Exclusive breastmilk - Breastmilk and formula - Only formula	119 (68.4) 22 (12.6) 33 (19)	128 (67) 38 (19.9) 25 (13.1)	0.779 0.062 0.125
* significant Pearson Chi-Square $p < 0.05$			

Breastfeeding outcomes among women who did vs did not use the online resources.

After introducing the online resources, our findings demonstrated that only 27% of women with GDM who participated in the survey (29 out of 107) used the hospital-based online resources (website users, n=23 and app users, n=18) (see Table 6-5). There were no differences in breastfeeding outcomes between the groups. However, women who used the hospital-based online information had the following characteristics compared to the women who did not use the online resources: a) they were

Table 6-5 *Women with GDM – users of hospital-based online resources n=107*

Women's characteristics n=105	Used online resources n= 29 (27.6) n (%)	Did not use online resources n= 76 (72.4) n(%)	*p*
First baby	23 (79.3)	19 (25)	<0.001*
Age 36 years or more	8 (27.6)	17 (21.8)	.529
Intended to breastfeed	27 (93.1)	69 (88.5)	.482
Received continuity of caregiver	13 (44.8)	35 (44.9)	.997
Attempted Antenatal Expressing (ANE)	22 (75.9)	45 (57.7)	.084
Attended ANE class	13 (44.8)	9 (11.5)	<0.001*
Given enough breastfeeding information from staff at hospital	9 (31)	50 (64.1)	0.002*
Received consistent information from all staff	11 (37.9)	50 (64.1)	0.015*
Had a problem with breastfeeding after they left hospital (n= 99)	19 (65.5)	32 (41)	0.070
1st formula given in hospital (n= 51)	5 (35.7)	15 (40.5)	0.753
* significant Pearson Chi-Square $p < 0.05$ N/A = Not available			

first time mothers (79.3% vs 25%, $p < 0.001$); b) had attended hospital-based classes for antenatal expressing (ANE) (44.8% vs 11.5%, $p < 0.001$); c) reported that they did not receive enough breastfeeding information at the hospital (p,0.002), and d) felt they had received inconsistent breastfeeding information from staff (p, 0.015). There were no differences in breastfeeding outcomes for primiparous women after the resources were introduced.

Ancillary outcomes

In the broader study, there were three recommendations from women with GDM to help improve their EBF on discharge from hospital, one of these was access to one main caregiver. Women who reported they had one main caregiver instead of multiple caregivers during their pregnancy, reported more consistency in the information they received (68.8% vs 47%, p,0.027) and gave their babies less mixed-method feeds on discharge from hospital (12.8% vs 28.8%, p,0.046) (see Table 6-6).

Table 6-6 *Continuity of one main caregiver (CoC) during pregnancy*

Women with GDM who received Continuity of one main caregiver (CoC) n=107	CoC n= 48 (44.9) n (%)	No CoC n= 59 (55.1) n (%)	*p*
Used online hospital resources	13 (27.1)	16 (27.1)	.997
First baby	18 (38.3)	24 (41.4)	.749
Intended to breastfeed	42 (87.5)	54 (91.5)	.495
Age 36 or more	9 (18.8)	16 (27.1)	.309
Attempted ANE	30 (62.5)	37 (62.7)	.982
Attended ANE education	10 (20.8)	12 (20.3)	.950
Given enough breastfeeding information from staff at hospital	27 (56.3)	32 (54.2)	.835
Received consistent information	33 (68.8)	28 (47.5)	0.027*
Had a problem with breastfeeding after they left hospital	26 (54.2)	32 (54.2)	.951
First formula in hospital	5 (26.3)	15 (46.9)	.146
Skin-to-skin, timing first feed ≤ 60 minutes	28 (66.7)	33 (60)	.501
Feeding at birth			
Any BM	41 (97.6)	52 (94.5)	.451
Only formula	1 (2.4)	3 (5.5)	.451
Feeding at discharge from hospital			
Exclusive breastmilk	36 (76.6)	37 (62.7)	.125
Breastmilk and formula (mixed)	6 (12.8)	17 (28.8)	.046*
Only formula	5 (10.6)	5 (8.5)	.705
* p = significant Pearson Chi-Square $p < 0.05$			

Reasons for introducing formula in hospital

EBF in hospital is halted when infant formula is given to newborns. In this study, the main reasons women with GDM gave formula in hospital were a perception of low milk supply (milk didn't 'come in'), followed by poor attachment and sore nipples (see Figure 6-4).

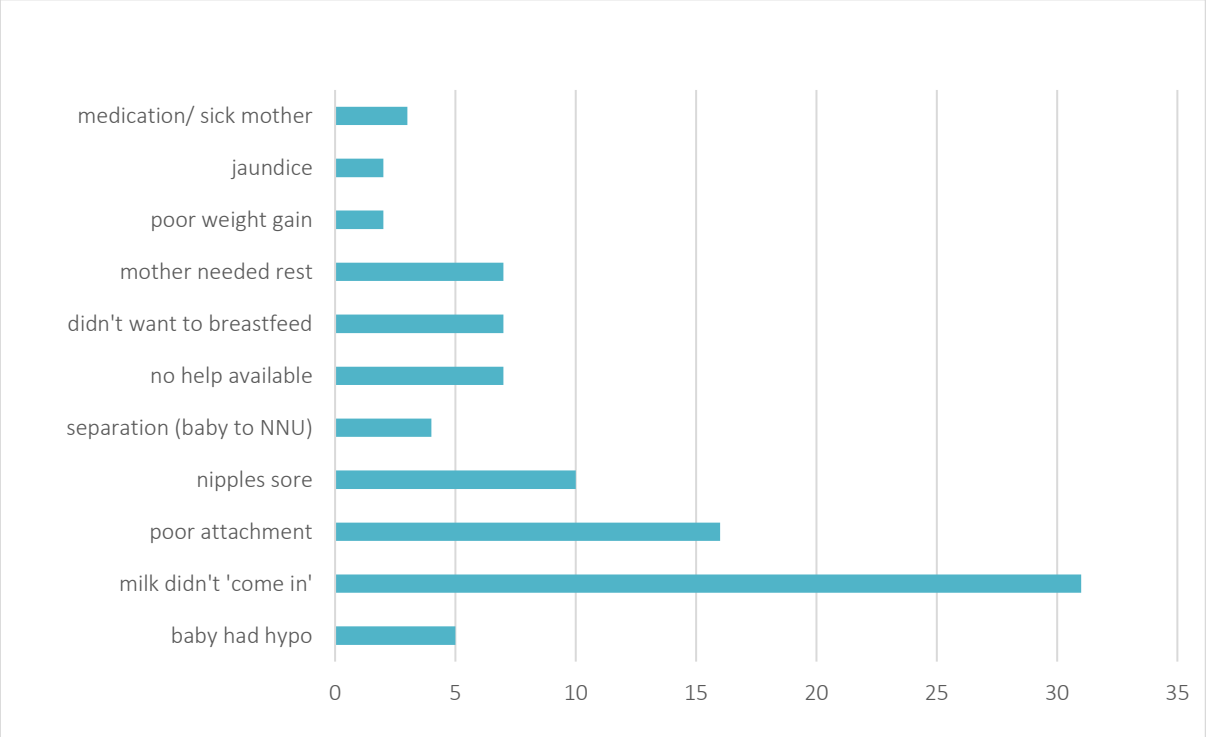

Figure 6-5 *Reasons given for in-hospital formula supplementation.*

Women's use of online resources

The usability of the online resources was assessed by using selected questions from the mHealth App Usability Questionnaire (MAUQ) among 29 women who used either or both website and the app. Women found both website and the associated app easy to use and well-organised. The mean score for women's ease of use and satisfaction was over five (out of seven) for both the website and the app and women suggested they felt comfortable and would use the hospital-based online resources again. (see Table 6-7, p. 131).

Table 6-7 *Women's feedback on usability of the hospital-based online resources*

mMA Mean (SD)UQ	Website Mean (SD)	The App Mean (SD)
Ease of use and satisfaction	n= 20	n=13
1. The website/app was easy to use	5.3 (1.0)	5.0 (1.5)
2. I like the interface	5.2 (1.3)	5.0 (1.6)
3. I could easily find the information I needed	4.9 (1.4)	5.0 (2.0)
4. The information was well organised	5.3 (1.3)	5.0 (1.8)
5. I feel comfortable using the website/app in social settings	5.9 (1.3)	6.0 (1.7)
6. The amount of time I spent using the website/app was suitable for me	5.6 (1.6)	5.0 (1.8)
7. I would use the website/app again	5.5 (1.6)	5.0 (1.9)
8. Overall, I am satisfied with the website/app	5.3 (1.5)	5.0 (2.0)
Total Mean Score	5.4	5.25
System information arrangement		
9. The navigation was consistent when moving between screens	5.2 (1.3)	6.0 (1.7)
10. The interface allowed me to use all the functions on the website, such as search options or linking to other resources	5.4 (1.3)	6.0 (1.8)
11. The website had all the functions and capabilities I expected it to have	5.3 (1.4)	5.0 (1.9)
Total Mean Score	5.3	5.3
Usefulness		
12. The website was useful for my health and well-being	5.2 (1.6)	5.0 (1.8)
13. The website helped me improve access to health care services	5.0 (1.8)	5.0 (1.8)
14. The website helped me manage my breastfeeding issues effectively	4.1 (1.7)	4.0 (2.0)
15. The information provided on the website helped improve communication with my health care provider	4.3 (1.7)	4.0 (2.0)
Total Mean Score	4.6	4.7

6.3.5 Discussion

In this study, women's breastfeeding practices and their feedback before and after introducing online resources to a hospital website when they had GDM were evaluated. The findings of this study demonstrated that more women initiated EBF at birth after the introduction of the online resources, however, there was no change in EBF at discharge from hospital. Despite improvements in overall breastfeeding at discharge from hospital after online resources were introduced, there are many factors that influence women's breastfeeding practices when they have GDM.

The introduction of hospital-based online resources derived from phase two findings from the broader PAR, where women with GDM identified three elements that could suit their needs to improve EBF on discharge from hospital. These included: a) online hospital-based information, b) community support, and c) continuity of care models (Cummins et al., 2022). However due to resource restrictions and the COVID-19 pandemic, connecting women to community support and increasing midwifery continuity of care models at the hospital were not possible, and the study therefore could not implement the entire person-centred change (three recommendations), based on women's needs.

Community peer support has been shown to improve initiation and duration of breastfeeding (Rai, 2017) and is becoming popular over social media with Facebook groups supported by breastfeeding counsellors (Bridges et al., 2018). During the COVID-19 pandemic, the Australian Breastfeeding Association (a peer-support service) supported women in the community to continue to breastfeed to protect their infants via online methods when face-to-face was not available. During their survey of over 100 women in a 2-month period, 38% of all women were assisted when they believed their milk supply was inadequate, which was the main reason for breastfeeding cessation in this study among women with GDM, highlighting the need for support after discharge from hospital (Hull et al., 2020).

Continuity of one main caregiver is a goal of NSW Health's 2023 '*Blueprint for Action'* for maternity care in NSW (NSW Health, 2023). Having a choice of one main caregiver for a woman's pregnancy contributes to positive outcomes for engagement, empowerment, and trust through their antenatal journey (COAG Health Council, 2019b; International Confederation of Midwives, 2021; RANZCOG, 2017). Evidence has demonstrated that continuity of midwifery care has a positive impact on women's and infants' health outcomes (Hall et al., 2023; Sandall et al., 2016). Amongst participants in this study, having one main caregiver, compared to multiple caregivers, significantly improved women's views of receiving consistent information when they had GDM (*p*,0.027) and reduced the amount of formula supplementation given to babies on discharge from hospital (*p*,0.046).

The lack of significant change in EBF at discharge from hospital before and after our person-centred change may be explained by the fact that only one in three of women's ideas were implemented. The Person-centred Practice Framework (McCormack & McCance, 2016) is an internationally recognised model that outlines how teams can deliver person-centred care. It includes the importance of support for change from strategic frameworks and policy at a macro level, and a commitment of professionally competent staff with a supportive environment at ward (meso) level. Unfortunately, with the added complexities enforced by COVID-19 lockdowns, this study could not be fully supported within the practice environment and only one of the women's suggestions could be incorporated, the online resources.

Evidence demonstrates that enabling access to online information is not enough to engage people to use digital resources (Almohanna et al., 2020; Keeling et al., 2022). According to Keeling et al. (2022), online resources can offer consumers information across a variety of health scenarios, however not all consumers would be engaged with the digital education or support (Keeling et al., 2022). In our study, only 27% (n= 29) participants used the online resources with most being supported to use them after attending diabetes antenatal education sessions. Designing a digital intervention requires a careful and scientific methodology such as the persuasive systems design model (PSD), where the online resources can be reinforced and embedded as part of the support given by health professionals (Almohanna et al., 2023). In this study, only nine women used the *Milky Way* app that was designed based on PSD. Also, due to the small number of women using the online resources, major confounding factors such as women's parity, type of birth, intention to breastfeed, confidence and support were not included in the data analysis. However, regardless of breastfeeding outcomes, women found the online resources useful when they were first time mothers or felt they received inconsistent advice during their hospital stay.

Evidence shows in-hospital supportive breastfeeding interventions such as early skin-to skin contact, frequent feeding and continuity of education and professional support from antenatal to postnatal periods (Cummins et al., 2021) can improve breastfeeding outcomes for women with GDM, especially when the interventions include regular professional support (Reichental et al., 2022) and are tailored to women's needs (Matriano et al., 2022). While this study was designed with a person-centred approach, it could not be fully implemented due to COVD-19 restrictions and staff shortages. Therefore, there is a need for multi-disciplinary research where interventions are designed based on women's needs, combining online resources, continuity of care and support from professionals and other women with GDM, that contributes to a supportive environment from antenatal into the postnatal period.

Recommendations for practice

Women with GDM will use online resources to clarify information and initiate EBF. Rates of EBF on discharge from hospital may be improved if online resources were embedded as part of the support given by health professionals across antenatal and postnatal disciplines.

Strengths and Limitations

This study was conducted in one regional hospital and may not represent the views and outcomes of all women with GDM across Australia. However, our results resonate with previous research on the challenges women with GDM experience in relation to breastfeeding, which adds valuable additional data to this body of work.

6.3.6 Conclusion

Our study confirmed that giving women with Gestational Diabetes Mellitus access to online resources offers strong support to improve initiation of exclusive breastfeeding by providing them with relevant and consistent information. However, the multi-factorial influences that impact on infant feeding decisions for women with GDM need to be addressed by listening to what women want and tailoring support to their needs. Improving EBF for women with GDM may be achieved by combining localised online information with further support such as continuity of one main caregiver and access to peer support in the community.

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6.4 Conclusion of chapter

Results of staff discussions and the evaluation of the impact of the staff intervention have been delivered in this post-intervention findings chapter. The published paper highlights the multiple influences that impact on infant feeding decisions for women with GDM, and the need for them to be addressed by listening to what women want and tailoring support to their requirements. The following chapter will discuss the findings reported in Chapters five (p. 93) and six (p. 116), and make recommendations for future midwifery practice, policy and research.

Chapter Seven Discussion & Recommendations

7.1 Chapter Introduction

This chapter provides a critical discussion of the findings presented in this thesis over the previous two chapters. The AD-MIRE breastfeeding study, conducted through a person-centred lens, gained background information to ascertain the relevance of the study within the context of the study hospital, and asked women with GDM for their ideas to improve exclusive breastfeeding (EBF) rates on discharge from hospital (Chapter 5, pre-intervention findings, p. 93). Women made three recommendations: online hospital-based information, community support and a continuity of care model of pregnancy care. This information was then disseminated to hospital staff, who chose to implement one of the participant recommendations: online hospital-based resources (Chapter 6, post-intervention findings, p. 116), as an intervention to fulfil women's ideas for change.

I will discuss the main findings of the study in this chapter for each phase and will highlight the reasons why the ideas proposed by women with GDM may have been successful if implemented as one intervention. The chapter will also outline how this study was challenged by COVID-19, its effects on the research, women and staff, and how the ensuing restrictions legitimised the implementation of only one of the three recommendations women with GDM had to improve their rates of EBF on discharge from hospital. The chapter will conclude with recommendations for midwifery practice, policy and future research.

7.2 Discussion of background information

According to phase one background information, women with GDM in this study were 10% less likely to be exclusively breastfeeding at birth or on discharge from hospital in 2020 and give their babies more exclusive formula feeds on discharge than women without GDM (see Table 5-2, p. 95). This highlights women with GDM in any hospital in Australia, or around the world, need more support than women not affected by GDM, to improve their rates of EBF on discharge from hospital and thereby improve breastfeeding outcomes, and the health of mothers and babies in the long term. Recent evidence reports the absence of diabetes during pregnancy is a significant predictor for higher rates of EBF on discharge from hospital (OR 3.83, 95% CI [1.57, 9.37]) (Brockway et al., 2023), which suggests women with GDM continue to have less EBF rates around the world. Chapter 1 (p. 1) highlighted the health

benefits for breastfeeding for women with GDM (and their babies) and demonstrated the deficit in breastfeeding rates on discharge from hospitals around the world, including Australia, for women with GDM. The findings of parts one and two of phase one has been explained first, the third part of phase one (information about breastfeeding practice among women with GDM prior any change) will be discussed with Phase four findings.

7.3 Discussion of findings from phase one

To gain a better understanding of the challenges for women with GDM who intend to breastfeed, both women (phase one – part 1) and staff (phase one – part 2) at the study hospital were asked about their attitudes, confidence, and perceived support to breastfeed, or for staff, confidence to support women with GDM to breastfeed.

7.3.1 Survey of women with GDM

The survey findings demonstrated that most women with GDM who intended to breastfeed at the study hospital believed breastmilk is healthy for babies, however only 57% believe breastfeeding is better than formula. Although the reasons for women's poor attitude towards breastfeeding when they have GDM can have different factors, the impact of social media may be one of the major factors. Luce et al. (2016) suggests women seek out programs on television to learn, however the media often portray a medicalisation of pregnancy, childbirth and postnatal issues that do not carry over into real life. With breastfeeding, some media reports use professionals to advocate for women's wellbeing by writing that breastfeeding is hard (Comerford, 2021) and advocating that women should not be judged for using breastmilk alternatives (Maclean, 2014). Many women in this study believed breastfeeding to be difficult, and their confidence was negatively affected. "Breastfeeding is hard" was a strong theme in this study's phase two evidence (see 5.3, p. 101), and contributed to women's low confidence levels to breastfeed, which was represented in phase one surveys (see 5.2.2, p. 95).

Overall, women in this study felt a pressure to 'succeed' with breastfeeding. The lack of information women stated they received from staff at the hospital, however, did not improve their confidence, e.g., almost half of the women surveyed in this study admitted they would have difficulty knowing whether their baby was receiving enough milk when breastfeeding. Despite most women thinking they needed help to breastfeed, fewer than half of the women with GDM that I collected data from at the study site felt supported to do so by staff. In 'Baby Friendly' accredited hospital environments (BFHI), where breastfeeding is considered 'the norm,' staff are required to know how to support mothers, including how to assess whether their baby is receiving enough milk (WHO, 2017b, 2018, 2019). NSW Breastfeeding policy supports breastfeeding by promoting 'baby friendly environments' (NSW Health,

2018). This study therefore contributes to evidence for more facilities across Australia to become BFHI accredited.

Fewer than half the participants in this study felt they had support for breastfeeding from their doctors or family members, including the baby's father. Merritt et al. (2019) found many fathers did not know about breastfeeding until after their baby was born and left the mother to decide, adding they did not know what to say to support their partners through breastfeeding difficulties. Breastfeeding support from family and friends, if lacking, is a known barrier to breastfeeding for all women (ACOG, 2021). Breastfeeding interventions targeting fathers and grandparents have been successful to support women to breastfeed (Koksal et al., 2022; Sinha et al., 2015). Online social support intervention with postnatal groups have been highly successful to improve breastfeeding practices in Brazil for new mothers (Cavalcanti et al., 2019), and this can be translated to support for partners, as recommended by a recent UK study (Baldwin et al., 2021), where timely and relevant staff discussions with fathers can positively influence attitudes and confidence of family members and support new mothers.

7.3.2 Survey of staff

In part 2 of phase one, almost half of surveyed staff (43%) believed that systems were in place at the hospital for women to exclusively breastfeed on discharge from hospital. However, staff were not confident discussing how to manage low supply, frequent feeds after birth, hand expressing, finger feeding, or knowing about community supports outside the hospital to assist women with breastfeeding after discharge from hospital (see Table 5-4, p. 100). More interestingly, only 13% of staff were aware women with GDM require extra support to breastfeed. This lack of awareness may compound the lack of support and stress women with GDM feel. According to Park et al. (2021), women with GDM are more susceptible to stress due to insulin resistance, and this pressure is exacerbated by their breastfeeding concerns. While staff in this study were confident discussing early skin-to-skin after birth, they were less confident with supporting women to feed frequently after birth, which is known to avoid neonatal hypoglycaemia (Ling et al., 2022; Tozier, 2013), and is another concern from women with GDM in the literature (see Chapter 2, p. 13). Staff would therefore benefit by receiving more education about the importance of EBF for women with GDM, and the challenges faced by them to improve support.

The WHO (2017b) suggests that to create an enabling environment for breastfeeding, health professionals must guide and counsel family members. In maternity facilities, BFHI Australia (2020) recommends that all staff facilities be cognisant of breastfeeding policy and be competent in their ability to assist women to establish breastfeeding. National breastfeeding policy (Australian Government, 2018) includes these recommendations, suggesting EBF rates on discharge from hospital

below 75% requires action to be taken by the facility to improve (BFHI Australia, 2020). With group support or counselling by a trained professional such as a lactation consultant, women with GDM are 90% more likely to be exclusively breastfeeding at 1-2 weeks postnatal (Reichental et al., 2022). In a study conducted by Reichental et al. (2022), support prior to birth and in the first two weeks postpartum over at least four sessions was noted to improve breastfeeding outcomes for women with GDM, with authors concluding that tailoring breastfeeding support for women with GDM is important when considering interventions that will improve breastfeeding outcomes. Tailored support, gained from knowing what women want, can be achieved if we ask women about their needs. During phase two of this study, women with GDM at TWH asked for breastfeeding support from a trained professional such as one main caregiver (continuity of care).

7.4 Discussion of the findings from phase two: women's participatory workshops

In the pre-intervention phases of this study (Chapter 5, p. 93), during the workshops with women, I explored women's experiences of challenges regarding antenatal breastfeeding support. I discovered that women with GDM believe breastfeeding is difficult, and any breastfeeding information offered to them was considered inconsistent and not available to them in ways that complemented their busy lifestyles (Cummins et al., 2022). This was also consistent with the findings in the review of literature provided in Chapter 2 (p. 13).

It has also been reported that women with GDM believe they are treated differently from other pregnant women by staff and are generally not confident about achieving breastfeeding success. In recent literature, such perceived difficulties are a common stressful barrier to breastfeeding among women with GDM (Park et al., 2021). The perceived differences in care women with GDM experience detrimentally influences their breastfeeding outcomes, despite any physiological barrier to breastfeeding (Doughty & Taylor, 2021). This is also seen cross-culturally; for example in Japan, authors surveyed almost 300 hospital staff across the country for levels of breastfeeding support for women with GDM and found insufficient communication to women by staff created barriers to breastfeeding (Matsunaga et al., 2021). It is clear from the evidence, including that reported in this thesis, that women with GDM need extra support to breastfeed.

Listening to and understanding what women with GDM want to support their breastfeeding decisions was achieved with person-centred, face-to-face and telephone workshops. Women with GDM identified three elements that could suit their needs: online hospital-based information, community support, and continuity of care models. These findings will be presented in combination with the results of phase four of this study.

7.4.1 Online hospital-based information

In phase two of this study, women requested to have online resources and consistent advice. Having consistent advice and support are reported as effective interventions to support breastfeeding women (WHO, 2017b). The findings of phase four of the study Post-intervention findings (see Chapter 6, p. 116) demonstrated that introducing online resources alone may have helped to improve EBF initiation for women with GDM at birth, but not at discharge from hospital (see Table 6-4, p. 128). Alianmoghaddam et al. (2019) advocates for the use of social media to provide breastfeeding support as the generation that is currently having children have smartphones, use the internet, and trust its content for healthcare information. Internet-based breastfeeding support was also found to be helpful for new mothers in a review by Almohanna et al. (2020), where pregnant and postnatal women accessed e-technologies via mobile applications and web-based interventions to assist with exclusive (or any) breastfeeding, claiming women's experiences were enhanced by additions such as videos, articles and/or discussion platforms.

Health decision-making, according to Bussey and Sillence (2019), can be stimulated by online resources, supported by them, or they can assist consumers to ask questions during their appointments. My findings provided evidence that women found online resources convenient when they were first time mothers or when they received inconsistent advice during their hospital stay, which is a common frustration for new mothers that has been reported in the literature previously (Matriano et al., 2022; WHO, 2017b). Online resources can therefore be useful to provide additional support for women with GDM or enable them to seek further information about their health decisions.

7.4.2 Community support

Women during their workshops expressed their need for community support where they can be connected with other women with GDM. Community peer support has been shown to improve initiation and duration of breastfeeding (Rai, 2017) and is becoming popular over social media with Facebook groups supported by breastfeeding counsellors (Bridges et al., 2018). As stated in the discussion the findings manuscript which is under review (see 6.3, p.121), during the COVID-19 pandemic, a community peer-support service (Australian Breastfeeding Association) supported women at home to continue to breastfeed when face-to-face methods were not available. Thirty-eight percent of over 100 women called as they believed their milk supply was inadequate (Hull et al., 2020), one of the main reasons babies of women with GDM in hospital were given infant formula (see Figure 6-4, p. 130). Community-based breastfeeding support services such as the Australian Breastfeeding Association (ABA) offer telephone helpline assistance or online chats for new mothers, answering an average 5550 calls each month in 2020 and offering 539 online support events at group level for

geographically isolated families (Australian Breastfeeding Association, 2021a). Additionally, ABA offered a 'mum2mum' app used by over 3000 people per month, a podcast (over 40,000 plays) and an online blog (Australian Breastfeeding Association, 2021a). In a systematic review on the effectiveness of community (peer) support for mothers, Rai (2017) concluded that at three months of age, EBF rates were improved in low, middle, and high-income countries. Community support for women with GDM such as ABA already exist but women wanted to have their own small face-to-face community based activities.

7.4.3 Continuity of care models

Women in phase two of the study requested to have a continuity of care from their main caregivers. Continuity of one main caregiver is a goal of NSW Health's 2023 '*Blueprint for Action'* for maternity care in NSW (NSW Health, 2023). Having a choice of one main caregiver for a woman's pregnancy contributes to positive outcomes for engagement, empowerment, and trust through their antenatal journey (COAG Health Council, 2019b; International Confederation of Midwives, 2021; RANZCOG, 2017). Evidence has demonstrated that continuity of midwifery care has a positive impact on women's and infants' health outcomes (Hall et al., 2023; Sandall et al., 2016). Amongst participants in phase four of this study (see Table 6-6, p. 129), having one main caregiver, compared to multiple caregivers, significantly improved women's views of receiving consistent information when they had GDM (*p*,0.027) and reduced the amount of formula supplementation given to babies on discharge from hospital (*p*,0.046).

In a recent review of midwife-led continuity of care (Shipton et al., 2022), clear conclusions for improvements in breastfeeding were not found. Conversely however, a dis-continuity of care produced disjointed information, a barrier to breastfeeding (Garner et al., 2016). Women with GDM at the study hospital alluded to dis-continuity as the type of care they received (see Figure 5-5, p. 107), believing nobody cared about them at the hospital and highlighted the amount of inconsistent information they received.

Evidence suggests that a midwife continuity of care (CoC) model includes a high level of satisfaction for information and advice for a woman's care (International Confederation of Midwives, 2021). Support from a consistent caregiver who is cognisant with the requirements of women with GDM would be advantageous to reduce stress and provide tailored breastfeeding support. They would also be able to educate family members during pregnancy visits. Unfortunately, in this study (see Table 5-4, p. 100), only 13% of staff believed women with GDM need extra support to breastfeed, and women with GDM are more than 10% less likely to receive CoC compared with women without GDM (see Table 5-1, p. 94). The trust created in a CoC relationship helps challenge attitudes and behaviours as it supports

maternity care of the highest quality (McInnes et al., 2020). It would therefore assist staff to challenge general attitudes of women such as believing formula is as good as breastmilk (see Figure 5-1, p. 96), when almost 20% of women with GDM left the study hospital only formula feeding their infants (see Table 5-2, p. 95).

Considerable research shows women feel more supported to breastfeed through low or high-risk pregnancies with CoC models (Cummins et al., 2022; Fernandez Turienzo et al., 2020; Homer et al., 2019; Mortensen et al., 2019). Expert individualised support from trusted health professionals before discharge from hospital can help address women's issues, especially when they have GDM. Griffin et al. (2022) ascertains a postnatal visit for women with GDM from an international board-certified lactation consultant (IBCLC) before hospital discharge can significantly improve breastfeeding rates at discharge (aOR 4.87; 95% CI [2.67, 8.86]). A recent RCT also confirmed the positive effects of individualised education and interventions by an IBCLC by improving EBF rates on discharge from hospital for women with GDM by 12% ($p < 0.05$) (You et al., 2020). Additionally, in a study reviewing breastfeeding interventions, Reichental et al. (2022) reports women with GDM who are regularly supported by professionals are 90% more likely to be exclusively breastfeeding at 1-2 weeks.

7.5 Discussion of the findings from phase four: Listening to women, recommendations for change

This study's findings showed women will feel more supported if hospitals provide ways for women with GDM to connect with each other, offer consistent and relevant information by trusted online sources and having one main caregiver. Women's requests may be achieved by establishing different continuity of care models where women have a primary caregiver through their antenatal and postnatal period and are further supported by online hospital-based information. Women in Australia have been asking for changes in maternity care well before this study was conceived. Including over 900 submissions from consumers and professionals in 2009, the *Improving Maternity Services in Australia Report* (Bryant, 2009) presented a case for the Australian Government to develop a plan to expand the number of models of care available to women for maternity care. The report highlighted the need for collaborative models of care and recommended more choice be available for women to assist them to be "*better able to make decisions about their maternity care by accessing comprehensive reliable information… including (from) internet resources*" (Bryant, 2009, p. 2). Interestingly, over ten years later, women in this study are still asking for online resources and continuity of care models to feel better prepared and supported to breastfeed.

It is important to note that adopting evidence-based interventions for change in the healthcare system is difficult (Wilson et al, 2022). The costs involved with offering high quality maternity care, with the

fear of increased mortality due to more women with pre-existing medical conditions, are often blamed for reasons to not change (Shaw et al., 2016). In this study restrictions during the COVID 19 pandemic was the main reason for all women's suggestions not being adopted.

7.5.1 Discussion of findings from phase four

The main finding of phase four (evaluation) was that breastfeeding initiation was improved after implementation of the change, but there was not a significant change in exclusive breastfeeding rates at discharge compared to the pre-intervention phase of the study. One of the reasons for this lack of success was that women's recommendations were not fully considered in the change of practice. Other factors such as skin to skin contact, frequent feeds after birth, and using the online resources may not have been reinforced adequately by staff. Another reason is that there is a time-lag between having evidence for change and making that happen in practice, one study suggesting it can take up to 17 years for change to occur (Morris et al., 2011). Implementation scientists aim to address the challenges to a lack of uptake in healthcare advancement and identify behaviours of organisations and their staff to tackle these (Eccles et al., 2012). Sustainable change in maternity practice can occur with a multidisciplinary approach, drawing on policy makers, service users and health professionals to work in partnership toward change (Downe & Byrom, 2019). Working across all levels of an organisation, i.e., individual practitioners (micro), organisational (meso) and policy/financial (macro) levels, implementation scientists have been known to use up to 60 different frameworks, derived from varying theories for change (Birken et al., 2017). The person-centred practice framework (PCPF) uses person-centred theory and also frames healthcare delivery from the macro to the micro perspectives (Phelan et al., 2020). As this research was performed through a person-centred lens, the PCPF will be used to provide recommendations for change.

7.5.2 Discussion of findings based on the Person-centred practice framework

The Person-centred Practice Framework (PCPF) (McCormack & McCance, 2016) is an internationally recognised model that outlines how teams deliver person-centred care. It includes the importance of support for change from strategic frameworks and policy at a macro level which already exist within Australian maternity healthcare and breastfeeding policies (Australian College Midwives, 2016; Australian Government, 2018; COAG Health Council, 2019a; NSW Health, 2018; WHO, 2017b). NSW Health's Annual Report 2021-2022 (NSW Health, 2022) states person-centred care is a strategic objective and staff are supported to deliver the best outcomes for consumers by unlocking the 'ingenuity' within staff to contribute to their work practices. The PCPF includes the commitment of professionally competent staff (prerequisites) with a supportive care environment at ward (meso) level,

and at a micro (individual, person-to-person) level, for the development of person-centred outcomes and change for a healthful outcome for healthcare users (see Figure 7-1).

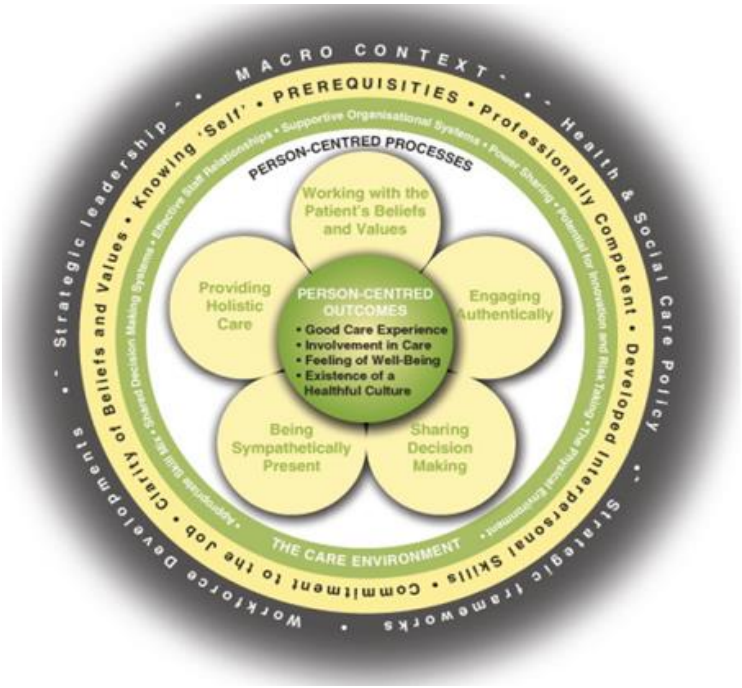

Figure 7-1 *Person Centred Practice Framework (McCormack & McCance, 2016)*

Improving EBF rates for women with GDM may be implemented by achieving the four person-centred constructs in the PCPF outlined below: a)macro Context, b) pre-requisites, c) care environment, and d) person-centred processes.

a) Macro context.

At a strategic level, person-centred outcomes and the importance of breastfeeding are high on governmental agenda. National health initiatives promote, protect and support breastfeeding in Australia through various health policies (Australian College Midwives, 2016; Australian Government, 2018; COAG Health Council, 2019a; NSW Health, 2018; WHO, 2017b). Australian hospitals affirm they are dedicated to providing safe, quality healthcare by following National Safety and Quality Standards (Australian Commission on Safety and Quality in Health Care, 2022) which incorporate person-centred care through one of their four key priorities called 'partnering with consumers,' where consumers partner in the design and governance of the organisation. In this study, evidence from consumers were collected in workshops and women's surveys to show what women wanted from the study hospital and gave their three recommendations for improvement as discussed earlier (see 7.4, p. 138).

b) Pre-requisites.

A pre-requisite to achieving person-centred outcomes is for staff to deliver safe and effective care; McCormack and McCance (2016) assert attributes such as professional competence is required by staff to enable this. In this study, staff were asked about their confidence to support women with GDM to breastfeed via anonymous survey. Low numbers of staff gave extra support to women with GDM (see 5.2.3, p. 99) or felt the hospital had systems in place to assist women with GDM to exclusively breastfeed on discharge from hospital. Although in my study, staff may have gained breastfeeding knowledge or become more aware of breastfeeding support requirements for women with GDM due to filling out the survey or participating in staff discussions, more opportunities are required for the staff to learn and reflect on their practice regarding breastfeeding support for women with GDM. In addition, education provided to staff in line with breastfeeding policy (NSW Health, 2018), where hospitals are recommended to work toward BFHI accreditation, would improve staff knowledge through regular education across the hospital, working toward seeing breastfeeding as normal.

c) The care environment.

Focussing on the context in which care is provided (the care environment) is the third level of the PCPF. It includes constructs such as power-sharing, having effective staff relationships and allowing for shared decision making between staff and women using the service. These are already acknowledged as being important woman-centred ways of working for midwives (International Confederation of Midwives, 2011). This study has outlined the importance of continuity of care (see 7.4.3, p. 140) for enabling trusting relationships between midwives and women with GDM. In this care environment, person-centredness is expanded to include staff relationships, which are known to increase job satisfaction and feelings of support (Vassbø et al., 2019; Willemse et al., 2015), which can improve experiences for healthcare consumers such as women with GDM (Australian Commission on Safety and Quality in Health Care, 2023).

d) Person-centred processes.

This micro-level refers to the processes used in this study to ensure quality of person-centred information was obtained from women in this study. Engaging authentically and being sympathetically present in women's workshops enabled shared decision-making through developing trusting relationships in the groups. Working with women, incorporating their attitudes, confidence, and perceived support, and asking for their ideas for change will enable holistic care and will lead to person-centred outcomes where women feel heard and involved in their own care.

Despite having strategic-level support for person-centred care included in policies in their organisation, decision-makers chose to apply an intervention that included only online content that would benefit all women who use their service and justified this under the pressure of COVID-19 restrictions.

7.5.3 COVID-19

COVID-19 restrictions affected research and maternity services across the globe, including staff and women at TWH. This study had to change recruitment and data collection methods when restrictions were imposed from March 2020 in Australia (see 4.5.1, p. 57). Face-to-face services were drastically reduced at the study hospital, and educational classes were stopped until online options could be implemented. In Australia, women receiving maternity care felt isolated and alone (Wilson et al., 2022). Staff also felt burdened by the impact of reduced face-to-face care for pregnant women (including through personal protective equipment), and stressors related to risks of the disease to themselves and their families (Brown et al., 2022; Hearn et al., 2022). Workplace demands increased stress with rapid changes in policy and lack of resources (Brown et al., 2022; Hearn et al., 2022).

At the same time, I was asking staff to be pro-active, disseminating evidence collected from phases one and two, and asking staff to implement a new strategy to help women with GDM improve EBF rates on discharge from hospital, adding further stress to their workloads. The pandemic negatively affected breastfeeding support due to separation of mother from her support people, midwives or sometimes her baby (Lubbe et al., 2022). Midwives often felt complicit in causing harm to families by separating them (Hearn et al., 2022).

In a time of major uncertainty, staff decided connecting women to community support and increasing midwifery continuity of care models were not possible, and decision makers could not implement the entire person-centred change (three recommendations), based on what women wanted (see 5.3.1, p. 101). Perhaps midwives and decision-makers sought to assist many more women who used their service when midwives were challenged to provide safe and supportive care (Bradfield et al., 2019) by choosing one of the three recommendations from women with GDM within their power to change, and implementing online hospital-based resources as their strategy to improve EBF on discharge from hospital.

7.6 Recommendations

This study generated evidence for listening to what women with GDM want in order to improve EBF practices on discharge from hospital that has implications for midwifery practice, policy, and research.

7.6.1 Midwifery practice

Women with GDM undoubtedly require more support from staff to exclusively breastfeed on discharge from hospital. Staff at the study hospital would benefit by receiving more education about the importance of EBF for women with GDM and the challenges faced by them that may interfere with breastfeeding. Tailoring breastfeeding support for women with GDM is important when considering interventions to improve breastfeeding outcomes, including challenging resistive breastfeeding attitudes of women and their family, and improving women's confidence to breastfeed. Staff would also benefit by knowing more about community support for women, and in-hospital interventions such as promoting early skin-to-skin contact after birth. Staff may also ask their policy makers to implement strategies to reduce stress and provide tailored breastfeeding support such as continuity of care models for women with GDM.

7.6.2 Policy

Sustainable change in maternity practice can occur with a multidisciplinary approach, drawing on policy makers, service users and health professionals to work toward change together, starting with person-centred care, a strategic objective where staff are supported to deliver the best outcomes for consumers (NSW Health, 2022). Women with GDM may feel more supported if hospitals provide ways for women with GDM to connect with each other and offer consistent and relevant information by trusted online sources and caregivers. The hospital may also like to work toward Baby Friendly (BFHI) accreditation, as per breastfeeding policy (NSW Health, 2018), which ensures staff are up-to-date with their breastfeeding knowledge and ways to support women, ensuring that breastfeeding is seen as the normal way to feed babies by all staff in the hospital.

7.6.3 Research

Women with GDM in this study gave three recommendations for this to occur. Listening to women and implementing all three of their ideas simultaneously may be one way to improve outcomes for EBF on discharge from hospital. More research is required to assess the feasibility and effectiveness of a multidisciplinary interventional study that is tailored for women's needs with GDM and acceptable by maternity service stake holders.

7.6.4 In summary

Overall, as social order returns after the COVID-19 pandemic, there is a need for maternity services staff and policy makers to be innovative, piloting a person-centred continuity of care model for antenatal care for women with GDM, where information given by one main caregiver is supported by online hospital-based information to improve EBF rates on discharge from hospital. Recommendations which stem from the findings of this study include the need for:

- Timely and relevant professional support for women with GDM as women with GDM are treated differently, leading to increased stress and poor breastfeeding outcomes compared to women without GDM.
- More Baby Friendly (BFHI) facilities that have educated staff, where breastfeeding is considered 'the norm' and staff know about the importance of EBF for women with GDM, the challenges faced by them, and how to give professional support that is tailored to their individual needs.
- Online resources offered for additional support for women with GDM to enable them to seek further information about their health decisions.
- Women with GDM made aware of community support, or groups organised by the hospital to enable women with GDM to talk to each other while pregnant.
- A continuity of care model for women with GDM, where trust can be created with one main caregiver to challenge attitudes and behaviours that may not support breastfeeding.

7.7 Conclusion of chapter

Women with GDM undoubtedly require assistance with breastfeeding to at least parallel the rates of EBF on discharge from hospital compared with women with no-diabetes. Women asked for more support and offered three recommendations: online hospital-based information, community support and continuity of care. While each of these concepts have not been evaluated amongst groups of women with GDM alone, research shows they may individually improve breastfeeding rates for all women. This study has shown women with GDM will use online resources to clarify information and initiate EBF. Rates of EBF on discharge from hospital may therefore be improved if online resources are embedded as part of the support given by continuing care of one main trusted health professional across a woman's antenatal and postnatal periods. The following chapter will discuss limitations and reflections for this study to conclude my thesis.

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Chapter Eight Limitations, Reflections, and Conclusion

8.1 Chapter introduction

Following the last chapter where discussion and recommendations for future practice, policy and research were described, this chapter provides a summary of research outcomes including an overview of key findings, strengths, and limitations. From a personal perspective, this chapter creatively reflects on my personal growth since 2019 as a PhD candidate, wildlife carer, midwife, and mother, and provides a final recommendation and conclusion to this study.

8.2 Overview of key findings

Through a person-centred lens, working with women with GDM to improve rates of exclusive breastfeeding on discharge from hospital, new knowledge was generated from the AD-MIRE Breastfeeding study. This study has explored the need for improvement in breastfeeding support at Wollongong Hospital (TWH) for women with GDM. Women and staff were surveyed to ascertain their attitudes and confidence for being supported, and background data was gathered from TWH. Women with GDM were asked for their recommendations for change and data was disseminated to staff for them to choose which of the women's ideas they could feasibly implement in an effort to improve exclusive breastfeeding (EBF) rates on discharge from hospital for these women. Two years after the commencement of this study, I evaluated the impact of the resulting intervention, which was a hospital-based website. Study questions were answered across four phases of this participatory action research study, and these have been summarised in Table 8-1 (p. 150) to display where each research finding has been presented within this thesis.

Table 8-1 *Key Findings AD-MIRE Breastfeeding Study*

Study phase		Research question	Key findings	Thesis location
Phase one	Part 1	What were women with GDM's breastfeeding attitudes, confidence, and support?	Attitude: less than 2/3 women with GDM believe breastfeeding is better than infant formula Confidence: 80% believe breastfeeding is hard, 2/3 women confident they can succeed Support: 40% of women with GDM have BAPT ≤20 (high chance of attrition in 8 weeks after birth)	5.2.2 (p. 95)
	Part 1	What is rate of breastfeeding cessation (attrition) for women with GDM at around 6-8 weeks postpartum?	64% of women with GDM EBF on D/C from hospital 77% of women with GDM any BF on D/C from hospital 50% of women with GDM any BF at 8 weeks postpartum Attrition rate for women with GDM= 27% to 8 weeks postpartum	5.2.2 (p. 95) Table 5-3 (p. 99)
	Part 2	What were staff attitudes and confidence about supporting breastfeeding for women with GDM?	13% of staff believe women with GDM need extra support to EBF. < 80% of staff are confident to support women with GDM with managing low supply, frequent feeds after birth, hand expressing or knowing community support to help after discharge	5.2.3 (p. 99)
	Part 3	What were the baseline breastfeeding practices in TWH among women with and without GDM?	68.4% women with GDM EBF on discharge (2020) [vs 78.4% no-GDM], $p = 0.014$*	5.2.1 (p. 93)
Phase two	NA	What are women's experiences of challenges regarding antenatal breastfeeding support?	Three major themes- women with GDM are: - stressed and worried (treated differently from other women) - breastfeeding is hard (fear of failure, struggle, unhelpful information, isolated) - inconsistent BF information and caregivers (feel nobody cares about them)	5.3.1 (p.101) Figure 5-5 (p. 107)
		What are the women's recommendation for change?	- online hospital-based information - community support - continuity of care	5.3.1 (p.101) Figure 5-5 (p. 107)
Phase three	NA	After dissemination of the findings, what would be the staff consensus in changing the practice?	Develop online hospital-based information	6.2.2 (p. 118)
Part four	Part 1	What were the breastfeeding practices in TWH, after implementation of online hospital-based resources?	At birth – 9% more EBF ($p = 0.036$) At D/C – no significant differences - 1.4% less EBF, 6% less exclusive infant formula and 6% more any BF	6.3 (p. 121) Table 6-4 (p. 128)
	Part 2	Did women with GDM use the online hospital resources?	Users were: - first time mothers (79.3% vs 25%, $p < 0.001$) - had attended hospital-based classes for antenatal expressing (ANE) (44.8% vs 11.5%, $p < 0.001$) - reported they did not receive enough breastfeeding information at the hospital (p, 0.002) - felt they had received inconsistent breastfeeding information from hospital staff (p, 0.015)	6.3 (p. 121) Table 6-5 (p. 128)
		Was there any differences in breastfeeding for women who used the online resources?	No significant differences	6.3.4 (p. 127) Table 6-4 (p. 128)

8.3 Strengths and limitations

Identifying the strengths and weaknesses in this study helps give an honest representation of the processes of the AD-MIRE Breastfeeding study, and these have been outlined in previous chapters (see pages 29, 48, 53, 114, 133). There were limitations that stemmed from my own knowledge gaps as a novice researcher and the COVID-19 pandemic. Nevertheless, I was supported by supervisors that were experts in person-centred and breastfeeding research to guide my learning which was invaluable across the four phases of this study.

The most notable limitation was this study being undertaken in one regional Australian hospital and therefore may not represent the views of all women with GDM. However, this study had 366 participants involved across phases one (n = 175) and four (n = 191) of this study. In phase two, 30 women with GDM were involved in workshops where the themes and women's attitudes, beliefs and confidences were similar to those found in existing literature. The transferability of findings to other Australian or international institutions may be comparable.

Another limitation occurred when the main outcome culminated in only one of the three women's recommendations being adopted. While this was out of my control, when armed with existing literature as I disseminated women's ideas to staff, a major benefit was they were also educated about breastfeeding support for women with GDM. I knew staff were discussing this study amongst their own teams, which is advantageous for the health of new mothers and their babies in the Illawarra. Nevertheless, a post-doctoral study may look at whether implementing all of women's ideas as one intervention may be more successful for improving EBF on discharge from hospital.

Finally, there are always limitations to using self-reported measures for attitudes, confidence, and breastfeeding outcomes via survey, as people may comprehend the questions or recall events differently. However, a major strength of this study is that this is the first study to include women with GDM in developing a person-centred intervention to improve breastfeeding. As a midwife working within this hospital for more than 10 years, I feel the rapport I had with staff and women contributed to the high survey numbers received across all phases. There was no deviation from the 'usual care' given to antenatal women with GDM at TWH during this study, therefore I believe it will be of interest to any institution who would like to pursue the improvement of breastfeeding for women with GDM, or avenues for talking with and listening to their own health consumers in person-centred ways.

8.4 Reflections on my PhD journey

As I reflect on my PhD journey, I am proud of what I have achieved. At times I have been anxious and berated myself for not making the most of my time, however reflection has allowed me to notice what a great time-juggler I have been! I wear many hats, and I have longed to add the doctorate hat to my collection. It is particularly important to me that, irrespective of the hat on my head, the time I spend wearing each one is of high quality. Figure 8-1 (p. 152) is a representation of how many hats I may wear in one day, with some of my supervisors in life helping me choose the most appropriate hat. As I have juggled wearing each hat on my hat-rack over the time spent doing this research study, I have learned a great deal more about myself – like being kind to myself and celebrate any milestone, for example sending a draft chapter to a supervisors, managing to fit in a few days of paid work each week, managing around 24 bottles of milk a day, delivering a training session to other volunteers, working in a wildlife hospital, or finding time to connect with children living away, a husband, friends, and aging parents.

As a wildlife carer, I am able to spend time outside, sitting, thinking, and feeding bottles to orphaned macropods and wombats. As I creatively reflected on how I worked toward acquiring a nice new doctorate hat for my hat-rack, one of my Red-neck wallabies ("Blue") reminded me about the time I worked to acquire my gardening hat, and the comparison to how I navigated this study seemed appropriate.

Figure 8-1 *My hat rack (with supervisors)*

I am not a gardener. However, one day I bought a beautiful kangaroo paw plant. To keep this plant looking healthy and achieve my gardener-hat, I would have to carefully consider information that was new to me, such as watering, feeding, and nurturing the plant to keep it alive. Blue was my supervisor. I had shown him what I thought was a good effort at keeping the kangaroo paw alive and healthy, similar to the way I felt about my first paper for publication or a thesis chapter. I was looking forward to a new challenge and eager to begin. However, like my supervisors with first drafts of papers or chapters, Blue ate all those flowers and almost stripped the plant bare. I felt devastated. My initial enthusiasm was shattered, and I wondered "what have I started?". However, as I worked to achieve my hat, I learned that my supervisor had left the foundations intact and ready for some more attention to detail. I enjoyed this challenge despite my frustration at not doing it right the first time. My supervisors and Blue have all guided me to achieve many new skills toward personal growth and the ultimate achievement of my goals … and a new hat!

As time passed, nurturing the plant, and writing with guidance and feedback from my supervisors during this study, I began to feel more comfortable and motivated to continue. Being someone who never gives up certainly helped me to achieve my goals! New shoots grew from the kangaroo paw and one publication turned into two, while thesis chapters started to grow and flower as my journey toward the attainment of my new hat progressed.

Finally, I am experiencing feelings of pride in the work I have achieved and incredibly grateful for the assistance and guidance of my supervisors. While the new flowers that have blossomed on my kangaroo paw are not what I had initially envisioned, I can acknowledge that the challenges I have faced to see this journey to fruition has given such reward. I am certainly not the midwife now that I was at the beginning of this study. My commitment to the project, rapport built with women and staff at TWH, and fellow PhD candidates over the past four years, have taught me more about how I relate to the world. I have also developed a broader understanding of how people relate to each other, especially when anxious or inspired about change. I now have an immense interest in research and look forward to where that might take me, and the learning I am yet to recognise. Finally, I am looking forward to wearing a new hat, and my plant is still alive!

8.5 Final recommendation and conclusion

Person-centredness guided this study's PAR design to gather an extensive amount of information from women, staff, and the hospital database, to verify the broad picture of breastfeeding support at a regional Australian hospital. Background data was amalgamated with broad experiences of women with GDM to understand women's frustrations with support for exclusive breastfeeding as they journeyed through maternity services from antenatal into their postnatal periods.

Results showed women with GDM feel breastfeeding is hard and complicated by the many inconsistencies within their hospital care, from seeing multiple caregivers to receiving breastfeeding information that is not relevant or timely for their circumstances. However, women who felt they needed more breastfeeding information used the online resources provided by staff and there were improvements in initiation of EBF at birth in this study.

There are, however, numerous influences that impact infant feeding decisions for women with GDM that need to be addressed by listening to what women want and tailoring hospital support to their needs. While this study did not improve EBF practices on discharge from hospital for women with GDM, the AD-MIRE Breastfeeding study has successfully contributed to the acquisition of new knowledge for breastfeeding support for women with GDM.

Improving rates of exclusive breastfeeding on discharge from hospital for women with GDM may be achieved by combining localised online information with further support such as continuity of one main caregiver and access to peer support in the community. Asking women what they want, and tailoring education to their specific needs cannot be achieved if only one of three recommendations are implemented. There is a need therefore to investigate the entirety of women's suggestions to fully tailor an intervention to their needs and improve EBF rates on discharge from hospital.

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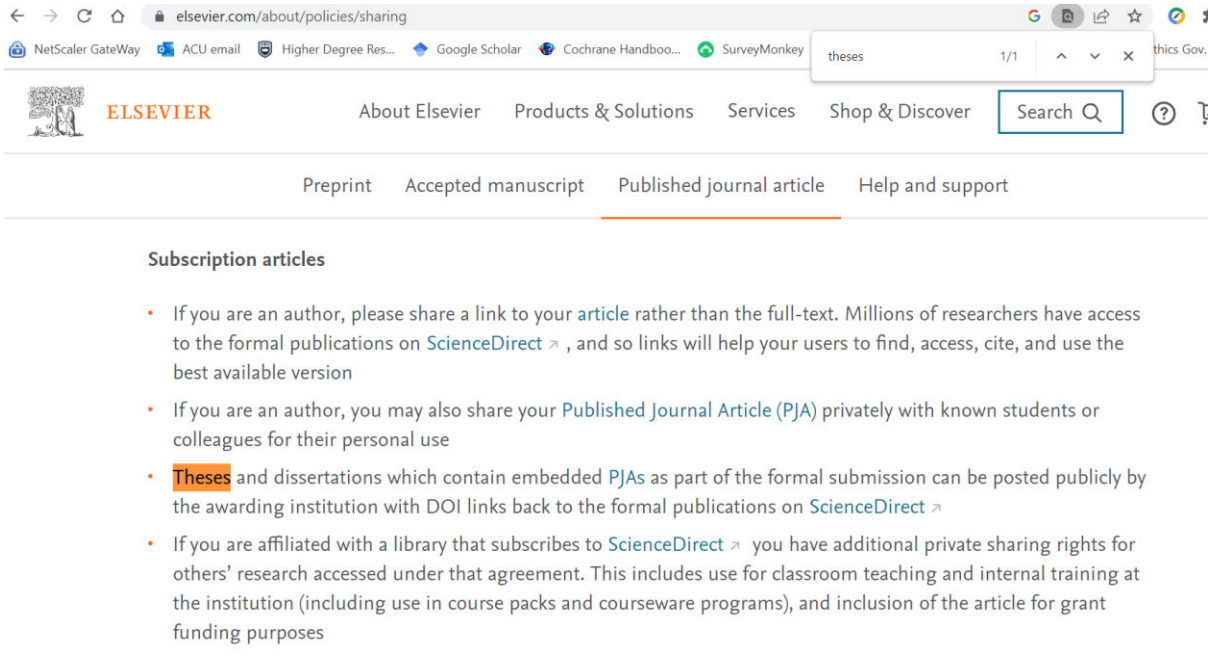
Appendices

Appendix A: Publisher permission for reproduction of literature review

Cummins L, Meedya S, Wilson V. Factors that positively influence in-hospital exclusive breastfeeding among women with Gestational Diabetes Mellitus: An integrative review. *Women and birth: journal of the Australian College of Midwives* 2021.



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journal homepage: www.elsevier.com/locate/wombi

ELSEVIER

Factors that positively influence in-hospital exclusive breastfeeding among women with gestational diabetes: An integrative review

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ABSTRACT

Problem: Women with gestational diabetes have higher rates of introducing infant formula before leaving hospital.
Background: Despite health professional support, less women with gestational diabetes exclusively breastfeed in hospital.
Aim: To find factors that positively influence in-hospital exclusive breastfeeding practices among women

Appendix B: Permission for use of Maternity Data at Wollongong Hospital

From: Barbara Atkins (Illawarra Shoalhaven LHD)
Sent: Thursday, 22 August 2019 11:58 AM
To: Leanne Cummins (Illawarra Shoalhaven LHD) <Leanne.Cummins@health.nsw.gov.au>
Subject: PhD study

Hi Leanne
Approval to release data for your PhD study is granted through the Maternity Data manager, Jenny Budd, pending approval by the ethics committee.

Kind regards

Barb

Barb Atkins
Operations Manager
Maternity & Paediatric Services
Northern Illawarra Hospital Group
Level 2. Lawson House. Wollongong Hospital
Tel. 02 4253 4625 Barbara.Atkins@health.nsw.gov.au

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I acknowledge the traditional owners of the land that I live and work on and pay my respects to Elders past and present.

Appendix C: Pre-intervention - Poster for women with GDM

Got gestational diabetes (GDM)?

Want to help us improve services for women with GDM at Wollongong hospital?

Be involved in our research project!

What do you want from me?

1) Fill in a survey
2) Optional participation in a workshop
3) Telephone interview 6 weeks after birth
4) Allow us to follow up some stats through hospital records

How do I participate?

Ask staff at reception or the researcher at the desk for more information

Appendix D: Pre-intervention - Participant Information Sheet, Women with GDM

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Participant Information Sheet for Women with Gestational Diabetes (GDM) at Wollongong Hospital

AD-MIRE Breastfeeding: Antenatal Diabetes- Mothers Improving Rates of Exclusive Breastfeeding; an initiative to investigate what women with GDM want to support them to exclusively breastfeed on discharge from hospital.

Researcher:
Leanne Cummins, PhD Student, Clinical Midwife Specialist, Wollongong Hospital. Ph. 4253 4271. leanne.cummins@health.nsw.gov.au

Supervisors:
Principle Investigator - Prof. Val Wilson, Professor of Nursing and Midwifery Research, Nursing and Midwifery Research Unit (NMRU), Illawarra Shoalhaven Local Health District (ISLHD), Contact PH. 4253 4854
valerie.wilson@health.nsw.gov.au

Dr Shahla Meedya, Senior lecturer, University of Wollongong, School of Nursing, Faculty of Science, Medicine and Health. Contact Ph. 4221 3205
smeedya@uow.edu.au

Invitation to participate and brief summary
This is an invitation for you to participate in a study to examine infant feeding decisions on discharge from hospital for women with GDM. *Please note, you do not have to intend to breastfeed to participate.*

The aim of this study is to support future practice at Wollongong Hospital.

The purpose of your involvement is to improve the support given to women with GDM at Wollongong Hospital.

What is involved?
Participation is voluntary. You may choose to participate in any of the following:

1) Completion of a 10-minute survey in antenatal clinic (consent will be implied by participation),

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2) Filling in a consent form for participation in your choice of the following:

a) i) To participate in one workshop (lasting approx. 2 hours) at the hospital to discuss ways that staff at Wollongong Hospital can support you to exclusively breastfeed on discharge from hospital.
ii) To be contacted for a follow-up interview after the workshop which will be further discussed in the workshop.

b) Allow researchers to look at your hospital data (for birth outcomes and baby information such as blood sugar levels and feeding in hospital)

c) Have a researcher call you for a short survey approximately 6 weeks after birth of your baby.

What information will you collect from my records?
The only people who will look at your records are the midwives in the research team. Your information will be de-identified and coded to compare to results from your surveys.
We will collect this data: GDM diagnosis & management (ie diet/ insulin), type of birth, baby's weight and gestation at birth, your feeding intention, baby's feeding method from birth to discharge from hospital, baby's BGLs, whether baby was admitted to NNU and reason/ management in NNU.

Participation is voluntary. You can change your mind and withdraw from the study at any time. This will not affect your care at the hospital or relationships with staff in any way.

Findings of this study will be published as a PhD paper at UOW, in a professional journal and presented at conferences. You will **not** be identified in any of these findings or results.

How will information be stored?
All paper data will be stored in a locked cupboard within Wollongong Hospital by the chief investigator. All electronic data (de-identified survey results) will be stored on a password protected computer by the chief investigator. These

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will be destroyed after 5 years. Only the research team will have access to the data.

What are the possible benefits of taking part?
With your help, this research hopes to improve care and support for women with gestational diabetes (GDM) within Maternity Services at Wollongong hospital.

What are the possible disadvantages and risks of taking part?
We are not aware of any risks to you from taking part in this research. Your care will not be affected by participation in this research. The researcher is also a midwife that works in this hospital. If you feel as though you need more support from your participation, the on-call social worker can be called to help. Remember that you can withdraw from the study at any time.

Funding and conflict of interest:
There have been no conflicts of interest declared by the research team and no funding has been sought for completion of this study.

Collection of data;
The researcher is responsible for the collection and storage of all information that will be kept in a locked filing cabinet in an office within Wollongong Hospital. All information will be kept confidential and doctors and midwives in the hospital will not know that you are taking part in the research.

Data Analysis;
The research team are the only people that will have access to the information collected. You will not be identified in any reports.

Questions or concerns:
If you have any concerns or questions about this research, please do not hesitate to contact Leanne Cummins, Ph. 4253 4271, leanne.cummins@health.nsw.gov.au, Val Wilson, Ph. 4253 4854 valerie.wilson@health.nsw.gov.au, or Shahla Meedya, Ph. 4221 3205 smeedya@uow.edu.au.

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If you have any concerns or complaints regarding the way in which this research is being conducted please contact the University Ethics Officer on (02) 4221 3386 or email rso-ethics@uow.edu.au and provide the name of the project (AD-MIRE Breastfeeding).

Consents:
If you have read and understood this Participant Information Sheet, have had questions about the research or your participation in this research answered, and you would like to take part in the study, please now fill in the survey and sign the consent form to participate.

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Appendix E: Pre-intervention - Antenatal Survey for women with GDM

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AD-MIRE Breastfeeding Study
Antenatal Survey for women with GDM

MRN-

For each of the following, indicate how you think you should feed your infant.

Please fill in the oval that most closely describes how you feel about each statement. Would YOU...			
	Agree	Neither	Disagree
1. Breastfeeding is more convenient than formula feeding.	◯	◯	◯
2. Breast milk is healthy for the baby.	◯	◯	◯
3. Breast milk is more nutritious than infant formula.	◯	◯	◯
4. Breastfeeding makes your breasts sag.	◯	◯	◯
5. Breastfeeding makes you closer to your baby.	◯	◯	◯
6. Breastfeeding makes returning to work more difficult.	◯	◯	◯
7. Breastfeeding is more economical than formula feeding.	◯	◯	◯
8. When you breastfeed you never know if the baby is getting enough milk.	◯	◯	◯
9. Mothers who formula feed get more rest than breastfeeding mothers.	◯	◯	◯
10. Breastfeeding is more time consuming than formula feeding.	◯	◯	◯
11. Breastfeeding is messy.	◯	◯	◯
12. Breastfeeding ties you down.	◯	◯	◯
13. Breastfeeding helps you bond with your baby.	◯	◯	◯
14. Breastfeeding is better than formula.	◯	◯	◯

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	Feed Formula	No Opinion	Feed Breast Milk	N/A
15. The baby's father thinks I should:	○	○	○	○
16. My mother thinks I should:	○	○	○	○
17. My mother-in-law thinks I should:	○	○	○	○
18. My sister thinks I should:	○	○	○	○
19. My doctor thinks I should:	○	○	○	○

Please indicate whether you agree or disagree with the following statements. Would YOU...

	Agree	Neither	Disagree
20. I have the necessary skills to breastfeed.	○	○	○
21. I am physically able to breastfeed.	○	○	○
22. I know how to breastfeed.	○	○	○
23. I am determined to breastfeed.	○	○	○
24. I won't need help to breastfeed.	○	○	○
25. Breastfeeding is easy.	○	○	○
26. I am confident I can breastfeed.	○	○	○

(BAPT Tool)

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Confidence

How confident are you with breastfeeding your new baby? Please colour the number that is closest to how you feel. There is no right or wrong answer.

		Not at all Confident ---→ Very Confident				
27	I can always determine that my baby is getting enough milk	1	2	3	4	5
28	I can always successfully cope with breastfeeding like I have with other challenging tasks	1	2	3	4	5
29	I can always breastfeed my baby without using formula as a supplement	1	2	3	4	5
30	I can always ensure that my baby is properly latched on for the whole feeding	1	2	3	4	5
31	I can always manage the breastfeeding situation to my satisfaction	1	2	3	4	5
32	I can always manage to breastfeed even if my baby is crying	1	2	3	4	5
33	I can always keep wanting to breastfeed	1	2	3	4	5
34	I can always comfortably breastfeed with my family members present	1	2	3	4	5
35	I can always be satisfied with my breastfeeding experience	1	2	3	4	5
36	I can always deal with the fact that breastfeeding can be time consuming	1	2	3	4	5
37	I can always finish feeding my baby on one breast before switching to the other breast	1	2	3	4	5
38	I can always continue to breastfeed my baby for every feeding	1	2	3	4	5
39	I can always manage to keep up with my baby's breastfeeding demands	1	2	3	4	5
40	I can always tell when my baby is finished breastfeeding	1	2	3	4	5

(Breastfeeding Self-Efficacy Scale – Short Form)

Appendix F: Pre-intervention - Consent form: Women with GDM

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CONSENT FORM for Women with GDM at Wollongong Hospital

AD-MIRE Breastfeeding –

Antenatal Diabetes – Mothers Improving Rates Exclusive Breastfeeding

Investigators

1. Prof. Val Wilson (Professor of Nursing and Midwifery Research), Nursing and Midwifery Research Unit (NMRU), Illawarra Shoalhaven Local Health District (ISLHD). (Principle Investigator). Contact PH: 4253 4854 valerie.wilson@health.nsw.gov.au
2. Dr Shahla Meedya, Senior Lecturer, Faculty of Nursing, University of Wollongong. Contact smeedya@uow.edu.au
3. Leanne Cummins, ANSC Coordinator, Illawarra Shoalhaven Local Health District (ISLHD). Contact Leanne.Cummins@health.nsw.gov.au Phone 4253 4271.

I confirm that I have read the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

Please only tick the boxes if you agree to consent:

1. a) I am interested in attending an early antenatal workshop for women with GDM in the next month or so. ☐

   b) I consent to being followed up after participation. ☐

2. I agree that researchers can access my hospital records for information about my GDM and hospital stay as outlined in the information sheet. ☐

3. I agree to be contacted about a follow-up telephone survey about 6 weeks after the birth of my baby. ☐

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I believe there are no risks associated with my involvement but if I become distressed I am aware that I can receive support from the research team or midwives and doctors here at the hospital to access the social worker.

There will be no record of my name other than the consent form, surveys and attendance list.

I have volunteered to participate but I understand that I am free to withdraw from the study at any time and this decision will not affect my care at Wollongong Hospital.

I have had the opportunity to ask any questions and I understand that I can contact the research team or the ethics department at University of Wollongong if I have any concerns or complaints in regards to the way the research is being conducted. The Ethics Department at the University of Wollongong can be contacted on 4221 3386 or email rso-ethics@uow.edu.au and I know to quote the name of the study.
Contact details for the research team are: Professor Val Wilson, Nursing and Midwifery Research Unit, PH: 4253 4854 valerie.wilson@health.nsw.gov.au

My best contact method for workshop details and/or telephone interview is:

☐ email: _____

☐ phone: _____

I agree to participate:

_____	_____	_____
Name of participant	Date	Signature
_____	_____	_____
Name of person taking consent	Date	Signature

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Appendix G: BAPT - Breastfeeding Attrition Prediction Tool

Edmunds, L. S., Lee, F. F., Eldridge, J. D., & Sekhobo, J. P. (2017). Outcome Evaluation of the You Can Do It Initiative to Promote Exclusive Breastfeeding Among Women Enrolled in the New York State WIC Program by Race/Ethnicity. *Journal of Nutrition Education and Behavior*, *49*(7, Supplement 2), S162-S168.e161. https://doi.org/https://doi.org/10.1016/j.jneb.2017.05.350

Prenatal Breastfeeding Survey (BAPT)	
Date:	
Name:	LA#:
WIC ID#:	Site #:

Please fill in the oval that most closely describes how you feel about each statement. Would YOU...	Agree	Neither	Disagree
1. Breastfeeding is more convenient than formula feeding.	○	○	○
2. Breast milk is healthy for the baby.	○	○	○
3. Breast milk is more nutritious than infant formula.	○	○	○
4. Breastfeeding makes your breasts sag.	○	○	○
5. Breastfeeding makes you closer to your baby.	○	○	○
6. Breastfeeding makes returning to work more difficult.	○	○	○
7. Breastfeeding is more economical than formula feeding.	○	○	○
8. When you breastfeed you never know if the baby is getting enough milk.	○	○	○
9. Mothers who formula feed get more rest than breastfeeding mothers.	○	○	○
10. Breastfeeding is more time consuming than formula feeding.	○	○	○
11. Breastfeeding is messy.	○	○	○
12. Breastfeeding ties you down.	○	○	○
13. Breastfeeding helps you bond with your baby.	○	○	○
14. Breastfeeding is better than formula.	○	○	○

For each of the following individuals, indicate how they think you should feed your infant.	Feed Formula	No Opinion	Feed Breast Milk	N/A
15. The baby's father thinks I should:	○	○	○	○
16. My mother thinks I should:	○	○	○	○
17. My mother-in-law thinks I should:	○	○	○	○
18. My sister thinks I should:	○	○	○	○
19. My doctor thinks I should:	○	○	○	○

Please indicate whether you agree or disagree with the following statements. Would YOU...	Agree	Neither	Disagree
20. I have the necessary skills to breastfeed.	○	○	○
21. I am physically able to breastfeed.	○	○	○
22. I know how to breastfeed.	○	○	○
23. I am determined to breastfeed.	○	○	○
24. I won't need help to breastfeed.	○	○	○
25. Breastfeeding is easy.	○	○	○
26. I am confident I can breastfeed.	○	○	○

Appendix H: Pre-intervention Participant Information Sheet, Staff

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Participant Information Sheet for Staff at Wollongong Hospital

AD-MIRE Breastfeeding: Antenatal Diabetes- Mothers Improving Rates of Exclusive Breastfeeding; an initiative to investigate what women with GDM want to support them to exclusively breastfeed on discharge from hospital.

Researcher
Leanne Cummins, PhD Student, Clinical Midwife Specialist, Wollongong Hospital. Ph. 4253 4271. leanne.cummins@health.nsw.gov.au

Supervisors:
Principle Investigator - Prof. Val Wilson, Professor of Nursing and Midwifery Research, Nursing and Midwifery Research Unit (NMRU), Illawarra Shoalhaven Local Health District (ISLHD), Contact PH. 4253 4854
valerie.wilson@health.nsw.gov.au

Dr Shahla Meedya, Senior lecturer, University of Wollongong, School of Nursing, Faculty of Science, Medicine and Health. Contact Ph. 4221 3205
smeedya@uow.edu.au

Invitation to participate and brief summary
This is an invitation for you to participate in a study to improve exclusive breastfeeding rates for women with GDM. Participation is voluntary and will involve completion of a 10-minute survey on-line or on paper.

The aim of this study is to co-design a person-centred intervention with women with GDM to improve exclusive breastfeeding rates on discharge from hospital.

The purpose of staff involvement is to inform the collaborative workshops held with women with GDM so that we have accurate information about the supportive strategies that already exist at Wollongong Hospital.

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What is involved?

If you agree to participate in the study, you will be asked to participate in:

1) An anonymous survey (approx. 10 minutes) to ascertain your attitudes and ideas regarding exclusive breastfeeding for women with GDM at Wollongong Hospital.

2) Involvement in feedback session (approx. 20 minutes) during maternity services Tuesday education and staff handover time to discuss the implementation of supportive strategies that women with GDM feel will support them to exclusively breastfeed, and how midwives may accommodate these.

Participation in the survey is anonymous and feedback sessions will be part of regular educational updates within your area of work. Non-participation will not affect your relationship with other staff in the ISLHD. Findings will be published as part of a PhD thesis in a journal and/or presented at a conference.

How will information be stored?

All paper data will be stored in a locked cupboard within Wollongong Hospital by the researcher. All electronic data (anonymous survey results) will be stored on a password protected computer by the researcher. These will be destroyed after 5 years. Only the research team will have access to the data.

What are the possible benefits of taking part?

Staff involvement is of great benefit to continuous quality improvement of care within Maternity Services at Wollongong Hospital. Participation in an anonymous survey and feedback sessions are integral to working out what strategies are already in place in the service and what extra support we can implement to further support women with GDM to exclusively breastfeed on discharge from hospital.

What are the possible disadvantages and risks of taking part?

We are not aware of any risks to you from taking part in this research. However, if you feel you need support by answering the survey or attending the feedback sessions, the on- call social worker can be called and you can also access Employee Assistance Program (a free program for ISLHD employees -see details at the end of this information sheet).

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Funding and conflict of interest:
There have been no conflicts of interest declared by the research team and no funding has been sought for completion of this study.

Questions or concerns:
If you have any concerns or questions about this research, please do not hesitate to contact Leanne Cummins, Ph. 4253 4271, leanne.cummins@health.nsw.gov.au, Val Wilson, Ph. 4253 4854 valerie.wilson@health.nsw.gov.au, or Shahla Meedya, Ph. 4221 3205 smeedya@uow.edu.au.
If you have any concerns or complaints regarding the way in which this research is being conducted please contact the University Ethics Officer on (02) 4221 3386 or email rso-ethics@uow.edu.au and provide the name of the project (AD-MIRE Breastfeeding).

Employee Assistance Scheme (EAP)

The EAP can help with a range of issues and concerns, including:

- Interpersonal conflict and tension
- Work-related stress
- Changes in your work environment
- Relationship or family matters
- Grief and bereavement
- Career issues
- Mental health concerns
- Personal crisis or trauma

Face to face counselling is available from 7:00am to 7:00pm Monday to Friday
Outside of those hours, the 1300 USE EAP number is staffed 24 hours a day, seven days a week so that staff can make contact and access immediate telephone counselling should they require it.

1300 USE EAP/ 1300 873 327

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Appendix I: Pre-intervention Staff survey

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AD-MIRE Breastfeeding **Staff Survey (1-14 BAPT)**			
Please circle all that apply: I work in these areas: ANC / BU / C2 / NNU			
	Agree	Neither	Disagree
1. Breastfeeding is more convenient than formula feeding.			
2. Breast milk is healthy for the baby.			
3. Breast milk is more nutritious than infant formula.			
4. Breastfeeding makes your breasts sag.			
5. Breastfeeding makes you closer to your baby.			
6. Breastfeeding makes returning to work more difficult.			
7. Breastfeeding is more economical than formula feeding.			
8. When you breastfeed you never know if the baby is getting enough milk.			
9. Mothers who formula feed get more rest than breastfeeding mothers.			
10. Breastfeeding is more time consuming than formula feeding.			
11. Breastfeeding is messy.			
12. Breastfeeding ties you down.			
13. Breastfeeding helps you bond with your baby.			
14. Breastfeeding is better than formula.			
15. Women with GDM have more problems with breastfeeding.			
16. I offer formula to women with GDM more often than women without GDM.			
17. I offer more breastfeeding assistance to women with GDM.			
18. We can improve rates of exclusive breastfeeding on discharge from hospital for women with GDM.			

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19. Wollongong Hospital has systems in place to help all women to exclusively breastfeed on discharge from hospital.			
20. I am confident using the following methods to help women to breastfeed exclusively:	Agree	Neither	Disagree
a) hand expressing			
b) machine expressing			
c) skin to skin in the first hour			
d) breastfeeding 8-12 times in 24 hours			
e) feed hourly for 3-4 feeds until BSL stable			
f) baby to breast within an hour of birth			
g) finger-feeding expressed breastmilk			
h) I can tell when a baby is attached / positioned well to breast			
i) I can tell when milk is being transferred to the baby			
j) I know what community supports are available for breastfeeding and tell women about them			
k) I can work with a woman to manage nipple damage			
l) I can work with a woman to manage low supply			
m) I also use these methods to support women with GDM:			

I have these further comments about women with GDM and exclusive breastfeeding:

Appendix J: Post-intervention – Participant information sheet, women with GDM – postnatal survey

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Participant Information Sheet for Women with Gestational Diabetes (GDM) at Wollongong Hospital

(Phase 4 – AD-MIRE Breastfeeding Study -Post-intervention, post-natal study)

AD-MIRE Breastfeeding: Antenatal Diabetes- Mothers Improving Rates of Exclusive Breastfeeding; an initiative to investigate what women with GDM want to support them to exclusively breastfeed on discharge from hospital.

Researcher:
Leanne Cummins, PhD Student, Clinical Midwife Specialist, Wollongong Hospital. Ph. 4253 4271. leanne.cummins@health.nsw.gov.au

Supervisors:
Principle Investigator - Prof. Val Wilson, Professor of Nursing and Midwifery Research, Nursing and Midwifery Research Unit (NMRU), Illawarra Shoalhaven Local Health District (ISLHD), Contact PH. 4253 4854 valerie.wilson@health.nsw.gov.au

Dr Shahla Meedya, Senior lecturer, University of Wollongong, School of Nursing, Faculty of Science, Medicine and Health. Contact Ph. 4221 3205
smeedya@uow.edu.au

Invitation to participate and brief summary
This is an invitation for you to participate in a study to examine infant feeding decisions on discharge from hospital for women with GDM. *Please note, you do not have to intend to breastfeed to participate.*

The aim of this study is to support future practice at Wollongong Hospital.

The purpose of your involvement is to improve the support given to women with GDM at Wollongong Hospital.

What is involved?
Participation is voluntary and involves completion of an on-line 10-15 minute survey at home after baby is born (consent will be implied by participation). You will not be able to be identified from your responses.

What information will you collect from my records?
None. Researchers will be looking at a broad range of outcomes for all women who have birthed at Wollongong Hospital. You will not be identified from any of the data collected.

Participation is voluntary. You can choose whether to fill in the survey. It will not affect your care in any way in the community.

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Findings of this study will be published as a PhD paper at UOW, in a professional journal and presented at conferences. You will **not** be identified in any of these findings or results.

How will information be stored?
All electronic data (de-identified survey results) will be stored on a password protected computer by the chief investigator. These will be destroyed after 5 years.

What are the possible benefits of taking part?
Last year, we spoke with other women who had GDM and listened to what they wanted to change. With your help, this research hopes to evaluate some of the changes we made to assess whether we have improved care and support for women with GDM at Wollongong hospital.

What are the possible disadvantages and risks of taking part?
We are not aware of any risks to you from taking part in this research. Your care will not be affected by participation in this research.
If you feel as though you need more support from your participation, the on-call social worker can be called to help.
If you become upset or distressed for any reason during this survey, please contact any of these services for help:

1) Your GP
2) ISLHD Child and Family Services – a list of all clinics and phone numbers are available here: Kids and Families | Illawarra Shoalhaven Local Health District (ISLHD) (nsw.gov.au)
3) PANDA National Helpline (Mon to Fri, 9am-7.30pm) Ph. 1300 72 6306 PANDA | Support that's always there, for you and your family
4) Beyond Blue – Ph. 1300 22 4636 or email/ chat on-line Perinatal depression (beyondblue.org.au)

Funding and conflict of interest:
There have been no conflicts of interest declared by the research team and no funding has been sought for completion of this study.

Data Analysis:
The research team are the only people that will have access to the information collected. You will not be identified in any reports.

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AUSTRALIA

Health
Illawarra Shoalhaven
Local Health District

Questions or concerns:

If you have any concerns or questions about this research, please do not hesitate to contact Leanne Cummins, Ph. 4253 4271, leanne.cummins@health.nsw.gov.au, Val Wilson, Ph. 4253 4854 valerie.wilson@health.nsw.gov.au, or Shahla Meedya, Ph. 4221 3205 smeedya@uow.edu.au.

If you have any concerns or complaints regarding the way in which this research is being conducted, please contact the University Ethics Officer on (02) 4221 3386 or email rso-ethics@uow.edu.au and provide the name of the project (AD-MIRE Breastfeeding).

Consent:
There is an implied consent from you when you fill in a survey. Please remember that we have no way of identifying you from any of the answers you give.

If you have read and understood this Participant Information Sheet, have had your questions about the research answered, and you would like to take part in the study, please return to the survey.

Appendix K: Post intervention - 6-week online Postnatal Survey for women with GDM

Survey Flow

Standard: Demographics (8 Questions)
Standard: During pregnancy (16 Questions)
Block: Breastfeeding questions (15 Questions)
Standard: website and app questions (4 Questions)
Page Break

Start of Block: Demographics

Thank you so much for participating in our survey.
It should take less than 10 minutes of your time and is anonymous.

Your answers will help to improve services for women in the future.

Q1- My age is

- 24 years or less (1)
- 25-35 (2)
- 36 or over (3)

Q2- I smoked during my pregnancy

- No (1)
- Yes (2)

Page 1 of 17

Q3- I had a normal weight before I was pregnant

- No (1)
- Yes (2)

Q4- I had a caesarian birth

- No (1)
- Yes (2)

Q5- I had the following conditions during my pregnancy

- Diabetes (1)
- High blood pressure (2)
- Anxiety/ Depression (3)
- Other medical condition (5)
- No medical condition (4)

Display This Question:
If I had the following conditions during my pregnancy = 1

Page 2 of 17

Q6- My diabetes was

- ○ Type 1 (I had it before I was pregnant) (1)
- ○ Type 2 (I had it before I was pregnant) (2)
- ○ Gestational diabetes (GDM) (3)
- ○ Type 1 or 2- diagnosed during pregnancy (4)

Display This Question:
If I had the following conditions during my pregnancy = 1

Q7- My glucose levels were controlled by

- ☐ diet (1)
- ☐ oral medication (2)
- ☐ insulin (3)
- ☐ none of these - they were not controlled well (4)

End of Block: Demographics

Start of Block: During pregnancy

Q8- My main caregiver during pregnancy was –

- ○ hospital midwife (1)
- ○ hospital doctor (2)
- ○ GP practice (GP or midwife) (3)
- ○ private obstetrician (4)
- ○ private midwife (homebirth) (5)

Q9- I saw the same midwife or doctor most of the time

- ○ No (1)
- ○ Yes (2)

Q10- I was told about the following breastfeeding information while I was pregnant (may choose more than one):

- ☐ antenatal breastmilk expressing (1)
- ☐ skin to skin contact at birth (3)
- ☐ frequent feeding in hospital to improve my milk supply (4)
- ☐ help that is available in the hospital for breastfeeding support (e.g. lactation consultant) (5)
- ☐ my concerns around breastfeeding or infant feeding (6)
- ☐ community support available to help when I left hospital (2)

Q11- Who provided you with breastfeeding information? (may choose more than one)

- [ ] hospital midwife (1)
- [ ] hospital doctor (2)
- [ ] GP practice (3)
- [ ] diabetes educator or dietitian (4)
- [ ] family/friends (5)
- [ ] nobody (6)

Q12- I went to a midwife education session (on-line) for antenatal breastmilk expressing and GDM information

- ○ No (1)
- ○ Yes (2)

Q13- I tried hand expressing during late pregnancy (antenatal expressing)

- ○ No (1)
- ○ Yes (2)

Skip To: Q20 If I tried hand expressing during late pregnancy (antenatal expressing) = 1

Page Break

Q14- I found antenatal expressing easy

- ○ No (1)
- ○ Yes (2)

Q15- What makes you say that?

_____

Q16- I brought the expressed milk into hospital

- ○ No (1)
- ○ Yes (2)

Skip To: Q20 If I brought the expressed milk into hospital = 1

Q17- How much did you bring in?

- ○ 1-2 mL (1)
- ○ 2-5 mL (2)
- ○ 5-10 mL (3)
- ○ 10-20 mL (4)
- ○ > 20 mL (5)

Q18- Was your expressed milk given to baby?

- No (1)
- Yes (2)

Skip To: Q20 If Was your expressed milk given to baby? = 1

Q19- What was the main reason your expressed milk was given to baby?

- because it was there (no medical reason) (1)
- baby had a hypo (2)
- I was separated from baby at birth (3)
- Other (4) _____

Page Break

Q20- I felt I received *enough* information about breastfeeding when I was pregnant

- No (1)
- Yes (2)

Q21- I felt I received *enough* information about gestational diabetes (GDM) when I was pregnant

- No (1)
- Yes (2)

Q22- I received the same (consistent) information from everyone who looked after me

- No (1)
- Yes (2)

Q23- Information was given to me in ways I could understand

- No (1)
- Yes (2)

End of Block: During pregnancy

Start of Block: Breastfeeding questions

Q24- How old is your baby today?

- < 4 weeks (1)
- 4-7 weeks (2)
- 8-12 weeks (3)
- > 12 weeks (4)

Q25- How many weeks gestation was baby when they were born?

- less than 36 weeks (1)
- 36-37 weeks (2)
- 38 weeks or more (3)

Page Break

Q26- When you were pregnant, did you want to breastfeed?

- No (1)
- Yes (2)

Skip To: Q28 If When you were pregnant, did you want to breastfeed? = 1

Q27- How long after birth did you breastfeed?

- in the first 30 minutes (1)
- 30 minutes to 1 hour (2)
- 1-2 hours (3)
- In the first 24 hours (4)
- After 24 hours (5)
- I never breastfed (6)

Q28- When you left hospital, how was baby feeding?

- only breastmilk (1)
- breastmilk and other fluids (e.g water, juice) (3)
- breastmilk and infant formula (2)
- only infant formula (4)

Skip To: Q31 If When you left hospital, how was baby feeding? = 4

Q29- How is your baby feeding now?

- only breastmilk (1)
- breastmilk and some other fluids (e.g water, juice) (3)
- both breastmilk and infant formula (2)
- solids and breastmilk (5)
- solids and infant formula (6)
- only infant formula (4)

Skip To: Q32 If How is your baby feeding now? = 1
Skip To: Q32 If How is your baby feeding now? = 3
Skip To: Q32 If How is your baby feeding now? = 5

Display This Question:
If How is your baby feeding now? = 2
Or How is your baby feeding now? = 4
Or How is your baby feeding now? = 6

Q30- When did you first give formula to baby?

- in hospital (1)
- during first week at home (2)
- 1-4 weeks of age (3)
- >4 weeks of age (4)

Display This Question:
If When you left hospital, how was baby feeding? = 4
Or When you left hospital, how was baby feeding? = 2
Or How is your baby feeding now? = 4
Or How is your baby feeding now? = 2
Or How is your baby feeding now? = 6

Q31- What was the main reason you gave baby the formula?

- [ ] I didn't want to breastfeed (6)
- [ ] baby had a hypo and needed it (4)
- [ ] my milk didn't come in / I didn't have enough breastmilk (5)
- [ ] baby didn't attach well (7)
- [ ] baby went to the neonatal nursery (8)
- [ ] my nipples were too sore (11)
- [ ] nobody was available to help me (12)
- [ ] other (9) _____

Skip To: End of Block If What was the main reason you gave baby the formula? = 6

Q32- Did you have any difficulty breastfeeding when you were in hospital?

- ○ No (1)
- ○ Yes (2)

Skip To: Q34 If Did you have any difficulty breastfeeding when you were in hospital? = 1

Q33- What was the main difficulty?

- [ ] difficulty attaching baby to breast (1)
- [ ] sore nipples (5)
- [ ] low milk supply (2)
- [ ] baby in neonatal unit (3)
- [ ] lack of practical help (6)
- [ ] other (4) _____

Q34- Did you have any difficulty breastfeeding when you went home?

- ○ No (1)
- ○ Yes (2)

Skip To: Q36 If Did you have any difficulty breastfeeding when you went home? = 1

Q35- What was the main difficulty at home?

- [ ] difficulty attaching baby to breast (1)
- [ ] sore nipples (5)
- [ ] low milk supply (2)
- [ ] baby still in neonatal unit (3)
- [ ] no help available (6)
- [ ] other (4) _____

Q36- Did you ever ask for help with breastfeeding in hospital?

- ○ No (1)
- ○ Yes (2)

Q37- Did you find midwives helpful?

- ○ No (1)
- ○ Yes (2)

Skip To: End of Block If Did you find midwives helpful? = 2

Q38- Please provide your reason if you found the midwives not helpful (may choose more than one)

_____

End of Block: Breastfeeding questions

Start of Block: website and app questions

Q39- Did you use Wollongong Hospital Maternity website?

- ○ No (1)
- ○ Yes (2)

Skip To: Q41 If Did you use Wollongong Hospital Maternity website? = 1

Q40- Please give your feedback on the Hospital Maternity website pages

	Strongly disagree						Strongly agree
	1	2	3	4	5	6	7

The website was easy to use ()	
I like the interface of the website ()	
I could easily find the information I needed on the website ()	
The information on the website was well organised ()	
I feel comfortable using the website in social settings ()	
The amount of time I spent using the website was suitable for me ()	
I would use the website again ()	
Overall, I am satisfied with the website ()	
The navigation was consistent when moving between screens in the website ()	
The interface allowed me to use all the functions in the website, such as search options or linking to other resources ()	
The website had all the functions and capabilities I expected it to have ()	
The website was useful for my health and well-being ()	
The website helped me improve access to health care services ()	
The website helped me manage my breastfeeding issues effectively ()	
The information provided on the website helped improve communication with my health care provider ()	

Q41- Did you use The Milky Way Breastfeeding App?

- No (1)
- Yes (2)

Skip To: End of Block If Did you use The Milky Way Breastfeeding App? = 1

Q42- Please give your feedback on The Milky Way Breastfeeding App

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
The app was easy to use ()							
I like the interface of the app ()							
I could easily find the information I needed on the app ()							
The information on the app was well organised ()							
I feel comfortable using this app in social settings ()							
The amount of time I spent using the app was suitable for me ()							
I would use this app again ()							
Overall, I am satisfied with this app ()							
The navigation was consistent when moving between screens in the app ()							
The interface allowed me to use all the functions in the app, such as search options or linking to other resources ()							
This app had all the functions and capabilities I expect it to have ()							
The app was useful for my health and well-being ()							
The app helped me improve access to health care services ()							
The app helped me manage my breastfeeding issues effectively ()							
The information provided on the app helped improve communication with my health care provider ()							

Page Break

End of Block: website and app questions

Appendix L: MAUQ (mHealth App Usability Questionnaire)

Zhou, L., Bao, J., Setiawan, I. M. A., Saptono, A., & Parmanto, B. (2019). The mHealth App Usability Questionnaire (MAUQ): Development and Validation Study. *JMIR mHealth and uHealth*, *7*(4), e11500. https://doi.org/10.2196/11500

Exploratory factor analysis results for the 21 items on the mHealth App Usability Questionnaire designed for interactive mHealth apps (overall Cronbach alpha=0.932, 21 items). Values >0.32 for each factor are italicized.

Item	Factor 1	Factor 2	Factor 3
Ease of use and satisfaction (alpha=0.895), 8 items (MAUQ_E)			
I1. The app was easy to use.	*0.633*	−0.001	0.271
I2. It was easy for me to learn to use the app.	0.234	−0.248	0.268
I3. I like the interface of the app.	*0.729*	0.002	0.010
I4. The information in the app was well organized, so I could easily find the information I needed.	*0.523*	−0.097	0.196
I5. I feel comfortable using this app in social settings.	*0.538*	0.022	0.123
I6. The amount of time involved in using this app has been fitting for me.	*0.588*	−0.041	0.222
I7. I would use this app again.	*0.800*	−0.112	−0.136
I8. Overall, I am satisfied with this app.	*0.855*	0.016	0.136
System information arrangement (alpha=0.829), 6 items (MAUQ_S)			
I9. Whenever I made a mistake using the app, I could recover easily and quickly.	0.148	0.057	*0.672*
I10. This mHealth app provided an acceptable way to receive health care services.	0.114	−0.189	*0.512*
I11. The app adequately acknowledged and provided information to let me know the progress of my action.	0.281	0.007	*0.414*
I12. The navigation was consistent when moving between screens.	0.178	−0.143	*0.466*
I13. The interface of the app allowed me to use all the functions (such as entering information, responding to reminders, viewing information) offered by the app.	0.111	−0.129	*0.473*
I14. This app has all the functions and capabilities I expect it to have.	0.180	−0.250	*0.485*
Usefulness (alpha=0.900), 7 items (MAUQ_U)			
I15. The app would be useful for my health and well-being.	0.235	*− 0.667*	−0.102
I16. The app improved my access to health care services.	0.202	*− 0.750*	−0.165
I17. The app helped me manage my health effectively.	0.308	*− 0.806*	−0.225
I18. The app made it convenient for me to communicate with my health care provider.	−0.196	*− 0.951*	0.109
I19. Using the app, I had many more opportunities to interact with my health care provider.	−0.103	*− 0.797*	0.146
I20. I felt confident that any information I sent to my provider using the app would be received.	−0.046	*− 0.541*	0.189
I21. I felt comfortable communicating with my health care provider using the app.	−0.033	*− 0.487*	0.257

Appendix M: Ethics Approval

1) Initial approval 2019

Date of Decision Notification: **12 Nov 2019**

Dear Leanne Cummins,

Thank you for submitting the following Human Research Ethics Application (HREA) for HREC review;

2019/ETH12108: AD-MIRE Breastfeeding (Antenatal Diabetes- Mothers Improving Rates of Exclusive Breastfeeding)

This project was considered by the **Joint University of Wollongong and Illawarra Shoalhaven Local Health District Health and Medical Human Research Ethics Committee** at its meeting held on **12/11/2019** and was determined to meet the requirements of the National Statement on Ethical Conduct in Human Research (2007).

This project has been Approved to be conducted at the following sites:

* The Wollongong Hospital - Leanne Cummins

The following documentation was reviewed and is included in this approval:

- HREA Version: 3 Date: 04 Nov 2019
- Protocol - August 2019 ETHICS_proposal
- Research Proposal Review
- Project Registration
- Poster
- Permission for use of hospital data after ethics approval by Maternity Operations Manager - 22/08/2019
- Permission for use of BFSES-SF from author, DR Cindy Dennis - 30/03/2018
- Letter - further information required for ethics team (Response to review dated 04/11/2019)
- Information sheet - women with GDM V2 - Oct 2019
- Information sheet - staff V1 - Aug 2019
- Consent - women with GDM V2 - 17/10/2019
- Antenatal survey - women with GDM
- 6-week postnatal survey - women with GDM V1 - August 2019
- Staff survey V1 - Aug 2019

It is noted that the Joint University of Wollongong and Illawarra Shoalhaven Local Health District Health and Medical Human Research Ethics Committee is constituted in accordance with the National Statement on Human Conduct in Research, 2007 (NHMRC). The approval is for a period of **1 years from the date of this e-mail (12 Nov 2019)** , continuation can be requested by submitting a progress report prior to the expiry date.

We wish you all the best with the project and remind you that any changes to the application and safety reports will need to be submitted and reviewed by the approving HREC prior to implementation.

This email constitutes ethical and scientific approval only.

This project cannot proceed at any site until separate research governance authorisation has been obtained from the Institution under whose auspices the research will be conducted at that site.

This HREC is constituted and operates in accordance with the National Statement on Ethical Conduct in Human Research (2007). The processes used by this HREC to review multi-centre research proposals have been certified by the National Health and Medical Research Council.

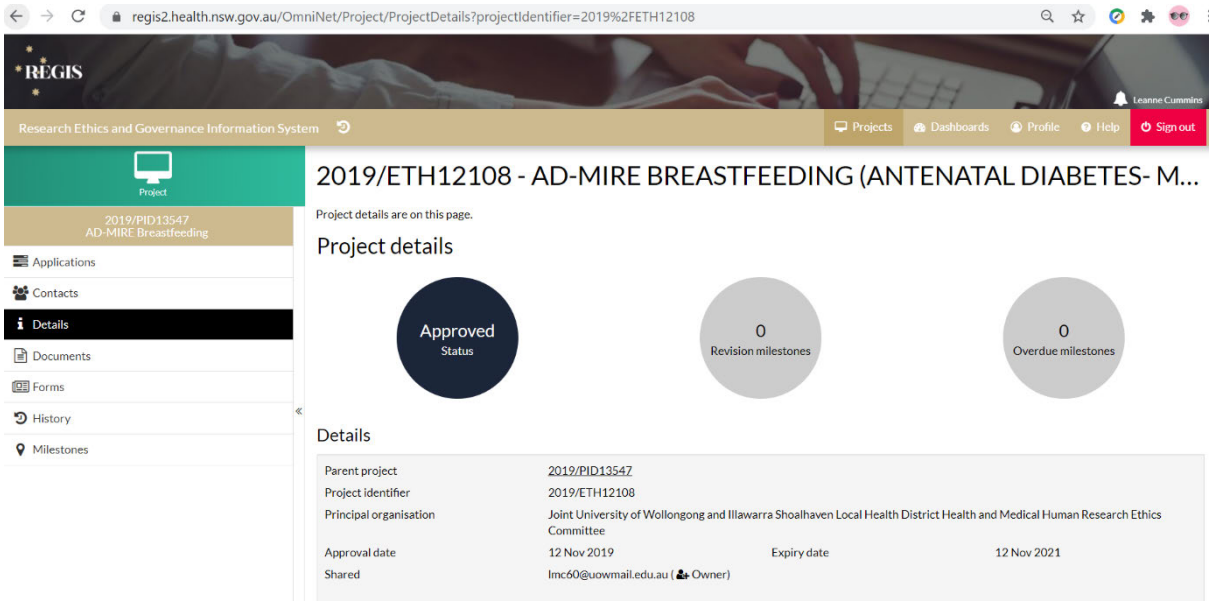
Please contact us if you would like to discuss any aspects of this process further, as per the contact details below. We look forward to managing this application with you throughout the project lifecycle.

Regards,

Susan Thomas

Dr Susan Thomas,
Chair, UOW & ISLHD Health and Medical Human Research Ethics Committee
The University of Wollongong and Illawarra and Shoalhaven Local Health District Health and Medical HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research. The processes used by this HREC to review multi-centre research proposals have been certified by the National Health and Medical Research Council.

Contact details: Research Services Office - rso-ethics@uow.edu.au or 02 4221 3386



2) Transfer of approval to ACU

From: Res.Ethics@acu.edu.au <Res.Ethics@acu.edu.au>
Sent: Tuesday, 21 March 2023 2:46 PM
To: Res Ethics <Res.Ethics@acu.edu.au>
Subject: [2023-3075T] - Ethics application approved!

Dear Applicant,

Chief Investigator: Leanne Cummins, Dr Shahla Meedya, Dr Sara Bayes, Dr Kate Dawson, and Prof. Valerie Wilson
Ethics Register Number: 2023-3075T
Project Title: AD-MIRE Breastfeeding
Date Approved: 21/03/2023
End Date: 31/12/2023

The Australian Catholic University Human Research Ethics Committee has considered your application for ethics transfer 2023-3075T. As this application has already been ethically reviewed by Joint University of Wollongong and Illawarra Shoalhaven Local Health District Health and Medical Human Research Ethics Committee (Ethics Reference: 2019/ETH12108), ACU HREC accepts the approval with no further conditions.
This project has now been recorded as an ACU project for which ACU is responsible. Continued approval of this research project is contingent upon the submission of an annual progress report which is due on/before each anniversary of the project approval. A final report is due upon completion of the project. A report proforma can be downloaded from the ACU Research Ethics website.

Researchers are responsible for ensuring that all conditions of approval are adhered to and that any modifications to the protocol, including changes to personnel, are approved prior to implementation. In addition, the ACU HREC must be notified of any reportable matters including, but not limited to, incidents, complaints and unexpected issues.

Researchers are also responsible for ensuring that they adhere to the requirements of the National Statement on Ethical Conduct in Human Research, the Australian Code for the Responsible Conduct of Research and the University's Research Code of Conduct.

Any queries relating to this application should be directed to the Ethics Secretariat (res.ethics@acu.edu.au). Please quote your ethics approval number in all communications with us.

Any queries relating to this application should be directed to the Ethics Secretariat (res.ethics@acu.edu.au). Please quote your ethics approval number in all communications with us.

We wish you well with your research project.

Kind regards,

Tanya Quesnel
on behalf of ACU HREC Chair, Assoc Prof. Michael Baker

Research Ethics Officer | Research Services | Office of the Deputy Vice-Chancellor (Research)
Australian Catholic University
T: +61 2 9739 2646 E: res.ethics@acu.edu.au

Appendix N: Publisher permission for reproduction of paper in *Breastfeeding Review*

From: Jennifer James <bfreditor@gmail.com>

Sent: 04 February 2023 08:48

To: Leanne Cummins (Illawarra Shoalhaven LHD) <Leanne.Cummins@health.nsw.gov.au>

Subject: Re: thesis question re publication from Breastfeeding Review

Absolutely Leanne, just ensure publication details are included

Warm regards and good luck with all that writing

Jenni

On Fri, 3 Feb 2023 at 2:21 pm, Leanne Cummins (Illawarra Shoalhaven LHD) <Leanne.Cummins@health.nsw.gov.au> wrote:

Hello Jennifer,

I am currently writing my thesis as a PhD Candidate, and I had a paper published with Breastfeeding Review in November 2022.

I was wondering whether Breastfeeding Review will allow me to add the entire publication to my results chapter please as this paper presented findings of one stage of my PAR study?

--

Dr Jennifer James

Editor

Breastfeeding Review

bfreditor@gmail.com

What do women with gestational diabetes want for breastfeeding support? A participatory action research study.

Leanne Cummins, Valerie Wilson, Shahla Meedya

ABSTRACT

Mothers who have gestational diabetes and their babies have higher risks for developing health conditions after birth which may be mitigated by breastfeeding. However, despite help from health professionals, these women do not breastfeed as often as pregnant women without diabetes. Asking women with gestational diabetes for their recommendations for change regarding antenatal breastfeeding support may reveal essential areas for improvement. To explore the experiences of women with gestational diabetes in relation to antenatal breastfeeding support and discover their recommendations for change, a participatory action research approach was used to generate meaning from the experiences of 30 women who participated in workshops in a regional Australian hospital. Key themes incorporated that women with gestational diabetes feel marginalised and treated differently from other pregnant women. They believe breastfeeding is hard and are frustrated by inconsistencies in their care and the information they receive. Women with gestational diabetes feel they would be better supported to breastfeed if hospitals provide more consistent and relevant information with connections to other women. Digital breastfeeding educational resources such as a website and evidence-based links such as mobile phone applications and continuous professional support by one trusted caregiver throughout pregnancy would be better suited to support breastfeeding with their busy lifestyles.

Keywords: *breast feeding, gestational diabetes, GDM, support*

***Breastfeeding Review* 2022; 30(3), 27–36**

Appendix O: ISLHD Quality Awards, finalist certificate

QUALITY & INNOVATION AWARDS 2022

Congratulations to

ISLHD Maternity Services

recipient of the

ISLHD Finalist - Director of Clinical Governance, Patient Safety and Quality Best Poster Award

for the project

Maternity Services: Redesigning a website

Kylie Wright, Director of Clinical Governance, Patient Safety and Quality

NSW GOVERNMENT Health Illawarra Shoalhaven Local Health District

QUALITY & INNOVATION AWARDS

Appendix P: ISLHD published paper on website redesign

Elder, T., Cummins, L., Tait, C., & Kuzela, W. (2023). Website redesign in a maternity setting: Co-designing a resource for consumer support and education. *Health Education in Practice: Journal of Research for Professional Learning*, *6*(1). https://doi.org/10.33966/hepj.6.1.17086

Health Education in Practice: Journal of Research for Professional Learning

Vol. 6 | No. 1 | 2023

Education-in-practice article (single blind peer-review)

Citation: Elder, T, Cummins, L, Tait, C & Kuzela, W 2023, 'Website redesign in a maternity setting: Co-designing a resource for consumer support and education', *Health Education in Practice: Journal of Research for Professional Learning*, vol. 6, no. 1 https://doi.org/10.33966/hepj.6.1.17086

Website redesign in a maternity setting: Co-designing a resource for consumer support and education

Taryn Elder[1], Leanne Cummins[1], Claudia Tait[1], Wendy Kuzela[1]

Abstract

Women want to be informed about their healthcare. Google searches provide an accessible option for women during pregnancy, but the content is largely unmonitored. Women have expressed dissatisfaction and confusion about receiving conflicting information from clinicians across the maternity service. It is essential for providers to offer person-centred care and listen to the voices of consumers. If the aim is to provide a service women want to use, women must have the opportunity to voice what they want. The local health district (LHD) maternity website development project aimed to redesign maternity website pages over 12 months to meet community needs and increase hits to the site by 70% within six months. Consumers were approached to participate through maternity services in a regional Australian health district where approximately 3,500 babies are born yearly. In a three-phase participatory action research study, researchers identified the areas of concern for consumers, worked with them to co-design and implement a new website, and evaluated the changes. Almost 20% of women who birthed from January to March 2022 responded to the evaluation survey. Half of these had explored the website. After the upgrades, the number of hits to the district website service page increased by 875 (from 124 to 999). Post-development surveys showed that women who felt they received inconsistent information at the hospital during their pregnancy were more likely to visit the website for clarification (p = 0.009). Of women who visited the website, 78% found the information useful, and 73% said they would use it again. This study highlighted that women engaging in maternity services desire access to relevant, quality information through digital technology. Maternity website development improvements increased patient satisfaction and reduced confusion, providing a reliable source of accessible health information for consumers.

Keywords: maternity, digital, website, education, antenatal

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INTRODUCTION

The World Health Organization recognises women's health during the perinatal period as a foundation for population health (Nieuwenhuijze & Leahy-Warrant 2019). This acknowledgement demonstrates the importance of prioritising accessible, trusted information for women. Empowering women through pregnancy and childbirth education is believed to lead to more positive outcomes in pregnancy and birth that also continue into motherhood (Vedam et al. 2017). Therefore, the design and implementation of good quality, consistent education for women and their families must be a priority of maternity service delivery. Women report greater satisfaction with birth experiences when involved in decision-making (Vedam et al. 2017). Many pregnant women report using online media to supplement their knowledge of pregnancy and childbirth concerns. This highlights online media as a significant resource for maternity care providers to develop quality antenatal education (Alainmoghaddam, Phibbs & Benn 2018). When providers offer accessible, trusted information, women can change from passive recipients into collaborative partners in the healthcare space (Vedam et al. 2017). The significant barriers women report include needing more information, lack of access and receiving conflicting or inconsistent information (Alainmoghaddam, Phibbs & Benn 2018, Cummins, Wilson & Meedya 2022). These barriers can be remedied by providing an improved, trusted, accessible one-stop information source for women via a digital platform (Alainmoghaddam, Phibbs & Benn 2018, Cummins, Wilson & Meedya 2022).

This paper outlines the considerations in designing a maternity website, including acknowledging the diverse community within the Illawarra Shoalhaven Local Health District (ISLHD). In this region, 3.4% of people identified as Aboriginal or Torres Strait Islander (compared to 2.4% in NSW), 9% were born in a predominantly non–English speaking country, 26% lived in the most disadvantaged communities in the region (compared to 20% in NSW) and there was a growing number of refugees (Illawarra Shoalhaven Local Health District 2019). Three models of maternity care are used in the ISLHD: doctors' clinics, antenatal general practitioner shared care and midwifery-led clinics (Illawarra Shoalhaven Local Health District 2019).

METHODS

Participatory action research (PAR) methodology was chosen for this study, as the team wanted to work with consumers to gain their insights into how they thought healthcare information could be improved for all users of the maternity services website. Phase 1 identified areas of concern, and Phase 2 involved working with consumers, staff and LHD stakeholders to co-design and implement an improved website. Phase 3 evaluated whether consumers were using the website, were satisfied with the changes and would use the website again.

Ethics approval to conduct this research was granted by the ISLHD Low and Negligible Risk Research Review Committee (ISLHD/QA147). All participants were provided with project information and gave their consent to participate. Responses received were anonymous.

PHASE 1: IDENTIFICATION OF CONSUMER CONCERNS

Phase 1 sampled 60 women receiving maternity care through Wollongong hospital via a convenient online Qualtrics survey. Staff asked participants to fill in a survey that asked whether they knew a website existed, whether they had used it and what they looked for. If they had not yet seen the site, consumers were given the website link to

evaluate it at that time and answer further questions. They were then asked what they would like to see on an improved hospital-based maternity website to enhance the information gathered from stakeholders in Phase 2 focus groups. Surveys were anonymous and could be completed in paper form while women waited in the antenatal clinic or online via Qualtrics. Consent was implied with completion. All paper-based forms were entered into Qualtrics and then destroyed. Online survey answers were kept on a password-protected computer.

PHASE 2: CO-DESIGNING AN INTERVENTION

In 2020, ISLHD had a basic website that included service information. The study identified what stakeholders thought should be changed on the website through focus groups of maternity consumers, staff and health support services, such as multicultural and Aboriginal health services. Participants were sought through community consumer groups, and staff from all areas of maternity and health support services were invited to attend. Three focus groups of four to 10 participants were run from February to March 2021 to co-design ideas for a new maternity website that would serve the needs of consumers. Facilitators informed all focus groups of the outcomes of Phase 1 consumer surveys. Notes from focus groups were taken, and themes were gathered from all groups. No participants were identified. All files were confidential and kept on a password-protected computer.

Reflexive thematic analysis was conducted during the three focus groups following Braun and Clarke's (2006, 2021) six phases of analysis. Researchers immersed themselves in the emerging data, created themes and revisited them until data collection was complete. There were no new ideas after the three focus groups were completed. The co-designed ideas became the basis for new maternity website pages, and construction started in March 2021. Researchers worked with district leaders to ensure National Safety and Quality Health Service Standards were met for ISLHD by implementing a website that improved the quality of health service provision, partnered with consumers and protected the public from harm (Australian Commission on Safety and Quality in Health Care 2022). Development of the new website pages concluded in September 2021, and they were then advertised to maternity consumers via posters in antenatal clinics, general practitioner surgeries, birthing units and maternity wards.

PHASE 3: EVALUATION

The website team aimed to increase visits to the new maternity site. Therefore, the number of visits and average time spent on the pages were measured and evaluated. To determine whether consumers would revisit the site, an invitation to participate in the Phase 3 online website evaluation survey was sent to all women who birthed between January and March 2022 (n = 1,060) across the district via SMS. Survey questions such as 'did you find the website useful?' and 'would you use it again?' evaluated consumer experiences.

RESULTS

Results across the three phases of the study show how information was gathered to co-design a website well utilised by consumers.

PHASE 1: IDENTIFICATION OF CONSUMER CONCERNS

The study received 60 surveys from women about the website available to them in 2020 (Table 1). All respondents had looked for pregnancy information online, but almost one in four did not know a maternity website existed for the hospital, and 40% thought it was hard to find. Participants were asked to comment on their first impression of the hospital website. Comments were received from 32% of participants, and all of them had negative connotations, such as 'not enough information', 'impersonal', 'disappointing', 'clunky' and 'confusing'.

Most consumer responses (80%) showed they were looking for general information about birth, gestational diabetes mellitus (GDM) or midwifery models of care. Over half of the respondents looked to the website for general pregnancy advice. However, only 10% reported that finding the information they sought was easy.

Table 1: Consumer survey responses to 2020 website

Website 2020 Consumer Responses	n (%)
Used websites to look for maternity information	60 (100)
Unaware of the hospital website	14 (23)
Found the hospital website hard to find	24 (40)
Had a negative first impression	19 (32)
Found it easy to find the information sought	6 (10)
Sought general information (Midwifery Group Practice, gestational diabetes mellitus [GDM], birth)	48 (80)
Sought general pregnancy advice	34 (57)
Sought antenatal classes	23 (38)
Sought breastfeeding information	15 (25)

To inform the focus groups in the next phase of the study, we asked survey participants what they would like changed in new website pages. Every respondent commented. Responses ranged from suggestions about how the website looked (e.g., add photographs, videos and tours, reduce clinical language) to requests for more specific information on antenatal models of care and advice around pregnancy, GDM and breastfeeding.

PHASE 2: CO-DESIGNING AN INTERVENTION

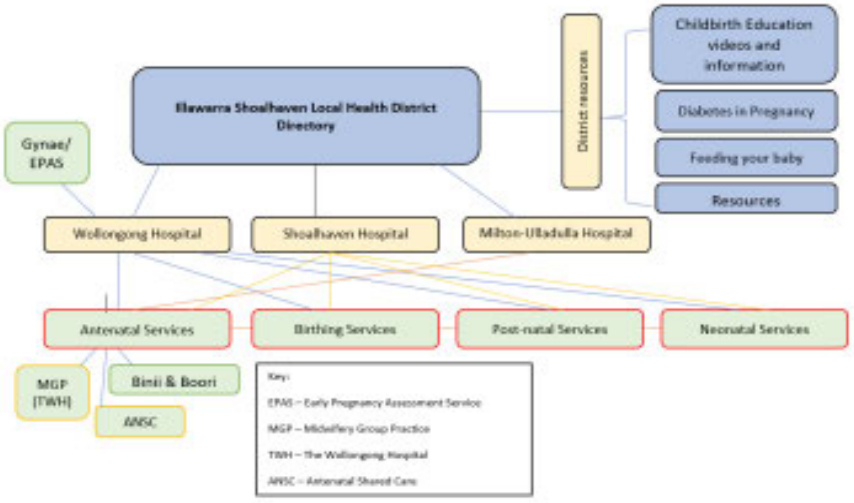
Three focus groups of consumers, staff and community stakeholders were run in February and March 2021. Results from Phase 1 were shared to start a conversation.

Groups collaborated using mind maps. No new themes emerged from the first focus group; however, it was important for researchers to talk to as many staff, consumers and stakeholders as possible. During that time, researchers spoke to 19 people with interest in improving the hospital-based maternity website:

- Workshop 1: eight consumers, two staff
- Workshop 2: one consumer, two ISLHD stakeholders, two staff
- Workshop 3: one stakeholder, three staff.

Following the collaboration, the groups designed a flowchart for a new website to submit to the LHD's quality and safety committee for approval before the website team began construction (Figure 1). The LHD has three hospitals that provide antenatal services and two that offer birth services. New pages would be required for each of these and district information pages on topics such as childbirth education, GDM and breastfeeding.

Figure 1. Outline of flowchart for maternity web pages



Information for each page was gathered from consumer recommendations and the clinical educators in each area. It included photographs, videos and tours and considered the Clinical Excellence Commission's health literacy guidelines (NSW Government Clinical Excellence Commission 2022).

PHASE 3: EVALUATION

Evaluation of the website during Phase 3 by measuring webpage use and asking maternity service users about their experiences. In September 2020, the website was limited to pages with information about the service (e.g., phone numbers) and a general description. The study measured visits to the main district page and the average time visitors spent there.

In September 2020, the average number of visits per month in the previous six months was 539, and the average time spent on each page ranged from 41 seconds to

under three minutes (Table 2). The new pages were completed in September 2021 and then advertised. From January to February 2022, the monthly usage rate was 6,613 visitors across all maternity pages, and visitors were engaged on each page for an average of one to four minutes. Visits to all areas of maternity services were enhanced by improving the pages and letting consumers know the site existed.

Table 2. Visits to maternity website 2020 and 2022

Page Title	Visits per Month March to September 2020	Average Time (minutes) 2020	New Pages Built	Visits per Month January to February 2022	Average Time (minutes) 2022
District services main page	124	0.41	District	999	1.24
Postnatal services	12	1:33	TWH	118	2.36
			SDMH	41	1.21
Birthing services	69	1:53	TWH	476	3.43
			SDMH	75	2.15
Antenatal services	120	2:53	TWH	592	3.47
			SDMH	45	2.00
			MUH	15	1.43
Neonatal services	8	1:55	TWH	47	3.06
			SDMH	12	1.08
Feeding your baby	N/A		District	502	2.46
Childbirth education	N/A		District	558	4.08
Gestational diabetes mellitus (GDM)	N/A		District	147	3.15

In addition to attracting more visitors to the maternity website, the researchers also wanted to evaluate whether women found the information useful or would use the website again. An invitation to participate in an online survey to was sent to 1,060 women who birthed across the district between January and March 2022, and 11.5% of those responded (n=122). Almost half of the respondents (47.5%) had used the website (n = 58), and, of those, 53% were having their first baby and 19% were aged 36 years or over. Of the 122 women who responded to the survey, 41.3% (n = 50) stated they did not feel they received consistent information while in hospital. Of these women, 53.4% looked at the website to clarify information (p = 0.009).

Of the women who used the website (Table 3), 78.8% found it easy to use, 73% would use it again, 69.2% thought the information was well organised and 63.5% thought the information was easy to find (63.5%). A third accessed the website to help manage breastfeeding issues. Overall, 80.8% were satisfied with the website pages.

Table 3. Consumer survey responses to 2022 website

Website 2022 Consumer Responses (n = 58)	**n (%)**
Having their first baby	31 (53.4)
Aged 36 years or over	11 (19)
Found the website easy to use	41 (78.8)
Found it easy to find information	33 (63.5)
Found the information well organised	36 (69.2)
Would use the website again	38 (73.1)
Used information for breastfeeding issues	16 (33)
Were satisfied with the pages	42 (80.8)

DISCUSSION

The high percentage of responses received in the study highlighted that women wanted to be heard, which informed the creation and management of the website. Many women use digital technology to access health information about their maternity care (Alainmoghaddam, Phibbs & Benn 2018). The maternity care team should use websites and social media to capitalise on these forms of communication as key methods of health promotion. This may allow healthcare professionals to positively influence care and provide women with an avenue to allay their concerns more promptly (Alainmoghaddam, Phibbs & Benn 2018, Lupton & Maslen 2019).

After the website was developed, the statistical records showed that the number of visits increased as more women were utilising it to gather information. The

participants felt they received conflicting information while in hospital. This is consistent with reports from other maternity services, specifically regarding information about breastfeeding and GDM (Alainmoghaddam, Phibbs & Benn 2018, Cummins, Meedya & Wilson 2021). This validates the website development team's action and provides scope for further updates and enhancements.

Providing quality education to empower women's decision-making during pregnancy is imperative. Enhancing a maternity website in any LHD will positively impact prenatal and postnatal health outcomes (Nieuwenhuijze & Leahy-Warrant 2019). Further research should be undertaken amongst different pregnancy cohorts to assess and develop the impact of online information.

PRACTICE IMPLICATIONS

The results demonstrated that co-designing a website with consumers, staff and ISLHD stakeholders enabled the website team to develop well-utilised pages that offered consumers relevant, evidence-based information and education. Maternity services can support consumers by providing a website that has the information they want and need to clarify information gained from other sources.

IDENTIFIED SERVICE GAP

From the research, the website development team was able to identify and address a service gap. Women did not always receive consistent information from the hospital system. The redevelopment of the website improved the availability and accessibility of appropriate quality information.

STRENGTHS AND LIMITATIONS

Identified strengths of the study were the high response rate and a qualitative research method where women were encouraged to share their priorities with the website development team.

There were also some limitations to this research. The target demographic is women who can access and use digital technology via a computer or smartphone. This may exclude some women. The research required women to recall their previous experiences within the healthcare system. While the period between the healthcare interaction and the research contact was not excessive, there was potential for participant recall bias. It should also be noted that the question in the survey asking whether participants would use the website again provided no opportunity for a contextual response. Therefore, this question could include responses from women who would not use the website again due to having completed their families.

CONCLUSION

The study identified that women have stated that they are not receiving consistent information from the hospital system. The researchers were able to address this concern through the implementation of a website with accessible, high-quality information. The website provided a trusted information resource many women said they would use again.

Acknowledgements

The authors wish to thank all the research participants who contributed to this work. Their participation has been invaluable in helping the researchers develop the website and complete the study.

Conflict of interest

There are no conflicts of interest.

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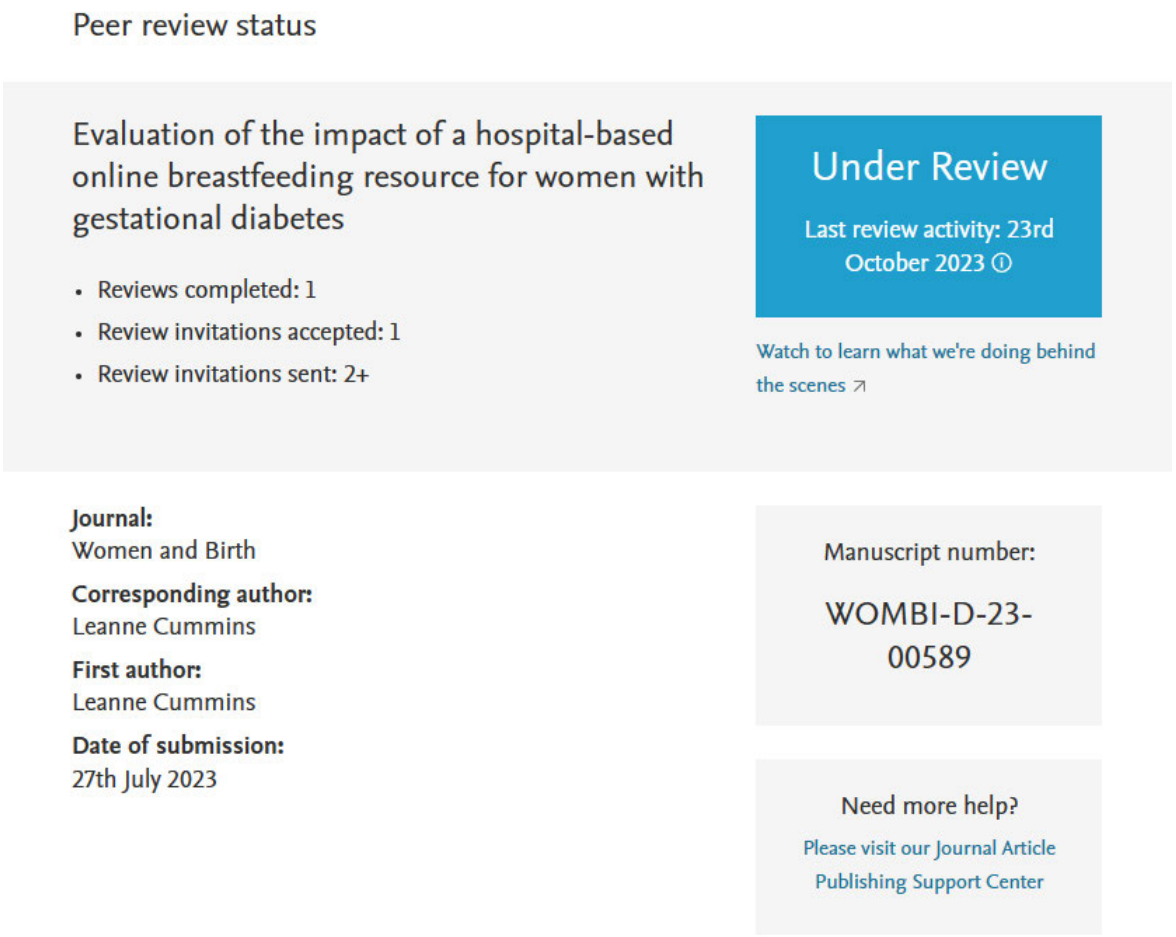
Appendix Q: Evidence for papers under review

1. Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). Evaluation of the impact of a hospital-based online breastfeeding resource for women with gestational diabetes. *Women and birth: journal of the Australian College of Midwives*, *under review.*

Found in Chapter 6, p. 121



Peer review status

Evaluation of the impact of a hospital-based online breastfeeding resource for women with gestational diabetes

- Reviews completed: 1
- Review invitations accepted: 1
- Review invitations sent: 2+

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Last review activity: 23rd October 2023

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Leanne Cummins

First author:
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Date of submission:
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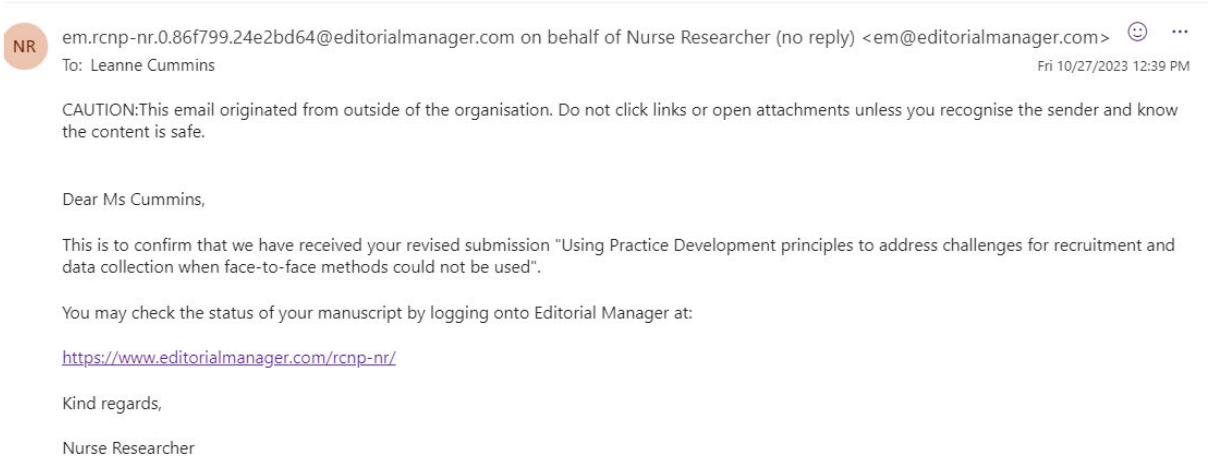
Appendix Q: Evidence for papers under review – paper 2

2. Cummins, L., Wilson, V., Bayes, S., Dawson, K., & Meedya, S. (2023). *Using Practice Development Principles to address challenges for recruitment and data collection when face-to-face methods could not be used*. *Nurse Researcher journal, under review.*

Found in Chapter 4, p. 80

Email regarding re-submission for review from Nurse researcher -



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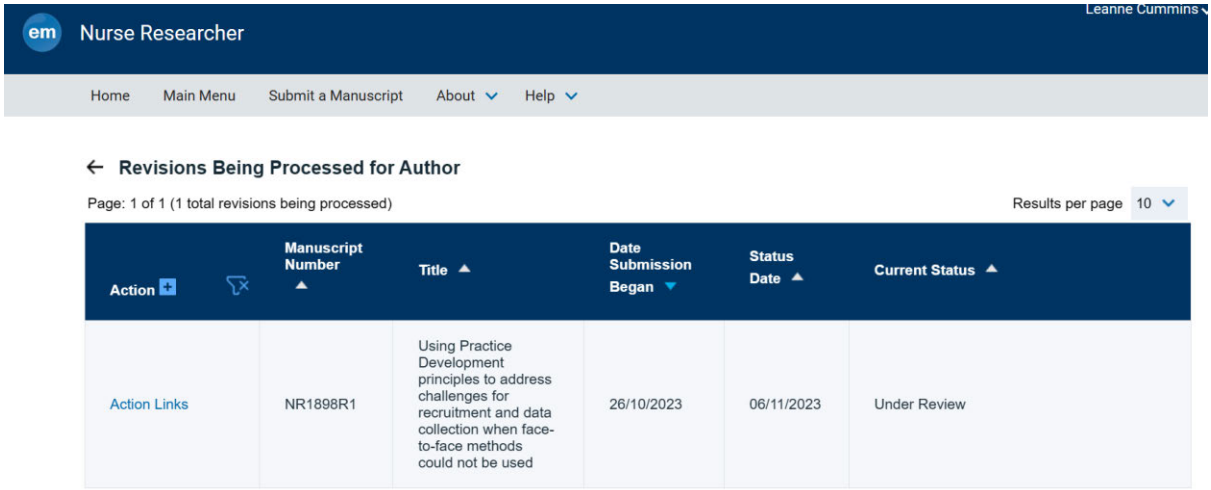

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Action	Manuscript Number	Title	Date Submission Began	Status Date	Current Status
Action Links	NR1898R1	Using Practice Development principles to address challenges for recruitment and data collection when face-to-face methods could not be used	26/10/2023	06/11/2023	Under Review