



Are the birth outcomes from a midwifery antenatal and postnatal service (MAPS) comparable to midwifery group caseload practice: A retrospective cohort study

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ABSTRACT

Midwifery continuity of care has demonstrated improved outcomes for mothers and babies including higher rates of spontaneous vaginal birth and more positive birth experiences, with health services cost savings, than non-continuity of care. However, midwives report challenges with continuity of care, such as on-call for labour/birth. Health services have responded with a new model, Midwifery Antenatal and Postnatal Service (MAPS), with care from a known midwife only during pregnancy and the early postnatal period. Women in the MAPS model have intrapartum care by rostered birth suite midwives (potentially unknown to the woman) whereas Midwifery Group Practice have a known midwife.

Aim: To determine if MAPS is associated with similar perinatal outcomes for women and babies as the Midwifery Group Practice (MGP) model.

Methods: A retrospective study was undertaken using de-identified routinely collected maternity data. All women who booked in and gave birth with MGP or MAPS at one hospital in New South Wales, Australia between April 2022 - April 2023. Descriptive and inferential statistics were used to describe the data.

Results: A total of 1303 births were analysed (MGP=349, MAPS =954). The MGP cohort were more likely to experience spontaneous labour (< 0.001) with local anaesthesia or no analgesia, vaginal births without instruments (<0.001), and exclusive breastfeeding at discharge (0.004) compared to MAPS births.

Conclusion: Continuity of care with a known midwife (antenatal, labour/birth, and postnatal) was associated with less intervention and improved breastfeeding rates as supported by international literature. Future research is needed comparing MAPS to standard fragmented midwifery care.

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Problem or Issue

The number of midwives available to provide continuity of care across the continuum is a challenge due to on-call commitments and caring responsibilities.

What is already known about this topic?

Midwives providing continuity of care find it satisfying and understand the benefits for women and babies. Women want continuity of care with a known midwife. MAPS is found to be a way to provide some continuity of care.

What does this paper add?

This is the first paper to compare the perinatal outcomes for women and babies who receive midwifery antenatal and postnatal care (MAPS) with those who receive full continuity of care (MGP). The findings demonstrate that intrapartum care is an important aspect of midwifery continuity

1. Introduction

The perinatal outcomes from midwifery continuity of care were recently compared to standard care (non-midwifery continuity) that included 17 studies, (18,533 women) and found women who received midwifery continuity were more likely to have a spontaneous vaginal birth, had a more positive experience of birth with cost savings for the health service [34]. The comparison group, standard care, included all other models of care, that may have included continuity from other practitioners such as obstetricians but not midwifery continuity [34]. Midwifery continuity of care was defined as care from the same midwife or team of midwives during pregnancy, birth, and the early parenting period in collaboration with obstetric and specialist teams when required [34]. In Australia midwifery continuity of care models are commonly referred to as Midwifery Group Practice (MGP) or Caseload. Despite the lower intervention rates experienced by women with midwifery continuity of care, only 14 % of all Australian models of care are MGP/Caseload [4].

The demand for MGP/Caseload models outstrips the number provided. Implementation and scale-up of MGP/Caseload has been slow. One reason is the challenge of recruiting and retaining midwives. Midwives are not always available to be on-call for intrapartum care when they have family commitments such as young children [16]. These staffing issues have also occurred in the United Kingdom (UK) and New Zealand [16]. In the UK, a willingness to be on-call for intrapartum care was low as participants surveyed, needed to work on the same day each week and were unable to do any on-call or night shifts [35]. Similarly in Australia, staffing midwifery continuity of care models has been identified as a barrier to widespread expansion [11,28]. More recently a survey in Australia identified that the majority (82.4 %) of midwives working in continuity of care models worked full-time [18]. Midwives who worked part-time described having to be on-call the same amount of time as a full-time midwife and some services did not offer a part-time employment model [18]. A suggested barrier to providing midwifery continuity of care is possible 'burnout', and exhaustion [33], however, that is a widely cited but rarely tested theory. Later research demonstrated that midwives who provided continuity of care were less likely to experience burnout [20,23]. Nonetheless, not all midwives can or desire to provide continuity of care.

Midwives in the UK provide continuity through the antenatal and postnatal periods as this is well accepted, particularly for those who have caring responsibilities and cannot be on-call for intrapartum care [12]. In this study, midwives reported manageable caseloads, extended appointment times, increased team stability, and flexible working patterns and job satisfaction. Women reported continuity was integral to building trust with the midwives who encouraged them to disclose

mental health issues and increased their confidence in making birth choices [12]. In Australia, 13.6 % of maternity models are reported to provide continuity through the antenatal and postnatal periods [4]. However, the report does not indicate who the care provider (midwife or doctor) is in this model of care.

Recently in New South Wales Australia, antenatal and postnatal midwifery continuity of care models have been implemented, known as Midwifery Antenatal and Postnatal Service (MAPS) [26]. In a MAPS model, women have a primary midwife allocated for the antenatal and postnatal period. Labour and birth care is provided at the birth site of a woman's choice by midwives working in the existing, standard maternity services. The MAPS model of care has a focus on outpatient services where women birth with, and receive any inpatient/ unplanned care by midwives who work within the existing standard Birthing Unit/ Maternity wards [26]. Collaboration with other healthcare professionals is provided at all stages of pregnancy, birth, and postnatal care as needed [4,8].

Qualitative research has explored the value and acceptability of a MAPS model of care and mapped it to a quality maternal newborn care framework and found women felt safe and connected and well prepared for birth through the antenatal period [8,10]. Midwives reported having more quality time at each visit with the woman because they knew the woman and could provide more comprehensive debriefing following the birth, and women felt the midwife knew their story and prepared for birth through the information shared [8,10]. The findings aligned with quality midwifery care as defined in the Quality Maternal Newborn Care Framework [31]. The authors cautioned that these findings should not detract from the scale-up of MGP/caseload models that include intrapartum care with all the associated benefits [8,10].

This study aimed to determine if a midwifery antenatal and postnatal service (MAPS) model of care is associated with similar or improved perinatal outcomes for women and babies compared to midwifery continuity of care models that provide midwifery antenatal, intrapartum and postnatal care (MGP).

2. Methods

This was a retrospective comparative cohort study using routinely collected perinatal data from the electronic database (eMaternity) from 1 April 2022 to 30 April 2023. The perinatal outcomes for liveborn singletons whose mothers were assigned to either MAPS or MGP at referral were compared. The MAPS model of care commenced at the study hospital using a staged approach with women transferred from standard care to MAPS from August 2021 to April 2022.

2.1. Setting

The study site was one regional hospital in New South Wales (NSW) with an annual birth rate of 1921 in 2021 [6] and covers a general population of 228, 218 people [2] and a geographical area of 13,763 sq kilometres. There are 18 NSW hospitals with annual birth rates between 1000 and 2000 [6], eight of which (including the study hospital) have a Level Four Maternity Services role delineation capacity. Level four maternity care role delineation includes: providing antenatal, intrapartum and postnatal care for women ≥ 34 weeks gestation, with clear referral and consultation to a delineated higher-level maternity and neonatal service (level 5 or 6) as required. NSW Ministry of Health [27].

2.2. Sample

The population of interest was singleton, liveborn babies born from 1 April 2022 until 30 April 2023 in the study hospital to mothers whose model of care at the initial antenatal visit was recorded as either MGP or MAPS.

2.3. Exposure

The women were allocated to one of the two models of care at their initial antenatal visit at the hospital with MAPS or MGP. Allocation to the MGP model was based on several factors including maternal choice/request for MGP model of care, availability of MGP model/carer for the woman’s expected month of birth, classification as either category A and/or B (low to moderate risk) as per National Midwifery Consultation and referral guidelines [3], combined with a desire for physiological birth and early discharge. Women with identified with significant risk factors/complexities at their initial visit (classified as either category B/C and C) [3] and women who requested an elective caesarean section were considered ineligible for MGP and were allocated to the MAPS model of care.

Regardless of the allocated model of care, consultation and collaboration with a medical practitioner were available throughout the pregnancy based on the midwives’ ongoing assessment of the woman’s needs [3]. If the clinical assessment or situation identified the woman’s ongoing care required responsibility to be transferred to a different model of care, several things were considered such as gestation and the severity of the condition. For example, at greater than 34 weeks’ gestation, the woman would most likely continue with MGP care in collaboration with an obstetric consultant and the known midwife. However, if risk factors were identified early i.e. less than 28 weeks gestation, this normally resulted in care being transferred to the MAPS model of care.

2.4. Data collection

Following ethical approval (HREC XXX), de-identified data was requested from the hospital maternity database via the Local Health District data custodian who has legitimate access to the database. Data is routinely collected and stored in the maternity information system (eMaternity) in all NSW public health sites.

2.5. Outcome Measures

The outcomes of interest (using eMaternity questions) were:

- Preterm birth (<37 completed weeks of gestation)
 - Onset of labour: no labour, spontaneous, induction of labour (IOL)
 - Analgesia: none / local anaesthetic or epidural/nitrous oxide / narcotics /spinal /general anaesthetic / pudendal block
 - Mode of birth: Vaginal without instruments, vaginal with instruments, caesarean section (CS) with labour, CS without labour
 - APGAR score at 5 minutes: < 7, or 7 and above
 - Breastfeeding at the time of discharge from the hospital (Yes, No)
- Other variables: Several factors were considered likely confounders of a causal relationship between the model of care and perinatal outcomes. These possible confounders were:
- maternal age (in years)
 - whether the mother was born in Australia
 - Socio-Economic Index for Areas (SEIFA) quintile. SEIFA quintiles were based on the mother’s residential postcode [2].
 - Body Mass Index (underweight (BMI less than 18.5), healthy weight (BMI 18.5–24.9), overweight (BMI 25.0–29.9), obesity I (BMI 30.0–34.9), and obesity II & III (35.0 or more))
 - Parity (nulliparous, 1, and 2 or more)
 - Smoking during pregnancy

2.6. Data analysis

Counts and percentages are reported for maternal characteristics and pregnancy complications for MGP and MAPS births and comparisons between the two groups were made with Pearson’s chi-squared tests. The number of preterm births and low Apgar scores were small, relative

to the number of potential confounders. Therefore, rather than fitting logistic regression models with adjustment for multiple confounders, marginal structural models were fit using inverse probability of treatment weighting (IPTW) and one independent variable, model of care. Weights were obtained from regressing model of care against the potential confounders. Stabilised weights were used [32]. Standard errors were estimated with the Horvitz-Thompson-type sandwich estimator. The distributions of the probability of treatment (propensity scores) for each model of care were assessed visually. The balance of covariates before and after weighting was also assessed visually.

There was potential for reverse causation in associations between the model of care (MoC) and the perinatal outcomes. As MGP is intended for women committed to vaginal births, women considering a planned Caesarean section (CS) are less likely to be accepted for MGP than MAPS, leading to an association between the mode of birth and the model of care [25]. We excluded women who had a CS without labour and repeated the analysis. It was not possible to definitively determine from the data whether CS without labour were planned or in response to a pregnancy that had become high risk, making it difficult to disentangle any causal relationship between MoC and mode of birth. In a previous study, in the same setting, we found the majority of mothers were Caucasian [9]. For this reason, we did not include ethnicity. In addition, the data on ethnicity collected in the perinatal data collection program contains a large proportion of missing data and does not include some major ethnicities in Australia.

R version 4.3.1 was used for all analyses [29]. The inverse

Table 1
Maternal characteristics by model of care at referral (n = 1303).

Characteristics	Midwifery Group Practice (MGP)	Midwifery Antenatal and Postnatal Service (MAPS)	P-value
Total N (%)	349 (26.8)	954 (73.2)	
Maternal age category			0.006
Less than 25	57 (16.3)	201 (21.1)	
25–29	133 (38.1)	348 (36.5)	
30–34	128 (36.7)	276 (28.9)	
35 or older	31 (8.9)	129 (13.5)	
Born in Australia			0.017
Yes	327 (93.7)	850 (89.1)	
No	22 (6.3)	104 (10.9)	
Parity			< 0.001
Nulliparous	182 (52.1)	410 (43.0)	
1	118 (33.8)	312 (32.7)	
2 or more	49 (14.0)	232 (24.3)	
Body Mass Index			< 0.001
Underweight (less than 18.5)	12 (3.4)	27 (2.8)	
Healthy weight (18.5–24.9)	160 (45.8)	305 (32.0)	
Overweight (25.0–29.9)	122 (35.0)	288 (30.2)	
Obesity I (30.0–34.9)	48 (13.8)	177 (18.6)	
Obesity II & III (35.0 or more)	7 (2.0)	157 (16.5)	
Smoking during pregnancy			< 0.001
Yes	17 (4.9)	156 (16.4)	
No	332 (95.1)	798 (83.6)	
Number of antenatal visits			< 0.001
1–4	5 (1.4)	90 (9.4)	
5 or more	344 (98.6)	864 (90.6)	
SEIFA quintile			0.003
1 (Most disadvantaged)	62 (17.8)	254 (26.7)	
2	109 (31.2)	304 (32.0)	
3	94 (26.9)	217 (22.8)	
4	84 (24.1)	176 (18.5)	
5 (Most advantaged)	0 (0.0)	0 (0.0)	

Data were missing for SEIFA quintile for 3 MAPS births and 0 MGP births. P-values are from Pearson’s chi-squared test.

probability of treatment weights was obtained using the weightIt function from the WeightIt package [15] and marginal structural models were fit using the svy_vglm function from the svyVGAM package [21].

3. Results

There were 1389 births identified at the initial booking-in visit with the model of care listed as MGP or MAPS. After excluding 74 births that occurred not at the study hospital, 1315 births subsequently took place at the study hospital. However, 12 of these births were excluded (multiple births or stillbirth), leaving 1303 births for analysis. Multiple pregnancies/births were excluded as a higher level of care was required with an obstetric consultant [3], and four stillbirths were excluded as the outcome of breastfeeding was not possible for those births and because the numbers were negligible. Of the 1303 birthing women, 26.8% (n = 349) were referred to MGP at the booking-in visit with the remaining 954 women referred to MAPS (Table 1).

3.1. Demographic data

There were major differences in the characteristics of the MGP and MAPS groups. Mothers less than 25 years and 35 years or older were less likely to be referred to MGP (Table 1). Women who were born in Australia, nulliparous, did not smoke during pregnancy, and were more socioeconomically advantaged were more likely to be in the MGP group. Women who were obese were less likely to be in the MGP group.

3.1.1. Birth outcomes

Preterm births were uncommon in this low-risk group and the two groups had similar proportions of preterm births (Table 2). Spontaneous labour was more common in the MGP group than the MAPS group, even

after exclusion of births without labour. Births in the MGP were more likely to have local anaesthetic or no analgesia. Vaginal birth (with or without instruments) was more common in the MGP group than the MAPS group (78% vs 65%), though the difference was less after exclusion of CS without labour (84% vs 80%). Low APGAR scores were uncommon, and proportions were similar in the 2 groups. Exclusive breastfeeding at discharge was more common in the MGP group.

After accounting for the imbalance in the MGP and MAPS in maternal age, whether the mother was born in Australia, parity, BMI, smoking, the number of antenatal visits, and SEIFA, women in the MGP group were 41% less likely to have induction of labour than spontaneous labour, compared to births in the MAPS group (Table 3). After removing CS without labour births, the direction of the association between model of care and preterm birth changed (Table 4). The associations with analgesia and breastfeeding changed little.

4. Discussion

In this study, we found improved outcomes for mothers and babies who received MGP Midwifery Continuity of Care when compared to the Midwifery Antenatal and Postnatal Service (MAPS) at the same hospital. Women in the MGP group were more likely to experience spontaneous labour with local anaesthesia or no analgesia. The MGP group were more likely to have a vaginal birth without instruments and more likely to be exclusively breastfeeding at discharge. These outcomes add to the already robust body of knowledge supporting the implementation and benefits of midwifery continuity of care. These findings reflect those presented in the latest systematic review [34] on midwifery continuity of care and the randomised controlled trials conducted comparing MGP/caseload and standard care [13,22,36] however, our study compared MGP care with MAPS. This study did not compare the MAPS

Table 2
Perinatal outcomes by model of care at referral.

Outcome	levels	Full sample			Excluding CS and No Labour		
		MGP	MAPS	P-value	MGP	MAPS	P-value
Total N (%)		349 (26.8)	954 (73.2)		323 (29.4)	776 (70.6)	
Preterm birth (<37 weeks)	No	339 (97.1)	912 (95.6)	0.273	316 (97.8)	750 (96.6)	0.394
Onset of labour	Yes	10 (2.9)	42 (4.4)		7 (2.2)	26 (3.4)	
	Spontaneous	188 (53.9)	334 (35.0)	< 0.001	188 (58.2)	334 (43.0)	< 0.001
Analgesia	Induction of labour	135 (38.7)	442 (46.3)		135 (41.8)	442 (57.0)	
	No labour	26 (7.4)	178 (18.7)		•	•	•
	Epidural, nitrous oxide, narcotics, spinal, general anaesthetic, and/or pudendal block	273 (78.2)	819 (85.8)	0.001	247 (76.5)	641 (82.6)	0.023
Mode of birth	None/local anaesthetic	76 (21.8)	135 (14.2)		76 (23.5)	135 (17.4)	
	Vaginal without instruments	227 (65.0)	496 (52.0)	< 0.001	227 (70.3)	496 (63.9)	0.108
	Vaginal with instruments	45 (12.9)	121 (12.7)		45 (13.9)	121 (15.6)	
	Caesarean section without labour	26 (7.4)	178 (18.7)		•	•	•
APGAR score at 5 minutes	Caesarean section with labour	51 (14.6)	159 (16.7)		51 (15.8)	159 (20.5)	
	7 or more	339 (98.0)	932 (98.4)	0.766	313 (97.8)	758 (98.6)	0.528
Breastfeeding at discharge	Less than 7	7 (2.0)	15 (1.6)		7 (2.2)	11 (1.4)	
	Exclusive breast feeding	285 (83.6)	695 (74.8)	0.004	264 (83.5)	568 (75.0)	0.009
	Formula	36 (10.6)	139 (15.0)		33 (10.4)	114 (15.1)	
	Mixed	20 (5.9)	95 (10.2)		19 (6.0)	75 (9.9)	

Data were missing for APGAR score for 3 MGP births and 7 MAPS births in the full sample and missing for 3 MGP births and 7 MAPS births after exclusion of caesarean section without labour. Data were missing for breastfeeding for 8 MGP births and 25 MAPS births in the full sample and missing for 7 MGP births and 19 MAPS births after exclusion of caesarean section without labour. P-values are from Pearson's chi-squared test.

Table 3

Odds ratios for perinatal outcomes for births in the MGP group compared to the MAPS group.

Outcome		Odds ratio (95% CI)	P-value
Preterm birth (n = 1300)	No	Ref	
	Yes	0.59 (0.28, 1.23)	0.160
Onset of labour (n = 1300)	Spontaneous	Ref	
	Induction of labour	0.59 (0.41, 0.84)	0.004
	No labour	0.27 (0.16, 0.45)	< 0.001
Mode of birth (n = 1300)	Vaginal without instruments	Ref	
	Vaginal with instruments	0.54 (0.35, 0.83)	0.005
	Caesarean section without labour	0.30 (0.18, 0.51)	< 0.001
	Caesarean section with labour	0.81 (0.49, 1.33)	0.406
	Major	Ref	
Analgesia for birth (n = 1300)	None/local anaesthesia	0.56 (0.37, 0.83)	0.004
	Major	Ref	
APGAR score at 5 minutes (n = 1290)	7 or more	Ref	
	< 7	1.31 (0.52, 3.32)	0.566
Breastfeeding at discharge (n = 1267)	Exclusive breast feeding	Ref	
	Formula	0.72 (0.43, 1.21)	0.212
	Mixed	0.38 (0.22, 0.66)	< 0.001

For the outcomes of preterm birth, onset of labour, mode of birth, and analgesia for birth, complete data were available for 1300 of the 1303 births. Three births were missing SEIFA quintile. For APGAR score, complete data were available for 1290 births as APGAR score was missing for 10 of the 1300 births. For breastfeeding at discharge, complete data were available for 1267 births as breastfeeding data were missing for 33 of the 1300 births. Inverse probability of treatment weighting was used, using weights obtained by regressing the model of care against maternal age, whether the mother was born in Australia, maternal socioeconomic quintile, body mass index, parity and smoking during pregnancy.

model to standard midwifery care, as the participating hospital only offers MGP or MAPS, so it is unclear if MAPS has better perinatal outcomes than standard and fragmented care with no known midwife during the antenatal/postnatal time. Further research to measure levels of intrapartum continuity following the implementation of MAPS models is recommended. The underlying causal relationship between intrapartum continuity, having the known midwife at the birth who provided the pregnancy care is still unknown and requires further exploration.

The MGP cohort in this study were more likely to come from a socio-demographic position of advantage and less likely to smoke. These findings are similar to other cohort studies comparing birth outcomes for women who received midwifery continuity of care compared to standard care [7,9]. Midwifery continuity of care for women with social risk factors has demonstrated improved maternal and neonatal clinical outcomes for these women [30]. An integrative review that explored the outcomes and experiences for women with complex pregnancies receiving midwifery continuity of care in Australia, identified only three eligible studies [14]. The reason women with social/medical/obstetric risk factors are rarely referred to MGP is unknown. Implementation and evaluation of continuity of care for women with social risk factors should be a priority for further research due to the inequities of access for women [14] including those women who identify as Aboriginal or Torres Strait Islander, despite the known benefits of midwifery continuity of care [17].

Table 4

Odds ratios for perinatal outcomes for births in the MGP group compared to the MAPS group, after exclusion of caesarean section without labour births.

Outcome		Odds ratio (95% CI)	P-value
Preterm birth (n = 1097)	No	Ref	
	Yes	1.63 (0.67, 3.95)	0.279
Onset of labour (n = 1097)	Spontaneous	Ref	
	Induction of labour	0.59 (0.41, 0.84)	0.004
Mode of birth (n = 1097)	Vaginal without instruments	Ref	
	Vaginal with instruments	0.54 (0.35, 0.83)	0.005
	Caesarean section with labour	0.81 (0.49, 1.33)	0.406
Analgesia for birth (n = 1097)	Major	Ref	
	None/local anaesthesia	0.64 (0.43, 0.97)	0.034
APGAR score at 5 minutes (n = 1087)	7 or more	Ref	
	< 7	1.03 (0.39, 2.76)	0.950
Breastfeeding at discharge (n = 1071)	Exclusive breastfeeding	Ref	
	Formula	0.70 (0.40, 1.21)	0.200
	Mixed	0.41 (0.23, 0.72)	0.002

After exclusion of 206 births with missing SEIFA quintile and/or Caesarean section without labour, complete data were available for 1097 births to the outcomes of preterm birth, onset of labour, mode of birth, and analgesia for birth. For APGAR score, complete data were available for 1087 births as APGAR score was missing for 10 of the 1097 births. For breastfeeding at discharge, complete data were available for 1071 births as breastfeeding data were missing for 26 of the 1097 births. Inverse probability of treatment weighting was used, using weights obtained by regressing the model of care against maternal age, whether the mother was born in Australia, maternal socioeconomic quintile, body mass index, parity and smoking during pregnancy.

While MGP continues to demonstrate improved outcomes, we do need to acknowledge that MAPS is not trying to replace MGP/Caseload, rather provide a sustainable alternative in view of the multi-faceted reasoning behind the slow uptake of MGP services [18,19,24,8]. One reason is that staffing MGP/Caseload models have been repeatedly reported as a barrier to implementing this model of continuity [11,18,28,5]. Implementing the MAPS model is valuable and acceptable to women, obstetricians [10], and midwives who may wish to work part-time and who cannot commit to being on-call [8]. This is important because the role of midwives working part-time has recently been identified as the key to sustaining the implementation and scale-up of midwifery continuity of care models [1] and nurturing and encouraging the uptake of part-time positions in a team may provide sustainability in the workforce. Previous research has been optimistic that MAPS could be introduced as a stepping stone for midwives to providing MGP/Caseload [8]. Alternatively, midwives may lose intrapartum skills leading to a reduction in continuity of care across the continuum of pregnancy, birth and postnatal. The results of this study suggest health services need to be cautious when implementing new modified models of care without sufficient evidence.

One point of consideration is that the MAPS model is based on the premise that antenatal and postnatal care is provided by a known midwife or small group/team of midwives [26] however, we could not ascertain this from the e-Maternity data. One of the core principles of midwifery continuity of care is that midwives have an agreed midwifery philosophy of care, vision for the model, and ways of working together. Continuity of care includes a team of caregivers working within the same philosophy and framework [26] but it is unclear from this study whether

women had care by a known midwife at each visit, both antenatally and postnatally. Another point to note is that the MGP model at the participating hospital is a low-risk model, and, although the results of this study may be seen to reflect this, previous research has shown continuity of care is beneficial regardless of risk [36].

The outcomes of this study not only reinforce the positive outcomes of midwifery continuity of care (MGP), but they also suggest careful planning is needed before the implementation of new models of care. Models of care need to be designed and implemented using a woman-centred philosophy that meets the needs of the women, the midwives, and the service [26,28]. Supporting and encouraging part-time availability and enabling staffing with two primary midwives may demonstrate the numerous favourable outcomes continuity of midwifery care provides [1,13,34]. As this is a new model of midwifery care introduced in one State in Australia [8], more research is needed surrounding the underlying structure of the model and how it is implemented amidst the slow uptake of MGP.

5. Limitations of this study

The model of care was not known for all births at the first hospital booking-in visit (for example, the decision had not been finalised) and these births were excluded. The findings cannot be generalised to other settings as this study was undertaken at one site only. We were unable to determine from the maternity electronic database if one known midwife or the number of midwives that provided care during the antenatal and postnatal period (MAPS) cohort. The reporting of ethnicity in the data set was limited to 'being born in Australia'. The authors acknowledge the limitation of the findings with the lack of analysis relating to ethnicity, and recommend future studies report ethnicity coding. A further limitation of the study's findings was the exclusion of the four women who experienced a stillbirth.

6. Conclusion

The Midwifery Antenatal and Postnatal Services (MAPS) are being implemented in Australia and internationally without evidence of the outcomes for mothers and babies. We compared midwifery continuity of antenatal and postnatal care without intrapartum care (MAPS) with MGP that offers care throughout the continuum with a known midwife for labour/birth. We found that MGP had improved outcomes compared to MAPS which are similar to high level international evidence that compared MGP with standard care (no continuity). However this was at one site and a snapshot in time, the authors recommend further national and international studies to determine if MAPS has benefits for mothers and babies.

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Authors Contributions

LM: Data curation; Investigation; Project administration; Writing - original draft and review & editing final manuscript.

AG: Formal analysis; Writing - review & editing final manuscript.

EP: Writing original draft, review & editing final manuscript.

NH: Writing original draft, review & editing final manuscript.

KG: Writing original draft, review & editing final manuscript.

AC: Conceptualization; Data curation; Investigation; Methodology; Resources; Writing - original draft, and review & editing of the final manuscript.

Authors Agreement

All authors have seen and approved the final version of the manuscript being submitted. They warrant that the article is the author's original work, hasn't received prior publication, and isn't under consideration for publication elsewhere.

Declaration of Competing Interest

No conflict of interest identified by any authors: in employment, products or distribution of products, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or funding, equipment and drugs.

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