Policy Research Unit in Maternal and Neonatal Health and Care

Responsive Project Report

What evidence is available about the use and effectiveness of collaborative midwife continuity of care models to improve pregnancy outcomes for women with medical and obstetric complexity? A scoping review

October 2022

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FUNDED BY NIHR | National Institute for Health Research

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Funding: This scoping review is funded by the National Institute for Health and Care Research (NIHR) Policy Research Programme, conducted through the Policy Research Unit in Maternal and Neonatal Health and Care, PR-PRU-1217-21202. The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care

This report should be cited as:

Alderdice F, Malouf R, McLeish J, Roberts N and Rowe R. What evidence is available about the use and effectiveness of collaborative midwife continuity of care models to improve pregnancy outcomes for women with medical and obstetric complexity? A scoping review. Oxford: NIHR PRU-MNHC, National Perinatal Epidemiology Unit, University of Oxford 2022.

ISBN: 978-1-7392619-0-0

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Executive summary

Reports into maternal deaths in the UK have highlighted the increased vulnerability of women with pre-existing physical and mental health problems throughout the perinatal period, and the need for effective multi-disciplinary care. One model of maternity care with the potential for supporting the coordinated care that these women need is continuity of care from a midwife working within a collaborative multi-disciplinary team. However there appears to be little evidence about the implementation and effectiveness of this model of care.

Research question

What evidence is available about the use and effectiveness of collaborative midwife continuity of care (collaborative MCoC) models to improve pregnancy outcomes for women with medical and obstetric complexity?

The objectives were to identify and describe:

- The quantity and types of available evidence about collaborative MCoC models
- The range of collaborative MCoC models described in the research literature and how these have been integrated into service provision for women with medical and obstetric complexity
- The groups of women with medical/obstetric complexity who have experienced this model of care
- The experiences and outcomes for mothers and babies who have experience of collaborative MCoC
- The experience of health professionals involved in delivering collaborative MCoC
- The barriers and facilitators to introducing collaborative MCoC.

Methods

Studies of women with medical and/or obstetric complexity during pregnancy (including mental health) or health professionals delivering collaborative MCoC in high-income countries were included. Sources of data to include: MEDLINE; PsycINFO; PubMed; Cumulative Index to Nursing and Allied Health Literature (CINAHL); EMBASE; Cochrane Library; Web of Science and Scopus. The Turning Research Into Practice (TRIP) and Overton databases were also searched. Other search strategies included: tracking citations of key papers (forward searching); examining reference lists of key papers (backwards searching).

Language: Due to time restrictions only papers retrieved as English-language records were included.

Type of evidence to include: We included any study design, and grey literature.

Synthesis: We used a PRISMA flowchart to clearly describe the review decision process. All articles were screened by one reviewer, with a second reviewer screening a 10% sample. A standardised charting form was developed which included study type, country of origin, aims and objectives, population, description of the model of care and a brief summary of key findings.

Findings

The quantity and types of available evidence about collaborative MCoC models

Five unique studies (published in 11 papers) met the inclusion criteria for this scoping review. Two studies were conducted in the UK, one in Australia, one in Denmark and one in the USA. Two studies were randomised controlled trials, one was a mixed method study, one used a qualitative design and one was a case series.

The range of collaborative MCoC models described in the research literature and how these have been integrated into service provision for women with medical and obstetric complexity

Four of the five studies looked at collaborative MCoC during the antenatal period, labour and birth, and the postnatal period. In the remaining study there was continuity during the antenatal and postnatal periods, but not during labour and birth. Descriptions of the models tended to focus on the role of the midwife (co-ordinator of care, referral to other health professionals) and continuity of care, rather than the role and content of the collaborative partnerships.

The groups of women with medical/obstetric complexity who have experienced this model of care

Two studies explored collaborative MCoC for pregnant women with medical complexity, namely women with one or more chronic illnesses diagnosed before pregnancy, and women who tested positive for human immune deficiency virus (HIV). The studies of obstetric complexity involved pregnant women at <24 weeks' gestation who were considered at an increased risk of preterm birth, and women at ≤20 weeks' gestation who had previously experienced a stillbirth or neonatal death. The fifth study reported on midwives' experiences in implementing collaborative MCoC for women who had a previous caesarean section.

The experiences and outcomes for mothers and babies who have experience of collaborative MCoC

There was limited evidence about the impact of collaborative MCoC on maternal and neonatal outcomes. The evidence available was not indicative of significant improvements in outcome. Women receiving MCoC generally viewed their experiences positively, expressing more trust in midwives and reporting better access to care.

The experience of health professionals involved in delivering collaborative MCoC

Midwives reported that they valued the model and the opportunity to get to know women, although concerns were expressed about maintaining contact with women with the level of service pressure, workload and shifts. None of the studies reported the experiences of collaborative MCoC among other healthcare professionals contributing to care.

The barriers and facilitators to introducing collaborative MCoC

Good partnership working was highlighted as important to facilitate implementation. Potential barriers identified included service pressures, lack of funding and lack management support.

Conclusion

Limited evidence was identified about the use of collaborative MCoC models for women with medical and obstetric complexity in high income countries. More research is needed about the impact of collaborative MCoC on maternal physical and mental health outcomes, infant outcomes, maternal satisfaction, staff experiences and cost-effectiveness. Collaborative MCoC models need to be more clearly defined and evaluated with a range of women with medical and obstetric complexity.

Background

In the UK in 2017-19, 65% of women who died during or up to six weeks after pregnancy had a pre-existing physical health problem and 33% had a pre-existing mental health problem (Knight et al 2021). Women with multiple obstetric and medical complexities have been found to receive fragmented care, fall through gaps in services and experience an increased burden of care and cost when accessing uncoordinated services (Knight et al 2021). One model with the potential for supporting the coordinated care these women need is continuity of care from a midwife working within a collaborative multi-disciplinary team. This model could provide co-ordination, advocacy and personalised care throughout the maternity pathway, with the potential to improve outcomes and experiences for this group of women (Fernandez et al 2021). However, there is limited evidence about the feasibility and impact of collaborative midwife continuity of care models (collaborative MCoC) for women with medical and obstetric complexity (Sandall et al 2016). A recent randomised controlled trial, conducted in Denmark, found that women with chronic medical conditions who received midwife-coordinated individualised care, with additional antepartum and postpartum consultations by known specialised midwives, were more satisfied with their maternity care (de Wolff et al 2022). There is also some evidence of improved experiences for women participating in collaborative models of care in the UK (Fernadez et al 2021).

There is a need to better understand the possible benefits of collaborative MCoC models, and the barriers and facilitators to implementation. A scoping review was conducted to provide a preliminary assessment of the potential size and scope of the available research literature and to identify the nature and extent of research evidence about collaborative MCoC models for women with medical and obstetric complexity.

Research question

What evidence is available about the use and effectiveness of collaborative midwife continuity of care models to improve pregnancy outcomes for women with medical and obstetric complexity?

The objectives were to identify and describe:

- The quantity and types of available evidence about collaborative MCoC models
- The range of collaborative MCoC models described in the research literature and how these have been integrated into service provision for women with medical and obstetric complexity
- The groups of women with medical/obstetric complexity who have experienced this model of care
- The experiences and outcomes for mothers and babies who have experience of collaborative MCoC
- The experiences of health professionals involved in delivering collaborative MCoC
- The barriers and facilitators to introducing collaborative MCoC

Methods

The PRISMA framework and PRISMA-ScR extension for scoping reviews guidelines was used to ensure thorough reporting and mapping of the body of literature.

Inclusion criteria

Population: 1) Women with medical and/or obstetric complexity during pregnancy, including mental health problems. 2) Health professionals delivering collaborative MCoC.

Intervention: Collaborative midwife continuity of care models. Building on the definition of Sandall et al (2016), midwife continuity of care refers to any model that where midwives delivering care in a way which acknowledges that a woman's health needs are not isolated events, and should be managed over time by known providers. This longitudinal aspect allows a relationship to develop between women and their providers of care, and contributes to women's perceptions that their provider has knowledge of their medical history, and similarly an expectation that a known provider will care for them in the future. A collaborative model was defined as midwife continuity of care implemented in collaboration with other specialist health professionals working together for the same goal, working with agreement, having good communication and available to each other (Behruzi et al 2017) in the care of women with medical or obstetric complications in pregnancy. Continuity enables care coordination by creating the conditions and ongoing relationships to support seamless interactions among multiple providers, within interdisciplinary teams or in care settings or sectors (World Health Organization; 2018).

Context: The policy context is England, but given that we anticipated the evidence base to be limited we included studies from any high-income country.

Sources of data to include: Systematic searches were conducted through online databases including: MEDLINE; PsycINFO; PubMed; Cumulative Index to Nursing and Allied Health Literature (CINAHL); EMBASE; Cochrane Library; Web of Science and Scopus. The Turning Research Into Practice (TRIP) and Overton databases were also searched. Other search strategies included: tracking citations of key papers (forward searching); examining reference lists of key papers (backwards searching). Search terms were built on those used for the current related Cochrane review (Sandall et al 2016), expanded to include extra terms related to collaboration and medical and/or obstetric complexity. The full search strategy can be found in Appendix A.

Language: Due to time restrictions only papers retrieved as English-language records were included.

Type of evidence to include: We included any study design, and grey literature including doctoral theses or unpublished research, evaluation or audit reports. In order to maintain quality, grey literature was included only if details were provided about how the data were produced and where the report was associated with an established registered body, for example, a university, an NHS or other governmental organisation, or a registered non-governmental organisation.

Synthesis

We used a PRISMA flowchart to clearly describe the review decision process, results from the searches, removal of duplicate citations, study selection, full retrieval, any additions from reference list scanning and final summary presentation. All articles were screened by one reviewer, with a second reviewer screening a 10% sample. In scoping reviews, 'charting the results' is an iterative process which involves the extraction of relevant data from all the studies included in the review. A standardised charting form was developed which included study type, country of origin, aims and objectives, population, description of the model of care and comparison group (where appropriate)

and a brief summary of key findings (maternal outcomes, infant outcomes, process data, maternal experience, health professional experience, barriers and facilitators of care). Data relating to study characteristics, study objectives and key findings are presented in tables and as a narrative summary.

Results

The quantity and types of available evidence about collaborative MCoC models

Overall, 9,069 references were retrieved by searching the literature electronically, of which 4,059 were duplicates (Figure 1). A total of 5,010 titles and abstracts were screened and 4,694 references were deemed not relevant. Of the 314 references sought for full text retrieval, 13 references were not found and 291 studies were excluded for the following reasons: 203 studies did not adequately fit the review definition of collaborative MCoC; 34 studies involved the wrong population; 25 studies reported on different models of care and 29 studies did not contain primary data. Five unique studies were included in this scoping review, published in 11 reports (de Ferrari et al., 1993; de Wolff et al., 2019, 2022; Fernandez Turienzo et al., 2019; Fernandez Turienzo et al., 2020; Fernandez Turienzo et al., 2021; Fernandez Turienzo et al. 2022 in press; Martin et al., 2015; Mills et al., 2022; NCT 2018; Sandall et al., 2018).

A description of the characteristics of included studies is presented in Table 1, charted by country. All five included studies were published in peer-reviewed journals and all were published between 1993 and 2022. Two studies were conducted in the UK, one in Australia, one in Denmark and one in the USA. Two studies were randomised controlled trials, one was a mixed method study, one used a qualitative design and one was a case series.

During full text screening a number of studies were identified that used collaborative MCoC models in women with social complexity. This group of women were beyond the scope of the review, however as mental health can be included in definitions of social complexity, these studies identified at full text review are described in Appendix B. In addition, three studies included a ‘mixed risk’ sample in which women with medical or obstetric complexity could not be identified as a separate subgroup. These studies were therefore excluded but are also described in Appendix B.

Figure 1: PRISMA 2020 flow diagram

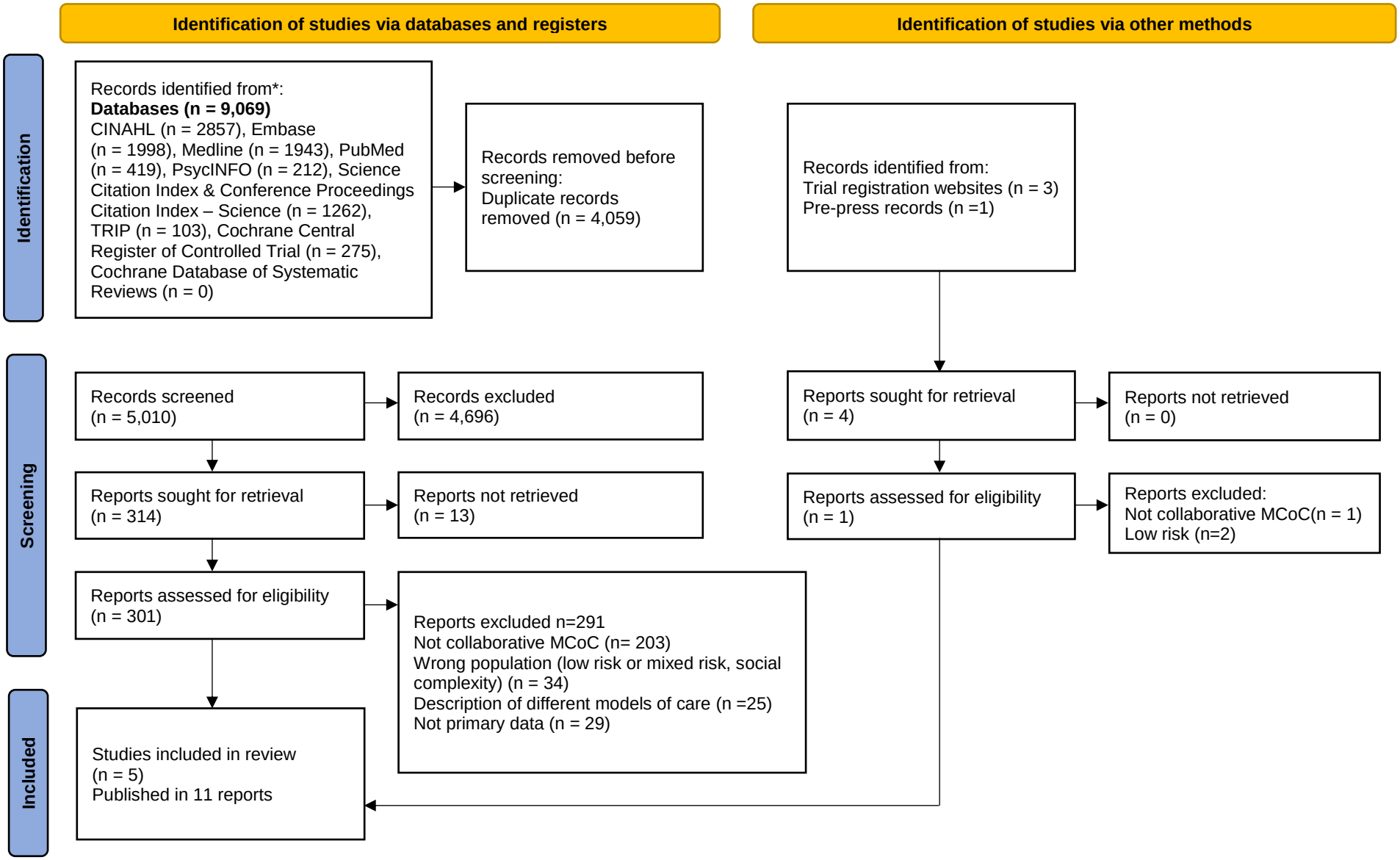

Table 1: Characteristics of included studies

Study reference (1st author's surname, publication year) by Country of origin	Study design	Main objectives	Study populations and medical/social complexity Number of participants (N)
UK			
Fernandez Turienzo, Sandall 2018 (pilot), 2019 (protocol), 2020, 2022 (in press)	Pilot implementation-effectiveness randomised controlled trial with mixed methods evaluation of women's experience and health professionals' experience in one inner-city maternity service.	To test whether a model of care combining continuity of midwife care with rapid referral to a specialist obstetric clinic throughout pregnancy, intrapartum and the postpartum period is feasible and improves experience and outcomes for women at increased risk of preterm birth	Pregnant women at increased risk of preterm birth N=169 (continuity care group) N=165 (standard care group)
Fernandez Turienzo 2021	Mixed methods – survey and interviews using thematic framework analysis	To quantitatively measure and compare perceptions of social support, trust, safety and quality, control during childbirth, bonding and quality of life among women who received CMoC or standard care; and 2) to explore those concepts using qualitative methods to get a deeper understanding of specific experiences and potential mechanisms	Mothers who had been at risk of preterm birth Survey: N=90 (continuity of care group) N=76 (standard care group) Interviews: N=16 (continuity of care group) N=14 (standard care group)
Mills 2022,	A prospective, mixed-methods pre- and post-cohort study in 2 Northwest England maternity units	To explore the feasibility of implementation of a care package of support and of a full-scale trial to test the effectiveness for women in pregnancy after stillbirth or neonatal death	Pregnant women(≤20 weeks' gestation) and previous stillbirth, or neonatal death Total N=54 pregnant women N=38 women (intervention group) N=16 women (usual care) Qualitative interviews: N=20 women, N=5 partners, N=8 midwives

Australia			
Martin 2015	Qualitative descriptive using interviews and thematic analysis	To describe midwives 'experiences of working in a new continuity of care service within a collaborative team	N=6 midwives discussing women with previous caesarean section
Europe			
de Wolff et al 2019, 2022, NCT, 2018	Parallel randomized controlled trial in a large tertiary university hospital in Denmark	To evaluate the effects of a midwife-coordinated maternity care intervention (ChroPreg) for pregnant women with pre-existing chronic medical conditions on the quality of maternity care	Women with pre-existing chronic medical conditions, total N=262 N=131 ChroPreg (intervention group) N=131 standard care (comparison group)
USA			
de Ferrari, 1993	Case series	A midwifery model of care for women with HIV was designed to "demonstrate that the positive attributes of midwifery care can help to strengthen family organization and decrease infant abandonment, neglect, and abuse, and to increase the utilization of specialized HIV care for mothers," in pregnancy and after birth.	Women with human immunodeficiency virus (HIV) n pregnancy at one hospital over 19 months from April 1991 N=73 No comparison group

Table 2: Description of collaborative MCoC models

Study reference (1st author's surname, publication year) by Country of origin	**Health system details**	**Collaborative care component** Providers, role, content	**Continuity care component** Providers, role, content	**Care model timing and duration**	**Women's health conditions**
UK					
Fernandez Turienzo, Sandall 2018 (pilot), 2019 (protocol), 2020, 2021, 2022 (in press)	National health services (NHS)	Teams of specialist midwives could refer woman to others (e.g., medical staff, mental health) guided by clinical need and local guidelines support the specialized known midwives. Midwives had a linked obstetrician with expertise in preterm birth they could contact directly to discuss any clinical concerns, queries, or referrals.	Midwives employed on annual salary to work own patterns with self-rostering to cover caseload of 35 women a year and be on call 2–3 times per week. Women receive continuity of care during antenatal, labour, birth, and up to 28 days after birth in the community, home, and hospital, mainly from a named midwife and her partner midwife (backed up by a team of 7 midwives).	Antenatal, birth and 28 days after birth	Women at increased risk of preterm birth: Cervical surgery, uterine abnormality, previous short cervix, short cervix this pregnancy (< 25mm), previous cerclage, previous premature ruptured membranes (< 37 weeks), previous PTB (< 37 weeks), Previous late miscarriage/abortion (>14 weeks), smoking at booking
Mills 2022	National health services (NHS)	Midwife care-coordinate model Midwife care-coordinator, a registered midwife (hospital or community at the included site) with previous experience of caring for bereaved women and study specific training. A second named midwife to cover for leave and any other absences.	Continuity of care provided by the midwife care-coordinator from antenatal to postnatal in addition to monthly in person support group sessions, facilitated by the research team were scheduled at each site, and a study 'WhatsApp' Messaging group offered. Midwife meets women and partner at recruitment (≤20 weeks' gestations) Antenatal contacts: Provide midwifery care, liaise with multidisciplinary professionals in case of medical complication or extra appointment, available for non-urgent contacts Intrapartum care plan: Discuss/write birth plan, visit labour ward Postnatal: Make contact within 72 h of birth, This is the final contact before transfer to (primary care) health visitor	Antenatal to 72 hours postnatally	Pregnant women who experienced stillbirth or neonatal death in previous birth

Australia					
Martin 2015	Public health system	Midwifery team embedded within a collaborative network. No further details	Continuity of care from midwife at 'Next Birth After Caesarean' clinic	Antenatal	Pregnant women who had a caesarean section in previous birth
Europe					
de Wolff 2022 (full paper), de Wolff 2019 (protocol), NCT (trial registration),	In Denmark, maternity care is tax-financed and free of charge, and most women give birth at public hospitals (97%)	The collaborators are obstetricians, medical specialists, and midwives in a tertiary hospital During each visit the specialized midwife followed up on appointments with obstetricians and other medical specialists to help the woman understand her care plan and assist her in integrating information given during all consultations	Midwife-coordinated and individualized care with specialized known midwives In addition to the routine visits, two additional (1-h long) visits were scheduled antenatally Unlimited access to e-mail consultations and weekly telephone hours were available	Antenatal, birth and postnatal periods	Women with pre-existing chronic medical conditions (CMC), any prolonged medical condition diagnosed >6 months before pregnancy, with continued reoccurrence and a need for medical treatment Excluded: Substance abusers, diabetes type 1 or 2, cardiac conditions, or mental illness unless combined with other CMC Types of CMC included: Endocrinological disease N=66 Neurological disease N=75 Rheumatological disease N=66 Hematological disease N=25 Bowel disease N=43 Hypertension N=17 Lung disease N=16 Kidney disease N=10 Liver disease=2 Psychiatric disease N=2 Endometriosis N=7 Other CMC N=16
USA					
de Ferrari, 1993	John Hopkins Hospital	Collaborative team including consultant obstetrician, infectious disease counsellor and an outreach worker.	Nurse-midwife provides primary care in the clinic and co-ordinates medial and support services. Nurse-midwife also provides continuity during any hospital stays for acute episodes, co-ordinating care and maintaining social contact. Intrapartum care provided by three-member nurse-midwife team. Postnatal continuity as well with visits at 2 and 6 weeks postpartum.	Throughout pregnancy, intrapartum and up to 6 weeks postpartum	Women with HIV in pregnancy

The range of collaborative MCoC models described in the research literature and how these have been integrated into service provision for women with medical and obstetric complexity

The provision of maternity care differs between countries, therefore descriptions of the models of care described in each study were charted by country (Table 2). Four of the five studies looked at collaborative MCoC during the antenatal period, during labour and birth, and postnatally. In the remaining study the continuity extended throughout the antenatal period and postnatally, but not during labour and birth.

A named midwife/midwife care coordinator provided continuity of care and collaborated with other services in the two studies from the UK. The POPPIE trial examined MCoC in collaboration with a specialist obstetric clinic for women at increased risk for preterm birth (Fernandez Turienzo et al., 2019; Fernandez Turienzo et al., 2020; Fernandez Turienzo et al., 2021; Fernandez Turienzo et al., 2022 in press; Sandall et al., 2018). A named midwife provided continuity of care during antenatal, labour and birth and postnatal periods in hospital and at home for up to 28 days after birth. The named midwife collaborated with a team of specialists and referred women to other specialities in accordance with UK protocols and guidelines. In Mills et al., (2022) a specific care package was designed for bereaved parents experiencing a subsequent pregnancy in which the team involved a midwife care-coordinator and a hospital/community midwife. A second named midwife supported the main midwife care-coordinator. The midwife care-coordinator provided continuity of care through pregnancy, labour and birth, with the last contact at 72 hours after birth. The midwife care coordinator provided midwifery care and liaised with other health care professionals as needed. The women also had access to additional and online support.

In the ChroPreg collaborative MCoC model in Denmark (de Wolff et al., 2019, 2022; NCT, 2018) midwives provided all antenatal and postpartum care in addition to co-ordinating the care between all health care providers involved in women's care. A specialized midwife provided six antenatal consultation sessions in addition to weekly phone calls and email consultations. Intrapartum midwifery continuity of care was not part of the model (further details in Table 2).

The study from the USA (de Ferrari et al., 1993) described a model where a nurse-midwife provided antenatal, labour, birth and up to six weeks postpartum care for women with HIV, in collaboration with a consultant obstetrician, an infectious disease counsellor and an outreach worker. Details about the model of care in the final included study about a MCoC model for women after a previous caesarean were very limited (Martin et al., 2015).

Descriptions of the models tended to focus on the role of the midwife (co-ordinator of care, referral to other health professionals) and continuity of care, rather than the role and content of the collaborative partnerships.

The groups of women with medical/obstetric complexity who have experienced this model of care

Two studies explored collaborative MCoC for pregnant women with medical complexity; women with one or more chronic illnesses diagnosed before pregnancy (de Wolff et al., 2019, 2022; NCT, 2018) and women who tested positive for human immune deficiency virus (HIV) (de Ferrari et al., 1993). The studies of obstetric complexity involved pregnant women at <24 weeks' gestation who were considered at an increased risk of preterm birth (Fernandez Turienzo et al., 2019; Fernandez Turienzo et al., 2020; Fernandez Turienzo et al., 2021; Fernandez Turienzo et al., 2022 in press; Sandall et al.,

2018) and women at ≤20 weeks' gestation who had previously experienced stillbirth or neonatal death (Mills, 2022). Martin et al., (2015) reported on midwives' experiences in implementing collaborative MCoC with women who had a previous caesarean section. Inclusion and exclusion criteria for these studies can be found in Table 2.

Table 3: Outcomes investigated by included studies

Outcomes	**Number of studies**	**Study ID**
Maternal outcomes	4	De Ferrari 1993 de Wolff et al., 2019, 2022; NCT, 2018 Fernandez Turienzo (Sandall 2018 (pilot), 2019 (protocol), 2020, 2021,2022 (in press)) Mills 2022
Infant outcomes	3	de Wolff et al., 2019, 2022 NCT, 2018) Fernandez Turienzo (Sandall 2018 (pilot), 2019 (protocol), 2020, 2021,2022 (in press)) Mills 2022
Process data	1	Fernandez Turienzo (Sandall 2018 (pilot), 2019 (protocol), 2020, 2021,2022 (in press))
Maternal experience	3	de Wolff et al., 2019, 2022; NCT, 2018 Fernandez Turienzo (Sandall 2018 (pilot), 2019 (protocol), 2020, 2021, 2022 (in press)) Mills 2022
Health Care Professional experience (Midwives)	2	Mills 2002 Martin 2015
Barriers and facilitators	2	Fernandez Turienzo (Sandall 2018 (pilot), 2019 (protocol), 2020, 2021, 2022 (in press)) Mills 2002

The experiences and outcomes for mothers and babies who have experience of collaborative MCoC

Table 3 provides a summary of the studies that reported on experiences and outcomes. A brief overview of the main outcomes is presented in Table 4.

Maternal outcomes: All but one study (Martin et al., 2015) reported on the impact of collaborative MCoC care on maternal outcomes, but only the two trials had comparison groups. Neither of the trials showed significant differences in their primary outcomes (preterm birth and length of stay). There was no difference between groups in the reporting of serious adverse events. Mills et al., (2022) described before and after outcomes for a number of maternal outcomes, including number of live births and mode of birth, however numbers were small and differences between before and after the introduction of the new model were not tested. In the descriptive case series of de Ferrari et al., (1993) preliminary analysis showed that nurse-midwifery care improved use of the health care system by

HIV-infected women when compared with resident physician care in the period preceding initiation of the model: (43% collaborative MCoC were followed up within three months of birth compared with 13% resident physician care).

Neonatal outcome: Infants of women allocated to a collaborative MCoC model of care in the POPPIE trial were more likely to have skin to skin contact directly after birth and for longer duration, and were more likely to breastfeed immediately after birth and at hospital discharge (Fernandez Turienzo et al., 2019; Fernandez Turienzo et al., 2020; Fernandez Turienzo et al., 2021; Fernandez Turienzo et al., 2022 (in press); Sandall et al., 2018). The ChroPreg trial found that gestational age, birthweight and Apgar scores of babies born to women with chronic medical conditions did not significantly differ between the group who received the collaborative MCoC and the standard care group (de Wolff et al., 2019; de Wolff et al., 2022; NCT, 2018). Mills et al (2022), described a number of neonatal outcomes before and after the implementation of collaborative. The median Apgar score (at 5 minutes) was one point lower after the intervention, and more babies were admitted to NICU, but the median length of hospital stay was the same after the intervention.

Maternal experiences: Three studies reported on maternal experiences of the collaborative MCoC model. The survey data from the POPPIE trial showed the intervention was associated with increased trust in midwives, greater perceptions of safety during antenatal care, more involvement in care decisions and positive experiences of bonding with their babies. Themes from qualitative interviews in the POPPIE trial confirmed the survey findings, with women in the intervention arm expressing more trust in midwives and reporting better access to care (Fernandez Turienzo et al., 2019; Fernandez Turienzo et al., 2020; Fernandez Turienzo et al., 2021; Fernandez Turienzo et al., 2022 in press; Sandall et al., 2018). Similarly, in Mills et al., (2022) women reported feeling supported and looked after with collaborative MCoC care but they did not always experience continuity. Women who were allocated to the MCoC intervention arm in the ChroPreg Trial (de Wolff et al., 2022; de Wolff et al., 2019) were more satisfied with the care received, compared with standard care alone.

The experience of health professionals involved in delivering collaborative MCoC

Midwives: Midwives in Mills et al., (2022) valued continuity of care, but expressed concerns about maintaining contact with women with the level of service pressure, workload and shifts. Midwives' were supportive of the collaborative MCoC model of care as it enhanced the opportunity to have a better relationship with the women and their peers in Martin et al., (2015).

Table 4: Summary of key findings from included studies by country

Study ID	Summary of Key findings
UK	
Fernandez Turienzo, 2020; 2021 and 2022 (in press)	**Main maternal outcome:** The primary clinical outcome was a composite of timely and appropriate interventions for the prevention and/or management of preterm labour which showed no statistically significant difference between groups (POPPIE group 83.3% versus standard group 84.7%; risk ratio 0.98 [95%CI 0.90 to 1.08]. **Main Infant Outcome**: Infants in POPPIE group were significantly more likely to have skin-to-skin contact after birth, to have it for a longer time, and to breastfeed immediately after birth and at hospital discharge. No differences in other secondary outcomes. **Process data:** Fidelity: More than 75% of antenatal and postnatal visits were provided by a named or partner midwife, and a POPPIE midwife was present in more than 80% of births. Acceptability: Nearly 98% of women who responded to the postnatal survey were very satisfied with POPPIE model. Quantitative fidelity and acceptability results were supported by the qualitative findings. Penetration and sustainability: Despite delays (likely associated with lack of existing continuity models at the hospital), the model was embedded within established services and a joint decision was made to sustain and adapt the model after the trial (strongly facilitated by national maternal policy on continuity pathways). Potential mechanisms of impact identified included e.g. access to care, advocacy and perceptions of safety and trust. There was no association between implementation measures and the primary outcome. **Maternal Experience (Survey):** POPPIE group had increased trust in midwives as measured by Trust in Nurses Scale (TNS), greater perceptions of safety during antenatal care measured using Perceptions of safety scale, more likely to have particular midwife to contact when they needed in pregnancy and postnatal period. Increased involvement in decisions about antenatal, intrapartum and postnatal care, greater postnatal support and advice. More positive experiences of bonding with babies. Almost 90% women in the POPPIE group were able to access their midwife via mobile phone compared to 71% in the standard group. Women in the intervention arm were more likely to feel they were spoken in a way they could understand (100% vs 97.4%, $p<0.0001$) and being involved in decisions regarding the antenatal care (94.4% vs 75.0%, $p = 0.002$), intrapartum care (86.7% vs 67.1%, $p = 0.008$) and postnatal care (91.9% vs 73.6%, $p = 0.006$). No differences in other measures using Labour Agency Scale, Social Support Scale and Promis-10 Global **Maternal Experience (qualitative interviews):** Women in the collaborative MCoC group described more trust in midwives; better access to and communication with midwives; more support from midwives in some aspects of their care and; more timely interventions or follow up; and both more positive and negative emotions in relation to control during childbirth, which are potentially associated with fulfilment or lack of fulfilment of their expectations. **Barriers and facilitators:** Partnership working and additional funding were crucial for adoption of the model.
Mills 2022	**Main maternal outcomes:** 96% of women had a live birth; 39% had a planned caesarean sections **Main Infant outcomes**: APGAR (5 min) Median (range) usual care 10 (8 – 10) vs collaborative MCoC 9 (4 – 10), Length of hospital stay usual care 2 (0 – 10) vs 2 (0 – 9) days collaborative MCoC, NICU admission 15% (usual care) vs 27% collaborative MCoC. **Maternal experience (qualitative interviews) :** The key theme related to MCoC was 'Good idea, variable practice' with sub-themes 'Feeling supported and cared for'; 'Building supportive relationships'; 'System needs 'tweaking''(not always seeing the same midwife);

	Health care professional experience (qualitative interviews): Midwives valued care continuity. They had difficulties maintaining contact with the women due to service pressure, shift changes and part time work. Telephone calls and text messages were found to be useful and not excessively time consuming. **Barriers and facilitators** Continuity of midwifery was viewed as a beneficial strategy by both parents and professionals but more radical change in working practices was needed to improve relational care. Changes in leadership, service pressures and competing priorities were implementation barriers. Managers on both study sites were not entirely supportive of the research.
Australia	
Martin 2015, (qualitative study including midwives)	**Health Professional Experience:** Four themes: *'Getting to know the women'* describes midwives' perceptions of working in a new midwife-led model of care and the enhanced opportunity to get to know women. **'***Layers of support'* illustrates how midwives value women's choice and the support of midwifery colleagues. *'Under scrutiny'* reflects the attention directed towards the service and their midwifery practice. *'Facing the challenges'* describes issues around the day-to- day operation and the physical environment, including challenges for the future of the service.
Europe	
de Wolff 2022, Denmark	**Main maternal outcome**: No differences in hospital length of stay between women in the ChroPreg intervention group and women who received usual care. **Main infant outcome:** No difference between the ChroPreg intervention group and the standard group regarding gestational age at birth, birth weight. **Maternal experience:** Women in the intervention arm were more satisfied with maternity cares
USA	
De Ferrari, 1993	**Main maternal outcome:** Mode of birth -77% vaginal birth, 23% C-section. 43% of women in nurse-midwifery model attended follow-up compared with 13% before project initiation.

Other healthcare professionals: None of the studies published findings about the experiences of collaborative MCoC among other healthcare professionals contributing to care.

The barriers and facilitators to introducing collaborative MCoC

Two studies highlighted barriers and facilitators to introducing collaborative MCoC models. Fernandez Turienzo et al., (2022, in press) highlighted that partnership working and additional funding were crucial for the adoption of collaborative MCoC models. In Mills et al., (2022) service pressures and lack of management support were reported as barriers to implementing CCoC.

Discussion

Only five studies from four different countries (UK, Australia, Denmark and USA) met the review eligibility criteria. Two studies compared a collaborative MCoC model of care with standard care in randomised controlled trials. Two studies included women with medical complexity (chronic health conditions and HIV) and the other studies included women who had a previous caesarean section, women at risk of preterm birth, and women in a subsequent pregnancy after a previous stillbirth or neonatal death. There was limited evidence about the impact of collaborative MCoC on maternal and neonatal outcomes for any of these groups of women. The evidence available was not indicative of significant improvements in outcome. Women receiving MCoC generally viewed their experiences positively; expressing more trust in midwives and reporting better access to care. Midwives also reported positive experiences of implementing collaborative MCoC although concerns were expressed about maintaining contact with women with the level of service pressure, workload and shifts. Good partnership working was highlighted as important, but in general there was little detail about the extent of collaboration and there was no information about the experiences of other health professionals involved in these models. Potential barriers to implementation that were highlighted included service pressures, lack of funding and lack of management support.

Neither of the two small trials in this review showed differences in their primary outcomes (preterm birth and length of stay). There was also no difference between groups in the reporting of serious adverse events. More research is needed to evaluate key outcomes experienced by women with medical and obstetric complexity including impact of care on any existing conditions, mode of birth, preterm birth and the postnatal health of women and babies. All trials should include an assessment of maternal mental health. In addition, there is a need to estimate maternity care costs, and trials should include economic analyses of the relative costs and benefits.

The findings about maternal experiences are very much in keeping with other reviews of MCoC models in low or mixed risk populations (Sandall et al., 2016; Fernandez Turienzo, Rayment-Jones et al., 2021). As with other models of MCoC, building a trusting relationship with respectful practitioners was important to women. Fernandez Turienzo, Rayment-Jones et al., (2021), in their realist review to uncover theories of change explaining why MCoC might affect preterm birth, highlighted that within these models, building relationships, trust, confidence and advocacy resulted in women feeling safer and more respected. Midwives clearly valued the model and the opportunity to get to know women, but they also recognised the challenges of the day to day operation of the services they were providing and the need for support from other colleagues (Martin, 2015). Rayment-Jones et al., (2020) in their qualitative study of midwives who delivered collaborative MCoC for women with social complexity

found that midwives believed the service was beneficial to women and had positive impacts on their maternal outcomes. These midwives also reported that the trusting relationships developed with women enabled enhanced, needs-led, holistic care.

No studies were found using collaborative MCoC models with women experiencing mental health problems. One trial was found that explored a MCoC model in pregnant women with a history of depression, however the collaborative component was unclear and therefore it was not included in this review (Marks et al., 2003). Women with mental health problems experience many barriers to care at individual, system and community levels (Webb et al., 2021), and being able to form a trusting relationship with a midwife may therefore be particularly beneficial. A number of women with mental health problems are likely to be included in studies of MCoC for women with social complexity (see Appendix B) and the findings from these studies suggest that women with social complexity find collaborative MCoC models more accessible. Frederiksen, Schmied, and Overgaard (2022) found, for women with social complexity and their partners, that all forms of continuity of care (relational, informational, management) were essential to the parents' experience as their support needs stretched across providers, sectors and services. Midwives routinely witness the complex interplay of social, psychological, medical and obstetric problems and therefore research exploring MCoC within collaborative models for women experiencing mental health problems would be particularly valuable.

The unique component of the MCoC models in this review was collaboration with other health professionals. The description of the collaborative component was generally very poor and there was no evidence from these studies about the experience of the other health professionals involved. The premise of a collaborative continuity of care model is that it enables effective care coordination by creating the conditions and ongoing relationships to support communication among multiple providers (World Health Organization; 2018), but more work is needed to understand and operationalise good collaborative working in practice. All partners need to be clear about their roles, and the team structure and culture. Creating a collaborative culture can be challenging. A study from the Netherlands found that satisfaction with collaboration within maternity care was low and midwives, in particular, were pessimistic about collaboration in future models of maternity care (Cronie et al., 2018). The American College of Obstetricians and Gynecologists (ACOG) and the American College of Nurse-Midwives (ACNM) asked their members to provide examples of successful and sustainable collaborative practices between obstetricians and midwives and to describe their care models (Avery, Montgomery, Brandl-Salutz, 2012). Five main themes were identified: impetus for new collaboration, basic foundations of collaborative care, commitment to successful partnership, care integration, and health professions education in an inter-professional practice environment. These findings highlight the need for further research about collaborative MCoC models to have significant input from all partners from the early stages of development and implementation to optimise the benefits of multi-disciplinary working for women with medical and obstetric complexity.

Strengths and limitations

This review was guided by a pre-developed protocol. The search was broad and inclusive and charts an overview of the available evidence about collaborative MCoC models for women with medical and obstetric complexity. The review only included studies conducted in high income countries however a recent broader review of MCoC models suggests there are very few studies of MCoC in low and middle income countries (Bradford et al 2022). No assessment of the methodological quality of

included studies was carried out. The authors of three papers were contacted to provide additional information about models of care but nothing was supplied and these papers were therefore excluded from the review. In addition, some eligible collaborative MCoC studies may have been excluded if information was missing about the collaborative component, the continuity component or the medical or obstetric complexity of women involved.

Implications for research and practice

There is limited evidence on which to base the implementation of collaborative MCoC models in policy and practice. Women with complexity have a clear need for multi-disciplinary collaborative maternity care and the role of a midwife providing continuity and co-ordination of care for these women should be explored further.

The lack of definition around the collaborative component of the MCoC models in the review demonstrates the need for future research to clearly define who is being collaborated with, when and how in these models, and about the experience of the other health professionals involved in providing care. The lack of evidence about collaborative MCoC models would also suggest that a review of collaborative care models more broadly, in maternity care settings and beyond, may provide additional, valuable information about how different professionals involved in maternity care can work together to support women with complex needs.

No studies were found of collaborative MCoC for women with mental health problems. This is a significant gap in the evidence as these women may particularly benefit from continuity and developing a trusting relationship. As resources are perceived to be a barrier to implementing collaborative MCoC, the other significant gap in the evidence is health economics studies.

Conclusions

Limited evidence was identified about the use of collaborative MCoC models for women with medical and obstetric complexity in high income countries. More research is needed to inform policy and practice. More evidence is needed about the impact of collaborative MCOC models on maternal physical and mental health outcomes, infant outcomes, maternal satisfaction, staff experiences and cost-effectiveness. Collaborative MCoC models need to be more clearly defined and evaluated with a range of women with medical and obstetric complexity, and in particular with women with mental health problems.

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Appendix A: Medline (Ovid MEDLINE® Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®) 1946 to 17/08/2022 search strategy and number of hits

1 exp Pregnancy/ 976808

2 birthing centers/ or delivery rooms/ 2495

3 exp perinatal care/ or prenatal care/ 40668

4 Hospitals, Maternity/ 3140

5 Pregnant Women/ 12734

6 Maternal Health Services/ 15778

7 (pregnancy or pregnancies or pregnant or antenatal or ante-natal or prenatal or pre-natal or antepart* or ante-part* or prepart* or pre-part* or perinatal or peri-natal or peripart* or peri-part* or intrapart* or intra-part* or postnatal or post-natal or postpart* or post-part* or puerper* or trimester* or childbirth or child-birth or maternal or maternity or gestation* or expectant).ti. 501234

8 ((pregnancy or pregnancies or pregnant or antenatal or ante-natal or prenatal or pre-natal or antepart* or ante-part* or prepart* or pre-part* or perinatal or peri-natal or peripart* or peri-part* or intrapart* or intra-part* or postnatal or post-natal or postpart* or post-part* or puerper* or trimester* or childbirth or child-birth or maternal or maternity or gestation* or expectant) adj3 (care or health* or service? or model?)).ti,ab,kf. 99835

9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 1112605

10 Midwifery/ 20689

11 nurse midwives/ 7446

12 (midwife* or midwives).ti,ab,kf. 28029

13 10 or 11 or 12 39119

14 Continuity of Patient Care/ 20426

15 Delivery of Health Care, Integrated/ 14012

16 Case Management/ or Case Managers/ 10661

17 ((continuity or continuum) adj3 (care or carer? or health* or service? or model?)).ti,ab,kf. 23627

18 ((led or continu* or coordinat* or co-ordinat*) adj3 (midwife* or midwives)).ti,ab,kf. 1077

19 ((usual or regular or stabil*) adj3 (midwife* or midwives)).ti,ab,kf. 44

20 ((midwife* or midwives) adj5 (group care or group practice)).ti,ab,kf. 53

21 ((integrat* or individuali?ed or personali?ed or shared or multidisciplin* or multi-disciplin* or interdisciplin* or inter-disciplin* or interprofessional or inter-professional) adj3 (care? or health* or service?)).ti,ab,kf. 73801

22 ((multidisciplin* or multi-disciplin* or interdisciplin* or inter-disciplin* or interprofessional or inter-professional) adj3 (team? or collab*)).ti,ab,kf. 48113

23 (caseload? or case load? or (case adj2 manage*)).ti,ab,kf. 23478

24 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 181971

25 9 and 13 and 242242

26 limit 25 to ("systematic review" or "reviews (maximizes specificity)") 109

27 afghanistan/ or exp africa/ or albania/ or andorra/ or antarctic regions/ or argentina/ or exp asia, central/ or exp asia, northern/ or exp asia, southeastern/ or exp atlantic islands/ or bahrain/ or bangladesh/ or bhutan/ or bolivia/ or borneo/ or "bosnia and herzegovina"/ or brazil/ or bulgaria/ or exp central america/ or exp china/ or colombia/ or "commonwealth of independent states"/ or croatia/ or "democratic people's republic of korea"/ or ecuador/ or gibraltar/ or guyana/ or exp india/ or indonesia/ or iran/ or iraq/ or jordan/ or kosovo/ or kuwait/ or lebanon/ or liechtenstein/ or macau/ or "macedonia (republic)"/ or exp melanesia/ or moldova/ or monaco/ or mongolia/ or montenegro/ or nepal/ or netherlands antilles/ or new guinea/ or oman/ or pakistan/ or paraguay/ or peru/ or philippines/ or qatar/ or "republic of belarus"/ or romania/ or exp russia/ or saudi arabia/ or serbia/ or sri lanka/ or suriname/ or syria/ or taiwan/ or exp transcaucasia/ or ukraine/ or uruguay/ or united arab emirates/ or exp ussr/ or venezuela/ or yemen/ 1286480

28 organisation for economic co-operation and development/ 460

29 australasia/ or exp australia/ or austria/ or exp baltic states/ or belgium/ or exp canada/ or chile/ or czech republic/ or europe/ or exp france/ or exp germany/ or greece/ or hungary/ or ireland/ or israel/ or exp italy/ or exp japan/ or korea/ or luxembourg/ or mexico/ or netherlands/ or new zealand/ or north america/ or poland/ or portugal/ or exp "republic of korea"/ or exp "scandinavian and nordic countries"/ or slovakia/ or slovenia/ or spain/ or switzerland/ or turkey/ or exp united kingdom/ or exp united states/ 3417475

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Appendix B: Social complexity and mixed risks studies

Study reference (1st author's surname, publication year) by Country of origin	Study design	Main objectives	Study populations and medical/social complexity Number of participants (N)	Midwifery collaborative and continuity care model	Key findings
Social complexity studies					
UK					
Rayment-Jones 2020	Realist study using focus groups, thematic analysis	To explore how midwives provide continuity of care to women with complex needs, and what they believe works, for whom, in what circumstances	N= 12 midwives experiences of looking after women with social risk factors living in a deprived urban area	A named midwife coordinates all care, multi-disciplinary communication, and referrals. Hospital-based midwives attend obstetric appointments with women, participate in multi-agency meetings, and advocate working with social care	Health professional experience: Midwives believed the service was beneficial to women and had positive impacts on their maternal outcomes. Trusting relationships with women enabled, enhanced, needs led, holistic care. Barriers and facilitators: The community-based midwives focus group believed their location enabled them to help women integrate into their local community and make use of specialist services. Fear of social services prevented some women from engaging.
Australia					
Allen 2015	A retrospective cohort study in a tertiary Australian hospital May 2008 to December 2012	To determine if caseload midwifery or young women's clinic are associated with better perinatal outcomes compared to standard care	N = 1971, young women aged ≤21 years N=627 Caseload collaborative care group N=306 Young women's clinic N=1038 Standard care (comparison group)	Collaborators are primary MGP midwife, part of four MGP midwives, two obstetricians, social worker and child protection and peer support workers Primary midwife provides continuity of care antenatal, intrapartum and postnatally, primary or back-up midwife available 24 h a day via telephone	Main maternal outcome: Young women were less likely to have a preterm birth with caseload midwifery care when compared to standard care adjusted odd ratio. Main infant outcome: Infants of young women in the caseload group were less likely to be admitted to neonatal intensive care units. No difference in delivering low birth weight infant and breastfeeding initiation.
Hartz 2019	Mixed methods including retrospective cohort study and qualitative interviews with women and staff,	Determine maternal and infant health outcomes of women and their	Women identifying as Aboriginal and Torres Strait Islanders N=505 (MMS)	Aboriginal Health Worker, Aboriginal maternal and infant health worker, obstetrician, social worker, child and family	Main maternal outcome: Malabar Midwifery Service (MMS) women were likely to have spontaneous vaginal birth. Other outcomes were similar to standard care this include: Induction of labour, augmentation of labour, instrumental birth,

	in one urban hospital in 2007-2014	babies (who identified as Aboriginal and Torres Strait Islander) during 2007–2014 and were cared for by the Malabar Midwifery Service (MMS)	N=201 (comparison cohort) N=9 interviews with women N=13 interviews with staff	health nurse and community paediatrician. Four fulltime midwives provide continuity throughout pregnancy, birth and postnatally up to 6 weeks after birth	caesarean section, 3/4 degree tear, episiotomy, postpartum haemorrhage and maternal length of stay. Main infant outcome: MMS babies more likely to be LBW with similar rates of preterm birth and neonatal admission and breast feeding at discharge. Maternal experience (interviews): Mothers referred to the care as accessible, and well prepared for birth. Women interviewed referred to Their relationships Health professional experience: Midwives reflected on continuity of care and engagement with the women's wider family Barriers and facilitators: Cultural infrastructure of the Malabar Community as a challenge and restricted funds
Stapleton 2013	Mixed method study (survey and interviews or focus groups) from two hospitals	To evaluate a specialist antenatal clinic for women from refugee backgrounds	N=190 Refugee women N=42 women participated in a survey or focus groups N=147 hospital staff N=3 clinic staff N=3 hospital managers N=2 interpreting co-ordinators N=5 key community-based stakeholders N= 4158 all women attending the maternity unit (comparison group)	A specialist antenatal clinic for women from refugee backgrounds, situated within the mainstream maternity clinic of a large tertiary hospital. Continuity during antenatal period only	Main maternal outcome: Refugee women were significantly more likely to be multiparous (3+), have spontaneous onset of labour, an intact perineum and be discharged with babies who were breastfeeding. Less likely to smoke. Main infant outcome: Preterm birth <37 weeks gestation was less likely among these babies. Maternal experience: The clinic was highly regarded by women and their families. Health professional experience: Informal access outside scheduled appointments increased midwives workload Barriers and facilitators: Clinic staff were concerned about the inflexible hospital recording systems and the time spent in servicing ad hoc requests.
McLachlan 2022	Prospective non-randomised implementation study, using before and after	To develop and implement culturally appropriate	N=1040 Women having a First Nations baby (approximately 70% of mothers identified as	Care could be solely hospital-based, with all care by the caseload midwife, or shared care between the caseload	Maternal outcome: Not applicable Neonatal outcome: Not applicable Process data: Majority of women acceptance and received of the new model of care

	outcome measures, over three sites	caseload midwifery care for First Nations women	Aboriginal and/or Torres Strait Islanders) N=703 who received any continuity of midwife model of care No comparison group	midwife and other specialised hospital services. Care could also be caseload care shared with a community- based provider. Woman was linked with, and had 24/7 phone access a caseload midwife during antenatal, intrapartum and postpartum periods	Barriers and facilitators: Staffing crisis prevented implementing the care model to other sites.
Europe					
Frederiksen 2022,	Ethnography using interviews and field observations; thematic analysis	To explore the role of continuity of care in creating a coherent care journey for parents in a vulnerable position during pregnancy and the first 12 months following birth	Mothers N=26 and fathers N=13 with social complexity for mother or partner: mental illness, limited social support, adverse childhood experiences, drug and alcohol misuse, poverty, young age, and trauma and violence	Extra multi-disciplinary services for vulnerable parents: Midwives and health visitors organize specialized parenting class; midwife is part of multi-disciplinary team offering a weekly supportive intervention; midwife is part of Family Outpatient Unit team. Continuity of care from a specialised midwife during antenatal period only	Maternal experience: All forms of continuity of care (relational, informational, management) were essential to the parents' experience as their support needs stretched across providers, sectors and services
USA					
Piechnik 1985	Prospective cohort study, non-randomised matched intervention-controlled study	To evaluate a multidisciplinary team program/clinic for teenagers pregnancy and compare the outcomes with other pregnant teenagers who received standard care	Adolescent pregnant women <18 years old and low socioeconomic status N=738 attended the clinic (intervention) N= 2034 Adolescent pregnant women (Comparison group) (Medically high risk pregnancies excluded)	Five years of a special maternal care program Collaborators are two obstetricians, psychiatrist, two nurse midwives, one nutritionist, two social workers and a nurse. Nurse-midwives coordinate the program services, evaluate, manage and coordinate the care during pregnancy, birth and after birth	Main maternal outcome: Preeclampsia incidence and caesarean section rate did not change when comparing the rates before and after the clinic. Breast feeding rates increased. Main infant outcome: Low birth weight ≤2500g rate for the study group (special programme) was significantly lower than the controls.

Mixed risk studies					
Australia					
Beasley 2012	A retrospective analysis of weekly case review meetings between obstetricians and midwives over a 12 month period	To demonstrate how simple collaboration can lead to a level of effective and professionally satisfying maternity care	N=337 all risks women booked with Midwifery Group Practice (MGP), N=169 women were discussed at least once at a case review meeting	Midwifery Group Practice (MGP) provide all care for women of all risk status with collaboration with obstetricians via discussion the cases during their weekly meetings	Evaluation of the new model via a staff survey: All staff agreed on the necessity of meetings and they had been described as 'collaborative, enjoyable, educational and productive'
Biro 2000	A randomised controlled trial, in a public tertiary hospital, Monash Medical Centre, Melbourne	To compare the team care model with standard maternity care	Women with low and high risk pregnancies N= 502 women team midwifery (intervention group) N= 498 women standard care (comparison group)	Team of 7 full-time midwives and hospital medical staff provided care. Women at high risk of complications had individual care plans. The 7 full-time midwives provided antenatal, intrapartum, and some postnatal care	Maternal outcome: Women received MCoC stayed in hospital 7 hours less than the standard care women Neonatal outcomes: More babies of standard care mothers were admitted to the special care nurseries for more than 5 days. No differences in perinatal mortality between the two groups.
Tracy 2013	Randomised, controlled, parallel-group trial, unblinded study at two hospitals, between Dec 8, 2008, and May 31, 2011 Trials Registry, number ACTRN12609000349246 (The M@NGO trial)	Assessing maternal and perinatal clinical outcomes and cost of care for all risk women allocated to caseload midwifery compared with standard maternity care	All risks women medical/obstetric including social risks N=512 in the caseload group, N = 530 in standard care group	Caseload midwifery care providers: Named (or primary) caseload midwife, within a small group known as a midwifery group practice of 4 full-time midwives A senior obstetrician was allocated to each midwifery practice to enhance consultation and referrals Named caseload midwife providing care throughout pregnancy, labour, and birth	Maternal outcomes: The proportion of caesarean sections did not differ between the groups Elective caesarean sections rates was significantly lower in caseload group Neonatal outcome: Neonatal outcomes did not differ between the two groups

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