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Models of care for pregnant women with multiple long-term conditions and the role of the midwife: A scoping review

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ABSTRACT

Background: More women are experiencing pregnancy with two or more long-term health conditions such as hypertension, depression or HIV (MLTC). Care can be complex and include multiple teams, health professionals and services. The type and range of maternity care models for these women and the role of the midwife within such models is unknown.
Aim: To provide an overview of the literature on models of care for pregnant, birthing, and postnatal women with MLTC and the role of the midwife.
Methods: We conducted a scoping review guided by the Joanna Briggs Institute scoping review methodology. Five databases MEDLINE, CINAHL Plus, PsycINFO, EMBASE and The Maternity and Infant Care database were searched from inception until August 2022. A total of 3458 titles and abstracts and 56 full text papers were screened independently by two researchers. Data was extracted from five papers and synthesised narratively.
Findings: Multidisciplinary care models are described or recommended in all five papers. Midwives have a varied and core role in the multidisciplinary care of women with MLTC.
Discussion: Models of care for those with MLTC covered part or all the maternity journey, primarily antenatal and postnatal care. A focus on delivering high-quality holistic care throughout the maternity journey, including postnatally is needed. There is a lack of evidence on how midwifery continuity of care models may impact experiences of care and outcomes for this group.
Conclusion: There is a lack of empirical evidence on how best to provide midwifery and multi-disciplinary care for those with MLTC and a need for research to understand this.
Inclusivity statement: Our aims refer to 'pregnant, birthing, and postnatal women and birthing people with MLTC'. We acknowledge that not all those accessing maternity services will identify as a woman. We continually strive to ensure that our research and public involvement is inclusive and sensitive to the needs of everyone. Our search terms did not narrow to either women or birthing people specifically and used broad terms of pregnancy, antenatal, prenatal, childbirth and postnatal care. All included papers use the term woman or women throughout therefore, we have used this terminology when describing their findings. Where the term 'woman' is used this should be taken to include women and people who do not identify as women but are pregnant or have given birth. This builds on our Patient and Public Involvement and Engagement work which has highlighted the need to use inclusive language.

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Statement of Significance

Problem or Issue:	The presence of multiple long-term health conditions is known to contribute to poorer pregnancy and birth outcomes.
What is Already Known	Care provision is often complex, involving multiple teams and health professionals. There is limited evidence of how best to provide maternity care for women and with multiple long-term conditions and the role of the midwife in care provision.
What this Paper Adds	This paper improves the understanding of the range of models of care which are recommended or provided for those with multiple long-term conditions during pregnancy, and the role of the midwife within these.

1. Introduction

The 2023 United Kingdom (UK) annual report of the Confidential Enquiry into Maternal Deaths and Morbidity identified that 56 % of women who died during or up to six weeks after pregnancy in 2019–21 had pre-existing medical problems and 37 % had pre-existing mental health conditions [1]. Women who have multiple morbidities or health conditions are consistently over-represented in maternal deaths [1–3]. The Academy of Medical Sciences defines multimorbidity as:

'The co-existence of two or more chronic conditions, each one of which is either:

- *A physical non-communicable disease of long duration, such as a cardiovascular disease or cancer.*
- *A mental health condition of long duration, such as a mood disorder or dementia.*
- *An infectious disease of long duration, such as HIV or hepatitis C.'* [4])

The prevalence of multimorbidity, also called multiple long-term conditions or MLTC, among pregnant women has been found to be between 20 % and 44 %, the range reflecting whether secondary or primary care data sources are utilised for diagnoses [5]. Persistent ethnic and social inequalities exist in these women's experiences of maternity care and impact on outcomes. Those in deprived communities are at higher risk of experiencing poorer health outcomes and greater dissatisfaction with healthcare [6], [4]. Evidence demonstrates significant disparity in mortality rates amongst women from different ethnic groups in the UK. Black women have a mortality rate four times higher than White women, and Asian women have a mortality rate two times higher than White women [1]. Social deprivation and ethnicity are both independent sociodemographic determinants of multiple long-term conditions [6,7].

The 2016 National Maternity Review undertaken in England, UK, highlighted the need for an integrated approach to support the vision for safer, more personalised, and family-friendly care [8]. This and the Maternal Medicine Networks Service Specification identify that midwives have a key role in the multi-disciplinary team, ensuring joined up care with obstetric and specialist services which meets women's needs [9]. The specification supports midwife-led and continuity of carer models of midwifery care. There is significant literature which suggests that midwifery continuity of care models and co-ordination of care can improve the quality of care and outcomes for women and babies, although this has not focussed on women with MLTC [10–13]. A recent randomised controlled trial, conducted in Denmark, found that women with chronic medical conditions who received a midwife-coordinated individualised care intervention, delivered by specialised known midwives, were more satisfied with their maternity care. However, there was no difference in total length of hospital stay or other outcomes [14].

This paper aims to provide an overview of the literature on the range of models of care for pregnant, birthing, and postnatal women with MLTC and the role of the midwife within these. The findings will be used to inform the development of future research focussed on co-producing recommendations for midwifery care for those with MLTC. [15]

2. Methods

A scoping review was selected as the most appropriate to identify and summarise different types of evidence on models of care for pregnant, birthing, and postnatal women with MLTC and the role of the midwife, to identify research gaps, and make recommendations for the future research [16]. A preliminary search of PROSPERO, MEDLINE, JBI Evidence Synthesis and the Cochrane Database of Systematic Reviews found no existing or in progress reviews on midwifery care for women and birthing people with MLTC. An a priori protocol was developed and registered with the Open Science Framework [17], registration DOI: https://doi.org/10.17605/OSF.IO/8XF6R. The Joanna Briggs Institute (JBI) scoping review methodology guided this review [18]. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) and the PRISMA-ScR checklist guided reporting [19].

2.1. Review questions

This review considered literature on models of care for pregnant, birthing, and postnatal women and birthing people with MLTC and the role of the midwife to understand the depth, breadth, and type of existing literature available and aimed to answer the following questions:

- Which models of care for women and birthing people with MLTC during pregnancy, birth and postnatal are described in the literature?
- What are women and birthing people's experiences of these models of care?
- What is the role of the midwife in the different models of care for women and birthing people with MLTC?

2.2. Search strategy

The search was developed using the 'Participant, Concept, Context' (PCC) mnemonic to identify the Participants: Pregnant, birthing, and postnatal women with MLTC, using the Academy of Medical Sciences (2018) definition of multimorbidity [4]; Concept: existing models of care for women and birthing people with MLTC and the role of the midwife in different models of care provision (using the International Confederation of Midwives (ICM) definition of the midwife when considering studies reporting professionals with the title of 'midwife') [20]; and Context: care provided for women and birthing people with MLTC during the childbirth continuum (the antenatal, intrapartum, and postnatal period) within the health system in both hospital and community settings in high income countries with a public health system.

We used a three-step database search strategy. First undertaking an initial search of the five selected databases MEDLINE, CINAHL Plus, PsycINFO, EMBASE and The Maternity and Infant Care database using keywords. This was followed by a search using the subject headings and keywords from relevant articles to develop a more comprehensive search strategy (see Appendix I) in consultation with research librarians. The second step was to search all five databases using the identified index terms and keywords. Hand searching of relevant journals, such as

the Royal College of Midwives 'Midwives' Magazine, and British Journal of Midwifery was undertaken. Google and Google Scholar were used to identify other relevant literature, reports, guidelines, theses, and unpublished studies. We included only articles written in English as it is the primary language of the authors. There were no restrictions on the date of publication and the final search was completed on 22/08/2022.

The review considered all forms of evidence including systematic reviews, quantitative and qualitative studies, mixed-method studies, and grey literature. Policy and opinion papers were also included in this scoping review. Three pieces of literature met the scoping review inclusion criteria [2,21,22] and a further two were included as were highly relevant, although they did not meet the precise participant criteria [9, 14]. Both these papers include participants with both MLTC and with single conditions. Following discussion with all authors these were included due to the extremely limited evidence on this topic. They include the right participants and concept, and one of these was the sole piece of empirical research. Most participants in ChroPreg had one chronic medical condition and it was not possible to disaggregate results for women with two or more chronic conditions [14]. The Maternal Medicine Network service specification is focused on women with significant medical problems that pre-date or arise in pregnancy or the puerperium [9]. This service specification is not solely for women with MLTC but provides a specification for care of women with highly complex medical conditions, including MLTC.

The MBRRACE-UK multimorbidity enquiry includes both women in the enquiry with multiple morbidities in addition to those who had their care reviewed as part of a separate confidential enquiry into diabetic ketoacidosis (DKA) [2]. The definition for multimorbidity in the DKA element of the enquiry was those with DKA and either pre-existing hypertension or thyroid disease in addition to the 41 % of women with DKA without either of these conditions who had other pre-existing physical or mental health conditions [2].

All identified records were collated and uploaded to EndNote (version 20), and duplicates removed. The deduplicated results were then imported into Rayyan, a free online tool which supports management of literature reviews, and any duplicates not previously eliminated were removed. Reference lists of included papers were reviewed for other relevant literature.

2.3. Screening and evidence selection

Two researchers (ZV and HL) conducted the title and abstract screening independently using Rayyan. Title and abstracts of n= 3548 papers were screened. A total of n= 56 papers were included in the full text review and assessed in detail against the inclusion criteria by two independent reviewers (ZV and HL). Reasons for exclusion of full-text papers were recorded. Any disagreements between reviewers were resolved through consensus or with a third reviewer as appropriate. A total of n= 5 papers were included in the final review. Reasons for exclusion included wrong participants, wrong concept, a focus on single conditions and no full text available. The PRISMA flow diagram (Fig. 1) describes the review process.

2.4. Data extraction and analysis

We extracted data from included papers included in the review using a data extraction tool adapted from the template in the JBI scoping review guidance (see appendix II) [18]. Extracted data includes the study details and key findings of the description of the model of care, any experiences of the model of care, the role of the midwife and any other relevant findings.

We piloted the data extraction process by randomly selecting two papers. Two independent reviewers (ZV and HL) charted the information and then compared their data extraction forms. For the remaining papers one researcher charted data from the paper using the data extraction form, and another researcher verified the extracted data. We discussed discrepancies to reach consensus, or where necessary, consulted a third reviewer. Extracted data was synthesised narratively.

3. Findings

The review process resulted in five included papers which contained a variety of literature types including a randomised controlled trial, a case study, a national service specification, an open access expert resource, and a confidential enquiry into maternal deaths and morbidity report (Table 1). The papers were all from high income countries with one from Australia [22], one from Denmark [14], one from England [9], and two from the UK [2,21]. Two were published in peer reviewed journals [14,22] and the three other papers freely available online through government [9], university [2] or open access expert resource [21] websites.

Three themes were explored 1) Models of maternity care for women with Multiple Long-Term Conditions, 2) Women's experiences of these models and 3) The role of the midwife.

3.1. Models of maternity care for women with Multiple Long-Term Conditions

Models of care provided for women with MLTC, one as part of an RCT [14] and one a single case study [22] are described. The other three papers made recommendations for how models of care could or should be provided, including a national service specification for care of women with highly complex medical conditions, including MLTC [9]. Two papers made recommendations for care of women with MLTC including mental and physical health co-morbidity [2,21].

3.1.1. Types of care provision

The literature describes models providing care during different parts of women's maternity journey. One paper described a model of care including pre-conception care, through to antenatal, intrapartum and postnatal care [9], two made recommendations for care during the antenatal, intrapartum and postnatal period [2,21], one was an intervention providing both antenatal and postnatal care [14], and one described antenatal care only [22]. All five papers described aspects of multi-disciplinary care and described or discussed a need for care co-ordination, aspects of care co-ordination or the need for a care co-ordinator.

3.1.2. Multi-disciplinary care and care co-ordination

Women with MLTC may receive multidisciplinary specialist care from multiple teams, often in multiple locations [2]. An approach to care that takes account of multimorbidity, informed by guidelines to optimise care for adults with multimorbidity, which includes care coordination is recommended [2]. A named coordinator of care is a specific recommendation in circumstances where women are receiving care from more than one healthcare team [21] Different compositions of multi-disciplinary teams (MDT) are described, including teams made up of an experienced and appropriately trained obstetrician, obstetric physician, midwife or team of midwives [9]. Another model incorporated medical, nursing and allied health professionals from relevant specialties, facilitated by a Nurse Practitioner liaising with obstetric, medical, nursing and allied health professional teams and the women [22].

Although MDT care is frequently recommended, it is reported to be fragmented. There is limited evidence on the components of an effective multi-disciplinary team for women who have medically complex pregnancies, including those with both physical and mental health conditions [21]. There is a need for further evidence for where MDT care should be located, who should be included, how women and families should be involved and how best to integrate care for women with complex pregnancies [21].

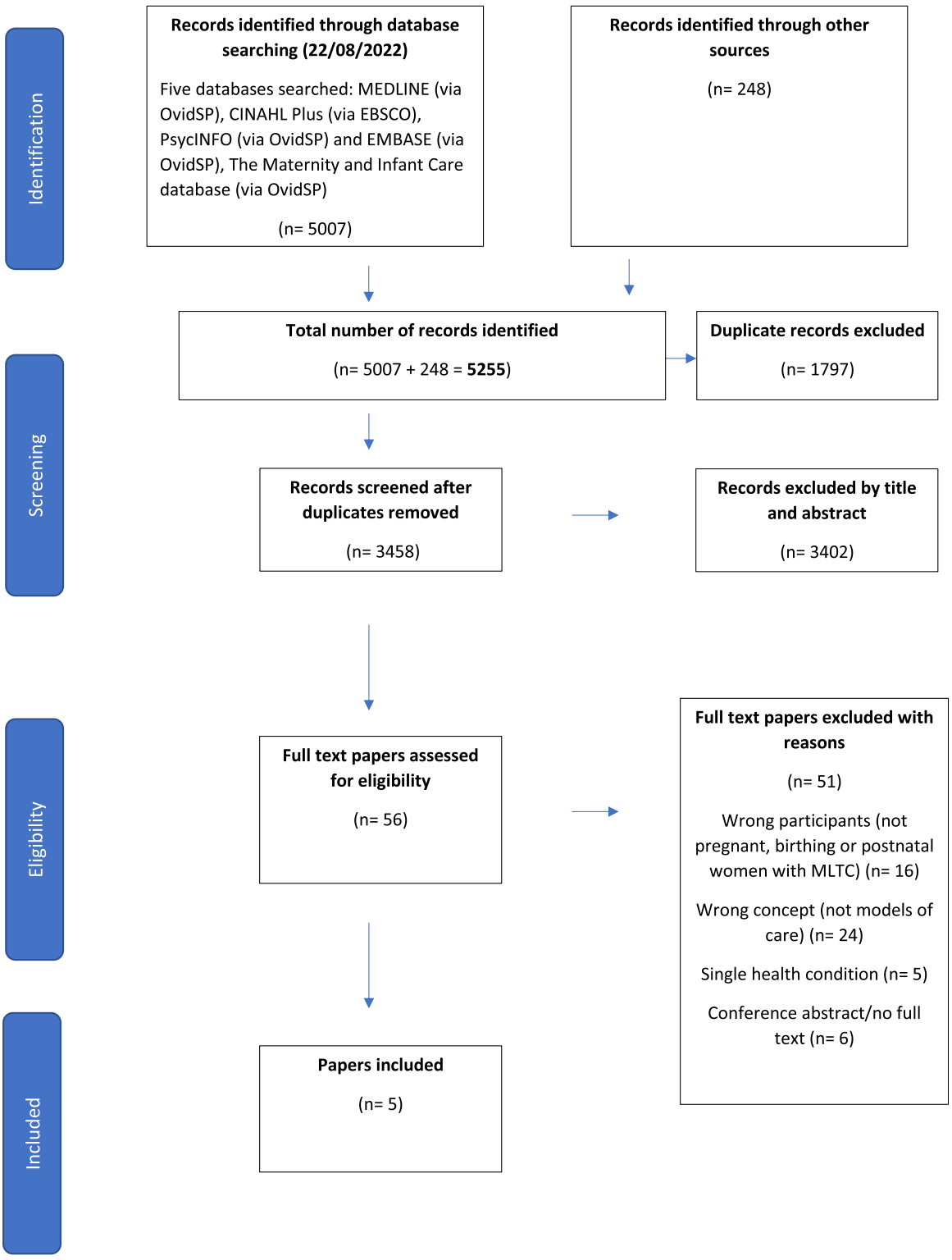

Fig. 1. PRISMA-ScR Flow Diagram.

3.1.3. Continuity of care

It is suggested that women with medically complex pregnancies are likely to benefit from ongoing continuity of midwifery care although there is a lack of evidence on which specific model would be most effective for this group [21].

In the ChroPreg intervention specialised known midwives provided all antenatal and postpartum midwifery appointments, including additional longer appointments, and coordinated care between all health care providers involved in maternity care for the women. They also provided unlimited email support and weekly telephone support [14]. The study was unable to include intrapartum care in the continuity model due to the organisation of care at the recruiting site. They recommend future studies should evaluate the effect of continuity models which include intrapartum care for women with chronic medical

Table 1
Characteristics of included studies.

Author, Year	Country	Design and purpose	Participants	Concept	Context
Bezzant, 2019	Australia	Case Study	Pregnant woman with chronic kidney disease and diabetes	Nurse practitioner, complex care co-ordination and multi-disciplinary care during pregnancy	Tertiary health facility in Australia
NHS England, 2021	England	Maternal medicine network service specification	Women who have significant medical problems that pre-date or arise in pregnancy or the puerperium	Pre-pregnancy, antenatal and postnatal care model which ensures appropriate – investigation and management by an experienced MDT (including an appropriately trained obstetrician e.g. with sub-specialty training in maternal fetal medicine or equivalent; an obstetric physician or equivalent physician with appropriate training; and an appropriately trained midwife or team of midwives)	Maternity services in England
Bick et al. (in Howard), 2021	UK	Open access expert resource for medical professionals/ Book Chapter	Women with mental and physical co-morbidity who have obese BMIs (BMI ≥30, at pregnancy commencement	Antenatal, intrapartum and postnatal care and practice recommendations	Focussed on UK/High Income Countries
de Wolff et al., 2021	Denmark	RCT - two-armed parallel group randomised trial design	Pregnant women with a chronic medical condition n= 262 (n=131 in each arm) n=32 > 1 chronic medical condition in standard care n=39 > 1 chronic medical condition in intervention	Evaluating midwife-coordinated maternity care using ChroPreg intervention which consisted of: (1) Midwife-coordinated and individualized care, (2) Additional ante-and postpartum consultations, and (3) Specialized known midwives. Randomised to either intervention or standard care	Women at a department of obstetrics in a public hospital in Denmark. All women receive care free of charge.
Frise et al. (in Knight et al.), 2022)	UK and Ireland	Confidential Enquiry into Maternal Deaths and Morbidity/ confidential enquiry into diabetic ketoacidosis (DKA) in pregnancy	Pregnant women with multiple morbidities/pregnant women who have diabetes ketoacidosis (DKA) and preexisting thyroid disease, hypertension or other pre-existing physical or mental health co-morbidities.	Review of care and recommendation for improvements for women with multiple morbidities	Any women within the UK healthcare system

conditions [14].

3.2. MLTC encompassing physical and mental health conditions

Specific considerations for those with both a mental and physical health co-morbidity at each stage of the maternity journey are suggested including: antenatally through a named co-ordinator if care provided by multiple teams; during labour and birth, ensuring women know who will be caring for them and the role of each healthcare professional; postnatally through continuation of MDT and coordinated care during the postnatal period [21]. Postnatal discharge from maternity care should be included in planning and the traditional 6 weeks review may be too early for this group of women to have sufficiently recovered from birth for discharge [21].

3.3. Women's experiences of these models

Monitoring women's experiences and including service user experience as a key performance indicator is recommended in the service specification [9]. This sets out a requirement for service user coproduction and the establishment of user groups who feedback on key aspects of their experience including quality and accessibility of care and choice [9]. Information and guidance should be co-produced ensuring representation from culturally diverse service users and those groups impacted by health inequalities [9]. Some papers suggests that the models of maternity care that this group of women receive may influence birth outcomes, discussing the importance of relational care experiences as part of supporting empowerment and improving outcomes [2,21]. They describe opportunities to build trusting relationships through individualised care, psychological support, continuity and flexibility as integral to this.

Only one paper reported women's experiences of a model of care [14]. Satisfaction with maternity care in the ChroPreg trial was measured using the Pregnancy and Childbirth Questionnaire (PCQ). This measures satisfaction with maternity care during pregnancy and delivery respectively. Women who received care as part of the ChroPreg intervention in the RCT experienced increased satisfaction with maternity care in the intervention group compared to those receiving standard care mean total PCQ score 104.5 vs 98.2 (MD difference 6.3 points 95 % confidence interval 3.0–10.0, $p < 0.0001$). A higher level of satisfaction was also found concerning the two domains of the pregnancy subscale, women in the ChroPreg group scored 3.3 points higher in Personal treatment (48.8 points vs. 45.5, mean difference 3.3, 95 % CI 2.0–5.0, $p < 0.0001$) and 2.0 points higher in Information/education (25.8 points vs. 23.8 points, CI 1.0–3.0, $p = 0.003$). There was no difference in the delivery subscale. Women in ChroPreg group had a total median of 11 (IQR 9–13) planned consultations with midwives and obstetricians versus 9 (IQR 8–12) in standard care. There were no differences in unscheduled consultations or in the primary outcome of Length of Stay [14]. Care should be women centred, considering and making reasonable adjustments to meet cultural needs [9].

3.4. The role of the midwife

Midwifery or the role of a midwife was described in four of the five included papers [2,9,14,21]. The fifth paper does not discuss midwifery or the role of the midwife but does describe the role of a nurse practitioner in care co-ordination, multi-disciplinary team liaison and support of women and families with MLTC [22]. The paper suggests that undertaking a role coordinating and leading the multi-disciplinary care for women with MLTC enables Nurse Practitioners or Advanced Nurse Practitioners to use their full scope of practice. This may have relevance

for midwifery practice.

3.4.1. Midwives as a core part of the MDT

The need for all women to have access to ongoing midwifery care and a named midwife/midwifery team, and one-to-one midwifery care in labour was identified [9,21]. In the ChroPreg intervention for women with chronic medical conditions, which included those with MLTC, specialised midwives known to the woman provided individualised and coordinated care with other health professionals [14]. Midwives were recommended as a core part of the multidisciplinary team or service [9,21].

3.4.2. Supporting informed decision making

Midwives have a role, in addition to other health professionals, in effectively communicating the balance of concerns over risks and benefits of medication to pregnant women to enable them to make informed decisions, with a need for access to appropriate training to enable them to achieve this [2].

3.4.3. Perinatal Mental Health

To support women's perinatal mental health midwives should develop links with their local specialist perinatal mental health teams [21]. The role of lead perinatal mental health midwives in supporting assessment and specialist services, particularly during times of service disruption during the Covid-19 pandemic was also mentioned [2].

3.4.4. Reducing health inequalities

Consultant level midwives with public health expertise working as part of the Maternal Medicine Networks can increase the accessibility of quality care [9]. This includes helping to identify and address socio-cultural barriers.

3.4.5. Continuity of carer

Three of the five included papers refer to midwifery continuity of carer. One describes support for midwife-led models of care and continuity of carer as part of Maternal Medicine Network services in England, suggesting achieving this through continuity of carer teams with specific expertise of providing care for women with medical complexity [9]. One tested an intervention in a tertiary maternity hospital in Denmark, where specialised midwives who had received a three-day training course provided all ante and postnatal midwife appointments with additional support by email and telephone [14]. The specialised midwife provided relational continuity and supported information continuity by following up with other health professionals providing maternity care to help the woman receive integrated care and understand her care plan [14]. Another suggested continuity of midwifery care is likely to be beneficial and more appropriate for women with medical complexity during pregnancy, birth and postnatally whilst acknowledging evidence is needed to understand which models of care work best for which women.

3.4.6. Leadership, care co-ordination and integration

Midwives provide clinical and strategic leadership. This included co-ordination of midwifery models of care to support successful operation of the Maternal Medicine Networks and midwifery leadership to improve the quality of care in partnership with a lead obstetrician and physician [9]. Care co-ordination between all the professionals providing maternity care was undertaken by midwives in the ChroPreg intervention [14].

4. Discussion

To our knowledge this is the first review providing an overview of the literature on models of care specifically for pregnant women and birthing people with MLTC or the role of the midwife in such models. The review found limited literature or empirical evidence available with three pieces of literature meeting the specific inclusion criteria and a further two included due to being highly relevant. All the models described are in three high income countries: the UK, Australia and Denmark. The review identified models of care which cover part or all the maternity journey primarily antenatal and postnatal care, with models including preconception care and care during labour and birth described less frequently. A clear description of how care was provided, or the role of different practitioners, is needed to effectively implement changes to care provision in response to evidence. Use of the TIDieR checklist in future studies could support better reporting of interventions and increase the likelihood of successful replication in clinical practice [23].

The role of care coordination or integration were also frequently described. Although it is suggested that the model of care women receive may influence their birth outcomes and experiences of care [2,21] only one paper reports experiences of care, with a positive impact on satisfaction with maternity care during pregnancy identified [14]. Multi-disciplinary care is a key component in all the descriptions or recommendations for models of care. Midwives were seen to be an integral part of the MDT with a range of roles including supporting perinatal mental health, reducing health inequalities, providing leadership and facilitating integration, continuity and coordination of care.

There is a body of pre-existing literature on the benefits of midwifery continuity of care [10–13,24]. This review shows there is a lack of evidence on how midwifery continuity of care models may impact experiences of care and outcomes for women and birthing people with MLTC. Other recent scoping reviews have looked at midwifery continuity of care models globally and collaborative midwife continuity of care models to improve pregnancy outcomes for women with medical or obstetric complexity [25,26]. These reviews also identified only one study on the use of such models for women with chronic medical conditions (although this was not focussed specifically on MLTC), which is included in this review [14]. Clear reporting on the type of midwifery continuity model provided, including the scope of midwifery practice and level of continuity achieved, when studies and reports are published would enhance future evidence synthesis [25]. One approach to achieve this is through the use of a classification system such as the Maternity Care Classification System, to enable outcomes to be reported by model of care [25,27]. Such an approach would enable the impact of continuity models of midwifery care for underserved groups, such as those with MLTC to be evaluated more effectively.

The presence of mental health conditions among those with pre-existing multimorbidity is high, with anxiety and depression being among the four most prevalent health conditions in those with MLTC [5]. Over 70 % of women in the study with multimorbidity had mental health conditions [5]. Our review has drawn attention to the need to specifically consider those with both a mental and physical health condition and focus on delivering high quality holistic care throughout the maternity journey. The importance of ensuring these women know who will be caring for them during labour and birth, and the role of each healthcare professional in addition to evaluating the impact of continuity models which include intrapartum care was highlighted [14,21].

The findings suggest the importance of coordinated postnatal care, with input from the MDT which holistically considers the physical, mental health and social needs of the woman not confined by a set time frame [21]. Other studies which have looked at postnatal health and experiences of women with hypertensive disorders of pregnancy (HDP), including chronic hypertension, found high levels of physical and psychological morbidity and unmet need among women with HDP and a need to unite physical and mental health care [28]. The need for individualised postnatal care which can extend beyond the first 6 weeks if needed has been recommended [29]. One study, a cluster Randomised

Control Trial, found a model of midwife led postnatal care which offered individualised care for three months following birth resulted in improvements in mental health, although not physical health, compared to women in the control group [30]. The leading direct cause of maternal death between 6 weeks and one year following birth in the most recent UK confidential enquiry is suicide and the report identifies that maternity care needs an increased focus on care during the postnatal period and not solely on pregnancy and childbirth [1]. The need to integrate regional maternal medicine specialist services and mental health services to improve management of complex pregnancies has been highlighted as an essential action by the recent Ockenden report which reviewed maternity services in England following poor outcomes [31].

All the papers included in this review included a description of, or recommendation for multi-disciplinary care. Results from this review also identify a need to reduce fragmentation of care, optimise and co-ordinate care provided by multiple teams and highlight the limited evidence on how best to provide and operationalise MDT care [2,21]. This reflects other studies, which report a lack of evidence to both understand the optimum components and inform the processes of MDT care for those with complex pregnancies due to single chronic conditions, such as cardiac disease and diabetes [32–34]. The need for evidence on how best to provide care for those with MLTC is particularly relevant considering findings of recent reviews of maternity services due to poor outcomes. Such reviews have highlighted the need for improved MDT working, particularly when women are experiencing a complex pregnancy [31,35,36].

4.1. Strengths and limitations

This review provides an overview of models of care for pregnant women and birthing people with MLTC, women's experiences of these models and the role of the midwife. The review was guided by a pre-developed published protocol and the search strategy was developed with guidance from expert librarians. The broad inclusion criteria supported identifying the maximum amount of literature on a topic with a limited evidence base. Due to the extremely limited literature available, a decision was made to include two papers which although including women with MLTC did not meet the precise participant criteria. Both these papers looked at women with both MLTC and single conditions and it was not possible to disaggregate the results or recommendations to solely those with MLTC. We then reviewed other papers that had been excluded on the initial criteria to ensure we had not missed other papers that would have been included.

4.2. Clinical relevance for maternity care

This scoping review found a varied and essential role for midwives in care of women with MLTC. The findings reflect the philosophy and model of midwifery care described by the ICM which is holistic, protects rights and supports health and social status of women [37]. The role of midwives in providing leadership and coordination of care was found [9,14]. A systematic review which analysed the association between maternity care co-ordination and pregnancy outcomes in the United States found most included studies used co-ordination activities involving a team approach to decision making and/or individual case management with approximately a third of the studies in the review reporting an increase in infant birth weight among those receiving care co-ordination [38]. The review acknowledged the impact on women and care providers satisfaction, factors which may impact on both the quality and use of maternity care, is unknown and recommended future research to explore whether care co-ordination increases access to needed services during pregnancy and the postnatal period [38]. The need to actively consider MLTC when providing healthcare is recommended by the National Institute for Health and Care Excellence in England to optimise care for adults with MLTC which includes improving coordination of care across services and reducing treatment burden [39]. Midwives are well placed to facilitate care coordination and the evaluation of midwife-coordinated maternity care using the ChroPreg intervention found increased satisfaction with maternity care [14].

5. Conclusion

There is a high prevalence of MLTC among pregnant women [5]. Those with MLTC disproportionately experience poorer outcomes [1,2,40]. This review highlighted a lack of empirical evidence on models of care for women and birthing people with MLTC. Although guidelines recommend effective MDT working, there is limited evidence on how this should be structured, led, and the role of the midwife within it. There is a vital need for research to understand how best to provide midwifery and multi-disciplinary care for this group of women.

Author Agreement

1. The submitted article is the authors original work and has not received prior publication and is not under consideration for publication elsewhere (except in the form of an abstract for the British Maternal and Fetal Medicine Society conference and Royal College of Midwives Education and Research conference).
2. All authors have seen and approved the manuscript being submitted
3. All the authors abide by the copyright terms and conditions of Elsevier and the Australian College of Midwives

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Declaration of Competing Interest

None

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Appendix A. Search Strategy

Conducted in EMBASE (OvidSP) on 22 August 2022

Search	Query	Results Retrieved
#1	exp pregnancy/ or exp prenatal care/ or exp postnatal care/ or exp childbirth/ or exp obstetric delivery/ or pregnan*.mp or antenatal care.mp or prenatal care.mp or childbirth.mp or postnatal care.mp or obstetric deliver*.mp	1248888
#2	exp midwife/ or exp obstetrics/ or exp nurse midwife/ or midwi*.mp or obstetric*.mp or nurse-midwi*.mp or (continuity adj2 care).mp or certified nurse-midwi*.mp or (multi-disciplinary adj2 team).mp or (multidisciplinary adj2 team).mp or (multi-disciplinary adj2 care).mp or (multidisciplinary adj2 care).mp	311331
#3	exp multiple chronic conditions/ or exp comorbidity/ or MLTC.mp or Multiple Long Term Condition*.mp or Multiple Long-Term Condition*.mp or comorbid*.mp or co-morbid*.mp	552225
#4	#1 AND #2 AND #3	2606

Appendix B. –Data Extraction Template (adapted from JBI template source of evidence details, characteristics and results extraction instrument) [18]

Scoping Review Details

Scoping Review Title:

Models of care for pregnant women and birthing people with Multiple Long-Term Conditions and the role of the midwife: a scoping review

Review Objectives

To identify and summarise research findings on models of care for pregnant, birthing, and postnatal women with Multiple Long-Term Conditions and the role of the midwife and identify research gaps to make recommendations for the future research

Review Questions

- Which models of care for women and birthing people with Multiple Long-Term Conditions during pregnancy, birth and postnatal are described in the literature?
- What are women and birthing people's experiences of the models of care?
- What is the role of the midwife in the different models of care for women and birthing people with Multiple Long-Term Conditions?

Inclusion/Exclusion Criteria

Inclusion **Exclusion**

Participants

Concept

Context

Included study details and characteristics

Citation details (e.g., author/s, date, title, journal, volume, issue, pages)

Country of origin

Methodology/methods

Aim/purpose

Study population details (details e.g., age/sex and number)

Details and results extracted from the study

Key findings

Most relevant findings:

Description of model of care

Experiences of the model of care

Role of the midwife

Emerging themes (not described *a priori* in the scoping review protocol but relevant to the review)

Limitations or challenges

Research gaps or recommendations described

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