Supporting women with diabetes experiencing menopause: A workshop to co-design research recommendations for improving the understanding of and support for women with diabetes experiencing menopause

Steven Parks[1], Nia Otake John[2], Anna Morris[1], Kamini Shah[1], Elizabeth Eves[1], Dawn Adams[3], Eleanor Barry[4], Vicki Causer[3], Rachel Churm[5], Sahir Ahmed- Evans[3], Alex Vienne Haggett[3], Reena Patel[6], Rita Forde[7,8] & Rebecca Reynolds[9]

[1]Diabetes UK, London, UK

[2]Wolfson Institute of Population Health, Queen Mary University of London, London, UK

[3]Expert by Lived Experience, Diabetes UK, London, UK

[4]Nuffield Department of Primary Care Health Sciences, Radcliffe Observatory Quarter, University of Oxford, Oxford, UK

[5]Applied Sports Technology, Exercise and Medicine (A- STEM) Research Centre, Faculty of Science and Engineering, Swansea University, Swansea, UK

[6]Spinney Medical Centre, Leicester, UK

[7]School of Nursing and Midwifery, University College Cork, Cork, Ireland.

[8]Care in Long Term Conditions Research Division, Florence Nightingale Faculty of Nursing, Midwifery and Palliative Care, King's College London, London, UK.

[9]Centre for Cardiovascular Science, Queen's Medical Research Institute, University of Edinburgh, Edinburgh, UK

Correspondence: Steven Parks, Diabetes UK, Wells Lawrence House, 126 Back Church Lane, London, UK. Email: steven.parks@diabetes.org.uk

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Novelty statement

- Diabetes management during menopause presents unique challenges, yet this intersection remains underexplored in research.

- This publication presents a report of a collaborative workshop, with individuals with experience of diabetes and menopause, alongside healthcare professionals and researchers to identify key priorities and unmet needs in this area. This publication highlights the lived experiences and insights of those navigating these dual health challenges, aiming to inform re searchers and policymakers.

Abstract

Aims: Based on direct feedback on the challenges faced by women with diabetes navigating menopause, the Diabetes Research Steering Groups (DRSGs), organised by Diabetes UK, conducted a workshop aimed at outlining key research priorities in this area. The statement will provide actionable recommendations for researchers and funders, ensuring future studies address the unique needs and lived experiences of women living with diabetes during this life phase. The DRSGs also highlighted the need to bring researchers and healthcare professionals in the field of diabetes together with those working in women's health to collaborate in this field. The goal is to bridge the gap in understanding and support, driving research that informs more effective care strategies and improves quality of life during this critical and often challenging life stage.
Methods: In November 2023, Diabetes UK convened a workshop on diabetes and menopause, bringing together 49 participants, including people with lived experience, researchers, healthcare professionals, and representatives from charities and funding bodies. The workshop began with presentations from experts and case studies, followed by small- group discussions facilitated by Diabetes UK staff. Participants were asked to identify key evidence gaps and refine research questions related to diabetes and menopause. Groups focused on thematic topics, discussing barriers and potential solutions. Insights from these discussions were collated and thematically analysed, resulting in key recommendations to address health inequalities in diabetes research.
Results: The following key areas were identified for increased future research focus:

• Improving the understanding of the mechanisms underlying the impact of menopause on blood glucose control in women with diabetes

• Understanding the safety and efficacy of treatments, technology, and exercise in the management of diabetes and menopause

• Understanding how to best support women from underserved communities in their management of diabetes and menopause

• Understanding the impact of menopause on the mental health of women with diabetes and tailoring psychosocial interventions that support women during this period.

• Supporting healthcare professional education in how to effectively support women with diabetes experiencing menopause.

• Exploring how innovative models of care can support women with diabetes experiencing menopause more effectively.

Conclusions: This position statement presents recommendations to address the unmet needs of women with diabetes experiencing menopause. The diabetes research

community is to act upon these recommendations to ensure the views and needs of this group are well- represented.

1. INTRODUCTION

There is growing recognition that knowledge of women's health and the provision of evidence- based treatment remain inconsistent, particularly concerning menopause (1,2). This extends to the management and care of women living with diabetes, where specific research on the intersection between menopause and diabetes is notably lacking, potentially reflecting the broader issue of insufficient attention to women's health research. Although awareness and discussion about menopause are increasing in media and public discourse, the representation and prioritisation of women's health issues in medical research are only now beginning to follow suit, with specific research funding calls opened recently to ad dress the inequalities experienced by women (3). This lack of research funding likely represents the historical and continuing 'male as default' approach to research and health care, mentioned throughout the 2022 Women's Health Strategy (1).

There is a distinct lack of research investigating how menopause interacts with chronic conditions; in particular, the impact on diabetes management. While limited, there is evidence suggesting that menopause can profoundly affect diabetes management, likely due to changes in hormone levels influencing insulin resistance among other proposed mechanisms. A recent public and patient involvement (PPI) activity concurs, with 73% (n = 137) of women with type 1 diabetes surveyed reporting that menopause had impacted their diabetes (4). However, the absence of comprehensive research means that these insights have not been translated into evidence- based treatments and support strategies for women navigating both diabetes and menopause. Moreover, only 28% of women with type 1 diabetes surveyed reported that the relationship between diabetes and menopause had been discussed with them by a healthcare professional. This lack of guidance leaves women with diabetes in a vulnerable position, often unable to access treatments such as hormonal replacement therapy (HRT) due to ambiguity about safety in this group, whilst also having to manage fluctuations in glycaemia. This can increase the mental burden faced by these women, with subsequent effects on diabetes management. Given that the incidence of diabetes is continuing to increase, this lack of information also threatens to place increased strain on a health system that is already struggling to provide adequate support to women during menopause. Recently, efforts have been made to highlight the need to address gaps in women's health (1); however, for women with diabetes experiencing menopause, this paucity of care is amplified.

The Diabetes Research Steering Groups (DRSGs) were established by Diabetes UK in 2017 to identify gaps in the diabetes research landscape and bring people with lived experience of diabetes together with researchers and health care professionals to

address these gaps by stimulating work in these areas. One of the first topics raised by those with lived experience was the need for research to better understand the link between diabetes and hormones, particularly during menopause. This concurred with recent feedback the DRSGs received on social media in response to a call for research priorities, highlighting the lack of research related to women's health and the impact of this on health care provision. We therefore brought together researchers, healthcare professionals, and women with lived experience of diabetes at the Diabetes and Menopause workshop in 2023 to pinpoint research gaps and highlight them to the research community to stimulate more work in these areas.

Addressing these deficits is critical to ensuring that women with diabetes receive the necessary support and management strategies during menopause, a pivotal and often poorly understood period of their lives. More research is needed to understand the mechanisms at play and to develop effective interventions that can improve health outcomes for these women. In addition to expanding the core knowledge about the relationship between diabetes and menopause, it is crucial that any interventions developed through these insights can be effectively upscaled and implemented across the National Healthcare Service. Such strategies include improving healthcare professional education about the difficulties of managing diabetes and menopause and establishing models of care that can deal with the complex overlap between diabetes care and women's health care, especially for those experiencing inequalities in access.

This paper will highlight some of the priority areas identified during the Diabetes and Menopause workshop and provide recommendations to relevant stakeholders about how to address these needs.

2. METHODS

In November 2023, Diabetes UK brought together clinicians, academics, and people with lived expertise for a 1- day workshop to identify key gaps in the evidence and best practice around diabetes and menopause. In total, there were 49 participants, including 7 people living with or affected by diabetes, 8 researchers, 18 healthcare professionals (including general practitioners, obstetricians and gynaecologists, diabetologists, endocrinologists and diabetes specialist nurses), 6 representatives from charity and advocacy organisations, 1 funder, and 9 members of Diabetes UK staff who facilitated the workshop. Participants are listed in Appendix A.

When determining the scope and format of the workshop, an expert advisory group made up of 10 researchers, healthcare professionals, and people living with diabetes was convened to guide the design of the workshop. The advisory group also gained broader insights into the lived experience of women with diabetes by targeting social media posts on Twitter, Facebook, Instagram, and LinkedIn around World Menopause Day. These posts asked women with diabetes to share the questions that

they would most like research to answer around menopause. These insights were collated to inform the workshop agenda.

The workshop commenced with presentations from experts in the field (listed in Appendix B), including case studies from researchers and personal perspectives from people living with or affected by diabetes and menopause. Following these presentations, participants were divided into small groups, with representatives from each group at every table, and asked to discuss the following questions: (a) What do we already know: where is there good evidence to inform care? (b) Where are the gaps in knowledge, and where is further evidence needed?

Responses to these questions were collated and themed by the Diabetes UK facilitators. Participants were then invited to self- select a theme they would like to discuss in more detail. Each group was then asked to refine the research questions relevant to their topic, answering the following questions: (a) What is/are the research question(s)? (b) What approaches should be taken? (c) What are the barriers and are there any dependencies? (d) How could these barriers be overcome?

This report summarises the outputs from those discussions and outlines key recommendations to address health inequalities in diabetes through research.

Please note the following definitions used for the terms menopause and perimenopause in this paper:

• Perimenopause is the transition phase before menopause, marked by fluctuating oestrogen and progesterone levels. It can cause irregular cycles and impact blood glucose control in women with diabetes

• Menopause is defined as 12 consecutive months without menstruation, leading to a permanent decline in oestrogen. This hormonal shift affects insulin sensitivity and increases the risk of diabetes-related complications.

3. RESEARCH PRIORITIES AND RECOMMENDATIONS

3.1 Mechanisms underlying the impact of menopause on blood glucose control and complications in women with diabetes

3.1.1 Context

The depletion of oestrogen throughout menopause has been shown to affect the metabolic profile of women. Several studies have indicated that early menopause can increase the likelihood of women developing type 2 diabetes (5–8).

Several hypotheses have been proposed to explain this association. Menopause-related changes in sex hormone balance can alter body composition, leading to increased visceral fat accumulation (9) and associated changes in insulin resistance. Independent of weight gain, menopause may impact insulin sensitivity through

decreased oestrogen receptor binding in the liver, which normally enhances glucose regulation by suppressing hepatic glucose production (10). Menopause is also associated with reduced energy expenditure (11) and changes in food- seeking be haviour and satiety, which may further impact metabolic health (12).

Whilst these mechanisms have been investigated in the context of increased risk of type 2 diabetes in post-menopausal women, there remains a lack of understanding of the role that these mechanisms may play in affecting blood glucose control in women with pre-existing type 1 and type 2 diabetes during perimenopause and menopause.

In addition to understanding the mechanisms responsible for changes in blood glucose management among menopausal women with diabetes, it is crucial to investigate the mechanisms driving post- menopausal complications, such as cardiovascular disease, and their interaction with factors such as ethnicity. Both type 1 diabetes and type 2 diabetes are associated with an increase in the risk of cardiovascular disease during menopause (13,14). Deeper insights into these mechanisms will support the development of targeted interventions and therapies.

To improve the management of menopause for women with diabetes and mitigate the risk of future complications, the following gaps should be addressed:

• Explore the biological mechanisms through which menopause influences glucose regulation in women with type 1 and type 2 diabetes.

• Use longitudinal studies to assess changes in insulin sensitivity and glucose metabolism during and after menopause, identifying patterns in glycaemic control and associated health outcomes over time.

• Explore the impact of menopause on blood glucose management in women with pre-existing type 1 and type 2 diabetes, with a focus on identifying differences across subgroups i.e., ethnicity, diabetes management approach (e.g., insulin therapy vs. oral medications vs. lifestyle management), and socioeconomic factors.

• Use CGM to track daily glucose trends during perimenopause and compare them with hormonal profiles (e.g., oestrogen, progesterone, LH via weekly saliva/blood tests or daily LH strips) to assess temporal changes in insulin sensitivity and inform treatment strategies.

• Investigate the mechanisms underlying the development of micro/macrovascular complications in women with diabetes post- menopause, considering factors such as ethnicity and other comorbidities to understand individual risk during and after menopause.

3.2 Treatments, technology and exercise

3.2.1 Treatments

Menopause is associated with decreasing levels of oestrogen and relative increases in androgen levels (15). Hormone replacement therapy (HRT) is the recommended treatment to manage menopausal symptoms, including vasomotor symptoms, and lowers the risk of osteoporosis- related fractures and urogenital atrophy (15).

Evidence has shown that HRT reduces the incidence of type 2 diabetes after menopause, improves HbA1c levels and increases insulin sensitivity (16). However, since reports of HRT being associated with an increased risk of cardiovascular disease (CVD) events (17), there has been a concern and reluctance to prescribe HRT to women with pre-existing diabetes, due to the significant links between diabetes and CVD (18). Evidence suggests that HRT in women with diabetes should not be avoided altogether, but that individualised and tailored approaches to prescribing HRT are extremely important (18). This includes assessing individuals' cardiovascular disease risk, duration of diabetes, and any target organ damage as a first step (15). This is reflected in current NICE guidelines for type 2 diabetes, but there is a lack of guidance for type 1 diabetes (19). To safeguard against discrimination of menopausal women living with pre-existing diabetes, the following gaps should be addressed to ensure safe and effective HRT prescription practices in this group.

3.2.2 Research recommendations

• Explore how cardiovascular risk is currently assessed in relation to prescribing HRT to women with diabetes, and how automated pre- assessment of cardiovascular risk using health data records could aid safe HRT pre scription and personalised treatment strategies.

• Explore alternative treatments to HRT for women with diabetes to ease menopausal symptoms where HRT is not a safe, available, or preferred option. • Explore whether HRT can effectively aid in the management of diabetes and menopausal symptoms.

• Assess whether HRT impacts the risk of micro or macrovascular complications in women with diabetes after menopause.

• Assess whether HRT affects glycaemia and required insulin dosages in women with diabetes who are experiencing menopause.

3.2.3 Technology

Technology such as continuous glucose monitors (CGM) and automated insulin delivery (AID) enables people living with diabetes to increase time in range and reduce the risk of hypoglycaemia and other complications of diabetes (20). AID algorithms allow for adjusted and predictive insulin delivery in response to real- time CGM readings (20).

In women without diabetes, insulin resistance is seen to increase during menopause, potentially due to a de crease in oestrogen levels (8). A small- scale qualitative study of women using open-source AID indicates that women with diabetes find it difficult to predict and manage their blood glucose levels during the menstrual cycle more generally, including during menopause (9), but there has been little physiological research to evidence this change in women living with diabetes (21). The study reported that women using AID felt safer while using AID, but that it was still necessary to manually adjust insulin dosages depending on the stages of their cycles (22). The study also suggested that these manual adjustments or 'workaround strategies' could provide valuable insights into how to link and automate AID algorithms to respond effectively to the insulin requirement changes caused by changing hormone levels (22). To ensure safe and effective use and implementation of diabetes technology for menopausal women with diabetes, the following research areas should be addressed:

3.2.4 Research recommendations

• Conduct observational studies of women with diabetes using CGM and AID to understand glycaemic variability during different stages of menopause.

• Qualitative studies to understand how women with diabetes use manual adjustments to their diabetes technology to adapt to changing insulin requirements during menopause.

• Explore how AID algorithms can be adapted to effectively manage blood glucose levels in women with diabetes who are experiencing variable insulin requirements during different stages of menopause.

• Research to understand how diabetes technology, particularly continuous glucose monitors and connected insulin pens, might support women with type 1 and type 2 diabetes experiencing menopause.

3.2.5 Exercise

Exercise has been established as an important factor for people living with diabetes. Exercise helps to reduce body fat percentage and increasing muscle mass, both of which have been shown to positively impact insulin sensitivity, aiding the management of both type 1 and type 2 diabetes (23–25). This is especially important during menopause, as different forms of exercise such as aerobic, strength or plyometric training have been shown to positively impact different health outcomes (26). For ex ample, leisurely physical activities like walking and jog ging have been shown to positively affect bone- mineral density in this group, which is often negatively impacted by menopause (27). Physical activity is also associated with helping manage some menopausal symptoms such as vasomotor symptoms, menopause- associated

changes in body composition and bodily pain (28). However, these lifestyle recommendations have generally not been tailored to the needs of women with diabetes, especially those living with type 1 diabetes. The European Menopause and Andropause Society (EMAS) guidelines cite exercise as the 'cornerstone' of management and recommends that women with type 2 diabetes should engage in at least 150 minutes of aerobic exercise per week, alongside anaerobic exercise (18).

Hypoglycaemic and hyperglycaemic episodes can pose significant barriers to exercise, particularly among those living with type 1 diabetes (29). In particular, the fear of hypoglycaemia remains one of the primary barriers to physical activity in people with diabetes (30). This can become more difficult during menopause, with some studies indicating an increased risk of hypoglycaemia during menopause (31).

Generally, physical activity is associated with positive outcomes in those living with type 1 and type 2 diabetes, including lower HbA1c levels, increased insulin sensitivity, and lower risk of diabetic ketoacidosis and other complications (29). Whilst recommendations for exercise for individuals with diabetes exist (23,32), to date, these have not been tailored to women throughout menopause and have involved very few older participants. Among women without diabetes, it has been shown that energy expenditure decreases two years before menopause (11), and that a third of women take part in less physical activity during menopause (33). Qualitative research suggests that among these women, a lack of knowledge and low exercise self- efficacy are barriers to partaking in exercise, and that more detailed guidance would empower this group to be more active (33). The lack of evidence- based advice for women with diabetes may pose a barrier to managing menopausal symptoms in tandem with glycaemic management. To ensure safe and effective physical activity guidelines for women with diabetes experiencing menopause, the following gaps should be addressed:

3.2.6 Research recommendations

• Qualitative studies to understand the barriers and facilitators of regular physical activity experienced by women with diabetes who are experiencing menopause.

• Co- design and evaluate accessible, tailored physical activity interventions with women with diabetes who are experiencing menopause.

• Assess the impact of different forms of physical activity (i.e., aerobic, strength and plyometric) on glycaemic variability, insulin resistance, and diabetes progression in women with diabetes who are experiencing menopause.

• Explore whether physical activity interventions help to manage menopause symptoms in women with diabetes.

• Assess whether diabetes technology can empower or enable women to increase participation in physical activity.

3.3 Menopause, diabetes and underserved communities

3.3.1 Context

The prevalence of type 2 diabetes is notably higher in people from ethnic minorities and low socio- economic backgrounds. Compared to white European populations, type 2 diabetes is 2 to 4 times more common in people of South Asian ethnicity (34) and 1.5 to 3 times more common in people of Black ethnicity (34). Type 2 diabetes is 40% more common in people within the most deprived quintile compared to the least deprived (35). This means that women from these backgrounds are more likely to experience the difficulties of managing diabetes and menopause. Despite this, there is a lack of focus on this intersection, which can exacerbate inequalities in the menopause care experience. Beyond differences in prevalence, inequalities exist in the treatment and management of both type 1 and type 2 diabetes. People from minority ethnic groups and lower socioeconomic backgrounds with type 1 diabetes are less likely to be offered diabetes technology, such as continuous glucose monitors (CGMs) and insulin pumps (36,37), which are important for optimal glucose management in type 1 diabetes. Similarly, research has highlighted disparities in ac cess to newer medications (38) for people with type 2 diabetes. Despite the higher burden of type 2 diabetes in underserved communities and inequalities observed in the management of both type 1 and type 2 diabetes, these in equalities also extend to the management of menopause. Women of colour are disproportionately more likely to experience delays in menopause diagnosis compared to their white counterparts, which might indicate systemic disparities in healthcare access and responsiveness. This delay can lead to prolonged suffering, untreated symptoms, and reduced quality of life (39). Differences in how menopause symptoms are communicated, both by patients and perceived by healthcare providers, can create additional barriers for women from minority ethnic backgrounds. Cultural differences, language barriers, and implicit biases may contribute to these challenges, making it more difficult for these women to seek or receive appropriate menopause care (40). Women from minority ethnic groups and those of lower socioeconomic status are significantly less likely to be prescribed hormone replacement therapy (HRT)(41), the causes of this disparity require further investigation to understand the underlying factors. The government has recognised the need to focus on understanding the ‘unique challenges based on the complex interaction of factors including sex, race, socio economic status and medical conditions’ when considering menopause policy, specifically in the workplace (42).

In recent years, the challenges associated with peri menopause and menopause have gained more visibility in the media and among the public (2). This has been effective in prompting government initiatives to improve access to information and

treatments for those experiencing symptoms of perimenopause and menopause (2). However, there is evidence that women's experiences of menopause care can be highly varied (43). Among respondents to an online survey, perceived quality of care was highly variable, with 37% stating they received very good or good care, 28% receiving acceptable care, and 35% receiving poor or very poor care (2). While this survey does not indicate whether these poor experiences of menopause care are more likely to affect specific groups, another survey of women in the UK showed that women of colour were 15% more likely to report delayed diagnosis of menopause compared to white women (39).

Awareness of the unique issues and barriers that are faced by women from underserved communities, such as minority ethnic women and women from lower socio- economic backgrounds, is less well understood (44,45). There is evidence that women from minority ethnic back grounds are less likely to access support and care and that when they do, they do not receive the same quality of menopause care as their white- British counterparts (46). There is also evidence that women from some ethnic minority backgrounds experience earlier menopause, although this is not currently well understood (47). Where diabetes is also a factor, it widens the knowledge gap.

While there is some active research taking place to explore the issues and barriers that minority ethnic women face during perimenopause and menopause to inform an evidence- based approach to menopause care (40,48), there are currently no respective studies in minority ethnic groups with diabetes. To ensure that all women with diabetes, irrespective of ethnicity, socioeconomic status, or cultural background, receive the right information, care, and support, the following should be addressed.

3.3.2 Research recommendations

• Explore the experience of diabetes and perimenopause/ menopause in women from underserved communities to identify barriers to accessing healthcare and co-create interventions to address this.

• Co- creation of culturally appropriate healthcare resources for women experiencing diabetes and perimenopause/menopause.

• Assess whether the risk of type 2 diabetes after menopause is increased in non- white ethnic backgrounds and women from areas of higher socioeconomic deprivation.

• Explore how physiological factors, which are more prevalent in ethnic minority groups and independently affect diabetes and menopause management, may be targeted in treatment approaches i.e., studies which explore how managing vitamin D levels in South Asian and Black women impacts outcomes.

3.4 Diabetes, menopause and mental health

3.4.1Context

It is known that people with diabetes experience disproportionately high rates of mental health problems, such as depression and anxiety (49,50). Additionally, people experiencing mental health problems are more likely to develop diabetes, suggesting a bi-directional relationship. The increased mental health burden in people with diabetes can lead to greater difficulty in blood glucose management. This can exacerbate feelings of lacking control, leading to diabetes distress and worsening existing mental health challenges (51,52). Despite this established relationship, ac cess to treatment and support to reduce psychological distress and improve self- management in people with diabetes is not always widely available (53).

Qualitative research shows that the mental health burden of living with diabetes varies across different life stages, with increased challenges during key transitions such as moving to adult care services (54), and pregnancy (55,56). Along with these other life events, perimenopause and menopause have been shown to increase the likelihood of depression and anxiety in the general population, especially in those with previous experiences of poor mental health (57,58). Where menopause coincides with other significant life stressors, this can compound the impact on mental wellbeing (59).

Despite this, there is a lack of understanding about how the combination of living with diabetes while experiencing menopause may affect mental health. In addition, given the bi- directional effect of anxiety and depression with diabetes (49), it is unclear whether the mental health impact of menopause in women without diabetes might be a causative factor in the development of type 2 diabetes after menopause.

Further research is needed to understand the impact of menopause on the mental health of women with diabetes and the subsequent effects on diabetes management. In order to enable the development of treatments and tailored support to improve both quality of life and diabetes management during menopause, the following research gaps should be addressed:

3.4.2 Research recommendations

- Assess the allostatic load in people with diabetes who are experiencing menopause and explore the consequences of allostatic load/overload on both physical and mental health.

- Investigate which treatments are most effective in man aging the interactions between mental and physical stress, including whether selective serotonin reuptake inhibitor (SSRI) treatments help with mental load in people with diabetes experiencing menopause.

- Collect and utilise longitudinal population data to understand the interaction between mental health, diabetes, and menopause.

• Explore the psychosocial impact of managing diabetes alongside transitioning through menopause.

• Explore how menopause influences the mental health and psychosocial well-being of women with diabetes, and the subsequent effects on their personal relationships and diabetes management.

• Explore gaps in support for mental health for people with diabetes who are experiencing menopause and explore the role of peer support and social prescribing.

3.5 Healthcare professional education

3.5.1 Context

Evidence indicates that healthcare professionals' comfort in treating menopausal women is low, and women themselves report low satisfaction with the quality of menopause care they receive (39,60). In a survey of GPs across the UK, only 61% felt 'comfort able' delivering care for women experiencing menopause (43). This could be attributed to the absence of menopause from the training curricula throughout higher education for most healthcare professionals. In a survey of UK universities, only 59% reported having a 'mandatory menopause education programme' for medical students' perception of the quality of menopause care also reflects this, with close to a third of women reporting a delay in diagnosis (39) and reporting that they experienced poor or very poor care (43) There is a notable lack of qualitative research that provides insight into GPs experiences of managing menopause in women with diabetes. Given the current paucity of scientific understanding, education, and guidelines specific to this population, it is reasonable to infer that GPs may have less experience and feel less confident in managing menopause in women with diabetes compared to those without. The NICE guidelines for menopause treatment offer limited mention of Type 2 diabetes and do not provide any guidance for Type 1 diabetes. Similarly, NICE guidelines for managing Type 1 and Type 2 diabetes do not address menopause, leaving a significant void in comprehensive care recommendations for this group. In order to support the education of healthcare professionals and the development and implementation of evidence- based guidelines when managing menopause in women who have diabetes, the following areas should be addressed:

3.5.2 Research recommendations

• Implementation research to determine how knowledge about diabetes and menopause can be effectively integrated into curricula for all trainee healthcare professionals and for existing healthcare professionals through training modules.

• Develop examples of best practice for consultations between women with diabetes experiencing menopause and healthcare professionals.

• Explore and raise awareness of the relationship between the risk of developing type 2 diabetes during and after menopause.

3.6 Improving models of care

3.6.1 Context

In the United Kingdom, diabetes care typically involves a multidisciplinary team comprising various healthcare professionals (HCPs) such as general practitioners (GPs), practice nurses, diabetes specialist nurses, endocrinologists, dietitians, and others (61–63). Current diabetes models of care, such as the Portsmouth Super Six Model, emphasise the need for interdisciplinary collaboration between cardiovascular, renal, and diabetes teams to address the complexities of diabetes management (64). Whilst models of care that explore the integration of these services exist, menopause and diabetes are not currently part of these plans for integration, often lacking specific consideration. When it comes to menopause- related care, women often seek support from alternative HCPs, such as gynaecologists or menopause specialists (65). However, as menopause can have pronounced effects on the management of diabetes, including insulin requirements, mental health support and weight gain, these two disciplines must work together to ensure holistic care for women with diabetes during menopause. There is a clear demand for better integration of care for women, with the Women's Health Strategy for England highlighting the need to improve ser vices promoting 'healthy ageing' for women with long- term conditions, with diabetes being specifically mentioned (1). Primary and secondary diabetes care also provides a space to offer continuity of care for women with diabetes throughout their menopause journey, alongside integration with more specialised services. To effectively explore the best models of care for women with diabetes as they transition through menopause, it is essential to under stand existing practices to see how these might be im proved. Additionally, it is key to explore novel solutions to integrate women's health support. One such example might be in the form of women's health hubs and comparable 'one-stop clinics', which are being established across the UK.66–69 These setups offer comprehensive women's health services at the primary and community care levels, prioritising women's needs by fol lowing a life- course approach. Recognising these one- stop clinics are not condition- specific, they might provide a central space for information on best practices for women with diabetes amongst other multiple long-term conditions. While there may not be established best practices specifically tailored to women with diabetes experiencing menopause, lessons could be learned from diabetes and pregnancy programs, which offer multidisciplinary and holistic support for women with diabetes, from preconception counselling through to postpartum care.70 In order to improve models of care for women with diabetes experiencing menopause, the following gaps should be addressed:

3.6.2 Research recommendations

• Explore the current model of care for managing diabetes and menopause, including where and how these conversations are initiated, such as primary or secondary care, and whether there is collaboration between these healthcare systems.

• Assess the optimal pathway for managing menopause and diabetes and how this can effectively be implemented.

• Explore the barriers to the integration of menopause- related care into diabetes models, and how they can be overcome.

• Explore how to improve interdisciplinary collaboration between diabetes and menopause specialists to ensure comprehensive care for women with diabetes during menopause.

• Evaluate the efficacy of one- stop clinics and women's health hubs in accommodating the needs of women with diabetes transitioning through menopause and understanding how improvements could be made to these services to meet these needs.

• Explore the integration of women's health into other conditions and how these can inform tailored care for women with diabetes before and during menopause.

In conclusion, this workshop highlighted the essential need to address the intersection of diabetes and menopause to improve the quality of care and outcomes for women experiencing both conditions. The workshop identified significant knowledge gaps in this area, leading to a lack of tailored treatment options for women with diabetes. The priorities identified highlight the need to improve this understanding across healthcare, from generating a better understanding of the mechanisms through which menopause affects blood glucose, improving understanding of the safe and effective use of hormone replacement therapy for women with diabetes, and the role of emerging technologies in managing diabetes during menopause. Additionally, there was a strong focus on the necessity of including diverse and underserved populations in research to ensure equitable healthcare provision. The workshop also highlighted the importance of educating healthcare professionals on the unique challenges faced by women with diabetes experiencing perimenopause and menopause. Holistic models of care that integrate diabetes and women's health services are vital for providing comprehensive support. By prioritising these areas, we can create a pathway for more effective interventions and improve both the physical and mental well- being of women navigating these complex health challenges. Ultimately, collaborative efforts between researchers, healthcare providers, and women with lived experience will be key to driving forward meaningful progress.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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APPENDIX A

Workshop participants

The authors are grateful to the following for participating in the workshop Alex Vienne Haggett (Menopause Mithers), Amanda Epps (Diabetes Specialist Nurse), Amobi Onumaeme (General Practitioner), Angus Forbes (King's College London), Anna Morris (Assistant Director of Research Strategy and Partnerships), Annice Mukherjee (Endocrinologist), Bethany Kelly (Specialist Nurse), Camille Cronin (University of Essex), Caroline Schmutz (JDRF), Charlotte Gooding (Menopause Care), Charlotte Moffett (Ulster University), Danielle Roberts (Expert by experience), Dawn Adams (Expert by experience), Edward Morris (Medical Director, NHS East of England), Elizabeth Eves (Diabetes UK), Ellie Barry (Academic General Practitioner), Emma Shaw (Expert by experience), Helen O'Kelly (Diabetes UK), Isioma Okolo (Academic Obstetrician and Gynaecologist), Itunu Johnson Sogbetun (General Practitioner), Jamie Ross (Academic General Practitioner), Jenny Haskey (The Menopause Charity), Jeremy Barratt (Wellbeing of Women), Jessica Brown (Diabetes UK), Joanne Bushby (Expert by experience), Joseph Iskaros (Royal College of Obstetrics and Gynaecology), Julia Prague (Clinical academic and NHS consultant University of Exeter), Justine Cox (Expert by experience), Kamini Shah (Diabetes UK), Karen Birch (University of Leeds), Kate Vickers (Diabetes UK), Kristina Carman (Functional Medicine Practitioner), Lindsey Thomas (Primary Care Women's Health Forum), Lisa King (Diabetes Specialist Nurse), Neelam Heera Shergill (Cysters), Olivia Hum (General Practitioner), Priya Viswanathan (NIHR), Rachel Churm (Swansea University), Rebecca Reynolds (University of Edinburgh), Reena Patel (Diabetes Clinical Nurse Specialist), Rita Forde (King's College London), Samantha Dottin (Diabetes UK), Sarah Gatward (Expert by experience), Steven Parks (Diabetes

UK), Tamsin Fletcher (Diabetes Specialist Nurse), Tina McCrossan (Diabetes UK), Trudi Evans (Expert by experience), Vicki Causer (Real Strong Women), Vivien Coates (Ulster University).

APPENDIX B

Workshop presentations

Diabetes & Menopause: Life is a rollercoaster. Speaker: Dawn Adams and Alex Haggett

Current evidence: What do we already know and where are the gaps? Perspectives from a GP. Speaker: Dr Rita Forde Dr Eleanor Barry

What have we learnt from patient and public involvement in this area: survey results. Speaker: Prof Vivien Coates