Project Details	
Project Code	MRCPHS25Ex Pulsford
Title	Development of guidelines and resources to encourage and support exercise in pregnant women with pre-existing Type 2 Diabetes
Research Theme	Population Health Sciences
Summary	A physically active pregnancy including regular exercise reduces pregnancy complications in women with pre-existing type 2 diabetes (T2D) and supports the health of mother and baby, but most women do not do enough exercise to get this benefit. This project will measure exercise levels and barriers to exercise in pregnant women with T2D and determine what insulin dose adjustments and carbohydrate intake is needed to exercise safely. This work can inform the first national guidelines to support pregnant women with T2D to increase their exercise levels and improve outcomes for mothers and babies.
Description	A physically active pregnancy including regular exercise improves cardiovascular function, decreases the risk of gestational hypertension, limits weight gain, and improves mood. Diabetes affects around 10% of all pregnancies in the UK (~ 65 thousand per year): type 2 diabetes (T2D) accounts for around 56% of these. T2D increases the risk of preterm delivery, preeclampsia, macrosomia, intrauterine death and congenital malformations. Regular exercise is therefore likely to have an even greater effect on improving the health of pregnant women with T2D. Based on these benefits it is recommended all pregnant women aim for at least 150 minutes of moderate intensity activity and two muscle strengthening sessions each week. However, physical activity both amongst pregnant women, and amongst those with pre-existing T2D is disproportionately low. There is currently no evidence-based guidance to support physical activity (PA) for pregnant women with pre-existing T2D, as key questions remain unanswered. No studies have looked at habitual activity levels, or barriers to physical activity in pregnant women with T2D and crucially, how they change over time during pregnancy. In addition, it is not known how exercise affects glucose control in pregnant women with pre-existing T2D, and whether advice on insulin dosage adjustment and carbohydrate intake for exercise that is used for non- pregnant women with T2D is effective in pregnant women with T2D who are treated with insulin, (estimated 40-80% of cases). As such, healthcare professionals have told us that they are unsure how to support pregnant women with T2D, when this support might be most useful and appreciated. This interdisciplinary project will establish this foundational evidence, and then work in collaboration with project partners to develop national guidance to enable healthcare workers to encourage and support pregnant women with T2D to increase their activity levels. Our partners for this project are: 1) The Association of British Clinical Diabetologists (ABCD) who lead on ensuring the highest quality of care for diabetes patient within the UK through provision of resources and training for health care professionals, and 2) 'Moving Medicine', a collaborative that develops physical activity materials and consultation guides that are now used by healthcare professionals in Europe, Australia and the United States to support patient groups increase their physical activity and improve their health and clinical outcomes.

	This project will have 5 distinct parts. 1. Literature review: What does the existing evidence tell us about physical activity and exercise in pregnant women with pre-existing T2D? Studies regarding diabetes management, exercise physiology, barriers to exercise and other relevant data will be identified by database searches, searching on grey literature (e.g. conference proceedings) and contact with known worldwide experts in the field. 2. Experimental study: What happens to glucose levels when pregnant women with T2D exercise on and off metformin, and are current guidelines for changing insulin dosages and carbohydrate replacement for exercise effective in pregnant women with T2D? Twelve pregnant women with T2D will attend the clinical exercise physiology research laboratory at University of Bath. Blood glucose measured every 5 minutes for 2 hours in 4 initial conditions; fasted sitting, fasted doing 40 minutes of moderate continuous exercise (MTE), post-meal sitting and during 40 minutes of post-meal MTE. In two subsequent conditions they will 1) alter their premeal dose of insulin by the recommended amount and then do 40 minutes of MTE exercise 30 minutes after eating and 2) conduct 40 minutes of MTE exercise 30 minutes after eating the recommended amount of carbohydrate. 3. Observational study: How active are pregnant women with T2D, how does this change during pregnancy and how is activity related to glucose? Sixty pregnant women with T2D and sixty matched controlled pregnant women will be recruited from 5 pregnancy clinics in the Southwest. PA will be measured using accelerometers for 2 weeks during the 1st, 2nd and 3rd third trimester. Women with T2D will also complete exercise, food, insulin and sleep diaries, and data from their continuous glucose monitors will be downloaded for these periods. 4. Qualitative study. What information/resources would support women with T2D during pregnancy, and what resources would be valued by the HCPs who will provide it? Semi-structured interviews will be carried out with pregnant women with T2D and HCPs (dieticians, diabetes nurses, midwives, obstetricians and diabetologists) to explore the barriers and facilitators to participating in PA and strategies to support PA. 5. Producing national guidelines: A working group will be established of research team members and representatives from Moving Medicine and the ABCD to agree on guidelines for on how to help healthcare workers to encourage and support pregnant women with T2D to increase their activity levels.
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