Cover crop species and mycorrhizal colonization on soil phosphorus dynamics

Arruda, Bruna; Herrera, Wilfrand; Rojas-García, José; Turner, Cyan; Pavinato, Paulo

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Midwifery

Women's engagement, views and experiences of postnatal follow-up after Gestational Diabetes Mellitus in pregnancy

--Manuscript Draft--

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Abstract:	Background The evidence base relating to women's engagement and experiences of postnatal care following Gestational Diabetes Mellitus in the United Kingdom is limited. Additionally, the uptake of a postnatal fasting blood glucose testing following Gestational Diabetes Mellitus appears to be poor. Objective This study aimed to explore women's engagement, views and experiences of postnatal care following Gestational Diabetes Mellitus in the United Kingdom. Design and Participants An online survey of participants that had Gestational Diabetes Mellitus was undertaken to gather mixed-methods data regarding women's engagement, views and experiences of postnatal care. Demographic data were also collected. Findings A total of 31 participants completed the online survey; respondents were from two countries in the United Kingdom only (England and Wales). Some respondents indicated positive postnatal experiences following Gestational Diabetes Mellitus (such as good family support) with effective communication by some healthcare teams and screening coinciding with engagement with the routine six week follow-up appointment. Overall, findings indicated a general dissatisfaction with the care provided, mostly due to the inconsistency of information and advice in relation to the type of screening test and the timing, location and organisation of blood glucose screening and follow up care. Conclusion This study provides an insight into ways that may improve women's engagement, views and experiences of postnatal care following Gestational Diabetes Mellitus in England and Wales. Implications for practice Findings indicate a lack of consistent adherence to national guidance. A clear care pathway facilitating continuity of care for women in the postnatal period following Gestational Diabetes Mellitus, along with further education and support for health professionals, may improve the provision of postnatal care. The authors recognise the limitations of this small standalone study however, findings highlight the need for further exploration of postnatal follow up following Gestational Diabetes Mellitus in the UK.

Corresponding Author: Siân Pierce Roberts

Authors: Mrs Sheila JS Brown, Dr Seren Haf Roberts

Reference No: YMIDW-D-20-00740R1

Dear reviewers,

Thank you for your helpful feedback on our paper entitled:

"**Women's engagement, views and experiences of postnatal follow-up after Gestational Diabetes Mellitus in pregnancy**".

Please see our response to reviewers' comments in the table below. All in-text amendments have been highlighted in yellow in the revised manuscript.

Please let us know if you require any further clarification.

Yours Sincerely,

Siân Pierce Roberts
Corresponding Author

Reviewer 1

Reviewer comments	Response/amendment
Thanks very much for your very positive response to the reviewers' comments. I think the revisions have made the paper clearer and more cogent, and the contribution of this study to our understanding of GDM is now clear. This is a small study, but it is interesting, and it certainly points the way to future research. In addition, the implications for policy and particularly for practice in implementing the NICE guidelines is very interesting. Overall, my evaluation of this paper is positive.	We thank the reviewer for the positive feedback on the manuscript

Reviewer 2

Reviewer comments	Response/amendment
Thank you for the revision. This manuscript is much improved. Please move the statement about no significant findings from the Methods to the Results section. Please state statistical test and the fact that there was no significant outcome in the Footnotes of Tables.	We thank the reviewer for the positive feedback on the manuscript. This statement has been moved to the Results section. Statistical test and no significant outcome statement has been included in the footnotes of tables (Pages 10 and 11).
If stating that a 'non significant' trend is observed, please provide the P-value, which should be close to 0.05. If there is in fact no statistical trend, please ensure the discussion to reflect that there are no subgroup differences.	None of the statistical tests indicate a close to significant findings. Therefore the text has been reworded to clarify this. Please see page 8 of the manuscript, highlighted in yellow. The statistical analysis outputs can be provided if required.

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Dear Editor,

Enclosed, I include a revised electronic submission of our manuscript to be considered for the “Midwifery” journal, titled:

”*Women’s engagement, views and experiences of postnatal follow-up after Gestational Diabetes Mellitus in pregnancy”*

Please see the amendments document, outlining each change made as raised in the reviewers comments. The amendments are highlighted in red in the manuscript. Minor editorial amendments were made for clarity and to minimise the word count, however only the areas relating specifically to reviewer comments are highlighted.

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We would highly appreciate if you could consider the enclosed manuscript for publication within the “Midwifery” journal.

Thank you very much.

Yours Sincerely,

Sian P. Roberts

Women's views and experiences of postnatal follow-up after Gestational Diabetes Mellitus in pregnancy

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1. Conflict of Interest

☒ No conflict of interest exists.

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

2. Ethical statement

☒ We further confirm that any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

Ethical approval was granted by the sponsor; the Healthcare and Medical Sciences Academic Ethics Committee (HCMS AEC) within Bangor University supporting the researcher's Master's project (SPR) (Ethical issues for dissertation students, 2012).

3. Funding Sources

☒ No funding was received for this work.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. However the work was undertaken and submitted as part of an MSc Programme by the lead author.

4. Intellectual Property

☒ We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

5. Authorship

The International Committee of Medical Journal Editors (ICMJE) recommends that authorship be based on the following four criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND

2. Drafting the work or revising it critically for important intellectual content; AND

3. Final approval of the version to be published; AND

4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

All those designated as authors should meet all four criteria for authorship, and all who meet the four criteria should be identified as authors. For more information on authorship, please see http://www.icmje.org/recommendations/browse/roles-andresponsibilities/defining-the-role-of-authors-and-contributors.html#two.

☒ All listed authors meet the ICMJE criteria. We attest that all authors contributed significantly to the creation of this manuscript, each having fulfilled criteria as established by the ICMJE.

☐ One or more listed authors do(es) not meet the ICMJE criteria.

We believe these individuals should be listed as authors because:

[Please elaborate below]

☒ We confirm that the manuscript has been read and approved by all named authors.

☒ We confirm that the order of authors listed in the manuscript has been approved by all named authors.

6. Contact with the Editorial Office

The Corresponding Author declared on the title page of the manuscript is:

Siân Pierce Roberts

☒ This author submitted this manuscript using her account in editorial submission system.

☒ We understand that this Corresponding Author is the sole contact for the Editorial process (including the editorial submission system and direct communications with the office). She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

☒ We confirm that the email address shown below is accessible by the Corresponding Author, is the address to which Corresponding Author's editorial submission system account is linked, and has been configured to accept email from the editorial office of International Journal of Women's Dermatology:

sianproberts@gmail.com

☐ Someone other than the Corresponding Author declared above submitted this manuscript from his/her account in editorial submission system:

N/A

☐ We understand that this author is the sole contact for the Editorial process (including editorial submission system and direct communications with the office). He/she is responsible for communicating with the other authors, including the Corresponding Author, about progress, submissions of revisions and final approval of proofs.

7. Acknowledgments

We would like to thank all of the participants who gave their time to complete the online survey, and to the online platform for providing permission to post the survey on their online site.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

We the undersigned agree with all of the above.

	Author's name (Fist, Last)	Signature	Date
1.	Roberts, S P_____		31/10/2020
2.	Brown, S.J.S ___		31/10/2020
3.	Roberts, S. H____		31/10/2020

Highlights

1) Participants were mostly informed and attended postnatal checks
2) Most participants were aware of the importance of postnatal follow-up
3) Postnatal care was inconsistent following GDM
4) Some participants were dissatisfied with their care following GDM
5) Convenience of attending appointments was important for participants

Women's engagement, views and experiences of postnatal follow-up after Gestational Diabetes Mellitus in pregnancy

Background

The evidence base relating to women's engagement and experiences of postnatal care following Gestational Diabetes Mellitus in the United Kingdom is limited. Additionally, the uptake of a postnatal fasting blood glucose testing following Gestational Diabetes Mellitus appears to be poor.

Objective

This study aimed to explore women's engagement, views and experiences of postnatal care following Gestational Diabetes Mellitus in the United Kingdom.

Design and Participants

An online survey of participants that had Gestational Diabetes Mellitus was undertaken to gather mixed-methods data regarding women's engagement, views and experiences of postnatal care. Demographic data were also collected.

Findings

A total of 31 participants completed the online survey; respondents were from two countries in the United Kingdom only (England and Wales). Some respondents indicated positive postnatal experiences following Gestational Diabetes Mellitus (such as good family support) with effective communication by some healthcare teams and screening coinciding with engagement with the routine six week follow-up appointment. Overall, findings indicated a general dissatisfaction with the care provided, mostly due to the inconsistency of information and advice in relation to the type of screening test and the timing, location and organisation of blood glucose screening and follow up care.

Conclusion

This study provides an insight into ways that may improve women's engagement, views and experiences of postnatal care following Gestational Diabetes Mellitus in England and Wales.

Implications for practice

Findings indicate a lack of consistent adherence to national guidance. A clear care pathway facilitating continuity of care for women in the postnatal period following Gestational

Diabetes Mellitus, along with further education and support for health professionals, may improve the provision of postnatal care.

The authors recognise the limitations of this small standalone study however, findings highlight the need for further exploration of postnatal follow up following Gestational Diabetes Mellitus in the UK.

Keywords

Diabetes; Aftercare; Monitoring; Oral Glucose Tolerance Test; Fasting Blood Glucose.

Introduction

Gestational Diabetes Mellitus (GDM) is a growing public health concern by increasing the likelihood of Type 2 diabetes mellitus (T2DM) in the population in the future (Carreiro et al.2018). GDM is a form of diabetes where the body cannot produce enough insulin to meet the additional metabolic demands of pregnancy (Diabetes UK, 2015; World Health Organisation (WHO), 2016a). GDM occurs within 5% of pregnancies typically during the second or third trimester whereby women require additional care provided by the multidisciplinary team, as well as a midwife, to ensure that the individual needs of the mother are met (Diabetes UK, 2016; National Institute for Health and Care Excellence (NICE), 2015). Additionally, due to the increased risk of developing subsequent Type 2 Diabetes Mellitus (T2DM) it is recommended in the UK that women are offered routine follow up by their general practitioner (GP) at 6 to 8 weeks after the birth, with a fasting blood glucose (FBG) test at 6 to 13 weeks postnatally (NICE, 2015). The WHO (2016a) state that diabetes can be largely prevented through public health interventions. Postnatal follow up is an important public health initiative to screen for T2DM following GDM and offers the opportunity to advise and educate women on maintaining a healthy diet and lifestyle to minimise the risk of developing T2DM or GDM within a future pregnancy (Guo et al. 2016; Ryswyk, et al. 2015). In the UK, health professionals, including midwives, should advise and promote health behaviours and screening postnatally to minimise the risk of, or to identify possible T2DM (NICE, 2015). If women are not receiving postnatal follow up care after GDM, women may be at risk of having undiagnosed T2DM (NICE, 2015). Anecdotal information from a diabetes team in one area in the UK suggested that the number of women presenting for a postnatal FBG test was poor. Thus, evidence surrounding postnatal follow-up care after GDM in the UK warrants further exploration.

At the time this study was undertaken, evidence from various countries highlighted a possible trend of low postnatal follow-up rates amongst women who had GDM (Bennet et al. 2011; Chamberlain et al. 2015, Chang et al. 2014; Kilgour, 2013; Kim et al. 2006; Ko et al. 2013; Oza-Frank, 2014). Bennet et al. (2011), Kim et al. (2006) and Oza-Frank (2014) provide evidence from the USA. In a qualitative study by Bennet et al. (2011), 16 out of 22 women did not access postnatal screening; furthermore, Oza-Frank (2014) and Kim et al. (2006) reported postnatal screening averaged 48.5% and 42% respectively. Similar findings have also been reported in other countries with screening rates of 13.1% in China (Chang et al. 2014) and rates of 7% of indigenous and 16.8% of non-indigenous women accessing screening in Australia (Chamberlain et al. 2014). Findings from these studies supported

anecdotal evidence from practice that led to the master's project undertaken by the first author.

More recent studies exploring postnatal follow up rates following GDM, offer similar findings. Low postnatal follow up rates of 35% were reported in Pakistan (Aziz, Munim and Fatima, 2017) and 42% in the USA (Werner, Has, Kanno, Sullivan & Clark, 2019). Venkataramani, Chenj, Yeh, Bennet and Maruthur (2020) analysed a national survey from 2016-2017 in the USA. Participants were from low-income backgrounds accessing social care programmes. Twenty-one to 35% of women had not accessed screening. Additionally, a systematic review by Jones, Hernandez, Edmonds and Ferranti (2020) explored studies that analysed postnatal screening rates following GDM in the USA. In all 9 reviewed studies, screening rates did not exceed 58%. Therefore, postnatal follow up rates have not improved in other countries in recent years.

In the UK, low postnatal follow up rates were also identified by Fahami et al. (2018), Pierce et al. (2011), Patel et al. (2015), and Ward et al. (2018). Fahami et al. (2018) reported that 62% of women did not have postnatal screening, supporting evidence by Patel et al. (2015), and Ward et al. (2018) with screening rates of 27% and 59.8% respectively. Furthermore, a cohort study by Walsh, Mahmoud, Htun, Hodgett and Barton (2019) analysed postnatal follow-up rates, pre and post updated NICE guidelines in 2015 and found that follow-up rates had improved. However, evidence from each of these studies focused on specific areas in the UK and are therefore not generalisable.

Barriers to accessing screening highlighted by Bennett et al. (2011), Lie et al. (2013) and Nielsen et al. (2014) include: birth experience; health of the newborn baby; personal and family adjustment; self-care and coping; and concerns regarding the possibility of a T2DM diagnosis. McMillan et al. (2018) explored women's views of postnatal support services within the UK following GDM by conducting face to face interviews with 27 participants. Findings demonstrated barriers to accessing care, specifically time constraints, not being aware of the care/ screening provided, and a lack of healthcare support postnatally. Similar findings were also highlighted by Parsons et al. (2018) who also examined women's experiences of postnatal follow-up care in the UK. Both studies were conducted within one unit or area in the UK, therefore limiting transferability of findings. Evidence regarding women's experiences of postnatal care following GDM in the UK is limited (McMillan et al. (2018).

The existing literature points to low uptake of postnatal blood glucose testing following GDM and some possible barriers to accessing care. This paper adds to the existing literature reporting on a small descriptive mixed-methods survey which aimed to explore women's views and experiences of postnatal follow up following GDM in the UK.

Methods

An anonymised online survey was conducted. A link to the survey was placed, with permission, on a well-known online discussion forum for mothers in the UK. Descriptive surveys are commonly used within healthcare research, allowing the researcher to integrate quantitative and qualitative aspects (mixed methods) of a research design (Harvey & Land, 2017). An example being the all Wales survey exploring women's experiences of pregnancy and birth conducted in 2017, which utilised qualitative and quantitative data collection (Consultant Midwives Cymru, 2017).

Participants' recruitment and data collection

The study sample was a self-selecting convenience sample (Jirojwong et al. 2011) via the online forum. Participants were able to respond in Welsh or English as lead author was fluent in both languages. Participants who met the inclusion criteria were invited via a post on the forum. The inclusion criteria were women who: had GDM in their pregnancy; were over the age of 18; had the ability to understand, read and write in English or Welsh; and were cared for during their pregnancy between 6 weeks and 9 years ago in the UK. NICE produced a 'Diabetes in Pregnancy' guideline in 2008 (NICE, 2008), followed by an updated guideline in 2015 (NICE, 2015). Prior to 2008, NICE did not have guidance in place for 'diabetes in pregnancy' therefore the survey excluded women who had GDM within a pregnancy of more than 9 years ago. In terms of recalling information from 9 years ago, Simkin (1992) provides a significant insight into women's long-term memories of their childbirth experience, whereby women recall their birth experience many years later. The survey was open for a period of 4 months between September 2017 and January 2018. Of the 42 women who accessed the online survey, 11 (26.2%) did not complete the study. Therefore, the total number of participants who completed the survey was 31 (73.8%).

Study Design

The survey utilised both closed and open-ended questions to capture relevant data regarding women's experiences. Closed-ended questions allowed the researcher to gain demographic information and specific information about postnatal screening engagement (such as whether they were informed of the need for screening). Open-ended questions

offered participants the opportunity to elaborate on their answers, providing further depth of data (Consultant Midwives Cymru, 2017; Harvey & Land, 2017). The open-ended questions were: “What factors contributed to you attending or not attending the 6 to 8 week postnatal check?”; “What factors contributed to you attending or not attending for the blood test?” and “Please tell me about your experience of postnatal care in relation to your diagnosis of Gestational Diabetes Mellitus.” User testing of the survey, by a previous service user, was undertaken by the second author. Feedback was considered in finalising the design of the questionnaire to enhance content validity (Steen & Roberts, 2011).

Ethics

Ethics approval was obtained from the University hosting the research. There was no burden on individuals to participate in the study. Participants indicated consent by actively accessing the survey via an online link and by ticking a box to proceed with the survey, stating that they had read and understood the study information sheet. Participants were informed that all data collected within the study would remain anonymised.

Data analysis

Descriptive statistics were performed on quantitative data. In light of the smaller than expected sample size, the statistical analysis plan was reconsidered. A chi-square test for independence was planned; however given the sample size and that the minimum cell frequencies for all chi-square tests were below 5, the assumptions associated with chi-square were not met therefore limiting the statistical analysis (Laerd statistics, 2016). Thus a more conservative Fischer’s exact test of independence was undertaken, notwithstanding the possible risk of type 2 error with this approach. The Fischer exact test was undertaken using Statistical Package for the Social Sciences (SPSS) to explore the impact of demographic factors on screening outcomes. Quantitative data analysis was discussed and confirmed with last author SHR.

The qualitative data were analysed manually using Braun & Clarke’s (2006) six phase guideline to thematic analysis. The research was undertaken as part of Author SPR’s masters’ study. Initial coding and theme development was undertaken by the first author and subsequently verified and agreed with the second author, Author SJSB. Themes were refined through discussion and consensus.

Results

Of the 31 participants, 24 participants (77.4%) completed the English language survey and 7 (22.6%) completed the Welsh language survey. A summary of participants' demographic characteristics are provided in Table 1.

Characteristic	*Number of participants and % of all participants (Total number of participants = 31)*
Age 18-24 25-34 35+	 2 (6%) 18 (58%) 11 (36%)
When participants had GDM in a pregnancy: 6 weeks to1 year ago [6w-1y] 1 year to 5 years ago [1y-5y] 5 to 9 years ago [5y-9y]	 10 (32.3%) 16 (51.6%) 5 (16.1%)
Parity (number of children): 1 2 3 4	 12 (39%) 14 (45%) 4 (13%) 1 (3%)
Country: *England* *Northern Ireland* *Scotland* *Wales*	 8 (26%) 0 (0%) 0 (0%) 23 (74%)

Table 1: Demographic information

Findings are summarised in tables 2 and 3. The majority of the 31 participants (93.5%) were informed by a health professional of the need for a 6 to 8 week postnatal check by a GP and 90.3% of participants who were informed reported that they attended the postnatal check. One participant did not attend despite being informed. Of the 31 participants, 77.4% reported that they were aware of the need for postnatal blood glucose test, with only 64.5% reporting that they attended the blood test. One participant who stated she was not informed did not state whether she attended for the blood test or not. Of the 24 participants who were

informed of the postnatal blood test, 63.5% were offered a FBG test and 37.5% were offered an oral glucose tolerance test (OGTT).

Fischer exact test (used owing to small sample size) explored the impact of demographic factors on screening outcomes with no statistically (or close) to significant results. Despite no statistically significant subgroup differences, some descriptive data are noted. The majority of participants across all demographic characteristics were informed and attended their 6 to 8 week postnatal check with their GP. The majority of participants who stated they had their last baby 6 weeks to 1 year ago and 1 to 9 years ago were informed (90% and 95.2%) and attended (90% and 90.5%) the 6 to 8 week postnatal check. Most participants who had their baby 6 weeks to 1 year ago were informed (90%) and attended (80%) the FBG test. Results were lower amongst participants who had their baby 1 to 9 years ago, with 71.5% of participants being informed and 60% attending for FBG screening. These data suggests that participants who were diagnosed more recently were more likely to have received follow up information. Additionally, the reports of not being informed of the need for postnatal follow up and testing was more frequent in multiparous women. However, again these results did not reach statistical significance thus limiting the conclusion drawn from these findings.

Despite being available on a UK social media site responses were from two countries only in the UK; there were no participants from Northern Ireland or Scotland, therefore the results are not representative of the whole of the UK. Participants who lived in England were all informed (100%) of and attended the 6 to 8 week postnatal check and the majority of participants who lived in Wales (87%) were informed of and attended (82.6%) the postnatal check, demonstrating good compliance with national guidance for postnatal checks (NICE, 2006; 2013) within these two countries of the UK. In terms of the postnatal FBG screening, 62.5% of participants who lived in England were informed and 50% attended, compared to those in Wales where 82.6% of participants were informed and 72.7% attended (*see table 2 and 3*).

Demographic characteristics	Informed of 6-8 week postnatal check Number of participants (%)		Attended 6 – 8 week postnatal check Number of participants (%)		Informed of 6-8 week blood test Number of participants (%)		Attended 6 – 8 week blood test Number of participants (%)	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Age								
18-24	2 (100%)	0 (0%)	2 (100%)	0 (0%)	2 (100%)	0 (0%)	2 (100%)	0 (0%)
25-34	17 (94.4%)	1 (5.6%)	16 (89.9%)	2 (11.1%)	15 (83.3%)	3 (16.7%)	12 (70.6%)	5 (29.4%)
35+	10 (90.9%)	1 (9.1%)	10 (90.9%)	1 (9.1%)	7 (63.6%)	4 (36.4%)	6 (54.5%)	5 (45.5%)
When did you have your last baby?								
Six weeks to one year ago [6w-1y]	9 (90%)	1 (10%)	9 (90%)	1 (10%)	9 (90%)	1 (10%)	8 (80%)	2 (20%)
One to nine years ago [1y-9y]	20 (95.2%)	1 (4.8%)	19 (90.5%)	2 (9.5%)	15 (71.4%)	6 (28.6%)	12 (60%)	8 (40%)
When did you have GDM within your pregnancy?								
Six weeks to one year ago [6w-1y]	9 (90%)	1 (10%)	9 (90%)	1 (10%)	9 (90%)	1 (10%)	8 (80%)	2 (20%)
One to five years ago [1y-5y]	18 (94.7%)	1 (5.3%)	17 (89.5%)	2 (10.5%)	14 (73.7%)	5 (26.3%)	11 (61.1%)	7 (38.9%)

Six to nine years ago [6y-9y]	2 (100%)	0 (0%)	2 (100%)	0 (0%)	1 (50%)	1 (50%)	1 (50%)	1 (50%)
How many children do you have? 1 2 3 4	 11 (91.7%) 14 (100%) 3 (75%) 1 (100%)	 1 (8.3%) 0 (0%) 1 (25%) 0 (0%)	 10(83.3%) 14 (100%) 3 (75%) 1 (100%)	 2(16.7%) 0 (0%) 1 (25%) 0 (0%)	 9 (75%) 12 (85.7%) 3 (75%) 0 (0%)	 3 (25%) 2(14.3%) 1 (25%) 1 (100%)	 6 (50%) 11 (78.6%) 3 (100%) 0 (0%)	 6 (50%) 3 (21.4%) 0 (0%) 1 (100%)
Where did you receive your postnatal care? England Northern Ireland Scotland Wales	 8 (100%) - - 21(91.3%)	 0 (0%) - - 2 (8.7%)	 8 (100%) - - 20 (87%)	 0 (0%) - - 3 (13%)	 5 (62.5%) - - 19 (82.6%	 3(37.5%) - - 4(17.4%)	 4 (50%) - - 16(72.7%)	 4 (50%) - - 6(27.3%)
Chi-square test for independence - the sample size and that the minimum cell frequencies for all chi-square tests were below 5. *Fischer exact test – No statistical significant findings*								

Table 2: Summary of findings

Demographic Characteristics	Type of blood test Number of participants (%)	Type of blood test Number of participants (%)
	OGTT	**FBG**
Age 18-24 25-34 35+ All participants	 0 (0%) 5 (35.7%) 4 (50%) N = 9 (37.5%) (37.5%)	 2 (100%) 9 (64.3%) 4 (50%) n= 15 (62.5%) (37.5%)
When did you have your last baby? Six weeks to one year ago [6w-1y] One to nine years ago [1y-9y] All participants	 3 (37.5%) 6 (37.5%) (n=9, 37.5%)	 5 (62.5%) 10 (62.5%) (n= 15, 62.5%)
When did you have GDM within your pregnancy? Six weeks to one year ago [6w-1y] One to five years ago [1y-5y] Six to nine years ago [6y-9y] All participants	 5 (62.5%) 10 (66.7%) 0 (0%) n= 15 (62.5%)	 3 (37.5%) 5 (33.3%) 1 (100%) n= 9 (37.5%)
How many children do you have? 1 2 3 4 All participants	 4 (50%) 4(33.3%) 1(33.3%) 0 (0%) n= 9 (37.5%)	 4 (50%) 8(66.7%) 2(66.7%) 1 (100%) n= 15 (62.5%)
Where did you receive your postnatal care? England Northern Ireland Scotland Wales All participants	 3 (50%) - - 12(66.7%) n= 15 (62.5%)	 3 (50%) - - 6(33.3%) n= 9 (37.5%)
Chi-square test for independence - the sample size and that the minimum cell frequencies for all chi-square tests were below 5. *Fischer exact test – No statistical significant findings*		

Table 3: Summary findings for the type of blood test.

Qualitative findings

Of the 31 participants, 16 contributed to the open-ended questions. Excerpts from survey participants' narratives about their experience of postnatal care and follow-up after GDM are presented. The four overarching themes identified are:

- Awareness of the importance of postnatal follow up
- Inconsistency in postnatal follow up
- Lack of confidence in the healthcare system
- Convenience

Positive experiences were reported by some participants include: good family support (Participant (P), 37), effective communication by some healthcare teams (P11, P23), and screening coinciding with the routine six week follow-up appointment (P15 and P20). However, the majority of the findings were dominated by negative experiences or the inability to access care.

Awareness of the importance of postnatal follow up

Participants' responses were mixed in relation to their awareness of and reasons for requiring a 6-8 week postnatal check and blood glucose test. Most participants were aware of the health benefits of attending the postnatal check with the GP;

> *"I understood it was important to ensure that my blood levels were back in range post pregnancy and was also advised and informed by my midwife and health visitor of the importance of attending."* (P11; 1y-5y)

However, the response from participant 11 suggested that she was not offered further care and that she was not aware that she needed to be seen postnatally:

> *"My baby had regular checks for 24 hours after she was born. There was no other specific postnatal care we received".*

Three participants acknowledged the importance of attending postnatal follow up, but did not provide a specific reason for attending;

> *"...I went because I thought I had to."* (P15; 1y-5y)

Additionally, participant 37 thought that the postnatal check was a generic recommendation, not only for women who had GDM in their pregnancy:

"The health visitor discussed at every visit postnatally that I needed to see a doctor, however I believed that this visit is for everyone following birth and not necessarily to discuss diabetes" (P37*;* 1y-5y)

Despite being a generic recommendation, participant 15 stated she went because she "Thought I had to", and participant 1 stated that she did not feel that she needed the appointment therefore did not attend. Overall, a number of participants were uncertain of the benefits and reasons for postnatal follow-up following GDM in pregnancy.

Twenty-four participants stated that they were aware of the need for a postnatal FBG test following GDM:

"...I was aware of the need for follow-up blood test at 6 weeks. I requested this through my GP as I had not received any request from the surgery. I was sent the blood request through the post" (P32; 1y-5y)

However, 3, participants reported that they were not aware and/or not offered the FBG test:

"I was informed that the test in the hospital was normal, therefore I thought I didn't need anything else as nobody mentioned anything" (P37; 1y-5y)

Additionally, despite not being a question asked within the survey, participants commented on their annual screening experiences. Participant 26 [6w-1y] stated that she was "not told for certain" if she needed annual testing, highlighting a need for clarification from health professionals regarding follow up FBG screening.

Participants' responses indicated that not all women were aware of the importance of postnatal follow up and not all attended postnatal follow-up appointments. Additionally, it was apparent that most participants were not aware or not offered postnatal screening.

Inconsistency in postnatal follow up

It was apparent that participants received different advice from healthcare professionals, which ultimately appeared to have an effect on their postnatal experience:

"I got the feeling that the surgery didn't understand why I was asking for a 6-8 [week] test, I said that I had been advised to come back and get the glucose test done but they said that wasn't necessary and just gave me an ordinary blood test" (P15; 1y-5y)

Differences in the format of postnatal checks and blood testing was also reported whereby some participants had to arrange the appointment themselves and others stating that they had to attend two separate appointments for their postnatal check and blood glucose test:

> *"they said that 6-8 weeks was too early to test so was booked in for 12 weeks test and I attended that one"* (P15*;* 1y-5y)

Participants were offered different blood glucose tests at different times. Participant 15 was advised to attend at 12 weeks rather than 6 weeks; participant 1 *[1y-5y]* stated that she 'opted' for a FBG test at 12 weeks instead of an OGTT at 6 weeks*;* participant 26 *[6w-1y]* stated that she attended at 6 weeks for a OGTT test whilst participant 39 *[6w-1y]* stated she attended for a FBG test at 6 weeks. Additionally, the location of follow up care appeared to vary amongst participants.

It was apparent that some participants were not receiving information regarding their future risks, dietary advice, annual screening, or any follow up discussion following their blood results:

> *"I have had the test, however nothing has happened further than this"* (P35; 6w-1y)

Similarly, there appeared to be inconsistency in participants' experiences of arrangements for annual follow up screening. Participant 11 stated that the annual follow up blood glucose screening does not appear to be monitored:

> *"Guidelines state I should attend every 12 months for a repeat HBA1C - attending this testing doesn't appear to be monitored at all and I have never been reminded to attend."* (P11; 1y-5y)

Whilst participant 1 was 'surprised' that she had received a reminder letter for her annual blood glucose test, when she had to request the initial postnatal blood test:

> *"1 year on I have received a letter reminding me to have my annual hba1c which I was surprised about! I had to request an initial one at 12 weeks so I didn't think they would remember!"* (P1; 1y-5y)

Inconsistencies were apparent in the care that survey participants described. This included the advice they received, timing and location of follow up and annual follow up screening. It

was evident that women were dissatisfied with their follow up care with Participant 30 *[1y-5y]* stating that there was, “not much postnatal care” and “no aftercare provided”.

Lack of confidence in the healthcare system

Participants’ responses suggest some doubt in the quality of care provided. Participants reported various accounts of postnatal care, as being positive or negative experiences. Participants 3, *[1y-5y],* 8 *[6w-1y]* and 23 *[1y-5y]* were very satisfied with their care:

> *“Team were fantastic and kept me informed of process. At 6 week postnatal check, advised by GP to have an annual glucose test as would be at more risk of developing diabetes.”* (P23; *1y-5y*).

However, in contrast, participant 19 *[6w-1y]* stated “there was none” for postnatal care and participant 21 stated the sheer dissatisfaction with her care reporting:

> *“Terrible bullying scare tactics”* (P21; 1y-5y)

The response of a number of participants indicated a lack of confidence in the healthcare system and in healthcare providers:

> *“The health visitor asked if everything was ok, however there was no further mention than that about it”* (P37; 1y-5y)

and

> “*Not great- GP a bit clueless*” (P18; 1y-5y)

Despite 3 participants stating they had positive postnatal experiences, the majority of participants reported a lack of communication between women and health professionals in relation to: attending the 6 to 8 week postnatal check and postnatal blood glucose testing; being informed of blood test results and being advised and educated regarding their future health.

Convenience

Lastly, the ‘convenience’ of attending follow up appointments was repeatedly discussed amongst participants. Three participants stated that they attended their postnatal check as their appointment coincided with their baby’s postnatal check

However, other participants stated that they were not able to have the postnatal check and postnatal blood glucose testing at the same time which had a significant impact in terms of their care as this was an inconvenience for women:

"I went to the check up at 6 weeks and the doctor advised I'd need to arrange the diabetes test separately... I still haven't had the diabetes check yet." (P19; 6w-1y)

It was evident that childcare was amongst the most problematic for participants with some participants stating that they would not have been able to attend without family support;

"Didn't want to have to sit with 6 week old for 2 hours to wait for GTT. Opted for hba1c." (P1; 1y-5y)

Interestingly, 2 participants said that breastfeeding had an impact on their ability to attend. One participant stated it was easier for her to attend as she was breastfeeding on demand, whilst another participant stated it was difficult for her to attend as she was breastfeeding:

"General health and ability to make appointment with new baby who breastfed on demand. Also with another small child in tow." (P3; 1y-5y)

and:

"It was not convenient for me to sit in the surgery for that time as my baby was so young and I was breastfeeding (despite this, I understand why it is important)" (P38; 1y-5y)

There were inconsistencies in terms of where participants received their postnatal care and blood glucose screening. The location of the GP surgery and ease of access had an impact on attendance.

However, participant 20 stated that her blood glucose test was at the hospital and indicated that she may not have attended if she had not been attending the hospital that day for another reason:

"I very nearly didn't attend but was at the hospital anyway on the day of the appointment." (P20; 6w-1y)

It appears that participants' preference was for their postnatal check and blood glucose screening to be completed together, and at the same time as their baby's 6-8 week postnatal check and in a location convenient to them.

Discussion

This paper reports on findings from a small mixed-methods survey that sought women's engagement, views and experiences of UK-based postnatal follow-up care after diagnosis of GDM. Overall, participants were aware of and attended their routine postnatal check but less aware of the GDM follow-up care. There was a general dissatisfaction with the GDM follow-up care owing to inconsistency of information and advice about the type of screening tests, timing, location and organisation of follow-up care.

Participants who had a baby 6w-1y ago were more likely to be informed of the need for and attended a blood glucose test in comparison to participants who had their baby 1y-9y ago. Additionally, participants who had GDM 6w-5y ago, were more likely to participate in follow up care in comparison to women who had GDM more than 5y ago. This suggests that women who have had GDM recently appear to be more aware of the need for follow up in comparison to previous years. This may be due to familiarisation of the NICE Diabetes in pregnancy guideline, produced in 2008 and updated in 2015 amongst healthcare staff.

In this study the majority of participants were aged between 25 and 34 (58%), compared to 6% in the 18 to 24 and 36% in the 35 and over age categories, mirroring findings by Bennett et al (2011), Guo et al (2016) and the statistics for childbearing age currently and at the time of data collection, provided by the Office for National Statistics (2014; 2020). Lawrence et al. (2010) found that the odds of testing increased with maternal age. However, Sievenpiper, McDonald, Grey & Don-Wauchope (2012) did not find any correlation between women's age and attendance rates. Findings for this study and the evidence discussed highlight a need to target women of all age groups to attend follow up care (Bennet et al. 2011; Carolan, Davey, Biro & Kealy, 2012; Guo et al, 2016; Middleton & Crowther, 2014).

Awareness of the Importance of postnatal follow-up

Overall, participants recalled their postnatal experience and the advice they had received with some recognition of the importance of attending. However uncertainty with regards to plans of care and the benefits and reasons for postnatal follow-up after GDM were highlighted, implying that respondents were attending follow-up appointments without all the required information on which to make informed decisions (NMC, 2015).

Multiparous women were less likely to be informed of postnatal follow-up in comparison to primiparous women, which may indicate a perception that multiparous women were already aware of postpartum screening. This highlights the importance of healthcare professionals not assuming that multiparous women are aware of postnatal follow-up care as they may have not had GDM in a previous pregnancy. Participant reports of receiving inadequate information that did not convey the severity of GDM reinforce findings from a UK wide survey exploring women's experiences of maternity care in 2013, in which 84% of women stated that communication during their maternity care was poor (Care Quality Commission, 2013). Oza-Frank et al. (2018) and Sterne et al. (2011) highlight poor communication as a barrier to GDM management. Findings from the Lancet series for midwifery indicate that women feel empowered to learn for themselves and participate in their own care with the correct information, education and support and that without adequate information, women are less likely to engage in follow-up care (Renfrew et al. 2014). It is vital that all healthcare professionals communicate effectively with women to ensure that they understand the need for postnatal follow-up care after GDM to ensure they are at the centre of all decision making (NMC, 2015; Renfrew et al. 2014).

Inconsistency in postnatal follow up

Inconsistencies were indicated in the timing of postnatal care and the type of blood glucose test being offered. The majority of women had the OGTT compared to the FBG, which follows initial NICE (2008) guidance. However, the updated guidance (NICE, 2015) state that women should be offered a FBG not an OGTT. Nevertheless, the evidence underpinning the 2008 NICE guideline has been identified as of low quality and may therefore explain why FBG is not being consistently offered (NICE, 2015). However, OGTT involves 2 separate blood samples to be taken 2 hours apart, in comparison to 1 blood sample for the FBG test. A systematic review by Bennet et al. (2009) concluded that a FBG test was not consistently sensitive in detecting T2DM in the postnatal period. Findings were supported by other studies (McClean et al. 2010; Picón et al. 2012). In contrast, Kim et al. (2011) assessed the association between HbA1c and an OGTT and found that an OGTT is effective in detecting abnormal glucose levels. However, due to the trend of low postpartum screening rates, Kim et al. (2011) suggests that a HbA1c screening would be less invasive and cumbersome for women than OGTT and therefore could increase attendance rates; a view supported by Claesson et al. (2015). It appears that there is a need for (a) further research to establish the effectiveness of both FBG and OGTT in detecting T2DM, and acceptability to women, following GDM and (b) a review of the extent to which hospital policies and practice reflect national guidance (Kim et al, 2011).

Four respondents commented on the inconsistency of information regarding their future risk, dietary advice, and annual screening. Additionally, inconsistencies in relation to early postnatal information and GDM care was also reported demonstrating a lack of continuity of information and postnatal care. Continuity of care is defined as: receiving the same structure of care, a named midwife, and consistency in the midwife or midwifery team that provides care through the antenatal, labour and postnatal period (Sandall, 2018). Continuity of care and carer can decrease women's risks of adverse effects during the childbearing period (MBRRACE-UK, 2018; Renfrew et al. 2014) as well as promoting positive experiences as highlighted in the five year forward view "Implementing Better Births" (NHS England, 2017) and the five year Maternity vision in Wales (Welsh Government, 2019). In Wales, 87.3% of women stated they had a named midwife and 62% stated they saw their named midwife either all of the time or most of the time (Consultant Midwives Cymru, 2017). In England, only 38% of women stated that they saw the same midwife for their antenatal care (Care Quality Commission, 2019).

Women expressed their frustration when receiving conflicting information from different healthcare professionals (National Maternity Review, 2016). A framework developed by Renfrew et al. (2014) found that midwifery has a key role in reducing morbidity and mortality amongst childbearing women. Despite the specific management of GDM being beyond the remit of a midwife (NMC, 2015), midwives are the coordinators of care (NMC, 2019) and through partnership working with the wider multidisciplinary team (MDT) are involved in all aspects of maternity care (Consultant Midwives Cymru, 2017). Renfrew et al. (2014), suggest that postnatal care might improve if undertaken by a midwife. Findings from this study and related literature suggest that there is a clear need for clarification and continuity in terms of GDM follow up care in the UK, which could perhaps be achieved through the implementation of a standardised care pathway. In addition, given the uncertainty around postnatal follow-up reported by respondents, use of a reminder system to prompt women to attend postnatal follow up may be useful; this has been linked to increased postnatal follow up attendance rates in other studies (Hamel & Werner, 2017; Ko et al. 2013; Olmos et al. 2014; Vesco et al. 2012). Given the literature and evidence explored, further exploration of postpartum screening is warranted (Hamel & Werner, 2017). Furthermore, education and training would encourage healthcare professionals to provide consistent evidence-based care (Ko et al. 2013; Patel et al. 2015; Pierce et al. 2011; Ward et al. 2018).

Lack of confidence in the healthcare system

Respondents' accounts indicated a lack of confidence in the healthcare system and with healthcare providers. The quality of the information and care provided by healthcare professionals appears to have directly influenced the rate of postnatal follow-up attendance. Effective communication is a key element to the role of a healthcare professional (MBRRACE, 2018). Effective communication is imperative to inform women of the importance of follow up care which may reduce future risks to their health, such as T2DM (Kilgour et al., 2015). Quality of care may be improved for women following GDM by the development of a robust pathway of care reflecting national guidelines leading to increased awareness and clarity for women and the healthcare professional.

Convenience

Careful planning of postnatal care is considered highly important to ensure that the health and wellbeing of both mother and baby are met (Kinney et al. 2016; Sakala & Newburn, 2014). A systematic review by Nielsen et al. (2014) demonstrated that adhering to advice and attending postnatal care is considered to present challenges for some women. The NHS in Wales promotes "Prudent healthcare", to ensure patients are at the centre of decision making, ensuring care is easily accessible, and reducing unnecessary interventions (Welsh Government, 2016). Two of the 3 main action points of 'Prudent healthcare' are to provide ease of access to specialist care in the outpatient setting along with effective team working. Evidently there is a need for 'Prudent Healthcare' within current postnatal practices in England and Wales. Women value the opportunity to participate and make choices regarding their own care (Sakala & Newburn, 2014); if care is more accessible and convenient for women, this may improve the uptake of postnatal follow-up (Kinney et al. 2016; McDougall et al. 2014; Sakala & Newburn, 2014).

There is some evidence to suggest that offering GDM screening prior to discharge from hospital may increase uptake (Curtis et al. 2017; Nabuco et al. 2016; Werner et al. 2016). However, a report by the WHO Guideline Development Group (GDG) (2016b) highlighted that there is a research gap in evaluating the effectiveness of different strategies to implement postnatal care recommendations.

Conclusion

This study provides an insight into women's engagement, views and experiences of postnatal care following GDM within England and Wales. Findings add to the current body of knowledge on this topic with implications for the planning and provision of postnatal care for women with GDM in the UK and beyond.

Strengths and Limitations

The response rate was limited with a total of 42 women accessing the online survey. The survey was only accessible to parents who used the forum which has limited the scope of the survey.

The study findings represent a convenience sample of participants across England and Wales, providing a wider demographic data set rather than data from one geographical location. The largest number of responses from women in Wales was noted with interest. It is difficult to ascertain the reasons for this. One factor may be the offer of the survey in both Welsh and English languages and/or 'word of mouth' between respondents. Nonetheless, survey findings are from participant responses from both England and Wales.

The overall sample size is limited and therefore findings cannot be generalised, however a mixed-methods approach offered participants the opportunity to express their views and experiences in their own words, adding depth of data, therefore providing an insight into women's engagement with and experiences of postnatal care after GDM.

Implications for Practice and future research

Although some women reported positive postnatal experiences after GDM, overall, findings indicate a general dissatisfaction with the care received. Dissatisfaction in care and the lack of knowledge regarding postnatal follow-up care may ultimately have an effect on postnatal follow-up and screening rates. If women are not receiving follow-up care and not being screened for T2DM, risk of undiagnosed T2DM may be increased (Carreiro et al. 2018). Furthermore, participants also reported care that did not meet national guidance (NICE 2008; 2015). A clear pathway of care that adheres to national guidance may promote continuity and consistency of information in the postnatal period for women who have had GDM. This study supports the need for further research into this topic in the UK.

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Appendix 1

Survey

1. I have read and fully understand the participation information above and give my consent to proceed with the research study.

    - Yes
    - No

2. Age:

    - Under 18
    - 18-24
    - 25-34
    - 35+

3. When did you have your last baby?

    - Less than six weeks ago
    - Six weeks to one year ago
    - One to nine years ago
    - More than nine years ago

4. Did you have Gestational Diabetes Mellitus (GDM) within a pregnancy within the last 9 years?

    - Yes
    - No

5. Were you residing in the UK at the time of the affected pregnancy?

    - Yes
    - No

6. When did you have Gestational Diabetes Mellitus (GDM) within a pregnancy?

    - Six weeks to one year ago
    - One Year to Five years ago
    - Six to Nine years ago

7. How many children do you have?

    - 1
    - 2
    - 3

- 4
- 5 +

8. Where did you receive your postnatal care?

   - England
   - Scotland
   - Northern Ireland
   - Wales

9. Were you informed about the need for you to see the GP six to eight weeks postnatally?

   - Yes
   - No

10. Did you attend your six to eight week postnatal check with your GP?

    - Yes
    - No

11. What factors contributed to you attending or not attending this appointment?

    Text

12. Were you informed of the need for a blood test between six to eight weeks postnatally to check your blood glucose level?

    - Yes
    - No

If the participant answers “No”, skip to question 15.

13. Did you attend for a blood test at six to eight weeks?

    - Yes
    - No

14. If you were offered a blood test, did it involve having a fasting blood test only (not eating eight hours prior to the blood test)?

    - Yes
    - No

    Or

Did it involve a blood test, drinking a glucose drink and repeat the blood test two hours later?

- Yes
- No

15. What factors contributed to you attending or not attending for the blood test?

Text

16. Please tell me about your experience of postnatal care in relation to your diagnosis of Gestational Diabetes Mellitus.

Text

Thank you for your time to participate in this survey.

Acknowledgments

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Survey


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CRediT

Sian Pierce Roberts: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Writing - Original draft, Writing – Review & Editing, Visualization, Project administration. **Sheila J S Brown: Conceptualization,** Methodology, Validation, Formal analysis, Writing – Review & Editing, Visualisation Supervision, Project administration. **Seren Haf Roberts**: Conceptualization, Methodology, Validation, Formal analysis, Writing – Review & Editing, Visualisation, Supervision.