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STUDY PROTOCOL

REVISED The long-term general practice healthcare of women with a history of gestational diabetes: A Scoping Review Protocol

[version 2; peer review: 2 approved]

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Abstract

Introduction

Gestational Diabetes Mellitus (GDM) is a hyperglycaemic condition diagnosed during pregnancy. GDM is strongly associated with future development of type 2 diabetes and cardiovascular disease. Lifestyle and pharmacological interventions can reduce the risk of developing type 2 diabetes. General practice is the recommended setting for long-term follow-up of women with a history of GDM. However, rates of follow-up are suboptimal. The evidence around long-term general practice healthcare for women with a history of GDM has not previously been reviewed.

Aims

The aim of this scoping review is to explore the current evidence base for the long-term care of women with a history of GDM in general practice.

Study Design

The study described by this protocol is a scoping review. The study

Open Peer Review

Approval Status ✓ ✓

	1	2
version 2 (revision) 10 Apr 2025		✓ view
version 1 11 Feb 2025	✓ view	? view

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2. **Alpesh Goyal**, All India Institute of Medical Sciences, Bhopal, India

Any reports and responses or comments on the article can be found at the end of the article.

design was informed by Joanna Briggs Institute methodology.

Methods

Empirical qualitative and quantitative research studies published since 2014 will be identified from a search of the following databases: MEDLINE (Ovid), EMBASE (Elsevier), CINAHL, PsycINFO, Academic Search Complete and SocIndex. The review will identify key characteristics of the literature. Framework analysis will be used to map the findings against the Chronic Care Model, a primary care-based framework that sets out the core components for optimal long-term healthcare.

Results

A numerical descriptive summary (using frequencies) will describe the overall extent of literature, and the range and distribution of its component parts, including the geographical and economic settings, research methods, interventions, outcomes and findings. The qualitative analysis will map interventions and descriptions of care to components of the chronic care model. Research gaps will be reported, and research needs and priorities will be suggested.

Conclusion

The findings of this scoping review will have the potential to inform future research efforts in the area.

Registration

This protocol has been registered in Open Science Framework (https://osf.io/bz2vh).

Keywords
Gestational Diabetes Mellitus, Follow-Up, General Practice, Primary Care, Scoping Review, Type 2 Diabetes Mellitus

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Author roles: O'Flynn J: Conceptualization, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **McMorrow R**: Methodology, Writing – Review & Editing; **Foley T**: Conceptualization, Methodology, Writing – Review & Editing; **Forde R**: Methodology, Writing – Review & Editing; **McHugh S**: Methodology, Writing – Review & Editing; **Newman C**: Methodology, Writing – Review & Editing; **Jennings AA**: Conceptualization, Funding Acquisition, Supervision, Writing – Review & Editing

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REVISED **Amendments from Version 1**

The second version of this protocol follows peer review and includes several changes.

The introduction has undergone minor revision to enhance clarity regarding the subject area. We have included updated evidence by Foo and colleagues regarding the emerging link between gestational diabetes and hepatic steatosis. We have also included a meta-analysis by Lee and colleagues identifying the limitations within interventional evidence for this population. Preconception care and efforts to reduce the risk of recurrence of GDM are included. Diabetes prevention programmes are a potentially important aspect of the healthcare landscape for this high-risk population, and we have included this point in the introduction.

We have made no major adjustments to the methodology, but have included clarifications. We have clarified that we aim to map research evidence around the subject area, rather than directly evaluate health services. The time-frame used to define long-term care is described as beginning after the early postpartum period, independent of the occurrence of screening. However, we have chosen not to specify a timepoint as a cut-off, as this may result in the exclusion of some relevant studies conducted relatively early in the post-partum period, but which adopt a long-term perspective. There is no upper limit to this time-frame, and we have underscored our interest in examining the lifelong healthcare of these women. We have added an explicit justification for our decision to exclude studies published over the last 10 years (2014 or later), noting the rapid evolution of the healthcare landscape and the need to allow sufficient time to integrate the findings of the 2008 Hyperglycaemia and Adverse Pregnancy Outcomes study. We have also more clearly stated our intent to omit grey literature.

Any further responses from the reviewers can be found at the end of the article

Introduction

Gestational Diabetes Mellitus (GDM) is a hyperglycaemic condition with onset or first recognition during pregnancy[1]. The prevalence of GDM is estimated to be at 14% of pregnancies globally using the International Association of Diabetes in Pregnancy Study Group diagnostic criteria[2]. The prevalence is increasing, which has been linked to advancing maternal age and rising obesity rates[3,4]. GDM is associated with pregnancy complications for both mother and foetus, such as macrosomia and pre-eclampsia[5–7]. Pregnancy and perinatal GDM management is associated with increased economic costs[8–10]. Rates of GDM in subsequent pregnancies are between 30% and 84%[11].

GDM further presents enduring health risks for women after pregnancy. Women who experience GDM have an approximately tenfold risk of later developing type 2 diabetes[12,13]. It has been estimated that up to one in three women with type 2 diabetes experienced a pregnancy which was complicated by GDM[14]. Even in the absence of diabetes, GDM is associated with increased cardiovascular risks, including ischaemic heart disease, heart failure, thromboembolic disease and stroke[15,16]. Emerging research suggests potential links between GDM and increased rates of other conditions, including hepatic steatosis, renal disease and cancers of the breast, reproductive tract and thyroid[17–21]. A greater susceptibility to obesity and metabolic syndrome has also been identified among children of women with a history of GDM[22,23]. Consequently, GDM carries the potential for lifelong health consequences for the mother as well as intergenerational health implications[24,25].

To date, research relating to the management of GDM has primarily focused on pregnancy and early postpartum care after a diagnosis of GDM. Interventions aimed at preventing type 2 diabetes after a GDM diagnosis include lifestyle, education and medication[26]. A recent meta-analysis found that the hazard ratio of type 2 diabetes was significantly improved by interventions, while the relative risk did not achieve significance[27]. This may occur if the effect of interventions is time-dependent, and may suggest that their effect may more readily delay than outright prevent the onset of type 2 diabetes. Evidence syntheses indicate that interventions to support healthy diet and physical activity for women with a history of GDM may result in improvements in glycaemic measures and adiposity, with lower rates of subsequent type 2 diabetes[28–32]. However, these results have not consistently achieved statistical significance. Studies report multiple barriers for women engaging with lifestyle interventions, including maternal tiredness, competing occupational and family demands, and personal risk perception[33,34]. Educational interventions targeting postpartum women with a history of GDM have not predominantly been studied in isolation, and have been used primarily as an adjunct to or vehicle for diet and physical activity interventions[35–39]. Limited pharmacological studies have primarily examined glucose-lowering therapies. Meta-analyses inconsistently identify modest reductions in hyperglycaemia and progression to type 2 diabetes, though large scale and long-term data is lacking[26,27,40,41]. Deficits in the reporting of socioeconomic factors in the evidence for prevention of type 2 diabetes for women with a history of GDM has previously been demonstrated[42]. Despite the limitations of the evidence for optimal long-term interventions for this population, economic analyses have found that interventions designed to prevent the development of type 2 diabetes for women with a history of GDM appear cost-effective[43,44]. Data regarding the role for preconception care aimed at reducing the risk of GDM recurrence are also lacking[45–47]. In spite of this, clinical practice guidelines frequently identify the importance of family planning and contraception for women with a history of GDM[48]. To the best of our knowledge, the effects of interventions on the prevention of other diseases associated with GDM, such as cardiovascular disease, have not been studied[49].

Due to the long-term risks associated with GDM and the opportunities for subsequent disease prevention, clinical practice guidelines recommend regular long-term follow-up healthcare. This may include lifelong regular screening for early diagnosis of diabetes or cardiovascular disease, and ongoing support for maintenance of positive health behaviours[41,50–52]. Despite this, evidence suggests that rates of long-term follow-up of women who have been diagnosed with GDM are suboptimal, with less than half of women receiving follow-up diabetes screening after 1 year postpartum[53–55]. General practice (GP) has been identified as an appropriate setting for long-term follow-up care of women with a history of GDM[24,56]. GPs can provide direct support and can connect women with parallel services, including Diabetes Prevention Programmes[57,58]. A descriptive cross-sectional survey conducted in Canada found that three quarters of women

with a history of GDM appear satisfied to transition to primary care-based settings after pregnancy[59,60]. However, fragmentation of care, deficits in interprofessional communication and uncertainty regarding professional roles and responsibilities can impact on the long-term care provided to these women[59,61,62]. Optimal models of care and factors influencing their delivery have not been established.

To our knowledge there have been no systematic attempts to provide an overview of the available research evidence on the long-term general practice-based healthcare of women with a history of GDM. Therefore, a comprehensive understanding of long-term general practice healthcare for women with a history of GDM is required if the rates and quality of follow-up are to be improved. The aim of this scoping review is to explore the current evidence base for the long-term care of women with a history of GDM in general practice.

Objectives

What are the extent, nature and key characteristics of research exploring long-term GP-based healthcare for women with a history of GDM, including:

- The experiences and perspectives of women with a history of GDM and their GPs
- Interventions studied in a GP setting, with particular focus on the range of interventions, the reporting of interventions and the reporting of socioeconomic characteristics of study populations
- Outcomes studied, with particular focus on physical outcomes to include the prevention of type 2 diabetes and cardiovascular disease and psychological outcomes
- What areas of the healthcare system are well-researched, and where are there research gaps, employing the Chronic Care Model as a guiding framework

Methods

The JBI Manual for Evidence Synthesis builds on previous scoping review methodological frameworks, most notably Arksey and O'Malley, and will guide this scoping review protocol[63,64]. Guidance will also be taken from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol framework[65].

Eligibility criteria

Studies will be selected according to the criteria outlined in Table 1. Explanation of the criteria follows.

Population

We will include studies examining general practice healthcare of non-pregnant adults with a previous history of GDM. Heterogenous screening approaches and diagnostic criteria

Table 1. Eligibility criteria for studies in the scoping review.

Category	Inclusion Criteria	Exclusion Criteria
Population	Non-pregnant adults with a previous history of GDM, diagnosed using established criteria	People living with other forms of diabetes Offspring of women with a history of GDM
Concept	Research examining any characteristic of healthcare occurring after initial post-partum glycaemia screening	Studies examining initial post-partum glycaemia screening only Studies that do not describe or evaluate healthcare following a diagnosis of GDM
Context	General Practice in any geographical or economic setting	Studies not based in general practice, including healthcare delivered in the community, home, hospital or through the internet Healthcare services led by specialists other than general practice (e.g. dietetics, physiotherapy, midwifery)
Language	Any	None
Types of Evidence Sources	Peer reviewed Empirical research including: Qualitative research Quantitative research Mixed-methods research Economic analyses	Case reports Case series Opinion pieces Evidence syntheses Position papers Clinical practice guidelines Policy documents Dissertations or theses

are used for GDM, with variations of oral glucose tolerance testing and the associated diagnostic thresholds adopted by different clinical practice guidelines[66]. Studies including any internationally accepted criteria for the diagnosis of GDM will be accepted. Studies involving adults with prediabetes after a GDM diagnosis, established type 2 diabetes after a GDM diagnosis, pre-existing diabetes, or other forms of diabetes will be excluded. For the purposes of this review, due to the absence of clinical guideline recommendations for structured long-term follow-up of children of women with a history of GDM, studies involving children will be excluded unless maternal general practice healthcare is also addressed in the study.

Concept

We will review research studies which investigate long-term healthcare of women with a history of GDM in general practice. This may include general practice-based research on interventions for prevention of diseases including GDM recurrence, type 2 diabetes or cardiovascular disease following GDM, as well as processes for screening or diagnosis of such conditions. We will also include studies examining factors that increase or decrease rates of the delivery and uptake of GP healthcare. We will include studies examining interactions between GPs and women with a history of GDM, or GPs and other health professionals regarding the care of these women. We will include studies exploring stakeholder perspectives of care in general practice. Stakeholders may include GPs, GP staff or women with a history of GDM receiving GP care. Educational interventions targeting GPs and GP staff will be included. Studies of care pathways or care programmes and economic analyses of long-term general practice healthcare for women with a history of GDM will be included. Studies that compare long-term general practice healthcare for women with a history of GDM with other forms of healthcare will be included. We will exclude studies examining early post-partum follow-up care. Long-term healthcare for women with a history of GDM will be defined for this study as healthcare provided beyond the early postpartum period.

Context

Studies included in this review will involve general practice settings, defined according to the WONCA definition[67]. This will exclude community- or home-based interventions aimed at promoting self-management only. This will also exclude evidence pertaining to hospital or specialist care only. Interventional studies carried out through research institutions or universities will be excluded if they are not delivered within a clinical general practice setting. Other forms of primary care, such as dietitian-led care, will not be included in this review. Studies occurring in any geographical and economic context will be considered, provided the care occurs within a general practice setting.

Language

No language restrictions will be applied. Non-English language studies will be translated using freely available proprietary translation software programmes. Initial translation will be carried out using Google Translate, with unclear translations being cross-checked with CUBITT translation[68,69].

Types of evidence sources

This scoping review will include published empirical qualitative, quantitative or mixed-methods studies. Economic analyses will be included. Primary sources cited by evidence syntheses arising from the search process will be included, but the evidence syntheses themselves will not be included. Grey literature will not be included. Case reports, case series and opinion pieces will not be included. We will exclude clinical practice guidelines, policy documents and the position papers of scientific bodies. We will exclude dissertations and PhD theses.

Search strategy

A health information specialist with experience in scoping reviews was consulted in the design of the search strategy. The three-step search approach recommended by JBI will be used[64]. After an initial search to assess relevant keywords and indexing terms, the search strategy was developed using medical subject headings (MeSH) and natural language text words or phrases related to the core concepts of GDM, GP and a Long-Term timeframe. We will search MEDLINE (Ovid), EMBASE (Elsevier), CINAHL, PsycINFO, Academic Search Complete and SocIndex. The search terms for MEDLINE (Ovid) are provided in Table 2. To accommodate the rapidly evolving healthcare landscape, and to permit permeation of the practice-changing findings of the Hyperglycemia and Adverse Pregnancy Outcomes study 2008, the search years will be limited to the past 10 years (2014 or later)[70]. To ensure a comprehensive search of published literature, reference lists and studies citing the accepted papers will be scanned. The reference lists of systematic reviews identified in the search will also be scanned.

Source of evidence selection

Results will be managed with the systematic review tool, Covidence (www.covidence.org). A pilot selection process will be conducted on 100 papers to refine the process, according to JBI recommendations. Full screening will proceed once agreement is at least 75%. After the full search is completed, two reviewers will independently conduct screening according to the eligibility criteria (RMcM, JOF). Initial title and abstract screening will be followed by full text screening of apparently eligible articles. Disagreements will be resolved by consensus or by a third reviewer (AJ). If additional information is required from authors to confirm eligibility status of a source, the corresponding author will be contacted by e-mail. Reasons for exclusion of full text sources will be recorded. The numbers of citations identified, duplicates removed, additions via alternative sources, records screened, and full text reviews will be reported. Inter-rater agreement for the screening of search results will be reported. The report of the selection process will be accompanied by a visual flowchart according to the PRISMA extension for scoping reviews[71].

Data extraction and analysis

Descriptive numerical summary

For the descriptive numerical summary of studies included in this review, data extraction will be developed and piloted to record the key information from each source[63]. The process is intended to map key features of the literature, such as study design, aims, methods, intervention type (if applicable) and key

Table 2. Search (MEDLINE (Ovid)).

	Query
1	("Gestational Diabetes" or GDM or "Pregnancy-Induced Diabetes" or (Pregnancy and (Diabetes or Hyperglycaemia or Dysglycaemia or "Glucose intolerance" or "Impaired glucose tolerance"))).ti. or ("Gestational Diabetes" or GDM or "Pregnancy-Induced Diabetes" or (Pregnancy and (Diabetes or Hyperglycaemia or Dysglycaemia or "Glucose intolerance" or "Impaired glucose tolerance"))).ab.
2	(Long-Term or "Long Term" or Follow-up or "Follow up" or "longitudinal" or "Chronic disease management" or "late complications" or "delayed effects").ti. or (Long-Term or "Long Term" or Follow-up or "Follow up" or "longitudinal" or "Chronic disease management" or "late complications" or "delayed effects").ab.
3	("General Practice" or "General Practitioners" or "GP" or "Family medicine" or "Family Physicians" or "FP" or "Primary Care" or "Primary Healthcare" or "PCP").ti. or ("General Practice" or "General Practitioners" or "GP" or "Family medicine" or "Family Physicians" or "FP" or "Primary Care" or "Primary Healthcare" or "PCP").ab.
4	Diabetes, Gestational.sh.
5	(Follow-up Studies or Chronic Disease).sh.
6	(General Practice or General Practitioners or Primary Health Care or Physicians, Primary Care or Family Practice or Physicians, Family).sh.
7	1 or 4
8	2 or 5
9	3 or 6
10	7 and 8 and 9

findings[63,72]. The factors for inclusion on the initial data extraction form are included in Table 3. The items chosen are suggested in the JBI methodology, and minor additions are included here. We will record studies' reporting of population characteristics according to the PROGRESS framework. This framework is used to identify key population factors influencing equity of outcomes, which are place of residence, race, occupation, gender, religion, education, socioeconomic status and social capital[73]. Reporting of these items permits assessment of inequity within a study[74]. The presence of an equity assessment within research is desired by policymakers[75]. Intervention descriptions and outcome details will be extracted from interventional studies. We will record the reporting of interventions in studies according to the Template for Intervention Description and Replication (TIDieR), a 12-item tool designed to improve the completeness of reporting of interventions[76]. Outcomes will be categorised according to the core outcome sets designed for the reporting of interventional studies in this population[77,78]. Psychological or emotional outcomes will be included in addition to the core outcome set items. This activity will be refined iteratively at the review stage by one author (JOF) applying the initial data extraction form to five to ten papers. Two authors (CN, JOF) will discuss and adjust until the forms are used consistently, and the data emerging contribute to answering the research question[72].

Analysis of the extracted data will involve the use of descriptive statistics to provide an overview of the included studies according to their key characteristics. Frequencies will be the predominant statistical method used. For evaluations of interventional studies, the frequencies of outcomes reported in relation to the core outcome set will also be described.

Qualitative mapping

The qualitative arm of the review will systematically categorise and map findings from included studies. A framework synthesis will be conducted[64,79,80]. Framework methodologies use a highly structured, transparent approach to mapping data in a manner appropriate to scoping reviews[64,80]. The components of the Chronic Care Model will be used as a 'Best Fit' *a priori* framework based methods described by Carroll and colleagues[81,82]. The Chronic Care Model is a primary care-based theoretical model which sets out the core components of a system of high-quality chronic disease management[83–85]. These components are the community linkage, the self-management support, organisation of healthcare delivery system, delivery system design, decision support and clinical information systems[83,84]. Implementation of these components is associated with benefits for people with a history of type 2 diabetes[85–89]. Adoption of the Chronic Care Model in the design of approaches to the diabetes management has been recommended by the American Diabetes Association[90]. No pre-existing theoretical frameworks specifically designed for understanding the care of women with a history of GDM were identified by the authors.

The qualitative analysis and mapping will involve four authors (RF, AJ, RM, JOF). One researcher (JOF) will extract the

Table 3. Factors for inclusion on the initial data extraction form.

Item	Data for Extraction
Author	First author
Year of Publication	Year
Setting	Country / Countries
	Economic developmental category (according to the World Bank's Gross National Income per capita)
Aims / Purpose	Self-identified aim
Methodology	Methodological design
Population (if applicable)	Sample Size
	Subgroup items reported (PROGRESS)
	Duration of follow-up (if applicable)
Intervention (if applicable)	Intervention description (TIDieR)
	Duration of intervention
Outcome (if applicable)	Primary Outcomes
	Secondary Outcomes
Key Findings	Key Findings
	PROGRESS subgroup differences
Research Recommendations	Author Recommendations for Future Research

relevant text data from all included studies to word processing software (Microsoft Word). The units of analysis will be the intervention descriptions, verbatim quotations from participants in primary studies, and the qualitative findings of the studies. NVivo software (www.lumivero.com) will be used for the coding process. Two authors (RF, JOF) will conduct a pilot coding process on two papers. This will involve line-by-line deductive coding of the extracted data against the *a priori* framework[81,82]. Existing definitions of the Chronic Care Model components will be used to guide the coding and categorisation. Team discussion will be used to specify subcategories that will further contribute to characterising the distribution of data in this subject area. Extracted data not accommodated by the framework will be inductively coded[82,91]. The pilot coding will be subject to discussion among the review team regarding the coding rationale and its alignment with the research objective. The research team will meet to discuss the coding after this initial pilot. One author (JOF) will then independently conduct coding of the full dataset. Data charting involves rearranging the coded data according to the framework components[79,80]. Coded data will be charted, and inductive codes not falling within the framework will be gathered for consideration of significant new concepts[81]. The research team will meet regularly and collectively interpret and map charted and inductively coded data, with particular focus on implications for the research question[79–81]. A final "map" that describes the evidence will then be produced in the form of a narrative summary.

Gaps, needs and priorities

Research gaps are areas where insufficient evidence prevents the formation of conclusions for a given research question[92]. Research needs are gaps that may inhibit stakeholder decision-making, while research priorities are gaps prioritised due to resource constraints[92]. Systematic methodologies for identifying gaps may also incorporate assessments of the quality of evidence beyond the scope of a scoping review[64,93]. In this case, gaps will be identified only from areas of absence or sparsity of findings in the descriptive numerical summary, outcome reporting and qualitative map[93]. Gaps will be reported according to the pertinent areas of inadequacy using the population, intervention, comparison, outcome and setting framework (PICOS)[93,94]. Stakeholder consultation is an approach frequently used to identifying needs and priorities[92,94]. Potential research needs and priorities will be proposed from discussion of the review findings among the current multidisciplinary research team, comprised of individuals from several important stakeholder groups on the topic: general practice, public health, health services research, nursing and endocrinology. Research recommendations stated within the reports of included studies will be identified through the data extraction process, as included in Table 3. These recommendations will

further inform the proposal of potential research needs and priorities.

Reporting
The PRISMA extension for Scoping Reviews (PRISMA-ScR) will be used to guide the report[71].

Dissemination plan
The intended audiences for this study will be researchers, health care professionals and policymakers who are involved in contributing to the structure of healthcare for women with a history of GDM, as well as the women themselves. This study will be submitted for publication in a peer-reviewed scientific journal and for scientific conference presentation. A plain English summary will be produced for women with a history of GDM.

Discussion
This review will synthesise research evidence on the long-term healthcare for women with a history of GDM in general practice. This corresponds with recent interest in a longitudinal perspective on GDM[24]. The methods detailed in this study protocol will provide transparency to the study's findings. Incorporating both qualitative and quantitative papers, and the use of a well-established theoretical model, the chronic care model, will strengthen the findings of the paper. However, because no previous theoretical models have been applied to the healthcare of women with a history of GDM, the study may identify a need for a new, tailored model to understand long-term healthcare for women with a history of GDM. The use of a multidisciplinary research team with expertise from General Practice, Endocrinology, Nursing and Public Health will further strengthen the paper's methodology and the interpretation of its results. Future research studies will be guided towards research gaps identified in this study.

Conclusion
This paper outlines a study protocol for a scoping review on the topic of GP healthcare for women with a history of GDM. The review will provide a synthesis of the current research evidence on the topic, and research recommendations regarding long-term follow-up of women with GDM in general practice.

Ethics and consent
Ethical approval and consent were not required.

Data availability
Underlying data
No data are associated with this article.

Contributions
James O'Flynn, Roles: Conceptualisation, Methodology, Writing – Original draft preparation, Writing – Review and editing

Rita McMorrow, Roles: Methodology, Writing – Review and editing

Tony Foley, Roles: Conceptualisation, Methodology, Writing - Review and editing

Rita Forde, Roles: Methodology, Writing - Review and editing

Sheena McHugh, Roles: Methodology, Writing - Review and editing

Christine Newman, Roles: Methodology, Writing - Review and editing

Aisling A. Jennings, Roles: Funding Acquisition, Conceptualisation, Methodology, Writing – Review and editing, Supervision

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Open Peer Review

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Version 2

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✔ **Alpesh Goyal**
Department of Endocrinology and Metabolism, All India Institute of Medical Sciences, Bhopal, Madhya Pradesh, India

Thanks for revising the manuscript in line with the reviewer suggestions. The changes incorporated are appropriate and improve the quality of this paper. I have no further comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Diabetes in Pregnancy and Adrenal disorders

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 07 March 2025

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? **Alpesh Goyal**
Department of Endocrinology and Metabolism, All India Institute of Medical Sciences, Bhopal, Madhya Pradesh, India

Thanks for the opportunity to review. The authors aim to perform a scoping review about long-

term care of women with GDM in healthcare practices and the research gaps therein. The authors present a protocol for this review, which is fairly well written. I have the following comments/suggestions:

1. Background para 2: there are updated studies that highlight the link between GDM and steatosis and may be referred to (Kubihal S, et al., 2021 [Ref 1] and Foo RX, et al., 2024 [Ref 2]).

2. Background para 3: Authors state that lifestyle interventions are efficacious to prevent T2DM after GDM. However, I would like to draw their attention to the most updated meta-analysis on efficacy of interventions to prevent T2DM after GDM by Lee et al (Journal of Diabetes 2024; Lee VY, et al., 2024 [Ref 3]). This MA reported equivocal efficacy, and highlighted the need for more pharmacology trials in this field. Thus, the evidence, at this time, is equivocal and more research is needed, especially the role of pharmacological interventions. The MA by Lee et al focused on individuals with GDM complicated pregnancy within 5 years postpartum, and hence excluded the DPP GDM subgroup (mean 656 weeks postpartum). Please account for these recent updates in your description.

3. I agree that the postpartum screening rates are quite dismal and reported at <50% in most studies (Keely E 2024 [Ref 4], Goyal A, et al., 2018 [Ref 5].) Is that also a thrust area for your scoping review?

4. What time window will be used to define "long-term postpartum follow-up" or "beyond initial postpartum screening"?. In many settings, the initial postpartum screen may not happen at 6-12 weeks and be delayed for years.

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Is the rationale for, and objectives of, the study clearly described?

Yes

Is the study design appropriate for the research question?

Yes

Are sufficient details of the methods provided to allow replication by others?
Yes

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Diabetes in Pregnancy and Adrenal disorders

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 31 Mar 2025

James O'Flynn

We are most grateful to the reviewer for this detailed contribution. We have submitted an updated version of the protocol that takes into consideration the points made by the reviewer, and which we feel is stronger as a result. We would like to take the opportunity to submit some more specific responses to the points made by the reviewer here:

- The link between hepatic steatosis
  - Thank you for signposting towards these updated studies. We have swapped in the larger and more recent of your two suggestions (the review by Foo and colleagues).
- The efficacy of lifestyle interventions in preventing Type 2 Diabetes after GDM (Background, paragraph 3)
  - Thank you for this comment. Indeed, statistical significance of the effects of lifestyle and pharmacological interventions on the incidence of type 2 diabetes and other outcome measures is inconsistent across the literature. The analysis you cite may raise the possibility of intervention and outcome timing as important factors. We have edited the text to emphasise the statistical limitations of the current literature on the subject: "A recent meta-analysis found that the hazard ratio of type 2 diabetes was significantly improved by interventions, while the relative risk did not achieve significance.1 This may occur if the effect of interventions is time-dependent, and may suggest that their effect may more readily delay than outright prevent the onset of type 2 diabetes." Thank you.
- Postpartum Screening as a thrust area for the review
  - Thank you for this comment. Indeed the rates are disappointing and this is indeed a key reason why we are performing this research. We have re-emphasised this in the last paragraph of the introduction: "Therefore, a comprehensive understanding of long-term general practice healthcare for women with a history of GDM is required *if the rates and quality of follow-up are to be improved*."

- The time window for "long-term postpartum follow-up"
  - Thank you for raising this point. We had considered defining a strict minimum time frame for inclusion, and ultimately decided that a more flexible definition would be appropriate. We agree with your point that there is variability in the occurrence of that initial test, with the recommendations for the initial follow-up screening to be between 4 weeks at the earliest, to 6 months in some guidelines, and sometimes substantially longer in practicality.2 In addition, some study types (for example, qualitative studies of women's experiences of healthcare) may explore a continuous timeframe from antenatal to years later. Because of these factors, a strict time-frame may impair the selection of some highly relevant papers. Authors' judgments will be used to interpret whether candidate papers focus only on the initial postpartum period or contain data looking beyond that. To reduce confusion, we have clarified the text to state that we want to explore research that explores beyond the early post-partum "period" rather than healthcare after initial "screening". Thank you.

The review provided valuable opportunities to improve the accuracy and clarity of the protocol, and we feel that the newly submitted version has benefitted from these changes. Thank you.

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Competing Interests: No competing interests were disclosed.

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Angela Flynn
Royal College of Surgeons in Ireland, Dublin, Ireland

Overall, this scoping review protocol is very well written, and focuses on the important topic of optimising health and reducing the risk of chronic disease in women with previous GDM. The protocol outlines the methodology that will be undertaken to map the existing research evidence on longterm GP based healthcare for women with previous GDM.

My major comment is increasing the clarity of the 'concept' of the scoping review. It needs to be clear that this review is mapping the research evidence and is not a review of current healthcare practices. The concept in Table 1 needs to reflect this as the currently stated 'characteristics of healthcare' does not suggest a research focus. Ensure it is clear throughout the article that the review is mapping research evidence related to the longterm care of women with previous GDM and is not evaluating health services.

Other comments:
It is not clear from the background what is meant by 'longterm care'. What do the authors mean by 'longterm healthcare' for women with previous GDM?

It is worth noting in the background although primary care has been identified as an appropriate setting for longterm follow up, there are also several prevention programmes rolled out internationally to prevent the risk of chronic disease in women with previous GDM. Diabetes prevention programmes exist in several countries and are delivered virtually, either through self referral or referral through primary care. GPs have a role to ensure women can access existing programmes.

The background is focused on prevention of chronic disease, however, the concept also focuses on prevention of GDM recurrence. Optimising preconception health in women with previous GDM is part of longterm care but is not mentioned in the background. There are multiple research papers on preconception care and how preconception care can be implemented in primary care; Schoenaker D, et al., 2024 (Ref 1) and Schoenaker D, et al., 2022 (Ref 2)

Due to the nature of the research, the authors should include adding in a grey literature search. It might be useful to identify educational interventions in primary care settings.

Agree with ensuring the search strategy is relevant, however, what is the rationale for the search being limited to the last 10 years? Please add in.

References

1. Schoenaker D, Lovegrove E, Santer M, Matvienko-Sikar K, et al.: Developing consensus on priorities for preconception care in the general practice setting in the UK: Study protocol.*PLoS One*. 2024; **19** (11): e0311578 PubMed Abstract | Publisher Full Text
2. Schoenaker D, Connolly A, Stephenson J: Preconception care in primary care: supporting patients to have healthier pregnancies and babies.*Br J Gen Pract*. 2022; **72** (717): 152 PubMed Abstract | Publisher Full Text

Is the rationale for, and objectives of, the study clearly described?

Yes

Is the study design appropriate for the research question?

Yes

Are sufficient details of the methods provided to allow replication by others?

Yes

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Maternal health research, in particular preconception, pregnancy, and postpartum research of women at high metabolic risk eg women living with obesity or those who develop diabetes in pregnancy

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 31 Mar 2025

James O'Flynn

We are very thankful for this peer review. We have considered the feedback and submitted an updated version of the protocol. We would like to take this opportunity to more directly respond to the points made by the reviewer:

- Mapping Evidence rather than evaluating health services
  - Thank you for raising this point. We have made adjustments emphasising that our focus is to review the research rather than to evaluate health services. These changes occur in the Objectives, in Table 1, in the first line of the Concept paragraph, in the Discussion and in the Conclusion. Thank you.

- The meaning of "Long term care"
  - Thank you for identifying this opportunity to improve the clarity of this concept. We have edited the fourth paragraph of the introduction to say that “this may include lifelong regular screening for early diagnosis of diabetes or cardiovascular disease, and ongoing support for maintenance of positive health behaviours”. We would hope that this gives clarity on the timeframe and the broad content of this care.

- Prevention programmes including DPP
  - Thank you. We agree with your suggestion that such programmes are sufficiently important to necessitate their inclusion in this protocol, and have now done so in the introduction: "GPs can provide direct support and can connect women with parallel services, including Diabetes Prevention Programmes."1,2 However, a detailed discussion of diabetes prevention programmes is omitted in this general-practice focused review.

- The importance of preventing GDM recurrence
  - Thank you for this comment. We agree that the protocol may benefit from emphasis on this important risk for these women. We have included a point on this within the introduction: "Data regarding the role for preconception care aimed at reducing the risk of GDM recurrence are also lacking.3,4,5. In spite of this, clinical practice guidelines frequently identify the importance of family

planning and contraception for women with a history of GDM.6" Thank you.

- Grey Literature
  - Thank you for raising this point. Grey literature may contain valuable sources, and, as you point out, may be particularly valuable for identifying educational interventions. However, the primary aim for this scoping review will be to synthesise empirical evidence from peer-reviewed publications. In the absence of an assessment of quality within a scoping review, this creates some standardisation of quality across the included studies. Furthermore, given the scope of the subject area, including grey literature would significantly expand the search and screening process, which may compromise the feasibility of this review. To improve the clarity of our protocol, we have stated our intention to omit grey literature more explicitly. Thank you.

- 10 year eligibility limit
  - Thank you for this comment. Rationale clarified within the text: "To accommodate the rapidly evolving healthcare landscape, and to permit permeation of the practice-changing findings of the Hyperglycemia and Adverse Pregnancy Outcomes study 2008, the search years will be limited to the past 10 years (2014 or later)"7

Again, we are most grateful for your review, which identifies a number of opportunities to strengthen this protocol. Thank you.

References:

1. Valabhji J, Barron E, Bradley D, Bakhai C, Fagg J, O'Neill S, et al. Early Outcomes From the English National Health Service Diabetes Prevention Programme. Diabetes Care. 2019 Dec 12;43(1):152–60.

2. Dennison RA, Ward RJ, Griffin SJ, Usher-Smith JA. Women's views on lifestyle changes to reduce the risk of developing Type 2 diabetes after gestational diabetes: a systematic review, qualitative synthesis and recommendations for practice. Diabet Med. 2019 Jun;36(6):702–17.

3. Phelan S, Jelalian E, Coustan D, Caughey AB, Castorino K, Hagobian T, et al. Randomized controlled trial of prepregnancy lifestyle intervention to reduce recurrence of gestational diabetes mellitus. Am J Obstet Gynecol. 2023 Aug 1;229(2):158.e1-158.e14.

4. Quotah OF, Andreeva D, Nowak KG, Dalrymple KV, Almubarak A, Patel A, et al. Interventions in preconception and pregnant women at risk of gestational diabetes; a systematic review and meta-analysis of randomised controlled trials. Diabetol Metab Syndr. 2024 Jan 4;16:8.

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7. HAPO Study Cooperative Research Group, Metzger BE, Lowe LP, Dyer AR, Trimble ER, Chaovarindr U, et al. Hyperglycemia and adverse pregnancy outcomes. N Engl J Med. 2008 May 8;358(19):1991–2002.

Competing Interests: No competing interests were disclosed.