



Research article

Screening and nursing management of gestational diabetes in Ghana: Evidence-based recommendations

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ABSTRACT

Objective: To describe the development of evidence-based recommendations for screening and nursing management of gestational diabetes mellitus (GDM) in Ghana and present the recommendations.

Design: A qualitative study.

Setting: Military Health Institutions in Ghana.

Measurements: Data from qualitative interviews with 7 women with GDM and 8 midwives, and an integrative literature review including available clinical practice guidelines on screening and nursing management of GDM, was used to develop the recommendations. The National Institute for Health and Care Excellence' steps guided the recommendations' development. Methodological quality of the recommendations was assessed based on an adapted version of the Appraisal of Guidelines for Research and Evaluation (AGREE II) tool. Six experts reviewed the recommendations and an infographic in support of the recommendations.

Findings: Two main recommendations and an infographic were developed, including: 1. Early screening and diagnosis of GDM, and 2. Involvement of women with GDM and their significant others during pregnancy, intrapartum and postpartum management, in a culturally and socio-economically appropriate manner.

Key conclusions: The recommendations and infographic, once reviewed and pilot tested, may assist midwives managing GDM in Ghana, with support of health institution management.

Implications for practice: The study highlights the need for recommendations which can be used by midwives to manage GDM in Ghana. The recommendations are the first to be contextualized for the Ghanaian setting.

1. Introduction

Being pregnant, going into labour and child delivery, may become a challenge for those women who develop gestational diabetes mellitus (GDM) [1]. GDM is defined by the American Diabetes Association as diabetes that is diagnosed for the first time in a pregnant woman during the second or the third trimester, and which did not exist before the pregnancy (pre-existing pre-gestational diabetes)

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[2]. In some pregnant women, the intrauterine environment brings about a rise in glycaemic rates, leading to complications such as GDM. GDM that is not properly assessed may result in the woman developing type 2 diabetes in future [3]. Thus, the condition must thus be managed to prevent it affecting the mother and the unborn foetus negatively [4].

Global GDM median estimates range between 6 and 13% in pregnant women, with a higher rate of 16.6% for Africa [5]. In 2018, the United States estimate for GDM was 9% of all pregnancies, while Central and South America reported 11%. In the sub-Saharan African Region the estimates were 14.28%, with Central Africa having the highest prevalence of 20.4%, and the Northern Africa sub-region having the lowest prevalence at 7.57% [6].

In Ghana, although updated statistics are not available, the estimated prevalence rate of GDM in pregnant women is around 10% [7]. Considering the general trend of increasing prevalence of GDM, if GDM is improperly managed, there is a risk of a growing number of women in future who develop type 2 diabetes mellitus after delivery [8]. It is therefore imperative to put in place interventions for early screening and diagnosis to provide management of GDM during the postpartum period and beyond, thereby preventing diabetes mellitus and associated complications to develop [5].

Although internationally, guidelines on screening and management of GDM are available that may be used to guide midwives in their practices, these are not contextualized and translated to accommodate the Ghanaian context [9]. In line with the findings of an integrative review regarding clinical practice guidelines' adherence during the management of GDM [10], the researcher's observations at the time of the current study suggested that screening and nursing management of GDM in the antenatal, intra partum and postpartum periods in Ghana is often done inconsistently and not according to the latest evidence. Thus, a need was identified for developing evidence-based recommendations (hereafter referred to as 'recommendations') in order to assist midwives in providing evidence-based care regarding the screening and management of GDM in Ghana. In so doing, the intention is to prevent the potential increase of, or deferred conversion to, type 2 diabetes mellitus as a result of GDM. This article aims to describe the development of recommendations for screening and nursing management of GDM in Ghana and to present the recommendations.

2. Methods

2.1. Design

To develop the recommendations, a qualitative study was conducted using the findings from a qualitative study including women with GDM and midwives managing women with GDM in Ghana, as well as findings of an integrative literature review.

3. Ethical approval

Ethical considerations were maintained throughout the study. Ethical clearance from the Ghana Armed Forces (ethics number GHQ/9109/A/MED) and permission from the head of department in the military institutions was obtained. Non-maleficence (as the study did not cause harm to participants), autonomy (as the participants could withdraw at any time during the study) and justice (as all participants were treated the same) were adhered to.

Table 1
Steps in the development of the recommendations (adapted from: NICE [15]).

Steps	Activity/application
Step 1: Purpose	The purpose of the recommendations is to provide guidance to midwives for the screening and nursing management of GDM in Ghana, with support of health institution management
Step 2: Choice of development	Qualitative interviews with women and midwives (stakeholders' input), followed by an integrative literature review including guidelines on the screening and management of women with GDM, to inform the content of the recommendations. Interviews were conducted first to avoid any pre-conceived opinions the researcher could have formed if the review had been conducted prior to the interviews
Step 3: Literature review	An integrative literature review
Step 4: Search for other evidence-based recommendations formulated into clinical guidelines	The integrative literature review (Step 3) was used to search, screen, appraise, extract and synthesise data from guidelines on the screening and management of women with GDM.
Step 5: Formulate draft recommendations	Draft recommendations were formulated, based on triangulated data from the interviews and integrative literature review (see 'Findings' for a summary of the results). The first five main domains of the Appraisal of Guidelines for Research & Evaluation (AGREE II) instrument were considered when developing the recommendations, namely: purpose, stakeholder involvement, rigour of development, clarity, and the applicability of the recommendations [16]. An infographic was also developed.
Step 6: Expert reviewers' selection	Six experts from appropriate disciplines (allied health care providers and experts in developing best practice guidelines) were purposively selected to enhance the recommendations and infographic's validity through their reviews.
Step 7: Review of the guideline by experts	A draft of the recommendations and infographic was sent via email to the expert reviewers for review, using the AGREE II tool [16].
Step 8: Final revised recommendations	The draft recommendations and infographic were revised in response to the feedback of the expert reviewers.

3.1. Setting

The development of the recommendations occurred in the context of Ghana. Ghana, classified as a Low-Income Developing Country, has a population in 2018 of about 29.6 million [11]. There are three different levels that comprises Ghana's healthcare sector: national, regional, and district level. Health care, including antenatal, intra-partum and postpartum care, is provided mainly by midwives at clinics and hospitals. However, access to health care varies greatly as patients in rural areas often do not have access to progressive healthcare services. This inaccessibility results in patients either relying on traditional African medicine or needing to travel major distances to obtain healthcare services [12].

Ghana's healthcare system faces major challenges, including a lack of hygiene and sanitation, insufficient health investments, and inadequate numbers of personnel and facilities [13]. The lack of guidelines and policies on the screening and nursing management of pregnant women who are at risk for GDM as well as those diagnosed with GDM in Ghana means that these women are often misdiagnosed or not diagnosed at all and, therefore, are not properly managed [14]. Hence the need for adequate guidance on the screening and management of GDM through evidence-based recommendations.

3.2. Recommendations' development

The development of the recommendations was done by the first author, using the adapted National Institute for Health and Care Excellence's steps [15], under supervision of the second and third authors. The steps and their application are summarised in Table 1.

The draft recommendations were developed based on a synthesis of two sets of data: qualitative findings from semi-structured interviews and an integrative literature review. The methods used are briefly described below.

3.3. Interviews

Using purposive sampling, seven women with GDM, between 28 and 45 years of age, with one to three children, as well as eight midwives working at military health institutions in Ghana who were in the age range of 32 and 50 years with between 2 and 12 years of clinical experience, were selected. The women and midwives were selected as they are the major stakeholders in the developed recommendations - women being the recipients and midwives being the intended users of the recommendations. Semi-structured interviews were conducted with both groups of participants related to experiences regarding the management/treatment received by the midwives (women) as well as the perceptions regarding the nursing management of women with GDM (midwives). Women's experiences and midwives' perspectives regarding the management of GDM assisted in developing recommendations tailored to the needs of both women and midwives.

Within a week after the interviews took place, the audio-recorded interviews were transcribed verbatim by the first author. To analyse the data, an adapted version of Tesch's eight steps of data analysis (as described by Creswell [17]), was used by the first author and an independent coder. Transcripts were read a couple of times and similar topics were listed, summarised in groups, coded and categorized whereafter themes and subthemes were formulated. Consensus was obtained between both coders regarding the final themes and sub-themes.

3.4. Integrative literature review

An integrative literature review based on adapted stages by Whittemore and Knafl [18] was conducted that included available existing clinical guidelines regarding the screening and management of GDM. An extensive literature search was conducted in June 2018 and updated April 2022, using a variety of electronic databases, including: BioMed Central, EBSCOhost (CINAHL, ERIC, Health Source: Nursing/Academic Edition, MasterFILE Premier, MEDLINE), JSTOR, PUBMED CENTRAL, SAGE, ScienceDirect, Google Scholar, Scopus and Wiley Online Library, followed by a manual search for grey literature using Google Scholar and Google.

Guidelines published in English between 2002 and 2022 were included which focussed on the management of GDM in terms of early screening for GDM and its management, including self-monitoring of blood glucose levels, lifestyle modifications and/or insulin

Table 2
Triangulation of qualitative and integrative literature review findings to develop the draft recommendations.

Qualitative findings	Draft recommendations
1. Education on GDM is lacking	2
2. Emotional support for women is critical	2
3. Involving the women and their significant others is important	2
4. Cultural and socio-economic issues affect the nursing management of GDM	2
Integrative literature review findings	Draft recommendations
1. The need for early screening and diagnosis of GDM	1
2. The need for nursing management of GDM	2
2.1 Management during pregnancy	2
2.2 Intra- partum management	2
2.3 Postpartum management	2

administration. Two independent reviewers performed a critical appraisal using the AGREE II instrument [16]. Extracted data of 18 guidelines was synthesised, using content analysis.

3.5. Triangulation of data for the draft recommendations

Table 2 presents the triangulation of the findings from the interviews and integrative literature review from which the draft recommendations were developed.

Based on the draft recommendations, an infographic was also developed regarding screening and management of GDM.

3.6. Recommendations and infographic review

Six purposively selected reviewers with expertise in midwifery and/or obstetrics or in guideline development were forwarded the recommendations and infographic via email. Expert reviewers included: two clinical nurse managers, an academic with an Advanced Practice Midwifery degree, a Consultant Obstetrician Gynaecologist, a Clinical Psychologist and a dietician with a Master's degree.

Reviewers were requested to appraise the draft recommendations using an adapted version of the AGREE II instrument [16], including only the following five out of seven domains: Domain 1: Scope and purpose; Domain 2: Stakeholder involvement; Domain 3: Rigour of development; Domain 4: Clarification of the recommendations; and Domain 5: The applicability of the recommendations. Each domain was scored using a 7-point Likert scale (1 'Strongly disagree' to 7 'Strongly agree' with how the recommendations adhered to the criteria in the AGREE II instrument's domains) using the following formula: $(\text{obtained score} - \text{minimum possible score}) \div (\text{maximum possible score} - \text{minimum possible score}) \times 100$

Recommendations obtained scores above 70% which refers high quality of domain scores from each reviewer. Feedback that was incorporated in the recommendations related to the addition of information relating to the referral system after screening and diagnosis (Reviewer 3).

2.8. Quality of data used to develop the recommendations and infographic

The developed recommendations and infographic's content was based on data from qualitative interviews and an integrative literature review, while its format was based on the adapted version of the AGREE II instrument [16]. NICE's validated steps [15] were applied during development of the recommendations, including an expert review enhancing face validity.

4. Findings

A total of two recommendations (entitled 'Recommendations for the screening and nursing management of GDM in Ghana'), providing guidance to midwives in this context, were identified, as outlined in Table 3.

The two recommendations are outlined below, with the supporting evidence from the interviews with women with GDM (acknowledged as 'per women') and midwives (acknowledged as 'per midwives'), and/or from relevant data from the guidelines included in the integrative literature review.

4.1. Recommendation 1: Early screening and diagnosis of GDM

Rationale: Early screening and diagnosis of GDM is crucial to adequately manage GDM and prevent the development of, or delayed conversion to, type 2 diabetes mellitus.

It is recommended that,

- Screening to determine if pregnant women are at risk for GDM must be done as early as possible, preferably at the first antenatal visit, and that the following risk factors in pregnant women must be noted by midwives:
 - overweight (BMI greater than 25 kg/m²)
 - maternal age (45 years and older)
 - lacking physical activity (exercises less than 3 times a week)
 - previous foetal macrosomia (above 4.5 kg)
 - family history of diabetes mellitus or history of GDM [19–24].

Table 3

Recommendations for the screening and nursing management of GDM in Ghana.

Recommendations
1. Early screening and diagnosis of GDM
2. Involvement of women with GDM and their significant others during pregnancy, intrapartum and postpartum management, in a culturally and socio-economically appropriate manner

- If at risk, early screening of pregnant women for the diagnosis of GDM—namely, at around 24 weeks–28 weeks using 2-hr 75 g oral glucose tolerance test (OGTT)—is essential. Recommended diagnostic parameters are that OGTT normal range for fasting is between 100 and 125 mg/dL for prediabetes, 126 mg/dL or greater for diabetes, and greater than 92 mg/dL for GDM [19–31].

4.2. Recommendation 2: Involvement of women with GDM and their significant others during pregnancy, intrapartum and postpartum management, in a culturally and socio-economically appropriate manner

Rationale: Involvement of women and significant others (relatives, partner, friend) in their management of GDM during pregnancy, intra partum and postpartum, in a culturally and socio-economically appropriate manner empowers them to take ownership of their health and provides support for adherence to the treatment or care plan and lifestyle changes required for optimal management of GDM.

It is recommended that women who are diagnosed with GDM and their significant others are involved in the following regarding GDM management, done in a culturally and socio-economically appropriate manner.

4.2.1. During pregnancy, it is recommended that

- Lifestyle changes/modifications (first line of treatment) are encouraged by the midwife through the following interventions:
 - An appointment with a dietician should be made to meet the women and her significant others for diet planning so that it is high in vegetable intake, and low in glycaemic index (minimum intake of 1600–1800 kcal/day) and carbohydrate (intake limited to 35%–45% of total calories). Women with GDM and their significant others should be involved, and the cultural background and social-economic circumstances of the woman must be considered in the diet plan (per women, midwives). The midwife must encourage the pregnant woman with GDM to adhere to a diet or nutrition plan identified with the dietician (per women, midwives) [19,21,23,25,27,29];
 - Women with GDM should be encouraged to do moderate exercises daily—for at least 30 minutes to 1 hour a day (in episodes of at least 10 minutes)—such as walking and armchair exercises (per midwives) [20–22,26,32].
- Health education that is culturally and socio-economically appropriate must be provided to women diagnosed with GDM and their significant others on:
 - Recognizing the signs of hypoglycaemia and treatment of those signs; implications of GDM for the woman and the foetus; management principles and steps to be taken to achieve management of GDM; and the importance of long-term follow-up [20,23,29,33].
 - Discussing the necessary socio-economic support needed from the relatives and significant others in the management of GDM (per women, midwives).
- Glycaemic control and monitoring of blood glucose levels must be done once a week by midwives, while monitoring of possible diabetic complications and checking of weight gain must be done by midwives during the women's antenatal visits [26,32,34,35].
- If lifestyle moderations are inadequate to keep blood glucose targets within acceptable levels (fasting blood sugar <5.3 mM, 1 h pre-prandial <7.8 mM and 2 hours postprandial <6.7 mM) after 1–2 weeks, the following steps should be taken:
 - Pharmacological treatment—preferably insulin or metformin and glyburide as effective alternatives, if not contraindicated or unacceptable for the woman—should be provided (per midwives) [19–27,30,32,34]. Women on pharmacological treatment must be taught how to inject themselves and adhere to the correct timings for injections.
 - Weekly glycaemic control and monitoring of blood glucose levels must be done. Where the woman is commenced on pharmacological treatment (such as insulin therapy) blood glucose levels must be monitored 2–3 weeks until delivery. For women diagnosed with GDM, self-monitoring of blood glucose levels must be done daily (in resource-limited settings), as opposed 3–4 times a day (in resourced settings), in the manner taught by the midwife to the women and their significant others, including how to use the glucometer (per women, midwives) [20–22,25].
- Monthly blood pressure and dipstick urine protein should be done (in low-resource settings), as well as an ultrasound between 30 and 32 weeks of gestation to estimate foetal weight [20,29].
- When requested by medical practitioners, the following information must be provided by midwives at any time during gestation: the pregnant woman's health history, measured blood glucose levels, assessment of all medical risk factors for GDM and results from completion of the OGTT (per midwives).
- Women with GDM and their significant others must be offered regular feedback related to test results, treatment plans and their health state throughout the process of the management of their GDM (per midwives).

4.2.2. Intrapartum, it is recommended that

- Women with GDM and their significant others must be educated, before labour sets in, on their management during labour and delivery and of the requirement to fully cooperate during labour and delivery (per midwives).
- To reduce the risk for stillbirths, an elective induction at 38–40 weeks is performed [22,23,27,32].
- Close monitoring of women with GDM during labour until delivery should be done every 30 minutes to one hour to maintain maternal euglycemia to prevent neonatal hypoglycaemia, which is caused by hyperinsulinemia in the baby as a result of hyperglycaemia in the mother [22–24,27,29,35].

- Maternal blood glucose levels should be maintained at between 4.0 mM and 7.0 mM, with glucose (if blood glucose levels <4.0 mM), and insulin infusion should be provided during labour and delivery (if blood glucose levels >7.0 mM) [22–24,27,29,35].

4.2.3. Postpartum, it is recommended that

- Immediately post-delivery, blood glucose-lowering medication (such as insulin) should be decreased [19–22,26,27,29].

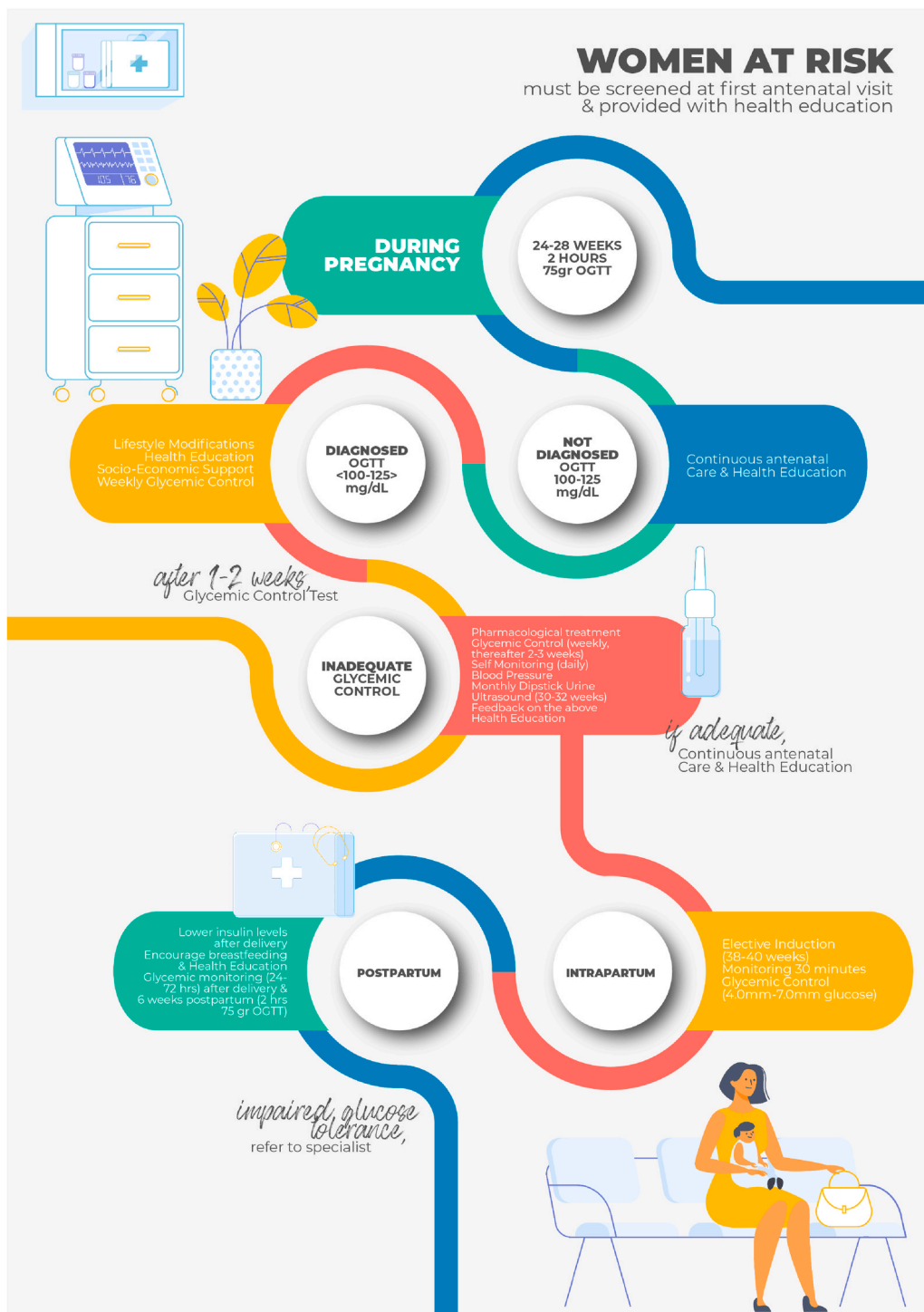


Fig. 1. Infographic of the screening and management of GDM.

- Immediately after delivery, women should breastfeed their new-borns, preventing hypoglycaemia in the new born [19–23,26,27,29,35].
- Women with a history of GDM and their significant others should be educated about maternal hypoglycaemia when breastfeeding [24] and the women should be given skilled lactation support [20,29].
- Blood glucose levels are checked 24–72 h after delivery (Blumer et al., 2013) and at least six weeks' postpartum, using 2-hr 75 g OGTT for early detection of diabetes mellitus, impaired glucose tolerance or impaired fasting glucose. The importance of these checks must be explained to the women with GDM and their significant others [22–24,35].
- Women with impaired glucose tolerance or with impaired fasting glucose must be referred for specialist care for prevention therapy [35].
- During the six weeks' follow-up, education and counselling should be provided to women with a history of GDM and their significant others on preventative lifestyle modifications to reduce the risk of type 2 diabetes [19,20,23,25–27,29,30,35] specifically regarding:
 - their diet, weight control and exercise requirements, with possible referral to a dietician [27,30];
 - the signs and symptoms of hyperglycaemia [23];
 - the benefits of continuous breastfeeding for a minimum of 3–4 months postpartum [27,30] or longer [22] to decrease childhood obesity, glucose intolerance and prevent diabetes in future;
 - If applicable: the risk of developing GDM in future pregnancies and the benefits of optimizing postpartum and interpregnancy weight [29].

Fig. 1 presents an infographic for the route to follow for screening and nursing management of women with GDM.

5. Discussion

This paper aimed to describe the development of evidence-based recommendations for the nursing management of GDM in Ghana and present these recommendations. The recommendations in this study were the first to be developed and contextualized for the Ghanaian setting. A total of two main recommendations were developed, including 1) early screening and diagnosis of GDM; 2) involvement of women with GDM and their significant others during pregnancy, intrapartum and postpartum management, in a culturally and socio-economically appropriate manner.

Early screening and diagnosis of GDM for effective management of GDM has also been recommended elsewhere [36]. For pregnant women at risk, it seems the earliest diagnosis can be made from 24 weeks to 28 weeks of gestation as the benefit of an earlier diagnosis shows conflicting results [36]. Most literature recommends a 75 g OGTT to assist with diagnosing GDM. However, it remains difficult to define clear-cut diagnostic levels as there seems to be a direct and continuous association between maternal hyperglycaemia and perinatal adverse outcomes [37,38]. Furthermore, the feasibility for conduct of the OGTT for a low-income developing country, such as Ghana, remains unknown and therefore requiring further exploration [20].

Management of GDM involve lifestyle modifications related to diet, self-monitored management, and exercise, which have been found difficult to adhere to by women diagnosed with GDM [39,40]. Therefore, involvement of the women and their significant others in their management during pregnancy, intrapartum and postpartum is crucial to achieve adherence to the care plan to manage GDM, leading to effective pregnancy and post-partum outcomes. Active participation of a woman in the management of her blood glucose levels, assists her in being informed about her state of her health, which enhances a feeling of empowerment and overall wellbeing [41,42]. Further, consistent engagement of midwives with woman's significant others, including family members, a partner, friends or colleagues, and involving them in counselling, education and feedback during the management process needs to be considered. The involvement of relatives was mentioned by other researchers as a source of support and complimentary care from significant others has been reported to be sought by women diagnosed with GDM [43,44]. Social support in the management of GDM was identified as crucial for effective glycaemic control [45]. Further, in order to empower women to take ownership of their health, GDM education is crucial to the women and their significant others as this provides them access to the best available evidence regarding screening and management of GDM, which can result in social change in the community and a healthier population [46]. GDM education should therefore be an integral part of the management of GDM and qualified midwives must therefore be given opportunities to attend GDM in-service training workshops to keep abreast of the latest evidence regarding the management of GDM [47,48].

A woman's culture in the management of GDM should be considered. To achieve optimum results of a care plan, the medical team needs to take account of the fact that the woman comes from a family within a specific community that may draw on a range of different ethnic and cultural backgrounds [49]. Furthermore, diversity in the care of patients by midwives in the context of multi-cultural societies—especially where diet is a key factor in the effective management of GDM—needs to be considered by midwives to enhance adherence with the care plan, including lifestyle moderations and treatment [50].

Addressing socio-economic challenges of the woman with GDM is crucial to the achievement of positive outcomes when managing GDM, as a commonly cited barrier to GDM management includes financial difficulties [51,52]. In Ghana and similar low-income settings, financial considerations are mainly related to the cost of healthcare, treatment (e.g. insulin), medical supplies (blood glucose test strips), transport to access healthcare, and the inability to access healthy food [51], which further underlines the importance of involving members of the woman's close support network in GDM management [53]. Further, midwives have a responsibility to use the available resources, such as medical consumables, wisely [54–56] and should be trained to educate the women with GDM as well as significant others on how to use these consumables in such a way that efficiency is enhanced.

However, it must be noted that there was a lack of emphasis on education and resources in the identified guidelines. This lack of

emphasis can be explained by the fact that they were clinical guidelines which focused on the clinical aspects of screening and management of GDM as opposed to non-clinical aspects, such as social, cultural or socioeconomic aspects. Furthermore, with the exception of one guideline [20], the guidelines supporting the recommendations were developed mainly in high-income countries and did not consider the socio-economical challenges and cultural aspects of management of GDM, the former which are experienced in many low-income countries, such as Ghana [40,51,57]. Globally, the socio-economic and cultural aspects need further exploration and consideration in guidelines related to screening and management of GDM. Finally, the developed recommendations and infographic should be further developed and pilot-tested in order to be used by midwives in similar low-income settings.

5.1. Strengths and limitations of the study

Although the developed recommendations were based on a triangulation of findings of qualitative data and existing evidence-based clinical practice guidelines, the guidelines on screening and management of GDM that were used to inform the practice recommendations, for the most part, did not consider low-income settings such as Ghana. Although the recommendations were developed by the first author under supervision of the second and third authors, a validated stepwise process by NICE [15] was used, including expert review, and validated tools (AGREE II tool by Brouwers et al. [16]) were used in its development.

6. Conclusion

The screening and management of GDM in Ghana requires involvement of the woman with GDM and significant others while considering culture and socio-economics to offer enhanced GDM screening and management and subsequently improved maternal and infant outcomes. Two recommendations were developed against the background of non-existence of recommendations for the screening and nursing management of GDM in Ghana—the lack of which challenges midwives to provide efficient and quality care to women diagnosed with GDM.

The developed recommendations and supporting infographic for the screening and nursing management of GDM can enable midwives in Ghana to offer quality nursing care to women diagnosed with GDM as well as assist hospital management in supporting midwives in their care for these women. The developed recommendations and infographic should however be further reviewed and be pilot tested in order to be used by midwives managing GDM in Ghana, with the support of health institution management.

Author contribution statement

Gwendolyn Patience Mensah: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data. Dalena (R.M.) van Rooyen: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper. Wilma ten Ham-Baloyi: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no competing interests.

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