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ORIGINAL ARTICLE

Clinicians' perspectives on gestational diabetes screening during the global COVID-19 pandemic in Australia

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Aim: There is no international consensus for the screening and diagnosis of gestational diabetes mellitus (GDM). In March 2020, modified screening and diagnostic recommendations were rapidly implemented in Queensland, Australia, in response to the COVID-19 pandemic. How clinicians perceived and used these changes can provide insights to support high-quality clinical practice and provide lessons for future policy changes. The aim of this study was to understand clinicians' perceptions and use of COVID-19 changes to GDM screening and diagnostic recommendations.
Methods: Queensland healthcare professionals responsible for diagnosing or caring for women with GDM were recruited for semi-structured telephone interviews. Data analysis of transcribed interviews used inductive reflexive thematic analysis.
Results: Seventeen interviews were conducted with the following participants: six midwives/nurses, three endocrinologists, two general practitioners, two general practitioners/obstetricians, two diabetes educators, one dietitian and one obstetrician. Three themes emerged: communication and implementation, perceptions and value of evidence and diversity in perceptions of GDM screening. Overall, clinicians welcomed the rapid changes during the initial uncertainty of the pandemic, but as COVID-19 became less of a threat to the Queensland healthcare system, some questioned the underlying evidence base. In areas where GDM was more prevalent, clinicians more frequently worried about missed diagnoses, whereas others who felt that overdiagnosis had occurred in the past continued to support the changes.
Conclusions: These findings highlight the challenges to changing policy when clinicians have diverse (and often strongly held) views.

KEYWORDS
COVID-19, gestational diabetes mellitus, health care professional, maternity, SARS-CoV-2

INTRODUCTION

Gestational diabetes mellitus (GDM) is a common pregnancy condition associated with adverse maternal and infant outcomes.[1] Identification and appropriate management of GDM can reduce the risks associated with GDM.[2,3] Consequently, there has been much focus on the screening and diagnosis of GDM. However, the 2010 recommendations proposed by the International Association of Diabetes in Pregnancy Study Group (IADPSG)[4] and the subsequent 2013 World Health Organization recommendations[1] have been the subject of debate, and there is currently no international consensus. Countries that have adopted universal one-step screening along with the recommended diagnostic criteria have experienced a 35% relative increase in GDM diagnosis rates.[5–7]

Concerns have been raised regarding the IADPSG diagnostic criteria leading to overdiagnosis with consequent 'medicalisation' of pregnancy, increased and unnecessary interventions, resources being stretched and women not benefitting from treatment.[8,9] In the midst of this uncertainty, understanding clinicians' perceptions and experiences is instrumental to informing better implementation of uptake of quality care.[10,11]

The COVID-19 pandemic was the catalyst for changing healthcare delivery. During this period, guidelines for diagnosing GDM were rapidly changed. To minimise the exposure to SARS-CoV-2 at pathology centres, healthcare jurisdictions changed from a one-step to a two-step process for diagnosing GDM. In Queensland, recommendations to temporarily change GDM screening and diagnosis pathways were first published by Queensland Health on 31 March 2020 and communicated to primary-care physicians the following day. The revised strategy was based on an initial screening fasting blood glucose (FBG) test (guideline advisors included four authors of this paper, M.D., H.D.M., L.C. and S.deJ).[12] An FBG of more than 5.1 mmol/L was diagnostic of GDM, and an FBG less than 4.7 mmol/L did not require further testing. Only women with FBG between 4.7 and 5.1 mmol/L proceeded to a 75-g oral glucose tolerance test (OGTT) to confirm or rule out GDM.[12] The recommendations were in place throughout 2020 and 2021 in the COVID-19 and pregnancy clinical guidelines, but it was unknown when individual Queensland Health services reverted to the standard one-step screening process (using OGTT) as this varied based on community risk of COVID-19 transmission. Nationally, the Australasian Diabetes in Pregnancy Society (ADIPS) recommended a tiered system based on infection risk and included the Queensland Health changes (preparation included two authors: L.C. and H.D.M., published 7 April 2020).[13] These GDM recommendations provided an opportunity to understand the uptake and application of the many COVID-19-associated guideline changes. Although studies have focused on assessing the impact of 'missed' diagnosis of GDM,[14–16] few have sought to understand clinician experiences. [Correction added on 05 Sep 2022, after first online publication: In the introduction paragraph the authors who are attributed to the guideline development are changed from ", M.D., H.D.M., J.D. and S.J." to "M.D., H.D.M., L.C. and S.deJ." and " M.D. and H.D.M.," to "L.C. and H.D.M., "]

In this study, we aimed to understand clinicians' perceptions and use of COVID-19 changes to GDM screening and diagnostic recommendations in Queensland. The impact of this qualitative study will help inform future implementation of guidelines and GDM practice changes.

MATERIALS AND METHODS

This exploratory, qualitative study used semi-structured phone interviews to examine clinicians' experiences and perspectives about changes to GDM screening and diagnosis during the COVID-19 pandemic, when compared to previous experiences in clinical practice.

The theoretical paradigm of pragmatism was used as it aligned with the underlying aim of the project, to gain practical and applied knowledge to solve real-world problems[17] and produce 'actionable knowledge'.[18]

Clinicians were recruited via purposive and snowball sampling through emails to clinical and professional networks. This email was also circulated to known contacts for dissemination, as well as posted on social media platforms. To be eligible, clinicians needed to be involved in caring for pregnant women in Queensland and experienced in the screening and diagnosis of GDM before and during the implementation of the modified COVID-19 recommendations.[19]

Participants completed an online registration that screened for eligibility and collected information about the participant's profession, years of clinical practice and workplace location. Individual interviews were conducted via phone. Verbal consent was gained for voice recording. Based on the theory of data saturation, no predetermined sample size was set.[20] The interview guide is provided in Appendix S1.

An ethics exemption was granted from the Royal Brisbane and Women's Human Research Ethics Committee as the study was a quality assurance activity evaluating clinical care (LNR/2020/QRBW/69186).

Data collection

Interviews were conducted with clinicians between March and May 2021 by a trained research assistant. The interview guide used open-ended questions that encouraged the clinicians to discuss aspects of the modified GDM recommendations that were important to them in the context of their health discipline and workplace to explore a wide range of clinical experiences. The guide was developed and adapted by the research team to ensure validity of the research question. Prompts in the interview guide covered topics related to experiences of discussing GDM screening with women; thoughts of GDM screening recommendations before and after the pandemic; and challenges, concerns and benefits of the changes. Participants were also given an opportunity to discuss any other thoughts or experiences related to screening and diagnosis of GDM.

Interviews were audio recorded using the smartphone app 'Otter'. Transcriptions were reviewed and corrected while listening to the audio recording. All participants were assigned an anonymous identifier number, and identifiable details were removed. Words such as 'um' and 'uh' were removed.

Data analysis

Data was analysed using an inductive, reflexive thematic analysis approach, which allowed for flexibility and evolution in the coding and theme development process, and further interpretations as the researchers became more familiar with the data.[21]

Interview transcripts were reread to ensure accuracy, and each sentence was analysed and coded using NVivo 12 Plus. Initial coding was made by one researcher (E.S.), with a second researcher (N.M.) independently reviewing the transcriptions and creating codes. A third researcher (S.J.) read all the transcripts for familiarity. In line with reflexive thematic analysis philosophy,[22] consensus of themes was achieved through discussion and creation of mind maps to demonstrate the relationships between themes.

RESULTS

Twenty-three clinicians registered to participate; however, six did not respond when contacted. Seventeen interviews were conducted. As the recruitment involved wide dissemination through clinical networks, social media and snowballing through known contacts, the number of clinicians approached is unknown. Table 1 provides participant characteristics.

Three overarching themes were determined: communication and implementation; perception and value of evidence; and diversity in perceptions of GDM testing. The theme-related sub-themes and example quotes are presented in Table 2.

TABLE 1 Characteristics of clinicians interviewed

	Number (%)
Profession	
Midwife or nurse	6 (35)
Endocrinologist	3 (18)
General practitioner	2 (12)
General practitioner obstetrician	2 (12)
Diabetes educator	2 (12)
Dietitian	1 (6)
Obstetrician	1 (6)
Years in profession	
1–5	1 (6)
6–10	6 (35)
11–15	4 (24)
16–20	2 (12)
>20	4 (24)
Years of caring for women with GDM	
1–5	5 (30)
6–10	6 (35)
11–15	5 (30)
16–20	1 (6)
>20	
Geographic location	
Metropolitan	8 (47)
Regional	4 (24)
Rural	4 (24)
Remote	1 (6)
Workplace	
Public	12 (71)
Work both private and public (endocrinologists or obstetricians)	3 (18)
Primary care (general practitioners)	2 (12)

GDM, gestational diabetes mellitus.

Communication and implementation

Clinicians discussed the importance of timely and clear communication from professional bodies. Information from official sources was valued; however, informal discussions with colleagues were important to share opinions about the modifications and to inform those who were unaware of changes.

Official communication

Clinicians reported that the modified recommendations were circulated promptly by Queensland Health. Clinicians agreed with the decision to change the screening methods, with the aim of protecting pregnant women as important, especially early in the pandemic.

However, some clinicians expressed that once there was a better idea of the minimal spread of COVID-19 in Queensland, the recommendations needed to be reviewed and rescinded.

Different sources of 'official communication' created some confusion among clinicians. Soon after the Queensland Health recommendations, ADIPS released recommendations based on COVID risk. Some clinicians preferred this to the Queensland Health recommendations.

Informal discussions

Once formal communication of the changes was circulated, clinicians often had informal discussions with colleagues and shared their opinion on the implemented changes, particularly when clinicians were dissatisfied or concerned about the changes.

Practicalities of implementation

Although official messages about the changes were circulated promptly, clinicians still reported some difficulties with

TABLE 2 Themes, sub-themes and example quotes from telephone interviews exploring clinicians' perspectives on gestation diabetes screening during the COVID-19 pandemic in Australia

Theme	Sub-theme	Example clinician quotes
Communication and implementation	Official communication	'To be honest, my first thought was, I'm really glad they've made a decisive plan early, and I thought it looked reasonable. Particularly at that time we were so keen to kind of keep anyone out of hospital that we could.... I thought it was sensible and I thought it was timely' (clinician 12, endocrinologist) 'And it did speak to the fact that, you know, we were in a really unpredictable world. And I thought, actually what came out of that quite well, is that there was open disclosure and discussion about we were in an unpredictable world and making the best of the situation, and that we made the decision, the best decision we can with the knowledge that we have' (clinician 2, GP) 'I went to look at more closely at the ADIPS guideline and the ADIPS guideline has the different zones and the classification of where you live, so the green zone, red zone, whatever. And if you live in a green zone, it means that you shouldn't be using the COVID guidelines, it should be standard testing' 'And that's why I think the ADIPS guidelines was a lot better because it gave you the option. And it also gave you the option of changing from one to the other, depending on the situation' (clinician 1, endocrinologist)
	Informal discussion	'That was a bit of discussion point and sort of like, well, where did these numbers come from and that sort of thing' (clinician 17, diabetes educator) 'So, in Darwin, they have a similar population to here. And so, I asked them, are you changing over to the new COVID screening guidelines?' (clinician 1, endocrinologist)
	Practicalities of implementation	'You know, making sure the whole team was on board. I wasn't ordering a GTT today and a colleague ordering a fasting BSL the next day. So, just making sure that we're all doing the same thing at the same time' (clinician 9, GP obstetrician) 'Practically, with the process of a health professional reviewing that result, and then sending them for a full glucose tolerance test, I was worried about the time that would go if there was going to be four weeks between the two tests. What if someone does have gestational diabetes, that's quite a clinical risk to have things delayed by that long' (clinician 3, dietitian) 'Our pathology lab automatically notifies if, when the OGTT is positive...., there was no system we were able to bring in that would notify us for just the fasting, because there was nothing that documented these women were pregnant. So, in the system of where the pathologist, even if we wrote it on the request form, the system, so the pathology staff didn't have that flagged anywhere' (clinician 14, obstetrician) 'I think the GPs were a little bit confused. I think because it happened so quickly' (clinician 11, diabetes educator)
Perception and value of evidence		'I did have concerns about the comment in the initial amendments to the flow chart about, that 95% of women who have a blood glucose level of less than 4.6 are most unlikely to have diabetes. That kind of rose my eyebrows a bit and I did wonder where that evidence was from.... I thought oh gosh, where did they get that figure from? And there was no link to it, it just said studies suggested. And I'm thinking, oh, I'm not sure if I'm happy with suggested in a guideline' (clinician 10, midwife) 'A decision had to be made on, pretty much on the spot... the issue was having women sitting together for two hours in places where, was no longer going to be an option. So, essentially it was an overnight decision based on no research, evidence, guidelines or any of these. It was completely a pragmatic decision' (clinician 6, endocrinologist) 'So, I had a number of obstetricians who I worked with who didn't agree with the new guidelines. One of them actually told me that RANZCOG, so the Royal Australian New Zealand College of Gynecologists disagreed with the guideline and were going to create a statement that was, I guess contradicting it. I never saw anything of that nature actually come out, but that was their opinion. And so they use that as a way to justify sending all their women for a full GTT' (clinician 3, dietitian) 'I brought it up with the statewide committee, spoke to *names redacted* via email and said that it's not working for *place redacted*, that we would miss all of these [women]. And then on a local level we decided to combine a risk based approach with the fastings and we still did more OGTTs than the guideline recommended' (clinician 14, obstetrician) 'I think if the Queensland Maternity Guidelines had confidence in it as a screening tool, I'd be very happy to keep using it ... as I said, I'm quite guideline driven, so I'm happy to do whatever they consider to be the best screening tool' (clinician 9, GP obstetrician) 'I just simply follow the guidelines' (clinician 2, GP)

TABLE 2 (Continued)

Theme	Sub-theme	Example clinician quotes
Diversity in perceptions of GDM testing	Priorities of outcomes	'I think that we have seen a shift in an increase in the number of women diagnosed, but I don't think that's a bad thing' (clinician 14, obstetrician) 'I think it's a good idea because we're actually picking women up that haven't had any risk factors. So, it is identifying. I'm not sure quite sure for the postnatal outcome of the babies or post-delivery' (clinician 11, diabetes educator) 'You have to wonder, you know, whether throwing that much money and resources at low risk women is worth it' (clinician 8, midwife)
	Risk management	'I'm not convinced there are any benefits from a big picture point of view. I think if you ask patients they would probably say it's nice to not sit there for two hours.... But I wouldn't say that I think that's necessarily enough of a benefit to consider it the right way forward without knowing what we're doing with it. The primary consideration can only be what's the best option to maximise the outcomes for the woman and the baby. That's always number one' (clinician 6, endocrinologist) 'Well, I always thought it was quite difficult for women to have to do a full GTT, that's quite unpleasant and takes time' (clinician 15, GP obstetrician) 'There are plenty of pockets in the southeast corner where this is not appropriate, your ethnicity count, all of your other risk factors count, so it's really a much more individualised, and it's not appropriate for a high risk woman to not be screen properly ... we did an audit at the time, and we found that we would be missing between 30 and 40% of all of our women with GDM' (clinician 1, endocrinologist) 'I did my own audit locally and found that I disagreed with their cut off for fasting BSLs ... we looked at all the fastings and we would have missed 40% of our women' (clinician 14) 'I think it's a bit more, more acknowledges the spectrum of risk ... accepting that there's a spectrum of risk, and feeding a woman's risk factors perhaps into a calculator and thinking about her individual risk rather than imposing a very strict cut-off on the whole population. So I do think that, GPs, particularly those who work in shared care, are definitely sophisticated enough to understand spectrum of risk and feed a woman's data perhaps into a risk calculator. So, I think that might be better than universal screening, and it might be easier to sort of explain to women' (clinician 2, GP) 'I've looked after plenty of women with diabetes and pregnancy who don't meet the criteria for high risk screening, so, yeah, I think universal screening, you have to definitely go that way' (clinician 6, endocrinologist)
	Thoughts for the future	'I think the women would think that there's a benefit. If they only have to do a fasting' (clinician 14, obstetrician) 'If you've got a fasting over 5.1, then why do you need to go and have the OGTT? ... I guess it would be nice to not have to make everyone go and sit and do that test' (clinician 17, diabetes educator) 'My initial thoughts were, wow that's great! Women are going to be really happy about that. And, why haven't we been doing this in the past? Why has everyone been having an oral GTT? Particularly because there are many women who find the oral GTT, you know, I don't want to put too strong a word on it, but some find it quite traumatic. You know, they faint, they vomit. It's not an enjoyable experience for a lot of women' (clinician 8, midwife) 'I think, at the end of the day, women were actually having some testing done. And I think that far outweighs them just not getting it done, and potentially getting missed' (clinician 16, midwife)

ADIPS, Australasian Diabetes in Pregnancy Society; GDM, gestational diabetes mellitus; GP, general practitioner; GTT, glucose tolerance test; OGTT, oral glucose tolerance test; RANZCOG, Royal Australian New Zealand College of Obstetricians and Gynaecologists.

implementing the changes. These were mainly due to initial confusion about what the changes meant for their clinical practice, problems in ensuring consistency within a service and the practicalities of organising new systems to accommodate the recommendations. Some clinicians also expressed concern about whether the changes had been recognised by primary- or private-care physicians.

Although difficulties were encountered, clinicians felt processes could easily be changed to accommodate the modifications once they understood how they impacted their work.

During the interviews, many clinicians expressed they had mostly, or in part, returned to the previous Queensland diagnostic guidelines as the perceived threat of COVID-19 remained relatively low.

Perception and value of evidence

Some clinicians expressed that evidenced-based practice was an important part of their identity as a health professional. An apparent lack of evidence to support the modified recommendations

was a concern, leaving some clinicians searching for other official sources that better aligned with their evidence base.

Other clinicians accepted the expert role of health authorities in making these changes and the circumstances in which they were made.

Diversity in perceptions of GDM testing

A wide range of perceptions and interpretations of risk–benefit analysis were evident in the interviews with clinicians. Generalist practitioners focused more on potential harms of overdiagnosis, whereas others focused on potential harms of a missed diagnosis. These differences were also associated with opinions on whether continuation of the modified recommendations was appropriate.

Priorities of outcomes

Clinicians varied in their beliefs of what they considered to be a 'good outcome' for women. Some clinicians felt the diagnosis of GDM was an outcome in itself, whereas other clinicians considered maternal and infant outcomes. These opinions were classified broadly into two categories: recognising the risk of overdiagnosis of GDM as a necessary and acceptable result or worrying that otherwise low-risk women were being diagnosed as GDM, and this was a potential concern.

Risk management

Weighing up the risks and benefits was commonly discussed, with clinicians interpreting what was 'best' for the woman differently. Clinicians either took a medicalised approach and largely appeared to deprioritise the woman's experience of GDM screening as a necessary evil or were empathetic to the difficulties women encountered when undergoing screening tests.

Commonly, clinicians identified that women within their health catchment area were different to the average woman, indicating their area of practice serviced more high-risk women, and therefore modified screening criteria could not be applied safely.

Perceptions of who should be screened based on risk was sometimes related to professional roles. Clinicians who were accepting of the modified screening criteria were also more likely to acknowledge the benefit of a maternal risk assessment to guide GDM screening and recognise the importance of individualising care.

However, many clinicians felt that a one-step universal screening was the most appropriate method for detecting GDM, even for women at low risk.

Thoughts for the future

When asked directly about the benefits of changes, most clinicians identified the reduced burden on women as the main or only potential benefit. Where the clinician was not in favour of continuing with the updated changes, this was also generally prefaced with the observation that this alone is not a good benefit to warrant permanent changes to screening and diagnosis.

Clinicians who were in favour of continuing with using FBG screening tests reported that the uptake of testing within women was higher due to the simplicity of the test itself, which improved their adherence to testing protocols.

DISCUSSION

This study aimed to understand clinicians, perceptions and experiences using COVID-19 changes to GDM screening and diagnostic recommendations. The three broad themes relating to communication and implementation, perceptions and value of evidence and diversity in perceptions about GDM testing practices have wide application to future screening processes.

Clinicians' perceptions of the GDM screening and diagnostic recommendations have not been well explored. Regarding the modified GDM screening recommendations, clinicians were broadly split into two groups: those who were sceptical of the underlying evidence base and those who trusted their governing bodies to make balanced recommendations. Similarly, perceptions of GDM testing (both since COVID and in the future) were mixed based on clinician's experience with certain cohorts of women and their empathy towards women's experiences of testing.

The debate on the 'gold standard' of GDM screening and diagnosis has been ongoing since IADPSG proposed updated recommendations in 2010. Since then, several studies have found significant increases in GDM diagnosis with seemingly no change to perinatal outcomes.[6,7,23,24] This includes two randomised controlled trials that compared the one-step (75-g OGTT) with the two-step procedure (glucose challenge test followed by 100-g OGTT)[23] and a comparison of two-step procedures (using IADPSG criteria or an alternate criteria known as Carpenter–Coustan following a glucose challenge test).[24] Neither studies found the current IADPSG criteria to be superior when considering maternal and infant outcomes commonly associated with GDM.[23,24] However, neither study used the strategy outlined in the modified COVID-19 recommendations.

The recent literature on modified COVID-19 recommendations largely reports on the estimated number of 'missed' cases.[14,25–27] Modified criteria were applied to a data set of women (n = 1992) from New South Wales diagnosed with GDM between 2013 and 2014 and determined that 29% with an FBG of <4.7 mmol/L would have been missed.[25] Another retrospective Australian study also concluded that 25% of women they examined would not have been diagnosed with GDM based on an FBG of <4.7 mmol/L.[14] Debate on the best way to diagnose gestational diabetes continues worldwide, balancing the benefits and harms of missing women who have GDM against the unnecessary medicalisation of women diagnosed with GDM but who are at low risk. Although

the pandemic-driven changes to the screening criteria provide a form of 'natural experiment' to investigate these competing claims, such studies are observational and will be confounded by other factors that occurred during the pandemic. It will be difficult to make strong conclusions from these studies of the effects of changing the diagnostic criteria on maternal and infant outcomes. The strong and divergent views regarding the diagnostic criteria were represented in the responses observed in this study.

Initially, the modified COVID-19 GDM guidelines were considered as a necessity in response to the pandemic. However, many clinicians felt that the guidelines did not need to remain as Queensland was largely unaffected by COVID-19. The uptake and acceptance of clinical guidelines have previously been examined. According to the four-step model proposed by Pathman in 1996,[28] guideline uptake relies on clinician awareness, agreement, adoption and adherence. Interestingly, the uptake of the GDM screening and diagnostic guidelines published in 2014–2015 was widespread in Australia with high awareness, adoption and adherence,[29,30] even though some (including at least one Australian professional organisation) did not agree with the guidelines. Conversely, awareness and adoption of the modified COVID-19 guidelines were high, but several clinicians cited the lack of evidence to support the changes to recommendations as a concern. A systematic review on clinical guideline 'leakage' indicated that clinicians are more likely to trust information from within their own professional organisation, and those working in large organisations are more adherent to guidelines than solo practitioners.[10] In our study, we had minimal representation from primary-care physicians (ie, general practitioners) and an overrepresentation of specialist clinicians, so it is likely that awareness and adherence to the changes were not representative of the broader health professional workforce. Based on the preliminary themes that have been reported in this study, further research surveying antenatal clinicians could provide a much more representative summary of their perspectives and challenges.

Other important insights from the current study provide guidance for future changes to GDM guidelines. As clinicians are governed by a variety of professional organisations, it is important that early consensus and cross-organisational promotion are encouraged. Queensland Health was the first to provide specific COVID-19 GDM screening and diagnostic recommendations, but these were soon followed by slightly different guidelines published by ADIPS, the Australian Diabetes Society, the Australian Diabetes Educators Association and Diabetes Australia. The clinicians in our study reported confusion over which guidelines were being followed and were uncertain what general practitioners or private physicians were doing. On the contrary, general practitioners were confused by hospitals using different diagnostic criteria. It was also clear that clinicians need sufficient rationale for guideline changes, especially where evidence is not clear. This is one of the few studies that have examined the clinician perspectives on the screening and diagnosis of GDM.

The findings from this study need to be considered in the context of several limitations. Though we attempted to recruit widely, less than one quarter of our respondents were general practitioners, and we recruited only one obstetrician. The number of clinicians we reached through recruitment and represented in each profession in Queensland is unknown. General practitioners are frequently involved in the care of pregnant women, including referring for GDM screening and testing in Australia. We acknowledge that the disproportionate representation from specialist clinicians may have overstated perspectives not representative of the wider clinician workforce caring for women at risk of GDM. As we recruited only within Queensland, where recommendations for COVID-19-modified screening and diagnosis were decided very early and promoted heavily within Queensland Health, we acknowledge that we are unable to draw conclusions on the experiences of clinicians across Australia.

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REFERENCES

1. World Health Organization. *Diagnostic Criteria and Classification of Hyperglycaemia First Detected in Pregnancy*. Geneva, Switzerland: WHO Press, 2013.
2. Crowther CA, Hiller JE, Moss JR *et al*. Effect of treatment of gestational diabetes mellitus on pregnancy outcomes. *N Engl J Med* 2005; **352**: 2477–2486.
3. Landon MB, Spong CY, Thom E *et al*. A multicenter, randomized trial of treatment for mild gestational diabetes. *N Engl J Med* 2009; **361**: 1339–1348.
4. International Association of D, Pregnancy Study Groups Consensus P, Metzger BE *et al*. International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. *Diabetes Care* 2010; **33**: 676–682.
5. Behboudi-Gandevani S, Amiri M, Bidhendi Yarandi R, Ramezani TF. The impact of diagnostic criteria for gestational diabetes on its prevalence: a systematic review and meta-analysis. *Diabetol Metab Syndr* 2019; **11**(1): 11.
6. Meloncelli NJL, Barnett AG, D'Emden M, De Jersey SJ. Effects of changing diagnostic criteria for gestational diabetes mellitus in Queensland. *Aust Obstet Gynecol* 2020; **135**: 1215–1221.
7. Cade TJ, Polyakov A, Brennecke SP. Implications of the introduction of new criteria for the diagnosis of gestational diabetes: a health outcome and cost of care analysis. *BMJ Open* 2019; **9**(1).https://bmjopen.bmj.com/content/9/1/e023293
8. Edwell J, Jack J. Gestational diabetes testing, narrative, and medical distrust. *J Bioeth Inq* 2017; **14**(1): 53–63.
9. Long H, Cundy T. Establishing consensus in the diagnosis of gestational diabetes following HAPO: where do we stand? *Curr Diab Rep* 2013; **13**(1): 43–50.

10. Mickan S, Burls A, Glasziou P. Patterns of 'leakage' in the utilisation of clinical guidelines: a systematic review. *Postgrad Med J* 2011; **87**: 670–679.
11. Farquhar CM, Kofa EW, Slutsky JR. Clinicians' attitudes to clinical practice guidelines: a systematic review. *Med J Aust* 2002; **177**: 502–506.
12. Queensland Health. GDM Screening and Testing during COVID-19. Queensland Clinical Guidelines. Available from URL: https://www.health.qld.gov.au/__data/assets/pdf_file/0031/951457/o-gdm-covid-faq.pdf
13. Diabetes Australia. Diagnostic testing for gestational diabetes mellitus (GDM) during the COVID-19 pandemic: Antenatal and postnatal testing advice. Available from URL: https://www.diabetesaustralia.com.au/wp-content/uploads/Diagnostic-Testing-for-Gestational-Diabetes-during-COVID-19-advice.pdf
14. Zhu S, Meehan T, Veerasingham M, Sivanesan K. COVID-19 pandemic gestational diabetes screening guidelines: a retrospective study in Australian women. *Diabetes Metab Syndr Clin Res Rev* 2021; **15**: 391–395.
15. Issa B, Becker L, Cheer K, Kelly A. Comment on McIntyre and Moses The diagnosis and management of gestational diabetes mellitus in the context of the COVID-19 pandemic. *Diabetes Care* 2020; **43**: 1433–1434. Diabetes Care 2020;43(11):e192-e192.
16. McIntyre HD, Gibbons KS, Ma RC *et al*. Testing for gestational diabetes during the COVID-19 pandemic. An evaluation of proposed protocols for the United Kingdom, Canada and Australia. *Diabetes Res Clin Pract* 2020; **167**: 108353.
17. Creswell JW, Plano Clark VL. *Designing and conducting mixed methods research*. Thousand Oaks, CA: SAGE, 2004.
18. Kelly LM, Cordeiro M. Three principles of pragmatism for research on organizational processes. *Methodol Innovat* 2020; **13**: 2059799120937242.
19. Queensland Health. Queensland Clinical Guidelines. Gestational diabetes mellitus (GDM). Guideline No. MN21.33-V5-R26. Available from URL: http://health.qld.gov.au/qcg
20. Guest G, MacQueen K, Namey E. *Applied Thematic Analysis*. Thousand Oaks, CA: SAGE Publications Inc, 2012.
21. Byrne D. A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Qual Quant* 2021;**56** 1391–1412
22. Braun V, Clarke V. Reflecting on reflexive thematic analysis. *Qual Res Sport Exerc Health* 2019; **11**(4): 589–597.
23. Hillier TA, Pedula KL, Ogasawara KK *et al*. A pragmatic, randomized clinical trial of gestational diabetes screening. *N Engl J Med* 2021; **384**: 895–904. (In eng).
24. Davis EM, Abebe KZ, Simhan HN *et al*. Perinatal outcomes of two screening strategies for gestational diabetes mellitus: a randomized controlled trial. *Obstet Gynecol* 2021; **138**(1): 6–15. (In eng).
25. van Gemert TE, Moses RG, Pape AV, Morris GJ. Gestational diabetes mellitus testing in the COVID-19 pandemic: the problems with simplifying the diagnostic process. *Aust N Z J Obstet Gynaecol* 2020; **60**: 671–674.
26. Nouhjah S, Jahanfar S, Shahbazian H. Temporary changes in clinical guidelines of gestational diabetes screening and management during COVID-19 outbreak: a narrative review. *Diabetes Metab Syndr Clin Res Rev* 2020; **14**: 939–942.
27. Panaitescu AM, Ciobanu AM, Popa M *et al*. Screening for gestational diabetes during the COVID-19 pandemic-current recommendations and their consequences. *Medicina (Kaunas)* 2021; **57**: 381. (In eng).
28. Pathman DE, Konrad TR, Freed GL *et al*. The awareness-to-adherence model of the steps to clinical guideline compliance – the case of pediatric vaccine recommendations. *Med Care* 1996; **34**: 873–889.
29. Meloncelli N, Barnett A, de Jersey S. Staff resourcing, guideline implementation and models of care for gestational diabetes mellitus management. *Aust N Z J Obstet Gynaecol* 2020; **60**(1): 115–122.
30. Meloncelli N, Barnett A, Pelly F, de Jersey S. Diagnosis and management practices for gestational diabetes mellitus in Australia: cross-sectional survey of the multidisciplinary team. *Aust N Z J Obstet Gynaecol* 2019; **59**(2): 208–214.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1. Interview guide for clinicians.