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Qualitative Research

Implementing primary care diabetes prevention for women with previous gestational diabetes: a mixed-methods study

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Background: The implementation of diabetes prevention for women with previous gestational diabetes (GDM) has been stymied by many barriers that are located within routine general practice (GP). We aimed to unpack the GP factors and understand the mechanisms that explain why a diabetes prevention intervention for this population succeeds or fails.

Methods: We performed a mixed-methods study with a Normalization Process Theory framework that included clinical audits, semistructured interviews, and focus groups within mixed urban and rural primary care practices in Victoria, Australia. Staff of primary care practices and external support staff who provide services to women with previous GDM participated in a 12-month quality improvement collaborative intervention. We compared diabetes screening and prevention activity planning with the strategies and factors identified through a process evaluation of full-, moderate-, and low-active participating practices.

Results: The intervention doubled screening rates (26%–61%) and 1-in-10 women received a diabetes prevention planning consultation. Critical improvement factors were: mothers being seen as participants in the quality improvement work; staff collectively building care strategies; staff taking a long-term care of a community perspective rather than episodic service delivery; and feedback processes being provided and acted on across the practice. The observable factors from the external perspective were: leadership by identified practice staff, reminder systems in action and practice staff driving the process collectively.

Conclusions: Successful engagement in diabetes prevention for women with previous GDM requires proactive building of the critical improvement factors and audit feedback into routine GP.

Key words: diabetes prevention, general practice, gestational diabetes, primary care, quality improvement, type 2 diabetes

Background

Gestational diabetes (GDM) is an increasingly prevalent and significant public health problem. In Australia, around 1 in 6 women who gave birth in 2017–2018 were diagnosed with GDM[1] and women with higher maternal weight are associated with substantially higher risk of GDM.[2] Women with previous GDM are 10 times more likely to develop type 2 diabetes (T2DM) compared with normoglycemic pregnancy and T2DM diagnosis typically occurs within 5 years of the GDM-index pregnancy.[3] They are also more likely to experience obesity and cardiovascular disease, while their offspring are at increased risk of developing diabetes and obesity.[4] GDM and T2DM risk are amenable to lifestyle modification through increase physical activity and healthy eating. Current guidelines for diabetes prevention postpartum recommend annual/biannual diabetes screening with the first screening occurring at 6–8 weeks postpartum and lifestyle modification to encourage healthy eating, physical activity, and weight loss when necessary.[5–7] Diabetes prevention programmes show 58% reduction in risk, which remains reduced with sustained lifestyle modification.[8–10]

The challenge for diabetes prevention worldwide has been the implementation of programmes in the real world and demonstrating their sustainability. Efforts to prevent T2DM among women with previous GDM have met with limited success. The fragmentation of prevention into its relative components (guideline implementation,[11] tailored diabetes prevention programmes,[12] reminder and recall systems[13]) have all resulted in only small, isolated effects. Quality Improvement Collaboratives (QICs) are quasi-experimental interventions which have been used in many countries to implement evidence in clinical practice by increasing adherence to guidelines over time.[14] QICs have worked successfully in Australia for general practice (GP) diabetes and diabetes prevention.[15,16]

We sought to explore whether a system based in GP could offer greater possibilities to engage women with previous GDM and whether we could identify factors associated with successfully implementing the intervention for future scale-up. GooD4Mum was a QIC that occurred in 15 Victorian GPs within Australia to implement a guideline-led postpartum intervention for women with previous GDM.[17]

Key messages

- Previous gestational diabetes increases a woman's risk for T2D 10 times.
- Guidelines recommend regular screening and lifestyle changes to reduce risk.
- Quality improvement collaborative can double screening activity.
- Critical improvement factors need to be proactively built with audit feedback.

This mixed-methods study sought to better understand the QIC intervention implementation and to identify observable factors and strategies that could be externally audited by health service staff that serviced the region. We aimed to unpack these GP factors and understand the mechanisms that explain why a diabetes prevention intervention for this population succeeds or fails. We hypothesized that GPs would exhibit greater postpartum diabetes prevention guideline implementation with increased presence of a priori defined normalization factors.

Methods

Setting

We conducted the GooD4Mum QIC intervention in Australia over a 12-month period. Five Victorian Medicare Locals participated, which represented 2 large regional and 3 urban geographical areas and about 3 million people. We engaged 15 GP of varying size ranging from small to large, multidisciplinary primary care hubs in the QIC. All practices provided a range of services including family medicine, women's health, chronic disease management, screening, and immunizations. Approximately 75,000 births occur annually in Victoria, GDM prevalence is 16.1%[1] and the WHO 2013 diagnostic criteria for GDM are used.[18]

Design and data sources

We used quantitative and qualitative methods with Normalization Process Theory (NPT) as the theoretical framework underpinning the study.[19] NPT is a framework that identifies, describes, and explains key mechanisms that will either inhibit or promote processes new or otherwise from being implemented.[19] Implementation processes are complex and dynamic reflecting the translation of strategic intentions into everyday practices. NPT facilitates understanding of these processes—it characterizes mechanisms (coherence, cognitive participation, collective action, and reflexive monitoring) that influence implementation processes and explains their operation.[19] Systematic review highlights NPT's strength as a tool to understand implementation as a dynamic process.[19]

We used quarterly QIC audit data to identify GP engagement with guideline-led postpartum diabetes prevention activities. We concurrently conducted quarterly semistructured interviews with health service staff involved in servicing that region regarding any QIC activity observed. Finally, we interviewed or held focus groups with stakeholders involved in the QIC at the end of the intervention.

Quantitative study

We conducted the study between 1 June 2014 and 30 January 2016. The intervention consisted of 4 stages: firstly, defining the quality improvement aims and measures through an Expert Reference Panel who then approved the QIC handbook disseminated to every participating practice; secondly, pinpointing the change principles and ideas to address underlying causes of the evidence-to-practice gaps; thirdly, developing the activities that would drive the intervention, action periods and 4 90-min online interactive learning workshops; and finally performing small local-level tests of change using Plan-Do-Study-Act cycles. The project activity comprised 4 3 monthly periods where each practice was required to submit a minimum of 1 Plan-Do-Study-Act report for each quarter with an audit at the start of each quarter and a final end-of-project audit. A detailed description of the context, intervention, and study of the intervention can be found in O'Reilly et al.[17] The primary outcome measures were the proportion of women with previous GDM who: completed a diabetes screening test and diabetes prevention planning consultation within the previous 15 months. Additional measures included glucose tolerance testing by 3 months postpartum and distribution of normal body mass index. The change in measures was calculated as average percent change over time. The clinical software within each practice extracted the audit data. All data extracted were aggregated at the practice level and nonidentifiable, its accuracy was checked manually against patient records. Run charts reported the change in measures over the 12-month intervention and repeated measures ANOVA explored change over time.[17]

Qualitative study

We conducted longitudinal semistructured interviews with Medicare Local staff employed to support all quality improvement work in that region (local programme officers, LPOs) to provide an external key informant QIC perspective. LPOs typically assist practices with running audits, maintaining local registers, reinforcing learning workshop messages, and provide guidance on Plan-Do-Study-Act reports. Eligible Medicare Local LPOs were identified and 3 out of 5 consented to participate. The quarterly telephone interviews were conducted within a fortnight of each learning workshop, lasted around 15 min, and used the same semistructured interview questions at each quarterly call (Supplementary Materials). Additional focus groups/interviews were conducted at the end of the project with participating practices. Interviews were used in the smaller practices and lasted about 30 min, while open focus groups were conducted in the larger ones and lasted about 45 min. Four practices did not participate in the interviews/focus groups due to staff unavailability. The semistructured interviews or focus groups looked to factors involved in the implementation process and barriers/enablers to undertaking that work (Supplementary Materials).

All interviews/focus groups were conducted and analysed by SOR, a female dietitian trained in qualitative interview and implementation science research who had no prior relationship with participants. The audio recordings were professionally transcribed then inductively and deductively analysed

with any field notes taken. The transcripts were inductively coded using thematic analysis[20] and subsequently deductively coded using NPT constructs within the NPT-EPOC professional intervention coding framework.[21] Each NPT mechanism group was divided into 4 subconstructs and the data were coded for constructs being present/absent and whether it was positive, negative, or mixed. Triangulation of the analysis was performed by circulating themes and quotations identified from interviews and focus groups to participants to check for accuracy and interpretation.

Integrative analysis

The concurrent mixed-methods approach meant that the quarterly quantitative audit data were explored alongside the key informant LPO interviews to identify areas where the implementation process could be improved. At the end of the intervention, the change in measures over time was analysed independently of the qualitative practice interview and focus groups data. The measure of active participation was determined a priori and calculated based on the practice's attendance at workshops and submitting at least 1 Plan-Do-Study-Act cycle per quarter. Actively participating practices completed this requirement, moderately participating ones had >50% compliance with these standards and low participating was <50% compliance. Once both data sets were analysed, the practices were divided into actively (n = 4), moderately (n = 5), and low participating (n = 1) with 4 practices not being included due to a lack of qualitative data. The qualitative data were then divided up based on whether they came from an actively, moderately, or low participating practice. The LPOs qualitative data were also divided up based on the practice they were discussing, and the same active participation criteria were applied.

Results

Fifteen practices participated but only 14 completed the intervention as 1 practice was merged into a larger provider and subsequently withdrew. Audit data submission ranged from 93% to 100% for each quarter. The number of women involved in GooD4Mum was 481 and 38 Plan-Do-Study-Act cycles were reported during the intervention. The average level of diabetes screening occurring at baseline was 26%, which rose to 61% at 12 months (P = 0.002). Diabetes prevention planning consultations rose from 1% initially to 10% at 12 months (P = 0.183) while postpartum screening rose from 43% to 60% (P = 0.066) and weight monitoring increased from 51% to 69% (P = 0.003) over the same timeframe.[17] For practices with qualitative data, the 12-month average for diabetes screening were 72% (actively participating), 57% (moderately participating), 20% (low participating) and for the postpartum screening it was 53% (actively participating), 64% (moderately participating), and 100% (low participating). The diabetes prevention planning averaged 31% (actively participating), 2% (moderate participating), and 0% (low participating) in practices with interview data. The data for weight monitoring in these practices showed an average of 74% (actively participating), 58% (moderately participating), and 100% (low participating), respectively. The number of key NPT constructs reported within actively participating practices was greater than those with lower levels of active participation and they were also observed externally by key informants (Table 1).

The main themes identified within the practice normalization factors from the interviews and focus group data were: identification of mothers as stakeholders within their care; staff collectively creating the care process; practice staff identifying a long-term community care perspective; and feedback being used as feedforward.

Mothers as stakeholders

Practice staff within actively participating practices described a collaborative approach to supporting women engaging in the intervention thereby enabling relational restructuring to occur.

> It is an easy process, well we will just be talking about children or, oh your reminder comes up that you are due for your annual glucose tolerance test or HbA1c, well why don't we order that today and we'll get you to do it [Actively participating, rural, large practice]

Collective staff creation of care

Actively participating practices reported bringing all members of staff together to design and co-create the way that innovations were brought into everyday care and sustained more on-going communications among staff:

> We have our regular monthly clinic meeting where our clinic staff um meet and have lunch, so we are practically engaged in that process through that, a couple of times and various information at some of the other meetings about that process. [Actively participating, urban, large practice]

Long-term community care

Practices with a transactional and short-term perspective on the care provided reported mainly negative experiences implementing the QIC project, whereas those practices with a long-term perspective about the care they were providing were more likely to be actively participating.

> I've had someone that I am worried about, I phone [practice nurse name], …and say well, this person needs more work or so needs follow up or you need to put that person on our register, even explain [health issue] with them, so, I think that works pretty well. [Actively participating, rural, medium practice]

Feedback and action

> [Practice nurse name], tracks the weights measures, cause that's formerly the thing we, we did poorly, and we're doing a lot more of those as well. Yes, I think we do that very well. It's actually become routine now when people come into the room we say "no we haven't done weight and height" [Actively participating, rural, large practice]

The external changes observable to the key informant LPO staff interviews were explored in relation to practices. The themes for actively participating practices were: leadership by

Table 1. Qualitative rating of 10 GPs active participation with diabetes prevention implementation for women with GDM across NPT constructs (2014–2016).

Participation level[a]	Data source	NPT constructs																	
		Coherence				Cognitive participation					Collective action				Reflexive monitoring				
		Differentiation	Communal specification	Individual specification	Internalization	Initiation	Enrolment	Legitimation	Activation		Interactional workability	Relational integration	Skill set workability	Contextual integration	Systematization	Collective appraisal	Individual appraisal	Reconfiguration	
Actively participating practice ($n = 4$)	Staff perspective	+	+/–	+	+	+	+	+	+		+	+	+	+	+	+	+/–	+/–	
	External key informant perspective	+	+	+	+	+	+	+	+		+	+/–	+	+	+	+	+		
Moderately participating practice ($n = 5$)	Staff perspective	+/–	+/–	+/–	+/–	+/–	+/–	+/–	+/–		+/–	+/–	+/–	+/–	+/–	+/–	+	+	+
	External key informant perspective		+/–	+/–	+/–	+/–		–	+			+/–	+/–		+/–		+/–		
Low participating practice ($n = 1$)	Staff perspective	–	–	+/–	+/–	–		–	–		–	–	–	–					
	External key informant perspective				+/–	+/–		+/–							+		–		

High = 100%, moderate = 50%–99%, low = <50% completion. + = construct positively reported, +/– = mixed reporting, – = construct negatively reported.
[a]Active participation level based on practice data of attending learning workshops and return of 1 Plan-Do-Study-Act cycle and audit data per quarter.

champions, collective staff action, and reminder systems in action.

Leadership by champions

The cognitive participation of participating practices was a central observation by the key informants. Only practices that were actively participating had specific comments regarding named individuals taking leadership on the project over time.

> … one of the doctors [GP] is kind of leading the project so she's been very proactive in getting things up and running. [Urban Medicare Local, Quarter 1]

Whereas practices that were not participating or had low participation were those with high staff turnover "… *they only have changed nurses….they have also just engaged and dismissed another nurse! So I think things will be very disrupted for them again …*" *[Urban Medicare Local, Quarter 3]*

Collective staff action

The key informants also observed another aspect of cognitive participation, where actively participating showed clear initiation and enrolment within their staff. This was sustained over time as well "… *they've been pretty self-directional—apart from in the beginning when I went out … to help them get started, … but last time I contacted them … they didn't really want any or need any further assistance.*" *[Urban Medicare Local, Quarter 3]*

Reminder systems in action

The observation of physical changes to the work setting to try and increase the identification of women with previous GDM along with staff engagement was another theme seen only for actively participating practices "*They've put a prompt on all their workstations, so prompting the practitioners to check women for a history of gestational diabetes.*" *[Urban and rural Medicare Local, Quarter 3]* and "*They have put notices around the clinic including notices in the toilet asking women to tell their doctor if they have had gestational diabetes. Um they've developed a template for a diabetes prevention plan and they've developed a notice for women on the database to come in for an annual check and I think they're planning on doing a mailout early this year*" *[Rural and urban Medicare Local, Quarter 2]*.

The integrative NPT analysis of the sources of successful implementation in actively participating practices can be seen in Table 2.

Discussion

We found that the NPT constructs were more visible and present within practices that were actively participating, and they had higher levels of change in diabetes screening rates, diabetes prevention planning and weight monitoring compared with moderately participating practices.

NPT has already proved useful in identifying barriers for postpartum follow-up from the perspective of the woman in those with previous GDM.[22] Now we have applied it to elucidated factors contributing to successful implementation of postpartum diabetes prevention in GP. The key differentiator for an actively participating practice was the positive presence of all 4 NPT constructs. These practices had clear

Table 2. Integrative qualitative data analysis from 4 actively participating GPs to identify sources of successful diabetes prevention operationalization in women with previous GDM (2014–2016).

		Implementation components				
		Intervention components (objects and procedures that are brought into play by the implementation project)	**Relational restructuring (changes in the ways that people interact with each other and the different kinds of relationships that exist between them)**	**Normative restructuring (modification of the conventions, rules and resources that form the scaffolding for everyday work)**	**Organizing logics (sources of cognitive authority for collaborative work and collective action)**	**Sources of success**
NPT constructs	Coherence (work that makes interventions and their components *meaningful* to participants) This work gives participants a coherent proposition for action.	Writing a quality improvement handbook; developing a template for a diabetes prevention plan; agreeing primary outcome measures created a clear programme of action.	The Expert Reference Panel supported the development of ways of working. LPOs and quality improvement teams worked together to support within practice co-design and co-creation of interventions at a micro-level.	Researchers, local quality improvement teams and practice staff worked together to formulate a common model for improvement that incorporated clearly defined change principles.	Practice staff were already working within a perspective on care that was organized around ideas about long-term community-oriented care.	*A clearly formulated template for action founded on agreed principles, measures, and outcomes* was formulated *and* this fitted with wider aspirations for quality improvement and patient safety in participating practices. The intervention *did not threaten participants beliefs about what constituted high quality care.*
	Cognitive participation (work that forms *commitment* around an intervention and its components) This work frames how participants become members of a specific community of practice.	Learning workshops drew participants together and created conditions for common cause within and between practices. At the same time, common methods for identification of women with previous GDM were established and agreed.	In participating practices there was clear leadership that secured the initiation of the intervention and the enrolment of staff within practices. At the same time, participation of women with previous GDM was actively sought.	Participating practices took a collaborative approach to supporting women and viewed them as stakeholders.	Participation was contextualized against shared beliefs about vulnerable populations, embedded in ideas about service improvement. It was incentivized by inclusion in continuous professional development programmes.	*Clear leadership; shared beliefs about the legitimacy of the intervention; and an inclusive view of women and professional participants* led to *activities that created common cause*. The intervention was experienced as *supportive of good therapeutic interactions between practitioners and women.*
	Collective action (work through which *effort* is invested in an intervention and its components) This work frames how participants realize and perform intervention components in practice.	Plan-Do-Study-Act and Mini quality improvement cycles were organized around already well-established methods of postpartum screening, diabetes screening and glucose tolerance tests. Practitioners agreed interaction strategies to engage women.	Learning workshop messages recycled the value of the intervention.	The intervention relied on already existing resources, these included local registers and well-established audit data extraction tools.	Implementation of the intervention was founded on clearly defined change principles and action periods.	Activity associated with the intervention drew together *already existing clinical techniques and forms of accountability*. It did not require new ways of working or new skills but was strongly supported across reference groups. The intervention was *highly workable, fully integrated in practice*, and *was not disruptive to other aspects of participants' work.*
	Reflexive monitoring (work through which the effects and components of an intervention are *appraised*) This work frames how participants frame the intervention and its effects as worthwhile.	Website, run charts, and audit tools were readily available and provided visual feedback on engagement.	Reminder systems on electronic health records was combined with history checking in the consultation.	Audit data submission, and manual verification of audit data against patient records. Surveillance by LPOs, external to practices.	Long-term perspective on care provision and prevention perspective.	Experienced workability and integration of the intervention combined with readily available tools that enabled *participants to systematically assess its impact on their practice* and *to see the benefits for patients.*

leadership, worked as teams, and routinized system changes. They worked on care processes using feedback to improve and made changes like using reminder systems. These strategies align with those found in primary care for diabetes care provision using data from the United States and Australia.[23,24] The resourcing and feedback aspects of the NPT constructs in our study were more challenging because practitioners were busy delivering other scheduled or episodic care and must balance competing demands. Diabetes care and prevention are associated with older adults, which makes the activities associated with prevention more front-of-mind for that population and therefore more easily facilitates the resourcing and feedback.[24] The low participating practice was a top performing practice within broader QICs so it was initially surprising that they were unable to normalize GooD4Mum, considering it aligned well will routine diabetes prevention activities. The practice was able to regularly weigh and complete the early postnatal diabetes screening in all their registered women, which reflects their strong, established systems for reflexive monitoring but their lack of collective action was probably due to the practice's shorter term, transactional approach to routine care such as weighing and screening. Practices that collectively see women's health as a focus of their care in our study were more likely to be those that were actively participating and the LPOs noted key observable factors in action for those practices as well. These factors align with a proactive reaching out to women to encourage them to engage in prevention activities that they may not know they need, which in turn aligns with data from high performing practices in general diabetes care.[23] The lower amount of observable NPT mechanisms (LPOs reported) compared with staff perspectives may potentially be highlighting the potential areas where less proactive patient engagement is occurring.

The uptake of the guidelines by women with previous GDM is inherently challenging as they are required to perform additional work in relation to managing their own health whilst managing the competing demands of caring for an infant.[22,25,26] Equally on the side of implementation, systemic barriers exist[27,28] and what is required are ways of working that reduce both implementation and uptake barriers through normalizing guideline change into routine primary care.

Limitations

This study had several limitations, which include the limited number of practices within a single Australian state, the absence of a control group and that the intervention lasting only 12 months. All of which highlight the preliminary and primarily hypothesis generating nature of the data and its need for further confirmation in more varied settings. Nonetheless, our data are reflective of other data from the United States in top performing diabetes care practices[24] and provide insight into care improvement for an increasing at-risk population that will potentially benefit across a wide range of noncommunicable disease prevention areas such as cardiovascular disease, obesity, diabetes, and improved reproductive health.

Conclusions

To the best of our knowledge, this is the first real-world evaluative intervention following up women with previous GDM in GP using quality improvement methods. A crucial translation step for moving randomized controlled trial evidence into national scaled up prevention programmes have been evaluative interventions demonstrating feasibility and acceptability in the real world.[29–31] Our findings show that GPs can achieve increased screening activity for women with previous GDM when critical improvement factors are proactively built with audit feedback. Further research is warranted to evaluate the effectiveness of these strategies in primary care.

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Supplementary material

Supplementary material is available at *Family Practice* online.

Conflict of interest

None declared.

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Ethical approval

This study had ethical approval from Deakin University (HEAG-H 167-2014).

Data availability

The data underlying this article cannot be shared publicly due to privacy issues associated with the qualitative data

from individuals that participated in the study. The quantitative data will be shared on reasonable request to the corresponding author.

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