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Improving postpartum screening after diabetes in pregnancy: Results of a pilot study in remote Australia

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Improving postpartum screening after diabetes in pregnancy: results of a pilot study in remote Australia

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Abstract

Background: The postpartum period is a critical time to improve health outcomes for Aboriginal women, particularly for those who have chronic conditions.

Aims: To assess enhanced support methods (for women following diabetes in pregnancy (DIP)) to improve completion rates of recommended postpartum health checks.

Materials and Methods: Fifty-three Aboriginal women in the Northern Territory (NT) were contacted in the postpartum period to encourage medical check-ups. Messages were delivered through phone (call or text messages) or other methods (Facebook or email). The primary outcome was postpartum blood glucose testing (oral glucose tolerance testing, random or fasting glucose and HbA1c).

Results: Establishing contact with women was difficult. Of 137 messages sent to 52 women, 22 responded (42%). Phone was the most common contact method with successful contact made from 16 of 119 (13%) attempts. Rates of postpartum OGTT completion were higher in the group successfully contacted (32% versus 7%). However, for any postpartum glucose testing (including OGTT and HbA1c) rates were 25 of 42 (60%) and neither success in making contact nor the contact method was associated with higher rates.

Conclusions: The small sample size limits our conclusions, however results highlight that engaging remote women postpartum is difficult. While rates of postpartum OGTT completion differed according to successful contacts, rates of any postpartum blood glucose testing did not. Further research is needed to explore feasible intervention methods to improve postpartum screening after a pregnancy complicated by diabetes.

Introduction

In Australia's Northern Territory (NT), Aboriginal and Torres Strait Islander women (referred herein as Aboriginal) experience high rates of diabetes in pregnancy (including all hyperglycaemic states). Specifically, 16% have gestational diabetes and 5% type 2 diabetes (T2DM) (1).

Diabetes in pregnancy is associated with multiple adverse perinatal outcomes (2), including higher rates of stillbirth and congenital malformations (3, 4). Additionally, gestational diabetes signals an increased risk of subsequent development of T2DM in the mother, while the offspring are also at increased risk of T2DM. These risks are more pronounced in Aboriginal people (5-7). This leads to a compounding of the burden of T2DM in Aboriginal populations, where maternal diabetes begets early-onset diabetes in offspring.

The postpartum period is an opportune time to improve inter-conception health and outcomes for mothers and offspring in subsequent pregnancies. Postpartum screening is important to identify women who are high risk for T2DM or have newly diagnosed T2DM, and to optimise their care. Screening informs timely intervention to delay or prevent diabetes for those at high risk. Early diagnosis of diabetes mellitus is important to optimising management and preventing complications. However, poor rates of completion of recommended postpartum diabetes screening for Aboriginal women have been reported (8). Women have expressed multiple barriers to glucose testing and initiating positive lifestyle changes in the postpartum period, including lack of information, time and motivation. The need for additional supports to achieve these goals has also been identified (9, 10). Programs to support lifestyle change following gestational diabetes, including face-to-face and telephone interventions, can reduce the risk of subsequent development of T2DM (11). Although there is no evidence of programs that effectively prevent T2DM postpartum for Aboriginal women.

The remote context of the NT creates challenges for delivering postpartum diabetes care. Specifically, it covers a large geographic area of 1.35 million square kilometres and has a relatively small population (245,700) (12), of which Aboriginal people account for 28.4 per cent (80 per cent of whom live in remote areas) (13). A dispersed and highly mobile population, high levels of staff turnover and fragmented systems of communication between health care providers are barriers to healthcare delivery in the NT, contributing to low rates of preconception and postpartum health checks (14-16). The NT Diabetes in Pregnancy Partnership was established in 2012 to improve health outcomes for all women with diabetes

in pregnancy and their infants. The Partnership's work has included enhancing models of care, establishing the NT Diabetes in Pregnancy Clinical Register and the Pregnancy and Neonatal Diabetes Outcomes in Remote Australia (PANDORA) longitudinal research study (17-19).

This study aimed to assess if enhanced postpartum support (including reminders for screening and providing relevant health information) for Aboriginal women with diabetes in pregnancy results in improved uptake of recommended diabetes health checks postpartum. A secondary aim of this pilot project was to establish which methods of intervening postpartum are most feasible and reach most women.

Material and Methods

Aboriginal women who were active participants in the existing PANDORA Cohort at the time of this pilot were invited to participate. This included women from the Top End of the NT and Central Australia whose babies were born between December 2015 and October 2016. Recruitment processes were led by an Aboriginal researcher on the team who had undertaken additional training in diabetes care. All research staff involved in recruitment had undertaken cultural competence training, had worked with Aboriginal women for many years and were known to participants. Of these staff, one was a midwife, one a nurse, and one a nurse/midwife. Recruitment occurred late in pregnancy or within seven days of delivery and occurred alongside data collection of the larger PANDORA study in either the hospital or clinic setting. Research staff had established relationships with participants through their engagement in the larger study and had visited them numerous times in the health care or hostel setting. The pilot study ceased follow-up of participants in October 2016 due to challenges encountered with contacting women.

Informed consent was obtained using a pictorial flipchart and an interpreter was offered to all. At the time of consent, the woman's phone number was recorded and other means of contact for follow-up information was recorded if relevant (including family member's mobile phone, social media or health clinic staff). Participants consented to their electronic medical records being accessed to follow-up on postpartum diabetes related health checks. This method also alerted the research team to when remote participants were accessing care in the Royal Darwin Hospital (for them or their child), and provided an opportunity to follow-up with them face-to-face. To enhance participants' understanding of their postpartum diabetes management, a pamphlet outlining the recommended health checks was developed

by health staff and Aboriginal staff and provided to women. Participants were encouraged to take this pamphlet to all clinic checks and to discuss relevant information with their primary healthcare provider.

At discharge, the researcher discussed with the participant the recommended diabetes management plan as outlined in the pamphlet (based on local guidelines (20)). In addition, the researcher checked with the participant which health service they would be accessing or had accessed on discharge. For women living in remote areas, when possible the researcher also contacted the primary health care clinic staff to advise them of discharge and to discuss the follow-up plan.

The researcher contacted the participant post-delivery to encourage a healthy lifestyle (including information relevant to the woman such importance of quitting smoking, breastfeeding, weight control and contraception) and to remind them to attend their health clinic for postpartum and regular diabetes checks. Women with T2DM in pregnancy were to receive a more intensive support model than women with GDM. For those with T2DM, contact was planned at 3-monthly intervals postpartum. For women with GDM, contact was planned at 6 weeks, 6, 12 and 24 months. Details of messages sent to women are outlined in Supplementary Figures 1 and 2. Successful contact was defined as replied to message, answered phone, returned phone call, replied to email or reported to research staff that they would act on a message (in face-to-face encounters) (Supplementary Table 1).

The researchers reviewed primary health care records to assess completion of recommended clinical checks (by the Primary Care team) according to clinical guidelines. If the participant had not completed the recommended tests, the research team were to contact the clinic staff and document any known reasons.

Data analysis

Simple frequencies and percentages were calculated using Stata v14 (21). Contacts for which the outcome or method of contact was missing were excluded. The contact outcomes were categorised: successful (diabetes check at time of child health check, diabetes check within 1-2 weeks of message, replied to message, replied to email, answered phone, rang back, will act on message); message sent but no response (message delivered, message read (as on Facebook), left message, email sent, email read); failed (failed to deliver, no answer, phone disconnected, participant not attending clinic, participant not in community); and other

(Supplementary Table 1). The primary outcome was completion of any blood glucose testing including OGTT, random and fasting glucose, and/or HbA1c.

Ethics

Ethics approval was obtained from the Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research (HREC 2015-2461), and the Central Australian Human Research Ethics Committee (HREC 15-345).

Results

Of the 114 Aboriginal women invited to participate, 53 consented (*n*= 44 in Top End; *n*=9 in Central Australia; one was excluded from analysis because she had no phone and was not on the electronic health record). Follow-up was attempted 137 times for 52 women. As the pilot study ceased early, of these, 25 were eligible for six month follow-up as they had babies born before June 2016. Attempts were made to contact women up to 7 times. The median (IQR) number of attempted contacts per woman was 2 [inter quartile range (IQR): 1-4] (Table 1).

The most common contact method was phone (call or text message) (87%) (Table 2). The least common methods were email (1%), Facebook (3%) and face-to-face (9%). Face-to-face opportunities occurred when women from remote communities were in Darwin accessing health care or when the research team were visiting communities for the PANDORA study. This contact was ad hoc and an unplanned option.

Thirty of the 137 (22%) messages successfully reached women. The outcome was missing for 13 contact attempts. Thirty-eight percent of women with T2DM (*n*= 8/21) were successfully contacted compared to 45% of women with GDM. The most common method of contact was by phone with 20% of the 119 phone contacts successful (Table 2). The median (IQR) number of contacts for the 22 women who were successfully contacted was 2.5 [1-4], for the 31 who did not respond it was 2 [1-3]. Clinic staff in Top End communities were contacted 27 times to alert them to overdue postpartum tests, however were not asked about the reasons women had not had their tests (as planned in the protocol). In Central Australia clinic staff were not contacted due to the research team's concerns of overburdening them.

Of the 52 women with whom contact was attempted, we have information for 42 on whether they had discussed a diabetes management plan and/or had any postpartum glucose checks (Table 3). Rates of any postpartum glucose testing (random, fasting glucose, HbA1c or OGTT) were 25 of 42 (60%) and responders had a 28% higher rate of blood testing (55% vs 43%). Rates of postpartum OGTT completion were 9 of 42 (17%) (32% for those

successfully contacted and 7% for not successfully contacted), although these results are limited by small numbers (Table 3). Of the 21 women with T2DM, 50% of those who responded had a blood test (glucose or HbA1c) compared to 46% of those who did not respond. Percentages for women with GDM were 57% versus 41% respectively.

Discussion

Although study participants provided a method of contact, we encountered significant difficulties in engaging with women during the postpartum follow-up period. Rates of mobile phone ownership are reportedly high in remote-dwelling Aboriginal women of childbearing age (22), making this technology an attractive method of reaching postpartum women to provide support. However, our study did not find use of mobile technology to be an effective means of communicating with study participants, with only 20% of phone calls or text messages resulting in successful contact with women.

Prior experience of using mobile technology for enhancing care in remote-dwelling Aboriginal people has been mixed, with publications only in the paediatric population. Mobile phone communication with Aboriginal patients was reported as effective in remote NT and Queensland. It was found to support adherence and clinic attendance (rates at final clinic review were 97%) in the paediatric setting following hospital admission with bronchiolitis (23). However, rates of successful contact via mobile phone declined over the 21-day follow-up period, with 62% of parents successfully contacted on the first attempt at the first follow-up point (day 5-9) versus 18% at the final contact (day 20-30).

Another paediatric study in the remote NT reported that a mobile phone intervention did not improve clinic attendance, despite participants reporting positive perceptions of receiving messages (24). While there have been no previous reports of use of mobile phone technology in the postpartum setting to specifically support Aboriginal women, one study in South Australia, including women across a range of ethnicities, found no difference in attendance for postpartum glucose testing with the use of SMS reminders (25). It should be noted that attendance for postpartum glucose testing in this study was high in both the intervention and control groups (77.6% and 76.8%, respectively), potentially indicating a ceiling effect; SMS reminders may therefore only be useful when used as a targeted strategy for groups with lower baseline attendance rates. Postnatal telephone interventions are generally well-accepted by women, with reports of higher satisfaction with postpartum care when augmented by telephone support (26).

The difficulties we experienced in engaging participants may be partly explained by the differences in mobile phone ownership and usage between Aboriginal and non-Aboriginal people, particularly in remote communities. While mobile phones are often owned and operated by a single individual in non-Aboriginal settings, in remote Aboriginal communities mobile phones are often perceived as a collective resource, and shared between individuals (22). This collectivist model of mobile phone ownership has been observed in other low-resourced settings (27).

Mobile phones in remote Aboriginal communities also have a short lifespan, with almost half of mobile phone owners in one community reporting they had owned their current phone for less than two weeks, and that phones were regularly purchased according to the fortnightly pay cycle (22). While mobile phone numbers may be temporary, social media accounts can be accessed from multiple devices, and may have a stronger link to a single individual over a longer period of time. Aside from behavioural differences in mobile phone use and ownership, there are still areas of the NT without mobile phone service coverage, providing another barrier to maintaining contact with women. Although only one woman in this study nominated Facebook as the preferred method of contact, we suggest social media platforms further be explored as a means of maintaining contact with women in this context.

In our pilot project, there was no association between successful contact and completion of any of several postpartum glucose tests, although small participant numbers may have affected this result. Rates of postpartum OGTT completion were higher in the group where contact was successfully made (32% versus 7%), although again numbers were small and associations may have been limited by participant bias. Overall completion of any glucose and/or HbA1c test was relatively high, at 55% and 43% respectively for women who were and were not successfully contacted. These results differ dramatically from a previous report from Queensland, where rates of OGTT following gestational diabetes were only 13.6% and 28.3% at 6 months postpartum in Aboriginal and non-Aboriginal women respectively (8).

There are many other reasons likely contributing to why engagement with women was challenging, although this was not assessed in this study. Firstly, it is important to acknowledge that women have the right to choose to engage with postpartum screening and some may have chosen not to do so. As described by Campbell et al. (10), for Aboriginal women in Far North Queensland, accessing services for postpartum screening may be inhibited by psychological and motivational barriers including: women's fear and denial of accepting the development of T2DM, not understanding long terms risks and being tired or

overwhelmed. However, women were found to access health care to address needs of their children and family (10), suggesting an opportunity to screen and provide health care to women.

Furthermore, participant's limited engagement with health services may be a reflection of the competing priorities of people's lives and social and environmental factors beyond the control of the individual (10). It may also be related to fragmented care resulting from poor service co-ordination or communication between health professionals (28). Additional reasons for inconsistency in postpartum service delivery in this context, from the perspective of health professionals, include patient mobility, women not valuing postnatal visits enough to attend clinic and lack of continuity of care (16).

The high rates of attendance for postpartum glucose checks in our cohort may be attributable to a higher level of engagement with healthcare services in women who volunteered to take part in the study compared to the general population. This highlights the difficulty in planning an intervention to support women who are less engaged with services, as they are less likely to volunteer to participate. It also highlights the crucial role of primary health care staff as they are likely to have a trusted relationship with women, positively influencing their clinic attendance in a remote context. Therefore, enhancing support and increasing the capacity of primary health care may be critical to improving postpartum care in remote settings.

Our study was limited by its small sample size, low participation rate and broad range of outcome categories, making it difficult to draw comparisons between groups. The number of attempted contacts per woman was low and may have impacted the limited response rates. This could be attributed to the limited capacity of research staff during the study. In addition, the pilot ceased early due to challenges encountered with contacting participants (with less than half being eligible for six month follow-up). Furthermore, an interpreter was not taken up by any participant, despite English being a second language for most. Language barriers may also have been a factor impacting the limited response rate. As this was a self-selecting group, and attendance at clinic was high despite failed attempts to contact women in this study, our findings are limited by volunteer bias.

In conclusion, although this pilot study demonstrated that it was difficult engaging women in the postpartum period successful contact did not seem to impact on rates of postpartum diabetes testing. The challenges experienced maintaining postpartum communication

highlight the need for a more nuanced understanding of the enablers and barriers women encounter when accessing postpartum care. Further qualitative work with remote Aboriginal women is needed to explore these factors.

Abbreviations

NT – Northern Territory

DIP – Diabetes in pregnancy

PANDORA – Pregnancy and Neonatal Outcomes in Remote Australia

GDM – Gestational diabetes mellitus

HREC – Human Research Ethics Committee

Conflict of Interest

None declared.

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Table 1 – Contacts by number of attempts

Attempted contacts per woman	Women	Total attempted contacts	Total successful contacts n(row %)
1	18	18	7 (39)
2	11	22	5 (23)
3	8	24	5 (21)
4	8	32	7 (22)
5	2	10	1 (10)
6	4	24	5 (21)
7	1	7	0 (0)

*See Supplementary Table 1 for definitions of successful contact.

Table 2 – Outcomes of attempted contact by method of contact

Method of contact	n(%) of attempted contacts	Outcome of attempted contacts			
		n(%) successful (sent and responded)	n(%) sent but no response	n(%) failed	n(%) other
Facebook	4 (3)	2 (50)	1 (25)	0 (0)	1 (25)
Phone text	29 (24)	1 (3)	28 (97)	0 (0)	0 (0)
Phone call	90 (66)	15 (17)	14 (16)	56 (62)	5 (6)
Face-to-face	12 (9)	12 (100)	0 (0)	0 (0)	0 (0)
Email	2 (1)	0 (0)	2 (100)	0 (0)	0 (0)

Table 3 - Frequency and % of women having a postnatal management plan, HbA1c or glucose test by outcome of contact

		Responded	
		Yes n(%) N=22	No n(%) N=30
Diabetes management plan			
	Yes	10 (45)	7 (23)
	No	9 (41)	10 (33)
	NA	3 (14)	13 (43)
HbA1c			
	Yes	7 (32)	7 (23)
	No	13 (59)	15 (50)
	NA	2 (9)	8 (27)
Random glucose			
	Yes	6 (27)	8 (27)
	No	14 (64)	14 (47)
	NA	2 (9)	8 (27)
Fasting glucose			
	Yes	1 (5)	1 (3)
	No	19 (86)	21 (70)
	NA	2 (9)	8 (27)
OGTT			
	Yes	7 (32)	2 (7)
	No	13 (65)	14 (47)
	NA	2 (10)	14 (47)
Any glucose and/or HbA1c			
	Yes	12 (55)	13 (43)
	No	8 (36)	9 (30)
	NA	2 (9)	8 (27)

Figure 1: Message schedule for participants with T2DM

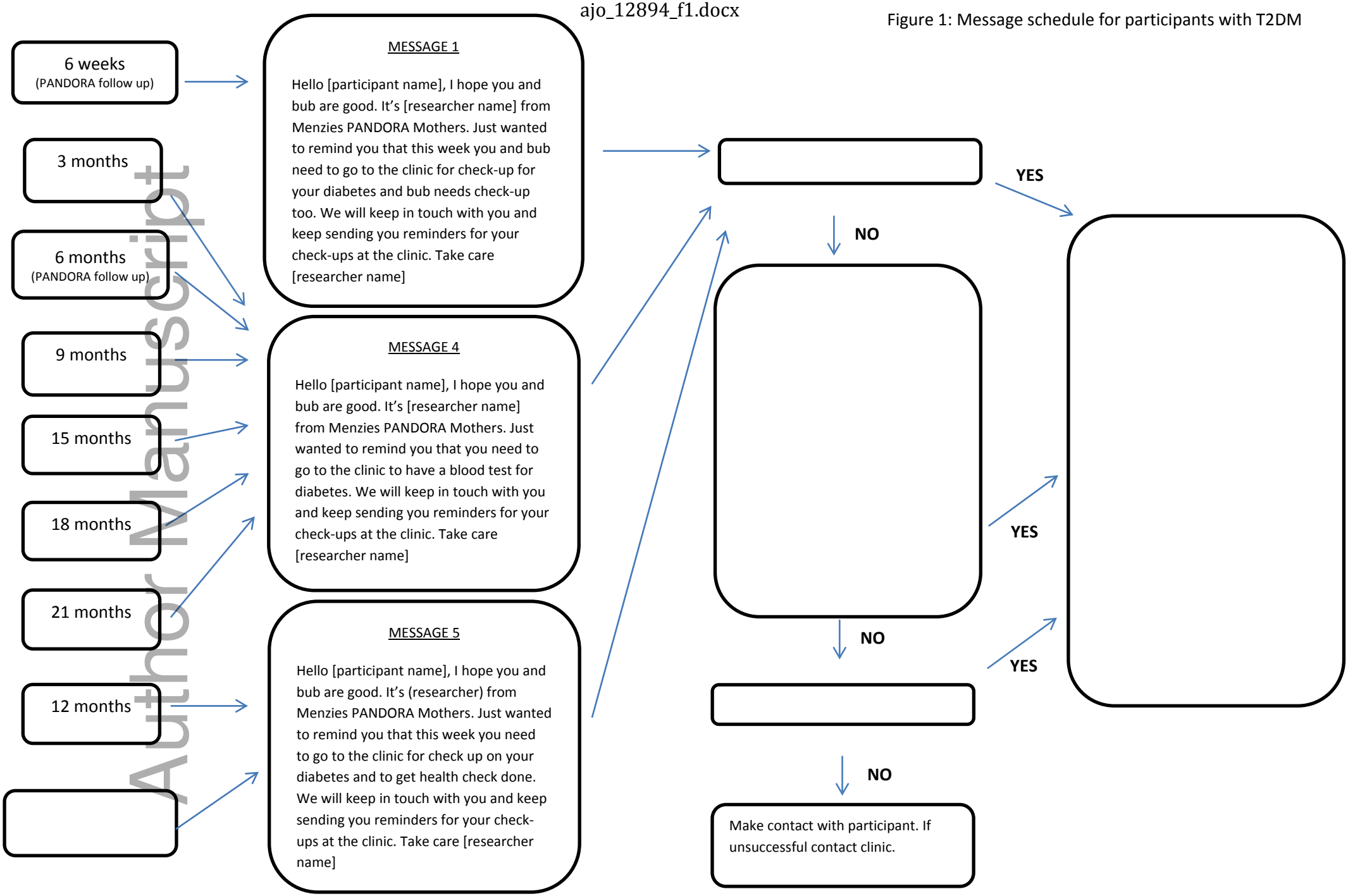

Figure 2: Message schedule for participants with GDM