



Let's talk aspirin: A survey of barriers and facilitators faced by midwives when engaging in conversations about aspirin with women at risk of pre-eclampsia

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ABSTRACT

Objective: Adherence to low-dose aspirin is key in preventing pre-eclampsia. Midwives are well positioned to support women to take aspirin as prescribed. This study aimed to understand the barriers and facilitators that midwives face during consultations with pregnant women about prophylactic aspirin.

Design, setting, and participants: A cross-sectional, UK-wide, quantitative and qualitative study of midwives was conducted between November 2020 and April 2021 using social media platforms. The survey was designed using the Theoretical Domains Framework by a team of researchers experienced in using it. An open-ended question was embedded in the survey to allow midwives to expand on matters related to the study subject.

Findings: Out of 160 responders, 37.5 % indicated inadequate engagement in conversations with women about aspirin prophylaxis. Domains 'Knowledge' (OR 13.7, 95 %CI 5.7–32.7, $p < 0.001$), 'Professional role and Identity' (OR 15.3, 95 %CI 6.4–36.7, $p < 0.001$) and 'Beliefs about capabilities' (OR 13.6, 95 %CI 6.1–30.6, $p < 0.001$) were most prominently associated with effective engagement. Best fit model was comprised of 'Beliefs about Capabilities', 'Social/professional role and identity', and 'Knowledge'. Midwives' comments focused on barriers within 'environmental context' related to 'conflicting views' and 'deficit in resources' that compromise positive reinforcement of aspirin use. Responders also provided helpful 'Top tips' that streamline their daily practice.

Conclusion and implications for practice: Beliefs about Capabilities, Social/professional role and identity, Knowledge, and Environmental Context and resources are key domains related to midwives' engagement in conversations about aspirin in pregnancy. Clear, up-to date information for midwives and the public should be available in an easy access format to allow provision of unequivocal advice related to the use of aspirin in pregnancy.

Introduction

Pre-eclampsia is a serious pregnancy complication defined as a new onset of hypertension (> 140 mmHg systolic or > 90 mmHg diastolic) with proteinuria or maternal organ dysfunction, after 20 weeks of pregnancy (National Institute for Health and Care Excellence, 2019). Daily low dose of aspirin (LDA), in 75–150 mg dose range, is advised for women at increased risk of developing pre-eclampsia by a number of

organisations across the world (National Institute for Health and Care Excellence, 2019; World Health Organization, 2011; Henderson et al., 2021; Poon et al., 2019). The 'Hypertension in pregnancy' guideline from the National Institute for Health and Care Excellence states, for example, that low dose aspirin should be offered to women who meet the increased risk criteria. The criteria is considered to be met when at least one of the five major risk factors (hypertensive disease during previous pregnancy, chronic kidney disease, autoimmune disease,

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diabetes, chronic hypertension) is present or at least two moderate (out of six) risk factors are identified (nulliparity, age ≥ 40 , pregnancy interval > 10 years, BMI ≥ 35 kg/m² at pregnancy booking, family history of pre-eclampsia, and multi-foetal pregnancy) (World Health Organization, 2011). This recommendation is based on evidence that LDA can significantly reduce the risk of developing pre-eclampsia in selected cohorts of women at increased risk of the disease (Roberge et al., 2018), while having a good safety profile (Roberge et al., 2018; Henderson et al., 2014).

To achieve the best prophylactic results, 90 % adherence to medication is required (Wright et al., 2017). Unfortunately, not all women who are advised to take LDA adhere to the treatment; a survey in the Netherlands estimated the rate of non-adherence to be 21.4–46.3 % (Abbeiden et al., 2016). Reasons for non-adherence are complex and relate to women's perception of the risks and benefits of aspirin treatment (Vinogradov et al., 2021); women have complex informational needs (Vinogradov et al., 2021), struggle to navigate convoluted information and to process it within the short time allocated for the treatment initiation, before 16 weeks gestation (Vinogradov et al., 2021). Moreover, women have to deal with conflicting information from various sources with a clear perception of low levels of support from their health care professionals (Vinogradov et al., 2021a, Vinogradov et al., 2021b; Ceulemans et al., 2019). Stark examples of inconsistency of information provided to women are described by publications from the UK and Australia where different health care professionals provide conflicting recommendations about aspirin use in pregnancy and in some cases restrict access to medication (Vinogradov et al., 2021; Shanmugalingam et al., 2020). Moreover, there are reports of missed opportunities amongst health care professionals in recognising the need for aspirin prophylaxis (Singh et al., 2023; Raganathan et al., 2022; Myers et al., 2022), as well as a perceived lack of professional support and reinforcement of the importance of aspirin use from midwives (Vinogradov et al., 2021). Women consider midwives to be central to their care and describe them as trusted healthcare providers (Bluff and Holloway, 1994; Lundgren and Berg, 2007), therefore midwives are well positioned to support pregnant women to make informed choices about taking aspirin as prescribed. It is important to understand the factors that influence midwives when engaging with women who have been prescribed LDA; an appreciation of difficulties, as well as good practices, will help to inform future training for midwives, benefiting mothers and babies. Until now this subject has not been explored in the literature.

The Theoretical Domains Framework (TDF V2) was chosen to theoretically underpin this project as it is a well-established framework of behavioural theories that are relevant to understanding behaviour change (Atkins et al., 2017; Cane et al., 2012). Investigating previous behaviour change theories and its predictors, the TDF proposes these theories can be aggregated into 14 key domains: Knowledge; Skills; Social and professional role and identity; Beliefs about Capabilities; Optimism; Beliefs about Consequences; Reinforcement; Intentions; Goals; Memory, Attention and Decision Processes; Environmental Context and Resources; Social influences; Emotions; and Behavioural Regulation (Atkins et al., 2017). A brief description of the domains, their definitions and constructs is available in supplementary materials (Supplementary Table 1).

The TDF has previously been used to guide the development of survey questions with the aim of establishing barriers and facilitators to professional behaviours (e.g. midwives engagement in conversations about smoking cessation, implementation of physical activity guidelines for obese pregnant women) (Beenstock et al., 2012; McParlin et al., 2017). Therefore, this study aimed to understand barriers and facilitators that midwives face during consultations with pregnant women about prophylactic use of aspirin in pregnancy using the TDF.

Study objectives

- Adapt an existing TDF based questionnaires to a subject specific behaviour (engagement in conversations about aspirin prophylaxis).
- Gain an understanding of barriers and facilitators of midwives' engagement in conversations about aspirin with pregnant women through; a) quantitative analysis of the association of TDF domains and the target behaviour (engagement in conversations about aspirin), b) qualitative analysis of midwives' reflections (free text responses) on their practices that are not captured by the closed-end questions within the survey.

Methods

Design and settings

An online cross-sectional survey study employing qualitative and quantitative methods, was conducted in the UK between November 2020 and April 2021.

Recruitment

This study was conducted during the COVID19 pandemic and national lock down with great challenges presented to the NHS in terms of an increase in workload, changes in the day-to-day conduct of routine activities, and availability of the workforce. Therefore, use of an online survey distributed via social networks presented an optimal opportunity to reach out to the midwifery workforce without increasing the burden to the NHS.

The survey distribution strategy was developed in a consultation with midwifery representatives. The survey was distributed via social networks (Twitter, Facebook, and LinkedIn) relying on a snowball recruitment strategy, which involved tagging voluntary, community and social enterprises (VCSE) such as Action on Pre-eclampsia (APEC) and Stillbirth & Neonatal death Society (SANDS), national network of Maternity Voices Partnerships (MVPs), as well as professional groups such as The Royal College of Midwives (RCM), Nursing and Midwifery Council (NMC), British Journal of Midwifery (BJM), Midwifery forums, and more. Tagging professional groups as key stakeholders in midwifery practice (use of '@' sign followed by and organizational/personal name that allows one to communicate or refer to the named organization/person in social media posts) allowed a wider reach within the midwifery workforce. The survey was advertised alongside the #AspirinFacts campaign to maximize engagement with the target audience, as well as with the general public, to encourage further distribution (see examples of recruitment messages in supplementary materials). Recruitment messages called for midwives practicing in the UK, while the landing page of the online survey clearly stated that the target population was midwives working in the UK (see landing page in supplementary materials, see supplementary Figs. 2 and 3).

Inclusion and exclusion criteria

Participants self-selected to participate in the study on a basis of a declaration of UK based midwifery registration and current practice, as well as being asked to declare their geographical area of practice. Incomplete responses were excluded from the analysis. There was no limit in how long participants had to complete the survey. No additional exclusion criteria were applied.

Analysis and data management

Descriptive statistics were used to describe responder's characteristics. Internal consistency of the items within the TDF domains underwent a post-test assessment using Cronbach's alpha coefficient on all available responses ($n = 160$), and linear regression analysis was

conducted to assess association of TDF domains with the engagement of midwives in conversations with women about aspirin in response to the index question: "I always engage in conversations about aspirin with all women at increased risk of PE". Data was analysed using IBM SPSS Statistics 24 software. A Multivariable logistic regression with backward elimination using $p > 0.10$ criterion was built to identify the subset of TDF domains which best explained the engagement outcome.

Responses to the open-ended question were analysed using thematic analysis following a six-phase approach as described by Clarke et al. (2015). Two researchers coded participants' responses independently using an inductive approach. Both researchers were female clinical academics experienced in qualitative methods and familiar with the reality of clinical practice in the UK. Researcher A's professional background is in midwifery, which ensured that interpretation of responses was grounded in professional midwifery practice, while the background of Researcher B allowed for interpretation from a stance external to midwifery practice. Once the data was coded independently, it was aggregated into overarching themes.

Survey responses were exported to IBM SPSS Statistics software directly from Qualtrics, data were reviewed for completeness and duplication, and incomplete responses were omitted. Qualitative data was managed by NVIVO QSR international software. Data were searched for consecutive duplications to minimise a risk of multiple responses.

Sample size

A minimum sample size was estimated to be 140 responses based on the maximum number of domains included in the regression analysis (Nunnally, 1978). Recruitment attempts were ceased when the number of responses had reached 160 complete submissions.

Ethics

This research was reviewed and given favourable opinion by Newcastle University Ethics Committee (Ref 4461/2020). All responders had access to study information and gave explicit consent to participate. Information provision and consent was delivered as part of the QualtricsXM software algorithm.

Survey adaptation

The Theoretical Domains Framework (TDF V2), an overarching framework of behaviour change theories (Atkins et al., 2017; Cane et al., 2012), was used to construct the survey. Based on previous studies that used the TDF to explore midwives' behaviours supporting smoking cessation and physical activity (Beenstock et al., 2012; McParlin et al., 2017), a subject specific draft of the survey was created. A consensus meeting was held between three researchers (VAS, VS, RV), experienced in using the TDF, to review survey items to agree on alignment of the proposed questions to the TDF domains. At this stage questions were re-ordered, re-worded, removed or added. Once complete, two independent raters with experience of using the TDF (CM, NH) rated all survey items in a back-validation exercise. Raters had 80.4 % absolute agreement. Eleven items that raters had disagreement about, were reviewed, and as a result removed, reworded and/or refined in a joint meeting with three researchers (VAS, VS, RV). All items were randomly arranged in a survey matrix with a five-point Likert scale ranging from strongly disagree (National Institute for Health and Care Excellence, 2019) to strongly agree (Roberge et al., 2018). To avoid acquiescence bias, a number of questions were negatively phrased. Once complete, the survey items were entered into an online survey tool (QualtricsXM). This process was followed by a test run with three practising midwives to check the survey for accessibility, layout and readability. This process resulted in a survey targeting engagement in conversations about aspirin with pregnant women and consisting of 53 questions related to 14 domains of the TDF V2 (see number of questions at different stages of

survey adaptation process in Table 1).

Post-test assessment of internal consistency of the questions within each domain was conducted on an entire survey cohort ($n = 160$). On a first version of the survey, we observed variable internal consistency within the domains with mean Cronbach α with a minimum α value of 0.3 and maximum α value being 0.87 (see Table 1). Considering 0.5 is lowest acceptable threshold for internal consistency (McGraw-Hill, 1967), all domains with a coefficient < 0.5 , were retested, with items removed one by one to achieve improvement in consistency by domain. In cases where improvement was achievable without reducing the number of questions to below 3, the weakest question was removed (see Table 1). This process resulted in acceptable consistency of all domains but Environmental Context and Resources (Cronbach $\alpha = 0.47$), therefore results related to this domain should be interpreted with caution.

In addition to the TDF items, participants were asked an open-ended question to elicit their views and experiences of supporting women with aspirin use in pregnancy. In particular, they were prompted to describe challenges as well as helpful hints they use in their clinical practice. A free text box was included in the survey.

Results

Study population

A total of 272 entries to the survey were registered within the six-month recruitment window. The majority (99.3 %) of midwives who entered the landing page consented to participate. Out of 270 who consented, only 160 midwives completed the survey, constituting a 59 % completion rate. Most participants self-identified as female (98.8 %) and of a white ethnic background (93.8 %). The largest age bracket amongst participants was 51–60 years (26 %), with the overwhelming majority of participants practicing midwifery for over 10 years. North East, North West, Yorkshire and Humber regions were very well represented, while West Midlands, South East and South Central regions were underrepresented (see Table 2). Areas of practice of the respondents varied with 30 % of responders practicing midwifery in community settings. Participant characteristics inclusive of age, sex, ethnicity, geographical area of practice, clinical area of practice, experience (expressed in number of years of midwifery practice) are described in Table 2.

According to the Nursing and Midwifery Council (NMC), at the time of the administration of the survey, there were 45,372 registered midwives living in the UK (Nursing and Midwifery Council, 2021). NMC registrants were predominantly White British (67.7 %), with 15.9 % within 20–30 age category and 23.6 %, 25.3 %, 26.5 %, 10.7% in 31–40, 41–50, 51–60, > 60 age groups respectively (Nursing and Midwifery Council, 2021). The majority (99.6 %) of the midwifery registrants were identified as females (Nursing and Midwifery Council, 2021).

Internal consistency

Cronbach alpha demonstrated acceptable consistency of all domains except Environmental Context and Resources (Cronbach $\alpha = 0.47$). Therefore, results relating to this domain should be interpreted with caution (see Table 3).

Barriers and facilitators

Sixty (37.5 %) respondents reported not engaging in conversation with women about aspirin prophylaxis. Within the whole cohort, the highest scores were in the 'Knowledge' domain indicating that this domain is acting as a facilitator to enacting conversations with women at risk of PE about aspirin intake. Domains with the lowest scores were 'Memory, Attention and Decision Processes' and 'Environmental Context and Resources' indicating that those domains may act as barriers to engagement in conversations about aspirin (see Table 3).

Table 1
Survey adaptation.

Domain	Initial N of items	N of items changed following consensus	N of items changed post back-validation	N of items included in the survey	Cronbach α^1	N of items deleted to improve consistency	Cronbach α^2
1 Knowledge	7	-1	0	6	0.79	0	-
2 Skills	4	0	-1	3	0.75	0	-
3 Social/professional role and identity	5	0	-1	4	0.63	0	-
4 Beliefs about Capabilities	5	0	0	5	0.87	0	-
5 Optimism	5	-1	-1	3	0.48	1	0.57
6 Beliefs about Consequences	6	-1	0	5	0.75	0	-
7 Reinforcement	3	0	0	3	0.55	0	-
8 Intentions	1	+2	0	3	0.78	0	-
9 Goals	4	+1	-2	3	0.83	0	-
10 Memory, Attention and Decision Processes	4	0	0	4	0.85	0	-
11 Environmental Context and Resources	5	-1	0	4	0.30	1	0.47
12 Social influences	4	0	-1	3	0.64	0	-
13 Emotion	4	0	-1	3	0.75	0	-
14 Behavioural Regulation	4	0	-1	3	0.82	0	-
Index question: "I always engage in conversations about aspirin with all women at increased risk of PE".							
Total number of questions	62	61	53	53	0.699*	51	0.718*

Cronbach α^1 refers to α prior to removal of the items to improve consistency.

Cronbach α^2 refers to α resulted post items removal.

* Mean Cronbach α for all domains.

Regression analysis

Associations of individual domains with engagement are described as odds ratio (OR) (CI 95 %) in Table 4, with all domains but "Environmental context" and "Optimism" associated with engagement. After adjustment for the area of midwifery practice, significance of the association was not changed.

Starting with 13 TDF (v2) domains (domain 'Environmental context and resources' was not included due to low internal consistency), a backward elimination reduced the number of domains to three which best explained the outcome; "Beliefs about Capabilities", "Social/professional role and identity", and "Knowledge" ($R^2 = 0.63$) (see supplementary material).

Thematic analysis

Almost half of participants (45 %) left responses to the open question: 'Please add in the space provided your views and experiences with aspirin in pregnancy. Please include challenges as well as helpful hints that you use in your practice'. Three main themes were identified; two closely linked to Environmental context and resources: "Conflicting views" and a "Deficit of resources", and one related to facilitators of engagement: "Top tips from midwives" (see Fig. 1).

Conflicting views

Survey responders described the complexity of the health care system relating to the prescription and supply of aspirin that make efforts to engage with women about aspirin counterproductive.

"The standard letter sent to women tells them to buy aspirin over the counter, however many women tell me that the pharmacist won't sell them aspirin if they know they are pregnant which then makes the women more anxious about taking it, and I have to ask their GP for a costly prescription. They could get from the supermarket, and no one would question whether they are pregnant, but again it's hard to explain this to the women without making them anxious that there is something wrong with taking aspirin during pregnancy." (R263, community midwife)

Inconsistent messages from various health care providers are rooted

in the 'off license' use of aspirin in pregnancy, with GPs, midwives and pharmacists being reluctant to prescribe or supply aspirin to pregnant women.

"Difficult to get GPs to prescribe aspirin as the BNF (British National Formulary) states not safe to take in pregnancy." (R258, Antenatal/Postnatal ward)

"Some patients reluctant to purchase as some GP refuse to prescribe and report it's an obstetrician's role to prescribe." (R261, Community midwife)

"My biggest challenge is GPs refusing to prescribe it especially at 150 mg." (R55, Community midwife)

In their notes, midwives describe a lack of clear prescribing responsibilities, whether they see this as part of their role or not.

"Some GP practices are reluctant to prescribe aspirin unless advised by obstetricians rather than 'just midwives'." (R224, Community midwife)

"Changes in dosage not been disseminated widely and conflict in responsibility for prescribing is an issue." (R217, Community midwife)

"My role is to advise, not to enforce. I will provide the information one requires to make an informed choice. Women are often confused by being on aspirin. My role isn't to force a woman to take a medication." (R216, Birth Centre/Community midwife)

The somewhat passive tone of a current guideline (World Health Organization, 2011), suggesting that women should be advised to take aspirin, as opposed to being prescribed aspirin, weakens the strength of the recommendation.

"It is not something I think about much, women are advised to take it but not prescribed." (R23, Community midwife)

Deficit of resources

Midwives identified three key areas of deficit: time, written resources and training (see Fig. 1: coding tree).

Midwives are overwhelmed with the number of topics they need to cover within the restricted timeframe that they have for an antenatal

Table 2
Participants characteristics.

Participant characteristics		Number (percentage)
Age	20–30	23 (14.4 %)
	31–40	53 (33.1 %)
	41–50	37 (23.1 %)
	51–60	39 (24.4 %)
	> 60	7 (4.4 %)
	Prefer not to disclose	1 (0.6 %)
Experience	< 2 years	13 (8.1 %)
	2–4 years	20 (12.5 %)
	5–10 years	34 (21.3 %)
	> 10 years	93 (58.1 %)
Sex	Female	158 (98.8)
	Other	1 (0.6 %)
	Prefer not to disclose	1 (0.6 %)
Ethnicity	White British	146 (91.3 %)
	White other	4 (2.5 %)
	Indian	1 (0.6 %)
	Pakistani	1 (0.6 %)
	Black Caribbean	2 (1.3 %)
	Black African	1 (0.6 %)
	Prefer not to disclose	2 (1.35 %)
	Other	3 (1.9 %)
Geographical area	East of England	4 (2.5 %)
	London	11 (6.9 %)
	North East	48 (30 %)
	North West	34 (21.3 %)
	South Central	1 (0.6 %)
	South East Coast	1 (0.6 %)
	South West	4 (2.5 %)
	West Midlands	1 (0.6 %)
	Yorkshire and the Humber	38 (23.8 %)
	Scotland	15 (9.4 %)
	Wales	3 (1.9 %)
Area of practice	Community	47 (29.4 %)
	Day assessment	3 (1.9 %)
	Antenatal Clinic	13 (8.1 %)
	Foetal medicine	3 (1.9 %)
	Delivery Suite	34 (21.3 %)
	Inpatient ward	16 (10 %)
	Birthing Centre	7 (4.4 %)
	Other*	7 (4.4 %)

* Other category is inclusive of rotational, transitional care, research, continuity of care, bereavement, and ultrasound.

visit. At times they do not always feel they have time to prioritise discussions about aspirin. This can be even more complex in certain circumstances (e.g., when an interpreter is required).

“Women don’t understand the indication at times and there is not enough time to discuss.” (R199, Community midwife)

“Discussing Aspirin with women is just one of too many things I have to discuss with women and not enough time to do everything.” (R75, Community midwife)

“I do check at 15-week appointment re if commenced, but honestly on subsequent visits do not ask each time as so many other things to discuss.” (R50, Community midwife)

Participating midwives called for more written resources such as leaflets being available to them to support discussions about aspirin, especially translated to other languages.

“We don’t have information leaflets at our hospital, which I think would be helpful.” (R50, Community midwife)

“A general information leaflet would be helpful to have in the community that we can give to women so that they are able to read up on why it is

Table 3
Scores for domains.

Domain		Final Number of items	Final Cronbach α	Total score median (IQR)	(Min–Max)
1	Knowledge	6	0.79	5 (1)	2–5
2	Skills	3	0.75	4 (2)	1–5
3	Social/professional role and identity	4	0.63	4 (1)	1–5
4	Beliefs about Capabilities	5	0.87	4 (1)	1–5
5	Optimism	2	0.57	4 (1)	1–5
6	Beliefs about Consequences	5	0.75	4 (1)	2–5
7	Reinforcement	3	0.55	4 (2)	1–5
8	Intentions	3	0.78	4 (1)	1–5
9	Goals	3	0.83	4 (2)	1–5
10	Memory, Attention and Decision Processes	4	0.85	3 (2)	1–5
11	Environmental Context and Resources	3	0.47	3 (3)	1–5
12	Social influences	3	0.64	4 (1)	1–5
13	Emotion	3	0.75	4 (2)	1–5
14	Behavioural Regulation	3	0.82	4 (2)	1–5

Table 4
Association of TDF domains with engagement.

Domains	Unadjusted OR (CI 95 %)	Adjusted for area of practice [†]	Adjusted for area of practice and years of experience
Knowledge	13.7 (5.7–32.7)	14.6 (5.9–36.12)	14.98 (5.99–37.44)
Skills	3.3 (2.1–5.2)	3.67 (2.27–5.9)	3.72 (2.3–6.03)
Social and professional role and identity	15.3 (6.4–36.7)	17.86 (6.91–46.2)	18.83 (7.13–9.69)
Beliefs about capabilities	13.6 (6.1–30.6)	15.46 (6.48–36.88)	13.46 (5.96–30.38)
Optimism	1.5 (0.96–2.3)	1.5 (0.97–2.39)	1.5 (0.99–2.45)
Beliefs about consequences	2.5 (1.4–4.6)	2.59 (1.39–4.82)	2.83 (1.46–5.45)
Reinforcement	2.8 (1.7–4.6)	2.88 (1.74–4.76)	2.87 (1.73–4.76)
Intentions	4.6 (2.6–8.2)	4.74 (2.59–8.7)	4.92 (2.66–9.1)
Goals	1.7 (1.18–2.54)	1.83 (1.24–2.72)	1.84 (1.22–2.77)
Memory, Attention and Decision Processes	1.48 (1.05–2.09)	1.48 (1.04–2.11)	1.49 (1.02–2.16)
Environmental context and resources	1.1 (0.7–1.6)	1.17 (0.79–1.72)	1.15 (0.77–1.7)
Social influence	4.5 (2.5–7.9)	4.52 (2.5–8.04)	4.7 (2.62–8.47)
Emotions	1.6 (1.1–2.3)	1.8 (1.2–2.74)	1.89 (1.23–2.9)
Behavioural regulations	4.26 (2.6–7)	4.03 (2.45–6.61)	4.12 (2.48–6.83)

* Area of practice was combined to create two conceptional categories where midwives were less likely or more likely to be involved in conversations about aspirin use for pre-eclampsia prevention: 0) Delivery Suite, Birthing Centre, and other, 1) Community, Day Assessment, Antenatal Clinic, foetal Medicine, Inpatient Ward.

advised in pregnancy etc. We give a lot of information at the booking appointment and this would be helpful for women to refer back to.” (R117, Rotational midwife)

“Do feel it’s a lot for some women to take in and I see a lot of non-English speaking women (interpreters used), but sometimes reluctant to take

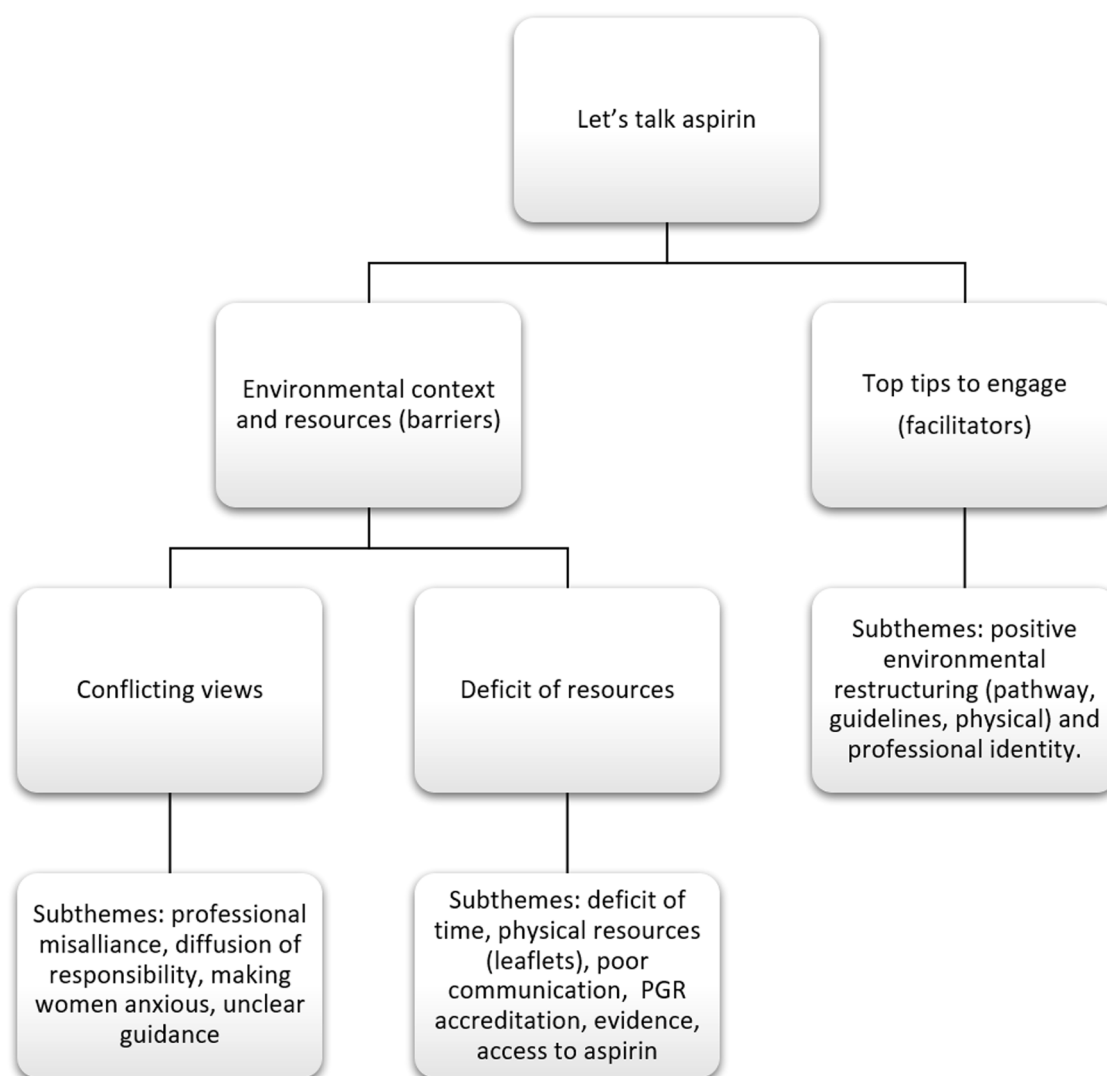


Fig. 1. Coding tree.

medication and understand implications. Should have information in other languages.” (R50, Community midwife)

Midwives recognise the deficit in their knowledge related to use of aspirin but feel limited in their ability to fill the knowledge gap.

“If a woman asks me for more evidence or wants a more in-depth discussion on side-effects/risks/benefits then I really feel I have no knowledge or resources to do this.” (R263, Community midwife)

“Need to learn more about the risks/benefits/advice for advising aspirin.” (R60, Community/Delivery suite midwife)

“Not enough teaching for staff.” (R16, Antenatal & Newborn Screening)

Top tips from midwives

In addition to describing barriers to engagement, participants shared a number of helpful tips (facilitators) that support their daily practice. Clear, updated local protocols, aids in interdisciplinary communication and a checklist that prompts midwives to trigger an ‘aspirin pathway’ were listed to be beneficial practices. Interestingly, the tips mentioned by the midwives were related to adherence to organisational strategies that were put in place on order to systematically support effective behaviours.

“We have benefited from guideline review and update, so there is an easier to follow protocol.” (R128, Community midwife)

“I met with the CCG GP lead they all agree to prescribe aspirin I devised a letter the midwife ticks the risk factors and emails to GP who then provides a prescription once he excludes any contraindications which the patient may have on their GP record our compliance is brilliant now.” (R200, Community midwife)

“Using check lists at booking which would raise the discussion of risk of pre-eclampsia and need of Aspirin in pregnancy is normal practice in my area. This helps remind the midwife at booking and encourages follow up on the woman’s file/record when organising prescriptions etc.” (R127, Research midwife)

Discussion

To date, this is the first study investigating barriers and facilitators faced by midwives while engaging in conversations about aspirin with pregnant women. This study echoes findings from our previous research about the barriers and facilitators of adherence to aspirin felt by pregnant women (Vinogradov et al., 2021a). In this study we showed that 37.5 % of midwives do not always engage in conversations about aspirin use in pregnancy. This represents a significant missed opportunity to

improve adherence to aspirin and therefore pregnancy outcomes in women at risk of pre-eclampsia. Understanding the key factors driving midwives' behaviours relating to discussions with women about aspirin use in pregnancy is vital to facilitate the development of helpful tools to promote these conversations (Araújo-Soares et al., 2019).

The results of this study provide evidence that can be used for the development of such tools. A key finding highlights the relevance of "Beliefs about Capabilities", "Social/professional role and identity", and "Knowledge" as key target domains. Targeting these domains could potentially improve midwives' engagement in conversations with pregnant women about aspirin by equipping them with subject specific knowledge; strengthening professional identity by aligning professional responsibility to current recommendations; and by providing training and a facilitating organisational environment to improve 'Beliefs about Capabilities'. It is important to highlight that 'Beliefs about Capabilities' can be easily influenced by organisational factors that either facilitate or hinder enactment of a behaviour (Atkins et al., 2017). Our analysis of textual responses clearly highlights organisational deficits in the facilitation of conversations about aspirin, due to time constraints, lack of resources, and the need to discuss a wide range of priority issues with pregnant women.

Similar findings were observed by researchers looking at factors associated with the implementation of smoking cessation guidelines and prescribing for pregnant women (McParlin et al., 2017; Paksaite et al., 2020), as well as in other studies looking at guideline implementation amongst health care professionals. A systematic review of barriers and facilitators of adoption of prescribing guidelines indicates 'Knowledge', "Social/professional role and identity", and "Beliefs about Capabilities", amongst other domains, as key in multiple health care settings such as Children and infants, Pregnancy and pre-conception, Elderly care, Co-morbidity and Emergency settings (Paksaite et al., 2020). A study investigating provision of information by midwives about physical activity indicated that 'Knowledge' and 'Social/Professional role and identity' were scored highest, indicating awareness and alignment of perceived professional role with the guidelines, however those domains alone were not translated into desired behaviour. Yet domains 'Skills' and 'Memory, Attention and Decision Processes' together with adequate resources were shown to be key to the enactment of the guideline (Lundgren and Berg, 2007). This again highlights the issue of adequate resources, described in the qualitative part of our study within a sub-theme 'Deficit of resources', revealing that this issue is not unique to conversations about aspirin. Lack of appropriate resources, whether time or material, will be compounded for women who already require enhanced time or input from their midwife (e.g., women with more complex health and social needs, women who do not speak English), potentially further widening inequalities in service provision and outcomes.

Further, in our qualitative exploration of barriers to conversations about aspirin, an important issue of conflicting professional views was highlighted with general practitioners' and pharmacists' practices not being aligned to obstetric guidelines. This potentially discourages midwives' involvement in conversations about use of aspirin, leaving this for obstetricians to discuss. This professional misalignment was recently described by Sanders et al., and extends to prescribed and over-the-counter medicines (Sanders et al., 2023).

Strengths and limitations

This is the first study to explore the barriers and facilitators to midwives promoting aspirin adherence in pregnant women at risk of pre-eclampsia. The use of a national survey means that the results have broad relevance, and the combination of qualitative and quantitative methodology means that the results have breadth and depth.

The survey adapted by our team had appropriate internal consistency for all domains excluding 'Environmental context and resources'. This could be reflective of the fact that the questions related to this

domain were not reflective of current constraints meaning that questions related to this domain need to be improved.

Despite deficiency of the internal validity within 'Environmental context and resources' domain, this study benefited from a quantitative and qualitative approach within the survey. While the results under the TDF domain 'Environmental context and resources' should be interpreted with caution, it was a prominent theme in the qualitative analysis. Midwives' responses to the open questions emphasised the relevance of 'Environmental context and resources' and this data could be used to support the refinement of the survey in this domain in the future.

Although this is a UK wide survey, some areas of the UK were underrepresented. Based on comparison of the survey cohort with NMC register demographics, it was evident that the white British population was overrepresented in this study. Although this study did not aim to explore differences between midwives' behaviour stratified by ethnicity, this could be further explored in future research. Other workforce characteristics such as sex and age were adequately represented in this cohort.

It was not possible to conduct meaningful subgroup analysis due to a relatively small number of participants in each subgroup by practice and geographical region, however it is entirely possible that results may vary once stratified to more homogeneous groups of responders.

Participants were not reimbursed for completion of this survey; therefore, it was unlikely that one person would respond more than once to this survey. Although duplicate responses were improbable, a review of responses was conducted during the data cleaning stage and no duplicate consequent responses were noted.

Implication for practice and research

This study results highlights factors that help or hinder midwives in their everyday practices relating to supporting pregnant women to adhere to aspirin therapy. This knowledge is essential to realise the improved maternal and neonatal health outcomes associated with aspirin therapy adherence for women at risk of pre-eclampsia. As a result of this study, we have a better understanding of behavioural drivers, providing a theoretically informed foundation for the development of a new training bundle aimed to support student and practicing midwives.

Having a good understanding of the problem means that multiple behavioural change approaches and frameworks can be applied to develop an intervention. Examples of such approaches are, but not limited to, Intervention Mapping (IM) (Bartholomew Eldredge et al., 2016), Six steps in quality intervention development (6SQiD) (Wight et al., 2016), Evidence-based co-design (O'Brien et al., 2016), and Behavioural Change Wheel (BCW) (Michie et al., 2011). Here we give a brief example of the application of the BCW to support engagement in a conversation about aspirin use. The BCW is a tool for the translation of an in-depth understanding of the modifiable determinants of the behaviour ('behavioural diagnosis'), as gathered via the survey described here, to a behaviour intervention design (Michie et al., 2011). This tool suggests that "Knowledge" "Beliefs about Capabilities", "Social/professional role and identity" could be targeted by using distinct intervention types and policy options that could provide means for behavioural change (Michie et al., 2011). In our case, for example, the domains "Knowledge" could be enhanced by intervention functions described as 'Education', 'Training', and 'Enablement', while "Beliefs about Capabilities" and "Social /professional role and identity" could utilise 'Education' as well as 'Persuasion', 'Incentivisation', and 'Modelling'. Above mentioned intervention functions could be targeted through a number of policy options such as 'Communication/marketing', 'Service provision' as an example. In practical terms it could mean that a wide-reaching campaign (Communication) may need to be deployed by stakeholder organisations (professional or voluntary) to educate and motivate midwives on the benefits of having conversations about adherence to aspirin during pregnancy. The campaign may

include videos demonstrating how midwives could engage in such conversations with pregnant women about aspirin i.e., modelling the behaviour.

To improve 'Environmental context and resource', the BCW suggests choosing appropriate intervention functions from a selection of 'Training', 'Environmental restructuring', and 'Enablement'. Although a careful examination of potential options needs to be conducted with a wider range of stakeholders (Currie et al., 2022) to ascertain an appropriate policy approach, potential examples of improvement could be changes in local and national guidelines and regulations, introduction of fiscal measures, and changes in environmental planning that would facilitate the streamlining of information amongst different professional groups and allow better access to the medication.

The important role that Professional and Voluntary Community and Social Enterprises (VCSEs) could play in driving change and reinforcing messages in education and policy should also be considered (Piotrowicz and Cianciara, 2013).

Conclusion

Beliefs about Capabilities, Social/professional role and identity, Knowledge, and Environmental Context and resources are key domains related to midwives' engagement in conversations with pregnant women at risk of pre-eclampsia about aspirin intake as a form of prevention.

Clear, up-to date information for midwives and the public should be available in an easy access format to allow provision of unequivocal advice related to the use of aspirin in pregnancy.

Ethical approvals

This research was reviewed and given favourable opinion by Newcastle University Ethics Committee (Ref 4461/2020). All responders had access to study information and gave explicit consent to participate. Information provision and consent was delivered as part of the QualtricsXM software algorithm.

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CRedit authorship contribution statement

Raya Vinogradov: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Writing – original draft. **Vikki Smith:** Validation, Data curation, Writing – review & editing. **Shaun Hiu:** Methodology, Formal analysis, Supervision, Validation, Data curation, Writing – review & editing. **Catherine McParlin:** Methodology, Data curation, Validation, Writing – review & editing. **Allison Farnworth:** Formal analysis, Methodology, Project administration, Validation, Data curation, Writing – review & editing. **Vera Araújo-Soares:** Conceptualization, Formal analysis, Methodology, Resources, Supervision, Validation, Data curation, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.midw.2023.103860.

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