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# Evaluation of a DVD for women with diabetes: impact on knowledge and attitudes to preconception care

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### Abstract

**Aims** To determine if an educational DVD increases knowledge and changes attitudes of women with diabetes towards preconception care.

**Methods** Ninety-seven women with diabetes (Type 1,  $n = 89$ ; Type 2,  $n = 8$ ), aged 18–40 years, completed a pre-DVD and post-DVD intervention study by postal questionnaire. Beliefs and attitudes associated with preventing an unplanned pregnancy and seeking preconception care were assessed using a validated questionnaire; scales included benefits, barriers, personal attitudes and self-efficacy. Knowledge of pregnancy planning and pregnancy-related risks were assessed by a 22-item questionnaire.

**Results** After viewing the DVD there was significant positive change in women's perceived benefits of, and their personal attitudes to, receiving preconception care and using contraception: change in score post-DVD viewing 0.7 (95% confidence interval 0.3, 1.2),  $P = 0.003$ , and 0.8 (0.3, 1.2),  $P = 0.001$ , respectively. The DVD significantly improved self-efficacy, that is, self-confidence to use contraception for prevention of an unplanned pregnancy and to access preconception care [3.3 (1.9, 4.7),  $P < 0.001$ ], and significantly reduced perceived barriers to preconception care [−0.7 (−1.2, −0.2),  $P = 0.01$ ]. Knowledge of pregnancy planning and pregnancy-related risks increased significantly after viewing the DVD: mean increase was  $37.6 \pm 20.0\%$ ,  $P < 0.001$ , and  $16.9 \pm 21.2\%$ ,  $P < 0.001$ , respectively.

**Conclusions** This study demonstrates the effectiveness of a DVD in increasing knowledge and enhancing attitudes of women with diabetes to preconception care. This DVD could be used as a prepregnancy counselling resource to prepare women with diabetes for pregnancy.

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**Keywords** diabetes, education, preconception counselling, prepregnancy care

### Introduction

Women with diabetes have a significantly increased risk of adverse pregnancy outcome, with a twofold and fivefold increased risk of congenital anomaly and stillbirth, respectively, compared with the general maternity population [1]. It is now well-recognized that pregnancy planning and markers of prepregnancy care are associated with reduced risks of adverse pregnancy outcome [2–5]. Internationally, clinical guidelines

have highlighted the importance of preconception counselling from adolescence for all women with diabetes [6,7], yet preconception counselling rates remain low [8,9]. Consequently, women are poorly prepared for pregnancy, with two-thirds of women receiving suboptimal preconception care [10]. Evidence suggests a lack of awareness of risks associated with pregnancy and the role of preconception care in preventing pregnancy complications, and in particular of the importance of preventing an unplanned pregnancy among women with diabetes [11,12], which will ultimately have an impact on the uptake of preconception care.

Multimedia technologies such as CD-ROMs with accompanying books have been shown to be an effective educational intervention in raising awareness of reproductive health issues in American teenagers with diabetes [13]. However, as not all

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women have access to computers, alternative technology, such as a DVD, is attractive to maximize accessibility and exposure given that almost all households have a DVD player. DVDs offer new possibilities for presenting content in a rich, televisual way, with full-motion video and huge data capacity, and have been shown to be efficient and appealing alternatives to classroom-based instruction within the field of diabetes education [14]. We previously developed a DVD to be used as a pre-pregnancy counselling resource for women with diabetes [15]. The aim of this study was to determine if this DVD intervention increases knowledge and changes attitudes of women with diabetes to preconception care.

## Patients and methods

This was a prospective, pre- and post-intervention study undertaken by postal questionnaire. The protocol was approved by the Office for Research Ethics Committees in Northern Ireland (09/NIR/03/71). Informed written consent was obtained from all study participants.

### Participants

Potentially eligible patients were identified from two National Health Service (NHS) hospitals in Northern Ireland. At the time of the study, neither hospital offered structured preconception care programmes to women with pregestational diabetes. Patients were eligible for inclusion if they were women of child bearing potential, aged between 16 and 40 years, had Type 1 or Type 2 diabetes, were not currently pregnant and were English speaking.

### Educational intervention

The intervention consisted of viewing a preconception counselling DVD called *Women With Diabetes: Things You Need to Know (But Maybe Don't!)* [15]. The aim of the DVD was to increase women's awareness about the importance of planning for pregnancy and positively influence attitudes, self-efficacy, and intentions towards seeking prepregnancy care and preventing unplanned pregnancies. Overseen by a multidisciplinary steering group, the systematic development of this innovative DVD centred around input from patient focus groups to direct the tone, key messages and format of the DVD [15,16] and featured eight women with diabetes sharing their views and experiences, alongside an evidence-based commentary.

### Outcome measures

Outcome measures evaluated reproductive health attitudes and knowledge using the Reproductive Health Attitudes and Behaviour (RHAB) instrument [17] and a DVD-specific knowledge instrument (K), collectively termed the Reproductive Health Attitudes, Behaviour and Knowledge Questionnaire (RHABK).

### Reproductive Health Attitudes and Behaviour

The RHAB questionnaire is a validated theory-based multidimensional instrument [17,18] that examines constructs of three social cognitive models – Health Belief Model [19], Theory of Reasoned Action [20] and Social Cognitive Theory [21] – evaluating Expanded Health Belief Model dimensions [22] with regard to family planning behaviour, including the use of effective contraception and preconception care in women with diabetes. We assessed nine constructs (see Table 2) containing 37 items related to knowledge, beliefs and attitudes, social factors and reproductive health behaviours. Following a pilot of the questionnaire among women aged 18–40 years during focus group sessions the RHAB was modified in respect of language only, to make it applicable to a UK study population (for example, 'birth control' was changed to 'contraception').

### Reproductive health knowledge

The knowledge instrument (K), consisted of 22 questions adapted from Charron-Prochownik *et al.* [23], or designed by the research team, to evaluate knowledge and rate understanding specific to DVD content. Questions specific to DVD content regarding pregnancy planning ( $n = 9$ ) and risks ( $n = 7$ ) were scored as correct or incorrect. Overall knowledge of pregnancy planning and risks was assessed by a summation of the categorically ranked responses expressed as percentage correct. Perceived understanding of diabetes and pregnancy – 'How would you rate your understanding of how diabetes and pregnancy affect one another' – was measured using an 11-point Likert scale ranking response of 'poor' (0) to 'excellent' (10) [23]. In addition, women were asked to rate five pregnancy planning statements using an 11-point Likert scale ranking response of 'strongly disagree' (0) to 'strongly agree' (10). Content validity was determined by a multidisciplinary panel of experts and the instrument was subsequently piloted among focus groups before use in this study.

### Procedure

Potentially eligible patients were mailed an invitation to participate by their consultant physician. Eligible women who expressed an interest in taking part were then mailed a baseline study pack that included a patient information sheet, consent form, a background questionnaire, a baseline RHABK questionnaire and a reply-paid envelope. Women were subsequently phoned by the researcher (M.S.) and given the opportunity to ask any questions. Women who agreed to participate were asked to complete and return the consent form and questionnaires. The DVD and a repeat RHABK questionnaire were mailed 2 weeks post-receipt of completed baseline questionnaires. Women were then asked to view the DVD and to return the completed post-DVD RHABK questionnaire via Freepost. If necessary, a reminder call was made to improve the questionnaire return rate. On receipt of the post-DVD questionnaire, women were paid an honorarium of £10 towards time costs of study participation.

### Statistical analysis

A total of 95 respondents were required to give the study 90% power to detect an effect size of one-third (i.e. one-third of a standard deviation change in mean score before and after DVD viewing) as significant at the 5% level. Analyses were performed using SPSS version 16 (SPSS Inc., Chicago, IL, USA).

Demographic data (see Table 1) are expressed as *n* (%) for categorical variables and mean  $\pm$  SD for continuous variables. Pre- and post-DVD RHAB scale responses (see Table 2) are

expressed as mean  $\pm$  SD and compared by paired *t*-test. The internal consistency of items forming each pre-DVD RHAB scale response was measured using Cronbach's alpha ( $\alpha$ ). Individual pre- and post-DVD knowledge responses (see Table 3) are expressed as percentage (95% CI) of participants correct and compared by McNemar's test. Overall pre- and post-DVD knowledge is expressed as mean  $\pm$  SD and compared by paired *t*-test.

### Results

Four hundred and sixty-eight patients were mailed about the study, of whom, 120 (26%) contacted the research team to receive further information. Four patients were pregnant and therefore not eligible for the study. Of the 116 eligible women willing to take part in the study, 110 women [100 (90%) with Type 1 diabetes and 10 (9%) with Type 2 diabetes], consented, returned baseline questionnaires and were subsequently mailed a DVD along with a post-DVD RHABK questionnaire. In total, 97 women reported viewing the DVD and completed the evaluation. The sociodemographic characteristics of the 97 women who completed the study are outlined in Table 1.

**Table 1** Study participant characteristics at baseline

	N = 97
Age (years)	30.3 $\pm$ 6.0
Marital status	
Single*	50 (52%)
Married	47 (48%)
Diabetes type	
Type 1	89 (92%)
Type 2	8 (8%)
Diabetes duration (years)	14.7 $\pm$ 8.5
Race or ethnic group	
White	94 (97%)
Asian	1 (1%)
Other	2 (2%)
12 years or fewer in fulltime education	23 (24%)
Occupation status	
Employed full-time/part-time	69 (71%)
Full-time homemaker	8 (8%)
Unemployed	8 (8%)
Student	10 (10%)
Not known	2 (2%)
Social class	
I–II	59 (61%)
III–V	33 (34%)
Unknown	5 (5%)
Never been pregnant	59 (61%)
Previous miscarriage	17 (18%)
Has one or more children	32 (33%)
Has a child with a congenital malformation†	2 (2%)
Currently thinking about or planning to have children	36 (37%)
Previously received contraceptive advice from a health-care professional	82 (85%)
Previously received preconception counselling‡	74 (76%)
Previously received preconception care§	35 (36%)
From a general practitioner	17 (18%)
From diabetes outpatients clinic	29 (30%)
From prepregnancy clinic	3 (3%)
Other	4 (4%)

Data are *n* (%) for categorical and mean  $\pm$  SD for continuous variables.

\*Includes divorced, widowed and separated. †Both classified as minor congenital malformations. ‡Preconception counselling was described as advice from a health-care professional about the need for preconception care. §Preconception care was described as special medical care and advice about planning pregnancy.

#### Reproductive Health Attitudes and Behaviour

Viewing the DVD enhanced beliefs and attitudes associated with preventing an unplanned pregnancy and seeking preconception care, with significant changes from pre- to post-DVD viewing in eight of the nine scales measured, as reported in Table 2. While there was no change in women's belief of their own susceptibility to problems such as unplanned pregnancy and pregnancy-related complications (perceived susceptibility), there was a significant increase in beliefs about the seriousness of these problems (perceived severity) after viewing the DVD. Women also reported greater benefit of lower barriers to, and enhanced personal attitudes towards, preconception care and contraception after viewing the DVD. Women's intention to use contraception to prevent an unplanned pregnancy increased significantly after viewing the DVD, as did their self-confidence to get preconception care and use contraception to prevent an unplanned pregnancy (self-efficacy). Cronbach's  $\alpha$  coefficients for RHAB scales ranged from 0.49 to 0.92 (Table 2).

#### Reproductive health knowledge

Knowledge specific to content delivered within the DVD significantly increased after viewing, for both pregnancy planning and risks, as outlined in Table 3. Overall knowledge of pregnancy planning and risks increased significantly, with a mean increase of 37.6  $\pm$  20.0%,  $P < 0.001$ , and 16.9  $\pm$  21.2%,  $P < 0.001$ , respectively. Perceived understanding of how diabetes and pregnancy affect one another increased significantly after viewing the DVD from 5.7  $\pm$  2.6 to 8.3  $\pm$  1.5, mean difference 2.6 (95% CI 3.1, 2.1),  $P < 0.001$ . In addition, there was a significant increase in the perceived importance of

**Table 2** Beliefs and attitudes associated with preventing an unplanned pregnancy and seeking preconception care pre- and post-DVD viewing [Reproductive Health Attitudes and Behaviour (RHAB) multidimensional reproductive health and diabetes instrument] [17]

	Possible scale range	Pre-DVD	Post-DVD	Mean difference (95% CI)	$\alpha^*$	$P^\dagger$
Susceptibility‡ ( <i>n</i> = 96)	4–20	11.7 ± 3.4	11.9 ± 3.8	0.2 (–0.5, 0.8)	0.66	0.60
Severity§ ( <i>n</i> = 95)	3–15	10.9 ± 2.7	11.5 ± 2.9	0.5 (0.1, 1.0)	0.74	0.01
Benefit   ( <i>n</i> = 96)	4–20	18.4 ± 2.4	19.2 ± 1.4	0.7 (0.3, 1.2)	0.77	0.003
Barrier¶ ( <i>n</i> = 52)	5–25	7.1 ± 2.3	6.4 ± 1.8	–0.7 (–1.2, –0.2)	0.51	0.01
Personal attitudes# ( <i>n</i> = 97)	3–21	18.8 ± 2.6	19.6 ± 1.9	0.8 (0.3, 1.2)	0.49	0.001
Subjective norm** ( <i>n</i> = 40)	6–150	90.5 ± 40.6	98.5 ± 43.7	8.0 (2.1, 14.0)	0.86	0.01
Intention†† ( <i>n</i> = 96)	2–14	12.6 ± 3.2	13.3 ± 2.1	0.7 (0.2, 1.3)	0.92	0.01
Self-efficacy‡‡ ( <i>n</i> = 93)	0–60	50.7 ± 9.2	54.0 ± 6.7	3.3 (1.9, 4.7)	0.76	< 0.001
Outcome expectation§§ ( <i>n</i> = 95)	4–20	16.5 ± 2.7	17.5 ± 3.0	1.0 (0.3, 1.7)	0.54	0.004

Pre- and post-DVD scores are all means ± SD (higher scores = greater levels of the construct).

\*Pre-DVD Cronbach's  $\alpha$ . †Pre-DVD score vs. post-DVD by paired *t*-test. ‡Perceived susceptibility to complications of pregnancy and to becoming pregnant, a summation of four Likert-type items. §Perceived severity of complications of pregnancy and of becoming pregnant, a summation of three Likert-type items. ||Perceived benefit of preconception care and contraception, a summation of four Likert-type items. ¶Perceived barrier to preconception care and contraception, a summation of five Likert-type items. #Personal attitudes to preconception care and contraception, a summation of three Likert-type items. \*\*Subjective norm: perceived social pressure (from parents, friends and partner) to seek preconception care and use contraception, a summation of six multiplicative composite scores (normative belief × motivation to comply). ††Intention to use contraception to prevent an unplanned pregnancy, a summation of two items (1 = unlikely to 7 = likely). ‡‡Self-efficacy: self confidence to get preconception care and use contraception to prevent an unplanned pregnancy, a summation of six items (0 = 'not at all confident' to 10 = 'absolutely confident'). §§Outcome expectation: perceived benefit of receiving preconception care and using contraception to prevent an unplanned pregnancy, a summation of four Likert-type items.

pregnancy planning statements about the prepregnancy requirement or importance for women to: 'use some form of contraception until their blood glucose levels are in normal range' [mean difference pre- and post-DVD viewing 0.6 (95% CI 1.1, 0.2),  $P = 0.004$ ]; 'review their medication' [0.9 (1.5, 0.4),  $P = 0.002$ ]; 'maintain a healthy weight' [0.6 (0.9, 0.3),  $P < 0.001$ ]; 'have their eyes checked' [1.5 (2.1, 0.9),  $P < 0.001$ ]; and 'have their kidneys checked' [1.6 (2.2, 1.1),  $P < 0.001$ ].

## Discussion

Our study clearly demonstrates the effectiveness of a preconception counselling DVD in enhancing attitudes and beliefs of women with diabetes towards preconception care. In addition to increasing overall understanding of diabetes and pregnancy, women significantly increased their knowledge of pregnancy planning and risks after viewing the DVD. Our findings support the use of multimedia educational resources to raise awareness of reproductive health issues and enhance prepregnancy counselling and care among women with diabetes.

There was a significant positive change in women's perceived severity of pregnancy complications and in the perceived benefit of preconception care and contraception after viewing the DVD. Preconception counselling includes explanation of the risks associated with diabetes and how these risks can be reduced by prepregnancy care, with one recent qualitative study highlighting increased anxiety among women following preconception counselling [24]. Although we did not measure

anxiety, all participants (i.e. 100%) were of the opinion that women with diabetes can have a healthy baby after viewing the DVD (95% pre-DVD viewing), suggesting that, while the DVD increased knowledge of risks associated with pregnancy and diabetes, women were not unnecessarily alarmed by the DVD.

Focus groups conducted during the development of the DVD highlighted the need for all women with diabetes, regardless of age, marital status or type of diabetes, to receive guidance about planning pregnancy in a motivational, positive and supportive manner [16]. The findings of the evaluation of this prepregnancy counselling resource align with the Expanded Health Belief Model [22] and highlight that media education tools, such as this DVD, have a role to play in prepregnancy counselling, in agreement with previous studies using computer- and book-based media among adolescents in the USA [13, 25, 26].

Seventy six per cent of women in our study reported having received prepregnancy counselling, higher than rates reported in other studies [8,9]. However, evidence from focus groups in the same population suggests that advice received may only be in the context of being told of the need to plan, without receipt of information about why or how [16]. Diabetes care teams should record a woman's intentions regarding pregnancy and contraceptive use at each visit [7], yet a quarter of the women in our study reported that they had never been told by a health-care professional about the need to seek special medical care and advice before planning a pregnancy. Furthermore, despite high baseline knowledge scores in relation to contraception and the impact of glycaemic control on the health of mother and baby, women had poor knowledge of specific aspects of

**Table 3** Knowledge of pregnancy planning and pregnancy related risks: proportions of the correct answers pre-DVD and post-DVD viewing

	Pre-DVD; percentage of participants correct	Post-DVD; percentage of participants correct	Difference (95% CI)	P*
<b>Knowledge of pregnancy planning</b>				
Women with diabetes have very limited choices of contraception†‡	68	76	8 (-2, 19)	0.13
Women with diabetes cannot take the contraceptive pill†‡	92	98	6 (0, 13)	0.07
All insulins are suitable for use during pregnancy†	9	77	68 (58, 78)	< 0.001
If you have Type 2 diabetes and are planning to become pregnant you may need to change from tablets to injections of insulin†	43	100	57 (45, 69)	< 0.001
Women with diabetes should take the same amount of folic acid as all other women planning a pregnancy†	34	86	52 (40, 63)	< 0.001
Women with diabetes should get advice from a health-care professional:‡§	82	90	8 (-2, 16)	0.14
Before becoming pregnant, your blood glucose level before meals should be between:§	35	84	49 (37, 60)	< 0.001
Before becoming pregnant, your blood glucose level one hour after eating should be below:§	34	84	50 (37, 62)	< 0.001
Before becoming pregnant, ideally your HbA <sub>1c</sub> should be below:§	44	90	46 (34, 57)	< 0.001
<b>Knowledge of risks</b>				
Women with diabetes can have a healthy baby†‡	95	100	5 (0, 11)	0.06
Blood glucose levels before pregnancy can affect the health of a baby†‡	82	98	16 (7, 25)	< 0.001
High blood glucose levels during pregnancy do not increase the risk of problems for the mother†‡	81	96	15 (6, 23)	0.001
High blood glucose levels during pregnancy do not increase the risk of problems for the baby†‡	89	98	9 (2, 17)	0.01
Women with diabetes have an increased risk of having a large baby, making delivery more difficult†‡	82	96	14 (5, 22)	0.001
Women with diabetes do not have an increased risk of having a baby with birth defects†‡	52	69	17 (5, 29)	0.007
Women with diabetes have an increased risk of miscarriage†‡	34	78	44 (33, 56)	< 0.001

\*Pre-DVD vs. post-DVD responses (scored as correct and incorrect) by McNemar's test. †Three possible answers: true; false; not sure. ‡Question adapted from Charron-Prochownik *et al.* 2006 [23]. §Four possible answers including not sure.

pregnancy planning and risks, such as the requirement of high-dose folic acid, blood glucose targets, risk of miscarriage and congenital malformation and the need to review medication regimes, in keeping with our focus group findings [16]. While the majority of women in the current study were being informed of the need to access pre-pregnancy care and to plan for pregnancy, women were either not being informed of, or were not retaining knowledge essential to planning a pregnancy.

Previously reported barriers to discussions about family planning in women with diabetes include embarrassment, particularly among adolescents [27], and preconceived social stereotypes held by health-care professionals [16]. These barriers, together with poor communication, logistics of attending clinic and poor patient-provider relationships exacerbated by busy clinics and lack of continuity of staff, can make it difficult for women to discuss pregnancy planning with their health-care professional [16,28]. While a previously developed computer-based preconception counselling programme for teenagers with diabetes delivered within the clinical setting significantly raised awareness and increased knowledge in the USA [25,26], we must now widen access to, and knowledge of,

the importance of preconception care for all women with diabetes of child-bearing age, not just those planning a pregnancy, to ensure that all women receive adequate pre-pregnancy counselling. The results presented here show that this innovative resource, designed and developed for women to view independently, away from the health-care setting, leads to a significant increase in knowledge of both pregnancy planning and the risks associated with pregnancy and diabetes, with women perceiving fewer barriers to preconception care after viewing the DVD. This resource has the potential to overcome known barriers to accessing preconception care, widen access to preconception counselling and presents health-care professionals with an alternative route to ensuring that women with diabetes receive essential pre-pregnancy counselling.

Nevertheless our study has a number of limitations. Only 26% of women informed of the study contacted the researchers for further information; there was a lower representation of women with Type 2 diabetes than in the background population (9% vs. 17%), and social class status was higher among participants than in the background population [29], which may limit the generalizability of our findings. It is possible that

more motivated and more highly educated individuals responded to the invitation to take part in the study, and this may explain the relatively high rates of women who reported previously obtaining preconception advice compared with other studies [8,9,11]. Furthermore, while most of the RHAB scales had sufficient reliability ( $\alpha > 0.7$ ), internal consistency of susceptibility, barrier, personal attitudes and outcome expectations was less than desired [30].

Designed and developed as pre-pregnancy counselling resource that women can view in their own home, the DVD evaluated here is effective in increasing women's knowledge, and in enhancing their beliefs and attitudes to preventing an unplanned pregnancy and seeking preconception care. Further research is now required to determine the impact of the integration of this preconception counselling resource into routine practice on pregnancy planning indicators and pregnancy outcome and to establish the clinical relevance of changes in knowledge, attitudes and beliefs.

### Competing Interests

Nothing to declare.

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