

# Chapter 3

**What information do Dutch  
midwives give clients about  
toxoplasmosis, listeriosis and  
cytomegalovirus prevention?**

**An exploratory study of  
videotaped consultations**

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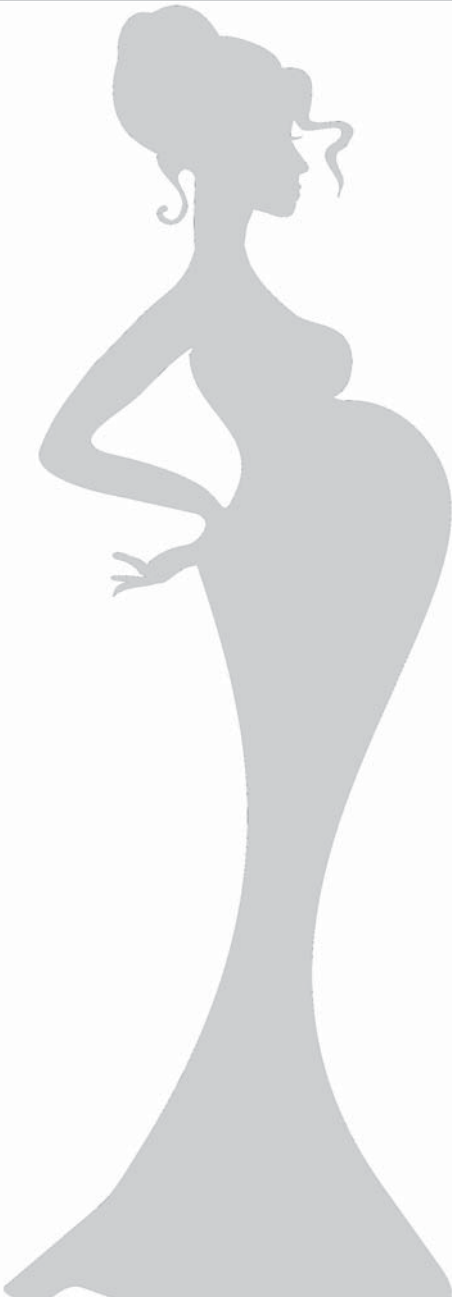
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## Abstract

**Objective:** To assess information provided by midwives about methods to prevent toxoplasmosis, listeriosis and cytomegalovirus, and whether the amount of provided information varied according to clients' and midwives' characteristics.

**Methods:** Intake consultations with 229 clients in four midwifery practices were videotaped between August 2010 and April 2011. Videotaped intake consultations, where infectious disease prevention were discussed, were evaluated, using a specifically designed nine-item scoring tool. Midwives and clients filled in a questionnaire about their background characteristics. Multilevel linear regression analysis was performed to establish associations between the amount of information provided and clients' and midwives' characteristics.

**Results:** In total 172 consultations with fifteen midwives were suitable for analyses. Information about not eating raw or undercooked meat and not consuming unpasteurized dairy products was provided most often. Information about not sharing eating utensils with small children and thoroughly reheating all ready-to-eat foods were rarely provided. More information was provided when the client was a primigravidae or the consultation lasted longer than 50 minutes.

**Conclusion:** Information on infectious disease prevention given to pregnant women by primary care midwives was insufficient; especially for cytomegalovirus prevention.

**Practice implications:** A guideline for professionals on preventable infectious diseases may be useful to inform pregnant women properly.

## Introduction

During pregnancy, maternally acquired infections with *Toxoplasma gondii*, *Listeria monocytogenes* and cytomegalovirus (CMV) can have severe effects on the fetus and child, and can be prevented by relatively small changes in lifestyle and behavior habits of pregnant women (1).

In the Netherlands, the incidence rate of congenital toxoplasmosis is two infected children per 1,000 live births, which is ten times higher than in Denmark and twenty times higher than in Ireland (2, 3). Possible consequences include: mental retardation, blindness, and epilepsy for congenital toxoplasmosis (4). Methods to prevent toxoplasmosis are: not eating raw or undercooked meat, thoroughly washing fruits and vegetables, avoiding soil contact, and not changing the cat litter box (5). The estimated incidence rate of pregnancy-related listeriosis in the Netherlands is between 1.3 and 2.4 cases per 100,000 pregnancies over 24 weeks of gestation (6). Although listeriosis is a rare disease it occurs seventeen times more likely in pregnancy than the general population and can have serious consequences, including: preterm labour, spontaneous abortion or stillbirth (6-8). Methods to prevent listeriosis are: not consuming unpasteurized dairy products, not consuming vacuum pre-packed smoked fish, thoroughly washing fruits and vegetables and thoroughly reheating all ready-to-eat foods (5). The estimated birth prevalence of CMV in the Netherlands is 0.54%, which translates in approximately 1,000 infants with a congenital CMV infection annually (9): a prevalence rate approximating that of Down syndrome (10, 11). Possible consequences of CMV infection include: mental retardation, vision loss, microcephaly, motor disabilities and hearing loss (12). Methods to prevent CMV infections include: washing hands after diaper change and not sharing utensils with small children (5).

In the Netherlands, healthcare providers do not routinely screen for toxoplasmosis, listeriosis and CMV during pregnancy but provide health education and they can provide written materials about methods to prevent these infections. At this moment there are several guidelines in the Netherlands for the prevention of toxoplasmosis, listeriosis and CMV, but there is no overall document presenting risk factors, preventive methods and ways how a midwife should inform pregnant women during prenatal care. Although there is no strong evidence about health education as an effective tool in reducing infections in pregnancy, preliminary evidence suggests that primary prevention through health education may help to reduce the burden of congenital infections (12-16). In addition, studies suggest that the success of health

education depends on the active involvement of the health care professional and that written recommendations are insufficient to change behavior (10, 13). However, health care providers do not always give information to their pregnant clients about methods to prevent infections (8, 17-20). Reasons cited for not educating clients are lack of knowledge of the risk factors, insufficient time, or because these have a lower priority than other pregnancy related risks (8, 18, 21, 22). Knowledge of infectious diseases among health care providers appears to increase at a more advanced career stage (23, 24). In addition, as ethnic origin of clients may influence awareness of infectious diseases, one may expect that the ethnic origin of midwives can also be a factor in the likelihood of providing disease prevention information to clients.

Many pregnant women are not aware of the danger posed by infections during pregnancy and do not act to prevent them (21, 25-32). Our own recent study from the Netherlands showed that pregnant women were not aware of all methods to prevent toxoplasmosis, listeriosis or CMV (28). Studies showed that pregnant women's infectious disease knowledge and awareness may differ between age, educational level, parity, marital status and ethnic-origin (21, 25-28, 31, 33).

Midwives are considered to be one of the most important sources of health education for pregnant women in the Netherlands because most pregnant women start their prenatal care in primary midwifery care (34). Health education about methods to prevent infectious diseases is embedded in the intake consultation, and should last 35 minutes (35).

Infections with toxoplasmosis, listeriosis and CMV can cause serious consequences in the fetus, but can be prevented in pregnancy by behavioral change of pregnant women, and verbally provided information by health care providers seems the most effective to establish behavioral change in pregnant women. Therefore, it is important to understand if and how midwives are providing information about infectious disease prevention to pregnant women, and if there are any differences in midwives' and clients' characteristics in the amount of provided or received information. To our knowledge, no research has examined information regarding infectious disease prevention provided to pregnant women by primary care midwives, by using videotaped consultations. We objectively provided insight in the actual verbally provided health education. We aimed to study what information primary care midwives in the Netherlands provided to their clients during the first prenatal visit about preventive measures to avoid toxoplasmosis, listeriosis and CMV, by using videotaped consultations. We examined the amount of information provided and whether the information varied according to clients' and midwives' characteristics.

## **Methods and materials**

This study was embedded in the DELIVER study, a large scale multi-center multidisciplinary prospective study into the quality and provision of primary midwifery led care in the Netherlands. Details of the design of the DELIVER study are described elsewhere (36). The DELIVER study, including videotaping of consultations, was approved by the Institutional Review Board and the Medical Ethics committee of the VU University Medical Center Amsterdam.

### **Study population**

From the twenty primary care midwifery practices participating in the DELIVER study, four practices were purposively sampled based on their practice size, because the amount of midwives working in a practice may influence their delivery and organization of care, and based on the location as certain subgroups of pregnant women (e.g. ethnic origin, level) vary according to region in the Netherlands, and participated between August 2010 and April 2011. Midwives were eligible for participation if they were qualified as a midwife and if they worked in one of the participating primary midwifery care practices. Consecutive clients, and if present their partners, who were cared for by participating midwives for their first consultation for a 'new' pregnancy were eligible if they had reached the legal age of consent of 18 years or older and were able to understand Dutch or English. All eligible clients were informed about the study and were invited to take part. Participants who wanted to take part in the study signed an informed consent form prior to the consultation.

### **Study procedure**

We examined the information on methods to prevent toxoplasmosis, listeriosis and CMV provided verbally by midwives to pregnant women (clients) during their first prenatal consultation by using recorded consultations on video. We did only assess the verbally provided information to clients and not additional information that may have been provided on paper. We asked all midwives to record ten to twenty intake consultations on video. The unmanned camera was positioned to show the midwife's full face; the client and their partner were seen from behind, from the side, or not at all.

In addition to the recorded video consultations, midwives completed a questionnaire which provided information on demographic and professional

characteristics, i.e. age, program of midwifery education, and number of years of work experience.

We asked clients as well to complete a questionnaire, preferably prior to the consultation, to provide baseline information about age, ethnic origin, marital status, highest achieved educational level, and gravidity. If clients ran out of time, they could complete the questionnaire at home even though this involved the risk that clients would forget to return the questionnaire.

Data from the videotapes were linked with the data from the questionnaires completed by clients and midwives, by using anonymized identification numbers. We excluded consultations from all analyses for which this link could not be made.

From August 2010 to April 2011, 352 clients in four midwifery practices were invited to participate in this study. In total, 229 (65.1%) clients filled in an informed consent form and their intake consultation was recorded on video. Of these 229 consultations, 57 recordings were excluded from the analyses: nineteen videotapes appeared to be empty and thus did not record the consultation, seventeen ended prematurely for various reasons or contained only a part of the consultation instead of the whole consultation, one videotape was not an intake consultation, two videotapes did not have a unique participation code, and seventeen clients did not complete the questionnaire with demographic characteristics. In addition, one midwife recorded only one consultation and was also excluded from the analyses. If less than six complete recordings were made by an individual midwife, the recordings were excluded, because this number was considered too low to give a valid impression of a midwife's performance.

### **Content of information to prevent infections**

The videotaped consultations were digitalized and observed on the level of content, by using a specially developed scoring protocol. The protocol included items on methods to prevent toxoplasmosis, listeriosis and CMV during pregnancy, based on a client information brochure, provided by the Dutch National Institute for Public Health and the Environment (5). This resulted in a scoring protocol of nine items, which are shown in Table 1. For each consultation, the items were scored if the midwife mentioned them. Therefore, the score could vary between zero and nine per consultation. If the midwife asked the client about having a cat or having a garden and the client stated that she did not have a cat or garden, the items 'wearing gloves while gardening' and 'not changing the cat litter box' were scored as mentioned.

## **Statistical analyses**

The main outcome measure in this study was the amount and content of information given by midwives to their clients regarding preventive measures for toxoplasmosis, listeriosis and CMV during pregnancy. Sum scores were calculated for the total number of disease prevention activities mentioned per consultation with a maximum possible score of nine.

For analyses, we dichotomized the midwives' years of work experience according to the median value. In addition, clients' characteristics were categorized as follows; age into  $\leq 25$  years, 26-30 years, 31-35 years or  $\geq 36$  years; marital status into single or married/partner; highest achieved educational level into no education, primary school, secondary school or vocational education/university; and gravidity into primigravida or multigravida.

Ethnic origin was based on the definition used by Statistics Netherlands (37), and dichotomized into Dutch versus non-Dutch. Statistics Netherlands defines someone to be of non-Dutch origin if at least one of the parents was born in a country other than the Netherlands. In case the parents were born in two different foreign countries, the mother's country of birth was considered the "ethnic origin" [37].

According to the Job Description Primary Care Midwifery 2007 from the Royal Dutch Organization of Midwives, an intake consultation (without genetic counseling) should last 35 minutes. In addition, genetic counseling should take 15 minutes as stated by Dutch health insurance companies (35). In our study genetic counseling was embedded in the intake consultation, thus we dichotomized the duration of the intake consultation as  $< 50$  minutes or  $\geq 50$  minutes.

Midwives could be more aware of the unmanned camera during their first recorded video consultation compared to later recorded video consultations. Therefore, per midwife the content and the amount of information given in the first recorded video consultation were compared to all other recorded video consultations. As we did not find any significant differences between the first videotaped consultations compared to later videotaped consultations per midwife, all videotaped consultations were included in the analyses.

Videotapes were observed and analyzed using Observer XT version 7.0. Data were converted from Observer XT 7.0 into SPSS 20.0 (SPSS inc., Chicago, IL). Data from the questionnaires completed by the clients and midwives were entered into SPSS 20.0 (SPSS inc., Chicago, IL) and linked with data from the video recordings. Since three observers were involved in analyzing the content of the videotapes, nineteen

video recordings were double coded to examine the inter-rater reliability using Kappa statistics (38).

To assess differences in the total amount of provided or received information between subgroups of midwives (years of work experience and ethnic-origin) and clients (age, presence of partner, ethnic-origin, marital status and educational level) we used independent-samples t-tests and one-way analysis of variance. In addition, to assess associations between demographic characteristics of midwives and clients, the duration of the consultation and the total amount of provided information we used multivariable multilevel regression analyses adjusted for clustering of clients within midwives, due to the hierarchical structure of the data. As outcome variable, i.e. the amount of provided or received information, was normally distributed we used linear regression analysis techniques. In order to identify the effect of the hierarchical structure of the data, we firstly conducted a naïve linear regression analysis of the relationship between the amount of provided information and each subgroup (midwives' work experience, midwives' ethnic-origin, clients' age, presence of clients' partners, clients' ethnic-origin, clients' number of pregnancies experienced, clients' marital status, clients' educational level and duration of the consultation). Secondly, we used the likelihood ratio-test to determine whether or not a random intercept for "midwife", "practice" or "practice and midwife" was the best approach. In this case, the best approach was to use only a random intercept for "midwife", because the likelihood ratio-test significantly declined. Finally, the likelihood ratio-test was used to determine if it was necessary to include a random slope for each dependent variable in the model. However, in the data used in this study, a random slope was not

**Table 1.** Number of consultations in which preventive information for toxoplasmosis, listeriosis or CMV were mentioned by midwives (N=172 consultations)

Items	N (%)
<sup>a</sup> Not eating raw or undercooked meat	135 (78.5)
<sup>b</sup> Not consuming unpasteurized dairy products	131 (76.2)
<sup>a</sup> Avoid changing the cat litter box	95 (55.2)
<sup>a</sup> Wearing gloves while gardening	94 (54.7)
<sup>b</sup> Not eating vacuum pre-packed smoked fish	92 (53.5)
<sup>a,b</sup> Thoroughly washing fruits and vegetables	68 (39.5)
<sup>c</sup> Washing hands after diaper change	10 (5.8)
<sup>b</sup> Thoroughly reheating all ready-to-eat foods	1 (0.6)
<sup>c</sup> Not sharing eating utensils with small children	0 (0.0)

<sup>a</sup> **Methods to prevent toxoplasmosis**

<sup>b</sup> **Methods to prevent listeriosis**

<sup>c</sup> **Methods to prevent CMV**



necessary, as the likelihood ratio-test did not significantly decline. We used a manual backward selection procedure. Results are presented as regression coefficients ( $\beta$ ) and 95% confidence intervals (CI). We considered a p-value below 0.05 statistically significant. For all analyses we used SPSS 20.0 (SPSS inc., Chicago, IL).

## **Results**

In total we analyzed 172 video consultations, representing a net response rate of 48.9% (172/352). Fifteen midwives were included in this study, with a range from two to five midwives per midwifery practice. The number of consultations varied from six to twenty recordings per midwife and from seventeen to 66 recordings per practice. Inter-rater reliability between the observers was tested for each scoring item in the protocol for nineteen video consultations; the Kappa coefficient between observers ranged from 0.58 to 1.0 indicating moderate to very good agreement (38).

### **Midwives' and clients' characteristics**

The mean age of the fifteen participating midwives was 34 years and ranged from 23 to 54 years. The median length of their work experience as a midwife was 6 years (range 0 to 33 years). Three midwives completed their midwifery education outside the Netherlands. The mean age of the participating clients was 29 years and ranged from 20 to 40 years. More detailed information on the demographic characteristics of participating clients and midwives is shown in Table 2. The mean duration of the consultations was 40 minutes ( $SD = 11$  minutes) and ranged from 20 minutes to 96 minutes. In total, 33 consultations (19.2%) lasted longer than 50 minutes.

### **Content of information to prevent infections**

Table 1 shows how often information about methods to prevent toxoplasmosis, listeriosis and CMV was mentioned in the videotaped consultations. Information about not eating raw or undercooked meat (78.5%) and not consuming unpasteurized dairy products (76.2%) was mentioned most often in the consultations. Hand washing after diaper change (5.8%), thoroughly reheating all ready-to-eat foods (0.6%), and not sharing eating utensils with small children (0.0%) were least frequently mentioned.

The mean sum score of the information mentioned in the consultations was 3.6 out of 9 ( $SD = 1.9$ ) and ranged from zero to seven. In nineteen consultations (11.0%) no information to prevent toxoplasmosis, listeriosis and CMV infections during pregnancy was given to the clients; this concerned five midwives. None of the clients

**Table 2.** Characteristics of midwives (N=15) and clients (N=172) and the mean sum scores of the amount of provided or received information

Characteristics of midwives	N <sup>a</sup> (%)	Mean sum score of the amount of provided information <sup>b</sup>	p-value <sup>c</sup> differences in knowledge scores per sub-group
Work experience			0.70
≤ 6 years	8 (53.3)	3.5	
≥ 7 years	7 (46.7)	3.2	
Ethnic-origin			0.85
Dutch	10 (66.7)	3.3	
non-Dutch	5 (33.3)	3.5	
Age			0.28
≤ 25 years	32 (18.8)	4.3	
26 - 30 years	84 (49.4)	3.6	
31 – 35 years	45 (26.5)	3.3	
≥ 36 years	9 (5.3)	3.6	
Presence of partner			0.17
yes	125 (72.7)		
no	47 (27.3)		
Ethnic-origin			0.01
Dutch	134 (78.8)	3.4	
non-Dutch	36 (21.2)	4.4	
Marital status			0.32
single	8 (4.7)	4.9	
married/partner	163 (95.3)	3.6	
Educational level			0.13
secondary school	91 (53.5)	3.9	
vocational education/university	79 (46.5)	3.4	
Gravidity			0.26
primigravida	73 (43.2)	3.9	
multigravida	96 (56.8)	3.5	
Duration of consultation			0.002
< 50 minutes	139 (80.8)	3.4	
≥ 50 minutes	33 (19.2)	4.5	

<sup>a</sup> Denominator varies due to missing values (between 0 and 3 missing per variable).

<sup>b</sup> Maximum possible score = 9.

<sup>c</sup> Independent-samples t-test and one-way analysis of variance

received information about all nine nationally advised items to prevent infectious diseases during pregnancy. The highest score was seven out of nine, which was observed in four (2.3%) consultations. Table 2 shows the mean score of the amount of provided information per midwifery subgroup and the mean score of the amount of information received per client subgroup. We observed significant higher sum scores for consultations with clients who were of non-Dutch origin, and for consultations with a relatively longer duration

**Table 3.** Mean sum score and range of the amount of provided information per midwife

Midwife	Number of video's recorded	Sum score	
		Mean (SD)	Range
1	8	0.4 (0.7)	0 – 2
2	12	0.9 (1.4)	0 – 3
3	6	1.0 (0.9)	0 – 2
4	11	2.7 (0.6)	2 – 4
5	11	3.1 (1.0)	2 – 5
6	10	3.1 (0.3)	3 – 4
7	20	3.7 (0.4)	0 – 6
8	6	3.8 (1.2)	2 – 5
9	8	3.8 (0.7)	3 – 5
10	11	4.0 (1.3)	2 – 6
11	10	4.1 (1.7)	2 – 7
12	13	4.4 (0.8)	3 – 5
13	16	4.8 (1.6)	0 – 6
14	15	5.3 (0.6)	4 – 6
15	15	5.7 (0.9)	4 – 7

**SD: Standard Deviation**

**Table 4.** Associations between clients' and midwives' characteristics and the total amount of provided information about toxoplasmosis, listeriosis and CMV; multivariable multilevel linear regression

	Coefficient ( $\beta$ )*	95% CI	p-value
Intercept	3.08	-	-
Gravidity			
primigravida	0.52	0.15 – 0.89	.006
Duration of consultation			
$\geq 50$ minutes	0.54	0.03 – 1.06	.039

**CI: confidence interval**

\* Adjusted for midwives' work experience, midwives' ethnic-origin, clients' age, clients' ethnic-origin, clients' marital status and clients' educational level.

Table 3 shows the mean sum score of the information provided per midwife, which varied from 0.4 ( $SD = 0.8$ ) to 5.7 ( $SD = 0.9$ ).

Demographic characteristics of midwives and clients that were independently associated with the amount of information given by the fifteen midwives are given in Table 4. When we adjusted for midwives' work experience, midwives' ethnic origin, clients' age, presence of clients' partners, clients' ethnic origin, clients' marital status and clients' educational level, we found that the results of multivariable multilevel linear regression analyses showed that midwives provided more information about toxoplasmosis, listeriosis and CMV prevention methods to primigravida than to

multigravida women ( $\beta=0.52$ ; 95% CI: 0.15 – 0.89) and when the consultation lasted longer than 50 minutes compared to consultations that lasted shorter than 50 minutes ( $\beta=0.54$ ; 95% CI: 0.03 – 1.06). The other factors did not show an independent relationship with the amount of received and provided information.

## Discussion

This study demonstrated that in most videotaped consultations, midwives provided some information for methods to prevent toxoplasmosis and listeriosis, but not for CMV. This study also revealed that there was a wide variation in the provision of information between midwives and also between consultations by the same midwife. Midwives provided more information on infectious diseases when clients were pregnant for their first time or when the consultation lasted longer than 50 minutes.

Some of our results about the content of the provided information to prevent toxoplasmosis, listeriosis and CMV by midwives are consistent with previous studies on this topic, which showed less information on soil contact and thoroughly washing raw fruits and vegetables (8, 19-21). In our study, the midwives more frequently provided information to their clients about not eating raw or uncooked meat, and less frequently about avoiding changing the cat litter box, compared with previous studies in the United States (19, 20, 31).

Prior studies have shown that midwives' years of work experience, client's age, ethnic-origin, marital status or educational level were associated with the behavior to prevent infectious diseases in pregnancy (18, 21, 26-28, 31, 33). This is in contrast with our study, as we did not find independent associations between the amount of information provided by midwives and the midwives' and clients' characteristics. We found a significantly higher amount of information provided by midwives to women of non-Dutch origin compared to women of Dutch origin. This effect disappeared when we adjusted the data for midwives in the multivariable multilevel analysis, indicating that the variance was based on the variance between midwives. Our study did find that midwives provided more information to clients who experienced their first pregnancy (18, 27). A possible explanation may be that midwives expect multigravida women to be familiar with methods to prevent infectious diseases. This assumption is plausible, some studies did find that primigravidae were less knowledgeable or less often showed behavior to prevent infectious diseases compared to multigravidae (27, 28, 33). Contrarily, other studies did not find any association between gravidity and

awareness, knowledge or behavior (18, 28, 31). We would recommend midwives to provide the same information to multigravida and to primigravidae.

The majority of the intake consultations lasted less than the recommended 50 minutes. We found that more information about the prevention of infectious diseases was provided when the consultation lasted at least 50 minutes. But even in the longest consultation, not all infection prevention methods were mentioned. Midwives should take sufficient time in the first consultations to provide their clients with adequate information about methods to prevent these three important infections. We do not have an explanation why midwives did not mention all prevention methods, or why the intake consultations lasted less than the recommended 50 minutes. This topic needs further investigation. It is possible that midwives did not provide information due to time constraints arising from other aspects of care organization, or because infectious diseases have a lower priority than other pregnancy related risks (18, 22, 35). An alternative reason for not informing pregnant women may be that midwives are not aware of all methods to prevent toxoplasmosis, listeriosis and CMV, as was found in other studies (8, 17, 23).

Currently, there is no strong evidence about the effects of prenatal health education in reducing the risk for infections with toxoplasmosis and CMV; and no review is available on the effect of listeriosis prevention programs. Observational studies do suggest that verbally provided prenatal health education may be highly effective (12, 13, 16) and that pregnant women are more likely to change their behavior than the general population (39). Until the effectiveness of prenatal health education is determined, it is important to follow current best practices to prevent infections with toxoplasmosis, listeriosis and CMV.

This study found a wide variation in the amount of provided information by midwives. It is possible that the variance between individual consultations could be accounted for by tailoring of information provided to each client. Also, midwives may be used to distributing the information over multiple consultations. In this study it is unlikely that midwives had much prior knowledge about clients on which to base individualising of the information because these video-taped consultations capture the first prenatal visit of women with their midwife during a first pregnancy as well.

The low level of information provision on CMV prevention is striking. Our results are comparable with earlier studies indicating that relatively few healthcare providers inform pregnant women on methods to prevent a CMV infection (17, 21, 22, 26) and indirectly comparable with studies that found low levels of awareness of CMV among pregnant women (21, 26-29). Next to a lack of knowledge and awareness, it

is also possible that midwives have doubts about the practicability of, some of the recommendations such as not sharing cutlery with a small child. Previous research does suggest that women are willing to adopt these kinds of prevention methods during pregnancy in order to prevent CMV infection (16, 21, 29, 39).

A limitation of this study is that we did not examine midwives' reasons or barriers for not providing information to clients. Another limitation is that our findings are not a priori generalizable to all primary care midwives in the Netherlands, because only fifteen midwives were included in this study. In addition, the midwives participated voluntarily in this study. It is possible that these practices were willing to participate because they expected to provide a certain level of quality of care and that the practices that refused to participate were not expected to provide a certain level of quality of care. Therefore, the amount of information provided may have been overestimated. Any overestimation of providing information is likely minimized by the fact that midwives did not know that the video consultations would be used to assess the provision of information regarding infectious disease prevention. In addition, selection bias may have occurred as we did not have information about clients who refused to participate or did not complete the questionnaire. It was not possible to carry out a non-response analysis. We regret it that we did not assess the information provided on paper, even though verbally provided information is more effective than information provided on paper (13). This may have led to an underestimation of the total provided information on infectious disease prevention.

The strength of this study is that data have been collected by the use of videotaped consultations, which objectively provides insight in the actual verbally provided information on the methods to prevent infectious diseases by midwives. Many previous studies were based on self-reported data by health care professionals, which may have resulted in over-reporting and overestimating the amount of provided information (8, 17, 19, 20, 23). In general videotaped consultations have the advantage for researchers of being able to consider non-communicable communication. However, for this particular research question, audiotaped consultation might have sufficed and in that case midwifery practices might have been more willing to participate.

## **Conclusion**

Toxoplasmosis, listeriosis and CMV during pregnancy may have severe effects on the fetus or child. This study indicates that the verbal information on infectious disease prevention given to pregnant women by the primary care midwives that we observed was insufficient. Not one client received full information as recommended by the National brochure, and many clients received considerably less information. Midwives may have relied on the provision of written information. The duration of the consultation appears to be associated with the completeness of verbal information on infectious disease prevention that is provided. This study shows that there is much room for improvement, which is especially the case for CMV prevention, since information provision was almost absent.

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## **Practice implications**

Prenatal health care providers are responsible for informing pregnant women about methods to prevent infectious diseases in order to help women change their lifestyle and behavioral habits and to prevent congenital infections. Based on our study results, it seems that midwives need to be more aware and be more consistent about the information provision on infectious disease prevention, with special emphasis on CMV infections.

The development of a guideline for prenatal care professionals on preventable infectious diseases could help Dutch primary care midwives to inform pregnant women properly. Perhaps standardized information checklists or other mechanisms to ensure consistency of information could be useful.

Since this is the first study on real life information provision about preventing infectious diseases during pregnancy, the findings of our study need further confirmation in comparable studies. In addition, qualitative studies could provide more insight into why midwives provide less information to multigravida and whether work pressure or time constraints are major factors in this respect. On the longer term it is necessary to establish which (combination of) methods to inform women about how to prevent infectious diseases during pregnancy are most effective.

**Declaration from all authors**

We confirm that all patient/personal identifiers have been removed or disguised so the patients/persons described are not identifiable and cannot be identified through the details of the story.

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