Chapter 6

Chlamydia trachomatis infection during pregnancy: Knowledge, test practices and attitudes of Dutch midwives


Monique T.R. Pereboom
Judith Manniën
G. Ingrid J.G. Rours
Evelien R. Spelten
Eileen K. Hutton
François G. Schellevis
Abstract

Background: *Chlamydia trachomatis* infection in pregnancy may lead to adverse pregnancy outcomes. In the Netherlands, testing for *Chlamydia trachomatis* is based on risk assessment. We assessed midwives’ knowledge, test practices, assessment of risk behaviour, and attitudes regarding testing for *Chlamydia trachomatis* infection during pregnancy. We evaluated the association between midwives’ characteristics and their knowledge of *Chlamydia trachomatis* infection in terms of symptomatology and outcomes.

Methods: A cross-sectional study among primary care midwives in the Netherlands. Between September and November 2011, midwives from all Dutch primary care midwifery practices were invited to complete a questionnaire about *Chlamydia trachomatis* infection.

Results: Of the 518 midwives invited for this study, 331 (63.9%) midwives responded. The overall median knowledge score for questions about symptomatology and outcomes was ten out of a maximum score of fifteen. The median knowledge score was higher among midwives in urban areas. In total 239 (72.2%) midwives reported testing pregnant women for *Chlamydia trachomatis*. The primary reason for testing was a request by the women themselves (96.2%) followed by symptoms of infection (89.1%), risk behaviour (59.3%) and risk factors for infection (7.3%). Almost 25% of midwives showed positive attitudes towards universal screening for *Chlamydia trachomatis*.

Conclusions: Midwives were knowledgeable about symptoms of infection, but less about outcomes. Midwives test pregnant women for *Chlamydia trachomatis* mainly on the women’s request. Otherwise testing is based on symptoms of infection rather than on known risk factors. This may contribute to under-diagnosis and under-treatment, leading to maternal, perinatal and neonatal morbidity.
Introduction

Chlamydia trachomatis infection in pregnant women may lead to maternal disease, adverse pregnancy outcomes such as preterm labour and perinatal mortality and may result in vertical transmission or subsequent neonatal disease (conjunctivitis or neonatal pneumonia) (1-7). International studies in industrialized countries reported high prevalence rates of Chlamydia trachomatis in pregnant women varying from 3.2% to 5.9% (1, 8-11). Among pregnant teenagers prevalence rates vary from 6.4% in Australia to 13.5% in the Netherlands (1-10).

International guidelines recommend Chlamydia trachomatis screening during pregnancy in women less than 25 years of age or universal screening during antenatal care (12-16). In 2004 The Dutch Health Council recommended screening for Chlamydia trachomatis based on risk assessment. Risk factors are young age, Surinam or Antillean ethnic origin, persons with sexually transmitted infections, persons with multiple sexual partners, partners to Chlamydia trachomatis positive persons, mothers to Chlamydia trachomatis positive new-borns, and other risk factors in combination with sexual behaviour or risk factors associated with symptoms. No recommendations specific for pregnant women exist (17).

For effective management of prenatal Chlamydia trachomatis screening using a risk assessment approach, healthcare providers need to be knowledgeable about symptoms and consequences of the infection, and associated risk and behavioural factors for infection. Insufficient knowledge may influence screening practices and prenatal health care providers with insufficient knowledge should receive training (18). However, not many studies evaluated the knowledge of prenatal health care professionals regarding Chlamydia trachomatis infection (19, 20). In addition to knowledge, health care professionals’ characteristics, such as gender, age, work experience, practice location, practice size and place of graduation, may influence screening practices (21). Health care professionals’ attitudes towards testing may also influence screening practices. A review about interventions to increase Chlamydia trachomatis screening reported that providers with a positive attitude towards screening were more likely to screen (22). In the Netherlands, approximately 80% of pregnant women start prenatal care within primary midwifery practices (23). Hence, midwives have the best opportunity to offer prenatal Chlamydia trachomatis testing in early pregnancy in order to prevent adverse pregnancy outcomes and neonatal and maternal disease.
We undertook this study to assess midwives’ knowledge in terms of symptomatology and outcomes, test practices, risk assessment behaviour, and attitudes regarding \textit{Chlamydia trachomatis} testing during pregnancy. In addition, we evaluated the association between midwives’ demographic and professional characteristics and their knowledge of the infection in terms of symptomatology and outcomes.

\textbf{Materials and methods}

\textbf{Study design and population}

We conducted a national cross-sectional study. Midwives from each of the 518 primary midwifery care practices across the Netherlands between September and November 2011 were invited to participate in the study. We sent a questionnaire regarding \textit{Chlamydia trachomatis} and other infections to all practices, accompanied by a cover letter with information about the study and a postage paid return envelope.

We obtained addresses of midwifery practices from the Royal Dutch Organisation of Midwives. Because the questionnaire contained questions about policies of midwifery care practices, it was requested that only one midwife per practice would complete the questionnaire. We excluded questionnaires completed by midwifery students (identified by work experience) and questionnaires without any answers to the questions about \textit{Chlamydia trachomatis}. Four weeks after the initial invitation, we sent a reminder to all non-responding practices.

The Medical Ethics committee of the VU University Medical Center Amsterdam approved the design of this study.

\textbf{Data collection}

We developed a questionnaire with questions based on previous studies and the literature (1-9, 19, 24-27). Midwives’ demographic and professional characteristics included age, gender, years of experience, place of graduation, type of practice (solo practice, duel practice or group practice), and whether the practice location was urban or rural. Urban was defined as more than 2,500 addresses per squared kilometre.

In total, fifteen questions covered midwives’ knowledge about \textit{Chlamydia trachomatis} infection in pregnant women and new-borns. We asked midwives to indicate whether symptoms and adverse pregnancy and neonatal outcomes associated with infection were ‘true’, ‘false’ or whether they didn’t know. We
presented midwives with a list of seven symptoms with six true and one false answer, and with a list of eight adverse pregnancy and neonatal outcomes with seven true and one false answer. Each correct answer (‘true’ or ‘false’) contributed to the knowledge score (one point for each correct answer). Because not many studies evaluated knowledge of *Chlamydia trachomatis* infection among prenatal health care professionals and no validated knowledge scale was available, we did not define a minimum score for knowledge about symptoms or consequences of infection.

We obtained information on test practices by asking the midwives if they tested pregnant women for *Chlamydia trachomatis*, and if so, in what situations. We provided a ten-item list of symptoms, risk factors and risk behaviour, as well as a statement: “if a pregnant woman asks for a test herself”. Midwives could select items from this list, allowing multiple answers.

To establish assessment of risk behaviour, we presented two questions about the frequency (always, usually, sometimes, never) with which they assessed behavioural risks. We also asked how difficult they felt it was to ask these questions (difficult, somewhat difficult, not difficult).

We asked midwives whether they agreed with one of four statements about their attitudes towards *Chlamydia trachomatis* testing in pregnant women: 1) all women should be tested, 2) only women at increased risk should be tested, 3) only women who want to be tested, 4) testing during pregnancy is not necessary.

**Statistical analyses**

We calculated frequency distributions for questionnaire items on knowledge, screening practices and attitudes. We used non-parametric tests, (Mann-Whitney U test and Kruskal-Wallis test), to test for differences in median knowledge scores between subgroups of midwives based on their demographic and professional characteristics. We used non-parametric tests because knowledge scores were not normally distributed. We considered p-values <0.05 as statistically significant and used the statistical software package SPSS 20.0 (SPSS inc., Chicago, IL) for all analyses.

**Results**

In total 345 (66.6%) midwives from the 518 practices returned the questionnaire. Fourteen midwives were excluded: six midwives did not practice midwifery anymore, one was a student at the time of enrolment and seven midwives did not complete the
questions about *Chlamydia trachomatis*. We included the data of the remaining 331 midwives in the analyses, representing a net response rate of 63.9%.

**Demographic and professional characteristics**
Most midwives were female (98.2%). The median age was 34 years (25th percentile 28.0 years, 75th percentile 44.0 years) with a range of 21 to 65 years. The majority of midwives graduated in the Netherlands (83.5%), worked in rural areas (81.9%) and in a group practice (71.6%). They had practiced up to 41 years with a median experience of 8 years (25th percentile 4 year, 75th percentile 16 years) (Table 1).

**Knowledge**
Table 1 shows the median knowledge scores per midwives’ demographic and professional characteristics. No midwife answered all fifteen questions regarding symptoms and pregnancy and neonatal outcomes of *Chlamydia trachomatis* correctly; one midwife (0.3%) answered fourteen questions correctly; two midwives (0.6%) answered no question correctly. The overall median knowledge score was 10.0 out of a maximum score of 15.0 (8.7% answered zero to five questions correctly; 54% answered six to ten questions correctly; 37.3% answered eleven to fifteen questions correctly). Midwives who worked in urban areas had a significantly higher score than midwives who worked in rural areas, but no other association was found between knowledge and midwives’ demographic or professional characteristics (Table 1).

Regarding questions about symptoms of *Chlamydia trachomatis*, 90 (27.7%) midwives answered all seven questions correctly; three (0.9%) midwives answered none of the questions correctly. The median knowledge score for the seven symptoms was 6.0 (34.8% answered zero to five questions correctly; 65.2% answered six to ten of the questions correctly).

Regarding questions about pregnancy and neonatal outcomes, no midwife answered all eight questions correctly; eight (2.5%) midwives answered seven questions correctly; 27 (8.3%) midwives answered none of the questions correctly. The median knowledge score for the total of eight pregnancy and neonatal outcomes was 4.0 (27.0% answered zero to two questions correctly; 61.3% answered three to five questions correctly; 11.7% answered six to eight questions correctly).

More detailed information about the scores on the knowledge items regarding symptoms and consequences due to *Chlamydia trachomatis* infection during pregnancy are shown in Table 2. The majority of midwives correctly identified symptoms of infection, with correct answers varying from 74.2% for burning
wrongly indicated skin rash as a symptom. Regarding pregnancy and neonatal outcomes the knowledge was less accurate, varying from correct identification by 23.8% of midwives for perinatal mortality to 73.2% for neonatal conjunctivitis. A minority of midwives (0.9%) wrongly indicated clubfoot as a neonatal outcome.

Test practices and risk assessment

Midwives were asked whether they tested women for *Chlamydia trachomatis* at the time of the study. More than half of the midwives (55.8%) reported to test women based on symptoms of infection and only 17.1% reported testing based on risk factors for infection. None of the midwives reported testing all pregnant women. In total 89 (27.1%) midwives reported never testing pregnant women for *Chlamydia trachomatis*. Of the 239 (72.2%) midwives who reported testing some pregnant women for
Regarding risk behaviour assessment, most midwives reported that they always

tested, 14.1% reported that pregnant women should only be tested if they want to be

Correct answers

Vaginal blood loss
292 (88.8)

Symptoms

Lower abdominal pain
282 (85.5)
Pelvic inflammatory disease
303 (91.8)

Skin rash
65 (19.8)

Table 2. Midwives knowledge concerning symptoms and outcomes of Chlamydia trachomatis infection, the number and percentages of stated “yes” responses

Knowledge concerning:

Correct answers

N% (%)

Symptoms

True answers

Burning micturition
245 (74.2)

Different vaginal discharge
300 (91.7)

Vaginal blood loss
292 (88.8)

Pain or blood loss after sexual intercourse
297 (90.0)

Lower abdominal pain
282 (85.5)
Pelvic inflammatory disease
303 (91.8)

False answers

Skin rash
65 (19.8)

Pregnancy and neonatal outcomes

True answers

Spontaneous abortion
174 (52.9)

Preterm rupture of membranes
212 (64.4)

Preterm labor
210 (63.8)

Low birth weight
112 (34.1)

Neonatal conjunctivitis
240 (73.2)

Neonatal pneumonia
167 (50.9)

Perinatal mortality
78 (23.8)

False answers

Neonatal clubfoot
3 (0.9)

Denominator varies due to missing values (between 1 and 4 missing per item)

chlamydial infection, the primary reason was ‘on request by the women themselves’
(96.2%) followed by symptoms of infection (89.1%) and ‘risk behaviour’ (59.3%). Only
7.3% indicated risk factors for infection such as younger age, lower educational level
or certain ethnic origins as reasons to test. Detailed information on the reasons to
test is shown in table 3.

Regarding risk behaviour assessment, most midwives reported that they always
ask about previous sexually transmitted infections (94.8%), and that they did not
find it difficult to ask (Table 4). A minority asks about multiple sexual partners in the
previous 12 months (2.7%), which they find somewhat difficult or difficult to ask.

Attitudes towards testing

According to 24.8% of the midwives all pregnant women should be tested for
Chlamydia trachomatis; 38.2% answered that only women at increased risk should be
tested, 14.1% reported that pregnant women should only be tested if they want to be
The midwives had no opinion. This study showed that midwives were knowledgeable about symptoms of Chlamydia, a reason for midwives to test for Chlamydia in pregnant women. Table 3.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age less than 25 years</td>
<td>6 (2.6)</td>
</tr>
<tr>
<td>Certain ethnicities</td>
<td>10 (4.3)</td>
</tr>
<tr>
<td>Low educational level</td>
<td>7 (3.0)</td>
</tr>
<tr>
<td>Risk behaviors</td>
<td></td>
</tr>
<tr>
<td>Multiple sexual partners</td>
<td>105 (44.5)</td>
</tr>
<tr>
<td>History of sexual transmitted infection</td>
<td>93 (39.4)</td>
</tr>
<tr>
<td>Symptoms</td>
<td></td>
</tr>
<tr>
<td>Burning micturition</td>
<td>75 (32.1)</td>
</tr>
<tr>
<td>Different vaginal discharge</td>
<td>190 (80.2)</td>
</tr>
<tr>
<td>Vaginal blood loss</td>
<td>115 (48.7)</td>
</tr>
<tr>
<td>Lower abdominal pain</td>
<td>130 (55.1)</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Women themselves ask for a test</td>
<td>228 (96.2)</td>
</tr>
</tbody>
</table>

* Among midwives who offer Chlamydia trachomatis testing to (some) pregnant women (N=239; 72.2%)
* Percentages do not sum to 100%, because multiple answers were possible

Table 4. Frequency and difficulty of asking questions to identify risk behavior

<table>
<thead>
<tr>
<th>Questions</th>
<th>always %</th>
<th>usually %</th>
<th>sometimes %</th>
<th>never %</th>
<th>yes %</th>
<th>somewhat %</th>
<th>not %</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of STI</td>
<td>94.8</td>
<td>2.7</td>
<td>1.8</td>
<td>0.6</td>
<td>1.2</td>
<td>5.8</td>
<td>93.0</td>
</tr>
<tr>
<td>Multiple sexual partners</td>
<td>2.1</td>
<td>0.6</td>
<td>19.5</td>
<td>77.8</td>
<td>39.3</td>
<td>39.0</td>
<td>21.7</td>
</tr>
</tbody>
</table>

STI: Sexually Transmitted Infections

tested, 4.9% reported that testing of pregnant women is not necessary, and 18.0% of the midwives had no opinion.

Discussion

This study showed that midwives were knowledgeable about symptoms of Chlamydia trachomatis infection, but they had less knowledge about adverse pregnancy outcomes and subsequent neonatal disease associated with infection. The main reason for midwives to test for Chlamydia trachomatis infection during pregnancy was the women’s own request. Otherwise testing was based on symptoms of infection followed by risk behaviour, but rarely based on demographic risk factors for infection. The study revealed that almost one quarter of midwives had positive
attitudes towards universal *Chlamydia trachomatis* screening in pregnancy, but none tested all pregnant women.

Few studies have been conducted about the knowledge of prenatal health care providers regarding *Chlamydia trachomatis* infection during pregnancy. In contrast to our study, a study among Greek midwives showed a low level of knowledge about maternal complications associated with infection (19). In accordance with our findings, a study of American nurse practitioners showed that while they were generally knowledgeable about *Chlamydia trachomatis*, they demonstrated inadequate screening and treatment practices in pregnant women (20). In this study, midwives had less knowledge about outcomes due to *Chlamydia trachomatis* infection. This might possibly be due to conflicting evidence of pregnancy outcomes associated with infection (1-5, 9, 25, 27-29). A meta-analysis evaluated the effect of *Chlamydia trachomatis* infection in pregnancy on perinatal outcomes and found an increased risk for preterm labour, low birth weight and perinatal mortality (30). However, a more recent non-intervention Dutch study confirmed only preterm labour as a consequence of *Chlamydia trachomatis* infection, and the majority of midwives in this study indicated preterm labour as a consequence of infection (1). We found lower knowledge scores for midwives who worked in rural areas compared to those who worked in urban areas. A possible explanation may be that midwives working in larger cities are more familiar with *Chlamydia trachomatis* due to higher prevalence rates in larger cities compared to smaller cities or villages (21, 31).

Despite the recommendation of the Dutch Health Council to use risk factor based screening for *Chlamydia trachomatis* infection (17), the majority of Dutch midwives reported using symptoms as an indication for testing. *Chlamydia trachomatis* infects the cervix and urethra, which can result in altered vaginal discharge, burning micturition, vaginal bleeding, bleeding after sexual intercourse or lower abdominal pain (26). These symptoms are infrequent and too mild to be mentioned spontaneously (32) and are often mistaken for general pregnancy symptoms or discomforts. Further, almost all midwives in our study indicated that a reason to test pregnant women was the woman’s own request. Hence, these approaches are likely to under-diagnose cases because infections are often asymptomatic with only 20% of women exhibiting symptoms (33), and testing should not be based on women’s self-perceived risk, as most pregnant women who are infected do not perceive themselves or their sexual partner as being infected or at risk for infection (8, 34). Furthermore, targeted screening as recommended by the Dutch Health Council has the potential to stigmatize women and may be hampered by health care professionals’ discomfort of
speaking openly with patients about sexual behaviour (35, 36). This can be confirmed by our study, as the majority of midwives stated that they do not ask questions like about multiple sexual partners during the past twelve months and more than half of them indicated that they find this question difficult to ask.

The attitudes of health care providers may influence their management of Chlamydia trachomatis screening and testing (37, 38). This study reveals that almost one quarter of the midwives felt that all pregnant women should be screened for Chlamydia trachomatis, and the majority of midwives reported positive attitudes towards universal or selective screening for Chlamydia trachomatis in pregnant women. A study that estimated the cost-effectiveness of Chlamydia trachomatis screening among Dutch women revealed that antenatal testing is cost-effective in the Netherlands (39). This fact, together with the findings from our study, which indicate that inconsistent screening approaches are used during pregnancy by midwives in primary care, indicates that testing for Chlamydia trachomatis should be considered as standard in antenatal care.

This is the first study conducted in the Netherlands to assess the knowledge of midwives about symptoms and consequences of Chlamydia trachomatis infection during pregnancy and subsequent neonatal disease, screening practices and attitudes towards testing. A strength of this study is its rather high response rate. The background and professional characteristics of the midwives in our study were consistent with those of the overall population of midwives working in the Netherlands, regarding age and working experience, with the exception of the type of practice; participating midwives were more likely to work in a group practice than in a solo practice (23). However, we found no association between practice type and the median knowledge score for symptoms and consequences of Chlamydia trachomatis infection. A study limitation is that we did not ask if midwives knew that Chlamydia trachomatis infection is often asymptomatic. Midwives might think that the infection is often symptomatic and therefore base their risk assessment on symptoms. In addition, it is difficult to assess knowledge regarding pregnancy outcomes, as there are several uncertainties about the consequences of infection. Further, the question regarding reasons to offer screening for Chlamydia trachomatis infection was not an open question, instead midwives could choose multiple answers from several given risk factors, behavioural factors or symptoms. Hence, midwives may have reported symptoms, behavioural or other risk factors they know, but not actually use these when deciding to test pregnant women. Another limitation is that study participation was voluntary and only one midwife per midwifery practice was invited to participate.
in this study. Therefore, it is possible that the midwives who choose the complete the questionnaire may have more knowledge and have a more positive attitude towards screening.

This study reveals a gap in midwives’ knowledge regarding consequences of *Chlamydia trachomatis* infection. In addition, the majority of midwives based their decision to test women for *Chlamydia trachomatis* on symptoms and not on risk factors, despite the recommendation of the Dutch Health Council. This may result in under-diagnosis and under-treatment of infections in pregnant women. This omission may contribute to increased risk for maternal, perinatal and neonatal morbidity. In order to increase knowledge levels, and indirectly test practices, it is important that midwives receive additional training and educational materials. In addition, education about the infection should be implemented in midwifery education programs. Hence, as midwives have positive attitudes towards testing, we believe that increasing midwives’ knowledge levels and following the practice of other countries a national guideline promoting universal antenatal screening for *Chlamydia trachomatis* in the Netherlands may help to reduce complications associated with the infection.

**Acknowledgements**

The authors would like to thank all midwifery practices that were involved in this study.
References


