



Women's attitudes toward practicing cytomegalovirus prevention behaviors

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ABSTRACT

Congenital cytomegalovirus (CMV) infection causes severe disabilities and developmental delays. Women's awareness of CMV is low. Only about half of healthcare providers report counseling women about behaviors to reduce CMV risk and public health education is limited. Routine CMV counseling is not recommended. Providers may lack time to counsel women; other conditions may take priority for counseling; there may be a perception that women are reluctant to follow advice. This cross-sectional descriptive study examined women's attitudes toward CMV prevention behaviors. Data were collected from an online panel of 840 U.S. women 18–40 years of age, who had a child <5 years of age, and were pregnant or planning a pregnancy in the next 12 months. Questions assessed CMV awareness, frequency of past behaviors that transmit CMV, and attitudes toward eight CMV prevention behaviors. Only 15.5% of women were somewhat or very familiar with CMV. Very few women (6.1%) reported hearing from their provider about CMV. Women held positive attitudes toward the CMV prevention behaviors and perceived them as feasible. Least positive attitudes were toward not kissing a child on the lips and not sharing foods. Predictors of positive attitudes were CMV awareness, past behavior, talking to a healthcare provider, and perceived risk reduction. Healthcare providers and public health practitioners should collaborate to increase CMV awareness. Encouraging behaviors to reduce saliva sharing may result in greater gains in reducing CMV infection.

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1. Introduction

Congenital cytomegalovirus (CMV) infection is the leading cause of infant hearing loss in the United States (Grosse et al., 2008). Women exposed to CMV prior to conception or within the first trimester of pregnancy and then seroconvert have an increased risk of infant infection (Hyde et al., 2010). Congenital CMV infection can result in severe birth defects and developmental delays, including cognitive and motor deficits, vision loss, and death (Dollard et al., 2007). Annually, nearly 26,000 children in the United States are born with CMV; birth prevalence is estimated at 0.64% (Cannon et al., 2014a). Of these, approximately 400 infants will die and 8000 will develop permanent disabilities (Cannon & Davis, 2005).

The virus is spread through sexual contact, breastmilk, organ transplantation, and from mother to baby during pregnancy (Boppa, 2006). Congenital transmission of CMV can occur in utero, during birth or through breastfeeding and is most likely to occur when a mother experiences a primary CMV infection during pregnancy (Schleiss, 2008). Until a vaccine is available (Plotkin, 2015) women can reduce and prevent CMV transmission through practicing appropriate hygiene behaviors (Harrison, 2015; Price et al., 2014). Washing of hands is the

primary recommendation for reducing the spread of CMV (Kimberlin, et al., 2015; Centers for Disease Control and Prevention, 2016). However, viral loads are very high in children's saliva (Cannon et al., 2014a) and behaviors that expose women to saliva put them at increased risk. Studies have shown that doing the following behaviors can reduce risk: avoid contact with saliva when kissing a child, do not put things in your mouth that have been in a child's mouth (specifically food, cups, forks or spoons, or pacifiers), and washing hands after touching a child's saliva or urine, especially after changing a diaper or wiping a nose (Harrison, 2015).

Both general practitioners and obstetrician-gynecologists are key to providing a women's pre-conception care (Mazza et al., 2013; Ranji & Salganicoff, 2011). Studies have shown that counseling-based interventions have been effective in reducing CMV infection (Adler et al., 2004; Revello et al., 2015; Vauloup-Fellous et al., 2009). Fewer than half of healthcare providers report counseling their patients on CMV prevention (Ross et al., 2009). Both general practitioners and obstetrician-gynecologists have indicated that the lack of time during a visit, the number of topics to be discussed, and a lack of knowledge about some topics are barriers to providing women preconception and pregnancy-related information; (Mazza et al., 2013; Ross et al., 2009; Morgan et al., 2012). Providers may preferentially give advice that they perceive will most benefit the patient (Ross et al., 2009) and that the patient may be willing to follow. Additionally, current standards for prenatal care do not include routine screening for, or counseling about, CMV

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(Zolotor & Carlough, 2014; American College of Obstetricians and Gynecologists, 2015). There is limited public education about CMV. As a result, overall CMV awareness ranges between 13 and 39% (Jeon et al., 2006; Pereboom et al., 2013; Willame et al., 2015).

Health behavior theory posits that a person's attitude toward and perceived control over a target behavior are critical in determining whether or not they will perform a behavior (Godin & Kok, 1996). Additional factors that influence a person's response to health messages include their beliefs in the likelihood that they will be affected (susceptibility), how seriously they will be affected (severity), and the belief that they can take action to reduce their risk (response efficacy) (Witte, 1994). If women have positive attitudes toward the CMV prevention behaviors and believe that they can take action to reduce their risk they may be more likely to follow a healthcare provider's recommendation or public health message. Therefore, the purposes of this research were to 1) determine the frequency with which women perform CMV risk and prevention behaviors, 2) understand women's attitudes toward the behaviors and 3) identify what factors predict positive attitudes toward the behaviors.

2. Method

2.1. Sample and participant selection

This was a cross-sectional descriptive study. Data were collected from women in the United States who were members of an online panel operated by Qualtrics, a worldwide software company specializing in market research. Online panels are comprised of participants who have agreed to respond to survey requests in exchange for compensation. The participants had previously consented to be a member of the Qualtrics panel. As members of the panel, people complete a profile of demographic characteristics and interests that allows the survey administrator to target eligible participants. An email invitation, including the approximate survey length and quantity of reward points (equivalent to \$1.10) that would be credited to their account, was sent to potential respondents who met initial demographic criteria of being a female between the ages of 18–40. The study was approved by the university institutional review board.

In addition to age and gender, inclusion criteria were that the woman had a child <5 years of age and was pregnant or planning a pregnancy in the next 12 months. There were two exclusion criteria: having had a child with a previously diagnosed disability and having worked as a healthcare provider. Healthcare providers and parents of a child with a disability may be more aware of CMV than the general population as it causes several birth defects and developmental disabilities. Additional sociodemographic variables measured included race/ethnicity (white, black, Hispanic, other), number of children at home, education, and household income.

Panel members who met the criteria and responded to the email invitation were sent a link to a web-based survey. A one-page factsheet describing CMV was developed based on a previous study of CMV materials (Price et al., 2014) and was embedded in the survey. The text included statements about the likelihood that the woman and her child would be affected, steps to reduce the possibility of infection, and the potential results of following or not following the behavioral guidelines.

2.2. Measures

The dependent variable was women's attitudes toward CMV prevention behaviors. Attitudes toward each of the eight prevention behaviors were assessed using a seven-point semantic differential scale using four different descriptors with words that were opposites: impractical-practical, inconvenient-convenient, difficult-easy, unrealistic-realistic. Higher mean scores indicated more favorable attitudes. The authors developed the attitude scale based on standard semantic differential scales.

CMV related variables included familiarity with CMV, perceptions of the severity of infection, susceptibility to infection, how effective they thought the behaviors would be at reducing risk (response efficacy), and frequency of practicing the behaviors in the past. One question asked how familiar women were with CMV (very familiar, somewhat familiar, or not at all familiar) (Price et al., 2014). Perceived severity of a CMV infection was measured with three questions adapted from Block and Keller (Block & Keller, 1995) about whether the respondent felt that a CMV infection in a baby was frightening, dangerous, or severe. Perceived susceptibility of CMV infection was measured by three items adapted from Nan, Xie, and Madden (Nan et al., 2012) including if it is likely that they would contract CMV, if it is possible that they would get CMV, and if they are at risk for getting CMV. For both perceived severity and susceptibility, responses ranged from strongly disagree (Grosse et al., 2008) to strongly agree (Schleiss, 2008). Total scores were created by averaging the three items for each construct (Cronbach's alpha severity = 0.90; susceptibility = 0.81). Higher values indicated higher perceived severity or susceptibility (range: 1–7).

Practicing prevention or risk behaviors in the past was measured by eight items regarding the frequency of washing hands after changing diapers (two questions) or wiping a child's nose, sharing bites of food, cups, or utensils with children, putting a pacifier in the mouth after it had been in a child's mouth, and kissing children on the lips. (Price et al., 2014) Response options for washing hands ranged from never (Grosse et al., 2008) to always (Cannon & Davis, 2005). The remainder of the questions were also on a 5-point scale (never, rarely, 1–2 days per week, 3–5 days per week and every day).

Perceived response efficacy for each of the CMV prevention behaviors was measured by one item adapted from Taber and Aspinwall (Taber & Aspinwall, 2015). The question asked the respondent how effective they thought each behavior would be at decreasing her risk of getting CMV. Responses ranged from not at all effective (Grosse et al., 2008) to very effective (Cannon & Davis, 2005).

2.3. Statistical analysis

Frequencies and proportions were calculated to describe the sociodemographic characteristics and the prevalence of CMV risk behaviors. We examined the differences in the prevalence of CMV risk behaviors across sociodemographic characteristics using a chi-square test. Measures of central tendency and dispersion were calculated for the four semantic differential measures for each of the eight CMV prevention behaviors. We conducted principal component analysis with varimax rotation on all of the semantic differential measures. A four factor solution with variables clustered by behavior type adequately explained the covariation. The resulting scales were comprised of semantic differential measures for: 1) sharing utensils, cups, or food ($\alpha = 0.97$); 2) washing hands after wet or dirty diapers or wiping a nose ($\alpha = 0.97$); 3) kissing on the lips ($\alpha = 0.96$) and 4) putting a pacifier in your mouth ($\alpha = 0.96$).

Linear regression was used to evaluate the association between the independent variables: sociodemographic characteristics, CMV awareness, having talked to a healthcare provider about CMV, the respondent's participation in the risk behavior, response efficacy, perceived susceptibility and severity to CMV, and the dependent variables: attitudes toward the CMV prevention behaviors. Attitudes were measured by the four scales clustered by behavior-type identified in factor analysis: 1) performing hand hygiene, 2) avoiding sharing behaviors, 3) not kissing a child on the mouth, and 4) not putting a pacifier in the mouth. Using backward elimination, covariates that did not reach significance at $\alpha = 0.10$ were excluded. For the regression models, pre-survey frequency of sharing behaviors, kissing on the lips and putting a pacifier in your mouth were reverse coded so that higher numbers indicated lower frequency of the behavior. All analyses were conducted in SAS 9.4 (SAS Institute Inc., Cary, NC, USA).

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