

Awareness of human papillomavirus, cervical cancer and its prevention among primigravid antenatal clinic attendees in a tertiary care hospital in Sri Lanka: a cross-sectional study

Aruni H. W. de Silva^{A,1}, Nirma Samarawickrema^B, Anuradhani Kasturiratne^C,
S. Rachel Skinner^D, Ananda Rajitha Wickremasinghe^C and Suzanne M. Garland^{E,F,G,H}

^ADepartment of Family Medicine, Faculty of Medicine, University of Kelaniya, P.O. Box 6, Thalagolla Road, Ragama, Sri Lanka.

^BDepartment of Biochemistry and Molecular Biology, Monash University, Vic. 3800, Australia.

^CDepartment of Public Health, Faculty of Medicine, University of Kelaniya, Sri Lanka.

^DDiscipline of Child and Adolescent Health, Sydney University and Children's Hospital Westmead, NSW 2145, Australia.

^EDepartment of Microbiology and Infectious Diseases, The Royal Women's Hospital, Parkville, Vic. 3052, Australia.

^FMurdoch Children's Research Institute, Parkville, Vic. 3052, Australia.

^GDepartment of Obstetrics and Gynaecology, University of Melbourne, Vic. 3010, Australia.

^HDepartment of Microbiology, Royal Children's Hospital, Parkville, Vic. 3052, Australia.

¹Corresponding author. Email: aruni.weerakoon@yahoo.com

Abstract. *Background:* Cervical cancer is the second commonest cancer amongst Sri Lankan women. With introduction of the human papillomavirus (HPV) vaccine to the national immunisation schedule, awareness and prevention of disease underpins vaccine uptake. Knowledge of HPV, HPV-related diseases and attitudes towards prevention and screening among urban women was assessed. *Methods:* Primigravids attending Colombo North Teaching Hospital antenatal clinics were recruited over 8 months as surrogates for women who have recently become sexually active. Data through a self-administered questionnaire on three domains were collected (cervical cancer, Pap testing, HPV and vaccine). *Results:* Of 667 participants (mean age 23.9 (s.d. = 4.4) years, 68.0% ($n = 454$) had >11 years of schooling), only 1.5% ($n = 10$) were aware of all three domains: 55.0% (370/667) had heard of cervical cancer, 19.0% of whom (70/370) knew it was sexually acquired, 9.0% (60/667) were aware of Pap screening, while 5.4% (36/665) had heard about HPV and <1.0% (5/667) knew it caused cancer. The total knowledge score ranged from zero (379/665) to nine (2/665), with a mean of 0.9 (s.d. = 1.4), with awareness increasing with level of education ($\chi^2 = 18.6$; $P < 0.001$). Of those aware of Pap testing, 8.0% (5/60) were reluctant to undergo testing, while 46.6% (28/60) had no apprehension. *Conclusions:* Knowledge of cervical cancer, Pap testing, HPV and vaccine was low, especially in terms of HPV. Among those aware of Pap screening, generally there were favourable attitudes to having a test. These data have implications for acceptance of the vaccine and any future expansion of cervical screening with newer, more cost-effective technologies.

Additional keywords: Pap test, screening, South Asia, vaccine, women.

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Introduction

Cervical cancer is the fourth commonest cancer in women worldwide.¹ GLOBOCAN estimated 528 000¹ new cases of cervical cancer and 266 000 related deaths in 2012, accounting for 7.5% of all female cancer-related deaths in the world.¹ Despite the availability of relatively inexpensive detection or

screening methods and now effective prophylactic human papillomavirus (HPV) vaccines, ~85.0% of these deaths occur in the developing world.¹

Cervical cancer is the second commonest (16.0%)² cancer among females in Sri Lanka. According to the Institute Català d'Oncologia (ICO) Centre for HPV-related cancers,²

1721 cases of cervical cancer are diagnosed annually in Sri Lanka, with 690 deaths. As estimated in 2016, this accounted for a crude incidence rate of 16/100 000 females, similar to the rates reported in other South Asian countries. Sri Lanka ranks fourth in the age standardised incidence rates of cervical cancer, when compared with other South Asian countries.²

Anogenital HPV infections are very common, and most are transient. Only a small proportion of infections persist, and chronic infection of high risk human papillomavirus (HR HPV) genotypes is a prerequisite for cervical cancer and its precursor lesions.³ Screening for precancerous lesions by Pap cytology, with treatment of lesions to prevent invasive cancer was introduced as a routine screening test for cervical cancer for women aged ≥ 35 years in the Sri Lankan healthcare system in 1996. Cytology is conducted in Well Woman Clinics country-wide,⁴ but the coverage was less than 40.0% of the eligible women in 2013.⁴ Currently Pap screening is recommended every 5 years for women aged 30–65 years.⁵

Prophylactic vaccines against HR HPV strains have been introduced as public health campaigns in many countries in their routine immunisation schedules to reduce HPV-vaccine related cancers, precancerous lesions and genital warts. Cervarix® (2vHPV; Cervarix, GSK, Rixensart, Belgium), a bivalent vaccine targets HPV types 16 and 18; Gardasil® (4vHPV; Gardasil/Silgard, Merck, Kenilworth, New Jersey, USA), a quadrivalent vaccine, targets types 6 and 11 in addition to 16 and 18; while the nonavalent (9vHPV; Gardasil 9, Merck) vaccine targets the next most common cancer-causing types, HPV31, 33, 45, 52 and 58 in addition to types 6, 11, 16 and 18. The 2vHPV, 4vHPV and 9vHPV vaccines have all demonstrated very high immunogenicity, efficacy against the vaccine-related genotypes and excellent safety.⁶ The 4vHPV has reduced 90.0% of genital warts, ~45.0% of low-grade cytological cervical abnormalities and ~85.0% of high-grade histologically proven cervical abnormalities, where coverage of the vaccine to the target population has been high.⁷ The 2vHPV too has showed similar efficacy in reducing the rates of HPV 16/18-related genital lesions (93.0%, 95.0% CI 87.0% to 96.0%).⁸

Vaccines against HPV were approved for use in Sri Lanka in 2009, but have been available in the private sector only since 2010.⁹ The Sri Lankan government, however, introduced a two-dose schedule of HPV vaccination to all 10- to 11-year-old girls in the expanded program of immunisation in July 2017.¹⁰ Lack of awareness may still reduce the vaccine uptake.

Underpinning a good vaccine program is high coverage of the vaccine into the target population. Knowledge and understanding of cervical cancer and how it can be prevented will enhance vaccine and screening uptake.

A few studies on awareness of cervical cancer and its prevention have been conducted in Sri Lanka. Two studies comprised older women^{11,12} and another study was among a female undergraduate population who had a mean age of 18 years.¹³ The aim of this study was to assess the knowledge of HPV-related infections and cervical cancer, and attitudes towards screening and prevention strategies among Sri Lankan urban primigravid women attending their first visit at a large public teaching hospital antenatal clinic providing free-of-charge services. As young sexually active women are the most vulnerable

group for HPV infections, we chose to target primigravid women for this study, as they likely represent a reasonable proxy for the young sexually active female population in Sri Lanka, given conservative societal attitudes to sexual relationships outside marriage. High vaginal HPV genoprevalence was also measured in parallel to this study, which is presented in a separate paper.

Methods

Study design and study population

A descriptive cross-sectional study was conducted among primigravid women attending their first visit at an antenatal clinic at the Colombo North Teaching Hospital, Sri Lanka, over an 8-month period from 1 January to 31 August 2013. The Colombo North Teaching Hospital is a large government referral tertiary care hospital, 18 km north of the capital city of Colombo, and provides free healthcare services. It also serves the Ragama area, a semi-urban setting. Antenatal clinics are conducted in three units, under consultant obstetricians in this hospital. Consecutive primigravid women aged 18–35 years attending these antenatal clinics for the first time were identified and invited to participate in the study. The purpose of the study was explained to all eligible females and informed written consent was obtained before recruitment. Participants who were willing to have a vaginal sample taken were invited to participate in a vaginal HPV genoprevalence study, which will be discussed in a separate paper.

The study project was approved by the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya, Sri Lanka. Permission to conduct the study was obtained from the Director, Colombo North Teaching Hospital and Heads of the three obstetric units.

Data collection

A pretested, self-administered questionnaire (in Sinhala) was used to collect information on knowledge and attitudes. The questionnaire was adapted from a previous questionnaire developed for a Sri Lankan population,¹⁴ with modifications after a review of the literature. Items were modified to ensure cultural appropriateness. The questionnaire assessed knowledge on and attitudes towards cervical cancer, Papanicolaou cervical cytological testing and HPV vaccines. The questionnaire was pilot tested for readability and ease of understanding on 10 females aged 18–35 years, representing different educational levels. Two rounds of revision were done to ensure face validity, readability and ease of administration. The finalised tool consisted of three sections: (i) sociodemographic data; (ii) questions relating to knowledge on cervical cancer (five questions), Pap cervical cytological testing (three questions) and HPV (nine questions), where participants had to either agree or disagree; and (iii) attitudes towards Pap testing (five statements) and vaccination (12 statements) were assessed using a seven-point Likert scale.

The self-administered questionnaire was completed by the participant in a secluded area in the clinic. Instructions on how to complete the questionnaire were given to all participants. A research assistant was present at the time of the survey to clarify any doubts or answer any questions the participants

may have had. All invited participants did not have problems in reading and understanding the questionnaire, including non-Sinhala ethnic groups.

Data analysis

Data were entered to an Epiinfo™ database (Centers for Disease Control and Prevention, Atlanta, GA, USA) and analysed using SPSS version 16 (SPSS Inc., Chicago, IL, USA). A score of one was assigned to each correct answer and for each respondent, a total score and a sub-score for each component (cervical cancer, Pap test, HPV) were computed. In the analysis of knowledge sub-scores, only the respondents who had heard of the relevant topic (e.g. HPV) were included.

Percentages were used to describe response patterns. A χ^2 test was used to test for associations. A *P*-value <0.05 was considered significant.

Sample size

This study was a sub component of a larger vaginal HPV genoprevalence study. A minimum sample of 564 women was required for the main study to detect a HPV prevalence of 50 per 1000 women, with an α error of 0.05 and an acceptable difference of 18 per 1000 women. A total of 667 women were recruited. This number was sufficient to determine if 10.0% women had ever heard of HPV, with a 95.0% confidence interval ranging from 7.5% to 12.5%.

Results

Participant characteristics

Overall, 667 eligible women participated in the study. The mean age of the study participants was 23.9 (s.d. = 4.4) years. Forty-two percent of participants were aged 20–24 years and nearly 67.0% had passed the General Certificate of Education (G.C.E.) Ordinary Level (O/L) examination (Table 1).

Four participants had no formal schooling, while 68.0% of the participants had more than 11 years of schooling. The monthly household income was less than SLR 20 000 (\approx 115 USD), in 40.0% of the participants.

Knowledge of cervical cancer and Pap test

Approximately 56.0% of participants had heard of cervical cancer, of whom 19.0% knew that the aetiological agent was sexually acquired and even fewer knew that the cause was a virus (14.6%) (Table 2). Twenty-six percent (97/370) had incorrectly answered all questions on cervical cancer, while only three participants (0.8%; 3/370) answered all questions on cervical cancer correctly. Of the remainder, correct responses were obtained by 33.0% for one question, 25.0% for two questions, 12.0% for three questions and 3.0% for four questions.

Sixty (9.0%) participants were aware of the Pap test (Table 2). For the two questions on Pap test, half of the participants answered them correctly, while 37.0% gave incorrect answers for both. Most (593/665) did not know the recommended age for initial screening using the Pap test in Sri Lanka, while only six percent of the total participants mentioned 35 years as the recommended age for initial Pap smear screening. Among the participants aware of the Pap test, 16 (26.7%) knew the recommended age for screening correctly.

Table 1. Demographic profile of the participants

G.C.E., General Certificate of Education; SLR, Sri Lankan Rupee

Demographic characteristic	Number	Percentage
Age distribution (<i>n</i> = 652; years)		
≤19	114	17.5
20–24	278	42.6
25–29	172	26.4
30–35	88	13.5
Ethnicity (<i>n</i> = 656)		
Sinhala	565	86.1
Tamil	66	10.1
Moor	21	3.2
Burgher	4	0.6
Religious affiliation (<i>n</i> = 654)		
Buddhist	446	68
Hindu	46	6.9
Islam	20	3.0
Christian	143	21.4
Education (<i>n</i> = 656)		
No formal schooling	4	0.6
Primary (1–5 years)	8	1.2
Secondary (6–11 years)	201	30.6
Passed G.C.E. Ordinary level ^A	241	36.8
Followed G.C.E. Advanced level	58	8.8
Passed G.C.E. Advanced level ^B	122	18.6
Post-Advanced level Vocational training	3	0.5
Degree or Professional training	19	2.9
Household monthly income in SLR ^C (<i>n</i> = 656)		
Less than 5000	12	1.8
5000–9999	34	5.2
10 000–19 999	237	36.1
20 000–34 999	299	45.6
35 000–49 999	57	8.7
50 000 or more	17	2.6

^AExamination at the end of 11 years of schooling.

^BExamination at the end of 13 years of schooling.

^C1 USD \approx 170 SLR.

Knowledge on HPV

Thirty-six (5.4%) participants had heard of HPV (Table 3). Of these, only five knew that it was a pathogen causing cervical cancer and only three knew that a vaccine against HPV can prevent most cervical cancers. For the nine questions on HPV, the mean knowledge score was 0.9 out of a possible total of 9. The maximum score of six was obtained by 2.8%, while 61.0% scored zero.

Of the total study population, only 10 respondents were correctly aware of all three domains assessed; that is, cervical cancer, Pap test and HPV. The total knowledge score ranged from zero (57.0%) to nine (0.3%), with a mean of 0.9 (s.d. = 1.4). If a respondent was unaware of a domain, the score for the answers on that domain was discarded. The level of awareness on attributes in focus was strongly associated with level of education ($\chi^2 = 18.6$; *P* < 0.001), but not with income or age.

Attitudes towards the Pap test and HPV vaccine

Of the participants who were aware of Pap testing (60), 44.0% considered having a regular Pap smear as an important health practice, while 48.0% stated that they were not afraid to undergo

Table 2. Awareness of cervical cancer and Pap test

Knowledge	Yes/true (n)	%	No/false (n)	%	Don't know (n)	%	No response (n)	%
Heard of cervical cancer? (n = 665)	370	55.6	200	30.1	69	10.3	26	3.9
Cervical cancer is one of the commonest cancers in Sri Lanka (n = 370) ^A	217	58.6	24	6.5	95	25.7	34	9.2
Cervical cancer is inherited (n = 370) ^A	38	10.3	106	28.6	186	50.3	40	10.8
Cervical cancer is caused by a virus (n = 370) ^A	54	14.6	53	14.3	213	57.6	50	13.5
The causative factor for cervical cancer is acquired sexually (n = 370) ^A	70	18.9	57	15.4	201	54.3	42	11.4
Only people with multiple sexual partners are at risk of cervical cancer (n = 370) ^A	36	9.7	57	15.4	201	54.3	42	11.4
Heard of Pap test/smear? (n = 665)	60	9.0	462	69.5	92	13.8	51	7.7
Pap smear can detect cervical cancer (n = 60) ^B	38	63.3	0	0	8	13.3	13	23.3
Pap smear can detect cervical cancer early at a curable stage (n = 60) ^B	30	50.0	0	0	15	25.0	15	25.0

^AAnalysis only includes respondents who had heard about cervical cancer.

^BAnalysis only includes respondents who had heard about the Pap test.

Table 3. Awareness about the human papillomavirus (HPV)

Knowledge	Yes/true (n)	%	No/false (n)	%	Don't know (n)	%	No response (n)	%
Heard of HPV? (n = 665)	36	5.4	466	70.1	116	17.4	47	7.0
HPV can cause cervical cancer (n = 36) ^A	5	25.0	2	5.6	18	50.0	11	30.6
HPV affects both men and women (n = 36) ^A	6	16.7	4	11.1	15	41.7	11	30.6
HPV causes genital warts (n = 36) ^A	5	13.9	3	8.3	15	41.7	11	30.6
HPV causes genital herpes (n = 36) ^A	7	19.4	0	0	17	47.2	12	33.3
HPV is a sexually transmissible infection (n = 36) ^A	6	16.7	3	8.3	16	44.4	11	30.6
HPV is spread through blood or other bodily fluids (n = 36) ^A	4	11.1	4	11.1	16	44.4	12	33.3
HPV can cause an abnormal Pap test (n = 36) ^A	6	16.7	1	2.8	15	41.7	14	38.9
Most HPV infections do not have visible signs and symptoms (n = 36) ^A	4	11.4	2	5.6	15	41.7	15	41.7
Vaccination against HPV reduces the risk of cervical cancer (n = 36) ^A	3	8.3	2	5.6	18	50.0	13	36.1

^AAnalysis only includes respondents who had heard about HPV.

Table 4. Attitudes towards the Pap test among responders who were aware of it (n = 60)

Data are presented as n (%)

Attitude	Strongly agree	Agree	Can't comment	Disagree	Strongly disagree	Don't know	No response
Having regular Pap smear tests is an important health practice	14(23.0)	13(21.7)	5(8.3)	0	0	5(8.3)	23(38.3)
I have no fear to undergo a Pap smear	12(20.0)	16(26.7)	3(5.0)	2(3.3)	0	4(6.7)	23(38.3)
I believe that a Pap smear is safe	9(15.0)	17(28.3)	4(6.7)	0	0	6(10.0)	24(40.0)
I am too shy to undergo a Pap smear	1(1.7)	4(6.7)	5(8.3)	18(30.0)	2(3.3)	4(6.7)	26(43.3)
I believe that Pap smear tests are important only for those at high risk of developing cervical cancer	1(1.7)	3(5.0)	5(8.3)	20(33.0)	3(5.0)	5(8.3)	23(38.0)

the test (Table 4). Very few participants (8.0%) stated that they were too shy to undergo the Pap test. A few (7.0%) believed that the Pap smear is important only for high-risk women.

Six participants were aware of HPV and that it was transmitted sexually. Therefore, only these participants were considered when analysing the attitudes towards HPV vaccine. Nearly half of them answered 'don't know' to most statements given on HPV vaccine. Most believed the vaccine to be protective (n = 4) and important to them (n = 3). Half of them were willing to be vaccinated if the vaccine is offered free or for an affordable price and believed their daughters should be vaccinated. A majority (n = 5) were doubtful about who should be vaccinated, when the vaccine should be administered (n = 5) and its impact on their sexual practices (n = 4).

Discussion

Knowledge of cervical cancer, Pap test screening and involvement of HPV in cervical cancer was low in this primigravid Sri Lankan population attending the first antenatal clinic. Previous studies in Sri Lanka have also reported low awareness of cervical cancer and its prevention. In a study performed by Shivanthan *et al.* (2014) among ever married 25- to 65-year-old Sri Lankan women attending a medical clinic of a tertiary care hospital in 2013, 59.0% were aware of the Pap test and 36.9% knew that it was for detecting cervical pre-cancerous lesions. Only eighteen percent had undergone a Pap test.¹⁵ In their study, participants had a high mean age (43 years), with a better awareness of the Pap test (59.0%) compared with participants in our study, who were

younger (mean age 23.9 years) and who had lower awareness (9.0%). In a community-based study conducted by Witharana *et al.* (2015) in the Galle district of the Southern Province of Sri Lanka, awareness of the Pap smear was 51.0%, although only 7.5% had ever undergone a Pap smear. The study also found that awareness of cervical cancer was not associated with a favourable uptake of the Pap smear ($P = 0.16$), but with attendance at Well Woman Clinics.¹⁶ Studies involving older persons reported better awareness of cervical cancer and the Pap smear test, probably due to public health interventions targeting this group. It is to be noted that public health workers approached the above 35-year age cohort to recruit for Pap screening as the national policy is to offer the first Pap test at the age of 35 years. It is noteworthy that in both studies, a woman's awareness did not correlate with the uptake of the Pap smear. Fear, safety concerns and to a lesser extent, shyness, could be other factors influencing the uptake of the Pap test. These three attributes are likely to significantly contribute to the reported low Pap test coverage of 30–40.0% of eligible Sri Lankan women, in addition to the low awareness.⁴

Awareness of cervical cancer in an undergraduate female population that had a mean age of 18 years in Dambulla, Sri Lanka, was 58.0%,¹⁷ which is similar to the results of the present study (56.0%). In two undergraduate female communities in India and Nepal, awareness of cervical cancer was similar, but the awareness of HPV was 48.9% and 52.5% respectively compared with 5.4% in our study sample.¹⁷ In a study in Mangalore, India, among pre-university and degree college students, 16.5% identified cervical cancer as the most common cancer in women in India.¹⁸ Undergraduates of Bhutan had similar levels of knowledge.¹¹ Our findings are representative of a relatively young, sexually active population that visited a tertiary care centre with a catchment area comprising low-income urban, suburban and rural populations providing free-of-charge services.

Among female healthcare workers in six districts of Sri Lanka, 76.3% knew that a Pap smear could detect the precancerous stage of cervical cancer,¹² yet, only 26.0% of the married females had ever undergone a Pap smear test similar to those reported in other studies in the region.^{13,19} It is expected that healthcare workers have better knowledge of cervical cancer and the Pap smear test than the public; however, it is surprising that uptake of Pap tests was low in this group. The two commonest reasons for not taking up the test were reported to be: 'not necessary' because of a lack of symptoms and of fear. Cervical cancer is not included in the school curriculum and there is no national level public health awareness program or campaign to educate the young sexually active women in Sri Lanka. The major source of information on this topic for this population is the media. In spite of the availability of the HPV vaccine in the private sector, awareness of this preventive intervention is extremely low. This might have deprived even the minority who could afford the vaccine from accessing it, purely due to unawareness of cervical cancer and its aetiology.

This study was performed among primigravid women during their first antenatal visit, as it was considered a surrogate for young, sexually active women vulnerable to HPV infection. The mean age (24 years) of the study population is slightly less than the average age at first marriage (25.3 years) of Sri Lankan

women.²⁰ According to the Household Income and Expenditure Survey 2012–13, the mean monthly household income in the Western province is SLR 64 152.00 (\approx USD 425).²¹ Only 2.6% of the study population reported a monthly household income above SLR 50 000.00 (\approx USD 330) in our sample. This study population represents a lower socioeconomic group on average who are visiting a government health institution delivering free healthcare services. National statistics indicate that 37.0% of the adult population (>25 years)²² in the Gampaha District has passed G.C.E. O/L (examination at the end of 11 years of schooling) compared with 21.0% of the study group. Therefore, the study group represents a lower income group, with a lower educational attainment than the average resident of the locality. These factors may also explain the relatively poor knowledge on cervical cancer, the Pap test and HPV in this population.

Positive attitudes to cervical cancer screening were observed among those who had heard about cervical cancer. Due to the poor knowledge of the aetiology of cervical cancer and the sexual transmissibility of the causative HPV, it is difficult to elicit useful information on attitudes towards a vaccine preventing a sexually transmitted cancer. Considering the conservative culture, increasing awareness of HPV as a sexually transmitted virus may have adverse impact on Pap smear uptake. Education programs and awareness campaigns should be sensitive to the conservative culture around sexual activity, to ensure positive attitudes are supported and reinforced.

The major strength of this study was targeting a young sexually active female population using primigravid women during their first antenatal visit as surrogates. However, the study setting used to recruit subjects was a tertiary care public hospital providing free services that may have resulted in the inclusion of a relatively greater proportion of underprivileged, less-educated females.

This study highlights the poor knowledge of cervical cancer, Pap test and the HPV vaccine among primarily suburban low-income earning females in Sri Lanka. For successful uptake of any cancer prevention strategy, cervical cancer screening or HPV vaccination, good and widespread public awareness is important. As the government has just introduced the HPV vaccine to the national health system in the public sector, it is important to educate both parents and school children on HPV, cervical cancer and HPV vaccine. The low knowledge base of cervical cancer, its causative factor, prevention and vaccination found in this study underpins the importance of an appropriate and comprehensive education program to the general public, as well as clinicians, to ensure good uptake of the vaccine.

Conflicts of interest

S. R. Skinners's institution has received funding from GlaxoSmithKline (GSK) Biologicals for the conduct of clinical trials of the HPV vaccine, reimbursement of funds for travel to conferences to present data from these clinical trials and honoraria for attendance on advisory panels. Her institution has also received funds for investigator-driven research from GSK Australia and Sequiris. S. M. Garland has received grants through her institution from Merck & Co., Inc., Kenilworth, NJ, USA, GSK, Sequiris and Commonwealth Department of Health, travel and accommodation expenses paid by Merck &

Co., Inc., Kenilworth, NJ, USA to present at HPV advisory board meetings, and has delivered lectures and received speaking fees from Merck Sharpe & Dohme (MSD) for work performed in her personal time. The other authors declare no conflicts of interest.

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