

# News Media Coverage of Human Papillomavirus

Rebecca Anhang, M.S.<sup>1</sup>  
 Jo Ellen Stryker, Ph.D.<sup>2,3</sup>  
 Thomas C. Wright, Jr., M.D.<sup>4</sup>  
 Sue J. Goldie, M.D., M.P.H.<sup>1</sup>

<sup>1</sup> Harvard Center for Risk Analysis, Harvard School of Public Health, Boston, Massachusetts.

<sup>2</sup> Center for Community-Based Research, Dana-Farber Cancer Institute, Boston, Massachusetts.

<sup>3</sup> Department of Health and Social Behavior, Harvard School of Public Health, Boston, Massachusetts.

<sup>4</sup> Department of Pathology, College of Physicians and Surgeons, Columbia University, New York, New York.

See related editorial on pages 225–7, this issue.

Supported in part by National Cancer Institute Grant R01 CA93435-2 (S.J.G.).

Address for reprints: Sue J. Goldie, M.D., M.P.H., Department of Health Policy and Management, Harvard School of Public Health, Center for Risk Analysis, 718 Huntington Avenue, Suite 2, Boston, MA 02115-5924; Fax: (617) 432-0190; E-mail: sgoldie@hsph.harvard.edu

Received July 18, 2003; accepted September 9, 2003.

**BACKGROUND.** Now that human papillomavirus (HPV) DNA testing is being incorporated into cervical cancer screening programs, salient and accurate media information about HPV will be crucial to inform women's screening choices and to manage psychosocial responses to HPV DNA test results.

**METHODS.** The authors conducted a content analysis of 111 news stories about HPV from the 10 most circulated newspapers and from 3 major television networks for the period from January 1995 through July 2002. Stories were assessed for predominant theme (STD, cancer, or new tests); information about symptoms, transmission, prevention, and cancer-causing properties of HPV; screening test descriptions; and recommended screening guidelines.

**RESULTS.** Thirty-six percent of stories primarily were about new tests for HPV or cervical cancer, 30% of stories focused on cervical cancer or its link to HPV, and 27% of stories emphasized sexually transmitted diseases (STDs) or genital warts. Seventy-nine percent of stories mentioned that HPV is an STD, and 50% of stories reported that HPV is very common. Twenty-six percent of stories reported that most women with HPV will not develop cervical carcinoma. Of 81 stories that mentioned a screening test for HPV or cervical carcinoma, 38% reported the sensitivity of the test; 30% mentioned wrong, uncertain, or unnecessary test results; and 25% mentioned consequences of such results.

**CONCLUSIONS.** Media coverage of HPV could better fulfill women's educational needs by including information about low-risk and high-risk types of HPV and their differing links to cervical cancer; describing HPV prevention, transmission, and symptoms; explaining the benefits and consequences of HPV testing; and outlining the latest screening guidelines in every story. *Cancer* 2004;100:308–14.

© 2003 American Cancer Society.

**KEYWORDS:** cervical cancer screening, DNA testing, human papillomavirus, sexually transmitted disease, news media.

In the last decade, a major discovery in human cancer etiology has been the recognition that cervical carcinoma is a rare consequence of infection with certain *high-risk* types of human papillomavirus (HPV).<sup>1</sup> Sensitive assays have been developed to detect carcinogenic types of HPV; and, increasingly, HPV DNA testing is being incorporated into cervical cancer screening.<sup>2–8</sup> These developments have received considerable attention in medical specialty journals and the general scientific press. The lay public, however, remains largely uninformed about HPV and cervical cancer screening.

Although it is the most prevalent sexually transmitted disease (STD) in the United States, less than one-third of the general United States population has heard of HPV,<sup>9</sup> and similarly low awareness has been reported in high school and college settings.<sup>10–12</sup> Female university students report that they know less about HPV than about other common STDs.<sup>13</sup> Of the students who have heard of HPV, few are aware that it is associated with cervical carcinoma; can identify

that age of sexual debut, number of sexual partners, tobacco use, and use of oral contraceptives are risk factors; or know that HPV can be transmitted by genital contact, regardless of whether sexual intercourse has taken place or a condom has been used.<sup>10,13,14</sup> Most women cannot identify that the purpose of a Papanicolaou (Pap) smear is to detect changes indicative of HPV, premalignant conditions, or malignant conditions.<sup>13-15</sup> Once women become aware of HPV, their primary questions regard transmission, prevention, treatment, and level of cervical cancer risk.<sup>16</sup>

News media serve as major sources of information about advances in science and medicine,<sup>17-19</sup> setting the public agenda, influencing policy makers, affecting medical and scientific research, and prompting patients to seek health care.<sup>20-26</sup> Now that HPV testing is being introduced more widely into a population largely unfamiliar with HPV, the news media plays an important role in fulfilling the informational needs identified by awareness research and addressing women's primary questions about HPV.

To assess how this educational role is being performed by popular news media, in our study, we explored how top-circulation newspapers and major television networks present HPV information. In keeping with women's expressed information needs about HPV and gaps in lay knowledge, we examined news stories for the presence of information about HPV prevention, transmission, and symptoms; cancer risk; screening test profiles; and screening guidelines.

## MATERIALS AND METHODS

### Selection of News Stories

We evaluated news reports on HPV published in the 10 United States newspapers with the highest daily circulation or broadcast on the 3 major television networks from January 1995 through July 2002. We selected 1995 as the earliest year to reflect the timing of the release of conclusive scientific data relating HPV to cervical carcinoma.<sup>27</sup> We searched the Lexis-Nexis database (Lexis-Nexis, Dayton, OH), using the search phrase *human papilloma virus* or *HPV*. To ensure the comprehensiveness of our search, we supplemented this initial search with variants and misspellings of the search term, including, *human papillomavirus*, *human pappilloma virus*, and *human papiloma virus*. We found 1072 citations in total and obtained the full text of the 317 articles that were published in the top 10 newspapers in terms of circulation.

One author reviewed the full text of each article and decided whether to include the article in the current study. Articles were included if HPV was their main topic or if they included at least 100 words about HPV. Exclusion criteria for stories were developed to

ensure that only stories designed for mass audiences that were lengthy enough to provide at least summary background information about HPV were included. Stories were excluded if they contained less than 100 words about genital HPV or cervical cancer (131 stories); if they primarily were about business issues or were located in the financial section of the newspaper (33 stories); or if they were letters (4 stories), advertisements for HPV study recruitment (31 stories), obituaries (2 stories), or duplicate articles (identical or nearly identical articles appearing in more than 1 newspaper) (13 stories). Editorials and advice columns were included to reflect the overall content of the newspapers. Consequently, we had a total of 103 articles for analysis.

To obtain videotapes and transcripts of television news stories, we searched the Vanderbilt Television News Archive (Vanderbilt University Television News Archive, Nashville, TN) and Burrelle's Transcripts (Burrelle's Transcripts, Livingston, NJ) using the same time frame and search terms. We found 13 citations and purchased transcripts or borrowed videotapes of each. Eight videotapes were viable for analysis according to the inclusion criteria, including six from the National Broadcasting Company (New York, NY), one from the American Broadcasting Company (Burbank, CA), and one from the Columbia Broadcasting System (New York, NY).

### Measures

A coding instrument was developed,<sup>28</sup> tested by two researchers on six sample newspaper articles, and revised until consensus between coders was reached for each of the sample stories. The primary topics covered by the instrument were 1) overall story theme (STDs, cancer, new tests, or other); 2) general information about HPV transmission, symptoms, consequences, and risk factors, 3) screening test information; and 4) recommendations for cervical cancer screening. All points of information about HPV queried by the coding instrument were based on the latest science; therefore, results present the proportion of stories containing accurate HPV information.

### Data Collection

Using the standardized coding instrument, two of the researchers independently coded each story. Overall interrater agreement was high; raw agreement averaged 96% for story theme ( $\kappa = 0.89$ ), 95% ( $\kappa = 0.80$ ) for general HPV information, 92% ( $\kappa = 0.78$ ) for screening tests, and 90% ( $\kappa = 0.77$ ) for recommendations. Variables with a  $\kappa$  value  $\geq 0.60$  were included in the analysis.<sup>28</sup>

**TABLE 1**  
Characteristics of the 111 Stories in the News Media<sup>a</sup>

Characteristic	News stories No. (%)
Year	
1995	5 (5)
1996	15 (14)
1997	5 (5)
1998	18 (6)
1999	9 (8)
2000	24 (22)
2001	12 (11)
2002	23 (21)
Media source	
Newspaper <sup>b</sup>	103 (93)
<i>USA Today</i>	11 (10)
<i>New York Times</i>	10 (9)
<i>Los Angeles Times</i>	16 (14)
<i>Washington Post</i>	13 (12)
<i>Daily News</i>	5 (5)
<i>Chicago Tribune</i>	27 (24)
<i>Newsday</i>	15 (14)
<i>Houston Chronicle</i>	6 (5)
Television network	8 (7)
ABC	1 (1)
NBC	6 (5)
CBS	1 (1)

ABC: American Broadcasting Company; NBC: National Broadcasting Company; CBS: Columbia Broadcasting System.

<sup>a</sup> Due to rounding, not all percentages total 100%.

<sup>b</sup> Although news stories were sampled from all of the top 10 newspapers, no stories from the *Wall Street Journal* or the *San Francisco Chronicle* met the inclusion criteria.

### Statistical Analysis

We analyzed the means and frequencies with which specific characteristics occurred in the news stories. We used chi-square tests to assess differences between characteristics of television and newspaper stories; these tests yielded few statistically significant differences. Consequently, proportions were calculated for newspaper and television stories together. In all cases where sample sizes were too small for chi-square tests to be reliable, Fisher exact tests were performed. Analyses were performed using SAS software (Version 8.0; SAS Institute, Cary, NC).

### RESULTS

The characteristics of the news stories are described in Table 1. One hundred eleven stories released by 11 media outlets (8 newspapers and 3 television networks) were included.

#### Overall Story Theme

Forty of the 111 stories (36%) primarily were about new tests for HPV or cervical cancer. Thirty-three sto-

ries (30%) focused on cervical cancer or the link between HPV and cervical cancer. Thirty stories (27%) mainly emphasized STDs or genital warts. The remaining 9 stories (8%) highlighted a variety of other themes, including circumcision and lesbian health-care.

#### HPV Transmission, Symptoms, Risk Factors, and Prevention

Eighty-eight of the 111 (79%) stories mentioned that HPV is an STD, and 55 stories (50%) reported that HPV is very common (Table 2). Forty-six stories (41%) mentioned that HPV can cause genital warts. A variety of HPV or cervical cancer risk factors were discussed; 26 stories (23%) cited the number of sexual partners as a risk factor, 10 stories (9%) cited age of sexual debut, 10 stories (9%) cited tobacco use, 3 stories (3%) cited use of oral contraceptives, and 3 stories (3%) cited family history. Twenty-one stories (19%) mentioned that condoms can be used to prevent HPV transmission; of these, 14 stories (67%) mentioned that condoms are imperfect for HPV prevention. In all, 20 stories (18%) mentioned that condoms are imperfect for preventing HPV transmission.

#### HPV Progression and Cancer Risk

Twenty-nine stories (26%) reported that most women with HPV will not develop cervical cancer, and 9 stories (8%) reported that the types of HPV that cause genital warts are different from the types that cause cervical cancer. Fifteen stories (14%) mentioned that HPV can be asymptomatic, and 1 story (1%) noted that most high-risk HPV is asymptomatic. Twenty stories (23%) stated that HPV can go away on its own, and 14 stories (13%) mentioned that most HPV resolves on its own.

#### Screening Tests and Guidelines

Eighty-one stories (73%) mentioned a screening test for HPV or cervical cancer. Of these, 31 stories (38%) reported the sensitivity of the test; 24 (30%) mentioned wrong, uncertain, or unnecessary test results; 20 (25%) mentioned consequences of wrong, uncertain, or unnecessary test results; 20 (25%) mentioned the price of the test; and 8 (10%) mentioned the cost-effectiveness of the test.

A recommendation for cervical cancer or HPV screening was provided in 54 stories (49%). Twenty-three of those 54 stories (43%) recommended annual Pap smears, 21 (39%) advocated HPV tests after obtaining Pap smear results that were categorized as *abnormal* or *atypical squamous cells of undetermined significance*, 11 stories (20%) recommended Pap smears less frequently for women with 3 consecutive

**TABLE 2**  
**Human Papillomavirus Information, Recommendations, and Screening Test Descriptions by Story Theme**

Information Presented	Total	Story theme: Percentage (no.)		
		STD theme	Cancer theme	New test theme
HPV background information				
HPV is sexually transmitted	79 (88/111)	100 (30/30) <sup>a</sup>	85 (28/33)	60 (24/40) <sup>a</sup>
HPV is very common	50 (55/111)	87 (26/30) <sup>a</sup>	39 (13/33)	30 (12/40) <sup>a</sup>
There are different types/strains of HPV	36 (40/111) <sup>b</sup>	47 (14/30)	30 (10/33)	30 (12/40)
HPV can cause genital warts	41 (46/111)	87 (26/30) <sup>a</sup>	33 (11/33)	18 (7/40) <sup>a</sup>
The types of HPV that cause genital warts are different from the types that cause cervical cancer	8 (9/111)	17 (5/30)	12 (4/33)	3 (1/40)
Most women with HPV will not get cervical cancer	26 (29/111)	30 (9/30)	21 (7/33)	28 (11/40)
HPV can resolve on its own	23 (25/111)	37 (11/30) <sup>a</sup>	12 (4/33)	23 (9/40)
Most HPV resolves on its own	13 (14/111)	20 (6/30)	12 (4/33)	10 (4/40)
HPV can be asymptomatic	14 (15/111)	30 (9/30) <sup>a</sup>	15 (5/33)	5 (2/40) <sup>a</sup>
Most high-risk types of HPV are asymptomatic	1 (1/111)	3 (1/30)	0 (0/33)	0 (0/40)
Condoms can be used to prevent HPV transmission	19 (21/111)	40 (12/30) <sup>a</sup>	27 (9/33)	0 (0/40) <sup>a</sup>
Condoms are imperfect for preventing HPV transmission	18 (20/111)	43 (13/30) <sup>a</sup>	15 (5/33)	0 (0/40) <sup>a</sup>
Explanation of the purpose of Pap tests	54 (60/111)	30 (9/30) <sup>a</sup>	58 (19/33)	75 (30/40) <sup>a</sup>
Risk factors for HPV or cervical cancer				
No. of sexual partners	23 (26/111)	30 (9/30)	36 (12/33) <sup>a</sup>	8 (3/40) <sup>a</sup>
Age of first sexual intercourse	9 (10/111)	7 (2/30)	18 (6/33)	3 (1/40)
Tobacco use	9 (10/111)	0 (0/30)	15 (5/33)	13 (5/40)
Use of oral contraceptives	3 (3/111)	0 (0/30)	9 (3/33) <sup>a</sup>	0 (0/40)
Genetics/family history	2 (2/111)	0 (0/30)	3 (1/33)	3 (1/40)
Screening guidelines				
Recommendation for cervical cancer or HPV screening is given	49 (54/111)	30 (9/30) <sup>a</sup>	48 (16/33)	70 (28/40) <sup>a</sup>
Annual Pap smear is recommended	43 (23/54)	44 (4/9)	69 (11/16) <sup>a</sup>	25 (7/28) <sup>a</sup>
HPV test after abnormal or ASCUS Pap smear is recommended	39 (21/54)	0 (0/9) <sup>a</sup>	6 (1/16) <sup>a</sup>	71 (20/28) <sup>a</sup>
Less frequent Pap smears for women with three consecutive normal smears are recommended	20 (11/54)	0 (0/9)	38 (6/16)	18 (5/28)
Routine or regular Pap smear is recommended	13 (7/54)	22 (2/9)	25 (4/16)	4 (1/28) <sup>a</sup>
Screening tests				
Any type of screening test	73 (81/111)	50 (15/30) <sup>a</sup>	73 (24/33)	100 (40/40) <sup>a</sup>
Sensitivity	38 (31/81)	7 (1/15)	25 (6/24)	63 (25/40) <sup>a</sup>
Wrong, uncertain/unclear, or excess/unnecessary test results	30 (24/81)	7 (1/15) <sup>a</sup>	13 (3/24) <sup>a</sup>	53 (21/40) <sup>a</sup>
Consequences of wrong, uncertain/unclear or excess/unnecessary test results	25 (20/81)	0 (0/15) <sup>a</sup>	4 (1/24) <sup>a</sup>	48 (19/40) <sup>a</sup>
Price	25 (20/81)	7 (1/15)	21 (5/24)	38 (15/40) <sup>a</sup>
Cost-effectiveness	10 (8/81)	7 (1/15)	4 (1/24)	18 (7/40) <sup>a</sup>

STD: sexually transmitted disease; HPV: human papillomavirus; Pap test: Papanicolaou test; ASCUS: atypical squamous cells of undetermined significance.

<sup>a</sup>  $P < 0.05$  for chi-square tests comparing the proportion of stories from one theme with the proportion of stories from all other themes.

<sup>b</sup>  $P < 0.05$  for chi-square tests comparing the proportion of newspaper stories (38.83%) with the proportion of television stories (0.00%).

normal tests, and 7 stories (13%) recommended a routine or regular Pap smear without specifying the frequency.

## DISCUSSION

Our evaluation of 111 news stories revealed 2 main findings. First, like news stories regarding other health conditions and preventive interventions, media cov-

erage of HPV is not comprehensive; many stories fail to include basic information that women express interest in knowing, and many present facts without important caveats or nuances that may impact women's perceived susceptibility to HPV and anxiety levels about the virus. Second, there are substantial differences in the types of HPV information presented in stories themed around new tests and those themed around STDs.

### **Incomplete Coverage**

Many stories were missing vital information regarding HPV prevention, transmission, and symptoms. For example, many of the stories that presented condoms as a preventive method did not indicate, as the scientific literature indicates,<sup>29</sup> that condoms are imperfect at preventing HPV transmission. Similarly, only a minority of stories mentioned risk factors for HPV, informed that HPV can be asymptomatic, or described HPV's most common prognosis (regression without treatment).

Furthermore, many stories failed to provide comprehensive information about HPV's link to cervical cancer. Few stories mentioned that most women with HPV do not develop cervical cancer, and the vast majority of stories did not report that the types of HPV that cause genital warts are different from the types that cause cervical cancer. Accurately describing cancer risk and distinguishing between low-risk and high-risk types of HPV may moderate the worry and fear experienced by women upon HPV diagnosis<sup>30</sup> and may prevent women from over-estimating the risk of malignant disease from HPV.

For women age < 30 years, most of HPV infections that are identifiable through HPV testing are transient and clinically nonsignificant; nonetheless, expensive clinical work-ups and considerable anxiety often result when these women undergo cytologic screening while they are infected transiently. Few of the news stories mentioned this issue or mentioned any other consequences of wrong, uncertain, or unnecessary tests. Other systematic reviews of health news media coverage have shown similar patterns; stories about common preventative medications often are deficient in discussing potential harms,<sup>31</sup> and reservations regarding screening mammography often are omitted from news reports that discuss or recommend the procedure.<sup>32,33</sup>

All stories that made recommendations about cervical cancer or HPV screening were in concordance with professional guidelines<sup>34</sup>; however, only 50% of stories offered recommendations. Increasing the proportion of news stories that propose recommendations while maintaining accuracy will be crucial for promoting desired screening behaviors, especially given anticipated changes to screening guidelines.

### **Information Differences by Story Theme**

Our analysis showed that stories focused on new screening tests were significantly more likely to describe screening tests and guidelines in detail but were less likely to discuss HPV prevention and transmission. Compared with stories that had other themes,

fewer test-focused stories mentioned that HPV is transmitted sexually, that it is very common, that condoms offer limited protection, and that the number of sexual partners and the age of sexual debut are risk factors. In contrast, stories focused on STDs were more likely to mention symptoms, transmission, and prevention of HPV but were less likely to explain the purpose of a Pap smear, describe screening tests, or recommend screening guidelines.

Stories on new tests have dominated HPV media coverage in recent years, and continuing coverage is anticipated due to technologic developments and new screening guidelines; should test-focused stories become the major source of media information about HPV, such stories must be adapted to include transmission and cancer risk information that is critical to young women whose HPV infections usually are transient.

The current study has several limitations. First, despite the breadth of stories we reviewed from top-circulation media outlets, the stories in the study may not have been representative. Stories from additional newspapers and television stations or from other media channels, such as women's magazines, may have presented different or more comprehensive information about HPV. Because smaller newspapers often rely on wire services or larger newspapers for stories, and because it has been shown that women's magazines offer incomplete health coverage,<sup>35-38</sup> we believe that the stories selected for this analysis were likely of equal or higher quality compared with those featured in other media. Therefore, it is likely that the patterns of missing information we identified are present in stories from other sources as well as the stories we examined. Second, we reviewed stories through July 2002, before there was a profusion of media coverage regarding HPV vaccines in November of that year. Although additional stories regarding HPV vaccines are bound to shape HPV news coverage, we are confident that the role of HPV tests in cervical cancer screening also will continue to be featured prominently in the media. Third, our study reviewed news stories for the presence or absence of HPV information but did not assess the accuracy of information given. Media research indicates that omissions of important contextual information occur with greater frequency and consistency than factual errors;<sup>39-41</sup> because the objective of the current study was to assess the most common shortcomings in HPV media coverage, we did not document factual inaccuracies. Finally, the coding process we used to identify story themes and content was subjective. To increase reliability, we developed a standardized coding instru-

ment that was administered by two independent researchers with high interrater agreement.

As millions of women become familiar with HPV due to advances in test and vaccine technologies and incorporation of HPV DNA tests into primary cervical cancer screening, partnerships must be forged between the scientific community and the media to promote complete and balanced dissemination of HPV information to women. Given the time and space constraints imposed on most journalists, it is difficult for the media to convey comprehensively the complexity of HPV's natural history and its role in cervical carcinoma. However, there are a number of ways for both scientists and journalists to contribute to more thorough coverage of HPV. Professional associations must ensure that adequate studies are conducted regarding HPV progression and the benefits and harms of HPV testing; that updated cervical cancer screening guidelines are developed to incorporate new data; and that study results and clinical guidelines are communicated clearly and accurately to the media. When composing HPV news stories, journalists have an invaluable opportunity to fulfill women's educational needs and provide balanced viewpoints on the risks and benefits of HPV testing by including information about low-risk and high-risk types of HPV and their differing links to cervical carcinoma; describing HPV prevention, transmission, and symptoms; explaining the benefits and consequences of HPV testing; and outlining the latest screening guidelines in every story.

## REFERENCES

1. Bosch FX, Lorincz A, Munoz N, Meijer CJ, Shah KV. The causal relation between human papillomavirus and cervical cancer. *J Clin Pathol*. 2002;55:244–265.
2. Schiffman M, Herrero R, Hildesheim A, et al. HPV DNA testing in cervical cancer screening: results from women in a high-risk province of Costa Rica. *JAMA*. 2000;283:87–93.
3. Wright TC Jr., Denny L, Kuhn L, Pollack A, Lorincz A. HPV DNA testing of self-collected vaginal samples compared with cytologic screening to detect cervical cancer. *JAMA*. 2000;283:81–86.
4. Mandelblatt JS, Lawrence WF, Womack SM, et al. Benefits and costs of using HPV testing to screen for cervical cancer. *JAMA*. 2002;287:2372–2381.
5. Kim JJ, Wright TC, Goldie SJ. Cost-effectiveness of alternative triage strategies for atypical squamous cells of undetermined significance. *JAMA*. 2002;287:2382–2390.
6. Wright TC Jr., Schiffman M. Adding a test for human papillomavirus DNA to cervical-cancer screening. *N Engl J Med*. 2003;348:489–490.
7. Food and Drug Administration. FDA approves expanded use of HPV test [monograph online]. Available from URL: <http://www.fda.gov/bbs/topics/NEWS/2003/NEW00890.html> [accessed 14 November 2003].
8. Wright TC Jr., Cox JT, Massad LS, Twiggs LB, Wilkinson EJ. ASCCP-Sponsored Consensus Conference. 2001 Consensus Guidelines for the management of women with cervical cytological abnormalities. *JAMA*. 2002;287:2120–2129.
9. Kaiser Family Foundation. National survey of public knowledge of HPV, the human papillomavirus [monograph online]. Available from URL: [www.kff.org/content/2000/20000217a/HPVChartpack2.pdf](http://www.kff.org/content/2000/20000217a/HPVChartpack2.pdf) [accessed 14 November 2003].
10. Baer H, Allen S, Braun L. Knowledge of human papillomavirus infection among young adult men and women: implications for health education and research. *J Community Health*. 2000;25:67–78.
11. Dell DL, Chen H, Ahmad F, Stewart DE. Knowledge about human papillomavirus among adolescents. *Obstet Gynecol*. 2000;96:653–656.
12. Ramirez JE, Ramos DM, Clayton L, Kanowitz S, Moscicki AB. Genital human papillomavirus infections: knowledge, perception of risk, and actual risk in a nonclinic population of young women. *J Womens Health*. 1997;6:113–121.
13. Yacobi E, Tennant C, Ferrante J, Pal N, Roetzheim R. University students' knowledge and awareness of HPV. *Prev Med*. 1999;28:535–541.
14. Vail-Smith K, White DM. Risk level, knowledge, and preventive behavior for human papillomaviruses among sexually active college women. *J Am Coll Health*. 1992;40:227–230.
15. Mays RM, Zimet GD, Winston Y, Kee R, Dickes J, Su L. Human papillomavirus, genital warts, Pap smears, and cervical cancer: knowledge and beliefs of adolescent and adult women. *Health Care Women Int*. 2000;21:361–374.
16. Gilbert LK, Alexander L, Grosshans JF, Jolley L. Answering frequently asked questions about HPV. *Sex Transm Dis*. 2003;30:193–194.
17. Johnson J. Cancer-related information seeking. Cresskill, NJ: Hampton Press, 1997.
18. James C, James N, Davies D, Harvey P, Tweddle S. Preferences for different sources of information about cancer. *Patient Educ Couns*. 1999;37:273–282.
19. Meissner HI, Potosky AL, Convisser R. How sources of health information relate to knowledge and use of cancer screening exams. *J Community Health*. 1992;17:153–165.
20. Hornik R. Public health education and communication as policy instruments for bringing about change in behavior. In: Goldberg ME, Fishbein M, Middlestadt SE, editors. Social marketing: theoretical and practical perspectives. Mahwah, NJ: Lawrence Erlbaum Associates, 1997:45–58.
21. Phillips DP, Kanter EJ, Bednarczyk B, Tastad PL. Importance of the lay press in the transmission of medical knowledge to the scientific community. *N Engl J Med*. 1991;325:1180–1183.
22. Jordan D. Newspaper effects on policy preferences. *Public Opin Q*. 1993;57:191–204.
23. McCombs ME, Shaw DL. The agenda-setting function of the mass media. *Public Opin Q*. 1972;36:176–187.
24. Wright WR. Mass media as sources of medical information. *J Commun*. 1975;25:171–173.
25. Yanovitzky I, Blitz CL. Effect of media coverage and physician advice on utilization of breast cancer screening by women 40 years and older. *J Health Commun*. 2000;5:117–134.
26. Brown ML, Potosky AL. The presidential effect: the public health response to media coverage about Ronald Reagan's colon cancer episode. *Public Opin Q*. 1990;54:317–329.
27. International Agency for Research on Cancer. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 64: human papillomaviruses. Lyon: IARC Publications, 1995.

28. Neuendorf KA. The content analysis guidebook. Thousand Oaks, CA: Sage Publications, 2002.
29. Manhart LE, Koutsky LA. Do condoms prevent genital HPV infection, external genital warts, or cervical neoplasia? A meta-analysis. *Sex Transm Dis.* 2002;29:725-735.
30. Champion MJ, Brown JR, McCance DJ, et al. Psychosexual trauma of an abnormal cervical smear. *Br J Obstet Gynaecol.* 1988;95:175-181.
31. Moynihan R, Bero L, Ross-Degnan D, et al. Coverage by the news media of the benefits and risks of medications. *N Engl J Med.* 2000;342:1645-1650.
32. Wells J, Marshall P, Crawley B, Dickersin K. Newspaper reporting of screening mammography. *Ann Intern Med.* 2001;135:1029-1037.
33. Schwartz LM, Woloshin S. News media coverage of screening mammography for women in their 40s and tamoxifen for primary prevention of breast cancer. *JAMA.* 2002;287:3136-3142.
34. Smith RA, Cokkinides V, von Eschenbach AC, et al. American Cancer Society guidelines for the early detection of cancer. *CA Cancer J Clin.* 2002;52:8-22.
35. Carlson E, Li S, Hom K. An analysis of menopause in the popular press. *Health Care Women Int.* 1997;18:557-564.
36. Martinez R, Johnston-Robledo I, Ulsh H, Chrisler J. A content analysis of popular press articles about postpartum affective disturbances. *Women Health.* 2000;31:37-56.
37. Gerlach K, Marino C, Weed D, Hoffman-Goetz L. Lack of colon cancer coverage in seven women's magazines. *Women Health.* 1997;26:57-68.
38. Hoffman-Goetz L, MacDonald M. Cancer coverage in mass-circulating Canadian women's magazines. *Can J Public Health.* 1999;90:55-59.
39. Entwistle V, Watt I. Judging journalism: how should the quality of news reporting about clinical interventions be assessed and improved? *Qual Health Care.* 1999;8:172-176.
40. Moyer A, Greener S, Beauvais J, Salovey P. Accuracy of health research reported in the popular press: breast cancer and mammography. *Health Commun.* 1995;7:147-161.
41. Singer E. A question of accuracy: how journalists and scientists report research on hazards. *J Commun.* 1990;40:102-116.