



An analysis of the Human Papilloma Virus vaccine debate on MySpace blogs

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ARTICLE INFO

Article history:

Received 26 August 2009

Received in revised form

18 November 2009

Accepted 20 November 2009

Available online 8 December 2009

Keywords:

HPV

Social media

Blogs

Risk communication

Anti-vaccination

ABSTRACT

Background: The roll out of HPV immunization programs across the United States was hindered by controversy. We tracked the debate in the United States through MySpace, then the most popular social networking site, in order to better understand the public's reaction to the vaccine.

Methods: We searched MySpace for all blog discourse related to HPV immunization. We analyzed each blog according to the overall portrayal of HPV immunization, identified the characteristics of the bloggers, and developed a content analysis to categorize the types of supporting arguments made.

Results: 303 blogs met our inclusion criteria. 157 (52%) of the blogs were classified as positive, 129 (43%) as negative, and 17 (6%) were ambivalent toward HPV immunization. Positive blogs generally argued that HPV infection was effective and there were no reasonable alternatives to immunizing. Negative blogs focused on the risks of immunizing and relied heavily on vaccine-critical publications to support their viewpoint. Of the blogs where gender could be identified, 75 (25%) were posted by men and 214 (71%) by women. 60% of blogs posted by men were explicitly critical about HPV immunization versus 36% of women's blogs. Male bloggers also had larger networks of friends.

Conclusions: We describe a novel and promising approach to the surveillance of public opinions and attitudes toward immunization. In our analysis, men were far more likely to hold negative views about HPV immunization than women and disseminate negative messages through larger social networks. Blog analysis is a useful tool for Public health officials to profile vaccine criticism and to design appropriate educational information tailored to respond to alternative media/alternative information actively disseminated via social media tools. Public health officials should examine mechanisms by which to leverage this media to better communicate their message through existing networks and to engage in on-going dialogue with the public.

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1. Introduction

Over a decade of research examining immunization discourse on the Internet has demonstrated that there is a significant and persistent vaccine criticism movement [1–3]. This movement is actively spreading information contrary to public health science and expert opinions [4]. While the literature examining Internet-based vaccine criticism has focused on webpage content, it is increasingly relevant to look at how Web 2.0, or social media, is being used to broadcast alternative viewpoints and influence public debates [5,6]. Social media can be used to disseminate medical information, unimpeded by the expert medical community, to challenge conven-

tional thinking about many issues including immunization and this may influence immunizing behavior [7–11]. One social media tool that has not been examined for its role in disseminating information about immunization is blogging.

Described by Kim and Chung [12] as “shifting control over information to users”, blogs are a communication tool that allows users to read and write personal remarks on a wide range of issues. It is estimated that 8 million Americans have blogs—almost 7% of the 120 million US adults with Internet access [12]. While blogs are a type of webpage, they are distinguishable by frequent updates posted in reverse chronological order [13]. Blogs have historical roots to a number of different genres including marine navigation, media monitoring services, edited anthologies, political journalism (i.e. pamphlet writing and distribution) and personal journals and diaries [5]. While blogs are primarily text-based, they can include graphics and frequently contain links to external websites.

Blogs are variously described in the literature as more “authentic” and current when compared with traditional webpages because

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they are frequently updated [6]. Blogging enables the emergence or continuance of debates that can challenge information and ideas broadcast in more traditional media. Blogs can be seen as a parallel public discourse representing the unfiltered viewpoints of citizens motivated to write on a subject. Blog dialogue concerning the HPV vaccine provides researchers with a unique opportunity to track opinions and attitudes towards newly recommended immunizations amongst its target population (the parents making decisions for minor children). This approach could be particularly useful for retrospectively analyzing public controversies concerning immunization and could be adopted to continuously survey and monitor discourse concerning immunization.

The addition of the Human Papilloma Virus (HPV) vaccine to United States' child immunization schedules in 2007 was marked by considerable controversy [14–16,]. The roll out of mandatory immunization schemes in the United States was impeded by a vocal and organized opposition movement that involved vaccine safety (vaccine-critical) groups and social conservatives [17]. We examined the content of blogs to map the public debate over the implementation of HPV immunization using, what was then most popular social networking site, MySpace. Launched in 2003 in Santa Monica, California [11], MySpace allows users to create social net-

works by inviting viewers to read, respond and link to their own personal webpage. MySpace encourages members to link to other users' webpages by forming networks of friends to share ideas, experiences, and update members about daily activities in the users' life. MySpace also provides users with a wide range of tools to personalize their own webpages and incorporate new features as user demand warrants, such as photo, audio, and video display functions. Unlike traditional webpages, blogs on MySpace are often rapidly updated in response to unfolding news, public controversies, or events that interest the blogger [5,18]. At the time of our study, MySpace had over 70 million unique users with over 72 million unique site visits each month [19]. We analyzed the content of MySpace posts to determine what messages were being conveyed about the HPV vaccine.

2. Methods

On 6 May, 2008 we performed 5 separate blog searches using MySpace's public blog search engine. Using existing literature to guide us in keyword selection [20], we searched for the following keywords in the blog search engine: HPV; HPV Vaccination; HPV immunization; HPV vaccine; Human Papilloma Virus. We pooled

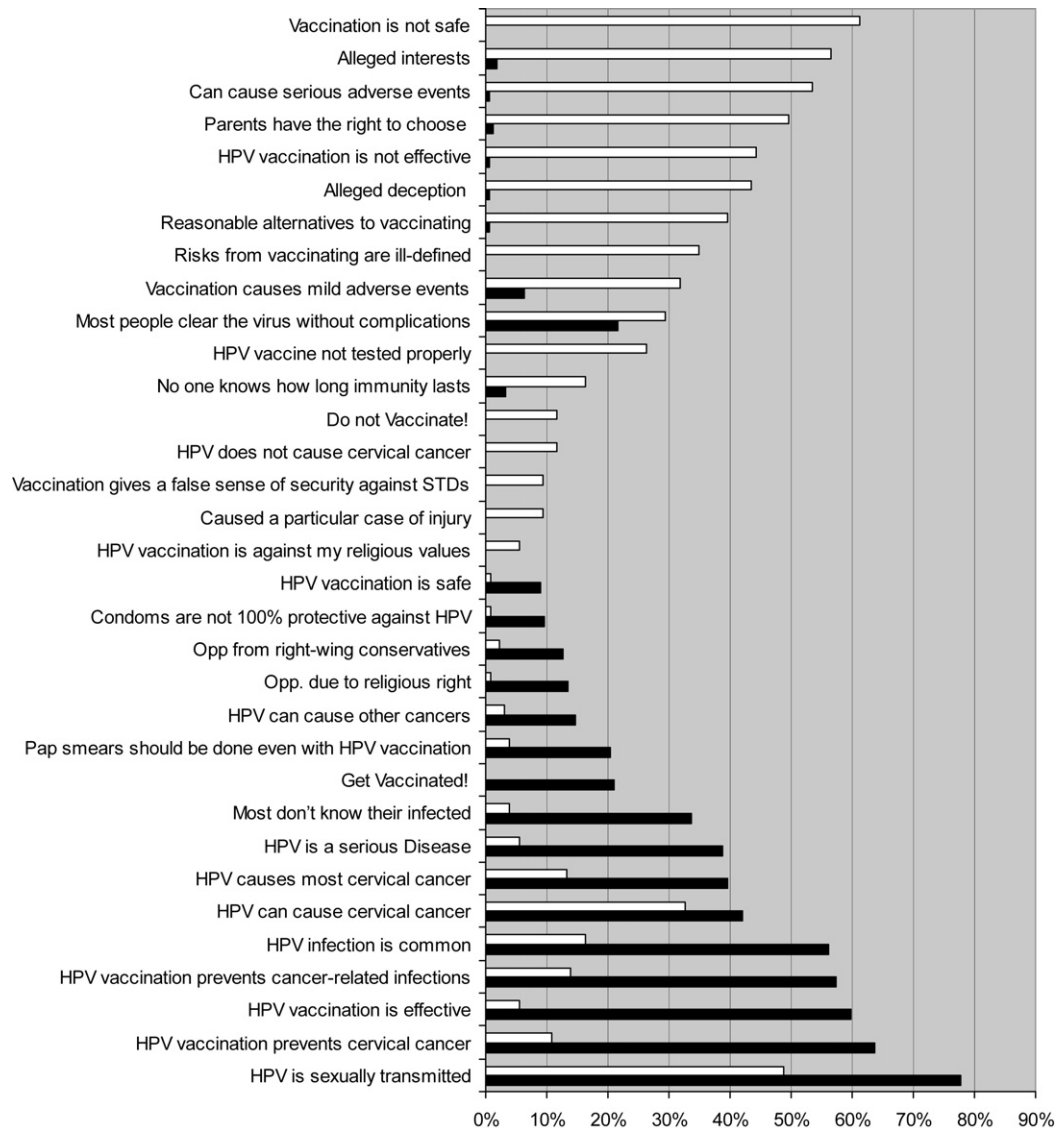


Fig. 1. A comparison of the frequency of arguments made in positive and negative blogs shown as the percentage of positive blogs (black bars) versus negative blogs (white bars) with each argument.

the results and analyzed the complete sample, eliminating any identical blogs (i.e., the same entry, posted by the same user). Blogs that users set to “private” appeared in the search results but were not accessible, thus they too were eliminated. Our final sample consisted of all unique English-language blogs that had any discussion of the HPV vaccine. Blogs only discussing HPV infection were excluded. The search results for each keyword were archived separately. In addition; all blogs in the study; and the user's profile; were both fully extracted to maintain their original look and form; and archived; using a program written and developed for the project by RB.

We compiled information logged in the users' MySpace profile detailing the users' age, sex, geographic location and parental status. We also tabulated information on viewers' response to the blogs including the number of kudos (akin to viewer approval of the message, or ‘thumbs-up’), posted comments, and replies to the blog. We also noted the size of the blogger's network of friends (friends).

Two researchers JK and VP independently assessed each blog's content using a content analysis sheet developed from previous analyses of vaccine-critical webpages [2] and from a pilot review of 50 blogs (sample taken from a search in March 2008). This analysis consisted of a 37-item content check-list summarized in Fig. 1, e.g., ‘cervical cancer is a serious disease’, ‘HPV infection is common’, ‘there are reasonable alternatives to immunizing’. Through this analysis, we extracted the main features of HPV vaccine discourse posted in the blogs (e.g., perceived risk from and severity of cervical cancer, the perceived relationship between HPV infection and cervical cancer, and the perceived risks and benefits from vaccinating).

Blogs were categorized based on the type of blog and their overall portrayal of the HPV vaccine. Blogs were categorized as “negative” if the main message of the blog portrayed immunization negatively (e.g., emphasized the risk of immunizing, advocated against immunizing, promoted distrust in the science supporting HPV immunization, made allegations of conspiracy or collusion between supporters of HPV immunization and manufacturers). Blogs were categorized as “positive” if the central message supported the HPV immunization (e.g., described the benefits and safety of immunizing, described HPV immunization as a social good). Blogs containing both positive and negative messaging or statements suggesting uncertainty, e.g., asking readers for advice about the HPV vaccine, were deemed “ambivalent”. Since we were able to analyze all the data resulting from our searches, absolute differences in the proportion of results were used to compare groups in our analysis.

3. Results

Our search identified a total of 1220 blogs of which 303 met our final inclusion criteria (i.e., unique blogs, we could access, discussing HPV immunization). The blogs were written over a two

and a half year period, between November 2005 and May 2008, with the majority of postings occurring after January 2007. When we compared the date and subject of the blogs against a timeline of mainstream print media discourse regarding the vaccine, we found that blogging activity tended to follow mainstream media activity. Spikes in blogging activity were seen following media controversies over mandatory immunization, as when the state of Texas attempted to mandate HPV immunization for all school-aged girls, and with the release of several scientific studies discussing the prevalence of STDs in teenage girls. 157 (52%) of the blogs were classified as positive, 129 (43%) as negative and only 17 (6%) were ambivalent towards HPV immunization. Agreement regarding the classification of the blog's portrayal of immunization was high between the two reviewers (kappa score .976).

4. Characteristics

Of the 303 blogs included in the study, only 16 were posted from users outside the United States. 289 of the blogs had profiles that identified the blogger as male or female. Of those blogs, 75 (25%) were posted by men and 214 (71%) by women. 6 blogs were attributed to groups (without denoting the blogger's gender) and 8 blogs had no information regarding the blogger's gender. 72 (24%) of the bloggers identified themselves as parents. Men posted 18% of the positive blogs and 35% of the negative blogs. Conversely, women posted 78% of the positive blogs and 60% of the negative blogs. When examining the attitudes of men and women separately, the differences in attitudes toward immunization were more apparent. 60% of blogs posted by men were explicitly critical about HPV immunization versus 36% of women's blogs. Self-identified parents also posted more negative blogs than positive blogs (56% versus 40%) (Tables 1 and 2).

When we analyzed bloggers' social networks, or the list of friends networked to the user's profile page, we found that men, on average, had more friends than female bloggers. Male bloggers posting negative messages about HPV immunization had approximately three times the number of friends as males posting positive blogs (951 versus 359). However, when we compared the networks of women posting positive versus negative blogs, we found that female positive bloggers had a slightly larger network versus female negative bloggers (231:213).

When we examined the viewer feedback tools, such as adding comments or approving the blog post using the ‘kudos’ function, the differences between categories were small (around a half point). Male positive bloggers and female negative bloggers had higher number of comments and kudos than either female positive bloggers or male negative bloggers.

We also observed several hot zones for blogging activity across the continental United States (all but a small percentage of blogs included in our study were posted by American bloggers). Corrected for state population, the most activity was seen in California, New York, Texas and Florida (see Fig. 2). The ratio of negative blogs to

Table 1
Set of included data analyzed by type (positive, negative and ambivalent).

N = 303	Positive	Negative	Ambivalent
# of blogs (%) ^a	157 (52%)	129 (43%)	17 (6%)
Age average/median (where declared)	30/28 (n = 139)	31/29 (n = 107)	28/27 (n = 17)
Parents (n = 72)	29 (40%)	40 (56%)	3 (4%)
<i>Reception</i>			
Kudos total (average)	167(1.1)	168(1.3)	69(4.1)
Comments total (average)	176(1.1)	169(0.4)	81(0.4)
<i>Network</i>			
Friends average/median	264/126	602/128	269/159

^a Percentages may not equal 100 due to rounding.

Table 2
Analysis of blogs by type (positive and negative) and by gender.

N = 286	Positive n = 157 ^a		Negative n = 129 ^a	
	Female	Male	Female	Male
# blogs	122 (78%)	28 (18%)	77 (60%)	45 (35%)
Parents (n = 69)	21 (29%)	8 (11%)	29 (40%)	10 (14%)
Age average/median (n = declared)	29/27 (n = 108)	31/30 (n = 25)	31/28 (n = 68)	32/30 (n = 37)
<i>Reception</i>				
# of comments (average)	137 (1.1)	38 (1.4)	121 (1.6)	41 (.9)
Average # where comments # > 0	3.0	2.7	3.3	2.7
# Kudos (average)	128 (1.0)	36 (1.3)	111 (1.4)	43 (1.0)
Average # where kudos > 0	4	4	3	3
<i>Network</i>				
Friends (average/median)	28,240 (231/118)	10,047 (359/151)	16,391 (213/113)	42,817 (951/193)

^a Includes blogs where gender could not be identified thus in the comparison of male to female, percentages may not add up to 100.



Fig. 2. Map showing the number of blogs about HPV immunization, on a gradient from dark green to light green (most dense activity to least dense activity) adjusted for state population. The small-scale overlay in each state shows the percentage of negative blogs to total blogs. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

total blogs in these hot zones revealed a high percentage of negative blogging in Texas, California, and Florida, while the opposite was true in New York.

5. Content analysis

There was a marked divergence in the content of blogs supportive of HPV immunization and those that were negative. Negative and positive bloggers prioritized safety, efficacy, and risk differently as well as demonstrating distinctly different levels of trust in public health science and its institutions. These differences can be seen in Fig. 1. Positive blogs focused on the inevitability of the risk of exposure to HPV virus by arguing that infection is common (56%), 78% of positive bloggers noted that HPV is sexually transmitted (75% of female and 82% of male positive bloggers), and 34%

noted that many people do not know they are infected with HPV. Controlling exposure to HPV infection was presented as unrealistic, with only 1% of positive blogs arguing that there were reasonable alternatives to immunization to prevent HPV infections. Positive blogs also emphasized the potential seriousness of HPV infections (39%) and the clear link between HPV infection and cervical cancer (42%). 39% of positive blogs noted that HPV infections cause most cases of cervical cancer and 15% discussed other forms of cancer, such as cancers of the throat. Over half of all positive blogs also noted the effectiveness of immunization to prevent HPV infections (60%) and 64% argued that vaccination will prevent cervical cancer. While 22% of positive blogs noted that most people clear HPV infections without complications, immunizing was generally presented as a sensible protection against the potentially unpleasant effects of an HPV infection, including the stress and discomfort of having an

abnormal pap smear. Only 9% of positive blogs discussed the safety of immunization and even fewer mentioned mild adverse events (6%). 21% explicitly endorsed HPV immunization and urged the reader to get vaccinated. Finally, 13% of positive bloggers attributed resistance to HPV immunization to religious or right-wing political ideology and countered the claim made by religious organizations that HPV immunization could lead to a false sense of security and encourage high risk sexual behaviors.

Negative blogs conversely focused on questioning the safety of HPV immunization, took issue with the costs and utility of immunizing against HPV, objected to mandatory vaccination, and forwarded theories that the then proposed mandates requiring girls to be immunized were brought about by collusion between vaccine manufacturers, their lobbyists, and public health officials in government. 61% of negative bloggers asserted that the HPV immunization was not safe and 44% asserted that it was ineffective. Negative blogs also downplayed the seriousness of HPV infection. Only 5% of negative blogs argued that HPV infection caused serious disease and 29% noted that most people clear the virus without experiencing any complications at all. 40% of negative blogs argued that there were realistic alternatives to immunizing, in particular, abstinence and monogamy were offered as alternatives to immunizing against a sexually transmitted disease. 50% of negative blogs asserted that parents should have the right to choose to not vaccinate. Only 12% of negative blogs contained directives not to vaccinate and messages urging viewers not to vaccinate came disproportionately from men. 43% of negative blogs alleged outright deception in the promotion of HPV immunization and 57% alleged that financial interests of pharmaceutical companies were driving immunization policy. Surprisingly few negative bloggers argued against HPV immunization for religious reasons, and only 9% raised the concern that immunizing against HPV would create a permissive environment for girls to engage in high risk sexual activity.

While positive blogs tended to reference leading scientific and health organizations such as the US CDC and peer reviewed publications, negative blogs relied heavily on press releases prepared by vaccine-critical organizations such as the Health Ranger (<http://www.healthranger.org/>), or the National Vaccine Information Center (NVIC) and propagated inaccurate information that there were multiple confirmed cases of death caused by the HPV vaccine. For example, 53% of blogs argued that the HPV vaccine had caused serious injuries including death and permanent disability.

Consistent with literature describing blogging as a one-way communication to viewers, rather than a dialogue between the blogger and the audience, neither positive nor negative blogs elicited much user interaction [13,21]. Less than 1/3 of blogs received kudos and just over 1/3 received comments, and these comments usually supported the position of the blogger. Ambivalent posts had the highest average number of comments reflecting the open-endedness of the blogger's position on immunizing. Ambivalent posts generated the most back-and-forth discussion over the ethics, efficacy and risks of vaccinating.

6. Discussion

Our study identified a diversity of viewpoints about the need for the HPV vaccine among MySpace bloggers. The high percentage of negative blogs reflected the controversy over the vaccine during its initial adoption. Colgrove 2007 noted that HPV immunization was largely framed as a women's issue in public discourse, however we found that only 57% of women blogging about HPV immunization supported the vaccine [16]. A somewhat unexpected finding in our study was the gender difference in attitudes about HPV vaccination. Men were even less supportive of the vaccine and, interestingly, men who had negative viewpoints on the vaccine

had more friends registered in their social network. This raises a hypothesis that men have found a venue to safely broadcast their opinions and viewpoints by using a technology best suited to dissemination of ideas rather than dialogue [22]. The lack of contrary commentary to posts suggests that bloggers were reaching a network of like minded individuals. This assertion is further supported by the relatively large response generated by ambivalent posts as compared with either positive or negative ones. Ambivalent attitudes generated genuine debate, whereas strong opinions about immunization, both positive and negative, were generally unchallenged by the blogger's friends. Blogging about HPV immunization through relatively larger male social networks also suggests that there is a receptive audience for the kinds of arguments forwarded by negative bloggers. This identification of male dissatisfaction with the vaccine foreshadowed future challenges in expanding HPV vaccine coverage to boys [23].

Research has yet to articulate how representative the attitudes and opinions expressed through popular social networking sites are of the broader US public and this may limit the generalizability of our findings. Two recent studies examining the differences between users and non-users of social networks found an extremely high penetration rate among American college students 87.1% [24], 88% [25], no significant gender differences, higher percentages of users among younger populations, significantly lower uptake amongst Native American populations [24] and small but measurable ethnic differences in platform preferences (i.e., MySpace has a high proportion of Hispanic users, the lowest proportion of Asian American users, and a higher proportion of users without a college degree) [25]. While the potential readership for the blogs we examined was large, the absolute number of blogs discussing the HPV vaccine was relatively small. Since our sample was taken, the discussion on the blogosphere has likely evolved with evidence from new research becoming available and gradual acceptance of this new vaccine. Furthermore, patterns in social networking site-use have changed somewhat with a rapid rise in the number of unique users on alternative social networking sites like Facebook and Twitter. As of February 2009, the number of unique visits to Facebook surpassed MySpace [26]. Nevertheless, MySpace continues to be one of the most popular social networking sites in the United States.

One strength of our study was that it sampled blogging activity during the introduction of HPV immunization into many public health programs in the United States. The activity we analyzed captured discourse among those actively engaged in social networks and those whose opinions reached a defined network of friends. A substantial body of research examining the influence of network players on a range of behaviors suggests that social networks formed through social media could be a potentially powerful resource for public health messaging [27,28]. Similar to other Internet-based tools, social media tools allow users to forge their own non-linear and idiosyncratic paths to share and seek out health information, relatively free of traditional "gatekeepers" of medical information [29]. According to Koerber et al. [30] "Online words can be heard by other like minded individuals and can produce ideological disruption in mainstream discourses". In addition, social media tools also enable users to generate, broadcast, and share information and health experiences online in a way that is not available with conventional websites [12].

Our study shows how public health officials could potentially use blogs on social networking sites to track the dissemination of information about immunization through defined networks, to profile vaccine criticism and to gauge the reception of vaccine-critical ideas. Blog discourse can be used to identify trends emerging within micro-networks of users and, using the self-reported background information, can allow researchers to identify issues that may be of concern to specific demographics or sub-communities. This information can be used to design appropriate educational

information tailored to respond to alternative media/alternative information actively disseminated via social media tools [31]. Public health officials should also examine mechanisms by which to leverage this media to better communicate their message through existing networks and to engage in on-going dialogue with the public.

Acknowledgements

Dr. Keelan is supported by an Ontario Ministry of Health and Long Term Care Career Scientist Award; Dr. Wilson is supported by the Canada Research Chair in public health policy. We would also like to thank our research assistants T. Johnson and S. Do Rego.

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