

Social media microblogs as an HPV vaccination forum

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The 2006 US FDA approval of the human papillomavirus (HPV) vaccine brought new hope for cancer prevention. Gardasil and Cervarix are widely available vaccines that can deter HPV infection, which causes 70% of cervical cancer. Acceptance of vaccination varies due to a lack of HPV awareness and HPV vaccine knowledge. Recent observations of the Chinese microblog “SinaWeibo” suggest a new approach to engage health professionals and consumer website bloggers. Websites that present the latest fashion, fitness or beauty news and ways to obtain “deals” have created informative blogs or online communities that appeal to female users. Some users raise health questions of their peers. Health professionals, as website bloggers, can introduce vaccine news or respond to conversations between bloggers and their followers. By transforming medical vocabulary into ordinary chat, microblogs may promote efficiency in vaccine education and communication. A web-based, interactive social media-microblog could offer an ideal platform to speed up information dissemination and increase targeted communication.

Social Media in Healthcare

As early as 1993, Walsh described using social marketing to gain patients/consumers’ attention and influence decisions about healthcare actions.¹ Marketing techniques and tools like mass media and advertising were advocated to improve the health of the public.¹ Television and mass media were expected to overcome misconceptions and convey reliable health

messages to the public.² Some television viewers did learn about health topics and were motivated to seek more information, even engaging in discussions with others.² This phenomenon motivated efforts to improve the content accuracy of mass media television and deliver more health messages.² Hawn concluded recently that social media, e.g., Twitter and Facebook, can reshape healthcare.³ Besides improving communication quality, social media empowers patients to talk directly with physicians anywhere, anytime, instead of waiting for a visit, and to see messages immediately after posting.³ Qualman’s powerful case for the impact of social media is depicted on YouTube Social Media Revolution 2011, <http://www.youtube.com/watch?v=3SuNx0UrnEo>.⁴ These tools can reengineer how doctors and patients interact by speeding up and enriching communication with motivated audiences. Public health officials have built social media sites which provide prevention messaging, vaccine strategies, programs and science-based knowledge on Facebook/Twitter. In 2009, the Boston Public Health Commission created a rap video on YouTube educating young people for H1N1 flu prevention.⁵

Meanwhile, consumers have taken matters into their own hands, sharing opinions about medical choices, including vaccines. News reports with social media “share” functions enable propagation of misinformation and quick formation of affinity groups around opinions, for example, the widespread web-disseminated controversy about the relationship between vaccination and autism.⁶ Despite extensive lay assertions of this relationship,

Keywords: HPV vaccine, social media, microblog

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Submitted: 06/09/2013

Accepted: 06/30/2013

<http://dx.doi.org/10.4161/hv.25599>



Figure 1. Twitter interface (screen capture).

scientists have not been able to find a link.⁷ Yet “evidence” is still posted and discussed online, e.g., http://www.naturalnews.com/027178_autism_vaccines.html.⁶ Framing of information through emotional processing affects people immediately, especially parents making decisions for their children. In the autism case, the public health community failed to properly frame the vaccination recommendation before naysayers took the lead. HPV vaccine acceptance reviews indicate framing is critical to acceptance to high-risk population groups in US.⁸ The emergence of the first cancer-specific vaccine presents an opportunity for health professionals to take a proactive approach to frame public discussion and disseminate information in a new social exchange context.

HPV Vaccine Perils vs. Promise

The HPV vaccine was developed to prevent viral infections thought to trigger cancers: cervical, vulvar, vaginal, penile, anal and oropharyngeal.⁹ More than 21 000 HPV-associated cancers occur annually in women and more than 12 000 HPV-associated cancers occur in men.⁹ The consequences of these cancers are tracked on <http://www.cdc.gov/std/hpv/default.htm>. Sexual activity is a risk factor. The largest population to benefit from vaccination is young people,

especially women who are sexually active, or are soon to be. Therefore, acceptance campaigns must take into account developmental stages and cultural norms about behaviors linked to early sexual activity. The World Health Organization (WHO) recommended incorporation of HPV vaccine into national immunization programs for countries in which cervical cancer or HPV-related diseases are considered a public health priority and HPV vaccination is feasible, financially sustainable, and cost-effective.^{10,11} According to Centers for Disease Control and Prevention (CDC), HPV vaccine uptake in the United States remains at a lower level compared with other routine vaccines for children and adolescents, yet it has increased gradually each year. From 2007 to 2011, the percentage of females aged between 13–17 who initiated the vaccine increased from barely a quarter to 53.0%, and the people who completed three doses increased from 6% to 34.8%.^{12,13} Increasing uptake, including all three doses is a major goal for US and other countries.

In a national survey in 2009, most young women did not believe in the protective impact of HPV vaccine and females under high risk of cervical cancer had low vaccination rates.¹⁴ Studies exploring factors associated uptake rates among young females show that factors influencing

initiation and completion include race/ethnicity, age, parents and adolescents’ knowledge of HPV vaccine, and health-care utilization.¹⁵ Source type and quantity of vaccine information are associated with uptake.¹⁵ Information from newspaper, family, and friends was mostly positive related to acceptance, and parental satisfaction from information amount and quality was significantly associated with vaccine uptake.¹⁵ One reason for not receiving HPV vaccine could be attributed to safety concerns and to doctors not recommending the vaccine.¹⁶ Cultural barriers affect awareness and knowledge of HPV infection risks and vaccine availability.⁸ Some Hispanic women think cancer is “bad luck” and fear cancer screening as risking a diagnoses. Such beliefs and language barriers inhibit some from undergoing Pap testing, and contribute to reduced uptake of HPV.⁸ Parents worry that HPV vaccine may promote sexual activity and they underestimate infection risk, which results in hesitation and refusal of immunization offers.⁸ Furthermore, both African American and Latina immigrants indicated side effects, cost and lack of information as barriers.⁸ Education, culture, and social network influence are three essential reasons for low HPV vaccine uptake.

Female caregivers often hold the primary responsibility for making health

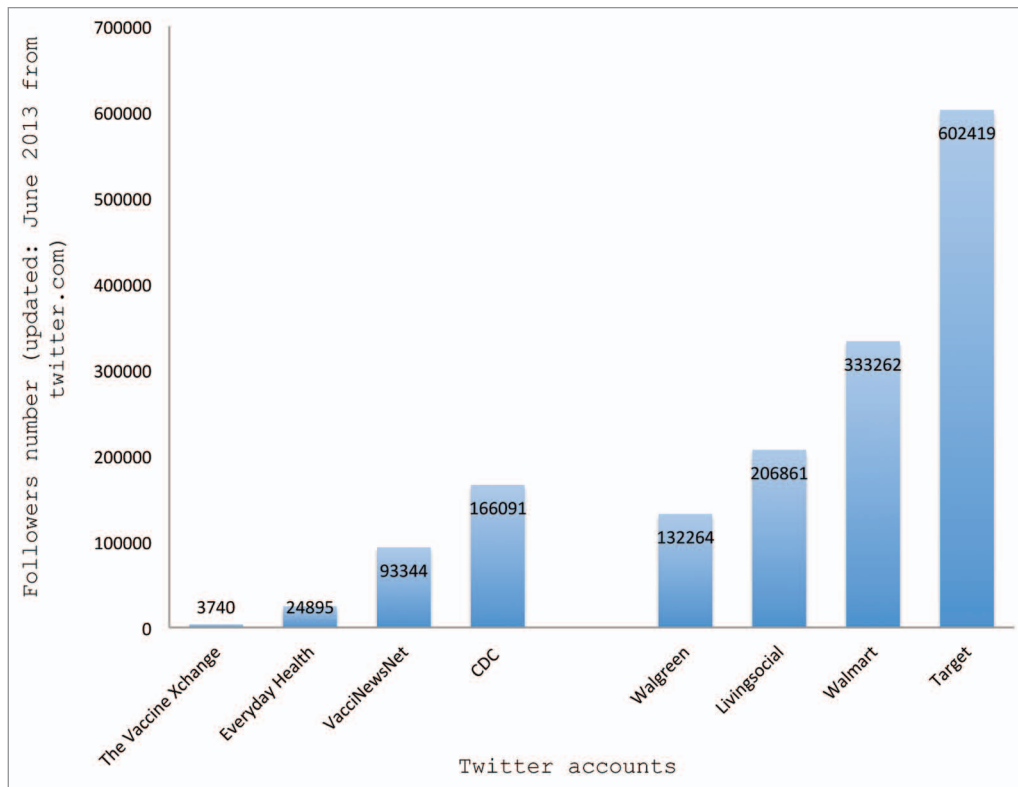


Figure 2. Comparison of followers' numbers between health care and shopping Twitter accounts.

decisions, e.g., mother-and-daughter.¹⁷ Many parents' decisions on vaccine uptake rely on other female family members or friends' suggestions.¹⁷ Therefore, it seems important to target key members in the social network of the target group since communication across the network could help disseminate this health information.¹⁷ Experts caution that public health professionals should not overlook adolescents' roles in decision-making.¹⁸ Adolescents can be involved in both positive and negative decisions on HPV vaccine uptake.¹⁸ Knowing how parents and adolescents jointly make decisions has been helpful to increase current vaccination rates.¹⁸ Given the research discussed so far, a socioecological model might facilitate design of marketing approaches. Lewis described a five-layer socioecological model that targets reducing barriers to HPV vaccination, such as public policy (national, state, local laws), community coalitions (cohesive shared campaign among organizations), institutional/organizational endorsements (formal social institutions), engaging social networks (family and peers), and individual capital

(knowledge, attitudes and skills).⁸ We propose that social networks of peers and influential leaders have been inadequately utilized. In addition, reviews of the literature for HPV vaccine describing women's knowledge and attitudes have not recognized the potential power of social media.¹⁹ Ordinary communication channels may be missing key audiences and influence sources. Moving ahead with new approaches is urgent as a recent study indicates that the acceptance curve for HPV vaccine is failing to increase in the historical arc.²⁰ The reasons for HPV vaccine refusal are different from other vaccines and interventions beyond clinician recommendation are required to address the challenging issue.²⁰ In this paper, we describe the communication opportunity provided by HPV vaccine availability and make the case for targeted communication through social media, e.g., microblogs.

Microblogs as Window

The communication of health information through mass media is

nothing new,¹ but web-based social media like Facebook, Twitter, Google plus and LinkedIn have come into the limelight as forces for rapid shaping of attitudes. Microblogs, e.g., Twitter, have high potential for speedy dissemination. Compared with other social media, Twitter information is transmitted in a truncated manner: a 140-letter limited message is a "tweet" anytime both for web and mobile. The followers who read the "tweet" can reply privately or forward it as "retweet." The retweeted message appears as a new tweet that could be seen by far more followers. In 2012, Twitter had more than 500 million users.²¹ People aged 18–35 use Twitter more often than other age groups which makes Twitter a better fit for this population.²² One study explored Twitter's geographical and topological properties.²³ The geographical distribution of users reveals that Twitter is most popular in US, Europe and Asia (predominantly in Japan since Twitter remains blocked for China mainland).²³ Network topology implies a high degree of correlation and reciprocity, which indicates close user acquaintance.²³ This network builds as people use Twitter



Figure 3. Discussion on Dealmoon on Sina Weibo of HPV vaccination in US.

simply as a “part of daily routine”—a checking in, conversations, sharing information, and reporting news. Users can be classified as: an information source who posts news as a hub for followers; “friends” which include most Twitter relationships; or an information seeker who seldom posts but follows others’ messages.²³ Although its length-limited post could not fully support a heavy-content message, Twitter leads as the most effective and immediate way of updating information.²⁴ The short posts cut down users’ time and, on average, a microblogger may post several updates in one day.²³ This versatility could be more fully exploited for public health purposes.

Twitter in Healthcare

Microblogs have already been used for health care purposes. One example, Scripps Health, is a health care system providing home health service, outpatient care and support service, and four hospitals.²⁴ It uses Twitter to inform its followers what the company is currently doing with links to detailed content. As a “press service hotline,” Twitter provides updates on “breaking news” and lets consumers know about service

availability—pharmacy, emergency room, and flu shot schedules.²⁴ The non-profit practice and medical research group, Mayo Clinic, launched its blog, Facebook page and Twitter in 2005.²⁵ They post podcasts, text and videos. Social media served as free promotion channels (blogs, Facebook and Twitter) and successfully increased podcast the downloads more than 80-fold.²⁵ These examples demonstrate how Twitter can be used to disseminate information more efficiently for health information to users who are socially tied to a healthcare organization as a client (Scripps) or who accept the source as definitive (Mayo Clinic).

Twitter can be powerful independent of a tie to a specific health care organization. In an analysis of Twitter postings specific to H1N1 vaccination, sentiments supporting vaccination were correlated with disease outbreaks.²⁶ Twitter was selected as the barometer because unlike Facebook, tweets on Twitter are public data and people write tweets because they want others to know. Also, limited length of tweets urges people to express opinions very concisely.²⁷ The survey showed that clusters of negative vaccine sentiments lead to clusters of unprotected individuals and the likelihood of disease outbreaks

increased greatly.²⁶ Another example of vaccine specific social media impact is the Vaccine Research Center (VRC) Clinical Trials Core (CTC) use of social media (Facebook and YouTube) to communicate with the priority population for HIV vaccine education and clinical trial recruitment.²⁷ The VRC also undertook a website revision to more effectively engage online audiences.²⁷ A high return on the social media investment was seen in both site visitors’ traffic and volunteered referral sources.²⁷ Although Twitter was not used in this study, the analysis “informed decision-making for greater entry into new media utilization including micro-blogging.”^{27(p1)} The success exemplified in these examples and the specific properties of Twitter, like fast dissemination, wide user-distribution, and concise expression, suggest bright prospects for broader use by health care professionals and policy setters.

Social Media Convenience

Evidence is building to promote social media tools as key components of public health information campaigns. Many professional organizations and official institutions have set up their social media

policies and encouraged use of this resource.²⁸ Browsing the 2012 CDC HPV vaccine-related site and other organizations sites, e.g., <http://www.vaccinews.net>, <http://www.cancerprogress.net>, it's easy to find the share gadgets in the corner.⁷ Gadgets are icons where, with just one touch, the link or the content will be shared on your personal Twitter or Facebook sites. Unlike traditional websites, people don't need to open special addresses for each topic, instead, they simply log into their own social network accounts once they elect to follow a site. If you are not familiar with Twitter, you will have to imagine the convenience. When you log into your Twitter account, you will read the news from your friends, posts from superstars, game results, and messages reminding you of health topics, diet, flu season, shot schedule, or tips for fitness all at the same time. Here is a typical Twitter interface.

Calculating Twitter Influence

The simple structure in **Figure 1** displays the immediate time-based posts to users according to their interests. Usually, every short message summarizes the content with the links to details and pictures. This seems very promising for vaccine education. Promoting information spread to large numbers of people is key not just in reaching a magic number of individuals but in demonstrating that a consensus is emerging. The Twitter mechanism relies on "retweeting" as it is crucial in information diffusion. The sheer number of followers and followees seem to affect the retweetability.²⁹ The retweeting rate strongly correlates in a direct ratio to the number of followers.²⁹ In a sense, more followers, more spreading.

Content, however, does matter. From the data on social media adoption by state public health departments (SHDs), Twitter is the most popular social network but their Twitter reach is limited by a low number of followers.³⁰ Content is not attractive. Also, SHDs don't use social media to create conversations and engage with the audience's interests.³⁰



Figure 4. HPV vaccine information introduced by Dealmoon.

Awareness of follower patterns that would promote retweeting is important. An inspection of Twitter sites on March 2013 indicates relative follower positions. With respect to the vaccine-related news sources (Vaccine Xchange, VacciSNews-Net, Everyday Health, CDC), follower numbers are far lower than common shopping sites, except CDC, the official site of US disease control and prevention (**Fig. 2**). The lower attention implies lower interest and consequently less influence on the socially-connected public. Engaging high follower accounts could promote vaccine acceptance.

China's Unexpected Resource: "SinaWeibo"

Tracking Twitter is less relevant in China despite its global presence. In China, the biggest microblog service is "SinaWeibo," <http://www.weibo.com>. This site, launched in 2009, now has over 500 million users³¹ and is growing fast. Weibo users can post a 140 Chinese character limited message (equivalent to 70–80 words) with video or photographic images. SinaWeibo is primarily a shoppers' mecca with social overtones. There are many accounts with heavy traffic that could be exploited.³² "Dealmoon" is a website that features shopping deals in US. This

English-Chinese bilingual website set up its Chinese version account on SinaWeibo followed by over 900000 users of whom 66.1% are females (<http://www.tfengyun.com/> updated March, 2013).

A 2012 scan of "SinaWeibo" suggests a model for enhancing the impact of vaccine-related microblogs (**Fig. 3**). On February 2nd and 4th 2012, "Dealmoon," posted messages about HPV vaccine twice: "Does anyone know how to take HPV vaccine and how much it costs in the United States?" and "Where can I take HPV vaccine in the United States?" Under each of the two posts, there are more than 100 replies and dozens of "reweibo" (retweets). This number is even higher than "Dealmoon" average feedback (<http://www.tfengyun.com/> updated March, 2013). While reading the posted replies, it becomes apparent that there are many Chinese females who don't know much about HPV vaccine but are eager to learn. People who took the HPV vaccine replied to them where and how to take the vaccine. Also, they talked about the post-immunization responses. Some people asked about the vaccine insurance gaps that are barriers to vaccination and they got replies from other followers. This post-and-reply pattern provides a possibility for better vaccine uptake through social media.

Chatting on Weibo, people who knew more about HPV vaccine typed out information that could be disseminated by other followers including friends, family members and even unknown users. Knowledge of HPV vaccine is discussed in a friendly manner, like a brief chat in the neighborhood. By end of 2012, Dealmoon recognized the importance of this topic and introduced links to vaccine information for followers (Fig. 4).

To the extent that women around the world share primary responsibility for health decisions, a site like Dealmoon, if used judiciously, could become very influential. For those parents who rely on female family members or female friends to get suggestions and confirmation of possible decisions,¹⁷ retweets (or reweibos) on trusted sites gain power in promoting specific health care perspectives. What is missing on “Dealmoon” is the deliberate engagement of knowledgeable public health professionals. Engagement between popular websites and vaccine providers on microblogs could become an optimal strategy for targeting communication intended to influence vaccine related decisions.

Feasibility in United States

The English version of “Dealmoon” on Twitter is not as famous as its Chinese version; therefore more widely used websites for women can be found on Twitter. The 2012 list of Forbes Top 100 websites for women lists blogs and online communities, personal sites and organizations involved in almost every aspect of women’s lives: career, beauty, finance, health, etc. For example, “HelloGiggles,” <http://hellogiggles.com/>, a 2012 nomination, shares articles, beautiful pictures, videos for female visitors either teenagers or 30-somethings.³³ On Twitter (@hellogiggles), their account is followed by over 120,000 users. “Hellogiggles” updates every day and interacts with followers via retweeting and replying. If health specific topics emerge, deliberate engagement by health professionals with a message could build momentum.

“HealthyWomen” (@HealthWomen on Twitter), <http://www.healthywomen.org/>, is a non-profit organization which is the

nation’s leading independent health and fitness information source for women. On their website, <http://www.healthywomen.org/content/ask-expert/1797/hpv-vaccine>, there are detailed introductions and recommendations for HPV vaccine provided by identified MD experts. The advantage of “Dealmoon” and “Hellogiggles” is that women go there who are not necessarily choosing to seek health information from a dedicated site like “HealthyWomen.” Followers on broader purpose sites may seek health information only when worried or ready. Alternatively, there is a level of comfort for “Dealmoon” and “Hellogiggles” type sites. Viewers know how to use the site and expect familiar vocabulary and “voice.” The longstanding tendency for “over-explanation” is a possible risk of deliberately encouraging public health professionals to monitor such sites. The Twitter/Weibo format, “perforce,” limits insertion of health “browbeating” or ponderous warnings and lectures.

Microblog Information Reliability

Medical information should be accurate and clear for patients, otherwise it may cause serious health problems. Nevertheless, as web use has exploded, the reliability of information remains a longstanding concern. Twitter and SinaWeibo user are both free to register and publish opinions. Messages on microblogs can be subjective, unverifiable, and even impossible to confirm for source reliability.³⁴ Special skill is required to use the Tweet/Weibo. In one study, 3% of self-identified physicians’ tweets were not professional.³⁴ “Ethical breaches and unprofessional content were rare but observed.”³⁴ (p567) On “Dealmoon,” the vaccine-related suggestions and experiences all come from unverified users making it hard to tell truth from misinformation. The majority of parents prefer receiving HPV vaccine information for their daughters directly from their health care provider,¹⁷ but plans for face-to-face talk raise the common problem of feeling rushed at medical appointments and the sense that physicians withhold information and give insufficient opportunities to ask questions.¹⁷ Although

a web-based microblog overcomes some of these barriers, parents remain concerned about misleading or inaccurate information.¹⁷ Providers should take the responsibility to give sufficient and accurate posts on microblogs supplying links to larger discussions, and aim to manage parental uncertainty, safety worries, and emotional concerns.¹⁷

The “Dealmoon” discussions mentioned earlier were a spontaneous phenomenon, but in a future where professionals engage, trust will be sustained only if they maintain standards. Identity verification can promote trust. For example, in SinaWeibo, various celebrities and organizations often get their identity verified by Sina website with a VIP label under their user names. Similarly, if the health experts are verified and labeled, people could easily distinguish them and pay more attention to their suggestions. HON, Health on the Net, <http://www.hon.ch>, principles might be adapted to microblogs with a certifying web icon.

What can’t be neglected is the power of celebrities, including popular bloggers as attractors and advocates. Jenny McCarthy is a popular advocate for a vaccine-autism link, even as professional and technical teams weigh-in to counter her campaign.³⁵ If professionals partnered with popular bloggers, their voice could be amplified and disseminated further.

Twitter Privacy

In the context of Twitter applications for health care, numerous legal issues can arise including patient privacy, fraud and abuse.³⁶ Users’ privacy has always been an issue for Twitter. Twitter made it possible for hackers to obtain unauthorized administrative control on Twitter allowing access to non-public users’ information and tweets, and sending phony tweets from any account.³⁷ In 2010, the Federal Trade Commission (FTC), finalized a proposed settlement on Twitter resolving charging it deceived consumers and failing to safeguard users’ personal information.³⁷ Under the terms of this settlement, Twitter “must establish and maintain a comprehensive information security program.”³⁷ Health providers who

use social media share responsibility for protecting users' privacy.

Conclusion

The observations from SinaWeibo unfold a new perspective on social media utilization for HPV vaccine. HPV vaccine is effective for adolescent females, but the low vaccination rate suggests a weak side of HPV vaccine education and communication. Microblogs engage target populations using beauty or fashion tweets. Followers raise health questions. Deliberate collaboration between popular websites for women and vaccine professionals can facilitate HPV vaccine education in the targeted population and gear up vaccination uptake. Profile verification for organizations and individual professionals is helpful to ensure credibility on microblogs in the United States and abroad.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

Supplemental Materials

Supplemental materials may be found here: www.landesbioscience.com/journals/vaccines/article/25599

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