

Communication about vaccinations in Italian websites

A quantitative analysis

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Keywords: vaccination, internet, web 2.0, communication, antivaccinist

Babies' parents and people who look for information about vaccination often visit anti-vaccine movement's websites, blogs by naturopathic physicians or natural and alternative medicine practitioners. The aim of this work is to provide a quantitative analysis on the type of information available to Italian people regarding vaccination and a quality analysis of websites retrieved through our searches. A quality score was created to evaluate the technical level of websites.

A research was performed through Yahoo, Google, and MSN using the keywords "vaccine" and "vaccination," with the function "OR" in order to identify the most frequently used websites. The 2 keywords were input in Italian, and the first 15 pages retrieved by each search engine were analyzed. 149 websites were selected through this methodology. Fifty-three per cent of the websites belonged to associations, groups, or scientific companies, 32.2% (n = 48) consisted of a personal blog and 14.8% (n = 22) belonged to some of the National Health System offices. Among all analyzed websites, 15.4% (n = 23) came from anti-vaccine movement groups. 37.6% reported webmaster name, 67.8% webmaster e-mail, 28.6% indicated the date of the last update and 46.6% the author's name. The quality score for government sites was higher on average than anti-vaccine websites; although, government sites don't use Web 2.0 functions, as the forums.

National Health System institutions who have to promote vaccination cannot avoid investing in web communication because it cannot be managed by private efforts but must be the result of Public Health, private and scientific association, and social movement synergy.

Introduction

For a long time the improvement of health care workers communicative skills was the only mean used to develop strategies hindering anti-vaccine movement and supporting the parents' compliance to the vaccination.

Various studies showed that the interaction relationship between parents and health care workers is crucial for the compliance with their children's vaccination; an effective communication can help even the most doubtful and skeptical parent in choosing vaccination.^{1,2}

At the beginning the most important recommendations about health care workers communicative skills were based only on the information given to the parents during the pre-vaccination interview (what to communicate); then the attention turned to how this interview was to be performed (how to communicate).³⁻⁵ For this reason training courses regarding immunization counselling were arranged for health care workers in order to improve their communicative skills.

Nowadays the attention to the development of communication regarding immunization counselling is moving from interaction between parents and health care workers to mass media.

According to a 2006 study by the Centre for Disease Control and Prevention (CDC), 21.5% of parents who refused vaccination stated that their choice was independent from their own physician advice.⁶

In the last few years, one of the most interesting events was the 2009 pandemic flu caused by AH1N1 virus, when a low acceptance rate to the immunization campaign was registered.

During pandemic flu, communicative strategies adopted by the government and enhanced by mass-media turned out to be crucial: on the one hand the lack of clarity increased the fear toward pandemic,⁷ on the other hand the conflicting messages given caused confusion among both health care workers and population and didn't facilitate the compliance to the vaccination. E.g., on 2009 September 22, the Italian Health Minister declared, "I will not receive the vaccination against pandemic flu."⁸

There is a lot to learn from other public health emergencies and to perform effective communication skills, based not only on official bureaucratic communications but on the new communication media like the web and social networks.⁹

Over time both printing press and electronic media are used to give information to people about health promotion, but

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Submitted: 11/14/2013; Revised: 02/11/2014; Accepted: 02/18/2014; Published Online: 03/07/2014
<http://dx.doi.org/10.4161/hv.28268>

sometimes media are used to give misleading information to people, persuading them not to access to public health care services, such as vaccination.

According to an international study comparing the inset of anti-vaccine movements information campaign, the anti-pertussis coverage and the incidence of pertussis in the United States and in several European countries, the highest incidence of pertussis and the lowest vaccination coverage was reported in those countries where anti-vaccination movement's campaigns were on-going.¹⁰ In the last 15 y also the Internet might condition perceptions about vaccination as it is the main source of information about health for most of the people. Data from the International Communication Union showed that in 2011 Internet users were 2.3 billion and the total Internet traffic was 76000 Gbit/s. In developed countries 70% of people use the Internet, with percentages higher than 90% in Holland, Norway and Sweden.¹¹

Nowadays, the Internet is available everywhere and so information about health as well. This implies that patients and all health customers can access any kind of content regarding their own health. An American study, performed in 2002, reported that 52% of the people who visited websites dealing with health topics think that "most of" or "some, at least" of the information shown were believable.¹²

Babies' parents and people who look for information about vaccination often visit anti-vaccine movement's websites, blogs by naturopathic physicians or natural and alternative medicine practitioners. The anti-vaccine movements take advantage of the use of internet to recruit parents and give information about vaccination and vaccine safety. In fact parents can get this Information by using just a few keywords.¹¹

The most common contents of these websites regard idiopathic illnesses, underestimation of adverse reactions, immune system damage caused by vaccination and include the fault of economic profit as the only reason for vaccination promotion. Many of these websites offer legal aid to abstain from vaccination or get compensation due to vaccination injuries. There are a lot of stories and pictures of children who went through permanent vaccination injuries, even though the relationship between vaccination and vaccination injury is based only on the "post hoc ergo propter hoc" principle. You can also find accusations of the violation of deontological constraints and references to self-freedom.¹³

For these reasons doctors and health care workers need to know these kind of websites and health and social-ethic contents, produced by anti-vaccine movements, that people and parents look at when they search for information about vaccination.

At the same time communication regarding health and vaccination, produced by public institutions, has several issues.

In the last few years technical website development became easier and, so, many institutions got moving on creating their own websites, without caring about their quality, such as usability and accessibility complying with the relevant legislation and about the production and management costs, communicative effectiveness, the website life history and the skills needed to keep the site quite active and of a good quality.¹⁴

Internet research about health topics were made on the most common search engines just using keywords; as a result, websites shown on the front page output were the highest visibility ones.

The sequence of displayed websites depends on their relation to the keyword, according to the search engine settings. It can be improved by optimising the pages and contents of public institutions' websites. Furthermore there are several features that can help websites to be easily used, such as the development of forum and "Ask the Expert" section.

The aim of this work is to provide a quantitative analysis on the type of information available to Italian people regarding vaccination and a quality analysis of websites retrieved through our searches. According to the statistics, Yahoo, Google, and MSN are the search engines with the highest number of visitors in Italy.

Results

The survey regarded 149 websites, 100 (67.1%) of which were available on Yahoo, 49 (32.9%) on Msn, and 36 (24.2%) on Google. Eighty websites (53.7%) were on more than one single search engine.

The first 15 search pages on Google showed a lower frequency of websites because it showed several videos coming from Youtube, which weren't included as websites in the present survey.

First of all, we classified the sites by their ownership: 53% of the websites belonged to associations, groups, or scientific companies, 32.2% (n = 48) consisted of a personal blog and 14.8% (n = 22) belonged to some of the National Health System offices.

We identified 23 of the 149 websites (15.4%) as by an anti-vaccine movement or group; they could be both personal blogs and websites by associations.

Then, we analyzed the technical characteristics of the websites, first grouping them by ownership and later comparing anti-vaccine websites to the sites which did not declare to fight against vaccination.

The percentage of the websites showing the information regarding the webmaster name was 37.6% of all: they were 36.4% of government sites, 38% of associations sites and 37.5% of personal blogs (chi-square = 0.06; $P > 0.05$). This figure was 43.5% for anti-vaccine movement sites and 37.8% for other websites (chi-square = 0.02; $P > 0.05$).

Fourty-nine percent of the analyzed websites gave the webmaster address. For government sites this percentage was 90.9%, 55.6% for associations, and 20.8% for personal blog (chi-square = 32.1; $P < 0.0001$). Thirteen percent of anti-vaccine movement sites gave this information and this percentage was lower than in other websites (55.6%; chi-square = 14.1; $P < 0.001$).

The webmaster e-mail was available in 67.8% of the websites: it was shown in 95.4% of government sites, 75.9% of association websites and 41.7% of personal blogs (chi-square = 26.7; $P < 0.0001$). An amount of 56.5% of anti-vaccine movement sites and 69.8% of other websites reported this information (chi-square = 1.58; $P > 0.05$).

Table 1. Proportions (%) of NHS, association, and personal websites which reported each topic investigated

	NHS websites (%) (n = 22)	Association websites (%) (n = 79)	Personal blogs (%) (n = 48)	P
Vaccines as means for infectious disease prevention	86.4	76.9	68.7	>0.05
Vaccine safety	86.4	69.6	60.4	>0.05
Vaccination benefits	86.4	66.6	56.2	<0.05
Adverse reaction to vaccines	77.3	69.6	63.8	>0.05
Compulsory vaccination	80.9	70.9	52.1	<0.05
Specific section for each vaccine	63.6	31.2	16.7	<0.05

An amount of 28.6% of the websites indicates the date of the last update: 40.9% of government sites, 29.9% of association websites, and 18.7% of personal blogs (chi-square = 4.09; $P > 0.05$). This percentage was 17.4% for anti-vaccine websites and 30.6% for others (chi-square = 1.67; $P > 0.05$).

The author name of published articles was reported in 46.6% of the websites: 45.4% of government websites, 37.2% of association sites and 66.7% of personal blogs (chi-square = 11.5; $P < 0.01$). Articles authorship was reported more frequently among anti-vaccine movement sites (68.2%) than in other sites (42.9%; chi-square = 4.8; $P < 0.05$).

Author credentials appeared in 24.8% of all the websites: 31.8% of government sites, 25.3% of associations sites and 20.8% of blogs (chi-square = 1.02; $P > 0.05$). 30.4% of anti-vaccine movement sites and 23.8% of other websites (chi-square = 0.45; $P > 0.05$) reported this information.

46.6% of all the websites showed the date of publication of articles and contributions; 40.9% of National Health System websites, 48.7% of associations websites, and 47.9% of blogs (chi-square = 0.43; $P > 0.05$). 69.6% of anti-vaccine movement sites referred the data of publication of articles and this percentage was higher than other websites (42.4%; chi-square = 5.76; $P < 0.05$).

The average quality score for government sites was 3.8 ± 1.2 , for associations websites 3.1 ± 1.6 , and for blog 2.5 ± 1.6 ($f = 5.23$; $P < 0.05$). The average score was of 2.9 ± 1.8 for anti-vaccine movements websites and of 3.0 ± 1.6 for other sites ($t = 0.26$; $P > 0.05$).

The information that vaccines are means of infectious disease prevention was indicated in 76.3% of all the websites and particularly in 39.1% of anti-vaccine sites and 83.2% of others (chi-square = 20.9; $P < 0.0001$). 69.8% of websites talked about the vaccine safety while none of anti-vaccine sites and 82.5% of others reported this information (chi-square = 62.8, $P < 0.0001$).

The proportion of websites giving information about vaccination benefits was 66.2% (none of anti-vaccine websites, 78.4 of others; chi-square = 53.4; $P < 0.0001$). Adverse reactions to the vaccination was frequently examined by websites: it was present in 67.6% of all selected websites, in all anti-vaccine sites and in 61.6% of other sites (chi-square = 13.1; $P < 0.0001$).

An amount of 66.9% of websites handled compulsory vaccination as well as 21.7% of anti-vaccine sites and 75.2 of others (chi-square = 25.1; $P < 0.0001$). There was a specific section for each vaccine in 30.9% of websites (13% of anti-vaccine ones and 34.1% of others; chi-square = 4.05; $P < 0.05$). **Table 1** shows

the proportion of NHS, association, and personal websites which reported each topic investigated.

An amount of 21.5% of all the websites had a forum (none of NHS sites; 19.5% of associations websites; 35.4% of blogs; chi-square = 11.6; $P < 0.01$). This proportion does not differ between anti-vaccine sites (21.7%) and others (21.4%; chi-square = 0.001; $P > 0.05$). An “Ask the Expert” section was found in 11.4% but no one of those include government; the figure is 16.9% for associations websites and 8.3% for blog (chi-square = 5.5; $P > 0.05$). No anti-vaccine site and 13.5% of others presents this section (chi-square = 3.5; $P > 0.05$). Experts answering questions were doctors without a Hygiene specialty or undergraduate medical students.

Multiple regression analysis showed a higher quality score in NHS websites ($t = 2.0$; $P < 0.05$).

Discussions

Our survey, which analyzed 149 websites selected through research on the most important search engines using the keywords “vaccino” and “vaccinazione” in Italian (meaning “vaccine” and “vaccination”), showed that the number of messages coming from non-government subjects is higher than from institutions. This is a consequence of the technological development and the Web 2.0 introduction. The Web 2.0 consists of all online applications which allow us a high level of interaction between the website and the user (blogs, forums, chat, Wiki, Flickr, Youtube, Facebook, Myspace, Twitter, Google+, LinkedIn, Wordpress, Foursquare, etc.).¹⁵ Interaction is possible through Web programming techniques fit for that and dealing with the Dynamics Web instead of Static Web or Web 1.0.

This evolution needs the healthcare workers to realize they have a leading role in communication and it requires them to find fit strategies for using new technologies.¹⁶

The imbalance in favor of the spread of single persons or group's idea, instead of institutional messages, is balanced by a higher technical quality of the National Health System websites. Nevertheless technical quality is only one aspect of the quality of the whole system; other aspects, such as expected and perceived quality, which are the most important ones for the effectiveness of communication were not analyzed in this survey, because only quantitative methods were used.

In our analysis, 15.4% of websites was classified as website by an anti-vaccine movement. This figure could be considered low and this resulted from our definition (a website which declared in its aims the fight against vaccination strategies) that did not involve sites which debated doubts or concerns about vaccination.

The most critical situation which came up from the survey was the fact that both institutions and anti-vaccine movements focused on few specific topics and used to have a one-dimensional communication on their websites.

The 2 opposite subjects of this communication (government and private/public association) chose to talk only about some specific topics, overlooking all the others: this produced a dichotomy of the available information. In particular, the anti-vaccine websites never talked about vaccine benefits and safety; government websites omitted to explain about possible adverse reactions after vaccine administration.

This partial way to show information could damage the consumers' trust and let them think there were interests or positions which could influence correct communication. After all an institutional debate about vaccination recently happened at the end of A/H1N1 virus pandemics involving the European Council and the World Health Organization.^{17,18}

Another critical aspect was the lack of interaction tools with consumers (forums, FAQ, "Ask to the expert" sections), especially for NHS websites.

In Italy it came out that parents who didn't allow children to be vaccinated chose to do that not for ideological reasons or basing it on their acquired knowledge but because they were doubtful and the interaction with communication media and with National Health System providers didn't help them to remove all their doubts.

A recent survey regarding determining factors to vaccination refusal showed that people who chose not to be vaccinated were widely open to talking and discussing about the reasons of their choice.¹⁹

Regarding the doctor-patient relationship, the counselling especially through active listening is the most used mean to create an exchange and communication: patients need to communicate and communication takes place within a specific relationship, the therapeutic alliance.

Considering the communication field, Web 2.0 interaction may create a parallel relationship to the therapeutic alliance. Forum plays a very important role in the social evolution of the web. A forum consists of a set of discussions about a topic: everybody can take part in this discussion, leaving a comment or answering a previous one. A forum can be considered as the true descendant of the BBS (Bulletin Board System) systems, very popular in the 70s-80s, but with a more user-friendly interface, easy to use even by non technicians.²⁰

Forums are very popular in the online culture and most of them are trying to develop more and more new social features. Nevertheless, as it came up from our survey, the management of the vaccination forum was totally devolved to private citizens and associations, without any kind of participation by institutions. As a consequence there was no control on the contents shared on these forums.

Recently in Italy the creation of web pages by Public Health stakeholder's groups and about specific vaccination topic was reported in social networks as Facebook (accessed by more than 30 million Italians), but these efforts currently have a very limited spread (less than 1000 friends from 2012 to 2014) and focus on communication for healthcare professionals than for common people.²¹ However, in 2013 National Society for Public Health launched "vaccinarSi," a website about vaccination strategies which has been accessed since April 2013 by more than 150 000 people.²²

As a conclusion, National Health System institutions who have to promote vaccination can't avoid investing on web communication because it can't be managed by private efforts but it has to be the result of Public Health, private and scientific association, and social movement synergy.

Materials and Methods

The research was performed through Yahoo, Google, and MSN using the keywords "vaccine" and "vaccination," with the function "OR" in order to identify the most frequently used websites. The 2 keywords were input in Italian, ("vaccino"; "vaccinazione") and the first 15 pages retrieved by each search engine were analyzed.

A website was defined as a virtual space of the World Wide Web. Every website has a home page, which is the first page users can see. We chose to analyze websites, not single web pages that appeared on the search pages.

We classified the websites into 3 groups: National Health System websites (Ministry of Health, National Institute of Health, Local Health Trusts, Regional Health Authorities); associations (scientific societies, registered companies of parents, etc); personal blogs.

We defined an antivaccine site a website which declared in its aims the fight against vaccination strategies; it could be both a personal blog as well as a website by an association.

For each website we filled in an evaluation form with information about: the search engine position; webmaster name, address, and e-mail; date of the last update (as reported in home page); name and credentials of articles authors; date of publication of articles and contributions; contents (vaccine as means for infectious disease prevention; vaccine safety; vaccination benefit; adverse reaction to vaccination; compulsory vaccination); forum; "ask the expert" section. The form was made by the research group after a revision of the medical literature and a following validation.^{5,8,10,13}

A quality score was created to evaluate the technical level of websites. We assigned one point to each positive answer from the following questions:

- 1) Name of webmaster (reported 1; not reported 0).
- 2) Address of webmaster (reported 1; not reported 0).
- 3) E-mail of webmaster (reported 1; not reported 0).
- 4) Date of the last update (reported 1; not reported 0).

The score was in a range from 4 (high technical quality) to 0 (low technical quality).

This evaluation was performed by 2 graduates in “Human communication science,” and then revised by 2 doctors of Public Health specialized in Vaccinology.

The completed forms were put in a database made by STATA MP11 software and analyzed with the same software.

Chi-square test was used to compare proportions. Two-sample-(mean) the student *t* test or ANOVA test if appropriate

was used to compare means of independent samples. A multiple logistic regression model was used to study the quality score in relation to ownership and anti-vaccine sites. For the test, a *P* value < 0.05 was considered to be statistically significant.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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