



PLENARY SESSION 3
Thursday 15 October
h. 11.30-13.00
Plenary Room

Monitoring the web to support vaccine coverage: results of two years of the portal VaccinarSi

Presidiare il web per sostenere le coperture vaccinali: risultati di due anni di attività del portale vaccinarSi

Antonio Ferro,¹ Anna Odone,² Andrea Siddu,³ Massimiliano Colucci,⁴ Paola Anello,⁴ Michela Longone,⁴ Elena Marcon,⁴ Paolo Castiglia,⁵ Paolo Bonanni,⁶ Carlo Signorelli^{2,7}

¹Direzione sanitaria, Azienda ULSS 20 Verona; ²Dip. Scienze biomediche, biotecnologiche e translazionali, Università di Parma, Italy; ³Dip. Sanità pubblica, medicina clinica e molecolare, Università di Cagliari, Italy; ⁴Dip. Medicina molecolare, Istituto igiene, Università di Padova, Italy; ⁵Struttura Igiene e medicina preventiva, Dip. Scienze biomediche, Università-AOU di Sassari, Italy; ⁶Dip. Scienze della salute, Sezione igiene, medicina preventiva e sanità pubblica, Università di Firenze, Italy; ⁷Presidente Società Italiana di Igiene, Medicina Preventiva e Sanità Pubblica

Corresponding author: Anna Odone; e-mail: anna.odone@mail.harvard.edu

Riassunto

Objectives. The increasingly widespread use of the Internet by the population to collect information regarding health and medical treatments and the circulation of many non-scientific documents on the effectiveness and safety of vaccines has led the Italian Society of Hygiene (SItI), in 2013, to promote a portal to provide scientific information that is verified and easily understood to counteract the rampant misinformation on health treatments and combat the phenomenon of vaccine hesitancy.

Methods. The project was launched in May 2013 and provides a portal with six main sections (vaccine preventable diseases, registered vaccines, benefits and risks of vaccination, against misinformation, pros & cons and travel immunizations) and other headings that relate to scientific events, comics and news coverage concerning vaccines. The contents are validated and evaluated by a scientific committee of high profile scientists and experts in computer-mediated communication.

Results. In the first two years of activity, the portal has published more than 250 web pages on all aspects related to vaccinations. The number of individual users was 860,411, with a constant increase over time. Of these, about 21.7% returned to the website at least once. The total visits in 24 months were 1,099,670, with a total page count of 2,530,416. The frequency of contact was almost exclusively Italian (95.6%), with a higher proportion of males (54.1%) and younger age groups (25-34 years, 33.5%, and 18-24 years, 27.5%). The data also show a significant position of the website in the major web search engines. The website has been certified by the Health On the Net Foundation. It is connected with the main social networks and it has recently opened its first regional section (Veneto).

Conclusions. The strong, progressive increase in web contacts, the involvement of several institutional bodies, and the appreciation of various stakeholders give an absolutely positive assessment of the first two years of the VaccinarSi project. The success of the website suggests future developments, with updates, sections devoted to regional problems, in-depth news analysis, and international expansion. The authors conclude that initiatives like this are to be implemented and constitute an effective way to counteract vaccine hesitancy.

(*Epidemiol Prev* 2015; 39(4) Suppl 1: 88-93)

Key words: immunization, vaccine hesitancy, communication, online portal, new media

Abstract

Obiettivi. Il sempre più diffuso utilizzo di Internet da parte della popolazione per attingere informazioni su salute e terapie e la circolazione di molti documenti non scientifici sull'efficacia e la sicurezza dei vaccini ha indotto la Società Italiana di Igiene (SItI), nel 2013, a promuovere un portale per fornire informazioni scientifiche verificabili e comprensibili per contrastare la dilagante disinformazione sanitaria e combattere le esitazioni all'utilizzo delle offerte vaccinali.

Metodi. Il progetto VaccinarSi ha preso avvio nel maggio del 2013 e prevede un portale con sei sezioni principali (malattie prevenibili da vaccino, vaccini disponibili, vantaggi e rischi delle vaccinazioni, contro la disinformazione, pro & contro, viaggi e vaccinazioni) e altre rubriche che riguardano eventi scientifici, fumetti illustrati e commenti alle principali notizie di cronaca sui vaccini. I contenuti sono validati e valutati da un Comitato scientifico di alto profilo scientifico e mediato da esperti di comunicazione informatica.

Risultati. Nei primi due anni di attività il portale ha pubblicato oltre 250 pagine web su tutti gli aspetti legati alle vaccinazioni.

Il numero di utenti singoli è stato di 860.411, con un incremento costante nel tempo. Di questi, circa il 21,7% è ritornato almeno una volta sul sito. Le visite complessive in 24 mesi sono state 1.099.670 con la visualizzazione di 2.530.416 pagine. La frequenza dei contatti è stata quasi esclusivamente italiana (95,6%) con una maggiore proporzione di maschi (54,1%) e di classi d'età inferiori (25-34, 33,5% e 18-24, 27,5%). I dati mostrano anche un posizionamento rilevante di VaccinarSi nei principali motori di ricerca web. Il portale ha ottenuto la certificazione dalla Health On the Net Foundation, è connesso con i principali *social network* e ha recentemente aperto la prima sezione regionale (Veneto).

Conclusioni. Il crescente e progressivo aumento di contatti, l'interessamento di diversi organi istituzionali e l'apprezzamento di molti *stakeholder* fanno ritenere assolutamente positivo il bilancio dei primi due anni del progetto vaccinarSi e meritevole di sviluppi futuri con aggiornamenti, sezioni dedicate alle problematiche regionali, approfondimenti di cronaca ed espansioni internazionali. Iniziative come questa devono, per gli autori, essere implementate e rappresentano un metodo efficace per contrastare il dilagante fenomeno di scetticismo verso le vaccinazioni.

(*Epidemiol Prev* 2015; 39(4) Suppl 1: 88-93)

Parole chiave: immunizzazione, *vaccine hesitancy*, comunicazione, piattaforma online, *new media*

BACKGROUND

Immunization is one of the most successful and cost-effective primary prevention tools; it is estimated that, globally, immunizations prevent between 2 and 3 million deaths every year.¹ CDC data show that vaccine introduction is responsible for an over 90% reduction in the number of cases for eleven vaccine-preventable diseases (VPDs) and a 100% reduction for two VPDs worldwide, this having largely contributed to the increase in life expectancy over the last decades.²

However, nowadays immunizations are victims of their own success and as the burden of VPDs has decreased, the risk of the vaccine is perceived to be greater than the risk of the disease.³ As a consequence, immunization is losing public confidence, a growing phenomenon known as «*vaccine hesitancy*»,⁴⁻⁷ ultimately leading to decreased coverage rates.

With the field of information and communication technologies flourishing in recent years, the way health information is gathered has been revolutionized and parental decision-making about vaccination is often negatively influenced by anti-vaccination movement arguments, which are widely available online.⁸⁻¹²

In Italy, it is estimated that 64% of families has an Internet connection at home, a percentage that rises to almost 90% when only considering families with at least one child aged <18 years.¹³ As Internet penetration increases, the web becomes a virtual place where health-related information is not only gathered but also actively expressed and shared. However, web-based content is not regulated and the spread of erroneous and misleading information cannot be monitored or limited.¹⁴

A large survey conducted in Italy reported that the Internet is the most used non-institutional source of information consulted by parents that decided not to vaccinate their children.¹⁵ In addition, a recent systematic review reported that in Italy 67% of vaccine-related websites have an anti-vaccination approach and that institutional websites providing information on vaccines have a low ranking in the Internet search engines and often contain data that is not easy to access or is not updated.¹⁶

These figures are alarming when considering that anti-vaccination movements are very active online on dedicated websites, blogs, forums, and social network accounts that are of-

ten used to disseminate wrong or unreliable data that ultimately have a negative impact on vaccine uptake at the population level.

In this context, the Italian Society of Hygiene and Preventive Medicine (SIIt) considering the idea of promoting “good” and “science-based” communication around vaccines to be not only in line with its institutional mission, but also a social priority, endorsed the VaccinarSi project. General aim of the project is to exploit the great potential offered by new media to communicate and educate the general population, as well as the healthcare community at large, about vaccines. In particular, specific objectives are:

- to produce and disseminate evidence-based, solid, comprehensive, understandable, and updated information about vaccines, counterbalancing the misleading and erroneous information circulating on the web on the topic;
- to raise awareness among health authorities and institutions on the use of new media to disseminate health-related information;
- to promote immunization programs.

METHODS

The VaccinarSi project components and target population

For the VaccinarSi Project a number of components that apply new media to educate the general population as well as the healthcare community at large on the benefits of immunization were designed, produced, and are constantly monitored and updated. They are:

- a web portal (www.vaccinarsi.org);
- dedicated accounts on social networks, specifically Facebook and Twitter;
- printed material (leaflets and brochure).

The VaccinarSi Project targets the general population, with particular reference to parents as well as healthcare professionals involved at different levels in immunization programs and campaigns.

Guiding principles

For the design, production, and update of the VaccinarSi con-

tents, strict ethical, deontological guiding principles as well as methodological rules are applied:

- all information published on the online portal and on the social networks is derived from solid scientific evidence (original studies, systematic reviews, official institutional and scientific reports) to which references are accurately made available;
- information is presented in a clear, transparent way, to be easily understood by the general population;
- conflicts of interest, if present, are always disclosed;¹⁷
- privacy and data protection laws are applied in line with legal and ethical standards.

Organizational structure

The VaccinarSi Project's organizational structure includes a coordinator, a steering committee, a scientific committee, an operational board, and a communication task force.

The steering committee comprises five members, including the coordinator, who is in charge of defining the guiding strategies of the VaccinarSi project.

The scientific committee includes 20 experts in the field of immunization from the academia and the national health service who are responsible for selecting the sources of data reported and validate the portal's scientific content.

The operational board is in charge of maintaining, updating, and monitoring the portal and the social network accounts; it comprises 36 members including a large share of medical residents in Hygiene and Preventive Medicine and IT technicians. The communication task force comprises 4 residents in Hygiene and Preventive Medicine from the University of Padova. They are in charge of monitoring the portal's content and publishing the VaccinarSi portal news.

Funding

Members of the steering committee, the scientific committee, the operational board, and the communication task force work at the VaccinarSi project on a voluntary basis.

The project is financed through unconditional support by Farindustria, the Italian association of 174 pharmaceutical companies and member of Confindustria.

Analysis

In this paper we present and discuss the outcome of the two-year activity of the VaccinarSi project in terms of: content and structure of the portal and other components, dissemination and visibility, initiated collaborations and side projects.

The website traffic data we report are derived from Google Analytics (study period: 8th May 2013 – 8th May 2015). We also report on the comparison between 2012 and 2015 of web browser (google.it) search results for the key word queries (Italian for) «vaccine/s», «vaccination» and «immunization». As done elsewhere, we analyzed the first page^{18,19} search results categorizing websites into: i) negative, ii) positive (including institutional websites), and iii) neutral/descriptive approach towards vaccines.²⁰

RESULTS

Institutional patronage and other collaborations

The VaccinarSi project was launched in May 2013. It received the institutional patronage of the Italian Ministry of Health and the Italian Institute of Health, as well as that of more than 70 local health units and hospitals. In addition, it has been certified by the Health On the Net Foundation (HON), a non-profit, non-governmental organization, accredited to the Economic and Social Council of the United Nations, which promotes and guides the deployment of useful and reliable online health information, and its appropriate and efficient use. In the context of the VaccinarSi Project the Italian Society of Hygiene and Preventive Medicine (SIIt) has initiated collaborations with a number of Italian scientific societies involved in immunization programmes and policies, including the Italian Federation of Family Pediatricians (FIMP), the Italian Society of Paediatrics (SIP), and the Italian Federation of General Practitioners (FIMMG).

The VaccinarSi web portal

The VaccinarSi project's web portal was launched on 8th May 2013; in the last two years it has enlarged its content and now counts more than 250 different web pages.

Structure and content

The content of the portal is structured in three different levels so that readers can approach a single topic choosing between three different levels of details:

- first level: titles and abstract are presented to offer a clear overview of the topic;
- second level: topics are presented in a concise but comprehensive way (short essays) and references are made available;
- third level: links to external sources, original articles and data are made available for readers who wish to gain a deeper understanding of the topic.

All levels are coupled with selected pictures, tables, and illustrations. Before being published on the portal, all content is reviewed, in a two-step process, by the scientific and steering committees.

The portal is organized in six main sections:

- **Vaccine-preventable diseases (VPDs):** all VPDs are described in terms of transmission, signs and symptoms, national and global burden, with epidemiological morbidity and mortality data. Selected case reports are also reported. For each VPD links are made to sections on available vaccines.
- **Available vaccines:** for each vaccine, data on efficacy and safety are presented, as well as vaccine recommendations, schedules, and doses. As per editorial policy, no reference is made to commercial names of vaccines or pharmaceutical companies.
- **Vaccine benefits and risks:** benefits and risks of vaccines – as they are perceived by the general population – are listed and discussed in detail.
- **Against misinformation:** in this section the arguments and theories of anti-vaccination movements are presented with constructive criticism based on referenced, solid arguments.

■ **Pros&Cons:** this section presents recent news items that have appeared in the popular press on vaccine-related topics, put into scientific context and constructively commented with referenced, solid arguments.

■ **Travel immunization:** this section focuses on vaccine recommendations for international travellers. In addition, general recommendations are provided on prevention of food-borne infections.

The six sections are linked through key-word tags. In addition, all key words are compiled into a Glossary section with a list of key terms in the field of immunization and their definitions. In the context of the VaccinarSi project, a number of innovative communication formats are applied, including:

- training videos, multimedia presentations, and tutorials targeting both healthcare workers and the general public;
- stories: these are brief essays with a storytelling approach – similar to the one widely used by anti-vaccination movements – that describe case reports of diseases that could have been prevented with vaccination and which are aimed at motivating hesitant parents to vaccinate their children;
- cartoons (included in the dedicated section «ComXtrue»), used as an effective communication tool to communicate and educate about the benefits of vaccines; as an example, comics on vaccines by the famous cartoonist Maki Naro, previously published in the *New York Times*, have been translated and published on the portal.

Constant monitoring of the portal's content is carried out by the scientific committee and the communication task force. In particular, two sections are constantly monitored and updated:

- the News section: the communication task force is responsible for writing the portal News: brief texts reporting on recent published scientific studies, guidelines, immunization schedules, recently released epidemiological data, outbreaks, and infectious disease epidemics of national and international relevance. In the last two years, 280 News items have been published, with an average of three per week. Addressed topics include seasonal influenza surveillance,^{21,22} the «Fluad episode»,²³ MMR vaccine safety news, adult immunization, health education and communication issues, etc. Once published on the portal each News item is automatically forwarded via email to all VaccinarSi subscribers;
- the Events section, which lists relevant Italian and international conferences, congresses, and seminars in the field of immunization and infectious diseases.

Dissemination and visibility

The VaccinarSi portal has achieved a high placement rank on Google's Search Engine Results. In fact, when entering the search term «vaccinarsi» in Google anonymous search, the VaccinarSi portal ranks first; when entering the search term «vaccino/i» (Italian for «vaccine»/«vaccines») or «vaccinazione/i» (Italian for «vaccination»/«vaccinations») the VaccinarSi portal ranks among the first five Google results.

In the two-year study period, 860,411 single users accessed the VaccinarSi portal, and nearly 22% of them accessed it more than once, for a total of over one million visits. Overall, 2.5

million single web pages were accessed, with 1.87 web pages visited on average for each access to the portal and an average session duration of 1 minute and 36 seconds. Average visitors per month increased exponentially from 10,000 to 60,000. With regard to socio-demographic characteristics, 54.2% of users were males and the 18-34 years age group accounted for more than 60%. Other age groups accounted for 15.5% (35-44 years), 12.5% (45-54), and 5.5% (both 55-64 and over 65 years). The vast majority of users were from Italy (95.6%). Accesses from Switzerland, the USA, and the UK were reported. Within Italy, Lombardia (26.9%) and Lazio (18.9%) were the regions with the highest number of reported accesses to the portal. Milano (19.5%) and Roma (17.7%) were the highest ranking cities. Relative user distribution by region weighted by number of residents is presented in **table 1**; the table shows that, when taking the background population into account, Lazio (3.70%), Lombardia (2.83%), and Toscana (2.32%) were the regions with the highest share of population visiting the VaccinarSi portal, a share greater than the national percentage (1.73%). Personal computers (PCs) were the most widely used devices to access the portal (46.4%). Smartphones and tablets accounted for, respectively, 41.8% and 11.8%.

The majority of visitors access the VaccinarSi portal through Google, but some were also referred by social networks, local health units and other health authorities websites, the «vaccinar...si» blog and the official SItI website, among others.

With regard to specific webpage visits, the most visited pages were those on the hexavalent and MMR vaccines. More in general, data show that visitors surfed several website pages of the portal per visit. The most frequently searched keywords were (Italian for) «vaccine», «vaccination», «hexavalent vaccine»,

Regions	Sessions (N)	Residents (%)
Lombardia	282,633	2.83%
Lazio	199,550	3.40%
Toscana	86,826	2.32%
Veneto	81,354	1.65%
Emilia-Romagna	61,578	1.38%
Campania	58,786	1.00%
Piemonte	46,675	1.05%
Sicilia	43,959	0.86%
Puglia	39,541	0.97%
Liguria	21,600	1.36%
Friuli-Venezia Giulia	20,488	1.67%
Marche	18,495	1.19%
Sardegna	17,958	1.08%
Abruzzo	14,108	1.06%
Trentino Alto Adige (South Tyrol)	9,953	0.95%
Calabria	9,857	0.50%
Umbria	7,371	0.82%
Basilicata	1,963	0.34%
Molise	1,232	0.39%
Aosta	657	0.51%

Table 1. Vaccinarsi.org visits by region (2013-2015).

Tabella 1. Accessi al portale Vaccinarsi.org per regione (2013-2015).

«www.vaccinari.org», «MMR vaccine», «chickenpox vaccine», «vaccines and autism», «polio vaccine».

According to Webstatsdomain, a free online service that collects and analyzes data about domains and key words, the VaccinarSi portal ranks 920,253th among the 30 million most visited websites worldwide and has an estimated site value of 3.911 euros. In addition, it is considered to have 100% reputation in terms of web security and a total of 17,603 external backlinks. According to Alexa – a company which provides commercial web traffic data – VaccinarSi ranks 29,698th in Italy; it must be considered that there are over 28 million websites in Italy and one of the major anti-vaccination movement websites, comilva.org, is ranked number 42,386.

As the 2012-2015 websites search comparison showed, distribution of Italian websites with regard to approach to immunization has changed over time. The first 10 websites resulting from browser search for 4 key words related to immunization (40 websites in total) had a negative approach to immunization in 39% of cases in 2012 (google.it search carried out on 1st June 2012) but only 12.5% of cases in 2015 (google.it search carried out on 1st June 2015). The share of websites with positive/institutional/scientific approach to vaccination resulting from web searches increased from 40% in 2012 to 60% in 2015, the rest having a descriptive/neutral approach. Although we cannot assume this positive trend to be directly associated with the launch of the VaccinarSi project, we are pleased to see that a cultural shift is taking place in Italy towards fighting the growing phenomenon of vaccine hesitancy and disseminating of evidence-based health education messages on immunization to the general population.

The VaccinarSi social network accounts

VaccinarSi's official Facebook account was launched on 17th April 2014, the Twitter account was launched on 8th May 2013.

Structure and content

The VaccinarSi social network account content in the first two months after its launch was almost entirely based on the portal's content, with links to the portal's updates. After that, specific Facebook and Twitter content was developed and shared, including iconographic material and Internet memes, pieces of media which spread, often as mimicry, from person to person via the Internet (http://en.wikipedia.org/wiki/Internet_meme). As reported in the results of a survey conducted among the VaccinarSi Facebook followers, vaccine memes were considered an effective communication tool.

Two specific awareness-raising campaigns on polio and influenza vaccines were launched and disseminated through the VaccinarSi Facebook and Twitter accounts. The polio campaign was carried out between May and October 2014 and aimed at raising awareness on a forgotten disease through a narrative-historical approach; the influenza campaign was carried out between October and December 2014 and aimed at promoting influenza vaccination among at-risk subgroups of the population. Both campaigns were successful and

showed that social networks are key communication tools to spread health education. To further advertise the VaccinarSi Facebook account, a promotional campaign was launched in February 2015. Another innovative initiative carried out in the context of the VaccinarSi social network accounts was the live online sharing of national conferences on immunization policy content, including sharing speakers' key quotes, videos, and slides.

Content on VaccinarSi social network accounts is usually posted on a daily basis in hours of high Internet access (11am-9pm). Strict community standards are in place to allow fruitful discussions and encourage respectful behaviour.

Dissemination and visibility

The VaccinarSi Facebook account reached 4,821 "likes" in the study period. The majority of followers are females (70%) and subjects in the 25-34 year age group (36% of females users). Females are also reported to be more active sharing information and commenting on posts. The number of "likes" almost doubled after the February 2015 Facebook promotional campaigns. The average number of users to visit the VaccinarSi Facebook account is 1,507 per day (range: 60-24,300).

The Twitter account published 544 tweets over the study period, followed 140 profiles and was followed by 337 other accounts. Contrary to Facebook, the majority of VaccinarSi Twitter followers are males (54%). Since the VaccinarSi twitter account was launched, average retweets are 1.29 per tweet (range: 0-13), average «add to favourites» are 1.01 per tweet (range: 0-6), average replies are 0.04 per tweet (range: 0-1). The highest engagement (retweet+favourite+reply) was 19 per tweet.

DISCUSSION

In this context, a number of new activities have recently been planned and implemented. First, a regional VaccinarSi chapter for the Veneto region was launched in August 2014 (www.vaccinarsinveneto.org). The initiative was included in a decision of the Veneto Regional Council on the «Regional communication plan on vaccine preventable diseases». The content of the Veneto VaccinarSi chapter targets region-specific issues, including the Veneto immunization schedule, information on the immunization programs, and services offered in the region. The Veneto VaccinarSi section also includes an area dedicated to healthcare providers with online training material, updated data, and other useful resources. The project is still at an early implementation phase and its efficacy as a powerful regional health policy instrument will be assessed in the near future. At the same time, thanks to a national grant awarded to the VaccinarSi project in 2014 by the National Centre for Disease Prevention and Control (CCM), six other regional VaccinarSi chapters are scheduled to open in the next two years (for the regions of Liguria, Marche, Puglia, Sardegna, Sicilia, and Toscana); this being a priority objective for VaccinarSi.

Thanks to the CCM grant, the national VaccinarSi portal will be further enlarged with an expanded section on «immunization and travels». In addition, a working group has been es-

tablished to build and launch the English version of the project, in order to increase its penetration and visibility in the larger European and international arena.

On a different note, the VaccinarSi project has sponsored an amateur sports association with a semi-professional cycling team that participate in national races with the aim of promoting a healthy lifestyle and a correct approach to immunization, in line with the VaccinarSi project's mission.

CONCLUSION

In the first two years since its launch, the VaccinarSi project has had an enormous success: the number of visitors to the portal has grown exponentially, reaching a total of one million, the VaccinarSi website ranks among the first websites on the main Internet search engines and the initiative has obtained the patronage of the Ministry of Health, the highest health authority in Italy.

In addition, the VaccinarSi project has engaged a number of

key stakeholders in fruitful collaborations at the institutional, scientific, academic, and civil society level; the reduction in the availability of Italian-language websites with an anti-vaccination approach underlines its impact on the web and, more in general, a recent cultural shift towards an enhanced trust in immunization.

Building on the success, the authority and visibility gained by the VaccinarSi project in its first two years of activity, the objective for the future is to have it grow further, to reach out to an even wider audience, to engage in more collaborations with national and international agencies and scientific associations, to further apply innovative communication media and skills,^{19,20} to increase VaccinarSi satellite projects and components, with the overall aim of further promoting the culture of immunization and counteracting the alarming phenomenon of vaccine hesitancy.

Conflicts of interest: none declared

References/Bibliografia

- WHO. World Immunization week. <http://www.who.int/campaigns/immunization-week/2014/event/en>
- Centers for Disease Control and Prevention. (Atkinson W, Wolfe S, Hamborsky J, eds.). *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 12th ed., second printing. Washington DC, Public Health Foundation, 2012. <http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/G/impact-of-vaccines.pdf>
- Centers for Disease Control and Prevention. Achievements in public health, 1900-1999 impact of vaccines universally recommended for children – United States, 1990-1998. *Morb Mortal Wkly Rep* 1999;48:243-48.
- Bonanni P, Ferro A, Guerra R, et al. Vaccine coverage in Italy and assessment of the 2012-2014 National Immunization Prevention Plan. *Epidemiol Prev* 2015; 4(Suppl 1): 146-58.
- Larson HJ, Cooper LZ, Eskola J, Katz SL, Ratzan S. Addressing the vaccine confidence gap. *Lancet* 2011;378:526-35.
- Dube E, Vivion M, MacDonald NE. Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications. *Expert Rev Vaccines* 2015;14:99-117.
- Zingg A, Siegrist M. Measuring people's knowledge about vaccination: developing a one-dimensional scale. *Vaccine* 2012;30:3771-77. doi: 10.1016/j.vaccine.2012.03.014.
- García-Basteiro AL, Alvarez-Pasquín MJ, Mena G, et al. A public-professional web-bridge for vaccines and vaccination: user concerns about vaccine safety. *Vaccine* 2012;30:3798-805. doi: 10.1016/j.vaccine.2011.10.003.
- Betsch C, Brewer NT, Brocard P, et al. Opportunities and challenges of Web 2.0 for vaccination decisions. *Vaccine* 2012;30:3727-33.
- Amicizia D, Domnich A, Gasparini R, Bragazzi NL, Lai PL, Panatto D. An overview of current and potential use of information and communication technologies for immunization promotion among adolescents. *Hum Vaccin Immunother* 2013;9: 2634-42; PMID:23954845; <http://dx.doi.org/10.4161/hv.26010>.
- Betsch C, Renkewitz F, Betsch T, Ulshöfer C. The influence of vaccine-critical-websites on perceiving vaccination risks. *J Health Psychol* 2010;15:446-55.
- Ward JK, Peretti-Watel P, Larson HJ, Raude J, Verger P. Vaccine-criticism on the internet: new insights based on French-speaking websites. *Vaccine* 2015;33: 1063-70.
- Istat. *Cittadini e nuove tecnologie* (2014). <http://www.istat.it/it/archivio/143073>
- Kata A. A postmodern Pandora's box: anti-vaccination misinformation on the Internet. *Vaccine* 2010;28:1709-16.
- Valsecchi M, Speri L, Simeoni L, Campara P, Brunelli M. Indagine sui determinanti del rifiuto dell'offerta vaccinale nella Regione Veneto. 2011. Azienda ULSS 20 di Verona. Report finale. Giugno 2011.
- Poscia A, Santoro A, Collamati A, de Belvis AG, Ricciardi W, Moscato U. Disponibilità e qualità delle informazioni presenti sul Web riguardo alle vaccinazioni. Revisione sistematica e implicazioni in Sanità Pubblica. *Ann Ig* 2011;24:1.
- Signorelli C. Vaccines: building on scientific excellence and dispelling false myths. *Epidemiol Prev* 2015;3:198-201.
- Eysenbach G, Kohler C. How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. *BMJ* 2002;324:573-7.
- Odone A, Chiesa V, Ciorba V, Cella P, Pasquarella C, Signorelli C. Influenza and immunization: a quantitative study of media coverage in the season of the «Fluad case». *Epidemiol Prev* 2015; 4(Suppl 1):139-145.
- Ward JK, Peretti-Watel P, Larson HJ, Raude J, Verger P. Vaccine-criticism on the internet: new insights based on French-speaking websites. *Vaccine* 2015;33: 1063-70.
- Blasi F, Aliberti S, Bonanni P, Mantero M, Odone A, Signorelli C. [Pneumococcal vaccination in adults: recommendations from the Italian Society of Respiratory Medicine (SIMEr) and the Italian Society of Hygiene, Preventive Medicine and Public Health (SIIt)]. *Epidemiol Prev* 2014;6 (Suppl 2):147-51. Italian. PubMed PMID: 25759360
- Signorelli C, Odone A, Pezzetti F, et al. [Human Papillomavirus infection and vaccination: knowledge and attitudes of Italian general practitioners]. *Epidemiol Prev* 2014;6(Suppl 2):88-92. Italian. PubMed PMID: 25759351.
- Signorelli C, Odone A, Conversano M, Bonanni P. Deaths after Fluad flu vaccine and the epidemic of panic in Italy. *BMJ* 2015;350:h116. doi:10.1136/bmj.h116. PMID: 25589037.
- Odone A, Fara GM, Giannico G, Blangiardi F, Signorelli C. The future of immunization policies in Italy and in the European Union: The declaration of Erice. *Hum Vaccin Immunother* 2015;11:1268-71.
- Odone A, Ferrari A, Spagnoli F, et al. Effectiveness of interventions that apply new media to improve vaccine uptake and vaccine coverage. *Hum Vaccin Immunother* 2015;11:72-82.