EDITORIAL IN
PUBLIC HEALTH POLICY

Vaccinations and media: An on-going challenge for policy makers

Francesco Chirico[1]

Affiliations:

[1] State Police, Health Service Department, Ministry of Interior, Italy

Corresponding author:

Dr. Francesco Chirico, Health Service Department, Ministry of Interior, Via Umberto Cagni, 21 20162 Milan, Italy, e-mail: medlavchirico@gmail.com

KEY WORDS: Vaccination; health policy; mass media; policy makers; internet.

Competing interests - none declared.

Cite this article as - Chirico F. Vaccinations and media: An on-going challenge for policy makers. J Health Soc Sci. 2017;2(1): 9-18

DOI 10.19204/2017/vccn1

Received: 28/02/2017 Accepted: 10/03/2017 Published: 15/03/2017

Vaccinations have made a great contribution to global health, eradicating smallpox and rinderpest, two major infectious diseases. This public health tool has been recognized as a formidable weapon against infectious diseases. Indeed, over the last decades in industrialized countries vaccination together with improvements in housing and sanitation has produced a significant reduction in child mortality [1]. Only clean water, which is considered to be a basic human right [2] has given better results [3]. However, vaccination has been also considered a victim of its own success [4]. But, why have vaccines got a bad reputation?

In 1998, Wakefield et al. published a case series in the *Lancet*, which suggested that the measles, mumps and rubella (MMR) vaccine might predispose children to pervasive developmental disorders (PPDs) – also known as Autism Spectrum Disorders (ASDs) [5]. After that study, several epidemiological studies refuted the posited link between MMR vaccination and autism [6, 7]. In 2004, there was a short retraction of the interpretation of the original data by 10 of the 12 co-authors of the Wakefield paper [8], and in 2010, the *Lancet* completely retracted that paper, while Wakefield et al. were held guilty of ethical violations and scientific misrepresentation [9], and Wakefield's professional license in England was revoked [10]. At the end of the story, the Wakefield fraud was recognized as one of the most serious frauds in medical history [11, 12]. However, despite all the refuting evidence, anti-vaccination networks on the web have expanded, especially due to the influence of celebrities that have embraced the cause in debates shown on TV—a phenomenon that appears to have prejudiced the coverage of English and American immunization programs [13–15]. Indeed, people were given a choice between the risk of infectious diseases, which celebrities and parents believe to be uncommon or almost eradicated in developed countries due to the widespread vaccination of the population and better hygiene, hand washing and clean water [16], and the risk of autism – an incurable neurological condition, capable of emotionally de-structuring families [15]. It was, therefore, logical that many parents have decided not to vaccinate their children for fear of the risk of autism, and several measles outbreaks across the world have been reported [17]. The anti-vaccine movement has been gathering momentum since the Wakefield fraud, with Western countries such as the US and Australia particularly supportive. In 2015, the United States experienced a large, multi-state measles outbreak linked to an amusement park in California. The outbreak likely started from a traveler who became infected overseas with measles, then visited the amusement park while infectious [18]. Moreover, some studies reported that in California some private schools have immunization rates as low as 60% [19], and in Northern California there are some clusters of MMR under-immunization [20]. Indeed, given the highly contagious nature of measles, vaccination rates of 96% to 99% are necessary to preserve herd immunity and prevent outbreaks [21, 22].

However, due to superficial and influential media, the anti-vaccination movement is continuing to grow. It's paradoxical and absurd that vaccine-preventable disease (VPD) still represents a major cause of morbidity and mortality worldwide and, according to the World Health Organisation (WHO), every year 1.5 million children, especially in developing countries, still die from VPD [23], while some of the diseases that are produced by poverty and absence of healthcare are now expanding among highly educated and high-income populations in well-developed countries, which have the greatest access to sources of information about health [15]. Surprisingly, a recent USA-based study showed that vaccination exemption percentages are higher in regions with higher income, higher levels of education and predominantly white populations [24]. Assuming that media and network technologies are more diffuse in industrialized countries, we can probably also assume that people with high levels of income and education are also high-frequency social media and Internet users. Social

networks and the Internet are easily accessible to anyone, and one of the greatest problems with using the web for health-related searches is that there is no formal system for editing information published on the web, and there is no peer review of information. This can be dangerous with respect to medical information because it is not difficult to find misinformation that appears credible [25]. Since the Internet is increasingly used as a source of health information, health professionals are beginning to use social media such as, for example, Facebook, Twitter and YouTube, which are powerful symbols of a new generation of online tools, to benefit patients [26]. Indeed, social networks are well-established means of influencing health behaviours and outcomes through modelling and social norms, imitative behaviour and social reinforcement [27]. Some studies have shown that social networks have contributed to educating people about public health issues such as obesity, smoking, eating behaviours, high-risk sexual behaviours and almost infinite other phenomena [27]. Unfortunately, vaccine sceptics have recognized that social media are powerful channels for propagating information as well as misinformation and anti-vaccine websites have proliferated [28]. The anti-vaccine movement is using pseudoscience and misinformation to support its claims, presenting false information as 'scientific evidence' to push the idea that vaccinations are linked with autism, brain injury and other illnesses [29]. For this reason, the WHO [30] has published a paper on its website reporting six common misconceptions about vaccinations in order to provide useful information to health-care workers who provide vaccinations as well as to concerned parents. However, the WHO's paper was probably not sufficiently persuasive to convince parents that vaccinating their children is safe and effective. Today, the WHO considers lack of confidence in vaccines [31] a serious challenge to the success of vaccination programs; 'vaccine hesitancy' has been defined as a 'gap in parental knowledge' [32] or 'reflection and deliberation about the benefits of specific vaccines' [33], and it is described as a phenomenon responsible for decreasing vaccine coverage and increasing the risk of vaccine-preventable disease outbreaks and epidemics [34]. In light of this, I wonder how social networks and the Internet influence vaccination coverage. Several studies have shown that media controversies have a negative influence on vaccine uptake [35, 36]. At the beginning of 2017, American newspapers reported curious news regarding USA President-elect Donald Trump's scepticism about the safety of childhood vaccines [37]. According to this news, Trump, an avid consumer of social media, has no trouble ignoring the existence of a compelling body of evidence supporting the safety and effectiveness of vaccines in preventing common childhood diseases [38]. Trump has met with Wakefield, who now lives in Austin, Texas, USA, where he is active in the state and national anti-vaccine movement, and the US President has now advocated the debunked theory that vaccines cause autism, recently announcing, a 'vaccine safety commission' to investigate this issue [39]. Establishing a commission to investigate the issue could itself be harmful, since it could give people the impression that the question has not been answered or that vaccines do not already go through a rigorous approval process [40]. The mass media campaigns have been also affecting the Italian vaccine debate. Indeed, since last year, Italian newspapers and TV have, with great concern, been constantly showing details regarding stories of people who are afflicted by meningitidis. As a natural consequence, the number of children who are vaccinated out-of-pocket by their parents has increased sharply. According to QuintilesIms [41], the out-of-pocket purchase of vaccinations by Italian people from pharmacies increased by 77% from 2015 to 2016, and the distribution of vaccinations to the hospitals and public health services of local health authorities has increased as well. However, even though meningococcal diseases have a high fatality rate and there is a high risk of complications from the disease, and also considering that incidence of invasive meningococcal disease (IMD) is under-reported in Italy, IMD

is relatively rare in Italy, where 0.25 confirmed cases per 100,000 people were observed in 2011 and a total of 172 cases were recorded in 2013. According to the European Centre for Disease Prevention and Control, in 2014, the rate of confirmed cases of invasive meningococcal disease per 100,000 people in Italy was 0.3, which is less than the 0.5 considered as the European average [42]. According to the Italian National Institute of Health, the incidence rate of IMD per 100,000 inhabitants in 2015 was 0.32 (n = 196 cases), while partial data in 2016 showed 178 cases, which is in line with the 2015 incidence rate. The only exception was in Toscana, 1 of the 20 Italian regions, where the number of cases in the period of 2014 to 2015 doubled from 16 to 38 with regard to Neisseria meningitidis, and from 58 to 105 with respect to all other microorganisms responsible for meningitidis [43].

Ultimately, the Italian Ministry of Health has launched the new '2017–2019 National Vaccine Prevention Plan', which includes a vaccine protecting against four meningococcus strains for teenagers and two pneumococcal vaccines for people over 65, with an offer active and free of charge for specific risk groups in all Italian regions. However, this new strategy has stirred controversy in Italy; for instance, there are doubts about the introduction of a meningococcal B (MenB) disease vaccine for infants, which was approved in Europe in 2013 and introduced country-wide only in the United Kingdom [44]. Indeed, compared to other vaccine-preventable diseases, the incidence of IMDs in Italy is low, and further evidence is still needed on the clinical effectiveness, duration of protection and cost-effectiveness of the MenB vaccine [45]. On the contrary, according to the European Centre for Disease Prevention and Control, measles is certainly targeted for elimination in Europe. However, although the MMR vaccination was included in the Italian National Vaccination Plan 2010–2015, media and stakeholders are not paying enough attention to this topic in the public debate, and, therefore, in Italy, the MMR vaccination remains a challenge. Indeed, in 2014, MMR vaccination coverage was 87% for the first dose, and 83% for the second dose, with none of the 20 Regions reaching the 95% vaccine coverage target [46]. The MMR vaccination coverage even decreased in the period 2013–2015, from 90.4% to 85.3%. As a consequence, between 1 February 2016 and 31 January 2017, the highest numbers of measles cases in Europe were reported by Romania (1,995) and Italy (1,020), accounting for 44% and 23%, respectively, of the European Economic Area cases in the 12-month period [47]. But even more shocking, the hexavalent diphtheria, tetanus, acellular pertussis, Haemophilus influenzae type B, poliovirus and hepatitis B (DTaP-Hib-IPV-HepB) combination vaccines, which were licensed and introduced in Europe in 2000 [47] to provide protection from these deadly diseases, has in Italy demonstrated an alarming downward trend in coverage (93.4% in 2015; 94.7% in 2014; 95.7% in 2013; and 96.1% in 2012). For this reason, policy makers in Italy are considering a new policy of mandatory immunization, even though the Internet reported that an Italian court in Milan unexpectedly has awarded compensation for a case of MMR vaccine-induced autism and the Ministry of Health has appealed the Court's decision [49].

However, an information-based health policy based on the current 'recommended' vaccinations could be sufficient if this information is thorough and accurate. The WHO has published some guidelines for interventions that should be dialogue-based and directly targeted to the unvaccinated or under-vaccinated populations and to specific populations, such as healthcare providers. Some of these strategies include: engagement of religious or other influential leaders to promote vaccination in the community; social mobilisation; use of mass media; improving convenience and access to vaccinations; mandating vaccinations with sanctions for non-vaccination; employing reminders and follow-up; communications training for health-care providers; non-financial incentives; and increasing the public's awareness of the bene-

fits of vaccination. As mentioned above, the media plays an important role in providing information about vaccinations. For instance, a study showed that the timing and annual receipt of influenza vaccination appear to be influenced by media coverage, particularly by headlines and specific reports on shortages/delays [50]. Another study suggested that social networks, and particularly parents' social or peer networks, play an important role in parents' decision-making about vaccinations [51]. Finally, other research has shown that technology can be effectively applied to improve vaccination uptake and coverage. Indeed, considering the ubiquity and portability of mobile phones and the relatively low cost of text messaging, their use might be successfully adapted to prevention programmes in the field of immunization [52]. Differently from the text messages that are 'one-way' communication tools with limited potential for interaction and discussion, social media are internet-based 'user-centred' applications that allow users to play an active role in the creation and exchange of information [23]. All this web-based technology should be supported and funded by Governments to serve epidemiologists, public health experts and other scientists in their work. Politicians and public health experts should play a central role in informing the public and should use the media to do this so people can make informed decisions. Conversely, politics are largely influenced by what appears in 'old' media, such as television, radio and newspapers, and 'new' media such as social networks and the Internet, which can set the agenda immunization, influencing the public and policymakers alike [53]. For instance, many politics are now supporting the idea that parents 'should have some measure of choice' on whether to vaccinate their children [54]. However, parents making decisions must be really informed to avoid that misinformed choices can lead to disastrous consequences. Therefore, parental concerns must be addressed. A well-informed pediatrician who effectively addresses parental concerns and strongly supports the benefits of vaccination has enormous influence on parental vaccine acceptance [55]. Furthermore, politicians and health experts should not look at media. They should work outside of the public gaze for the greater good of the community. In conclusion, the relationship between the media and politics can have a significant impact on the vaccination coverage. Policy makers should use the 'old' and 'new' media for improving health-related information that can reinforce vaccination coverage, because the wrong media campaigns can be more dangerous than Wakefield's work. Traditional and new media cannot become the new 'policy makers' on important vaccination issues. Probably, this is a new challenge for global public health. Indeed, it is really paradoxical that in developing countries, the lack of vaccinations due to economic reasons is leading to a huge burden in terms of child morbidity, disability and mortality, and in well-developed countries where there are no economic troubles, the risk of vaccinating children is perceived as greater than the potential benefit.

References

1. Greenwood. The contribution of vaccination to global health: past, present and future. Phil Trans R Soc B. 2014;369. doi: 20130433.
2. United Nations Department of Economic and Social Affairs (UNDESA). The human right to water and sanitation [updated 2014 May 29; cited 2017 Feb 14]. Available from: http://www.un.org/waterforlifedecade/human_right_to_water.shtml.
3. Plotkin SL, Plotkin SA. A short history of vaccination. In: Plotkin SA, Orenstein WA, eds. Vaccines, 4th edn. Philadelphia: WB Saunders; 2004:1–15.
4. Edwards D. J Small Anim Pract. 2004;45(11):535.
5. Wakefield AJ, Murch SH, Anthony A, Linnell J, Casson DM, Malik M, et al. Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. Lancet. 1998;351:637–41.
6. Taylor B, Miller E, Farrington CP, Petropoulos MC, Favot-Mayaud I, Li J, et al. Autism and measles, mumps, and rubella vaccine: No epidemiologic evidence for a causal association. Lancet. 1999;353:2026–2029.
7. Dales L, Hammer SJ, Smith NJ. Time trends in autism and in MMR immunization coverage in California. JAMA. 2001;285:1183–1185.
8. Murch SH, Anthony A, Casson DH, Malik M, Berelowitz M, Dhillon AP, et al. Retraction of an interpretation. Lancet. 2004;363:750.
9. Horton R. A statement by the editors of The Lancet. Lancet. 2004;363:820–821.
10. General Medical Council. Determination on Serious Professional Misconduct (SPM) and sanction: Dr Andrew Jeremy Wakefield [cited 2017 Feb 14]. Available from: http://www.gmc-uk.org/Wakefield_SPM_and_SANCTION.pdf_32595267.pdf.
11. Godlee F. The fraud behind the MMR scare. BMJ. 2011;342:d22.
12. Sathyanarayana Rao TS, Andrade C. The MMR vaccine and autism: Sensation, refutation, retraction, and fraud. Indian J Psychiatry. 2011 Apr-Jun;53(2):95–96. doi: 10.4103/0019-5545.82529.
13. Smith MJ, Ellenberg SS, Bell LM, Rubin DM. Media coverage of the measles-mumps-rubella vaccine and autism controversy and its relationship to MMR immunization rates in the United States. Pediatrics. 2008;121(4):e836-e843.
14. Speers T, Lewis J. Journalists and jabs: media coverage of the MMR vaccine. Commun Med. 2004;1(2):171–181.
15. Vasconcellos-Silva PR, Castiel LD, Härter Griep R. The media-driven risk society, the anti-vaccination movement and risk of autismo. Cien. Saude Coletiva. 2015;20(2). doi: 10.1590/1413-81232015202.10172014.
16. WHO. What are some of the myths- and facts- about vaccination? [updated 2016 March; cited 2017 Feb 14]. Available from: http://www.who.int/features/qa/84/en/.
17. Lancet retracts 12-year-old article linking autism to MMR vaccines. Eggertson L. CMAJ. 2010 Mar 9;182(4):E199-200.
18. Center for Disease Control and Prevention. Measles Cases and Outbreaks [updated 2017 March 06; cited 2017 Feb 14]. Available from: https://www.cdc.gov/measles/cases-outbreaks.html.
19. Sharfstein JM. Of mouse and measles. JAMA. 2015;313(15):1504–1505. doi:10.1001/jama.2015.1135. Available from: http://jamanetwork.com/journals/jama/fullarticle/2275433.
20. Lieu TA, Ray GT, Klein NP, Chung C, Kulldorff M. Geographic Clusters in Underimmunization and Vaccine Refusal. Pediatrics. February 2015;135(2). Available from: http://pediatrics.aappublications.org/content/135/2/280.
21. Majumder MS, Cohn EL, Mekaru SR, Huston JE. Substandard Vaccination Compliance and the 2015

Measles Outbreak. JAMA Pediatr. 2015;169(5):494-495. doi:10.1001/jamapediatrics.2015.0384.

22. Plans-Rubió P. Evaluation of the establishment of herd immunity in the population by means of serological surveys and vaccination coverage. Hum Vaccin Immunother. 2012;8(2):184–188.
23. Odone A, Ferrari A , Spagnoli F, Visciarelli S, Shefer A, Pasquarella C, et al. Effectiveness of interventions that apply new media to improve vaccine uptake and vaccine coverage. Hum Vaccin Immunother. 2015 Jan;11(1):72–82. doi: 10.4161/hv.34313.
24. Tony Yang Y, Delamater PL, Leslie TF, Mello MM. Sociodemographic predictors of vaccination exemptions on the basis of personal belief in California. Am J Public Health. 2016;106(1):172–177.
25. University of the Witwatersrand. Johannesburg. WHSL Evaluating Web Sites for Health Information: Dangers of Web-Based Health Information [cited 2017 Feb 14]. Available from: http://libguides.wits.ac.za/whsl-websiteeval.
26. George DR, Rovniak LS, Kraschnewski JL. Dangers and opportunities for social media in medicine. Clin Obstet Gynecol. 2013 Sep;56(3):10.1097/GRF.0b013e318297dc38.
27. Christakis NA, Fowler JH. Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives. New York: Little Brown; 2009.
28. A case of junk science, conflict and hype. Nature Immunology. 2008;9:1317. doi. 10.1038/ni1208-1317.
29. Osborne H. Why are anti-vaxxers so persuasive? Pseudoscience, misinformation and healthy behaviour. International Business Times [Newspaper on the Internet]. 2015 Nov 03 [cited 2017 Feb 14]. Available from: http://www.ibtimes.co.uk/why-are-anti-vaxxers-so-persuasive-pseudoscience-misinformation-healthy-behaviour-1527034.
30. WHO. Global Vaccine Safety. Six common misconceptions about immunization [cited 2017 Feb 14]. Available from: http://www.who.int/vaccine_safety/initiative/detection/immunization_misconceptions/en/.
31. WHO. Immunization, Vaccines and Biologicals. Addressing Vaccine Hesitancy [cited 2017 Feb 14]. Available from: http://www.who.int/immunization/programmes_systems/vaccine_hesitancy/en/.
32. Rees H, Madhi SA. Will the Decade of Vaccines mean business as usual? Lancet. 2011;378:382–385. doi: 10.1016/S0140-6736(11)60710-1.
33. Velan B. Acceptance on the move: public reaction to shifting vaccination realities. Hum Vaccin. 2011;7:1261–1270. doi: 10.4161/hv.7.12.17980.
34. Dubé E, Laberge C, Guay M, Bramadat P, Roy R, Bettinger JA. Vaccine hesitancy: An overview. Hum Vaccin Immunother. 2013;9(8):1763–1773. doi:10.4161/hv.24657.
35. Smith A, Yarwood J, Salisbury DM. Tracking mothers' attitudes to MMR immunisation 1996-2006. Vaccine. 2007 May 16;25(20):3996-4002.
36. Mason BW, Donnelly PD. Impact of a local newspaper campaign on the uptake of the measles mumps and rubella vaccine. J Epidemiol Community Health. 2000 Jun;54(6):473–474.
37. Edwards-Levy A, Delaney A. Americans aren't with Donald Trump on vaccines. The Huffington Post [Newspaper on the Internet]. 2017 Jan 19 [cited 2017 Feb 14]. Available from: http://www.huffingtonpost.com/entry/donald-trump-vaccines-poll_us_58812730e4b096b4a230a361.
38. Kabat G. Trump, Vaccines, and Science under threat. Forbes [Newspaper on the Internet]. 2017 Jan 30 [cited 2017 Feb 14]. Available from: https://www.forbes.com/sites/geoffreykabat/2017/01/30/science-under-threat/#14e104f92527.
39. Allen A. RKK Jr says Trump still wants 'vaccine safety commission'. Politico [Newspaper on the Internet]. 2017 Feb 15 [cited 2017 Feb 28]. Available from: http://www.politico.com/story/2017/02/robert-f-kennedy-jr-trump-vaccine-safety-commission-235058.
40. Sun LH. Trump's vaccine views are at odds with those of most Americans, study says. The Washington Post [Newspaper on the Internet]. 2017 Feb 6 [cited 2017 Feb 28]. Available from: https://www.washingtonpost.com/news/to-your-health/wp/2017/02/02/trumps-vaccine-views-at-odds-with-those-of-most-americans-study-says/?utm_term=.a37237d91f8d.

41. FederFarma. Meningite, nei dati di QuintilesIms il boom della domanda di vaccini. [cited 2017 Feb 28]. Available from: https://www.federfarma.it/Edicola/Filodiretto/VediNotizia.aspx?id=13778.

42. European Centre for Disease Prevention and Control. Invasive meningococcal disease. Annual epidemiological report. Reporting on 2014 data [cited 2017 Feb 28]. Available from: http://ecdc.europa.eu/en/healthtopics/meningococcal/Pages/Annual-epidemiological-report-2016.aspx#sthash.1ApW3GvS.dpuf.

43. Ministry of Health. Rome: Istituto Superiore di Sanità. Dati di sorveglianza delle malattie batteriche invasive aggiornati al 16 novembre 2016 [cited 2017 Feb 28]. Available from: http://www.iss.it/binary/mabi/cont/Report_MBI_20161116_v11.pdf.

44. Margotttini L. New vaccination strategy stirs controversy in Italy. Science [Newspaper on the Internet]. 2015 Dec 07 [cited 2017 Feb 28]. Available from: http://www.sciencemag.org/news/2015/12/new-vaccination-strategy-stirs-controversy-italy.

45. Signorelli C, Chiesa V, Odone A. Meningococcal serogroup B vaccine in Italy: state-of-art, organizational aspects and perspectives. J Prev Med Hygiene. 2015;56(3):E125-E132.

46. World Health Organization Regional Office for Europe. 4th meeting of the European Regional Verification Commission for Measles and Rubella Elimination (RVC): 26-29 October 2015, Copenhagen, Denmark. Geneva: World Health Organization, 2016 [cited 2017 Feb 28]. Available from: http://www.euro.who.int/en/health-topics/communicable-diseases/measles-and-rubella/publications/2016/4th-meeting-of-the-european-regional-verificationcommission-for-measles-and-rubella-elimination-rvc.

47. European Centre for Disease Prevention and Control. Surveillance and Disease data [cited 2017 Feb 28]. Available from: http://ecdc.europa.eu/en/healthtopics/measles/epidemiological_data/pages/annual_epidemiological_reports.aspx#sthash.7kUjVhBp.dpuf.

48. Italian Ministry of Health. Cnesps. Istituto Superiore di Sanità. Le coperture vaccinali in Italia nel 2014: qualche riflessione [cited 2017 Feb 28]. Available from: http://www.epicentro.iss.it/temi/vaccinazioni/Coperture2015.asp.

49. Holland MS. Recent Italian Court Decisions on Vaccines and Autism [cited 2017 Feb 28]. Available from: http://www.ageofautism.com/2015/01/recent-italian-court-decisions-on-vaccines-and-autism.html.

50. Yoo BK, Holland ML, Bhattacharya J, Phelps CE, Szilagyi PG. Effects of Mass Media Coverage on Timing and Annual Receipt of Influenza Vaccination among Medicare Elderly. Health Serv Res. 2010;45:1287–1309. doi:10.1111/j.1475-6773.2010.01127.x.

51. Brunson EK. The impact of social networks on parents' vaccination decisions. Pediatrics. 2013 May;131(5):e1397-1404. doi: 10.1542/peds.2012–2452. Epub 2013 Apr 15.

52. 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; 9:2634–2642.

53. Gollust SE, LoRusso SM, Nagler RH, Fowler EF. Understanding the role of the news media in HPV vaccine uptake in the United States: Synthesis and commentary. Hum Vaccin Immunother. 2016;12(6):1430–1434.

54. Barbaro M. Christie Says Parents Should Have 'Choice' on Vaccinations. The New York Times [Newspaper on the Internet]. 2015 Feb 02 [cited 2017 Feb 28]. Available from: https://www.nytimes.com/politics/first-draft/2015/02/02/christie-says-parents-should-have-choice-on-vaccinations/.

55. Edwards KM, Hackell JM, THE COMMITTEE ON INFECTIOUS DISEASES, THE COMMITTEE ON PRACTICE AND AMBULATORY MEDICINE. Countering Vaccine Hesitancy. Pediatrics. 2016;138(3):e20162146. doi: 10.1542/peds.2016-2146.