


RESEARCH PAPER



Parents' attitude, awareness and behaviour towards influenza vaccination in Pakistan

Allah Bukhsh^a, Habib Rehman^b, Tauqeer Hussain Mallhi^c, Humera Ata^d, Inayat Ur Rehman^e, Learn-Han Lee^{f,g}, Bey-Hing Goh^{f,g}, and Tahir Mehmood Khan ^f

^aInstitute of Pharmaceutical Sciences, University of Veterinary and Animal Sciences, Lahore, Pakistan; ^bDepartment of Physiology, University of Veterinary and Animal Sciences, Lahore, Pakistan; ^cDiscipline of Clinical Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Pulau Penang, Malaysia; ^dMaternal, new born, and child health (MNCH) project coordinator at Frontier Primary Health Care, Mardan, Pakistan; ^eDepartment of Pharmacy, Abdul Wali Khan University Mardan, Pakistan; ^fSchool of Pharmacy, Monash University Malaysia, Bandar Sunway, Selangor Darul Ehsan, Malaysia; ^gNovel Bacteria and Drug Discovery Research Group (NBDD) and Biofunctional Molecule Exploratory Research Group (BMEX)

ABSTRACT

National immunization program of Pakistan does not include Influenza vaccines. The low rate of immunization might be attributed to the poor knowledge of influenza vaccination in Pakistan. Current study was aimed to assess the knowledge and attitude of influenza vaccination among parents. A questionnaire-based cross sectional study was conducted among randomly selected parents with at least one child aged >6 months. The responses were recorded against 27 items questionnaire assessing knowledge, perception, attitude and behaviours of parents. Data were analysed by using appropriate statistical methods. A total 532 responses were recorded with male gender preponderance (65%). Most of the parents (61.1%) reported that their children had received or planned to receive all recommended vaccines in Expanded Program on Immunization (EPI) of Pakistan. Only one third of the parents (24.4%) were aware of the availability of influenza vaccines in Pakistan, and very few (6.6%) reported vaccinating their child against influenza. Exploring the parents' attitudes regarding children vaccination, the top motivator was 'immunization is important to keep my children healthy' (relative index = 0.93, $p < 0.000$). However, substantial number of parents believed that influenza is not a serious disease (18.5%) and vaccines are accompanied by several side effects (24.6%). A positive attitude was reflected among parents who were aware of influenza vaccines in Pakistan. About 35% participants believed that influenza vaccines are not required for healthy children. Current study demonstrated very low vaccination rate against influenza. Awareness and health literacy regarding influenza vaccine is poor among parents. These findings necessitate the need to appropriately structured awareness programs regarding influenza vaccination among parents.

ARTICLE HISTORY

Received 14 August 2017
Revised 15 November 2017
Accepted 4 December 2017

KEYWORDS

Influenza; expanded program on immunization; knowledge; vaccine; Pakistan

Introduction

Influenza, more commonly referred as "flu", is a highly contagious viral infection of the nose, throat and lungs that impacts people of all ages and occurs in late fall, winter and early spring.¹ The spectrum of illness ranges from mild self-limiting disease to serious infection, and at times can lead to death, particularly in high risk individuals.^{2,3} The global annual prevalence of influenza is 5–10% in adults and 20–30% in children. Annual epidemics of this disease result in about 3–5 million cases of serious illness and approximately 500,000 cases of death.⁴ Pakistan is the 6th most populous country of the world with almost 40% of urban population where influenza virus spreads in early October and its prevalent activity raised to maximum by the end of the year.⁵ The influenza viruses are prevalent across Pakistan and affect all age groups.⁵ The menace of influenza is not much differs in Pakistan where acute respiratory tract infections are one of the leading causes of death in children aged less than five years (20 – 30% child deaths).⁶ Since November 2015, 28 deaths have been reported in Pakistan secondary to infection by influenza A (H1N1)pdm09 virus (7). It must be noted that this figure only represents laboratory-confirmed decedents rather than the actual influenza-associated mortality.

In 2016, the National Institute of Health (NIH) Pakistan tested 300 samples across the country and found 110 positive samples.⁷

The Centres for Disease Control and Prevention (CDC) recommends a yearly flu vaccination as the first and most important step in protecting against flu and its potentially serious complications.⁸ To date, there is no official influenza vaccine policy in Pakistan. The expanded program on immunization (EPI), established in 1976, includes vaccination against six health threats including tuberculosis, poliomyelitis, diphtheria, tetanus, pertussis and measles. At present national immunization policy does not include vaccination against influenza.⁹ Results of recent investigation suggest that vaccination reduced the risk of influenza-associated death among children and adolescents and add to the evidence of benefits of influenza vaccination for children. Annual vaccination is an important strategy to prevent influenza and influenza-associated complications and deaths. These results support current recommendations for annual influenza vaccination for all children ≥ 6 months of age.¹⁰ Since children are considered a high risk group for influenza infection, only 59–73% of them are fully immunized in Pakistan.¹¹ Although, vaccines are available for both type A and B influenza viruses but lack of public

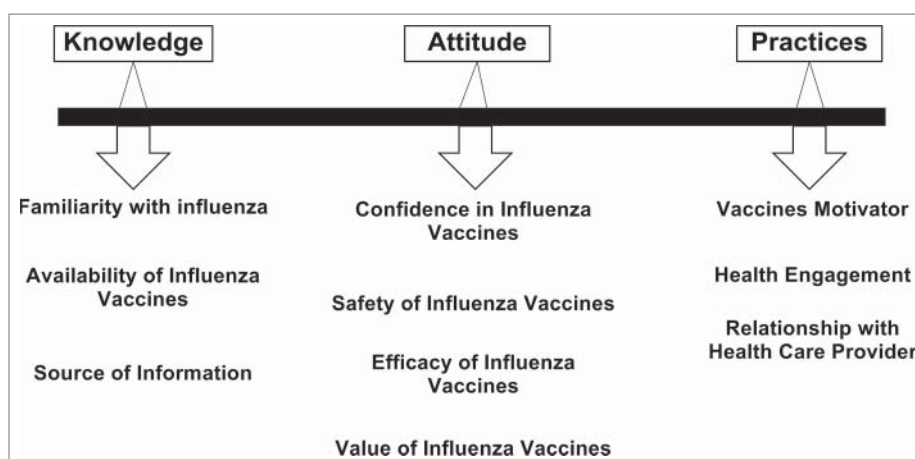


Figure 1. Reported sources of information for parents for influenza vaccine (N = 213).

Table 1. Demographics of respondents participated in survey N = 532.

Demographics	N (%)
Gender	
Male	346 (65%)
Female	186 (35%)
Age	
18–24 years	76 (14.3%)
25–34 years	251 (47.2%)
35–44 years	148 (27.8%)
45–54 years	46 (8.6%)
55 ≥ years	11 (2.1%)
Education Level	
Primary or less	64 (12.0%)
Secondary School Certificate (SSC)	90 (16.9%)
Higher Secondary School Certificate (HSSC)	129 (24.2%)
Graduation	167 (31.4%)
Maters & above	82 (15.4%)
Household Income	
<15,000 PKR	47 (8.8%)
15,000–24,999PKR	88 (16.5%)
25,000–39,999PKR	119 (22.4%)
40,000–59,999PKR	77 (14.5%)
≥60,000 PKR	83 (15.6%)
Did not know / refused	118 (22.2%)
Are you aware with Influenza / Flu?	
Yes	437 (82.1%)
No	95 (17.9%)
Do you know influenza Vaccine available in Pakistan?	
Yes	130 (24.4%)
No	402 (75.6%)

awareness is one of the main factors contributing to poor immunization in Pakistan. The primary objective of the current study was to evaluate the awareness and attitude of general public regarding influenza vaccination in Pakistan (Fig. 1).

Results

A total of 532 respondents were approached for this survey. Majority of the respondents were males and had age group between 25 to 34 years. Most of the study participants were graduated and were familiar with influenza. However, only one fourth respondents were aware that influenza vaccines are available in Pakistan. Demographics of study participants are described in Table 1. The knowledge of influenza was equally distributed between male and female gender ($p = 0.216$). Similarly, awareness of the availability of influenza vaccines did not differ between both genders ($p = 0.590$).

In order to explore that parent’s attitude towards influenza vaccination, responses against four items were recorded on Likert Scale. Majority of the study population agreed that routine vaccination is the best way to prevent disease spread and this response was significantly associated with the parent’s education while insignificant association was observed with parent’s age. Similarly, more than 80% of study participants were agreed to the safety and health benefits of influenza vaccines. About 96% respondents considered vaccination as appropriate measure to be considered. Interestingly, parent’s education was statistically associated with all four domains. Relative index (RI) was used to estimate the importance of identified statements. Among all four statements, the item “immunization is important to keep my children healthy” ranked first (RI = 0.93). The RI and ranks for all other three domains are shown in Table 2.

Figure 2 shows the sources of information of influenza vaccines among study participants. The primary source of

Table 2. Parents attitudes towards vaccination for their children (N = 532).

Statement	SA	A	N	D	SD	RI	Rank	p-value*	p-value**
Routine vaccination is the best way to prevent disease spread?	272 (51.5%)	208 (39.1%)	38 (7.1%)	2 (0.4%)	10 (1.9%)	0.87	3	0.000	0.54
The vaccines that are recommended by my child’s health care provider are safe?	238 (44.8%)	228 (42.9%)	54 (10.2%)	9 (1.7%)	0	0.86	4	0.000	0.09
Immunization is important to keep my children healthy?	300 (56.4)	206 (38.7%)	26 (4.9%)	0	0	0.93	1	0.000	0.04
Getting my child vaccinated is the right thing to do?	326 (61.3%)	189 (35.5%)	15 (2.8%)	1 (0.2%)	1 (0.2%)	0.91	2	0.000	0.21

SA = Strongly Approve, A = Approve, N = Neutral, D = Disapprove, SD = Strongly Disapprove. RI = Relative index.

Kruskal wallis test was applied, ¶ p-value < 0.05 was considered statistically significant. *Grouping variable Parents education, **Grouping variable Parents age

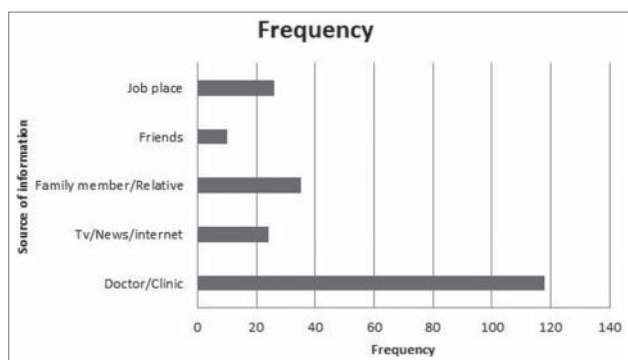


Figure 2. General public knowledge, attitude and practices towards influenza and its vaccination.

information was doctors or attending clinics followed by family members or relatives.

A large proportion of study population (61%) had planned to fully vaccinate their child according to EPI while 13% respondents had no vaccination plan for their children. Both parent's age and education were significantly associated with the plan of vaccination (Table 3). When protection measures against influenza were inquired, most the participants reported antibiotics (37%) and paracetamol (19.7%) as effective management of flu. About 35% respondents reported that their children have recently completed EPI. Confirmed vaccination rate was very low (6.6%) in the current study and approximately 30% parents were not sure whether their child receive influenza

vaccines. The details of vaccination status and flu prevention knowledge among study participants are described in Table 3.

Regarding behaviours of parents towards influenza most of the participants agreed that vaccines are effective and safe against influenza, while 25% parents were worried about the side effects. Out of 11 items inquired from the respondents, the behaviour "my child has had all their routine vaccines" ranked first with RI = 0.91 followed by item number 2 and 6 as described in Table 4. The least ranked behavior was item number 8 stating "I don't believe that children should have any vaccinations".

Discussion

This study demonstrates the knowledge, perception and attitude of parents towards influenza vaccines in most populated and largest province of Pakistan. The knowledge of influenza vaccination and awareness of its availability was equally distributed in both male and female gender. Our results indicate that the positive attitude of the parents towards vaccination was significantly associated with the education level, where most of the parents considered immunization as an important measure to keep their children healthy. Although most of the parents reported to had full vaccination plan for their children according to EPI but the confirmed vaccination rate was very low (6.6%) in the current study. Substantial number of parents believed that influenza is not a serious disease (18.5%) and vaccines are accompanied by several side effects (24.6%). These

Table 3. Vaccination status and flu prevention knowledge of the parents (N = 532).

Statement	N (%)	Parents age	Parents Education
Reported vaccination plans for youngest child			
Plan to get/have all recommended vaccines according to Expanded Program on Immunization (EPI) of Pakistan	325 (61.1%)	0.001	<0.001
Plan to get some recommended vaccines in addition to Expanded Program on Immunization (EPI)	136 (25.6%)		
Plan to get none of the recommended vaccines	71 (13.3%)		
Do you know how to protect your child from influenza /flu?			
By using Paracetamol	105 (19.7%)	0.113	<0.001
By using Antibiotics/medicines	197 (37.0%)		
With the help of influenza vaccine	86 (16.2%)		
No need of any remedy as it is not a serious disease	144 (27.1%)		
Have your child ever received influenza / flu vaccine?			
Yes	35 (6.6%)	0.006	<0.001
No	153 (28.8%)		
Just completed EPI but no influenza vaccine	187 (35.2%)		
Do not know	157 (29.5%)		

Chi-square test was applied, ¶ p-value<0.05 was considered statistically significant.

Table 4. Parent's behaviours towards influenza vaccination for their children (N = 130).

Item No.	Statement	Agree	Neutral	Disagree	RI	Rank	p-value*	p-value**
1	Influenza is a mild disease and does not need vaccination	24 (18.5%)	29 (22.3%)	24 (18.5%)	0.52	9	0.127	0.532
2	Vaccine is safe and effective measure to protect your child against influenza	89 (68.5%)	35 (26.9%)	5 (3.8%)	0.88	2	0.465	0.483
3	I am worried about side effects of the influenza vaccine	32 (24.6%)	52 (40%)	45 (34.6%)	0.63	6	0.95	0.432
4	It is better to have natural immunity against influenza	85 (65.4%)	29 (22.3%)	15 (11.5%)	0.85	4	0.659	0.991
5	Healthy young children should not get an influenza vaccine	44 (34.8%)	31 (23.8%)	51 (39.2%)	0.65	5	0.10	0.364
6	Children who have a chronic disease should get an influenza vaccine	89 (68.5%)	31(23.8%)	10 (7.7%)	0.87	3	0.135	0.107
7	My child has had all their routine vaccines	101 (77.7%)	15 (11.5%)	10 (7.7%)	0.91	1	0.708	0.365
8	I don't believe that children should have any vaccinations	15 (11.5%)	9 (6.9%)	103 (79.2%)	0.44	11	0.585	0.388
9	It is inconvenient to get an influenza vaccine	23 (17.7%)	34 (26.2%)	73 (56.2%)	0.54	8	0.594	0.176
10	Getting two needles in the first year is difficult to organize	32 (24.6%)	31 (23.8%)	67 (51.5%)	0.58	7	0.05¶	0.019¶
11	I am too busy to get my child vaccinated against influenza	24 (18.5%)	1 (0.8%)	105 (80.8%)	0.46	10	0.908	0.755

RI = Relative index. Kruskal Wallist test was applied, ¶ p-value<0.05 was considered statistically significant. *Grouping variable Parents education, **Grouping variable Parents age

findings illustrate that parents are quite positive towards influenza vaccination but had minimal knowledge and information on its safety, availability and significance.

The annual epidemics of influenza caused up to 500,000 deaths in 2016. According to an estimate influenza related respiratory complications are considered as primary factors of mortality in children with age of five years.¹² Since immunization is most influential and cost effective interventions for infectious diseases, influenza vaccination is major plan to protect general populations against morbidity and mortality associated with influenza.⁹ Centre of Disease Control and Prevention (CDC) recommends annual vaccination against influenza from age > 6 months.¹³

In Pakistan influenza vaccine is not included in routine immunization plan. Present study demonstrates that most of the parents got vaccine information from attending physician or clinic. These findings are in concordance with a Singaporean study reporting doctors and clinics as primary source of influenza vaccination.¹⁴ In another Italian study parent's awareness about influenza vaccination was primarily contributed to the physicians followed by magazines/leaflets and television.¹⁵ Similarly, another study support that physicians are major source of information for parents about influenza vaccination.¹⁶ However, the findings of Jung *et al.* demonstrate mass media (television, internet and magazines) as a source of high vaccination awareness among parents.¹⁷ Recent investigation by Ramprasad *et al.* also demonstrated that parents opted for influenza vaccination due to recommendation by physicians or consultants.¹⁸ These findings highlight that paediatrics and physicians play pivotal role in awareness of influenza vaccines among parents. However, aggressive manoeuvres at national level should be carried out to educate general community on the importance of influenza vaccines.

In our study, most of respondents were aware of influenza but very few were familiar with the availability of influenza vaccines. Though, majority of the participants in the current study have intention to get all vaccines according to national EPI but very few planned to get influenza vaccines. It might be attributed to the lack of knowledge of vaccines availability. Most of the participants in our study believed that use of paracetamol, antibiotics and other medications can protect their children from influenza. These findings are aligned with the results of another study stating painkillers and antihistamines as protective measures against influenza.¹⁹ Furthermore, about one fourth of study population in our cohort believed that influenza is not a serious disease and there is no need of any remedy. These findings are in agreement with the results of another study where 44.3% parents did not consider influenza as a serious disease.²⁰ The vaccination rate in the current study was 6.6% which might be attributing to the poor knowledge of vaccines and negative perception of parents towards the need of vaccines. Another negative behaviour of parents in the present study was concern that influenza vaccinations cause side effects. Similar findings are observed in a study conducted in Saudi Arabia, in which 90% parents avoid influenza vaccines due to their side effects.²¹ Many other studies have also reported that parents believe on side effects of influenza vaccines is important factor of low vaccination rate.²²⁻²⁴ In Pakistan, the rate of influenza vaccination is quite low.⁹ and it may result major

outbreaks in future. Health authorities should take stern measures to educate people and to counsel parents for their negative beliefs on vaccination. World health organization recommends vaccination against influenza in high risk groups including health care professionals, geriatric patients, children and pregnant women.¹² Influenza is more fatal for children as the immune systems for children are not yet fully developed so have higher chances of being at risk of developing flu related complications. Our finding reveals that majority of respondents don't know about the availability of influenza vaccines in Pakistan and appropriate measures for influenza management or protection. Moreover, parents had negative beliefs against influenza vaccination which primarily contributed to the low vaccination rate in the present study. Public awareness and educational programs should be launched for parents to equip them with proper understanding about influenza vaccine and its benefits for children. These campaigns should be launched at door step to educate parents about the hazards of flu and to counsel for hesitancy against influenza vaccination. Influenza vaccines should be available in all health care units at affordable price and health care professionals should be encouraged to educate parents. Since expanded program on immunization (EPI) is implemented in Pakistan, a national policy should be designed by health regulatory authorities to include influenza vaccines along with other six vaccines in EPI. Health care professionals should promote influenza vaccination and focus on high risk groups such as the elderly, pregnant, women and children. Convincing and educating the parents and follow-up regarding influenza shot will further improve vaccination rates in Pakistan. As majority of population in Pakistan is living below the poverty line, therefore government should provide free of cost vaccination and incentivize those parents who successfully protected their children against influenza by vaccination.

There are few limitations of the current study. This study is conducted in Lahore, one of the metropolises of Pakistan. Lahore is located in Punjab Province and is a major center of education in Pakistan. Moreover, the administrative services and health facilities are quite better in Lahore as compared to other cities of Pakistan. It might be possible that education and liberal level of residents of Lahore preclude generalizability of the findings of current study to the other cities of Pakistan. In addition, influenza vaccination status was self-reported by the respondents, not subject to independent verification and potentially influenced by social desirability bias. Moreover, majority of study population consists of males and propensity of gender bias cannot be disregarded while interpreting the results. However, this is the first study conducted in Pakistan to assess the parents' attitude, awareness and behavior towards influenza vaccination. We recommend large studies by including participants from all provinces of Pakistan in order to confirm these findings and to ascertain the factual scenario of vaccination rate and barriers of vaccination.

Conclusion

Influenza vaccination rate was very low in the current study and it might be attributed to the lack of knowledge of vaccines availability and negative perception or behaviour of parents

towards influenza vaccination. The primary source of information of influenza vaccines was physicians. The low immunization rate and poor knowledge of influenza vaccines in Pakistan may subject serious outbreaks in future. These findings necessitate the urgent need of national and provincial educational programs or campaigns on influenza vaccination in Pakistan. Moreover, influenza vaccination should be included in national immunization program.

Methodology

A cross-sectional study was conducted among parents to assess the awareness, attitude and behaviour towards influenza vaccination in Pakistan. A convenient sampling method was adopted and study was approved by the Research Ethics Committee of University of Veterinary and Animal Sciences, Pakistan and all the study procedures are in accordance with the Helsinki Declaration of 1975.

Study tool

A 27 items questionnaire was designed for the purpose of current study. Face validity was performed among 20 respondents. The tool content adequacy was measured using Bartlett test of sphericity. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is an effective technique for judging content adequacy. In this study the Kaiser-Meyer-Olkin was 0.653 with Chi-Square value ($X^2 = 435.27$) and Bartlett's test of sphericity showed significant value ($df = 210$, $p < 0.001$) for accuracy of the contents. As the Kaiser-Meyer-Olkin value in this study was more than 0.6, therefore the contents of the tool were satisfactory to meet the study specifications.

The questionnaire was comprised of four sections, section one had five items of demographic information and reported vaccination plans for youngest child. Section two had four questions about attitudes and behaviours regarding vaccination among children using five item likert scale. Section three comprised of five questions related to sources of influenza and vaccine information for parents. Section four contained eleven questions related to attitudes and behaviours regarding influenza vaccination for children on a three item likert scale.

Data source

Our data collection and analysis was based on the comprehensive interviews of the parents and the care takers of the children. Demographics of the population and their background were also kept in mind throughout the research/activity process which are of great importance especially when dealing with major health issues. The questionnaire was administered to only those respondents who had at least one child and consented to participate in the survey. However, respondents who were not willing to participate were excluded for this study.

Data analysis

All the analysis were performed by using SPSS 22.0.0. Categorical data were presented as frequency (N) along with percentages (%). Continuous data were presented as means

(standard deviation) and median, depending upon the data normality. Kruskal Wallis test was used for the scores of parent's attitudes and behaviour towards vaccination and Chi-square test was applied for parents vaccination and flu prevention knowledge. Relative importance index (RII) was used ($RII = \frac{\sum W}{A * N}$ ($0 \leq RII \leq 1$)). The items were ranked on the basis of the RII values, where item with value closest to one considered as main attitude towards vaccination.

In RII equation, W is the weight given to each factor by the respondents and ranges from 1 to 5 (where "1" is "strongly disagree" and "5" is "strongly agree"); A - is the highest weight (for example 5 in this case) and; N - is the total number of respondents. P-value of < 0.05 (two-tailed test) was considered as criterion of statistical significance.

Disclosure of potential conflicts of interest

The authors declare no potential conflicts of interest.

ORCID

Tahir Mehmood Khan  <http://orcid.org/0000-0003-0081-1957>

References

- Centers for Disease Control and Prevention. (2017). *Key Facts About Influenza (Flu)*. Retrieved from <https://www.cdc.gov/flu/keyfacts.htm>.
- Centers for Disease Control and Prevention. (2017). About Flu. Retrieved from <https://www.cdc.gov/flu/about/index.html>.
- Taubenberger JK, Morens DM. The Pathology of Influenza Virus Infections. *Annual Review of Pathology*. 2008;3:499–522. doi:10.1146/annurev.pathmechdis.3.121806.154316. PMID:18039138.
- <http://www.who.int/mediacentre/factsheets/fs211/en/>. [Accessed 14 September 2017]
- Aamir UB, Badar N, Mehmood MR, Nisar N, Suleman RM, Shaikat S, Sharif S, Kamran J, Zaidi SS, Kazi BM, et al. Molecular epidemiology of influenza A (H1N1) pdm09 viruses from Pakistan in 2009–2010. *PloS One*. 2012;7(8):e41866. doi:10.1371/journal.pone.0041866. PMID:22916112.
- Al-Bakri AG, Bustanji Y, Yousef A-M. Community consumption of antibacterial drugs within the Jordanian population: Sources, patterns and appropriateness. *International Journal of Antimicrobial Agents*. 2005;26(5):389–395. doi:10.1016/j.ijantimicag.2005.07.014. PMID:16221541.
- <http://www.thenews.com.pk/print/92406-No-swine-flu-outbreak-in-the-regionMinistry-of-Health-WHO-belatedly-clarify>. [Accessed 14 July 2017]
- <https://www.cdc.gov/mmwr/volumes/66/rr/rr6602a1.htm#introduction> [Accessed 16 July 2017]
- Hirve S, Lambach P, Paget J, Vandemaele K, Fitzner J, Zhang W. Seasonal influenza vaccine policy, use and effectiveness in the tropics and subtropics—a systematic literature review. *Influenza and Other Respiratory Viruses*. 2016;10(4):254–267. doi:10.1111/irv.12374. PMID:26842617.
- Flannery B, Reynolds SB, Blanton L, Santibanez TA, O'Halloran A, Lu PJ, Singleton JA. Influenza Vaccine Effectiveness Against Pediatric Deaths: 2010–2014. *Pediatrics*. 2017;139(5):e20164244. doi:10.1542/peds.2016-4244. PMID:28557757.
- Farrukh MJ, Ming LC, Zaidi ST, Khan TM. Barriers and strategies to improve influenza vaccination in Pakistan. *Journal of Infection and Public Health*. 2017;10(6):881–883. doi:10.1016/j.jiph.2016.11.021. PMID:28185822.
- World Health Organization (2016). *Influenza (Seasonal)*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs211/en/>.
- Centre of Disease Control and Prevention (2017). *Prevention and Control of Seasonal Influenza with Vaccines* [Online]. Available:

- <https://www.cdc.gov/flu/professionals/acip/index.htm> [Accessed 20th January 2017].
14. Low M, Tan H, Hartman M, Tam C. Knowledge, attitudes and practices of parents towards childhood influenza vaccination in Singapore. *International Journal of Infectious Diseases*. 2016;53:105–106. doi:10.1016/j.ijid.2016.11.265.
 15. Coniglio MA, Platania M, Privitera D, Giammanco G, Pignato S. Parents' attitudes and behaviours towards recommended vaccinations in Sicily, Italy. *BMC Public Health*. 2011;11(1):305. doi:10.1186/1471-2458-11-305. PMID:21569424.
 16. Gargano LM, Underwood NL, Sales JM, Seib K, Morfaw C, Murray D, DiClemente RJ, Hughes JM. Influence of sources of information about influenza vaccine on parental attitudes and adolescent vaccine receipt. *Human Vaccines & Immunotherapeutics*. 2015;11(7):1641–1647. doi:10.1080/21645515.2015.1038445.
 17. Jung M, Lin L, Viswanath K. Associations between health communication behaviors, neighborhood social capital, vaccine knowledge, and parents' H1N1 vaccination of their children. *Vaccine*. 2013;31(42):4860–4866. doi:10.1016/j.vaccine.2013.07.068. PMID:23954379.
 18. Ramprasad C, Zachariah R, Steinhoff M, Simon A. Parental attitudes towards influenza vaccination for children in South India. *World Journal of Pediatrics*. 2017;13(1):84–90. doi:10.1007/s12519-016-0053-7. PMID:27577192.
 19. Oria PA., Arunga G, Lebo E, Wong JM, Emukule G, Muthoka P, Otieno N, Mutonga D, Breiman RF, Katz MA. Assessing parents' knowledge and attitudes towards seasonal influenza vaccination of children before and after a seasonal influenza vaccination effectiveness study in low-income urban and rural Kenya, 2010–2011. *BMC Public Health*. 2013;13(1):391. doi:10.1186/1471-2458-13-391. PMID:23617891.
 20. Flood EM, Rousculp MD, Ryan KJ, Beusterien KM, Divino VM, Toback SL, Sasané M, Block SL, Hall MC, Mahadevia PJ. Parents' decision-making regarding vaccinating their children against influenza: A web-based survey. *Clinical Therapeutics*. 2010;32(8):1448–1467. doi:10.1016/j.clinthera.2010.06.020. PMID:20728759.
 21. Faden AA, Al Mofeez FI, Alsenaid AI, Alyousef MA, Al-Musailhi SA, Gorab A.H.A. Attitudes of Parents Towards the use of H1N1 Vaccination in Saudi Arabia. *Biosciences Biotechnology Research Asia*. 2015;12(3):2111–2116. doi:10.13005/bbra/1880.
 22. Eastwood K, Durrheim DN, Jones A, Butler M. Acceptance of pandemic (H1N1) 2009 influenza vaccination by the Australian public. *Med J Aust*. 2010;192(1):33–36. PMID:20047546.
 23. Torun SD, Torun F, Catak B. Healthcare workers as parents: attitudes toward vaccinating their children against pandemic influenza A/H1N1. *BMC Public Health*. 2010;10(1):596. doi:10.1186/1471-2458-10-596. PMID:20932342.
 24. Akis S, Velipasaoglu S, Camurdan AD, Beyazova U, Sahin F. Factors associated with parental acceptance and refusal of pandemic influenza A/H1N1 vaccine in Turkey. *European Journal of Pediatrics*. 2011;170(9):1165–1172. doi:10.1007/s00431-011-1425-6. PMID:21347848.