"PErCEIVE in Umbria": evaluation of anti-influenza vaccination's perception among Umbrian pharmacists

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PErCEIVE IN UMBRIA STUDY GROUP

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Keywords

Anti-flu vaccine • Pharmacist • Vaccine • Knowledge • Vaccine attitude • Italy • Cross sectional study

Summary

Vaccines recommendations are available for both healthcare professionals and the general public, but although the vaccination is the most effective method to prevent infectious diseases, the coverage is still behind the recommended rate. In Italy, according to a recent study, the anti-flu vaccination rate among healthcare worker range between 9% to 30%. The aim of our study was to identify knowledge, attitude and behaviours regarding influenza vaccination among community pharmacists in order to increase the coverage rate among healthcare professional. "PErCEIVE (Pharmacist Perception on Influenza Vaccine) in Umbria" was a cross sectional survey among community pharmacists in Umbria conducted between 16th November 2015 to 29th February 2016. The questionnaire was anonymous, on-line self-administered survey.

Statistical analysis were performed using STATA/SE 12 software. The response rate was 28.91% (n = 72/249). Among the studied population 76.39% (n = 55) had never performed influenza vaccine during the previous 5 years. Regarding source of information, only 15.28% of the subjects (n = 11) consulted the scientific publications, vs 52.78% (n = 38) who did not show any kind of interest upon the influenza vaccine. Our results show a low attitude to be vaccinated among pharmacists together with a low grade of awareness regarding the important role that pharmacists might play in order to reduce influenza burden, to promote health literacy among their patients and to decrease the risk of patients infection. Pharmacists might be crucial healthcare workers involved in health promotion, in vaccines' uptake and practices progression.

Introduction

Seasonal influenza is an airborne acute viral infection caused by influenza virus [1]. It is highly contagious, and despite the fact that, in the majority of the case, the progress is mild, influenza is responsible for about 3 to 5 million cases of severe illness worldwide [1], and about 5,000-70,000 death in Europe [2]. In particular, in industrialized countries most deaths occur among people age 65 or older [3]. Vaccines recommendations are available for both healthcare professionals and the general public, but although the vaccination is the most effective method to prevent the disease, also in the high risk group, the coverage is still behind the recommended rate. In Italy, the vaccination coverage for the Anti-flu, has fallen from 68.3 per 100 inhabitants during the 2005-2006 vaccination campaign, to 49.9 per 100 inhabitants in 2015-2016 [4]. It is extremely below the minimum established target (75%), set by the National Immunisation Plan. Thanks to the last National Immunisation Plan (2017-2019), the immunisation schedules are recommended for children, adolescents and adults with the regular update (through life approach), and vaccines are included in the basic levels of care (LEA-Livelli Essenziali di Assistenza) [5]. For example, in Italy, the Anti-flu vaccine is recommended for: i) general population with some specified chronic diseases, responsible for severe complication or death; ii) people aged 65 or more; iii) pregnant women who are in the second or third trimester during the beginning of influenza season; iv) professionals who are exposed to animals responsible for infection; v) professionals of public security interest; vi) family members of at high risk people; and last but not least vii) healthcare professionals [5]. Actually, anti-flu vaccines among healthcare workers is strongly encourage because it can prevent potential flu spread to patients, with unstable health status that can rapidly deteriorate, or to other professionals reducing the work absenteeism [6]. Moreover, the healthcare vaccination might serves as a positive model and promoter in influenza vaccination campaigns.

However, despite the recommendation, the vaccine coverage among healthcare workers is still low. The minimum objectives established in the US by Healthy People 2020 is 90% of influenza vaccination coverage among healthcare personnel [7]. In Italy there are two levels of vaccination coverage: 75% established as minimum rate to reach, and 95% as optimal goal [5]. Although the Anti-flu vaccine coverage rate is high heterogeneous among Europeans Countries, it is significantly under the recommended rate, ranging from 10% to 50% [8]. In Italy, according to a recent study conducted by Ali-

cino et al., the anti-flu vaccination rate among healthcare worker was around 30% among physicians, 11% among nurses and 9% among other clinical personnel during the vaccine campaign 2013/14 [9].

This significant low vaccine coverage seems to have serious consequences both individually and collectively. Even more serious is also the low perception of the importance of influenza vaccination among health care workers. Actually, Verger et al. in a recent National Cross-sectional Survey in Frances evidenced that only 54.5% of General Practices were "very confident" with vaccine utility, and only 26.2% of them were "very confident" with vaccine safety [10].

The aim of our study is to understand the determinants related to influenza vaccination uptake among community pharmacists. Pharmacists' role is not only to dispense drugs, but also they play a key role to provide appropriate consultations to the patients, to address patients' doubts among medications or vaccines [11]. However, community pharmacies are not always included in the vaccine campaign despite many patients receiving their medications and tips. Identification of knowledge, attitude and behaviours regarding influenza vaccination among community pharmacists is important to regulate the efforts need to increase the coverage rate among healthcare professionals and among general population. Moreover, understanding the reasons of vaccine hesitancy among pharmacists could identify the underlying reasons of vaccination campaigns' failure, other than to tailor public health strategies designed to increase the healthcare worker vaccinations' attitude.

Methods

"PErCEIVE (Pharmacist perception on Influenza VaccinE) in Umbria" was a cross sectional survey among community pharmacists in Umbria. The survey was conducted between 16th November 2015 to 29th February 2016 on community pharmacists working in Umbria. The questionnaire was anonymous, on-line self-administered survey. We used the validated questionnaire previously developed by the Medical Residents in Hygiene and Preventive Medicine of the Italian Society of Hygiene, Preventive Medicine and Public Health (S.It.I.- Società Italiana di Igiene, Medicina Preventiva e Sanità Pubblica) [12]. The questionnaire was first designed aimed to investigate the knowledge and attitude of the Italian Medical Residents in Hygiene. We decided to use the same questionnaire because of the similarity of the aims, and due to the correspondence of target groups' characteristics. Actually, both medical residents and pharmacists were Italian, with not cultural and language differences, moreover both this two professions categories are healthcare workers with a trustworthy relationship with the patients. We just replaced the term "medical residency" with "pharmacist" in the questionnaire. We invited the community pharmacists by sending them an email. The enrolment was voluntary base. Data were collected by an electronic survey, administered on-line (Google Moduli®).

The survey, with lasted no more than 20 minutes, contained 21 questions soliciting information about: demographics characteristics; personal experience of influenza; personal influenza immunization history; reasons for getting vaccination and for recommending it to the patients; potential barrier or reasons to refuse influenza vaccination; their recommendation for patients regarding influenza vaccine; main sources of information on anti-flu vaccine; readiness in vaccination campaign participation. The questionnaire had mainly multiple-choice questions. Box for comments was also provided for some section.

STATISTICAL ANALYSIS

Statistical analysis were performed using STATA/SE 12 software. Chi-square test (for categorical variables) and Student's t test (for continuous variables) were used for examining statistical significance. Pearson's correlation coefficient was also used to assess linear dependences between variables. We used the two-tailed version of all tests, and the p-value ≤ 0.05 were considered statistically significant.

ETHICAL APPROVAL

All data collected was recorded on a computerized database in an anonymous way; the file was protected by password, known only to researchers. Written informed consent was obtained from all participants. The "PErCEIVE in Umbria" study received ethical approval from the local ethics committee of the University of Perugia (Comitato Universitario di Bioetica), Reference Number: 2015-013.

Results

CHARACTERISTICS OF THE POPULATION

The population constituted of 249 community pharmacists who received the invitation mail, 72 of which agreed to fill the questionnaire, with a response rate of 28.91%. Out of 72 participants, 40 were female (55.56 %) and 32 were male (44.44 %), with a mean age of 45 ± 12.99 years. The 45.83% of the subjects self-reported a good or discreet knowledge related to influenza vaccine (Tab. I). In the majority of the case, the respondents (n = 46, 63.89%) had contracted the Influenza Like Illness (ILI) at least once during the past 5 years. However, 43.06% (n = 31) did not perceive themselves as a risk subjects, despite the professional exposure. Among the studied population 76.39% (n = 55) had never performed influenza vaccine during the previous 5 years. Among the only 5 pharmacists who performed anti-flu vaccination during the last year, the reason was the awareness to be a risk subject, due to the professional exposure. Inversely, among the subjects who had not performed the vaccination, the main reasons were: they believe that the low risk asso-

Tab. I. Characteristic of studied population. Number and percentage in parenthesis n (%).

Gender	Male	Female
	32/72 (44.44)	40/72 (55.56)
Anti-flu knowledge	Good-discrete	Not sufficient
	33/72 (45.83)	39/72 (54.17)
ILI in the previous 5 years	Yes	No
	46/72 (63.89)	26/72 (63.89)
Get a vaccine last year	Yes	No
	5/72 (6.94)	67/72 (93.06)
Get a vaccine during last 5 years	Yes	No
	17/72 (23.61)	55/72 (76.39)
Perception to be a risk subject	Yes	No
	38/72 (52.78)	34/72 (47.22)
Search information on anti-flu vaccine	Yes	No
	23/72 (31.94)	49/72 (68.06)
Institutional source of information	Yes	No
	15/23 (65.22)	8/23 (34.78)

ciated to the disease do not justify the vaccine need and because they did not consider themselves as a relevant element in the chain contagion both for relatives and for patients. Thirdly, they did not consider vaccination because of their age (younger than 65 years). Regarding source of information, 52.78% (n = 38) who did not show any kind of interest upon the influenza vaccine. Among them who search information (n = 23), 65.22% (15/23) of the subjects consulted institutional sources (scientific publication or institutional reports/web pages). Only 19.44% (n = 14) are intended to update their influenza vaccination during the following campaign. Among them in 50% (n = 7) of the cases, the reason was the awareness to be a high-risk subject, the remaining 50% (n = 7) recognize their responsiveness in contagion chain. Regarding the possibility to recommend the vaccination 25.00% (n = 18) of the subject did not invited people to get influenza vaccine, however the percentage decrease to 18.06% (n = 13) considering the intention to promote vaccine during the next campaign.

STATISTICAL ANALYSIS

Had been performed influenza vaccine, during the last 5 years, is statistical significant associated with consider themselves as risk subjects rho di Spearman = 0.33 (p = 0.005). This data was also confirmed considering who performed vaccination during the previous year (rho di Spearman = 0.26 (p = 0.028). At the same time, the awareness to be a risk subjects is statistical associated with the intention to get a vaccine during the following influenza campaign, rho di Spearman = 0.39 (p = 0.0006). The degree of self-reported knowledges, regarding influenza and influenza vaccine, is statistical associated with the source of information. Moreover, the intention to be vaccinated next year is also statistical associated with had performed influenza vaccine during the last 5 years and previous year. Interestingly, who have the intention to be vaccinated next year is also associated with the propensity to recommend vaccine to their patients. Actually, who consult scientific publication or institutional documents/web sites reported a higher degree of knowledges in a statistical significant manner, rho di Spearman = 0.52 (p = 0.012). Furthermore, the high self-reported degree of knowledge is also associated with having received the request for information from general population, rho di Spearman = 0.29 (p = 0.014). Having received the request for information is also associated with the attitude to recommend vaccination, rho di Spearman = 0.39 (p = 0.0006); and to be incline to suggest vaccination for the next campaign, rho di Spearman = 0.25 (p = 0.035). The duration of years of work is statistical associated with the vaccination performed last year, actually who get vaccine the previous year had 33.2 ± 9.73 years (mean ± standard deviation) of work (p = 0.0056) (Tab. II).

Discussion

In Umbria, during the 2011/14 season, influenza vaccine coverage rate in the population aged between 18 and 64 years with at least 1 risk factor was 19.4%. Among individuals over 65 years, the coverage rate was 62.8 per 100 inhabitants in 2015/16 season, the highest rate among the Italian regions. However, the national coverage rate is still 20-points percentage less compared to the 2005/06 season (2005/06 season was the period with the highest coverage rate since the flu-vaccine introduction in Italy, with a coverage rate of 68.3% among people over 65

Tab. II. Correlation between consider themselves as risk subjects and vaccine behaviour and between had received request of information regarding anti-flu vaccination and attitude.

	Be vaccinated last 5 years	Be vaccinated last year	Intention to be vaccinated next year
Consider themselves as risk subjects	Rho = 0.33 p = 0.005	Rho = 0.26 p = 0.028	Rho = 0.39 p = 0.0006
Had received request of information	Degree of influenza knowledges	Attitude to recommend vaccination	Be incline to suggest vaccination next campaign
	Rho = 0.29 p = 0.014	Rho = 0.39 p = 0.0006	Rho = 0.25 p = 0.035

years) [13]. Actually, Ministry of health, in collaboration with Istituto Superiore di Sanità, set up several activities in order to ensure influenza control. In particular the development of InfluNet (National sentinel influenza surveillance system), InfluWeb (community based participatory surveillance system) and Flunews (a report combining information from different sources) [14]. However, despite the high efforts, the low influenza vaccine coverage is probably due to a lack of influenza vaccine confidence after the 2009 pandemic [15]. Our survey confirmed that many healthcare workers, specifically pharmacists, do not consider anti-flu vaccination relevant to prevent patients/relatives' infection.

This is not the first study evaluating the vaccine hesitancy among healthcare professionals; however, the originalities of the present study are the ability to investigate the knowledge and the attitude such as the selection of the studied population. Although the questionnaire was already described in literature, it is for the first time used to assess the behaviour and willingness on influenza vaccine among Italian pharmacists. One of the most important result of "PErCEIVE in Umbria" study is that among pharmacists there is the wrong assumption that pharmacists are not professionals at high risk. Actually 5.56% of the subjects (n = 4) refuse the influenza vaccine, because younger than 65 years. These statements confirm the lack of appropriate knowledge regarding the definition of groups for whom the influenza vaccine is recommended. Previous studies has been demonstrated that people failed to be vaccinated because of the lack of healthcare workers' recommendations [16]. Although 59%-81% of adults in USA used internet to acquire health information [17, 18], healthcare professionals is the most important information source among patients [19]. Moreover, Johnson and colleagues in a recent survey conducted among general population and GPs found that both groups are more likely to discuss about vaccinations during well-care visits [20]. It seems likely that it might be the same also in pharmacies, during drugs' dispensation for mild diseases [21].

Moreover, Johnson et al. also indicated that influenza vaccine is less recommended compared to tetanus and pneumococcal [20]. This may indicate the absence of routinely vaccines' recommendations system that might reduce the missed opportunities to educate patients on immunizations or to update their immunization status. The missed opportunities for flu vaccine is particularly high (confirmed by the low coverage rate reached in every season), and a reminder/recall system for physician can increase GPs awareness on both their patient's vaccination status and vaccine indications.

Although anti-flu vaccination is universally recognized as an essential element of disease prevention, our results show a low propensity to be vaccinated among pharmacists. The consequences of these results are basically the urgent need to identifying the reasons responsible for low vaccine coverage, even in healthcare workers. Furthermore, it is crucial to identify strategies to increase awareness of the risk for general population, high-risk group such as healthcare workers. The results also show

the need to propose new training courses for the future, such as our sample suggested (58.33%, n = 42). However, Johnson previously described the healthcare professionals' lack of knowledge that we confirm in our sample. In particular only 2.78% (n = 2) of the subjects consulted the institutional web pages, 6.94% (n = 5) referred to ministerial disposal, and 11.11% (n = 8) read scientific articles. Recently, due to the low influenza coverage rate among Italian healthcare professionals, Alicino et al. conducted an educational project. The study was aimed to increase knowledge on influenza burden, risk of patients' infection from healthcare workers, and the immunization benefits [9]. The intervention was carried on for eight consecutives influenza seasons and was based on several courses, informative materials, and easier access for healthcare workers' immunization. Although during the whole period, the coverage rate had had a discontinuous trend, however the multicomponent intervention resulted in a significant increase of the influenza coverage rate. Recent evidences show as continuing education, incentives after immunization, easier access to vaccination are key strategies in increasing vaccination coverage among health care workers [22-24].

However, the study has some limitations. Firstly the small sample, although we obtained a good response rate compare to previous study, where the respondents were around 3% among general practitioners [20]. Secondly, the questionnaire was a self-administered, and suffer for the classical limitations of the survey such as social desirability bias and recall bias. However, we conducted an on-line survey that is associated with a lower social desirability bias compared with traditional version [25]. Thirdly, the vaccination history was self-reported and we did not check the pharmacists' vaccination status, due to the anonymous version of the survey. Nevertheless, there are indisputable advantages in the use of the questionnaire. It is a cheaper and easy tool, such as manageable for both respondents and researchers. Nonetheless, our study has also some strengths such as the use of previously validated questionnaire and the use of web-based questionnaire. Further, to the best of our knowledge it is the first study aimed to understand knowledge, attitude and behaviour on influenza vaccine among Italian pharmacists.

Conclusions

The aim of our study was to verify the knowledge and attitude of pharmacists on influenza vaccination. The results shown a low grade of awareness regarding the important role that pharmacists might play in order to reduce influenza burden, to promote health literacy among their patients, to decrease the risk of patients infection. In our opinion, pharmacists might be crucial healthcare workers involved in health promotion, in vaccines' uptake and practices progression. However, it is essential to plan a training courses tailored for healthcare workers.

Acknowledgments

Authors' contributions

TS, VG, OF and the "PErCEIVE in Umbria" study group collaborated with data collection. VG, DN and MV have contributed in study conception and design, data management and statistical analysis. VG in interpretation of results and preparation of the article, and MM for reviewing the last version of the present manuscript.

References

[1] World Health Organization. Influenza Seasonal, Fact sheet. 2016 Available at: http://www.who.int/mediacentre/factsheets/fs211/en/ Accessed on 06/06/2017.

[2] European Centre for Disease Prevention and Control. Seasonal Influenza, Factsheet for the general public. 2017 Available at: http://ecdc.europa.eu/en/healthtopics/seasonal_influenza/basic_facts/Pages/factsheet_general_public.aspx.

[3] Thompson WW, Weintraub E, Dhankhar P, Cheng PY, Brammer L, Meltzer MI, Bresee JS, Shay DK. Estimates of US influenza-associated deaths made using four different methods. Influenza and other respiratory viruses. 2009 Jan;3(1):37-49.

[4] Centro nazionale per la prevenzione delle malattie e la promozione della salute (EPICENTRO). Coperture della vaccinazione antinfluenzale in Italia. 2016 21 June 2016 Available at: http://www.epicentro.iss.it/problemi/influenza/coperturevaccinali.asp Accessed on 4 February 2017.

[5] Ministry of Health. Piano Nazionale Prevenzione Vaccinale, PNPV 2017-2019; 2017.

[6] Centers for Disease Control and Prevention. Influenza Vaccination Information for Health Care Workers. 2016 November 2016 Available at: https://www.cdc.gov/flu/healthcareworkers.htm Accessed on February 2017.

[7] U.S. Department of Health and Human Services. Immunization and Infectious Diseases. 2014 Available at: www.healthypeople.gov.

[8] Mereckiene J, Cotter S, Nicoll A, Lopalco P, Noori T, Weber J, D'Ancona F, Levy-Bruhl D, Dematte L, Giambi C, Valentiner-Branth P, Stankiewicz I, Appelgren E, D OF, group Vpg. Seasonal influenza immunisation in Europe. Overview of recommendations and vaccination coverage for three seasons: pre-pandemic (2008/09), pandemic (2009/10) and post-pandemic (2010/11). Euro Surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin. 2014 Apr 24;19(16):20780.

[9] Alicino C, Iudici R, Barberis I, Paganino C, Cacciani R, Zacconi M, Battistini A, Bellina D, Di Bella AM, Talamini A, Sticchi L, Morando A, Ansaldi F, Durando P. Influenza vaccination among healthcare workers in Italy. Hum Vaccin Immunother 2015;11(1):95-100.

[10] Verger P, Fressard L, Collange F, Gautier A, Jestin C, Launay O, Raude J, Pulcini C, Peretti-Watel P. Vaccine Hesitancy Among General Practitioners and Its Determinants During Controversies: A National Cross-sectional Survey in France. EBioMedicine 2015 Aug;2(8):891-7.

[11] Kennelty KA, Chewning B, Wise M, Kind A, Roberts T, Kreling D. Barriers and facilitators of medication reconciliation processes for recently discharged patients from community pharmacists' perspectives. Research in Social & Administrative Pharmacy: RSAP. 2015 Jul-Aug;11(4):517-30.

[12] Costantino C, Ricciardi A, Pennacchietti L, Guaccero A, Di Gregori V, Marcantoni C, Battaglia A, D'asta M, Micò R, Biafore A, Capasso L, Russo MR, Pasqua C, Mallamace NR, Nobile M, Ferretti V, La Maestra G, Shilpi S, Romani G, Licitra G, Palladino R, Passaro M, Pelullo P, Boemo D, Montante A, Parisi S, Manotti P, Odone A, Campanella F, Rossi L, Bernardini I, De Simone B, Poscia A, Sanasi S, Rinaldi A, Gilardi F, Azzolini E, D'Ippolito E, Baldini C, Gobbo S. Percezione della importanza della vaccinazione antinfluenzale tra gli specializzandi in Igiene e Medicina Preventiva Italiani. Studio conoscitivo della Consulta dei Medici in Formazione Specialistica della S.It.I. Ann Ig 2013;25 (Suppl. 1):421-7.

[13] Ministero della Salute. Vaccinazione antinfluenzale in Italia: coperture vaccinali negli anziani (età >= 65 anni) (per 100 abitanti) Stagioni 2000-2001/2015-2016; 2016.

[14] Istituto Superiore di Sanità. InfluNet. 2013 Available at: http://www.iss.it/iflu.

[15] Pariani E, Amendola A, Piatti A, Anselmi G, Ranghiero A, Bubba L, Rosa AM, Pellegrinelli L, Binda S, Coppola L, Gramegna M, Zanetti A. Ten years (2004-2014) of influenza surveillance in Northern Italy. Hum Vaccin Immunother 2015;11(1):198-205.

[16] Centers for Disease Control and Prevention. Influenza vaccination and self-reported reasons for not receiving influenza vaccination among Medicare beneficiaries aged > or =65 years--United States, 1991-2002. MMWR Morb Mortal Wkly Rep 2004 Nov 05;53(43):1012-5.

[17] HarrisInteractive. Number of 'cyberchondriacs' - adults going online for health information - has plateaued or declined. Available at: http://www.harrisinteractive.com/news/newsletters/healthnews/HI_HealthCareNews2008Vol8_Iss8.pdf Accessed on 30 March 2010.

[18] Fox Susannah. The Social Life of Health Information, 2011. Washington, D.C.; 2011 May 12, 2011.

[19] Hesse BW, Nelson DE, Kreps GL, Croyle RT, Arora NK, Rimer BK, Viswanath K. Trust and sources of health information: the impact of the Internet and its implications for health care providers: findings from the first Health Information National Trends Survey. Arch Intern Med. 2005 Dec 12-26;165(22):2618-24.

[20] Johnson DR, Nichol KL, Lipczynski K. Barriers to adult immunization. The American journal of medicine. 2008 Jul;121(7 Suppl 2):S28-35.

[21] Szilagyi PG, Shone LP, Barth R, Kouides RW, Long C, Humiston SG, Jennings J, Bennett NM. Physician practices and attitudes regarding adult immunizations. Preve Med 2005 Feb;40(2):152-61.

[22] Hakim H, Gaur AH, McCullers JA. Motivating factors for high rates of influenza vaccination among healthcare workers. Vaccine 2011 Aug 11;29(35):5963-9.

[23] Hollmeyer H, Hayden F, Mounts A, Buchholz U. Review: interventions to increase influenza vaccination among healthcare

workers in hospitals. Influenza and other respiratory viruses. 2013 Jul;7(4):604-21.

[24] McCullers JA, Speck KM, Williams BF, Liang H, Mirro J, Jr. Increased influenza vaccination of healthcare workers at a pediatric cancer hospital: results of a comprehensive influenza vaccination campaign. Infect Control Hosp Epidemiol 2006 Jan;27(1):77-9.

[25] Kesse-Guyot E, Assmann K, Andreeva V, Castetbon K, Mejean C, Touvier M, Salanave B, Deschamps V, Peneau S, Fezeu L, Julia C, Alles B, Galan P, Hercberg S. Lessons learned from methodological validation research in E-Epidemiology. JMIR Public Health Surveill 2016 Oct 18;2(2):e160.

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