Bulavinova K., Detsyk O., Tsikhon Z. Analysis of mandatory and recommended vaccination coverage among healthcare professionals. Journal of Education, Health and Sport. 2020;10(11):362-372. eISSN 2391-8306. DOI http://dx.doi.org/10.12775/JEHS.2020.10.11.036 https://apcz.umk.pl/czasopisma/index.php/JEHS/article/view/JEHS.2020.10.11.036 https://zenodo.org/record/4752909

The journal has had 5 points in Ministry of Science and Higher Education parametric evaluation. § 8. 2) and § 12. 1. 2) 22.02.2019. © The Authors 2020; This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article iscensed under the terms of the Creative Commons Attribution Non commercial use, distribution and reproduction in any medium, (http://creativecommons.org/license/by-ncs=4/4.00) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited. The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 16.10.2020. Revised: 30.10.2020. Accepted: 30.11.2020.

ANALYSIS OF MANDATORY AND RECOMMENDED VACCINATION COVERAGE AMONG HEALTHCARE PROFESSIONALS

K. Bulavinova¹, O. Detsyk², Z. Tsikhon²

¹UNICEF Ukraine

²Ivano-Frankivsk National Medical University, Ukraine

Abstract

Aim. The objective of present study is to evaluate the mandatory and recommended vaccination coverage among healthcare professionals.

Materials & Methods. In 2018 – 2019 sociological survey was conducted among 1384 healthcare workers from 4 Ukrainian regions: primary care doctors (353 people), specialized medical care doctors (233), healthcare managers (88), nurses (700), and others (10).

Results. The study revealed that 17,5% healthcare workers are not revaccinated against diphtheria and tetanus, 7,9% are revaccinated less frequently than every 10 years. The responses identified that 42,0% healthcare professionals are not vaccinated against hepatitis B, 13,1% – do not complete the series of three needed injections against hepatitis B. Regarding influenza immunization, 43,3% of respondents are not annually vaccinated, at the same time, they do not promote influenza immunization among the population.

Mandatory and recommended vaccination coverage rate among healthcare professionals normally rises with age of participants (except hepatitis B with inverse relation). The mentioned coverage rate depends on contamination risk assessed by healthcare workers.

The occupational activity also influences immunization rates: the lowest proportion of vaccinated workers is among specialized medical care doctors.

The study shows that attendance of trainings on immunoprophylaxis organization leads to increasing the mandatory and recommended vaccination coverage rate, encouraging them to advocate vaccination in communities.

Conclusion. A system of integrated cross-disciplinary decisions for increasing mandatory and recommended vaccination coverage rate among healthcare professionals is required.

Key words: vaccine coverage; vaccine hesitancy; healthcare providers.

Introduction

Vaccination is the most effective way to avoid occurring and spreading of epidemic diseases [1, 2]. According to World Health Organization (WHO) recommendations, the majority of countries have national mandatory immunization programs. Owing to these programs most infectious diseases were slowed down and, in some cases, eradicated, considerably prolonging life expectancy today [3, 4]. COVID-19 pandemic became an additional argument for immunization. COVID-19 pandemic showed what the all-encompassing harm from infectious disease could be without a vaccine against it. The pandemic also displayed the vulnerability of healthcare professionals who provide medical care [5].

In accordance with National Immunization Schedule (2018), in Ukraine mandatory vaccination for children includes tuberculosis, diphtheria, tetanus, pertussis, poliomyelitis, Haemophilus Influenzae Type b (Hib), measles, rubella, mumps, and hepatitis B. The mandatory revaccination for adults includes diphtheria and tetanus every ten years. Vaccination against measles, mumps, and rubella is obligatory for healthcare professionals as a risk group during epidemic if they were not contracted or revaccinated. Immunization against hepatitis B is mandatory for those who constantly handle blood and other biological materials, being recommended for the rest of healthcare workers. Annual influenza vaccination of healthcare providers is also recommended in Ukraine, as well as in most countries of the world. And in some developed countries influenza immunization is mandatory for healthcare workers [6-8].

Although abovementioned vaccine coverage remains substandard. The situation may deteriorate dramatically at the times of COVID-19 pandemic according to forecasts of the WHO and UNICEF [9-10]. The reasons for low immunization coverage are organizational

shortcomings and communication challenges [11, 12]. Healthcare workers who neglect immunoprophylaxis risk their own health as well as jeopardize their family members and patients' health. There are serious doubts that healthcare professionals who neglect vaccination could effectively communicate with different social groups on the importance of immunization.

That's why, the **aim** of the study is to evaluate mandatory and recommended vaccination coverage among healthcare professionals.

Materials and methods

The cross-sectional sociological survey was conducted among healthcare workers in the scope of a specially designed program in response to measles outbreak in Ukraine and the world in 2017 - 2018. Data collection was conducted during 2018 - 2019 based on healthcare facilities of Dnipropetrovsk, Donetsk, Ivano-Frankivsk, Poltava regions and among students of the Summer School "Transformation of healthcare systems" (Chernihiv, 2018). The study covered 1384 people, including 353 (25,5%) primary care physicians, 233 (16,8%) specialized medical care doctors, 88 (6,4%) healthcare managers, 700 (50,6%) nurses and 10 (0,7%) others (journalists, lawyers, sociologists, etc.; all of them were participants of the Summer School).

Respondents were divided into age groups (under 30 years old -12,9%, 30 - 39 y.o. -24,2%, 40 - 49 y.o. -29,0%, 50 - 59 y.o. -21,2%, over 60 - 12,8%). Gender distribution among participants presents 86,8% of females, 13,2% – males. Regarding the region of residence of the respondents the study covers 83,2% Eastern Ukrainians and 16,8% are from Western part of the country. The study comprises those healthcare professionals who attended trainings on vaccination and those workers who were not present at such education events (51,7% and 48,3% respectively).

Respondents present different age and gender groups (p<0,001). Among primary care physicians and healthcare managers almost one fourth is over 60 years old – 27,8% and 25,0% respectively, compared to 12,9% among specialized medical care doctors and 6,1% among nurses. At the same time, the percentage of participants under 30 years old is the highest among nurses (17,1%), quite significant among primary care physicians (11,9%), and specialized medical care doctors (7,7%), being extremely low among healthcare managers (1,1%). Regarding gender composition, the lowest percentage of females (p<0,001) was among healthcare managers (65,9%) and specialized medical care doctors (69,5%). In contrast, the highest proportion of females was among primary care physicians (79,3%) and

nurses (98,7%).

The part of respondents covered with trainings on vaccination was the highest among healthcare managers (67,0%), reached more than a half of participating primary care physicians (56,1%) and nurses (53,9%), only one third (32,2%) among specialized medical care doctors attended the trainings.

A database based on MS Excel software products was created for statistical processing. The frequency of the studied traits per 100 respondents and the standard error for proportions (\pm m) were calculated. The null hypothesis about the accuracy of differences between comparison groups was tested by calculating the chi-square (χ^2) correspondence criterion [13].

The design of the research was approved by the Ethics Committee of Ivano-Frankivsk National Medical University (protocol № 98/17 of 21.12.2017).

Used methods: epidemiological, sociological, and biostatistics.

Results & Discussion

The study identified that only 74,6±1,2% of respondents voluntarily are revaccinated against diphtheria and tetanus regularly (every ten years) (fig. 1), another 7,9±0,7% are revaccinated irregularly. Almost one fifth of participants (17,5±1,0%) admitted that they do not get the diphtheria and tetanus vaccine more than once (5,7±0,6%) or do not aware of their immune status (11,7±0,9%), what, as we presuppose, indicates the absence of revaccination.



Fig. 1. Diphtheria and tetanus regular revaccination coverage among the study participants

Primary healthcare doctors demonstrate the highest revaccination coverage rate (p<0,001). 82,6% of primary care physicians are regularly revaccinated against diphtheria and tetanus every ten years, 7,1% – are vaccinated less frequently. In contrast, specialized medical care doctors show the lowest rate (63,1% and 10,7% respectively).

Mandatory diphtheria and tetanus revaccination coverage rate rises with age of participants: from 78,0% in total among people under 30 years old to 82,5% – over 60 years old (p<0,001). Female respondents behave towards revaccination in an orderly manner more frequently (83,0% versus 79,3% among male respondents, p<0,001) as well as Western Ukraine population (85,7% versus 82,2% among residents of Eastern Ukraine regions, p<0,001).

Frequency of revaccination against diphtheria and tetanus is notably higher among healthcare professionals who attended education events on organization of mass immunization (fig. 2) (91,2% versus 73,3% among healthcare workers who did not take such trainings, p<0,001).





The adults who were not vaccinated against measles, mumps, and rubella in childhood or do not have relevant information in immunization records have to be vaccinated against these diseases. The need of immunization against measles, mumps, and rubella for adults became crucial after the measles outbreak in 2017 - 2018 [14]. Organizational

shortcomings of mandatory child vaccination against measles in Ukraine were identified as major outbreak reasons [15]. Healthcare professionals are a priority group in the context of immunization as they are among first to contact with patients [16]. However, the study reveals that not all of the respondents recognize the threat of infection. Almost 40% ($40,5\pm1,3\%$) of participants irrespectively of age, gender, and residence assess the risk of contamination as low, $33,1\pm1,3\%$ – as moderate, and only $26,4\pm1,2\%$ – as high. The context of mentioned figures is that only $68,2\pm1,3\%$ of participants are aware of when they had the last vaccination against measles, mumps, and rubella, while $31,8\pm1,3\%$ – are not.

Healthcare managers demonstrate vigilance against a threat of infection. Only 28,4% of healthcare managers assess the risk of contamination as low versus 44,4% of primary care doctors, 42,0% nurses, and 36,1% specialized medical care doctors (p<0,01). The highest percentage of those who are aware of their own immune status is also recorded among healthcare managers (81,6%), the lowest percentage – among specialized medical care doctors (58,4%) and nurses (64,4%).

The study determined the situation with vaccination against hepatitis B coverage (fig. 3). Less than a half of respondents got three required doses to complete the series $(44,1\pm1,3\%)$, while $13,1\pm0,9\%$ got one or two doses. 42,8% participants stated that they are not vaccinated against hepatitis B $(30,3\pm1,2\%)$ or do not remember the relevant immune status $(12,5\pm0,9\%)$.



Fig.3. Hepatitis B vaccination coverage among the study participants

The highest vaccination against hepatitis B rate is recorded among healthcare managers (who completed the series or got one or two doses) (64,8%) and nurses (61,9%). At the same time, the lowest rate is found out among specialized medical care doctors (53,7%) and primary care physicians (48,9%; p<0,001). Less frequent handling of blood and other biological materials might be presented as a reason for lower percentage of vaccinated primary care doctors.

Hepatitis B vaccination coverage declines with age of participants: from 72,8% among under 30 years old to 50,0% – over 60 years old (p<0,001).

Male healthcare professionals revealed to be favourable to immunization against hepatitis B than female healthcare workers -63,4% versus 56,3% respectively (p<0,05). The causes of the described disposition could lay in the fact that specializations with a greater part of male professionals more often associated with high hepatitis B infection risk.

The study shows that hepatitis B vaccination coverage has less gaps among healthcare workers from Western Ukraine -72,8% versus 54,2\% residents of Eastern Ukraine regions (p<0,001).

The explanation for low hepatitis B vaccination rates among healthcare professionals is contained in their personal risk assessment. Only a half of respondents $(50,1\pm1,4\%)$ irrespectively of age, gender, place of employment, and attendance of trainings on vaccination organization (p>0,05) assess the risk of hepatitis B contamination during medical procedures as high, a quarter $(25,2\pm1,2\%)$ – as moderate. The remaining part of participants evaluate danger of infection at work as low $(20,1\pm1,1\%)$ or do not recognize it $(4,6\pm0,6\%)$. Despite specialized medical care doctors demonstrate clear understanding of contamination hazard (only 15,7% assess the risk as low or do not recognize it, p<0,05), the hepatitis B vaccination coverage among these professionals is remarkably low.

We notice the significant influenza immunization coverage gaps in Ukraine. The greater part of respondents (81,9%) recognizes the existence of annual influenza immunization practice in healthcare facilities where they are working. Although only 29,0 \pm 1,2% of participants get the influenza vaccine every year, 27,7 \pm 1,2% – receive the injection irregularly, which is 56,7% in total (fig. 4).

In contrast with hepatitis B immunization, influenza vaccination coverage rate rises with age of participants: from 47,9% among people under 30 years old to 63,8% – over 60 years old (p<0,001).

Among the remaining 43,3% who do not get influenza vaccine (fig. 4) 7,8±0,7% of participants declare they have the contraindications. The portion of respondents with

contraindications to influenza vaccination grows with age: from 4,4% among people under 30 years old to 12,9% – over 60 years old (p<0,001). We assume that mentioned figures are overestimated. According to evidence base, chronic diseases are indications rather than contraindications to influenza immunization. Moreover, medical conditions which are contraindications to influenza vaccine are extremely limited and rare.



Fig. 4. Influenza immunization coverage among the study participants

The study indicated that a small number of respondents omit influenza immunization because of the vaccine price $(5,0\pm0,6\%)$. Another part of participants does not know where they could get an injection $(0,9\pm0,3\%)$. At the same time, one third $(29,5\pm1,2\%)$ finds influenza immunization unimportant, considering the vaccine is ineffective or of the poor quality.

The highest influenza immunization coverage (p<0,001) is noticed among healthcare managers (78,4%) and primary care doctors (68,9%) vs 51,4% nurses and 45,3% specialized medical care doctors.

Considerable difference in influenza vaccination rate between genders is not detected (p>0,05).

However, healthcare professionals from Western part of Ukraine again appeared to have higher influenza vaccination coverage than their counterparts from Eastern regions (66,8% versus 53,4\% respectively, p<0,001). Although, annual influenza vaccination campaigns in medical healthcare facilities is less common through Western Ukraine comparing to the Eastern part of the country (70,5% versus 84,6%, p<0,001).

Healthcare workers who attended trainings on vaccination are also more prone to be vaccinated against influenza: 69,9% versus 42,6% among professionals who were not present at such trainings (p<0,001). At the same time, these two comparison groups answer similarly regarding influenza vaccination campaigns in healthcare facilities they are working in (82,8% and 80,9% respectively, p>0,05).

We assume that healthcare workers who omit personal influenza vaccination would not educate the population to raise awareness on its importance. As a prove, almost the same percentage of respondents who are vaccinated against influenza ($56,9 \pm 1,3\%$) persuade others to get an injection, but $43,1 \pm 1,3\%$ – do not. Mostly this involves healthcare managers (80,7%) and primary care doctors (73,6%), comparing to nurses (48,0%) and specialized medical care doctors (47,6%) (p<0,001). Moreover, healthcare workers who were present at trainings on immunization organization convince others to get a vaccine rather than professionals who did not attend such education events: 68,9% versus 44,0% respectively (p<0,001).

Conclusions

The study revealed that 17,5% healthcare workers are not revaccinated against diphtheria and tetanus, 7,9% are revaccinated less frequently than every 10 years. The responses identified that 42,0% healthcare professionals are not vaccinated against hepatitis B, 13,1% – do not complete the series of three needed injections. Regarding influenza immunization, 43,3% of respondents are not annually vaccinated, at the same time, they do not promote influenza immunization among the population.

Mandatory and recommended vaccination coverage rate among healthcare professionals normally rises with age of participants (except hepatitis B with inverse relation). The mentioned coverage rate depends on contamination risk assessed by healthcare workers. The occupational activity also influences immunization rates: the lowest proportion of vaccinated workers is among specialized medical care doctors.

The study shows that attendance of trainings on immunoprophylaxis organization leads to increasing the mandatory and recommended vaccination coverage rate, encouraging them to advocate vaccination in communities.

Development of a system of integrated cross-disciplinary decisions for increasing mandatory and recommended vaccination coverage rate among healthcare professionals is outlined as the directions for future research.

References

1. Euro WHO (2019) TIP. Tailoring Immunization Programmes. World Health Organization. Regional Office for Europe, 104 p. Available at: <u>https://www.euro.who.int/en/publications/abstracts/tip-tailoring-immunization-programmes-</u> <u>2019</u> (accessed 22 March 2020).

2. Bloom D.E. (2015) Valuing vaccines: Deficiencies and remedies. *Vaccine*, Suppl 2, B29-33. doi: 10.1016/j.vaccine.2015.03.023

3. Kotvitska A.A., Kononenko O.V., Kubareva I.V. (2014) Naukove uzahalnennia suchasnych pidchodiv do provedennia planovoyi imunizacii v krainach svitu [Scientific generalization of modern approaches to routine immunization over the world]. *Current issues in pharmacy and medicine: science and practice*, no 3, pp. 72-76.

4. WHO (2019) The global vaccine action plan 2011-2020: review and lessons learned: strategic advisory group of experts on immunization. Geneva: World Health Organization. Available at: <u>https://apps.who.int/iris/handle/10665/329097</u> (accessed 22 March 2020).

5. WHO (2020) Framework for decision-making: implementation of mass vaccination campaigns in the context of COVID-19. Interim guidance. Geneva: World Health Organization, 8 p. Available at: <u>https://www.who.int/publications/i/item/WHO-2019-nCoV-Framework_Mass_Vaccination-2020.1</u> (accessed 22 May 2020).

6. Gur-Arie R. (2019) Maximizing influenza vaccination uptake among healthcare personnel in Israel: lessons learned from mandatory vaccination policy in the United States. *Israel Journal of Health Policy Research*, no 8(1). doi: 10.1186/s13584-019-0326-4.

7. Nutman, A., & Yoeli, N. (2016). Influenza vaccination motivators among healthcare personnel in a large acute care hospital in Israel. *Israel Journal of Health Policy Research*, no 5(1). doi:10.1186/s13584-016-0112-5.

8. Wang, T. L., Jing, L., & Bocchini, J. A. (2017). Mandatory influenza vaccination for all healthcare personnel. *Current Opinion in Pediatrics*, vol. 29, no 5, pp. 606–615. doi:10.1097/mop.00000000000527.

9. Wang K, Wong ELY, Ho KF, Cheung AWL, Chan EYY, Yeoh EK, Wong SYS. (2020). Intention of nurses to accept coronavirus disease 2019 vaccination and change of intention to accept seasonal influenza vaccination during the coronavirus disease 2019 pandemic: A cross-sectional survey. Vaccine. 2020 Oct 21;38(45):7049-7056.

10. Unisef (2020) Immunization coverage. Are we losing ground? Available at:

https://data.unicef.org/resources/immunization-coverage-are-we-losing-ground. (accessed 01 July 2020).

11. MacDonald N. E. (2015). Vaccine hesitancy: Definition, scope and determinants. *Vaccine*, vol. 33, no 34, pp. 4161–4164. doi: 10.1016/j.vaccine.2015.04.036.

12. Dubé E., Gagnon D., MacDonald N. E. (2015) Strategies intended to address vaccine hesitancy: Review of published reviews. *Vaccine*, vol. 33, no 34, pp. 4191–4203. doi: 10.1016/j.vaccine.2015.04.041.

13. Forthofer R.N., Lee E.S., Hernandez M. (2007) Biostatistics: A Guide to Design, Analysis, and Discovery. *Amsterdam, etc.: Elsevier Academic Press.* 502 p.

14. Biellik R. J., Orenstein W. A. (2018) Strengthening routine immunization through measles-rubella elimination. *Vaccine*, vol. 36, no 37, pp. 5645-5650. doi: 10.1016/j.vaccine.2018.07.029.

15. Veklych K.A. (2019) Eliminaciia virusu koru: vyrisheni pytannia ta maibutni vyklyky [Elimination of measles virus: issues addressed and future challenges]. International Medical Journal, vol. 25, no 3(99), pp. 83-88. Available at: http://dspace.nbuv.gov.ua/handle/123456789/161049. (accessed 11 April 2020).

16. Daragan H.M., Krushynska T.Yu., Stepanskii D.O., Demchyshyna I.V., Kolesnikova I.P. (2018) Aktualni pytannia vakcynacii ta epidemiologichnogo nahliadu za korom i krasnuchoiu v Ukraini [Topical issues of vaccination and epidemiological surveillance over measles and rubella in Ukraine]. *Medicni perspektivi*, vol. 23, no 1-1, pp. 38-43. Available at: <u>http://journals.uran.ua/index.php/2307-0404/article/view/127206</u>. (accessed 24 April 2018).