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Knowledge of community health workers about viral hepatitis before and after lectures

Conhecimento dos Agentes Comunitários de Saúde sobre Hepatites Virais antes e após palestras

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ABSTRACT
The objectives were to identify the knowledge of community health workers (CHW) about viral hepatitis (VH), to verify whether lectures improve these knowledge and to check for any association between CHW knowledge and years of practice and previous educational training. In this cross-sectional study, 674 CHW, from six municipalities in the state of Espirito Santo (Southeast Brazil), answered a questionnaire about VH before and after lectures concerning this issue. Scores of the questionnaires and the proportions of correct and wrong answers, before and after lectures, were compared by Wilcoxon and McNemar test, respectively. The association of knowledge with years of experience and previous educational training was explored by Mann-Whitney test. The p value was set at 0.05. CHW presented low levels of knowledge about VH before lectures; these levels increased after lectures; and there was no association between CHW knowledge about VH and years of practice or previous training.

Keywords: Community health workers. Health education. Continuing education. Human viral hepatites. Primary prevention.

RESUMO
Os objetivos desta pesquisa foram identificar o conhecimento dos agentes comunitários de saúde (ACS) sobre hepatites virais (HV), verificar se palestras aumentam tal conhecimento e investigar se este se relaciona com o tempo de atuação e com capacitações anteriores. Neste estudo transversal, 674 ACS de seis municípios do Estado do Espírito Santo responderam a um questionário sobre HV antes e após palestras relativas ao assunto. As pontuações dos questionários e as proporções de acertos e erros, anteriores e posteriores às palestras, foram comparadas pelos testes de Wilcoxon e McNemar, respectivamente. A associação do conhecimento com o tempo de atuação e com capacitações anteriores foi analisada pelo Mann-Whitney. Adotou-se $p < 0,05$. Os ACS apresentavam baixo nível de conhecimento sobre as HV antes das palestras, as quais aumentaram o conhecimento destes profissionais. O conhecimento prévio sobre HV não se relacionou com o tempo de atuação, tampouco com capacitações anteriores.

Palavras-chave: Agentes comunitários de saúde. Educação em saúde. Educação permanente. Hepatite viral humana. Prevenção primária.

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INTRODUCTION

Viral hepatitis (VH) is one of the main public health problems today, being considered a pandemic by the World Health Organization (WHO)[1]. It is estimated that VH caused 1.4 million deaths in 2015, which is more than the human immunodeficiency virus or malaria[2]. In Brazil, from 2000 to 2016, 66,196 deaths related to VH were recorded, among which, 21.4% were associated with the hepatitis B virus and 75.8% with the hepatitis C virus[3].

To contain this pandemic, in 2016, WHO, with the participation of most countries, including Brazil, developed the Global health sector strategy on viral hepatitis, a global strategy with the goal of eliminating VH as a public health problem until 2030[1]. The tools necessary to move towards elimination goals already exist: an effective vaccine against hepatitis B and a curative treatment for hepatitis C, it is essential to expand health promotion, prevention, diagnosis and treatment programs[2]. For this to be possible, in addition to guaranteeing access to hepatitis B vaccination, diagnosis and new treatments for hepatitis C, it is necessary to raise the awareness of the population and health professionals about VH[1], as some of the barriers to prevention, diagnosis and treatment of hepatitis are the lack of knowledge and the lack of training of health professionals on the subject[4].

In recent years, national[5-8] and international[9-13] publications have evaluated the knowledge of students and health professionals about VH, evidencing important gaps in this knowledge. Gaps that have been found both in countries with higher levels of development[4-10], and in countries with intermediate[13] and low[11-12] levels of development; and in the different professions of higher education (medicine[8-10,11,13], nursing[8,10,12-13], physical therapy[8], dentistry[5-8] and biomedicine[8]) and technical level (nursing technicians and assistants[8] and laboratory technicians[8,13]).

In Brazil, community health workers (CHW) are among the most suitable professionals for communicating health with the community, being fundamental in the relationship between the Municipal Health Secretariats and the population[14]. Therefore, it is essential that CHWs have knowledge about VH, its forms of transmission/prevention, vaccination, vulnerable population and care network, so that they are multipliers of this knowledge and can guide the most vulnerable groups to seek screening and diagnosis services, contributing to the interruption of the disease transmission chain.

Considering the above, added to the fact that no studies were found evaluating the knowledge of CHW about VH, it is urgent to investigate it for the elaboration of continuing education actions directed to the real needs of these professionals. Thus, the objectives of this study were: to identify the knowledge of CHW about VH, to verify whether lectures on VH improve this knowledge and to check for any association between CHW knowledge and length of experience and previous training.

METHODOLOGY

This was a cross-sectional study with a quantitative approach and a convenience sample, carried out from April 2016 to April 2017, in six municipalities in the state of Espírito Santo (ES), four in the Metropolitan Region (Cariacica, Guarapari, Serra and Vila Velha) and two in the Central Region (Aracruz and Colatina). In recent years, the Metropolitan and Central Regions, in this order, had the highest prevalence of hepatitis B among the four health macro-regions of the state. The estimated population of this municipalities are Aracruz (103,101), Cariacica (383,917), Colatina (123,400), Guarapari (126,701), Serra (527,240) and Vila Velha (501,325)[15].

The study population consisted of CHW, with a minimum age of 18 years, of both sexes, participating in lectures on VH held in the six municipalities, who agreed to participate in the research and signed the Informed Consent Form (ICF). As attendance at the lectures was not mandatory, this study was based on a convenience sample. CHWs who did not return the questionnaire to the researcher were excluded from the study.

These lectures were part of an education program on VH, which aimed to increase the knowl-

edge of health professionals about VH, coordinated by a non-governmental organization of the state of Espírito Santo. The lectures, previously scheduled with each Municipal Health Department for the most convenient day and month, were held in two different periods of the same day in each municipality and all CHWs were diverted from their work routine to participate in the lectures. The lectures

lasted approximately 4 hours and addressed the transmission and prevention of hepatitis A, B, C and D, the need for screening and early diagnosis and complications of VH.

Data were collected in the same places, days and times of the lectures. Before the beginning of the lectures, the CHWs received the ICF, which was read aloud by the responsible researcher, and everyone had the opportunity to clarify their doubts. After clarifying doubts, individuals who agreed to participate in the research signed the ICF and returned it to the researcher. Subsequently, participants received a printed version of a questionnaire and were instructed to answer it individually (without parallel conversation) following the researcher's reading. Then, each question was read aloud by the researcher, while the participants accompanied the reading in its printed versions, and sufficient time was given for them to answer the question in silence, before reading the subsequent question. Considering previous experiences in the application of questionnaires for CHW, this method of data collection facilitates the understanding of the participants and avoids interference with the individual responses, reducing potential bias.

After completing the questionnaires, they were delivered to the researcher and the lectures began. At the end of the lectures, participants answered another printed version of the questionnaire, with the same questions about VH to assess learning, following the same collection procedure described above.

The questionnaire, prepared by the authors according to the programmatic content of the lectures, contained ten objective questions about VH: 1) types of hepatitis for which there are vaccines; 2) risk of infection during the performance of the health professional; 3) risk of liver cirrhosis in individuals with hepatitis B and C; 4) types of hepatitis caused by virus; 5) forms of transmission of hepatitis A; 6) forms of transmission of hepatitis B; 7) forms of transmission of hepatitis C; 8) ways of preventing hepatitis A; 9) ways of preventing hepatitis B; 10) ways of preventing hepatitis C. In addition to the questions about VH, the first version of the questionnaire contained questions related to the length of professional experience, participation in previous training and the usefulness of training.

Statistical Package for Social Sciences (SPSS) 20 (IBM, Armonk, NY, United States) was used for statistical analysis. To measure the CHWs' knowledge about VH, all questionnaires returned to the researcher, even if incomplete, were considered, and zero was assigned to each question answered incorrectly and one point for each question answered correctly. The Kolmogorov-Smirnov test was used to test data normality. Categorical variables were expressed as relative and absolute frequencies and numerical variables as median and interquartile intervals (first quartile: Q_1; third quartile: Q_3), since the data were shown to be nonparametric. To verify whether lectures increased the knowledge of CHWs, the medians of the scores of the questionnaires before and after lectures were compared by the Wilcoxon test. In addition, the proportions of successes and errors for each question, before and after the lectures, were analyzed using the McNemar test. To investigate whether the knowledge of the CHW is related to the length of experience in the profession and previous training, the Mann-Whitney test was applied to compare the median score of the questionnaires, answered before the lectures, between the following groups: time up to 5 years of experience versus experience of more than 5 years, and participation in training prior to the study versus no training. $p<0.05$ was considered as significant.

The project was approved by the Research Ethics Committee of the Federal University of Espírito Santo (CAAE: 53620016.6.0000.5060) and all procedures were carried out observing the ethical aspects provided for in Resolution 466/12 of the National Health Council.

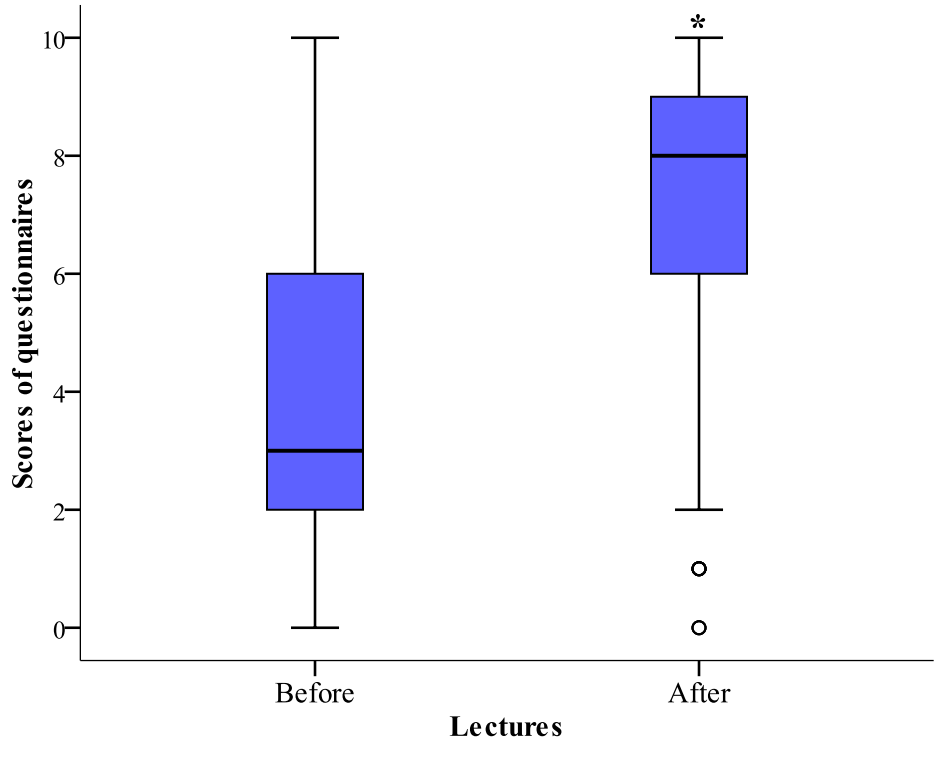
RESULTS

Six-hundred-seventy-eight CHWs participated in the lectures, of which 4 (0.6%) were excluded from the study because they did not return the questionnaires to the researcher. Thus, the sample was composed of 674 CHWs, resulting in a participation rate of 99.4%. Of the 674 CHWs, 452 (67.1%) had worked in the profession for more than 5 years, 469 (69.6%) had never done training on VH and 651 (96.6%) considered the training to be useful.

The median of the scores of questionnaires on VH before the lectures was 3 ($Q_1 = 2$ and $Q_3 = 6$). After the lectures, the median of the scores increased significantly ($p < 0.001$) to 8 ($Q_1 = 6$ and $Q_3 = 9$) (Figure 1).

The proportions of correct answers and errors showed statistically significant differences ($p < 0.001$) before and after the lectures for all questions: there was an increase in the percentage of correct answers after the lectures. Before the lectures, three questions had a percentage of correct answers below 30% and six questions between 30 and 50%, only question number 3 had a percentage of correct answers above 50%. After the lectures, six questions had a percentage of correct answers greater than 70% (Table 1).

Scores of questionnaires applied to CHWs with up to 5 years of experience (3, $Q_1 = 2$ and $Q_3 = 5$) was no different ($p = 0.303$) from the score obtained by CHWs with more than 5 years of activity (3, $Q_1 = 2$ and $Q_3 = 6$). The score of questionnaires applied to CHWs who reported never having participated in training on VH (3, $Q_1 = 2$ and $Q_3 = 6$) also did not differ ($p = 0.234$) from the score of CHWs who declared that they had already done some previous training on VH (3, $Q_1 = 2$ and $Q_3 = 5$) (Table 2).



* The scores before and after the lectures were compared using the Wilcoxon test, $p < 0.001$.

Figure 1. Boxplot of the scores of questionnaires on viral hepatitis, answered by community health workers, before and after the lectures. n = 674.

Table 1. Frequencies of community health agents who gave correct and wrong answers in the questionnaire on viral hepatitis, before and after the lectures

Questionnaire questions	Answers	Absolute frequency (Relative frequency)		p
		Before lectures	*After lectures*	
1) Vaccinations are currently available for which types of hepatitis?	Correct	257 (38.1)	540 (82.3)	< 0.001*
	Wrong	417 (61.9)	116 (17.7)	
2) The health professional is at greater risk of infection by which of the hepatitis below during his/her professional practice?	Correct	191 (28.5)	250 (38.1)	< 0.001*
	Wrong	480 (71.5)	406 (61.9)	
3) Can hepatitis B and C cause liver cirrhosis?	Correct	496 (73.8)	604 (92.2)	< 0.001*
	Wrong	176 (26.2)	51 (7.8)	
4) Which of the following types of hepatitis are caused by viruses?	Correct	106 (15.8)	374 (57.0)	< 0.001*
	Wrong	564 (84.2)	282 (43.0)	
5) Check the alternative that best applies to the main forms of transmission of hepatitis A	Correct	302 (45.1)	551 (84.0)	< 0.001*
	Wrong	367 (54.9)	105 (16.0)	
6) Check the alternative that best applies to the main forms of transmission of hepatitis B	Correct	215 (32.3)	420 (64.0)	< 0.001*
	Wrong	451 (67.7)	236 (36.0)	
7) Check the alternative that best applies to the main forms of transmission of hepatitis C	Correct	152 (22.8)	438 (66.9)	< 0.001*
	Wrong	516 (77.2)	217 (33.1)	
8) To prevent hepatitis A is indicated	Correct	318 (47.6)	539 (82.5)	< 0.001*
	Wrong	350 (52.4)	114 (17.5)	
9) To prevent hepatitis B is indicated	Correct	303 (45.8)	500 (76.5)	< 0.001*
	Wrong	358 (54.2)	154 (23.5)	
10) To prevent hepatitis B is indicated	Correct	210 (31.8)	509 (77.9)	< 0.001*
	Wrong	451 (68.2)	144 (22.1)	

*The proportions of correct and wrong answers were compared by the McNemar test.

Table 2. Relationship between the knowledge of community health workers about viral hepatitis, before the lectures, with the length of professional experience and with previous training

Questionnaire questions	Answers	Median	Q_1	Q_3	p
Time of professional experience	≤ 5 years	3	2	5	0.303
	> 5 years	3	2	6	
Have you done any training?	No	3	2	6	0.234
	Yes	3	2	5	

n = 674; Q_1: 1st quartile; Q_3: 3rd quartile; the scores of the questionnaires, answered before the lectures, were compared between groups (time of up to 5 years of experience versus time of experience greater than 5 years and participation in training prior to the study versus no training) by the Mann-Whitney test.

DISCUSSION

The present study showed that CHWs had a low level of knowledge about HV before lectures and that the lectures increased the knowledge of CHWs by 166% (median 3 before the lectures and 8 after the lectures). No other studies were found that analyzed the CHWs' knowledge about VH, but recent national and international research with other health professionals, such as physicians[8-10,11,13], nurses[8,10,12-13], physical therapists[8], biomedicine professionals[8], dentists[5-8], nursing technicians and assistants[8] and laboratory technicians[8,13], identified important gaps, at different levels, in the knowledge of these professionals about VH. One of the studies concluded that professionals with a technical level showed less knowledge about the topic than health professionals with a higher education degree, and considered that more research is needed in this area[8]. Thus, this research needs to be widely disseminated, as it contributes to minimize the lack of data in the literature on CHW and VH and their results can encourage other training actions.

Bearing in mind that CHWs are of great importance in raising the population's awareness of health promotion and disease prevention[14], the result of the present study deserves attention, as knowledge about VH is essential so that these professionals can effectively act in the prevention of these diseases and simple educational measures, such as lectures, proved to be sufficient to increase the knowledge of these professionals.

Universal childhood vaccination against the hepatitis B virus, as well as vaccination of health professionals and groups most vulnerable to the disease, is emphasized as the main form of prevention of hepatitis B[4], and is considered the most important WHO strategy for the elimination of hepatitis B until 2030[1]. In the southeastern region of Brazil, where the state of Espírito Santo is located, although a consistent increase in the rate of vaccination has been observed over the years, adherence to the vaccination schedule is still insufficient on the part of the population[16]. CHWs have a key role in what concerns the active search for immunization, as they enter the households, having the possibility of knowing the reality of the population and having a link with the families and the community[17].

In the present study, the question about the types of VH for which there is vaccination was among the questions with the highest percentage of errors (61.9%) before the lectures. This result is alarming, since, without this knowledge, it is not possible to adequately carry out the active search for immunization, nor to make the population aware of the importance of the vaccine, which can result in low adherence to vaccination and, consequently, in a greater number of infected people. After the lectures, 82.3% CHWs came to know for which forms of VH there are vaccines, however, 17.7% CHWs have not yet acquired this knowledge.

For the other nine questions in the questionnaire, there were also increases in the proportions of correct answers after the lectures, however, some still remained with high error rates, such as the question concerning which of the forms of VH represents the greatest occupational risk for health professionals, which continued to be answered erroneously by 61.9% CHWs even after the lectures. These findings indicate that the training is effective, but it must be carried out permanently.

Moreover, the lack of knowledge about ways of transmission, prevention and vaccination puts the health of the professional at risk, as observed when analyzing the findings of another investigation carried out by our group, which showed low adherence to the hepatitis B vaccine by CHW from 5 municipalities that made up part of the present sample (only 59.7% CHW said they had received all doses of the vaccine)[18]. Corroborating this statement, a recent study, which evaluated the prevalence of vaccination against the hepatitis B virus among professionals in the Family Health Strategy, showed that only 52.5% reported having taken the three doses of the vaccine, 25% reported having performed the dosage test of the antibody against hepatitis B surface antigen (anti-HBs) to prove the immunity acquired after vaccination, and only 16.4% were immunized when the anti-HBs dosage was performed[19]. In addition, it has been shown

that health professionals' greater knowledge of available evidence and recommendations contributes to more positive attitudes towards vaccination[20-21].

The present study also revealed that the CHWs' knowledge about HV was not related to the length of experience in the profession. Likewise, a recent survey of physicians, nurses and other health professionals showed that the length of professional experience had no significant impact on the total scores of knowledge about hepatitis B[16].

It was expected that the CHWs who reported having completed training on VH would present a greater number of correct answers in the questionnaire, however, having participated in previous training did not influence the level of knowledge about VH. Participation in previous training was self-reported and no data was collected on the time or type of training, workload or content covered, which makes it more difficult to analyze further, but does not prevent from suggesting that, in addition to the inclusion of the VH theme in the initial training of CHWs, this subject should also be included in continuing education programs of these professionals, as the approach to the subject in a single moment may not be sufficient.

Among the limitations of this study, the convenience sampling stands out, in which the CHWs participated in the lectures aware that their knowledge would be evaluated, it may have stimulated these professionals to maximize their learning. Another limitation refers to the lack of measurement of professional attitudes related to VH, since the improvement in knowledge does not always reflect attitudinal changes. Thus, it is suggested that further research also investigate how much training results in changes in clinical practice.

As practical implications, this study reinforces the provisions of the National Policy for Permanent Education in Health, suggesting that training is effective, but should be conducted periodically, for recycling, updating, improving and raising awareness on the topic, so that professionals can effectively contribute to the interruption of the VH transmission chain, through the improvement of hepatitis B vaccination rates, the active search and the number of people diagnosed and treated, collaborating so that Brazil can meet the hepatitis B and C elimination goals as public health problem by 2030.

CONCLUSION

CHWs had a low level of knowledge about VH before the lectures, which considerably increased the knowledge of these professionals on the subject. Furthermore, prior knowledge of CHWs about VH was not related to their professional experience, nor to previous training.

REFERENCES

1. World Health Organization. Global health sector strategy on viral hepatitis 2016-2021. Towards ending viral hepatitis [Internet]. Geneva: World Health Organization; 2016. Available in: https://www.who.int/hepatitis/strategy2016-2021/ghss-hep/en/

2. Brasil. Ministério da Saúde. Hepatites Virais 2018 [Internet]. Boletim Epidemiológico. 2018 [citado em 2020 nov 10];49(31):1-69. Available in: http://www.aids.gov.br/pt-br/pub/2018/boletim-epidemiologico-de-hepatites-virais-2018.

3. The Lancet. Eliminating viral hepatitis: time to match visions with action. Lancet. 2017;390(10108):2121. doi: https://doi.org/10.1016/S0140-6736(17)32856-8.

4. Papatheodoridis G, Thomas HC, Golna C, Bernardi M, Carballo M, Cornberg, M, et al. Addressing barriers to the prevention, diagnosis and treatment of hepatitis B and C in the face of persisting fiscal constraints in Europe: report from a high level conference. J Viral Hepat. 2016;23:1-12.

5. Garbin AJI, Wakayama B, Ortega MM, Garbin CAS. Imunização contra a hepatite B e os acidentes ocupacionais: importância do conhecimento na odontologia. Saúde e Pesquisa. 2016;9(2):343-8.

6. Oliveira MI, Villalobos B, Santos AS, Alvarez-Leite ME. Conhecimento dos estudantes de odontologia sobre hepatites e sua associação com a prática odontológica. Odontol Clin-Cient. 2017;16(4):295-300.

7. Fernandez CS, Mello EB, Alencar MJS, Albrecht N. Conhecimento dos dentistas sobre contaminação das hepatites B e C na rotina odontológica. Rev Bras Odontol. 2013;70(2):192-5.

8. Silva FJCP, Santos PSF, Reis FDP, Lima OL. Estado vacinal e conhecimento dos profissionais de saúde sobre hepatite B em um hospital público do nordeste brasileiro. Rev Bras Saúde Ocup. 2011;36(124):258-64.

9. Mahfouz M, Nguyen H, Tu J, Diaz CR, Anjan S, Brown S, et al. Knowledge and perceptions of hepatitis B and hepatocellular carcinoma screening guidelines among trainees: a tale of three centers. Dig Dis Sci. 2020 Sep:65(9):2551-61. doi: https://doi.org/10.1007/s10620-019-05980-1

10. C**hen Y, Xie C, Zhang Y, Li Y, Ehrhardt S,** Thio C, et al. Knowledge regarding hepatitis B mother-to-child transmission among healthcare workers in South China. J Viral Hepat. 2017;25(5):561-70.

11. Jaquet A, Wandeler G, Tine J, Diallo MB, Manga NM, Dia NM, et al. Prevention and care of hepatitis B in Senegal; awareness and attitudes of medical practitioners. The Am J Trop Med Hyg. 2017;97(2):389-95.

12. Mursy SMEM, Mohamed SOO. Knowledge, attitude, and practice towards Hepatitis B infection among nurses and midwives in two maternity hospitals in Khartoum, Sudan. BMC Public Health. 2019;19(1597):1-7.

13. Pham TTH, Le TX, Nguyen DT, Luu CM, Truong BD, Tran PD, et al. Knowledge, attitudes and medical practice regarding hepatitis B prevention and management among healthcare workers in Northern Vietnam. PloS One. 2019 Oct 14(10): e0223733. doi: https://doi.org/10.1371/journal.pone.0223733

14. Velho APM, Vermelho SCSD, Lucena TFR, Bortolozzi F, Bennemann RM. Estratégias de comunicação das Secretarias Municipais de Saúde: desafios para as Redes de Atenção à Saúde. Saúde e Pesquisa. 2018;11(3):505-15.

15. Instituto Brasileiro de Geografia e Estatística. Estimativas da população residente no Brasil e unidades da Federação com data de referência em 1º de julho de 2020. Rio de Janeiro: IBGE; 2020 [cited in 2020 dez 06]. Available in: https://ftp.ibge.gov.br/Estimativas_de_Populacao/Estimativas_2020/POP2020_20201030.pdf

16. Melo MC, Jacob LMS, Cabral ERM, Rolim ACA. Variação anual percentual de doses vacinais para hepatite B na região sudeste do Brasil. Rev Prev Infec Saúde. 2018;4(7028):1-12.

17. Martins JRT, Viegas SMDF, Oliveira VCD, Rennó HMS. Vaccination in everyday life: experiences indicate Permanent Education. Esc Anna Nery Rev Enferm. 2019;23(4):e20180365. doi: https://doi.org/10.1590/2177-9465-EAN-2018-0365

18. Pinto PK, Amorim SS, Rocha TS, Feriane LR, Almeida AV, Capellini VK, et al. Adherence of community health workers to hepatitis B vaccination. ABCS Health Sciences. 2021;46, *in press.*

19. Martins AMEBL, Costa FM, Ferreira RC, Santos-Neto PE, Magalhaes TA, Sá MAB, et al. Fatores associados à imunização contra Hepatite B entre trabalhadores da Estratégia Saúde da Família. Rev Bras Enferm. 2015;68(1):84-92.

20. Riccò M, Cattani S, Casagranda F, Gualerzi G, Signorelli C. Knowledge, attitudes, beliefs and practices of occupational physicians towards vaccinations of health care workers: a cross sectional pilot study in North-Eastern Italy. Int J Occup M Environ Health. 2017;30(5):775-90.

21. Harrison N, Brand A, Forstner C, Tobudic S, Burgmann K, Burgmann H. Knowledge, risk perception and attitudes toward vaccination among Austrian health care workers: a cross-sectional study. Hum Vaccin Immunother. 2016;12(9):2459-63.