ORIGINAL RESEARCH

DOI: 10.17944/interdiscip.1501218
Interdiscip Med J 2024;15(53):137-143

# Evaluation of hepatitis A, hepatitis B, hepatitis C, HIV, mumps, measles, rubella, and varicella immunity status of health sciences students

Berfin Babaoğlu, İzzet Fidancı, Hilal Aksoy, Duygu Ayhan Başer

Hacettepe University, Faculty of Medicine, Department of Family Medicine, Ankara, Türkiye

## Abstract

**Objective:** IIt is aimed to determine the immunity status of Hacettepe University health sciences faculty students against diseases specified in the Türkiye Ministry of Health's Health Personnel Screening Protocol for Communicable Diseases.

**Method:** The data of patients who were admitted to Hacettepe University Family Medicine outpatient clinics between 01.01.2018-31.12.2023, and were tested for at least one of the following tests: HAV antibody (anti-HAV IgG), Hepatitis B surface antigen (HBsAg), antibody against Hepatitis B surface antigen (anti-Hbs), HCV antibody (anti-HCV), HIV antibody (anti-HIV), measles antibody (Measles IgG), mumps antibody (Mumps IgG), rubella antibody (Rubella IgG), varicella antibody (VZV IgG), were retrospectively

**Results:** The median age of 9050 students was 22 (min=18, max=30, IQR=2), 6253 (69.10%) were female. While five (0.1%) students were HIV-positive, no HCV-positive students were found. The most immunized diseases were Rubella (97%), Varicella (93%), and Hepatitis B (80%); the least immunized disease was Measles (36.9%). AntiHbs and VZV IgG positivity were higher at younger ages ($p<0.001$).

**Conclusions:** As measles cases have begun to emerge in Türkiye, the low measles immunity identified in this study is concerning. It was found that the immunization rates among students at our university are generally lower than those among healthcare professionals in Türkiye. It is important to improve the implementation of the Ministry of Health's Protocol for Screening Healthcare Personnel for Infectious Diseases and to ensure that screening and immunization efforts reach all healthcare professionals and students in health sciences faculties effectively.

**Keywords:** Communicable diseases, health personnel, immunity, serologic tests

## INTRODUCTION

Healthcare workers are at high risk of contracting infectious diseases because of their direct contact with patients. For these reasons, it is crucial to vaccinate healthcare workers. This helps prevent the spread of contagious diseases from healthcare workers to non-immune patients, reduces absences due to illness, and sets a positive example for society regarding vaccination (1). Healthcare workers are considered a special category by all institutions that set vaccination guidelines worldwide. The most recommended vaccines for healthcare workers globally are seasonal influenza and hepatitis B. In some countries, these vaccines are mandatory for employees without consent (2).

In Türkiye, the Ministry of Health has established specific infectious disease screening and vaccination programs for healthcare workers. The Ministry's Protocol for Screening Healthcare Personnel for Communicable Diseases outlines the evaluation of healthcare workers for tuberculosis, hepatitis B, measles, mumps, rubella, varicella, tetanus, diphtheria, and influenza. It also guides the immunization procedures for personnel who require vaccination. Students in medical, dental, nursing, midwifery, and other health-related schools are at a higher risk of being exposed to infectious diseases, similar to healthcare workers in medical institutions during

**Cite this article:** Babaoğlu B, Fidancı İ, Aksoy H, Başer DA. Interdiscip Med J. 2024;15(53):137-143. https://10.17944/interdiscip.1501218

**Corresponding Author:** Dr. Berfin Babaoğlu, Hacettepe University, Faculty of Medicine, Department of Family Medicine, Ankara, Türkiye
**Email:** berfinblgc@gmail.com
**ORCID iD:** 0009-0008-8982-2591

**Received:** Jun 14, 2024
**Accepted:** Nov 13, 2024

their training. These students are also within the scope of screening and vaccination for infectious diseases (3). However, the vaccination program recommended for healthcare workers in Türkiye is not mandatory. Healthcare institutions advise that students undergo serology tests and receive any missing immunizations before their internship.

The objective of this study was to assess the vaccination status of students and research assistants at the University of Hacettepe Faculty of Medicine, Faculty of Dentistry, Faculty of Nursing, Faculty of Physical Therapy and Rehabilitation, and other faculties of Health Sciences for Hepatitis A, Hepatitis B, Hepatitis C, HIV, Mumps, Measles, Rubella, and Varicella.

## METHOD

This study is a retrospective descriptive study. The necessary ethics committee permission was obtained from the Hacettepe University Health Sciences Research Ethics Committee with the date 05.12.2023 (Research Number: SBA 23/406) and decision number 2023/08-26.

Before starting their internships in hospitals, students from the Faculties of Medicine, Dentistry, Nursing and Midwifery, Physical Therapy and Rehabilitation, and other Health Sciences at our university are advised to undergo screening for Hepatitis A, Hepatitis B, Hepatitis C, HIV, Mumps, Measles, Rubella, and Varicella serologies at the Department of Family Medicine's outpatient clinics. If necessary, students receive vaccinations and follow-up care. This screening and vaccination program focusing on the health sciences faculty students is not mandatory. So all the students are not screened and vaccinated in our university. This study focused on students from health sciences faculties who visited the Family Medicine outpatient clinics for serology control.

The data of patients who were admitted to Hacettepe University Family Medicine outpatient clinics between 01.01.2018-31.12.2023, and were tested for at least one of the following tests: HAV antibody (anti-HAV IgG), Hepatitis B surface antigen (HBsAg), antibody against Hepatitis B surface antigen (anti-Hbs), HCV antibody (anti-HCV), HIV antibody (anti-HIV), measles antibody (Measles IgG), mumps antibody (Mumps IgG), rubella antibody (Rubella IgG), varicella antibody (VZV IgG), were retrospectively analyzed. Within the specified time interval, 9050 students from the health sciences faculty underwent at least one of the serology tests mentioned in this study in our outpatient clinics. Among them, 4398 students had all of the serologic tests mentioned in this study (Figure 1). The analyses included data from 9050 students at health sciences faculties who underwent at least one of the serological tests. For students with repeated test results, only the results from the initial test were considered.

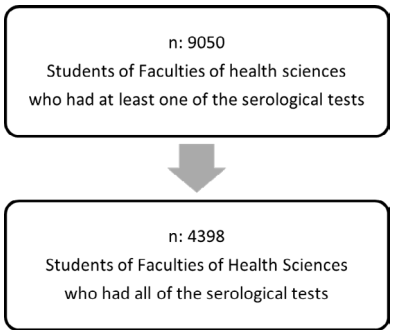


Figure1. Study population

### Statistical analysis

The data obtained in the study were transferred to electronic media (data entry) and statistical analyses of the data were performed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp. Released 2015. Armonk, NY: IBM Corp) statistical computer package program licensed by Hacettepe University.

The data's adherence to a normal distribution was assessed through visual examinations (histogram and probability plots) and statistical analysis (Kolmogorov-Smirnov/Shapiro-Wilk tests). Descriptive statistics for non-normally distributed variables were presented using the median and interquartile range (IQR). The relationship between two categorical variables was examined using the chi-square test, and the relationship between nonparametric continuous variables and categorical variables was analyzed using the Mann-Whitney U test. A significance level of 0.05 was used.

## RESULTS

The serologic testing data was gathered from 9050 students who had at least one of the serological tests. 48.59% (4398) of them had all of the serological tests mentioned in the study. The breakdown of serologic tests administered to the students can be found in Table 1.

The mean age of 9050 students included in this study was 21.95 years (median=22, min=18, max=30, 25p=21, 50p=22, 75p=23); 6253 (69.10%) were female. The mean age of the women was 21.90 years (median=22, min=18, max=30, 25p=21, 50p=22, 75p=23); the mean age of the men was 22.08 years (median=22, min=18, max=30, 25p=21, 50p=22, 75p=23). The mean age of males was statistically significantly higher ($p<0.001$).

The highest immunization rates were observed for Rubella (97%), Varicella (93%), and Hepatitis B (80%), while Measles had the lowest immunization rate at 36.9% (Table 1, Figure 2). None of the students tested positive for anti-HCV.

**Table 1. Distribution of number of students who underwent serological tests and their serology results**

| | Students who had the test | | Positive | | Negative | | Bord | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Anti Hbs** | 8258 | 91.3 | 6605 | 80.0 | 1653 | 20.0 | - | - |
| **HbsAg** | 8052 | 89.0 | 50 | 0.6 | 7987 | 99.2 | 15 | 0.2 |
| **Anti HCV** | 7280 | 80.4 | 0 | 0.0 | 7233 | 99.4 | 47 | 0.6 |
| **Anti HIV** | 6575 | 72.7 | 5 | 0.1 | 6570 | 99.9 | - | - |
| **Anti HAV** | 7199 | 79.5 | 3066 | 42.6 | 4133 | 57.4 | - | - |
| **Measles IgG** | 6010 | 66.4 | 2215 | 36.9 | 2819 | 46.9 | 976 | 16.2 |
| **VZV IgG** | 5813 | 64.2 | 5460 | 93.9 | 280 | 4.8 | 73 | 1.3 |
| **Rubella IgG** | 5815 | 64.3 | 5640 | 97.0 | 83 | 1.4 | 92 | 1.6 |
| **Mumps IgG** | 5896 | 65.1 | 3949 | 67.0 | 1184 | 20.1 | 763 | 12.9 |

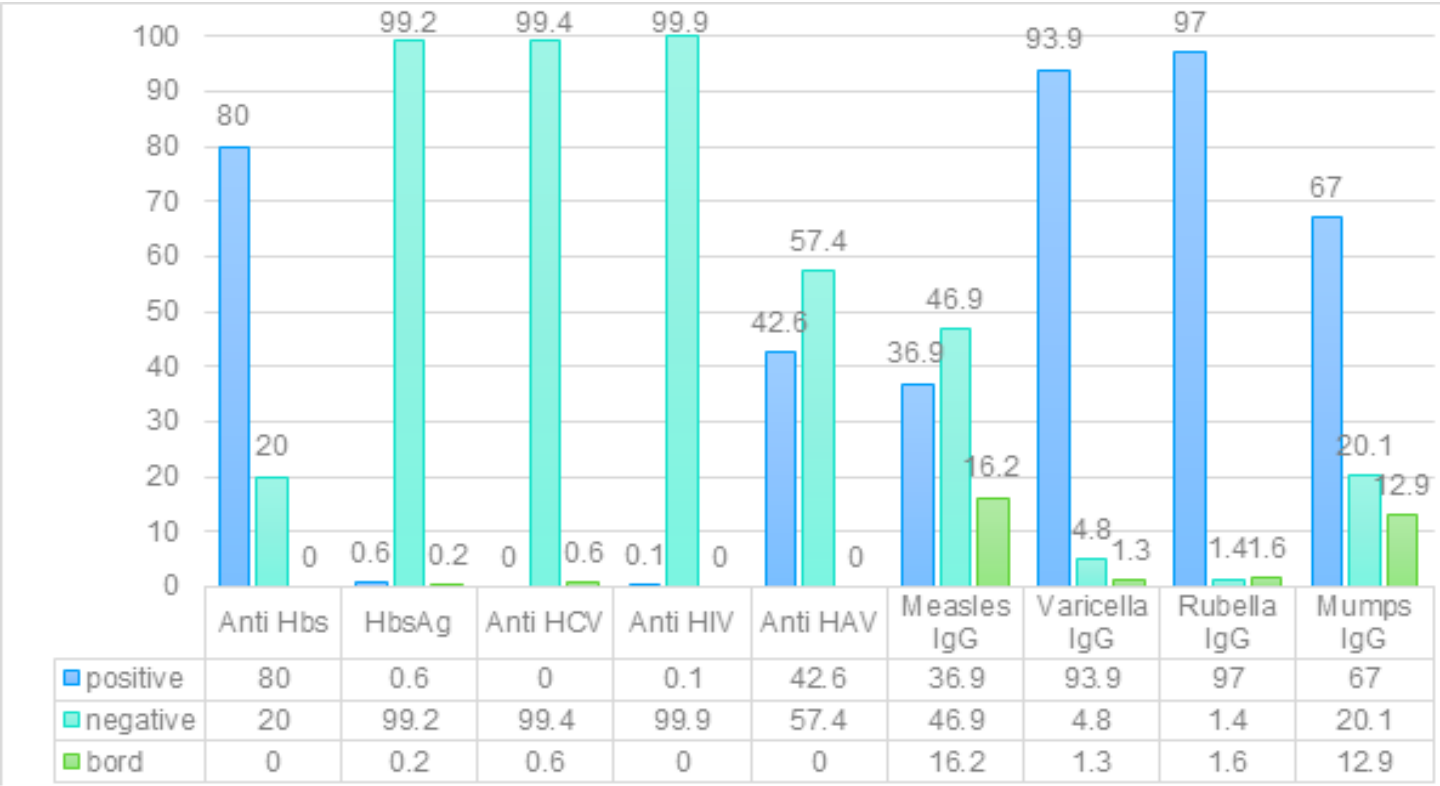


**Figure 2. Percentage distribution of serology results**

Upon analyzing the relationship between students' age and their serology results, it was observed that a higher prevalence of AntiHbs and VZV IgG positivity was evident among the younger age group. However, no statistically significant association was found between other serology results and age (Table 2).

Furthermore, gender-based analysis revealed no significant difference in the serology results (Table 3).

**Table 2. Relation between serology results and students' ages**

| | | Positive | Negative | p* |
|---|---|---|---|---|
| **Anti Hbs** | Mean | 21.94 | 22.09 | <0.001 |
| | Median | 22.00 | 22.00 | |
| | IQR | 2 | 2 | |
| **HbsAg** | Mean | 22.34 | 21.97 | 0.381 |
| | Median | 22.00 | 22.00 | |
| | IQR | 2 | 2 | |
| **Anti HCV** | Mean | - | | |
| | Median | - | | |
| | IQR | - | | |
| **Anti HIV** | Mean | 20.50 | 21.91 | 0.183 |
| | Median | 21 | 22 | |
| | IQR | 3 | 2 | |
| **Anti HAV** | Mean | 21.81 | 22.01 | 0.164 |
| | Median | 22.00 | 22.00 | |
| | IQR | 2 | 2 | |
| **Measles IgG** | Mean | 21.85 | 21.92 | 0.679 |
| | Median | 22.00 | 22.00 | |
| | IQR | 2 | 2 | |
| **VZV IgG** | Mean | 21.86 | 22.55 | <0.001 |
| | Median | 22.00 | 22.00 | |
| | IQR | 2 | 3 | |
| **Rubella IgG** | Mean | 21.88 | 22.10 | 0.872 |
| | Median | 22.00 | 22.00 | |
| | IQR | 2 | 3 | |
| **Mumps IgG** | Mean | 21.89 | 21.84 | 0.322 |
| | Median | 22.00 | 22.0 | |
| | IQR | 2 | 3 | |

*Mann-Whitney U test, IQR: interquartile range

**Table 3. Distribution of serology results according to students' genders**

| | | Female n (%) | Male n (%) | p* |
|---|---|---|---|---|
| **Anti Hbs** | Positive | 4562 (69.1) | 2043 (80.9) | 0.515 |
| | Negative | 1128 (68.2) | 525 (31.8) | |
| **HbsAg** | Positive | 35 (70.0) | 15 (30.0) | 0.318 |
| | Bord | 13 (86.7) | 2 (13.3) | |
| | Negative | 5485 (68.7) | 2502 (31.3) | |
| **Anti HCV** | Positive | - | - | - |
| | Negative | | | |
| **Anti HIV** | Positive | 3 (60.0) | 2 (40.0) | 0.665 |
| | Negative | 4419 (67.3) | 2151 (32.7) | |
| **Anti HAV** | Positive | 2132 (69.5) | 934 (30.5) | 0.983 |
| | Negative | 2873 (69.5) | 1260 (30.5) | |
| **Measles IgG** | Positive | 1528 (69.0) | 687 (31.0) | 0.495 |
| | Bord | 655 (67.1) | 321 (32.9) | |
| | Negative | 1947 (69.1) | 872 (30.9) | |
| **VZV IgG** | Positive | 3733 (68.4) | 1727 (31.6) | 0.112 |
| | Bord | 58 (79.5) | 15 (20.5) | |
| | Negative | 3733 (68.4) | 1727 (31.6) | |
| **Rubella IgG** | Positive | 3883 (68.8) | 1757 (31.2) | 0.843 |
| | Bord | 61 (66.3) | 31 (33.7) | |
| | Negative | 56 (67.5) | 27 (32.5) | |
| **Mumps IgG** | Positive | 2735 (69.3) | 1214 (30.7) | 0.480 |
| | Bord | 525 (68.8) | 238 (31.2) | |
| | Negative | 798 (67.4) | 386 (32.6) | |

*Chi-square test

## DISCUSSION

In this study, 48.59% of the health sciences students who were admitted to clinics for serology screening underwent all the serologic tests and successfully screened for all the diseases advised in the Türkiye Ministry of Health's Protocol for Screening Healthcare Personnel for Communicable Diseases.

The HBV and HCV serology tests were conducted in 90% and 80% of the students who were admitted for serology screening, respectively. Measles, mumps, varicella, and rubella IgG tests were performed in approximately 65% of the students who were admitted for serology screening. The higher frequency of HBV and HCV serology tests may be attributed to the necessity for testing following occupational accidents, such as needlestick injuries during patient care.

The results of this study indicate that the highest rates of immunization among students were for rubella (97%), varicella (93%), and hepatitis B (80%), while the lowest rates were for measles (36.9%) and hepatitis A (47%).

Although measles vaccination has been practiced in Türkiye since the 1970s, it wasn't widely adopted until the

1990s. As a result, there is a high rate of non-vaccination among individuals born between 1970 and 1991, especially for those born between 1980 and 1991 (4). Studies have shown varying immunization rates against measles among healthcare workers in different regions of Türkiye; 77.6% in a study conducted across Türkiye in 2020 (5); 99.1% in Elazığ Training and Research Hospital in 2016 (6); 75.8% in Izmir in 2023 (7); and 93.3% in Erciyes University in 2013 (8). In this study it was found that the measles seropositivity rate among health sciences faculty students who were admitted for serology screening is only 36.9%. This finding is concerning, particularly in light of the recent increase in measles cases in Türkiye. Additionally, it's worth noting that the age range of students included in the study was from 18 to 30, with the oldest participant being born in 1993.

Hepatitis B vaccine was added to the national vaccination schedule in 1998 (9). Additionally, the Hepatitis B vaccination program for healthcare workers has been in place in Türkiye since 1996 (10). In other studies conducted in Türkiye, the rate of anti-Hbs positivity among healthcare workers was found to range between 35-89% (11-14). Notably, it was reported to be 90.4% among younger healthcare workers (15). The 80% anti-Hbs positivity rate found in this study is consistent with the data from healthcare workers in Türkiye, underscoring the need for concerted efforts to raise this rate.

The prevalence of HBV carriage is 3.6% in the world and 2.6% in Türkiye (16). HBV carriage among healthcare workers in Türkiye has been reported at rates ranging between 0.3% and 1.8% (17-20). In this study, HbsAg positivity among screened health sciences students was found to be 0.6%. The mean age of HbsAg positive students was higher than that of negative students. This may suggest that HbsAg positivity rates may increase as the duration of occupational exposure of health workers increases, but it does not provide a clear result because the immunization status at the beginning of the faculty is not known.

It is generally accepted that immunity against hepatitis A varies according to socioeconomic level and hygiene conditions and that immunity increases with age. In Türkiye, seropositivity rates differ between the western and eastern regions (21-22). While 10% seropositivity was reported in some centers in the western regions, publications are reporting over 90% positivity in healthcare workers in the eastern regions (6, 23-24). Hepatitis A and varicella vaccines became part of the routine childhood vaccination schedule in 2013 (25). However, none of the students in this study had received these vaccines as they were not eligible based on their age. The 47% immunity rate against hepatitis A among screened students found in this study aligns with other research in the same age group. Nevertheless, this study did not observe the age-related increase in hepatitis A immunity reported in the literature (6).

The number of HIV positive patients is increasing in Türkiye and in the world. However, it has been reported that HIV positivity was not detected in studies conducted in healthcare workers in Türkiye (20,26,27). In this study, HIV positivity was found to be 0.1% among screened students.

### Limitations of the study

The limitations of this study include the fact that it could not access the vaccination status of the students, whether they had the infectious diseases examined, and exposure information regarding these diseases. These limitations may have led errors in the analysis of serology results by age and gender. Furthermore, this study included only students who had at least one of the serologic tests, and not all 9050 students underwent all serologic tests. Additionally, as serologic screening at our university is voluntary, it was not possible to reach all students from faculties of health sciences who were doing internships at our hospitals. When there were repeated serologic tests from the same student, only the earliest dated test result was included in the analysis. Therefore, post-vaccination serology results of the students were not evaluated. In addition, since the number of cases in which immunity did not occur even though vaccination was completed was not known, each antibody negativity was considered as non-vaccination. Despite these limitations, it is important to highlight that the high number of evaluated results compared to other similar studies in the literature is a strength of this study.

## CONCLUSION

In this study, the immunity status of the students in the faculties of health sciences at Hacettepe University against hepatitis A, hepatitis B, hepatitis C, HIV, mumps, measles, rubella, and varicella are evaluated. It was found that the students' immunity percentages were generally lower than those of healthcare professionals in Türkiye. It is important to implement the Ministry of Health's Protocol for Screening of Healthcare Personnel for Infectious Diseases more effectively and to reach all healthcare workers and students in health sciences faculties with screening and immunization studies. Lectures, activities, and brochures could be prepared to raise awareness among students on this issue. To ensure more consistent and accurate results nationwide, inspecting laboratories where serologic tests are performed more frequently is recommended.

## ACKNOWLEDGEMENT

### Peer-Review

**Both externally and internally peer reviewed.**

### Conflict of Interest

The authors declare that they have no conflict of interests regarding content of this article.

### Financial Support

The Authors report no financial support regarding content of this article.

### Ethical Declaration

Ethical permission was obtained from the Hacettepe University, Medical Faculty Clinical Research Ethics Committee for this study with University Health Sciences Research Ethics Committee with the date 05.12.2023 (Research Number: SBA 23/406) and decision number 2023/08-26., and Helsinki Declaration rules were followed to conduct this study.

### Athorship Contributions

Concept: BB, İF, Design: BB, İF, Supervising: İF, DAB, Financing and equipment: HA, DAB, Data collection and entry: BB, İF, Analysis and interpretation: BB, İF, HA, DAB, Literature search: BB, İF, DAB, Writing: BB, Critical review: İF, HA, DAB

## REFERENCES

1. Ozisik L, Tanriover MD, Altınel S, Unal S. Vaccinating healthcare workers: Level of implementation, barriers and proposal for evidence-based policies in Türkiye. Hum Vaccin Immunother. 2017;13(5):1198-206. https://doi.org/10.1080/21645515.2016.1269992
2. Maltezou HC, Wicker S, Borg M, et al. Vaccination policies for health-care workers in acute health-care facilities in Europe. Vaccine. 2011;29:9557-62. https://doi.org/10.1016/j.vaccine.2011.09.076
3. Sağlık Çalışanlarına Yönelik Uygulanması Gerekli Aşılar ve Uygulama Şemaları. T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü Aşı ile Önlenebilir Hastalıklar ve Bağışıklama Dairesi Başkanlığı. (Internet) https://hsgm.saglik.gov.tr/tr/saglik-calisanlari-asilama.html (Accessed: 10/11/2023).
4. Yetişkin aşılama. Erişim adresi:https://www.saglik.gov.tr (Accessed: 29.05.2024)
5. Alay H, Oguzoncul A, Torun A, Kul G, Tosun S, Akgul F, et al. Sağlık Çalışanlarının Kızamık, Kızamıkçık, Kabakulak ve Suçiçeği Geçirme ve Aşılanma Durumlarının Değerlendirilmesi (Ülke Geneli Çok Merkezli Çalışma). Dicle Tıp Dergisi. 2020;47(3):687-695. https://doi.org/10.5798/dicletip.800273
6. Özgüler M, Güngör Saltık L, Öztürk Kaygusuz T, Papila Ç. Elazığ Eğitim ve Araştırma Hastanesi Sağlık Çalışanlarında Hepatit A, Hepatit B, Kızamık ve Kızamıkçık Seroprevalansı. Klimik Dergisi. 2016;29(1):10-4. https://doi.org/10.31832/smj.806090
7. Emre BA, Alp-Çavuş S. Kızamık Eliminasyon Programı Sürecinde Sağlık Çalışanlarının Kızamık Seroprevalansı: Kesitsel Bir Çalışma. Klimik Derg. 2023;36(4):234-8. https://doi.org/10.36519/kd.2023.4717
8. Türe Z, Ulukılıç A, Cevahir F, Demiraslan H, Gökahmetoğlu S, Alp E. Sağlık Çalışanlarında Hepatit B, Kızamık, Kızamıkçık, Kabakulak ve Suçiçeğinde Bağışıklık Oranları. FLORA. 2013;18(2):98-102.
9. Aşılama Takviminde Değişiklik Yapıldı, T,C, Sağlık Bakanlığı Aşı Portalı. (Internet) https://asi.saglik.gov.tr/asi/asi-takvimi2 (Accessed: 10/11/2023).
10. Genişletilmiş bağışıklama programı genelgesi, T.C. Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, Genelge. 2009;17:2009. (Internet) https://www.saglik.gov.tr/TR-11137/genisletilmis-bagisiklama-programi-genelgesi-2009.html (Accessed: 27/03/2024).
11. Korkmaz P, Çağlan FÇ, Aykın N, Alpay Y, Güldüren HM, Yaşar ZD, ve ark. Bir Devlet Hastanesindeki Sağlık Çalışanlarında Hepatit A, B, C ve HIV İnfeksiyonu Seroprevalansı. Klimik Dergisi. 2013;26(2): 64-7. https://doi.org/10.5152/kd.2013.20
12. Kader Ç, Balcı M, Erdoğan Y, Göçmen AY, Meşe Üzümveren B, Ünsal G, ve ark. Seroprevalences of Hepatitis B, C, HIV and Hepatitis B Vaccination in Healthcare Workers in Bozok University Faculty of Medicine. FLORA. 2012;17(3):126-31.
13. Köse H, Temoçin F. İkinci basamak bir devlet hastanesi çalışanlarında hepatit A, B ve C serolojisinin irdelenmesi. Ortadogu Tıp Derg. 2019;11(2):155-60. https://doi.org/10.21601/ortadogutipdergisi.361805
14. Gülaçtı U, Üstün C, Arlıer, Turan M. Elazığ Harput Devlet Hastanesi Çalışanlarında Hepatit B ve C Seroprevalansı. Konuralp Tıp Dergisi. 2013;5(3):5-8.
15. Ödemiş, İ., Köse, Ş., Tatar Gireniz, B., Akbulut, İ., & Albayrak, H. Genç sağlık çalışanlarında hepatit A, B, C ve HIV seroprevelansının değerlendirilmesi; kesitsel çalışma. Journal of Dr. Behcet Uz Children's Hospital. 2018;8:1: 8-14. https://doi.org/10.5222/buchd.2018.008
16. Dayan S. Enfeksiyon Hastalıkları Tanı ve Tedavi El Kitabı. Ankara:Hipokrat Yayınevi, 2022. Website: https://gunider.org/wp-content/uploads/2022/03/Enfeksiyon-Hastaliklari-1-1.pdf (Accessed: 15/04/2024).
17. Apaydin H, Demir Ş, Karadeniz A. Bir Tıp Fakültesi Hastanesi Sağlık Çalışanlarında Hepatit A, Hepatit B, Hepatit C Seroprevelansı ve Aşılanma Durumu. Sak Tıp Derg. 2021;11(2):360-5. https://doi.org/10.26453/otjhs.1062233
18. Kepenek E. Hastane çalışanlarında hepatit B, hepatit C ve HIV virüsünün seroprevalans durumlarının incelenmesi. Selcuk

Med J. 2017;33(3):45-9.

19. Kalkan I, Cinar G, Mut A, Karasahin O, Gurbuz Y, Tekin A, et al. Evaluation of the Seroprevalence of Viral Hepatitis and the Human Immunodeficiency Virus Among Hospital Workers in Turkey and the Turkish Republic of Northern Cyprus. Hepat Mon. 2020;20(4): e97952. https://doi.org/10.5812/hepatmon.97952

20. Ceylan MR, Çelik M, Gürbüz E, Esmer F, Koç S. Sağlık Çalışanlarında Hepatit A, Hepatit B, Hepatit C ve HIV Seroprevalansı. Online Türk Sağlık Bilim Derg. 2022;7(3):420-4. https://doi.org/10.26453/otjhs.1062233

21. Çetinkol Y, Altunçekiç-Yıldırım A. Sağlık Meslek Lisesi Öğrencilerinde HBsAg, Anti-HBs, Anti-HCV ve Anti-HAV IgG Sonuçlarının Değerlendirilmesi. Viral Hepatit Dergisi 2012; 18(1): 23-5. https://doi.org/10.4274/Vhd.18.06

22. Ceyhan, M., Yildirim, I., Kurt, N., Uysal, G., Dikici, B., Ecevit, C., Aydogan, A., Koc, A., Yasa, O., Köseoğlu, M., Onal, K., Hacimustafaoglu, M. and Celebi, S. Differences in hepatitis A seroprevalence among geographical regions in Turkey: a need for regional vaccination recommendations. Journal of Viral Hepatitis. 2008;15:69-72. https://doi.org/10.1111/j.1365-2893.2008.01034.x

23. Bekçibaşı M, Üzel A. Sağlık çalışanlarında hepatit A, hepatit B, hepatit C ve HIV infeksiyonu seroprevelansı. ANKEM Derg. 2016;30:97-101. https://doi.org/10.5222/ankem.2016.097

24. Budak Ş. İş Yeri sağlık ve güvenlik birimi tarafından yapılan çırak ve stajyerlerin giriş muayenesi sonuçlarının değerlendirilmesi. Forbes J Med. 2020;1(1):5-10. DOI: https://doi.org/10.5222/forbes.2020.87597

25. Ülkemizde Güncel Aşı Takvimi (internet) ttps://millipediatri.org.tr/Custom/Upload/files/asilama.pdf (Accessed: 15/04/2024)

26. Boşnak VK, Karaoğlan İ, Namıduru M, Şahi A. Gaziantep Üniversitesi Şahinbey Araştırma ve Uygulama Hastanesi sağlık çalışanlarında hepatit B, hepatit C ve HIV seroprevalansı. Viral Hepatitis Journal. 2013;19(1):11-4.https://doi.org/10.4274/Vhd.69188

27. Bayar F, Görgü, N. Bir Eğitim Ve Araştırma Hastanesi Çalışanlarında Hepatit-A, Hepatit-B, Hepatit-C Ve HIV Seroprevalansının Değerlendirilmesi. Kırıkkale Üniversitesi Tıp Fakültesi Dergisi, 2022;24(3):491-5. https://doi.org/10.24938/kutfd.1107402