A Cross-Sectional Study of Hepatitis B and Hepatitis C Knowledge Among Dental Medicine Students at the University of Zagreb

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ABSTRACT:

Introduction: Dental health care workers, particularly dental medicine students (DMS), are at an increased risk of hepatitis B virus (HBV) and hepatitis C virus (HCV) infection. The aim of our study was to assess the level of knowledge on HBV and HCV, estimate needlestick injury (NSI) prevalence and reporting practice in DMS at the University of Zagreb and analyze how enrolment in obligatory and supplemental courses affects knowledge and needlestick injury reporting practice. *Materials and methods:* The knowledge was assessed by our questionnaires based on Centers for Disease Control general handouts. Additional information was collected to examine the prevalence and reporting practice of NSI. Data was analyzed by descriptive statistical analysis, independent-samples t-tests, proportion analyses and combined factor analyses of categorical and quantitative variables in SPSS and R. *Results:* In total, 206 students participated. The overall level of HBV and HCV-related knowledge was poor with average scores being 61.90% and 51.35% respectively. Moreover, students enrolled in the first year demonstrated significantly lower levels of knowledge in comparison with their older peers. Of all participants 18.2% sustained a needlestick injury, and majority of them (78.95%) never reported the injury. *Conclusion:* In conclusion, DMS have low levels of knowledge on important occupational pathogens and poor NSI reporting practice. Moreover, formal education in the current form failed to significantly improve competence of students and theoretical knowledge translates poorly into more conscientious injury reporting practice. We should look for a better way to increase student awareness and level of knowledge on this topic.

KEYWORDS: hepatitis B; hepatitis C; occupational health; dental education; needlestick injury

INTRODUCTION:

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections are one of the major global health problems that induce considerable morbidity and mortality worldwide, often through the consequences of chronic infection (1,2).

Recent estimates of the number of people chronically infected with HBV range from 240 to 350 million, and it is believed that more than 2 billion people have been infected with the virus[1]. For HCV, estimated number of infections based on the recent increases in seroprevalence was > 185 million infections worldwide (3).

In the Institute for Health Metrics and Evaluation Global Burden of Disease Study for 2017 , HBV was estimated to have resulted in 799 007 deaths, with 89 589 attributable to acute infection, 383 971 caused by cirrhosis and other chronic liver diseases due to HBV, and 325 447 caused by liver cancer. For HCV, the estimated number of deaths was 580 051, with 3472 deaths caused by acute infection, 342 243 caused by cirrhosis and other chronic liver diseases, and 234 336 caused by liver cancer. Estimated

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number of Disability-Adjusted Life Years (DALYs) was 2,53E+07 and 1,56E+07 for HBV and HCV respectively (4).

Health care workers (HCW) are considered to be among the groups at increased risk of both HBV and HCV infection (5,6). Moreover, there is some evidence that dental health care workers (DHCW) are at even greater risk of infection than other HCW. Prevaccination studies reported three to six times greater HBV infection rate among DHCW in comparison to the general population, and the highest among HCW (7,8). The health care students (HCS) are an especially important population with increased risk of HBV and HCV infection because of the lack of practical and theoretical knowledge during the first encounter with the patient in the clinical setting. Moreover, among HCS, dental students seem to be at the highest risk, possibly due to greater number of percutaneous injuries in comparison to other HCS (8–11), or poor compliance to guidelines for infection control in high risk dental setting (12,13).

Based on our subjective experience, students enrolled in entry level clinical years have inadequate knowledge regarding bloodborne pathogens and occupational disease that puts them at higher risk of an infection. As we believe this is of great importance, we decided to try to objectively and quantitatively assess the problem and investigate the effectiveness of our elective course as a tool that is currently used to solve it.

The aim of this study was to objectively assess HBV and HCV-related knowledge of dental medicine students at our University. Moreover, we wanted to estimate the prevalence of needlestick injuries in our students and evaluate whether injuries were officially reported and properly treated. Finally, we wanted to evaluate the effect of our elective supplementary course Occupational Diseases in Dentistry designed to reinforce the knowledge on important bloodborne pathogens and other potential occupational hazards in dentistry.

METHODS:

A cross-sectional analytical study was conducted on University of Zagreb School of Dental Medicine students by means of an anonymous questionnaire. All students were informed about the aims of the study and informed consent was obtained from all participants. The students were allowed to withdraw from the study at any time point without repercussions. The study was approved by the Ethics Committee of the University of Zagreb School of Dental Medicine. The questionnaire consisted of 4 parts. The first part consisted of questions about socio demographic status and general education-related information (gender, age, year of study, high school education, and the status of completion of Internal medicine course and Occupational diseases in dentistry course). The second part of the questionnaire assessed students' knowledge about HBV based on the 36 questions created to assess basic knowledge based on the Centers for Disease Control and Prevention information intended for the general public in order to exclude the curse of knowledge cognitive bias. The third part of the questionnaire assessed students' knowledge about HCV based on the 30 questions created in the same way as described for HBV. The fourth part of the questionnaire

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consisted of questions for evaluation of prevalence of needlestick injuries and knowledge about injury management. In the HBV, HCV and needlestick injury knowledge sections the correct answers were scored with 1 point and incorrect and conscious lack of knowledge received 0 points. The scores were summed up to obtain general HBV and HCV-related knowledge scores for each student. Statistical analysis was done by means of descriptive statistical analysis and independent-samples t-test with *IBM SPSS Statistics 25,0.* Additional exploratory statistical analysis and data visualization was conducted with R Statistical Software version 3.6.1. In short, visualization and calculation of proportions of answers for both HCV-related knowledge and HBV-related knowledge questionnaire was done with likert package. Factor analysis of mixed data (FAMD) was based on FactoMineR(v2.2) package and was separately conducted on all questions from HCV- and HBV-related knowledge questionnaires in the context of overall knowledge data and information related to the year of study, gender and course completion status. Additional factor analysis of mixed data was conducted on quantitative variables of overall hepatitis-related knowledge and in context of the information related to needlestick injury knowledge and reporting. FAMD variables were visualized in regards to the first two dimensions and final FAMD analysis was additionally reported by the individual factor map, graph of categories and quantitative variables.

RESULTS:

The total of 206 students completed the questionnaire. Of the respondents, 80,1% were women, and 19,9% were men. There were 90 preclinical (currently enrolled in the 1st and 2nd year of study) and 116 clinical (currently enrolled in the 3rd, 4th, 5th or 6th year of study) students. The majority of students (69,4%) previously completed General High School, 18,9% completed High School with Extended Natural Sciences and Mathematics Curriculum, 9,7% completed Classical High School/High School with Extended Language Curriculum, and 1,9% completed vocational school. The Internal Medicine Exam (IME) was passed by 55,3% of the examined students, and the Occupational Diseases in Dentistry Exam (ODDE) was passed by 28,2% of the students. Descriptive statistical representation of the examined sample is reported in **Table 1**.

Hepatitis B-related knowledge

After the total of 36 questions related to HBV infection have been scored as described in the methods section, the overall score was statistically analyzed by independent-samples t-test in order to evaluate the difference in absolute number of correct answers based on the participants' current year of study, gender, and the status of completion of IME and ODDE. Statistical analysis revealed the difference in HBV-related knowledge of students enrolled in the first year in comparison to knowledge of students enrolled in all other years (35,7% vs 64,7/68,8/67,5/66,8/67,9%; $p<0,001$). There was

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no statistically significant difference in HBV-related knowledge between male and female students (62,3% vs 58,7%; p=0,312). Students who passed IME demonstrated better knowledge in comparison to their peers (67,6% vs 52,8%; p<0,001), as did students who passed ODDE (68,7% vs 55,8%; p<0,001) (**Table 2.**). Comparison of answers to all questions with corresponding proportions in relation to completion of IME and ODDE is presented in **Fig. 1**. A relative contribution of all questions to the overall HBV-related knowledge score, and relationships between all questions with categorical variables of interest (gender, IME and ODDE completion, and current year of study) was further explored with factor analysis of mixed data (**Supplement**).

Hepatitis C-related knowledge

After the total of 30 questions related to HCV infection have been scored as described in the methods section, the overall score was statistically analyzed by independent-samples t-test to evaluate the difference in knowledge in the same way as was done for HBV-related knowledge. Again, students of the first year demonstrated significantly less knowledge related to HCV infection in comparison to their older peers (35,9% vs 50,7/53,5/59,5/54,4/54,1%; p<0,001). Male students scored slightly better, but the difference did not meet the criteria for statistical significance (52,4% vs 48,6%; p=0,146). As with HBV, students who passed IME scored significantly better (54,9% vs 44,9%; p<0,001), as did the students who passed ODDE (53,6% vs 47,7%; p=0,012) (**Table 3.**). A Comparison of answers to all questions with corresponding proportions in relation to completion of IME and ODDE is presented in **Fig. 2**. To analyze relative contribution of all questions to the overall HCV-related knowledge score, and relationships between all questions with categorical variables of interest (gender, IME and ODDE completion, and current year of study), data was further explored with factor analysis of mixed data (**Supplement**).

Needlestick injury

Of all the participants, 38 (18,4%) students sustained a needlestick injury, and 30 of them (78,95%) never reported the injury. Most of the examined students (69,9%) think all ongoing actions should be stopped in case of a needlestick injury. Most of the students (82,5%) also believe it is not important to assess the type of the injury (blood contamination, depth of the puncture wound, etc.) during the evaluation of the needlestick injury. One third of the students (36,4%) thinks it is recommended to apply pressure to the puncture wound. One third of the students (32,5%) also answered that it is recommended to rub and apply alcohol to the puncture wound. More than half of the participants (61,7%) think that the risk of the infection after a needlestick injury can be estimated based on the antibody titer (**Table 4.**)

Association of Occupational Disease in Dentistry course completion with injury reporting and hepatitis knowledge

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Finally, in order to see if students who completed Occupational Diseases in Dentistry really stand out from their peers by hepatitis-related knowledge and how they handle and report occupational injuries all obtained data was analyzed by factor analysis of mixed data (graphs of variables, categories, quantitative variable primary component analysis and individual factor map are available in **Supplement**). Moreover, exploratory visualization of hepatitis knowledge by years, course completion status, and needlestick injury reporting was done (**Fig 3**). As the year variable was a significant contributor to the hepatitis knowledge score variable, overall knowledge was plotted by years (**Fig 3A**). Interestingly, as also evident from **Table 2** and **Table 3**, the overall knowledge was greater in second year students in comparison to first year students, but there was no significant difference between students enrolled in the second year and their older peers. Needlestick injury reporting by year and course completion indicated that although fourth and fifth year students who completed ODDE were slightly more likely to be in the group of student who reported the injury in comparison to their peers who just completed IME, the effect was non-existent in the sixth year students and the overall number of participants was too small to deduce any relevant conclusions (**Fig 3B**). Hepatitis-related knowledge and needlestick injury reporting were visualized in **Fig 3C**. In contrast to what we expected, our data doesn't support our hypothesis that there is a greater chance that a student with greater factual knowledge on hepatitis will be more likely to report the needlestick injury. Interestingly, hepatitis-related knowledge was in correlation with needlestick injury-related knowledge (**Fig 3D**) indicating that greater awareness of needlestick injury didn't translate to more conscientious needlestick injury reporting.

DISCUSSION

In our study dentistry students demonstrated unsatisfactory low level of knowledge related to important bloodborne pathogens, HBV and HCV. Although the whole study was conducted in order to assess current knowledge and provide information for more effective design of education on occupational diseases and appropriate prevention strategies, and subpar results were expected, we were shocked to find out that the average dental medicine student knew the correct answer to just over 55% of questions in our questionnaire. The questionnaire we used for knowledge evaluation was based on Centers for Disease Control and Prevention (CDC) HBV and HCV overview documents, basic information handouts intended for education of the general population (A complete questionnaire is available in the **Supplement**). Nevertheless, on average, students scored just 51,35% on HCV-related knowledge test and 61,90% on HBV-related knowledge test. Considering the practical importance of the knowledge examined by the questionnaire, we believe the demonstrated knowledge was insufficient for safe clinical work. For example, only 36,4% knew that most of the people infected with HCV don't develop symptoms acutely and only 33,9% of students knew HCV is not transmitted through mosquito bites. Hepatitis infection is considered to be

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one of the most important infectious occupational hazards in the dental profession so we strongly believe solid knowledge on hepatitis virus transmission and at least superficial knowledge on hepatitis infection symptom time-course should be obligatory. Moreover, an alarmingly low number of students (16%) recognized the claim „After being exposed to HCV, for most of the people HCV antibody blood test will be positive 48 hours after the exposure“ as incorrect. In case of the injury during the clinical rotations, or occupational hazard in the dental practice, knowledge on HCV diagnostic tests is of exceptional importance, and a belief that antibody titer is usually positive 48 hours after the HCV exposure could lead to type 2 errors with serious medical consequences. Furthermore, hepatitis C drugs are considered to be a success story in the field of pharmacology with rapidly expanding treatment options and very high cure rates confirmed by data from clinical trials and real-world results (14) (up to >95% cure rate (15)), but 4 out of 5 students believe current HCV treatment can cure only 20% of people. On top of that, more than 50% think that, in Croatia, all people born after 1993. (and most of the students enrolled in the study were) were vaccinated against HCV. We believe this is very problematic. Although several vaccines are currently under development, HCV vaccine is not available at the moment, as was the case in 1993. Erroneous beliefs that everyone is vaccinated creates a false impression of security and probably contributes to poor compliance to guidelines for infection control in high risk dental setting. Results from the HBV-related knowledge questionnaire were slightly better, but a troublesome prevalence of incorrect answers to some questions was also observed. For example, 71,4% of students incorrectly believe that acute HBV infection is always symptomatic and that it always requires hospitalization. Moreover, only 11,6% know that the risk for chronic infection after exposure is greater in children and young people in comparison to adults. Both claims could lead to misinterpretation of symptoms and inadequate management after potential exposure to the infected material. On top of that, only 53,4% of students correctly answered to a very practical real-world question on postexposure prophylaxis and knew that postexposure prophylaxis by means of HBV vaccination can be done in order to decrease the risk of an infection preferably in the first 24 hours after the exposure. Also, 60,7% stated that HBV vaccination is dangerous in already vaccinated people that is clearly not supported by the facts. In context of the fact that 77,7% also believe that HBV vaccine is the only way to prevent infection after the exposure we argue that the average dental student is not equipped with the knowledge needed to detect and appropriately react in the case of the exposure to the virus. The importance of these findings is even more obvious in the context of prevalence of needlestick injuries. Of the examined students, 18,4% sustained a needlestick injury and only every fifth student reported the injury indicating that additional energy should be invested in education on the importance of occupational injury reporting. Additionally, the reason for the lack of reporting should be sought and both clinical staff and students should become more familiar with the reporting protocols. Analysis of hepatitis-related knowledge by years revealed some interesting trends. We hypothesized that 4th, 5th and 6th year students will have the highest scores on the hepatitis-related knowledge questionnaire as the Internal Medicine course (4th year) curriculum provides the most information on HBV and HCV in comparison to other courses. Moreover, we hypothesized that students who attend Occupational Diseases in Dentistry course (3rd year) will have higher scores than their peers. However, the greatest difference in

 doi:10.20944/preprints202004.0324.v1

knowledge was observed between 1st year students and students enrolled in all the other years indicating neither Internal Medicine course nor Occupational Diseases in Dentistry course resulted in increased knowledge on HBV and HCV (**Fig 3A**). Moreover, unexpectedly, we couldn't compare the students who completed ODDE with their colleagues from the 3rd year as most of the students who agreed to participate in the survey (22/24) attended the course. However, as knowledge of 3rd year students was comparable to that of students enrolled in 2nd year, we believe attendance of the supplementary course unfortunately didn't result with the expected benefits. As briefly discussed in the results section, 4th and 5th year students who completed ODDE were slightly more likely to report needlestick injury in comparison with their peers who just completed IME. However, absence of the effect in the 6th year students indicates that the observed effect was probably due to chance, and the number of students in this study was too small to draw meaningful conclusions from this observation. Either way, high prevalence of needlestick injuries in the clinical years and poor reporting suggests clinical year students should be one of target populations for additional education on occupational diseases. This might be especially important as there is an increasing trend of injuries with the increasing load of clinical work and educational interventions after graduation are much more difficult to implement. One of our hypotheses prior to this study was that education on important bloodborne pathogens and infectious occupational hazards would correlate with the number of reported needlestick injuries. However, our data suggest that although there is an obvious correlation between needlestick injury-related knowledge and hepatitis-related knowledge, neither one was in correlation with increased number of reported needlestick injuries (**Fig 3C-D**). As the number of reported injuries should be one of the main goals of education on occupational diseases, this raises an important question whether less time should be spent on teaching students about harmful health effects of infection and more time on teaching how and why the injury should be reported. Finally, limitations of our study should be noted. Our study was cross-sectional by design so no true causal conclusions can be extracted from our data. Moreover, our study was based on a questionnaire, and participation in the study was voluntary, so although we had 209 participants we cannot claim their responses are absolutely representative for the whole population of University of Zagreb dental medicine students.

CONCLUSION

In conclusion, our cross-sectional study on basic hepatitis-related knowledge among dental medicine students at University of Zagreb indicates that the level of knowledge on important occupational pathogens is low and we should look for a better way to increase student awareness and level of knowledge on this topic. Moreover, our results suggest that both our supplementary course and standard obligatory courses such as internal medicine rotation failed to significantly increase knowledge in this important field so we should design more robust studies to further understand significance and true meaning of this observations and proactively approach this problem to increase reporting and knowledge on important occupational pathogens in our students.

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Table 1. Descriptive statistics of the examined sample of dentistry students.

		N	%
Gender	Male	41	19,9%
	Female	165	80,1%
Current year of study	1	50	24,3%
	2	40	19,4%
	3	24	11,7%
	4	14	6,8%
	5	24	11,7%
	6	54	26,2%
Completed high school	Classical High School/High School with Extended Language Curriculum	20	9,7%
	General High School	143	69,4%

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	High School with Extended Natural Sciences and Mathematics Curriculum	39	18,9%
	Vocational School	4	1,9%
Passed Internal Medicine Exam	No	114	55,3%
	Yes	92	44,7%
Passed Occupational Diseases in Dentistry Exam	No	148	71,8%
	Yes	58	28,2%
Sustained a Needlestick Injury	No	168	81,6%
	Yes	38	18,4%

Table 2. Estimated knowledge related to HBV among dentistry students based on difference in absolute number of correct answers analyzed by independent-samples t-test

Number of correct answers to HBV-related questions (out of 36)						
		N	**Mean**	**SD**	**% of total number**	
Current year of study	1	50	12,86	6,58	35,7%	<0,001
	2	40	23,30	4,54	64,7%	
	3	24	24,75	4,16	68,8%	
	4	14	24,29	7,38	67,5%	
	5	24	24,04	3,59	66,8%	
	6	54	24,44	5,50	67,9%	
Gender	Male	41	22,41	8,87	62,3%	0,312

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	Female	165	21,13	6,80	58,7%	
Passed Internal Medicine Exam	No	114	19,02	7,73	52,8%	<0,001
	Yes	92	24,33	5,34	67,6%	
Passed Occupational Diseases in Dentistry Exam	No	148	20,07	7,67	55,8%	<0,001
	Yes	58	24,74	4,63	68,7%	

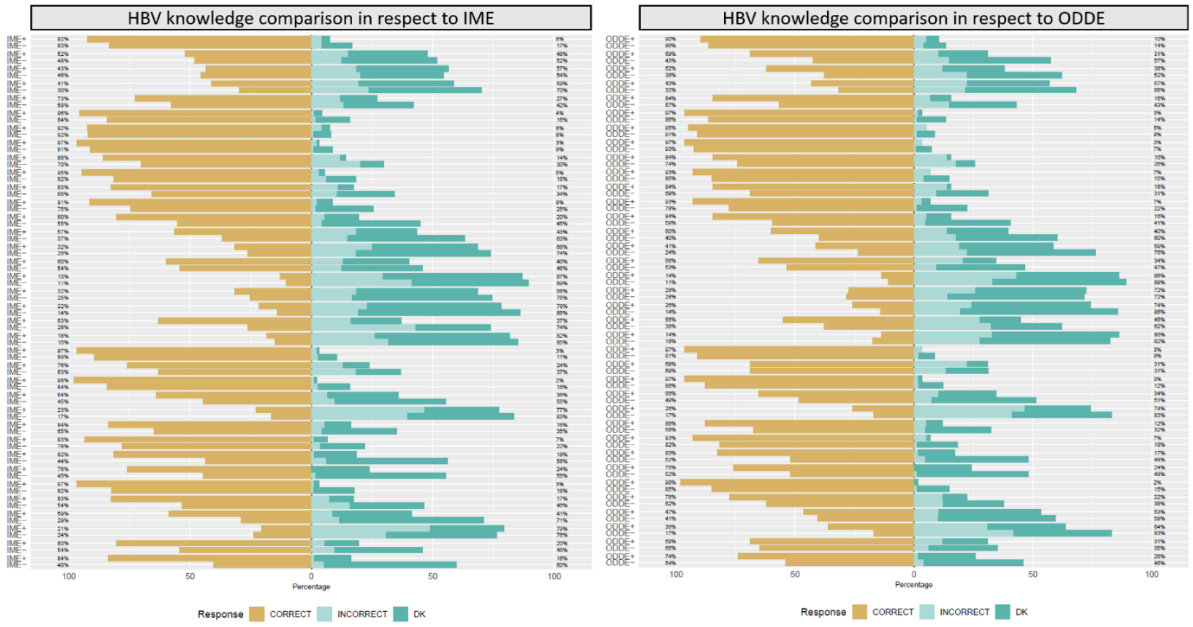

Fig. 1 Comparison of answers to all questions on HBV in regards to the status of Internal Medicine Exam completion (IME+/-) and Occupational Diseases in Dentistry Exam completion (ODDE+/-). Proportions of correct and incorrect answers are visualized. „I don't know“ (DK) answer representing conscious lack of knowledge was treated as incorrect, but due to its importance discussed in the text it was visualized separately from the incorrect answers. The list of all questions is provided as the **Supplement**.

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Table 3. Estimated knowledge related to HCV among dentistry students based on difference in absolute number of correct answers analyzed by independent-samples t-test

Number of correct answers to HCV-related questions (out of 30)						
		N	**Mean**	**SD**	**% of total number**	
Current year of study	1	50	10,76	4,24	35,9%	<0,001
	2	40	15,20	4,08	50,7%	
	3	24	16,04	3,61	53,5%	
	4	14	17,86	3,44	59,5%	
	5	24	16,33	2,65	54,4%	
	6	54	16,24	4,24	54,1%	
Gender	Male	41	15,73	4,70	52,4%	0,146
	Female	165	14,58	4,51	48,6%	
Passed Internal Medicine Exam	Ne	114	13,47	4,68	44,9%	<0,001
	Da	92	16,46	3,82	54,9%	
Passed Occupational Diseases in Dentistry Exam	Ne	148	14,31	4,67	47,7%	0,012
	Da	58	16,07	4,01	53,6%	

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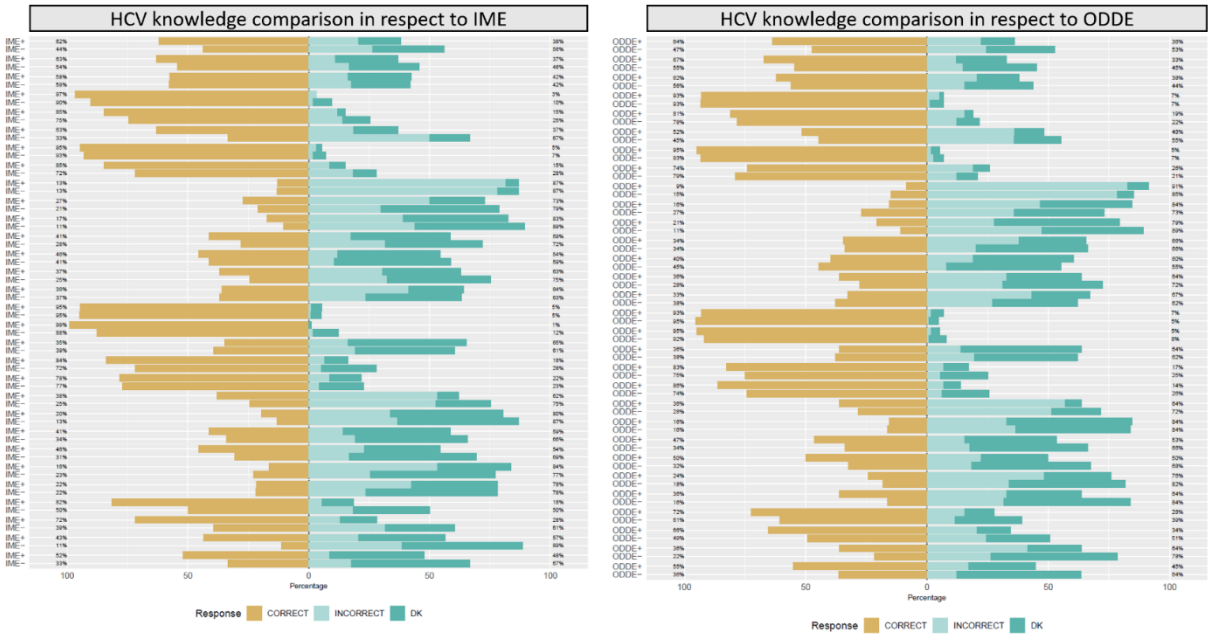

Fig. 2 Comparison of answers to all questions on HCV in regards to the status of Internal Medicine Exam completion (IME+/-) and Occupational Diseases in Dentistry Exam completion (ODDE+/-). Proportions of correct and incorrect answers are visualized. „I don't know“ (DK) answer representing conscious lack of knowledge was treated as incorrect, but due to its importance discussed in the text it was visualized separately from the incorrect answers. The list of all questions is provided as the supplement.

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Table 4. Prevalence of needlestick injuries and attitude on needlestick injury management.

		Number of answers	**Proportion**
Reported a Needlestick Injury	No	30	14,6%
	Yes	8	3,9%
	I have never sustained a needlestick injury	168	81,6%
In case of a needlestick injury all ongoing actions should be stopped	No	62	30,1%
	Yes	144	69,9%
During the evaluation of the needlestick injury, it is not important to assess the type of the injury (blood contamination, depth of the puncture wound,…)	No	36	17,5%
	Yes	170	82,5%
It is recommended to apply pressure to the puncture wound	No	131	63,6%
	Yes	75	36,4%
It is recommended to rub and apply alcohol to the puncture wound	No	139	67,5%
	Yes	67	32,5%
The risk of infection after a needlestick injury can be estimated based on the antibody titer	No	79	38,3%
	Yes	127	61,7%

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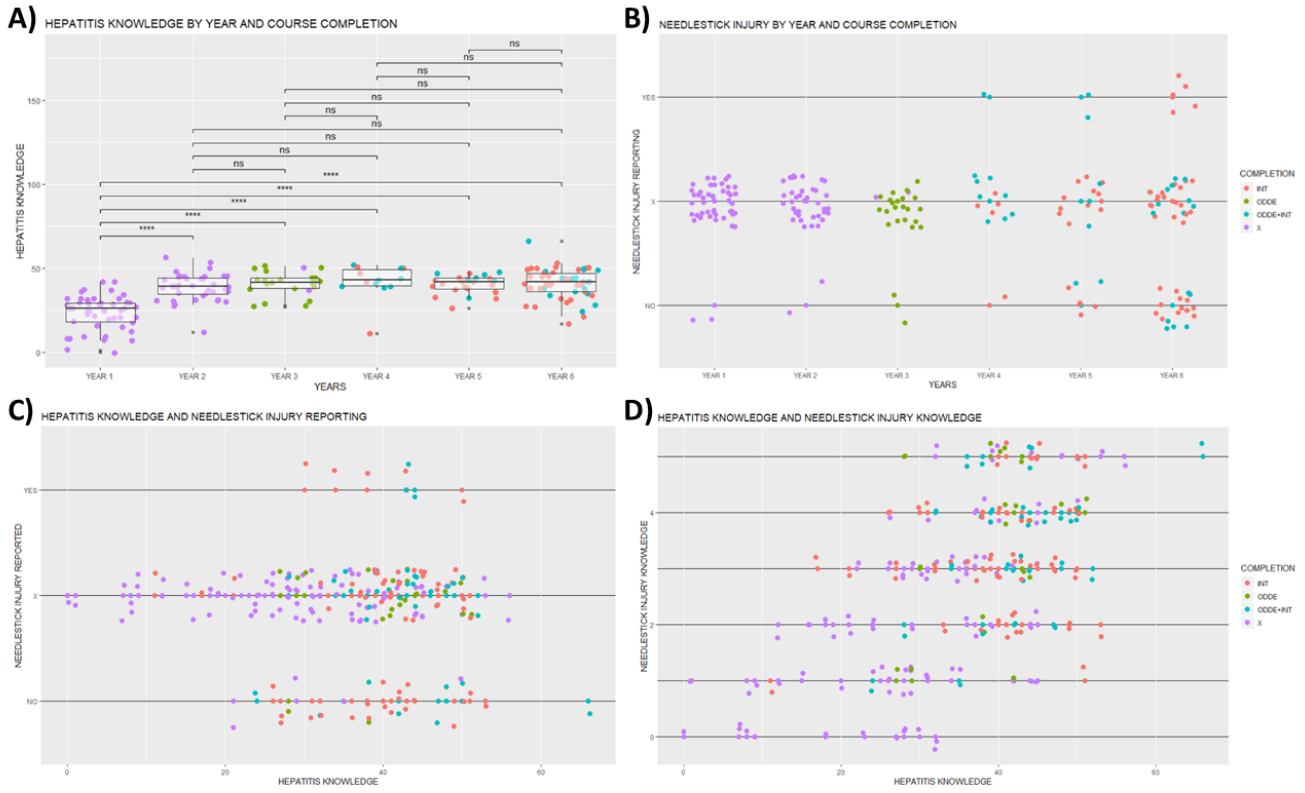

Fig. 3. A) A visual representation of the distribution of hepatitis-related knowledge by the year of study and Internal Medicine Exam/Occupation Diseases in Dentistry Exam (IME/ODDE) completion. **B)** Proportion of students who suffered and reported needlestick injury color-coded by course completion status. **C)** A visual representation of the relationship between the hepatitis-related knowledge with suffering and reporting a needlestick injury stratified color-coded by course completion status. **D)** A visual representation of the association between needlestick injury-related knowledge and hepatitis-related knowledge. **** (p<0,0001).

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Supplementary material:

- **HBV-related Knowledge Questionnaire**
- **HBV-related Knowledge Questionnaire With Answers**
- **HCV-related Knowledge Questionnaire**
- **HCV-related Knowledge Questionnaire With Answers**
- **Supplementary material 1 (Factor Analysis of Categorical and Qualitative Variables)**

HBV-related Knowledge Questionnaire

A person with no symptoms of HBV infection cannot infect others.

True
False
I do not know

There is no laboratory test to distinguish between an acute and chronic HBV infection.

True
False
I do not know

If a pregnant woman becomes infected with HBV, it is not possible to prevent the transmission of the virus to the baby.

True
False
I do not know

The symptoms of the disease usually develop 48 hours after the exposure to HBV.

True
False
I do not know

HBV cannot induce malignant liver disease.

True
False
I do not know

HBV can be transmitted through a contact (for example, by handshake).

True
False
I do not know

HBV can be transmitted through contact with open wounds and cuts.

True

False
I do not know

HBV can be transmitted through infected blood and bodily fluids.

True
False
I do not know

HBV cannot be transmitted through non-sterile syringes, needles or surgical instruments.

True
False
I do not know

HBV can be transmitted through sexual contact without protection.

True
False
I do not know

Vaccination cannot prevent HBV infection.

True
False
I do not know

There is no laboratory test to prove HBV infection.

True
False
I do not know

A post-exposure prophylaxis for HBV exists.

True
False
I do not know

Chronic HBV infection cannot be treated.

True
False
I do not know

Acute HBV infection is always symptomatic and requires a hospital admission.

True
False
I do not know

An acute HBV infection always transforms into a chronic infection.

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True
False
I do not know

Younger people are more likely to develop chronic HBV infection after an acute HBV infection, in comparison to older people.

True
False
I do not know

HBV infection in the first year of life will result in chronic infection in approximately 90% of cases.

True
False
I do not know

HBV infection in adulthood will result in the development of chronic infection in about 90% of cases.

True
False
I do not know

HBV can be contracted by using a toothbrush of a person infected with HBV.

True
False
I do not know

HBV is often transmitted by breastfeeding.

True
False
I do not know

It is possible to contract HBV by hugging.

True
False
I do not know

People living with those infected with HBV are at an increased risk of an infection.

True
False
I do not know

Health care professionals are at greater risk of HBV infection.

True

False
I do not know

In case of exposure to HBV, it is possible to prevent the development of the infection by vaccination within 24 hours.

True
False
I do not know

Once recovered from HBV infection, a person cannot get infected again.

True
False
I do not know

There is no effective way to prevent HBV.

True
False
I do not know

A vaccine for HBV still doesn't exist.

True
False
I do not know

It is dangerous to receive HBV vaccine if someone has been vaccinated previously.

True
False
I do not know

After exposure to HBV, a post-exposure prophylaxis can be provided by vaccination or by administration of hepatitis B immunoglobulin.

True
False
I do not know

Health care professionals should be tested to determine if they have sufficient immunity to HBV.

True
False
I do not know

If insufficient immunity in adulthood has been determined, it is not possible to receive an additional dose of vaccine to develop immunity.

True
False
I do not know

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HBV vaccine cannot be received at the same time as other vaccines.

True
False
I do not know

HBV vaccine is the only way to prevent the development of infection after exposure to infected blood.

True
False
I do not know

HBV vaccine usually also protects against HCV (hepatitis C virus).

True
False
I do not know

HCV vaccine is more effective and safer than HBV vaccine.

True
False
I do not know

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HBV-related Knowledge Questionnaire With Answers

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True
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I do not know

HBV can be transmitted through sexual contact without protection.

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I do not know

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I do not know

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I do not know

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HCV-related Knowledge Questionnaire

The infection becomes chronic in more than 75% of people infected with HCV.

True
False
I do not know

Acute HCV infection usually occurs within 6 months from exposure to HCV.

True
False
I do not know

Some people do not develop a chronic form of the HCV infection, even though they have not received any form of therapy.

True
False
I do not know

It is not possible to contract HCV by using infected syringes.

True
False
I do not know

A mother infected with HCV cannot transmit the infection to a child during a childbirth.

True
False
I do not know

It is possible to contract HCV by using an infected toothbrush.

True
False
I do not know

It is possible to contract HCV by getting a tattoo.

True
False
I do not know

It is not possible to contract HCV through sexual contact.

True
False
I do not know

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Blood transfusion recipients are at an increased risk of HCV infection.

True
False
I do not know

Blood clotting factor recipients are at an increased risk of HCV infection.

True
False
I do not know

An HCV infected mother will infect her child during childbirth in more than 50% of cases.

True
False
I do not know

It is possible to contract HCV from a bite of the mosquito that previously sucked the blood of an infected person.

True
False
I do not know

Symptoms of an acute HCV infection occur 48 hours after the exposure to the virus.

True
False
I do not know

Symptoms that appear 10 weeks after the exposure to HCV are considered to be a chronic infection.

True
False
I do not know

Most people with an acute HCV infection do not develop symptoms.

True
False
I do not know

A person with no symptoms cannot infect others.

True
False
I do not know

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Chronic HCV infection can induce failure of the liver function, malignant liver disease and death.

True
False
I do not know

HCV infection is easily transmitted through breastfeeding, so all infected mothers should refrain from breastfeeding.

True
False
I do not know

There is no laboratory test that could detect if someone has been infected with HCV.

True
False
I do not know

There is no laboratory test to detect the ongoing HCV infection.

True
False
I do not know

HCV antibodies in blood indicate there is an ongoing HCV infection.

True
False
I do not know

After exposure to HCV, antibodies usually appear in the blood after 48 hours.

True
False
I do not know

A laboratory test for detection of HCV RNA (PCR) is usually positive on the same day a person has been exposed to HCV.

True
False
I do not know

In a person with normal liver enzyme values (ALT, AST), the possibility of chronic HCV can be excluded.

True
False
I do not know

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When it comes to acute HCV infection, a targeted therapy is usually not recommended alongside symptomatic treatment.

True
False
I do not know

A therapy for chronic HCV exists, however only 20% of people are cured.

True
False
I do not know

The HCV vaccine is as effective as the HBV vaccine.

True
False
I do not know

In Croatia, every person born after 1993 was vaccinated against HCV.

True
False
I do not know

In case of exposure to HCV, there is a safe and effective post-exposure prophylaxis.

True
False
I do not know

Following a needlestick exposure to HCV positive blood, the risk of HCV infection is less than 2%.

True
False
I do not know

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Supplementary material 1

Fig 1. Factor analysis of mixed data conducted on all questions from the HCV- and HBV-related knowledge questionnaire, overall knowledge score and the information of year of study, gender, and Internal Medicine and Occupational Diseases in Dentistry course completion. **A)** Graph of variables for the HCV-related knowledge questionnaire. **B)** Graph of variables for the HBV-related knowledge questionnaire.

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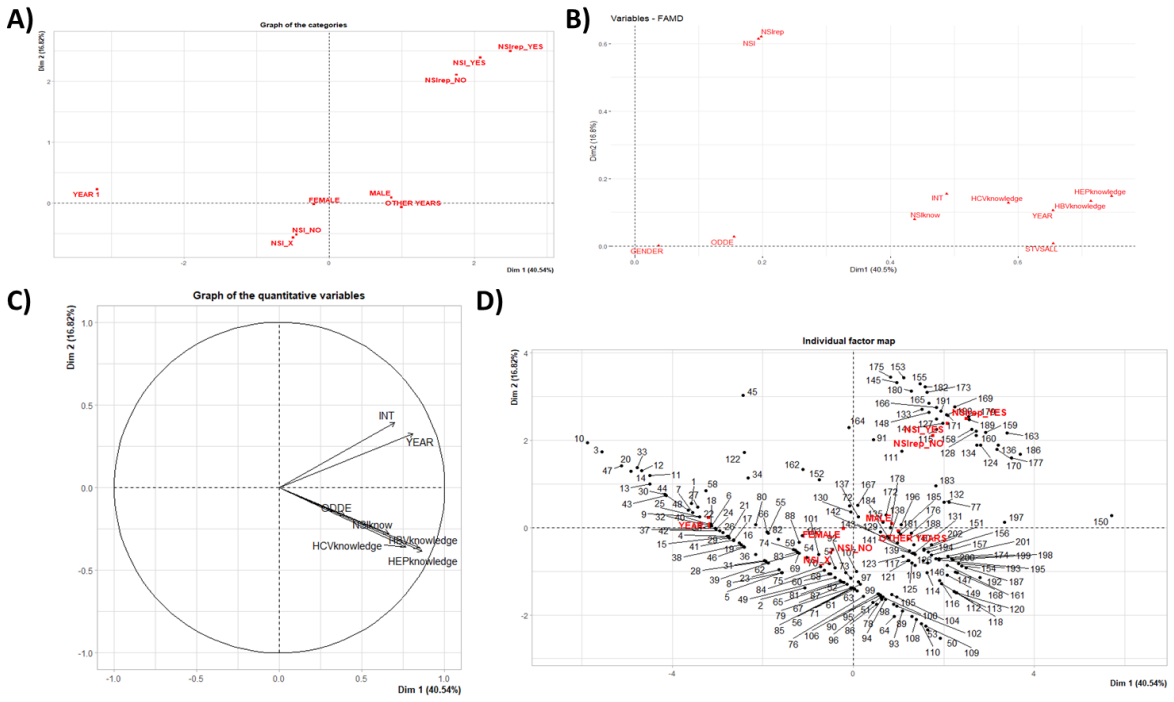

Fig 2. Factor analysis of mixed data for categorical and quantitative variables. **A)** Graph of categories representing spatial relationship of variables in the context of the first and second informational dimension. **B)** A graph of variables demonstrating spatial relationship of both quantitative and categorical variables in the context of first two informational dimensions. **C)** Primary component analysis of quantitative variables. **D)** Graph of individual students in regards to the descriptive categorical information. **YEAR1** – 1st year students; **OTHER YEARS**- students enrolled in all other years; **NSI_X/NSI_NO** – students who didn't sustain a needlestick injury; **NSI_YES** – students who sustained a needlestick injury; **NSIrep_YES** – students who sustained and reported a needlestick injury; **NSIrep_NO** – students who sustained, but didn't report a needlestick injury; **INT** – Internal Medicine Exam; **ODDE** – Occupational Diseases in Dentistry Exam; **NSI_knowledge** – needlestick injury-related knowledge; **HEPknowledge** – overall hepatitis-related knowledge.