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Original papers

Acceptability of screening for hepatitis C virus in healthcare workers

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Abstract

Background: Healthcare workers (HCWs) face occupational exposure to hepatitis C virus (HCV). Screening acceptability is essential to implement new strategies.
Aim: To assess HCV screening acceptability and associated factors among HCWs in a Romanian multidisciplinary hospital.
Methods: Cross-sectional study within the "Cancer Prevention at Work" project (2024–2025). Out of 1,189 invited HCWs, 910 (76.5%) participated; 712 accepted blood testing (Group A), 198 completed questionnaires (Group B), and 279 refused entirely (Group C). Anti-HCV antibodies were detected using a combined ELISA and chemiluminescence test; positives underwent real-time RT-PCR test. Chi-square and Fisher tests analysed associations ($p<0.05$).
Results: Women were significantly more likely to accept testing than men ($p=0.021$). Younger age groups participated more ($p<0.001$); participants ≥61 years refused most often. Stretcher bearers had the lowest acceptance; administrative staff the highest ($p=0.022$ for Group A vs B). Lower education correlated with refusal ($p=0.044$). Smokers accepted testing more than non-smokers ($p=0.043$). No significant associations with residence, comorbidities, or HBV vaccination. Of 712 tested, 10 (1.4%) were anti-HCV antibody positive; 1 (0.14%) had PCR positive with active infection.
Conclusion: HCV screening acceptability was high (76.5%) but varied by sex, age, profession, education, and smoking status. Targeted interventions for older, lower-educated, and high-exposure groups (e.g., stretcher bearers) are needed to support occupational HCV elimination.

Keywords: *hepatitis C, screening acceptability, healthcare workers, occupational exposure*

Introduction

The hepatitis C virus (HCV) affects more than 58 million people worldwide [1]. Each year, thousands of people die from cirrhosis or hepatocellular carcinoma linked to chronic HCV infection [2]. In Romania, the infection burden is among the highest in Europe, with a prevalence between 3% and 4% [3]. According to the World Health Organization, around 290,000 deaths were caused by HCV in 2019. These occurred mainly through complications of liver disease. The absence of a vaccine and the limited access to screening and therapy continues to slow elimination efforts [1]. Screening programs remain deficient, especially among healthcare workers who face a daily potential occupational exposure [4].

Occupational HCV transmission occurs through unsafe medical procedures in healthcare settings (e.g., needlestick injuries, blood spills) [5]. Undiagnosed cases progress silently, emphasizing the public health importance of screening, to take full advantage of the high cure rate of > 95% with direct antiviral therapy [4].

In order to test the implementation of a screening program in healthcare work (HCW), and to prevent not only hepatitis C but also hepatic cancer, a multicentric study was designed "Cancer Prevention at Work" (CPW) by several European partners. We report in this analysis the results on the participants at a Multidisciplinary Clinical Hospital in Bucharest. This approach aligns with the WHO's 2030 hepatitis elimination targets, evaluating screening feasibility, acceptability, and barriers among multidisciplinary hospital staff exposed to biological risks.

Materials and methods

The study was performed within the framework of a Multidisciplinary Clinical Hospital in Bucharest, as part of the "Cancer Prevention at Work" (CPW) project funded by the European Commission (Grant Agreement nº 101104716). The cross-sectional study was conducted from 2024 to 2025 and included 1,189 invited workers from various professional categories: physicians, nurses, assistant nurses, stretcher bearers, administrative personnel, and other healthcare specialists (physiotherapists, kinesiotherapists, biochemists, biologists, pharmacists). The study was approved by the Ethical Committee of the implementation unit (Ethical approval No. 06/26.02.2024). Participants volunteered to join the study; all participants provided written informed consent [5].

Data were collected from questionnaires covering demographics (age, sex, ethnicity, education, urban/rural status), occupational history (exposure to biological agents, use of protective equipment), diet, medical history (chronic conditions, cancer history), risk factors (tobacco, alcohol, drug use), self-perceived health, knowledge about hepatitis C and liver cancer, and feedback on the questionnaire process. Details of the research protocol have been already published [6].

All subjects who accepted participation were invited to provide blood samples for hepatitis C virus (HCV) testing. Anti-HCV antibodies were initially tested by a combined enzyme-linked immunosorbent assay (ELISA) and chemiluminescence assay. Participants with positive results underwent real-time polymerase chain reaction (PCR) testing to confirm active HCV infection. For those confirmed by PCR testing, a follow-up program was foreseen.

Participants were divided in 3 groups: group A = participants who accepted the whole program (filling the questionnaires and blood drawing for the screening test); group B = participants who filled in the questionnaires but did not agree to perform the screening test; group C = participants who did not agree to participate in the program.

Three comparative categories were established to evaluate testing behaviour and associated factors. Data collection was recorded by the occupational medicine physicians during routine medical check-ups, lasting an average of 30 minutes per participant. Responses were entered into a secure database using the REDCap (Research Electronic Data Capture) platform, ensuring confidential and efficient data management. Data were analysed with an SPSS software (26 version). Data are presented as averages and percentages. Chi-square tests were used to examine associations between HCV testing categories and variables such as professional category, sex, age group, education, residence, comorbidities (hypertension, diabetes, hepatitis B, hepatitis C), smoker status and status for hepatitis B vaccination. In addition, a crosstabulation analysis was performed to assess if the stated reasons for refusal varied across professional categories. Fisher's test was applied when expected cell counts were less than 5. A p-value < 0.05 was considered statistically significant.

Results

The characteristics of the study groups are presented in Table 1. Out of the 1,189 invited employees, 910 (76.5%) accepted participation, while 279 (23.5%) refused.

Table 1. General characteristics of the participants

Variable	Category	Group A (%)	Group B (%)	Group C (%)	Total
Sex	Men	125 (17.6%)	40 (20.2%)	67 (24.0%)	232
	Women	587 (82.4%)	158 (79.8%)	212 (76.0%)	957
Age group (yrs)	0–20	2 (0.3%)	0 (0%)	0 (0%)	2
	21–40	256 (36.0%)	69 (34.8%)	63 (22.6%)	388
	41–60	441 (62.0%)	125 (63.1%)	194 (69.5%)	760
	61–80	13 (1.8%)	4 (2.0%)	22 (7.9%)	39
Residence	Rural	117 (16.4%)	26 (13.1%)	53 (19.0%)	196
	Urban	595 (83.6%)	172 (86.9%)	226 (81.0%)	993
Education	No education	2 (0.3%)	0 (0%)	0 (0%)	2
	Primary	53 (7.4%)	18 (9.1%)	8 (2.9%)	79
	Secondary	326 (45.8%)	88 (44.4%)	135 (48.4%)	549
	High education	331 (46.5%)	92 (46.5%)	136 (48.7%)	559
Profession	Nurses	321 (45.1%)	81 (40.9%)	116 (41.6%)	518
	Physicians	182 (25.6%)	52 (26.3%)	79 (28.3%)	313
	Assistant nurses	117 (16.4%)	33 (16.7%)	37 (13.3%)	187
	Stretcher bearers	15 (2.1%)	14 (7.1%)	15 (5.4%)	44
	Administrative staff	29 (4.1%)	6 (3.0%)	7 (2.5%)	42
	Other healthcare specialists	48 (6.7%)	12 (6.1%)	25 (9.0%)	85
Hypertension	Yes	88 (12.4%)	29 (14.6%)	40 (14.3%)	157
	No	624 (87.6%)	169 (85.4%)	239 (85.7%)	1032
Diabetes	Yes	30 (4.2%)	7 (3.5%)	14 (5.0%)	51
	No	682 (95.8%)	191 (96.5%)	265 (95.0%)	1138
Hepatitis B infection	Yes	13 (1.8%)	0 (0%)	7 (2.5%)	20
	No	699 (98.2%)	198 (100%)	272 (97.5%)	1169
Hepatitis C infection	Yes	8 (1.1%)	0 (0%)	1 (0.4%)	9
	No	704 (98.9%)	198 (100%)	278 (99.6%)	1180
Smoking status	Smoker	292 (41.0%)	86 (43.4%)	93 (33.3%)	471
	Non-smoker	420 (59.0%)	112 (56.6%)	186 (66.7%)	718
HBV vaccination	Vaccinated	215 (30.2%)	66 (33.3%)	98 (35.1%)	379
	Not vaccinated	497 (69.8%)	132 (66.7%)	181 (64.9%)	810

The mean age of participants who accepted blood testing (Group A) was 43.08 years, compared to 46.10 years among refusers (Group C).

Further on, the analysis compared Group A+B with Group C by sex, age distribution, and profession.

Among acceptors (group A + Group B), there were 165 men (18.1%) and 745 women (81.9%). In the group C, there were 67 men (24.0%) and 212 women (76.0%). The chi-square test showed a significant difference by sex: women were significantly more likely to accept HCV testing than men.

The age distribution among acceptors (group A + group B) was: 2 participants in the 0–20 years group (0.2%), 325 participants in the 21–40 years group (35.7%), 566 participants in the 41–60 years group (62.2%), and 17 participants in the 61–80 years group (1.9%). In group C, the distribution was: 0 participants in the 0–20 years group (0.0%), 63 participants in the 21–40 years group (22.6%), 194 participants in the 41–60 years group (69.5%), and 22 participants in the 61–80 years group (7.9%).The chi-square test indicated a highly significant difference in participation by age group showing that older participants (especially ≥ 61 years) were more likely to refuse testing (Table 2).

Table 2. Differences among the study groups

Variable	Group A vs Group B	Group A vs Group C	Group A +Group B vs Group C	Observations
Sex	0.139	0.021 *	0.397	Women were more likely to accept testing than men.
Age group	0.275	< 0.001 *	< 0.001 *	Older participants (61–80 years) refused testing more often.
Residence (rural/urban)	0.26	0.34	0.21	
Education	0.764	0.044 *	0.360	Lower-educated participants refused more often.
Profession	0.022 *	0.094	0.17	Stretcher bearers had the lowest participaton rate, the administrative staff had the highest participation.
Hypertension	0.17	0.43	0.79	
Diabetes	0.55	0.91	0.97	
Hepatitis B infection	0.055	0.72	0.71	Slightly higher HBV prevalence among tested participants.
Hepatitis C infection	0.134	0.253	0.075	Slightly higher HCV prevalence among tested participants.
Smoking status	0.541	0.043 *	0.290	Smokers more likely to test; no overall difference.
HBV vaccination	0.212	0.971	0.129	

* p-value < 0.05 was considered statistically significant

The distribution of acceptors (group A + group B) by profession was: 234 physicians (25.7%), 402 nurses (44.2%), 150 assistant nurses (16.5%), 29 stretcher bearers (3.2%), 35 administrative staff (3.8%), and 60 other healthcare specialists (6.6%). In group C (refusers), the distribution was: 79 physicians (28.3%), 116 nurses (41.6%), 37 assistant nurses (13.3%), 15 stretcher bearers (5.4%), 7 administrative staff (2.5%), and 25 other healthcare specialists (9.0%). The chi-square test showed a significant difference in participation by profession, with lower testing rates among stretcher bearers and higher participation among administrative staff (Table 2).

Educational levels also influenced testing: group A more frequently had higher education, while group C more frequently had primary education. There was a significant association between education and testing, with lower-educated participants refusing more frequently.

Smoking status was significantly associated with testing, 41.0% of Group A participants were smokers, compared with 33.3% Group C.

No statistically significant associations were found for residence, hypertension, diabetes, hepatitis B infection, hepatitis C infection, or HBV vaccination status.

Among the 712 tested participants only 10 (1.4%) had positive anti-HCV antibodies and only one participant (0,14%) was confirmed positive for active HCV infection by PCR testing.

Among the 279 participants who refused participation, the predominant reasons were having recent blood tests 88 (31.5%) and lack of time 41 (14.7%), while 109 (39.1%) provided no reason. Fear of needles was cited by 8 individuals (2.9%), personal reasons by 23 (8.2%), and other reasons by 10 (3.6%). By profession, assistant nurses most frequently reported recent tests 39 and no reason 44, physicians cited lack of time 13 and no reason 34, and nurses had the highest rate of needle phobia 4. Stretcher bearers showed balanced distribution between recent tests 4 and lack of time 4, while administrative staff and other healthcare specialists had minimal specific reasons. The distribution of refusal reasons across professions showed no statistically significant differences (p=0.131).

Discussion

The main result of this study is the identification of some significant influencers of the acceptability of hepatitis C virus (HCV) testing among healthcare workers in a multidisciplinary hospital in Romania, namely the sex, age group, profession, education level, and the smoking status. On one side, female participants were more likely to test than males, and on the other side, older age was strongly associated with refusal to participate. Stretcher bearers exhibited the lowest testing rate, while administrative staff showed the highest, revealing significant professional differences. Educational levels influenced testing behaviour as lower-educated workers were more likely to refuse testing. In addition, smokers were more likely to accept testing. No statistically significant differences were observed for comorbidities, residence, or HBV vaccination status.

Participants who underwent actual HCV blood testing had a mean age of 43.08 years—nearly identical to the 43.6 years among screened individuals in Linas et al. [7] demonstrating that younger adults consistently have better acceptance of screening across community and occupational settings. The lower acceptance rate in older participants is a reason for concern, because the risk of infection was previously higher. With better protective measures, in many countries, including Romania, the risk declined [8,9], which leaves the elder healthcare workers in the higher risk category. Another explanation could be that older healthcare workers have already participated in previous screening programs, and without a supplementary incident exposure, they have considered the test unnecessary.

Westermann et al. (2015) reported a significantly increased risk of HCV infection in male healthcare workers compared to the general population (OR 3.1, 95% CI 1.21–7.99), with no such increase observed in females (OR 1.5, 95% CI 0.45–5.24) [5]. In contrast, our results show that female HCWs are significantly more likely to accept screening. This suggests that men, despite facing greater occupational risk, may need stronger encouragement and targeted interventions to improve testing uptake. In a nationwide Japanese workplace survey, women were significantly more likely to undergo HBV and HCV screening than men [10]. Our study mirrors this pattern, with female workers showing significantly higher acceptance of testing, highlighting consistent gender-driven preventive behaviors across diverse occupational health systems.

The significant effect of education in our study is consistent with the hospital-based Romanian screening reported by Gheorghe et al. (2020), who found that lower educational and rural residence were associated with decreased awareness and higher infection rates [11]. Both studies emphasize that educational background shapes screening

participation. These findings strengthen the argument for targeted educational strategies among lower-educated healthcare employees, who may underestimate their occupational risk or lack knowledge about available treatments.

Professional differences also played an important role. Our data showed that stretcher bearers were less likely to undergo testing, while administrative personnel demonstrated the highest participation rates. Similar observations were made from Malka et al. (2012), who described that nurses and auxiliary staff were the most frequently exposed to needlestick injuries in Romanian hospitals [8]. The combination of high exposure and low preventive participation seen in both studies highlights the persistence of occupational inequalities in infection-control awareness and access/participation to preventive programmes.

Although professional category significantly influenced participation rates, the reasons for refusal did not differ across professions. This suggest that occupational exposure level may influence participation, but not refusal motives, in line with evidence that awareness and perceived risk matter more than profession [4].

Smoking status was significantly associated with HCV testing uptake, with smokers more likely to participate than non-smokers. This may reflect greater perceived risk among smokers. This is a similar result with the one found in a representative sample of the US population in National Health Interview Survey, conducted between 2013-2017 [12], in which former smokers had an OR for being tested of 1.37 (95% CI 1.30-1.44) compared to non-smokers and current smokers an OR=1.75 (95% CI 1.65-1.86) compared to the same reference.

Tobacco smoking and HCV infection often coexist and amplify each other's harmful effects on liver cancer, heart disease, kidney disease, and diabetes. A systematic review reported smoking prevalence up to 76.2% in people living with HCV [13]. Smoking is related to high risk of hepatitis [14–16].

Taken together, these comparisons suggest that, even with a recognized occupational risk, behaviour and educational factors remain decisive for HCV screening acceptability.

Conclusions

The CPW study showed high acceptability of HCV screening among healthcare workers, with profession, women, younger age groups and higher educational levels. Interventions should target stretcher bearers, lower educated, older workers with need for targeted educational and motivational programmes. Integrating HCV testing into routine occupational health could support Romania's progress towards WHO 2030 hepatitis elimination goals.

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