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EDITORIAL

High cost of silence: Needlestick injuries and the persistence of hepatitis B virus risk among healthcare trainees

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Abstract

The study by Jaho *et al* published in the *World Journal of Virology* highlights a compelling paradox in occupational health: While a robust 86.6% of 134 Albanian health sciences students demonstrate seroprotection (antibody to hepatitis B surface antigen ≥ 10 IU/L), a staggering 64.5% report at least one needlestick injury during training. This high prevalence of exposure is compounded by a culture of silence, with one-third of incidents remaining unreported. This editorial analyzes why high seroprotection rates should not lead to institutional complacency. It argues that the specific vulnerability observed among midwifery students and the lack of systematic post-vaccination serological testing represent critical system gaps. Instead of relying solely on historical vaccination records, institutions should adopt guideline-based strategies for assessing hepatitis B immune status before clinical exposure, while fostering non-punitive reporting pathways. Bridging the gap between immunological protection and clinical behaviour is essential to safeguard those at the frontline of care.

Key Words: Hepatitis B; Students; Health occupations; Health personnel; Needlestick injuries; Occupational exposure; Serologic tests; Vaccination; Hepatitis B vaccines

Core Tip: High hepatitis B virus seroprotection rates among healthcare trainees may create a false sense of safety. The study by Jaho *et al* shows that protective antibody levels (antibody to hepatitis B surface antigen) often coexist with frequent needlestick injuries and underreporting. Protection in clinical training is not only biological but also procedural. It requires verification of immune status before exposure and clear, accessible post-exposure pathways. Without these systems, a meaningful minority of trainees remains at risk despite apparent vaccination success.

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This editorial refers to "*Serological evidence of hepatitis B virus exposure and vaccination coverage trends in health sciences students in Albania*" by Jaho *et al*, 2026; https://doi.org/10.5501/wjv.v15.i2.118992.

INTRODUCTION

The study by Jaho *et al*[1] published in the *World Journal of Virology* evaluated 134 Albanian health sciences students (mean age 23.8 ± 5.7 years). As Albania implemented universal hepatitis B vaccination by 2000[2], most participants were likely vaccinated during childhood. Nevertheless, the study breaks the false sense of security that permeates many educational institutions[1]. As expected, 86.6% of students had protective antibody to hepatitis B surface antigen (anti-HBs) levels (≥ 10 IU/L), and most (76.1%) had titers > 100 IU/L, indicating a robust vaccine-induced immune response. In addition, the absence of circulating hepatitis B surface antigen (HBsAg) suggests a controlled epidemiological situation. However, the same cohort reported frequent needlestick and sharps injuries, showing an alarming disconnect: Serological protection exists alongside uncontrolled percutaneous exposure and underreporting of approximately one-third of needlestick injuries, a finding that may indicate barriers to reporting within the training environment. Although these findings are clinically relevant, they should be interpreted considering the original study's limitations, including its single-center design, the relatively small serologically evaluated sample (n = 134), and the self-reported assessment of needlestick injuries, which may introduce recall bias and limit the applicability of the findings to other settings. Taking care of students therefore requires an inseparable trio: Vaccination policy, occupational safety, and continuous education (Figure 1).

VACCINATION POLICY

Regarding the vaccination policy, the hepatitis B vaccine has been used worldwide for more than 40 years, leading to an approximately 10-fold reduction in hepatitis B infections among vaccinated individuals[3]. The vaccine has demonstrated excellent efficacy, inducing protective levels of antibody to HBsAg (anti-HBs ≥ 10 IU/L) in more than 95% of infants, children, and young adults[4-6]. Non-responders (individuals who do not develop anti-HBs ≥ 10 IU/L after the primary vaccination series) remain at risk of acquiring hepatitis B and should be revaccinated, with seroconversion rates of 50%-99% depending on the regimen used[7,8]. The rate of anti-HBs positivity in healthcare workers vaccinated in infancy is significantly lower than the initial vaccine response rate, ranging from 16%-60% depending on the time since vaccination, with most studies showing that only 28%-51% maintain detectable protective levels when tested in adulthood[9,10]. This long-term decline in detectable anti-HBs levels is well documented in healthcare populations. A similar pattern has also been observed in a large United States cohort of nearly 1000 healthcare workers entering the workforce. Among 986 individuals born in 1991 or later with documented completion of the hepatitis B vaccine series, 51% had anti-HBs levels < 10 IU/L at the time of evaluation. Following administration of a fourth vaccine dose, 88% mounted an anamnestic response, whereas only a small proportion (approximately 5%) failed to respond[11]. In addition, despite progressive decline in detectable anti-HBs levels, immune memory is preserved, and protection against symptomatic acute and chronic hepatitis B infection persists for 30 years or more in most immunocompetent individuals who originally responded to the vaccine[7,10]. However, these exceptions are exactly the reason why vaccination assessment should be performed before healthcare workers are exposed. A randomized study showed that, in the few individuals who remain susceptible after revaccination, alternative vaccination strategies can still lead to protective immunity[12]. This finding is crucial, as it invalidates the passive acceptance of biological susceptibility in high-risk environments.

OCCUPATIONAL SAFETY

The main message of this study is that hepatitis B virus (HBV) prevention in healthcare trainees cannot be reduced to one question of whether vaccination was once received. In blood-exposed settings, protection is both biological and procedural. It depends on immune status, as well as on whether that status is known before exposure, whether non-responders are identified, and whether post-exposure protocols are simple enough for injured trainees to use. Unlike the general population, healthcare trainees at risk of occupational blood exposure should have their hepatitis B immune status documented before clinical placement, in accordance with current national and international recommendations. Individuals without documented post-vaccination serological testing may benefit from anti-HBs assessment to identify those who require revaccination or specific post-exposure management, whereas documented vaccine responders generally remain protected through immune memory despite declining antibody levels[9]. The World Health Orga-

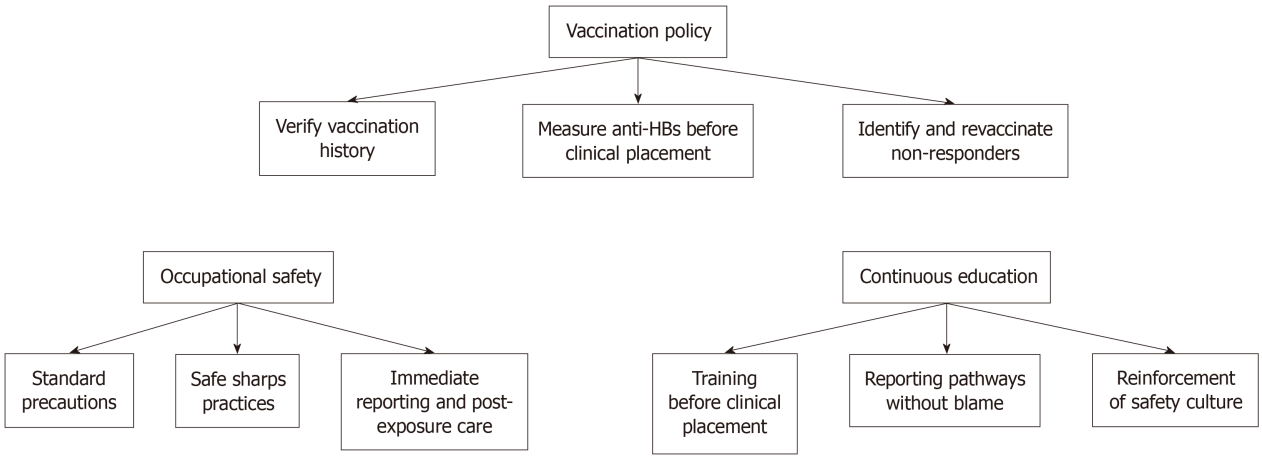

Figure 1 Three pillars for preventing hepatitis B virus occupational risk among healthcare trainees. Anti-HBs: Antibody to hepatitis B surface antigen.

nization position paper also supports targeted serologic testing in groups in whom knowledge of immune status has practical value, including individuals with occupational exposure to blood[13].

The 86.6% seroprotection rate reported by Jaho *et al*[1] can give a wrong impression if seen as a complete success. In a clinical training environment, it leaves a meaningful minority without documented protective titers at the very moment when exposure risk is becoming real. The study becomes even more compelling when this finding is read together with the high burden of needlestick injury and underreporting. A trainee with uncertain immune status and a delayed or unreported exposure cannot be protected by reassuring population averages. Among the major blood-borne viruses, HBV deserves particular attention because it is the most infectious following occupational percutaneous exposure[14]. The estimated risk of transmission after a needlestick injury ranges from 19%-37% when the source patient is HBeAg-positive, compared with approximately 0.2%-1.8% for hepatitis C virus (HCV) and 0.3% for human immunodeficiency virus (HIV). Importantly, these estimates apply primarily to susceptible individuals exposed to highly infectious HBeAg-positive source patients. In healthcare trainees with documented protective immunity after hepatitis B vaccination, the absolute risk is substantially reduced, and post-exposure management is guided by the individual's immune status, source-patient testing, the characteristics of the exposure, and timely post-exposure prophylaxis when indicated[8,9]. The high transmission potential in susceptible individuals reflects the combination of high circulating viral loads, remarkable environmental stability, and efficient transmission through percutaneous and mucosal exposure. HBV is also unique because highly effective preventive strategies are available, including pre-exposure vaccination, post-vaccination serological testing, and post-exposure prophylaxis with hepatitis B immune globulin and vaccination for susceptible individuals. Moreover, it is essential to emphasize that HCV and HIV are also transmitted by needlestick injuries, reinforcing the importance of prompt reporting and appropriate post-exposure evaluation[15,16].

CONTINUOUS EDUCATION

Continuous education is equally essential. Another important lesson from Jaho *et al*[1] is behavioral rather than immunological. Even when vaccination programs perform well, unsafe exposures still occur, and trainees often do not report them. This pattern is not exclusive to Albania. Studies in healthcare students and residents in different settings have documented the same combination of sharps injuries and underreporting, often related to fear of blame, concern about academic consequences, uncertainty about reporting routes, or the idea that minor injuries are not important[17,18]. These observations are consistent with a culture of underreporting that has been documented in healthcare students and residents in different settings. The Albanian findings are also consistent with global epidemiological evidence showing that percutaneous injuries remain a common occupational hazard among healthcare workers worldwide. A large meta-analysis estimated a global one-year prevalence of 36.4%, with substantial regional variation, including 43.2% in Asia, 34.5% in Africa, and 31.8% in Europe[19]. Underreporting has likewise been recognized as a pervasive international problem, suggesting that the true burden of occupational exposures is likely underestimated across many healthcare systems[20]. Thus, the findings from Albania are consistent with a broader global pattern rather than representing an isolated local phenomenon. Underreporting is not only an individual problem. It usually reflects a process that is too slow, unclear, or difficult to use. In such conditions, students may feel that reporting is not worth the effort. As a result, important steps are missed, including source evaluation, timely prophylaxis, and understanding where injuries are actually happening[21]. In addition, the study suggests that occupational risk may not be equally distributed across training areas[1]. Some groups may be exposed earlier or more frequently to sharps injuries, while having less confirmed protection. Surveillance may be particularly valuable in settings where exposure risk and gaps in immunity are more likely to occur[22].

The main message of this study is practical. Training institutions need a clear pathway for serological verification and management of blood exposure. Evidence from current guidelines supports a structured approach: Confirm vaccination history when records are available; distinguish individuals with documented vaccine response from those without previous post-vaccination serological testing; assess anti-HBs when immune status is uncertain or documentation is unavailable; identify true non-responders who require specific post-exposure management; and provide individualized management for immunocompromised trainees according to current recommendations[9,21]. Individuals who remain non-responsive after the recommended revaccination strategy should undergo evaluation for HBV infection, including testing for HBsAg. If current HBV infection is excluded, they should be considered susceptible to HBV, counselled regarding their ongoing occupational risk, and instructed to seek immediate occupational health evaluation after any blood or body fluid exposure for timely post-exposure prophylaxis[23]. Documenting persistent non-response may facilitate timely and appropriate post-exposure management by reducing uncertainty about immune status at the time of occupational exposure and enabling prompt implementation of appropriate post-exposure prophylaxis[23,24]. Simultaneously, verification of immune status alone is insufficient. Reporting systems must be simple, fast, and clearly non-punitive. Trainees should know before clinical placement whom to contact and what to do after an exposure[21,23]. A practical framework summarizing these recommendations is presented in Figure 2. Electronic reporting systems and digital surveillance tools may facilitate timely reporting of occupational exposures, improve adherence to post-exposure protocols, and strengthen institutional surveillance of exposure events[25].

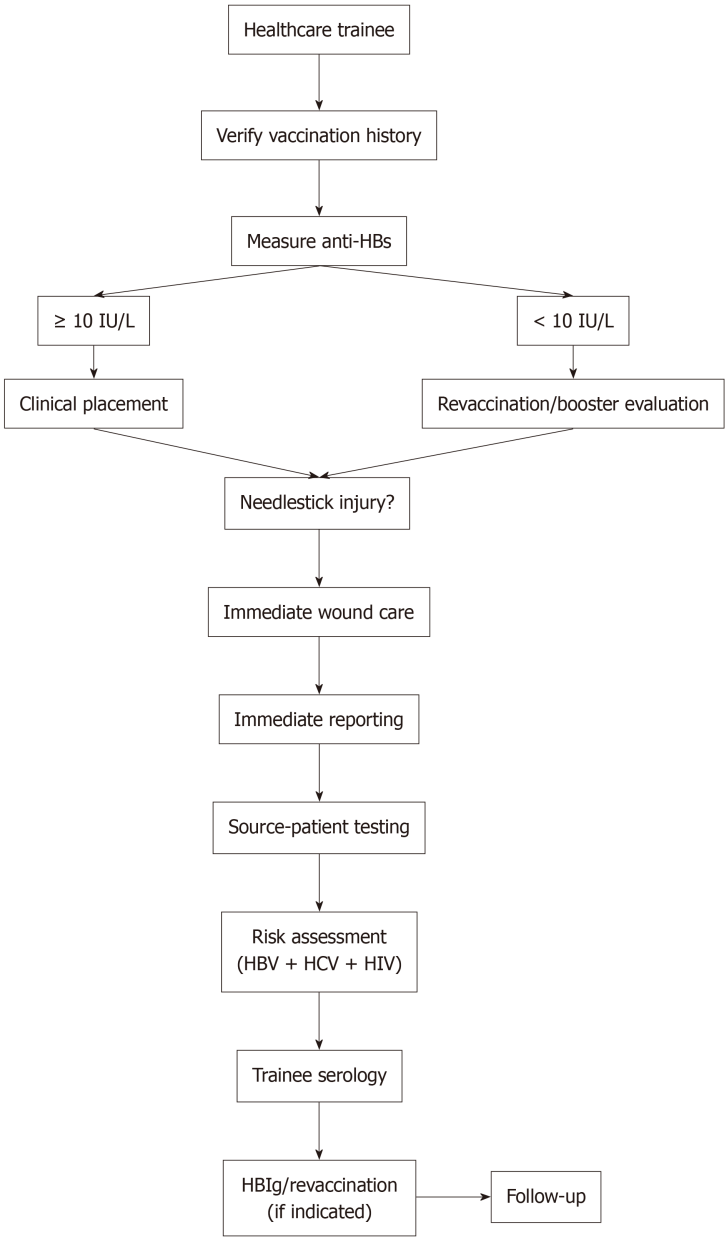

Figure 2 Proposed approach to hepatitis B virus prevention and post-exposure management among healthcare trainees. Anti-HBs: Antibody to hepatitis B surface antigen; HBV: Hepatitis B virus; HCV: Hepatitis C virus; HIV: Human immunodeficiency virus; HBIg: Hepatitis B immune globulin.

CONCLUSION

Ultimately, although the success of hepatitis B immunization is undeniable, high seroprotection rates should not be used to justify gaps in post-exposure safety. Even trainees who are immune to HBV remain vulnerable to unsafe sharps practices, delayed reporting, and exposure to other blood-borne pathogens. Vaccination prevents disease, but effective protection also depends on standard precautions, verified immunity when appropriate, and clear, timely post-exposure pathways.

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