

# Evaluation of Occupational Health and Safety System: A Case Study of Hepatitis B Due to Needle Stick Injury in a Sanitarian

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## Abstract

**Background:** Work-related Hepatitis B is a significant health issue among healthcare workers, especially those at high risk of needle stick injuries (NSI). Needle stick injuries can act as a transmission route for the Hepatitis B virus, which, if not adequately managed, may lead to serious complications. Evaluating the Hospital Occupational Health and Safety System (OHSS) is crucial to prevent similar incidents. This study aims to evaluate the OHSS system in a hospital for preventing workplace injuries and to analyze a case of Hepatitis B resulting from a needle stick injury in a sanitarian.

**Case presentation:** A 37-year-old male sanitarian was diagnosed with Hepatitis B following a Medical Check-Up that revealed reactive HBsAg without clinical symptoms. The incident occurred in April 2021 when the patient was pricked by a used needle while handling medical waste without using appropriate personal protective equipment (PPE) and without reporting the incident to the hospital's occupational health unit. The patient had no history of Hepatitis B vaccination and was previously declared HBsAg negative during a 2020 medical check-up. Based on the analysis using the Seven Steps of Occupational Diagnosis, the incident was categorized as an Occupational Disease due to the failure of the OHSS system in preventing infections.

**Methods:** This case report draws on clinical observations and a retrospective review of patient records, using the Seven Steps of Occupational Diagnosis framework to determine causal factors. Workplace safety protocols, including PPE availability and incident reporting processes, were assessed. The patient provided informed consent for the use of their data, with all identifying details removed to maintain confidentiality.

**Conclusion:** Based on the evaluation using the managerial approach of OHSS, the Hepatitis B case in this sanitarian can be categorized as a work-related disease. The needle stick injury leading to Hepatitis B virus transmission highlights deficiencies in implementing workplace safety systems in the hospital. This study emphasizes the importance of strengthening the OHSS system through regular training, adequate PPE provision, improved Standard Operating Procedures (SOPs), and continuous monitoring to prevent similar incidents.

**Keywords:** hepatitis B, needle stick injury, OHSS, occupational disease, risk management

## Abstrak

**Latar belakang:** Hepatitis B akibat kerja merupakan masalah kesehatan yang signifikan di kalangan tenaga kesehatan, terutama pada mereka yang berisiko tinggi mengalami cedera tertusuk jarum. Cedera tertusuk jarum dapat menjadi jalur transmisi virus Hepatitis B yang, jika tidak dikelola dengan baik, dapat menyebabkan komplikasi serius. Evaluasi Sistem Keselamatan dan Kesehatan Kerja Rumah Sakit (K3RS) menjadi sangat penting untuk mencegah kejadian serupa. Penelitian ini bertujuan untuk mengevaluasi sistem K3RS di sebuah rumah sakit dalam mencegah cedera kerja serta menganalisis kasus Hepatitis B akibat cedera tertusuk jarum pada seorang sanitarian.

**Presentasi kasus:** Seorang sanitarian laki-laki berusia 37 tahun didiagnosis Hepatitis B setelah hasil Medical Check-Up menunjukkan HBsAg reaktif tanpa gejala klinis. Insiden ini terjadi pada April 2021, saat pasien tertusuk jarum bekas ketika menangani limbah medis tanpa menggunakan alat pelindung diri (APD) yang sesuai dan tanpa melaporkan kejadian tersebut kepada unit K3 rumah sakit. Pasien tidak memiliki riwayat vaksinasi Hepatitis B dan sebelumnya dinyatakan HBsAg negatif pada pemeriksaan tahun 2020. Berdasarkan analisis dengan pendekatan Tujuh Langkah Diagnosis Okupasi, kejadian ini dikategorikan sebagai Penyakit Akibat Kerja akibat kegagalan sistem K3RS dalam mencegah infeksi.

**Metode:** Laporan kasus ini berdasarkan pengamatan klinis dan tinjauan retrospektif terhadap rekam medis pasien, dengan menggunakan kerangka Tujuh Langkah Diagnosis Okupasi untuk menentukan faktor kausal. Protokol keselamatan kerja, termasuk ketersediaan APD dan proses pelaporan insiden, juga dinilai. Pasien memberikan persetujuan informasi untuk penggunaan datanya, dengan semua rincian identitas dihapus untuk menjaga kerahasiaan.

**Kesimpulan:** Berdasarkan evaluasi dengan pendekatan manajerial K3RS, kasus Hepatitis B pada sanitarian ini dapat dikategorikan sebagai penyakit akibat kerja. Cedera tertusuk jarum yang menyebabkan transmisi virus Hepatitis B mencerminkan kekurangan dalam implementasi sistem keselamatan kerja di rumah sakit. Studi ini menekankan pentingnya penguatan sistem K3RS melalui pelatihan rutin, penyediaan APD yang memadai, perbaikan Prosedur Operasional Standar (POS), serta pengawasan berkelanjutan untuk mencegah kejadian serupa.

**Kata kunci:** hepatitis B, cedera tertusuk jarum, K3RS, penyakit akibat kerja, manajemen risiko

## Introduction

Hepatitis B is an infectious disease that causes inflammation of the liver and can progress to chronic conditions such as liver cirrhosis or hepatocellular carcinoma.<sup>1,2</sup> The primary modes of Hepatitis B transmission include direct contact with infected blood or bodily fluids, particularly through needle stick injuries (NSI) among healthcare workers.<sup>2,3</sup> NSI is one of the most common occupational hazards in healthcare facilities and serves as a significant transmission route for viruses such as Hepatitis B, Hepatitis C, and HIV.<sup>3,4</sup> The risk of Hepatitis B transmission through NSI has been reported to range between 6-30%, depending on the infectivity of the source blood and the healthcare worker's immunization status.<sup>5,6</sup>

Although Hepatitis B vaccination is one of the most effective preventive strategies, the absence of mandatory vaccination regulations for healthcare workers in many facilities increases the risk of transmission.<sup>6,7</sup> Furthermore, managerial failures in implementing the Hospital Occupational Health and Safety System (OHSS), such as inadequate infection prevention training, non-compliance with the use of personal protective equipment (PPE), and insufficient reporting of occupational incidents, exacerbate the risk of transmission.<sup>8,9</sup> Therefore, it is crucial to evaluate the OHSS system and conduct thorough investigations of NSI cases, particularly those involving Hepatitis B infections, to prevent similar incidents in the future.<sup>10</sup>

## Case Presentation

A 37-year-old male sanitationer presented for a follow-up Medical Check-Up (MCU) conducted independently in early 2022. The MCU results showed reactive HBsAg, while the patient had no clinical symptoms such as jaundice, nausea, vomiting, fever, abdominal pain, or weight loss. In a prior MCU conducted in 2020, the patient was reported as HBsAg negative when he first started working at the hospital. The patient denied a history of Hepatitis B in the family, blood transfusion, drug use, or high-risk sexual behavior.

The patient had been employed as a sanitationer at a private hospital since 2019, responsible for managing medical waste. Over the past two years, his duties included collecting, sorting, and packaging medical waste for transfer to a third party. In April 2021, the

patient experienced a needle stick injury (NSI) from a used needle while packaging medical waste. At the time of the incident, the patient was not wearing personal protective equipment (PPE) such as plastic gloves due to the sudden addition of medical waste. The needle stick injury was not cleaned with antiseptic, and the incident was not reported to the Hospital Occupational Health and Safety System (OHSS).

In his line of work, the patient was routinely at risk of exposure to biological hazards such as Hepatitis B, Hepatitis C, and HIV due to NSI. Other hazards included non-ergonomic work positions, heat exposure while wearing full PPE, and physical and psychosocial fatigue from workload demands. However, the patient denied any similar incidents during his tenure and had no history of infection risk exposures outside of work.

Recent laboratory tests revealed SGOT levels of 70 U/L and SGPT levels of 98 U/L, along with serological results indicating reactive HBsAg, reactive HBeAg, positive IgM anti-HBc, and HBV DNA detected at  $2.88 \times 10^4$  IU/mL. These findings indicated acute Hepatitis B infection. No clinical signs such as hepatomegaly, splenomegaly, or jaundice were found during physical examination. Thorax and ECG evaluations also showed normal results.

The patient had no history of Hepatitis B vaccination before starting work, despite being employed in a high-risk hospital environment. This highlights a weakness in the hospital's occupational health and safety management (OHSS), particularly in implementing infection prevention programs. Additionally, the absence of a proper incident reporting procedure at the workplace resulted in the needle stick injury being inadequately addressed, thereby increasing the risk of infection.

Analysis using the Seven Steps of Occupational Diagnosis established a clear link between the needle stick injury and the patient's acute Hepatitis B infection. Being pricked by a used needle containing HBsAg-positive blood carries a transmission risk of 6–30%, especially for healthcare workers without immunity to Hepatitis B. In this case, the absence of Hepatitis B vaccination was a compounding factor that heightened the risk.

Further investigation revealed that the hospital's OHSS system was suboptimal. Infection prevention training was not conducted routinely, PPE supplies were not consistently adequate, and standard operating procedures (SOPs) for managing medical waste were not consistently implemented. These factors increase the

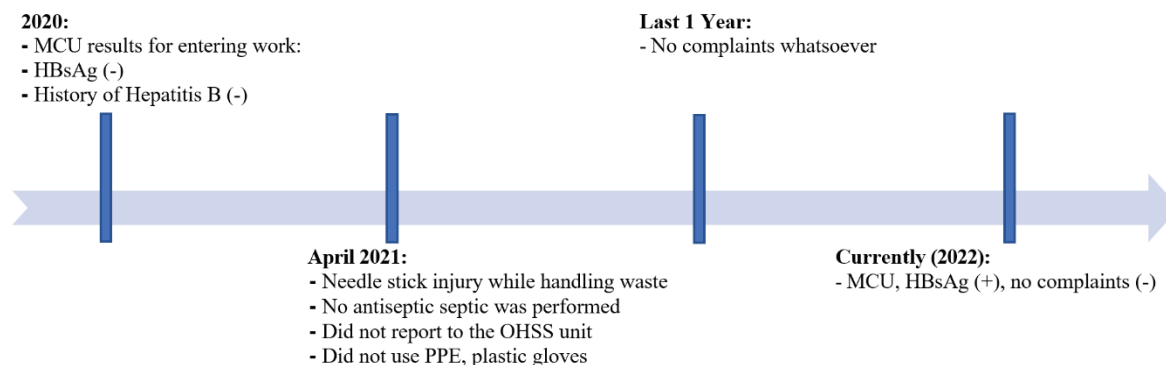


Figure 1. Chronology of hepatitis disease in workers

likelihood of similar incidents occurring among other healthcare workers.

Hepatitis B is a significant occupational disease in the healthcare sector, particularly for workers in high-risk roles such as sanitarians. This incident highlights the critical importance of strengthening the OHSS system through regular training, adequate PPE provisioning, and mandatory Hepatitis B vaccination for all healthcare workers before starting their jobs. Moreover, ongoing supervision and monitoring of high-risk workers are essential to prevent similar incidents in the future.

Based on this analysis, the patient's acute Hepatitis B can be categorized as an Occupational Disease (OD). This incident underscores the need for stronger managerial commitment to safeguarding healthcare workers by implementing more effective and sustainable OHSS policies.

## Methods

This case report draws on clinical observations and a retrospective review of patient records, using the Seven Steps of Occupational Diagnosis framework to determine causal factors. Workplace safety protocols, including PPE availability and incident reporting processes, were assessed. The patient provided informed consent for the use of their data, with all identifying details removed to maintain confidentiality.

## Discussion

Hepatitis B is one of the endemic infectious diseases in Indonesia, with a prevalence of 7.1% according to the

2013 Riskesdas data.<sup>6</sup> Healthcare workers, including sanitarians, are at high risk of contracting Hepatitis B due to exposure to contaminated blood or bodily fluids, particularly through needle stick injuries (NSI).<sup>3</sup> The risk of Hepatitis B transmission through NSI ranges between 6–30%, depending on the infectivity status of the source blood (e.g., HBeAg positivity) and the immunization status of the worker.<sup>5</sup> In this case, the patient was diagnosed with acute Hepatitis B following an NSI incident that occurred due to failures in the implementation of the hospital's Occupational Health and Safety System (OHSS).<sup>3</sup>

Analysis using the Seven Steps of Occupational Diagnosis revealed that the primary exposure in this case was the needle stick injury caused by a used needle while packaging medical waste without utilizing the available personal protective equipment (PPE). In this case, the worker negligently failed to use the provided plastic gloves. According to WHO guidelines, proper use of PPE, including gloves, is one of the main strategies to prevent infection transmission in healthcare facilities.<sup>5</sup> Failure to utilize the available PPE reflects a lack of individual compliance with safety protocols, thereby increasing the likelihood of occupational incidents and infection transmission.<sup>4</sup>

Moreover, the lack of reporting the NSI incident by the patient highlights a deficiency in the safety culture within the hospital. An effective incident reporting system is a crucial component of the OHSS program, as it enables the identification and mitigation of further risks.<sup>8</sup> Studies have shown that fear of stigma or consequences of reporting incidents can be a significant barrier for healthcare workers to report NSI incidents, ultimately exacerbating the impact of such events.<sup>10</sup>

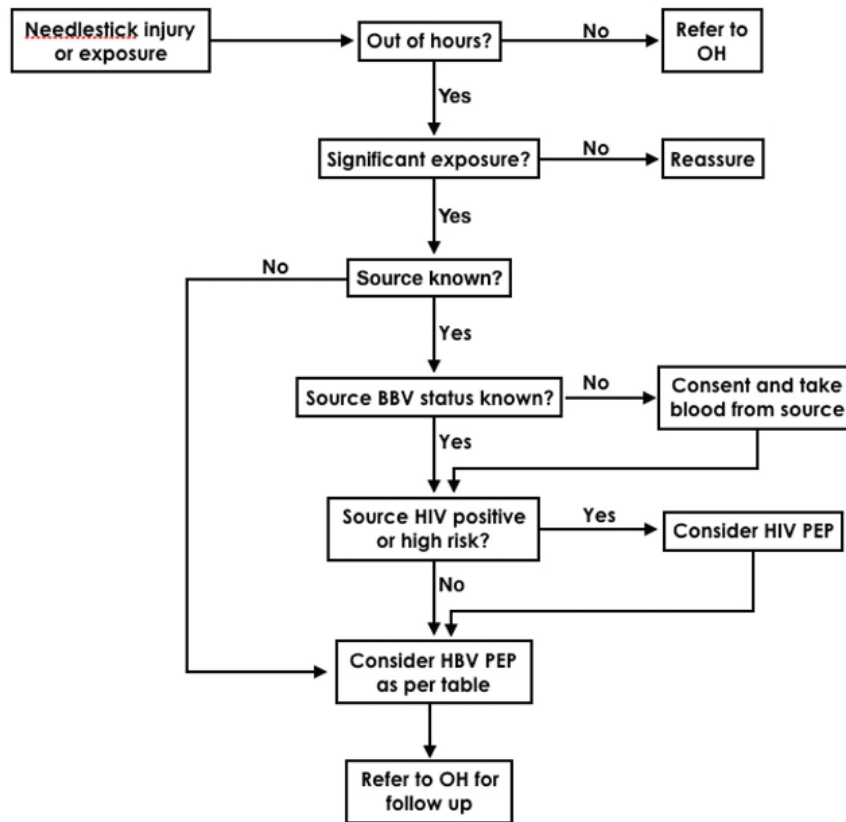


Figure 2. Needle stick injury management algorithm<sup>17</sup>

If a worker reports a Needle Stick Injury (NSI) immediately after the incident, the steps according to the needle stick injury management algorithm can be promptly initiated.<sup>18</sup> Once the incident is reported, the status of the exposure source can be evaluated to determine if there is a risk of viral infections such as HIV, Hepatitis B, or Hepatitis C. The worker may also undergo laboratory tests and preventive measures, such as post-exposure prophylaxis (PEP) for HIV or vaccination and/or Hepatitis B immunoglobulin if necessary.<sup>5</sup> These immediate actions not only help prevent the development of infections but also provide reassurance to the worker.<sup>7</sup> With timely reporting, the Occupational Health and Safety Management System (OHSS) can function more effectively to identify risks, implement mitigations, and prevent similar incidents in the future through strengthened SOPs and regular training.<sup>1</sup> This reporting also becomes part of a proactive safety culture, where worker safety is a top priority.<sup>4</sup>

The absence of Hepatitis B vaccination in the patient is also a contributing factor to the occurrence of the infection. WHO recommends Hepatitis B vaccination as an effective preventive measure for healthcare workers, with an efficacy of over 95% in preventing clinical and chronic infections.<sup>3</sup> In this case, the lack of mandatory Hepatitis B vaccination policies at the hospital where the patient works highlights the importance of regulations supporting healthcare worker protection. This is supported by studies showing that Hepatitis B vaccination can significantly reduce the incidence of acute Hepatitis B among healthcare workers.<sup>6</sup>

Supporting examinations in this case revealed reactive HBsAg, reactive HBeAg, positive IgM anti-HBc, and detectable HBV DNA levels. These results confirm the diagnosis of acute Hepatitis B. In the occupational context, this diagnosis can be classified as an Occupational Disease (OD) based on the correlation

between workplace exposure and clinical findings.<sup>5</sup> A study by Muljono (2018) also indicated that NSI incidents are one of the main causes of Hepatitis B infections among healthcare workers in Indonesia.<sup>1</sup>

An inadequate OHSS management system is a key factor in this case. The consistent implementation of SOPs, infection prevention training, and the provision of adequate Personal Protective Equipment (PPE) are essential steps to improve worker protection in the healthcare sector.<sup>9</sup> Research indicates that routine infection prevention training can enhance healthcare workers' adherence to safety protocols and reduce the risk of work-related infections.<sup>11</sup>

Furthermore, it is important to implement a continuous monitoring and evaluation system to ensure compliance with OHSS programs. Studies show that hospitals with strong OHSS systems have lower rates of NSI incidents compared to hospitals with weak safety management systems.<sup>8</sup> This indicates that strengthening management and regulations related to OHSS can have a significant impact on preventing similar incidents in the future.

## Conclusion

This case of acute Hepatitis B in a sanitarian highlights the significant risks faced by healthcare workers due to workplace exposure, particularly through needle stick injuries. Based on an analysis using the Seven Steps of Occupational Diagnosis, this incident can be categorized as an Occupational Disease (OD), with key factors including the lack of Hepatitis B vaccination and the failure to implement the Occupational Health and Safety System (OHSS), including the use of personal protective equipment (PPE) and incident reporting.

Strengthening the OHSS management system is crucial to prevent similar incidents in the future. This includes the implementation of mandatory Hepatitis B vaccination regulations for healthcare workers, routine infection prevention training, the provision of adequate PPE, and ongoing monitoring of compliance with safety procedures. By taking these steps, the risk of work-related disease transmission can be minimized, creating a safer work environment for healthcare workers.

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