



# Unnecessary Hepatitis-B Orders

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## Abstract

**Introduction:** Laboratory tests to diagnose hepatitis B infection provide important data to clinicians, but these tests lead to serious labor loss and high cost both in our country and also in the world. In the studies, it has been determined that the test requests are sometimes unnecessary. It is contemplated that the number of tests will increase due to non-questioning of vaccination and other inappropriate test orders. In this study, we aimed to retrospectively analyze unnecessary test requests in patients vaccinated against hepatitis B and to find out what could be the future challenges to prevent this.

**Methods:** Between March and December 2014, samples sent to the Microbiology Laboratory of Education and Research Hospital to test for hepatitis B seropositivity were analyzed in this study. HBsAg, anti-HBc IgG, anti-HBc IgM, HBeAg, and anti-HBe tests, which were requested from the patients and yielded anti-HBs-positive and anti-HBc-negative results, were accepted as unnecessary orders. The financial burden of the tests was calculated on the basis of the scores given in the Social Security Institution Health Practice Statement (SUT).

**Results:** As a result, it was determined that 92 tests of HBsAg, 20 tests of anti-HBc total, 48 tests of anti-HBc IgM, 14 tests of HBeAg, and 21 tests of anti-HBe were unnecessary. When the cost of the tests was calculated according to the SUT scores, it has been concluded that a total of 1507 TLs were spent for these unnecessary tests.

**Discussion and Conclusion:** In our study, if compared to the literature, a relatively low unnecessary test order was detected for hepatitis B infections. Even so, methods for eliminating health-care waste and reducing orders leading to cost-effectiveness should be developed.

**Keywords:** Hepatitis B; unnecessary test; vaccine.

Hepatitis B infection is a serious cause of mortality and morbidity in the whole world because it leads to the development of chronic liver disease, cirrhosis, and hepatocellular carcinoma. Diagnosis of the disease is based on serological tests such as HBsAg, anti-HBs, anti-HBc IgM, anti-HBc IgG/total, HBe Ag, and anti-HBe <sup>[1]</sup>. Anti-HBc positivity shows that the patient is infected with hepatitis B virus at any time during his/her life. Another test, anti-HBs, indicates that the patient has been exposed to the hepatitis B virus at any time during his or her life.

This encounter may be in the form of a vaccination or in the form of disease. Therefore, if anti-HBc is negative in anti-HBs-positive individuals, then the patient is vaccinated, and if it is positive, he/she is diagnosed as having the disease <sup>[2]</sup>.

In recent years, the cost of health expenditures has increased considerably both in our country and other countries. This rise will continue to rise to maintain the quality of health services. The most important way to reduce expenditures without sacrificing quality is to prevent inappropriate/unnecessary test requests. With this method, both

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**Submitted Date (Başvuru Tarihi):** 23.05.2018 **Accepted Date (Kabul Tarihi):** 25.07.2018

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workloads will be mitigated and health expenditures will be reduced. Anti-HBc IgM, HBeAg, and anti-HBe tests can be evaluated within this context.

The hepatitis B vaccine, which is also used in our country, shows a high efficacy in protection against the disease. With the initiation of vaccination studies, the incidence of infection has decreased and so the number of cases with cirrhosis and liver cancer due to chronic hepatitis B and hepatitis B decreased [3].

In vaccination guidelines, healthy individuals with hepatitis B vaccine are not routinely required to check for their immune status [4]. It is suggested that this control of immunity should be performed only in special clinical situations (immune system failure, chronic hemodialysis, HBsAg-positive mothers, sexual intercourse with HBsAg-positive individuals, health workers, etc.). Tests other than anti-HBs in vaccinated patients should be requested if the anti-HBs test negativity in special clinical cases mentioned above [4].

According to the World Health Organization data, hepatitis B vaccine was included in the vaccination program in 187 countries [5]. Therefore, if vaccination history is not questioned, then it is thought that unnecessary test requests for hepatitis B will increase. In our study, we retrospectively investigated unnecessary test requests in patients vaccinated against hepatitis B.

## Materials and Methods

Our study was carried out in a 648-bed training and research hospital. Anti-HBs-positive and anti-HCV-negative individuals were included in the study to determine the need for unnecessary testing in patients vaccinated with hepatitis.

The samples from the microbiology laboratory of our hospital were evaluated retrospectively to comply with the specified criteria. Specimens were examined for HBsAg, anti-HBc IgM, anti-HBc total, HBeAg, and anti-HBe to determine inappropriate test requests. Anti-HBs test requests were not included in the evaluation process because follow-up of the antibody titers is a debatable issue, and the clinical condition of the person (HBsAg-positive mother baby, risky contact with HBsAg-positive person, chronic dialysis, etc.) could not be known. Besides, patients who were suspected to have a diagnosis of immune system disorder were not included in the study as further clinical information could not be gathered.

At the time of the study, hepatitis tests in our hospital were performed with chemiluminescence immunoassay (Architect i2000, Abbott Laboratories, USA) and original kits compatible with these devices. The price of the tests performed

with this method in SUT was TL 7.5 for HBsAg and HBeAg and TL 8 for anti-HBc IgM, anti-HBc IgG, and anti-HBe.

## Results

Between March and December 2014, both anti-HBs and anti-HBc tests were requested from 2712 patients, and 434 (16%) of them had received hepatitis B vaccine. Anti-HBs positive and anti-HBc had been vaccinated against hepatitis B vaccine (anti-HBs positive and anti-HBc negative). As our investigation revealed, HBsAg (n=92: 0.8%), anti-HBc IgM (n=48: 23.1%), anti-HBc IgG (n=20: 3.5%), HBeAg (n=14: 3.4%), and anti-HBe 21 test 6%) tests were requested unnecessarily.

It was determined that the total cost of these tests amounted to TL 1507. Table 1 shows the number and costs of unnecessary tests studied between March and December 2014.

## Discussion

In our study, we determined that the cost of unnecessary test requests for the patients with hepatitis B within 10 months was TL 1507. These unnecessary test requests may have different reasons. One of them may be that the appropriate anamnesis has not been taken. In this case, as a defensive mechanism, heavy patient circulation, and lack of time may be suggested, clinicians may request relatively less time-consuming tests, instead of taking a detailed anamnesis which is the most important step of the examination. However, requests for unnecessary tests lead to the loss of labor, time, and money of the laboratory and also do not give clinicians time to follow the results.

Another reason is related to the thought that the vaccination does not produce enough immunity; if it did, the clinician may want to monitor antibody levels. However, studies have shown that vaccinations are very effective in preventing disease except for patients with special conditions as shown above. As has been demonstrated protective antibody levels remained elevated for many years and no additional dose was required. Therefore, it is unnecessary to

**Table 1.** Number of inappropriately requested tests between March and December 2014 and their total costs

Test	n	Unit cost (TL)	Total cost (TL)
HBsAg	92	7.5	690
HBeAg	14	7.5	105
Anti-HBc IgM	48	8	384
Anti-HBc IgG	20	8	160
Anti-HBe	21	8	168
Toplam			1507

request anti-HBs and other tests except in special cases in vaccinated patients [4]. Another reason is that HBsAg mutant strains may presumably cause infection in patients.

Indeed, studies have shown that mutant strains can escape the coverage spectrum of vaccines [6]. However, even in countries where hepatitis B is endemic, mutant strains are rarely encountered and no data have been found that these strains can be transmitted to vaccinated individuals. Our country is accepted as the moderate endemic region for HBV infection [7]. In our country, also a rarely encountered mutant strain has been reported. In this case, it is not appropriate to search for a mutant strain in vaccinated individuals.

In our study, the cost of unnecessary test requests is lower than other studies [8,9]. However, an amount of TL 1507 unnecessarily consumed state resources. This situation can be explained to the clinicians in the hospital with a training to prevent future requests for unnecessary tests. Another solution may be the reflex test request. According to the reflex test diagnostic algorithms, it is necessary to request the tests step by step. Thus, the test results can be checked and the new test is tried to prevent unnecessary testing.

In this case, if the results of the anti-HBs test were evaluated, then further tests would not be ordered. Nowadays, reflex test steps based on diagnostic algorithms can be applied in automated systems in which viral hepatitis tests are studied. As a result, there are still some inappropriate claims regarding hepatitis B tests in our hospital.

Thanks to the steps to be taken to prevent these demands, unnecessary labor and time loss will not happen, and the patients will not have to give blood in vain, and the increasing health expenditures will be reduced to some extent.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Financial Disclosure:** The authors declared that this study received no financial support.

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