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Preoperative vaccination for HBV at Polish hospitals as a possible public health tool to limit the spread of the epidemic: A cross-sectional study☆

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ABSTRACT

To determine the immunisation coverage for HBV and the prevalence of HBsAg an anonymous serosurvey of consecutive adult surgical/gynaecologic patients presenting to 16 randomly selected hospitals in West Pomerania, Poland, was conducted. Immunisation rate was 60.4%, of these 69.7% had received the complete course of three doses; 65.2% were immunised at the request of referring surgeons. The multivariable regression model revealed that age <40 years, low educational status, not having a surgery in the past, tattoo application, and emergency procedure were each associated with a greater odds of not being vaccinated. HBsAg prevalence was 0.6%. Authors conclude that the preoperative vaccination policy might be an effective public health tool to limit the spread of the epidemic.

1. Introduction

Hepatitis B virus (HBV) is the only one of three most virulent blood-borne pathogens that has a vaccine for prevention. Moreover, in the long run, hepatitis B can be eradicated by worldwide implementation of immunisation programs, because humans are the only epidemiologically relevant virus host [1]. The vaccine, which has been available in Poland since 1989, became instrumental in decreasing the potential for HBV infection. In the country with limited resources, immunisation alone resulted in dramatic decrease in incidence (from 15,000 in 1979 to 1727 in 2005) [2,3]. Due to the moderate levels of HBV infection in Polish population, with 350,000–450,000 carriers of hepatitis B surface antigen (HBsAg), since 1996 the country follows the World Health Organisation (WHO) recommendations of universal HBV immunisation of children and screening pregnant women for HBsAg [2,4,5]. Additionally, the active immunisation is offered to dialysed patients, recipients of blood and blood products, household members and sexual partners of HBsAg carriers. It is also recommended for health care workers (HCWs) and medical university students [2–4,6]. Latest studies show that 89–90% of surgical staff in Poland is immunised [7,8].

Although Poland has a moderately low prevalence of HBsAg carriers (1.5%) in the general population, it is noteworthy that, according to the data coming from 1996 to 2004, 55% of total hepatitis B cases and 90% of hepatitis B cases in patients aged 60 years or more were nosocomially acquired [2]. To reduce the number of infections generated in health care facilities, active immunisation for hepatitis B (before which testing for HBsAg is recommended) was required from all elective surgery patients between 1999 and 2004 [5]. Although the decree is not in force any more, the immunisation certificate is still unofficially required for most surgical elective procedures. Costs of both HBsAg testing and a full course of immunisation are covered by patients.

Patient's HBV immunisation certificate makes doctors and nurses feel a sense of security. Additionally, the fear of litigation for generating a nosocomial infection is a powerful stimulus for supporting immunisation. The vaccine became instrumental in decreasing the potential for occupationally acquired infection of HCWs and nosocomial infection for patients. As suggested by others [9,10], implementation of routine vaccination in institutions or facilities where large number of adults are routinely seen might be successful if implemented on a large scale. Preoperative immunisation policy seems to be an important component of preventive methods, resulting in significant decrease of HBV incidence rate in the population.

Moreover, as testing for HBsAg is recommended before immunisation, the preoperative vaccination policy might also serve as a public health tool to limit the spread of the epidemic by recognising those infected who are not aware of their serological status. The extent to which such requires are practised in Poland has not been

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evaluated. As a result, we neither know how surgical patients follow the preoperative immunisation nor whom to target the interventions to promote it.

Of note, a strict focus on immunisation against hepatitis B before elective procedures as an effective instrument to identify all HBsAg-positive patients may be illusory, as—because of the lack of official recommendations—some positive individuals immunise themselves without previous testing of their serological status. In such cases vaccination can be performed without any danger, however is ineffective [1].

The main objective of the study was to determine the immunisation coverage against HBV among patients admitted to randomly selected hospitals in the West Pomeranian region of Poland. Furthermore, we studied the distribution of immunised patients by selected demographics. In addition, the prevalence of HBsAg and characteristics of the carriers was surveyed in terms to define the extent to which positive patients might be immunised for HBV without previous HBsAg screening.

2. Materials and methods

2.1. Design and setting

A cross-sectional study was conducted at surgical and gynaecologic wards of 16 randomly selected hospitals from the region of Western Pomerania, Poland. This region of northwestern Poland with the population of 1.7 million borders Germany and the Baltic Sea and is close to Berlin.

2.2. Study population and sampling

The study population consisted of adult consecutive patients hospitalised between February 2008 and January 2009. The sampling frames included a list of hospitals obtained from the local health department. Multistage stratified sampling was used. First, all hospitals were stratified into urban and rural hospitals to ensure representation of different hospital levels, with random selection of six urban hospitals from the city of Szczecin (the capital of the region): two teaching hospitals and four municipal, and 10 rural hospitals from the region of Western Pomerania. A pilot study was done in one of two selected teaching-urban hospitals [11,12], on 400 patients of four surgical wards; results were included in the study. In the next step a stratified sampling of wards proportionate to number of surgical and gynaecologic wards was done for each hospital. Therefore, for the region, 20 wards, 10 surgical and 10 gynaecologic were selected; for Szczecin, 11 wards, 7 surgical and 4 gynaecologic. Two gynaecologic wards (one urban, one rural) refused to participate in the study, despite an initial commitment. At each ward blood samples from 50 consecutive patients who gave informed written consent to participate were collected with the anonymity of the subjects preserved.

2.3. Study instrument

A survey form was designed that included patient demographic data and risk factor information. The participants were asked to complete a questionnaire and offered HBsAg testing. The questionnaire was composed of four sections:

- demographic including patients' age, gender, literacy, residence (city, rural);
- type of ward, procedure performed (elective or urgent);
- risk factors for HBV infection: previous blood transfusion, surgeries or dental procedures with bleeding, tattooing, intravenous drug use, homosexual activity, risk factors in a sexual partner;
- past history of confirmed hepatitis.

Trained nurses interviewed each patient directly after obtaining consent. In order to ensure confidentiality, participants were given an identification code: one for the questionnaire, one for the blood sample and one for themselves. An extra tube of blood was obtained by venipuncture at the time of admission. Enzyme immunosorbent assays (ELISA) system version 3.0 was used to detect HBsAg (Abbott Laboratories Inc., Abbott Park, IL, USA). Testing was performed in two referential laboratories: one in the teaching hospital in Szczecin—it served for 10 hospitals, the second in the provincial hospital in Szczecinek (for six hospitals). Two weeks after sampling the participants could call the investigators at a dedicated phone line and obtain their results by stating their code. Participants with evidence of liver disease were advised to contact the specialist in infectious disease. The study received ethical approval from the Pomeranian Medical University Ethical Committee.

2.4. Statistical analysis

Data were entered and validated using a customised program STATISTICA PL. Our primary outcome variable was adequacy of HBV vaccination and we aimed to identify patients' characteristics associated with this outcome. For the purpose of these analyses, we collapsed vaccination groups as following: vaccinated, i.e. two or three doses and non-vaccinated, one dose/lack of vaccination. We next examined the associations between vaccination status and demographic, personal and hospital factors, using the chi-square test with or without Yates' correction factor and 95% CI for analysing categoric data, whilst the Mann–Whitney *U*-test was used for numeric variables. All variables significant ($p < 0.05$) in the univariate analyses were entered into logistic regression model with R software. Following variables: age, gender, literacy, residence (urban/rural), the lack of history of any surgery in the past, a tattoo application, an admission for the emergency procedure, type and location of ward (urban/rural) were taken into account as the potential predictors for the lack of HBV vaccination (Table 1).

Table 1
Logistic regression model: association of the lack of vaccination for hepatitis B among surgical/gynaecologic patients with selected variables (OR's estimates, significance of coefficients using Wald's *Z*-test), West Pomerania, Poland; $n = 1652$.

Variable/category	OR[a]	*p*-Value
Gynaecologic ward	1.78	<0.003*
Type of hospital		
University	1.15	>0.47
Urban	0.83	>0.44
Age <40	1.68	<0.0007*
Male gender	1.18	>0.33
Literacy		
Did not finish high school	1.70	<0.002*
High school graduate	0.86	>0.63
University graduate	0.64	<0.04
Residency		
Szczecin	0.71	>0.18
Town <25,000 inhabitants	0.66	>0.06
Rural	1.01	>0.98
Emergency procedure	2.14	<0.0001*
No history of surgery	2.10	<0.0001*
Tattoo application	2.66	<0.0001*

* Statistically significant.
[a] Odds ratio = lack of vaccination for hepatitis B ratio between the two categories tested in each variable, controlling for the other variables.