

Knowledge, Attitude, and Practice of Iranian Surgeons About Blood-Borne Diseases

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Background. Perhaps more than any other health-care worker, it is the surgeons who are at an increased risk of exposure to hepatitis B (HB) virus, hepatitis C virus, and human immunodeficiency virus. The aim of this study was to evaluate surgeons' concerns regarding risk awareness and behavioral methods of protection against blood-borne pathogen transmission during surgery.

Materials and methods. A 31-item questionnaire with a reliability coefficient of 0.73 was used. Of 575 surgeons invited to participate from three universities and one national annual surgical society between May and July 2007, 430 (75%) returned completed forms.

Results. Concern about being infected with blood-borne diseases was more than 70 (from a total score of 100). Only 12.9% of surgeons always used double gloves. Complete vaccination against HB was done in about 76% of surgeons and only 56.8% had checked their HB surface antibody (anti-HBs) level. Older surgeons never used double gloves ($P = 0.001$).

Conclusion. Iranian surgeons are not aware of the correct percentage of infected patients with and seroconversion rate of blood-borne diseases, do not use double gloves adequately, do not report their needlestick injuries, vaccinate against HB, and check anti-HBs after vaccination. Educational meetings, pamphlets, and facilities must be provided to health care workers, informing them of hazards, prevention, and

postexposure prophylaxis to needlestick injuries, vaccination efficacy, and wearing double gloves. © 2009

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INTRODUCTION

Of the world's carriers of hepatitis B (HB) virus (HBV), 75% are from Asia [1]. The prevalence of HBV infection in Iran varies from 1.07% [2] to 5% [3]. However, the global prevalence is lower than 3% (intermediate) [4]. It is estimated that over 35% of Iranians have been exposed to HBV [5]. The prevalence of hepatitis C (HC) virus (HCV) and human immunodeficiency virus (HIV) are remarkable in high risk groups such as thalassemics [6], intravenous (i.v.) drug users [7], and hemodialysis patients [8] in Iran.

The majority of the infections are subclinical and undiagnosed. It has been demonstrated that patient medical histories are unreliable in identifying exposure to HBV infection [9]. Despite an effective vaccine and regardless of their medical history, all patients should be regarded as potential HBV carriers. On the other hand, HCV and HIV infection have no effective prophylaxis or vaccine.

Surgical techniques and protective barriers in the surgical suite were designed to protect the patient from contamination, but in more recent years there has been increased concern regarding patient-to-surgeon transmission of blood-borne diseases [10–13].

Maybe more than other healthcare workers, surgeons are at an increased risk of exposure to HBV, HCV, and HIV. Studies have shown that the risk of

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exposure for general surgeons is about three to four times greater [14], and for nonimmunized surgical specialists about six times greater than that of the general population [15].

Exposure to blood-borne pathogens is common in the surgical suite and has stimulated concern regarding protection against disease transmission [12, 16, 17]. Protection strategies have included the establishment of universal precautions, the use of double gloves, and HB vaccination [10, 11, 16, 18–21]. Despite the increasing number of high-risk patients, these protection strategies have not been universally accepted by surgeons.

The purpose of this study was to evaluate surgeons' concern regarding risk awareness and behavioral methods of protection against blood-borne pathogen transmission.

PATIENT AND METHODS

Questionnaire

A 31-item questionnaire concerning risk of transmission and awareness of seroconversion rates of HBV, HCV, and HIV, being vaccinated against HBV, double glove practices, use of protective eyewear, and reporting patterns of needlestick injuries was developed. It consisted of Likert scale; yes/no and few open ended questions. According to our pilot study on 60 randomly selected surgeons, reliability coefficient of the questionnaire was 0.73 using Cronbach's alpha. After approval of the Ethical Committee at Nikan Health Researchers Institute, Tehran, Iran, samples were selected from three universities and one national annual surgical society.

Subject Sample

Between May and July 2007, questionnaires were distributed among 575 surgeons at the 29th National Iranian Association of Surgeons, held annually, and three schools of medicine (Tehran, Shaheed Beheshti, and Iran).

Data Analysis

Mean \pm SE (standard error), *t*-test, one way analysis of variance, Kruskal-Wallis χ^2 , and bivariate correlation were used in analysis with SPSS 13 software (SPSS Inc. Chicago, IL). Differences and correlations with $P < 0.05$ were considered statistically significant.

RESULTS

Of 575 surgeons invited to participate, 430 (75%) returned completed forms; of those, 278 (76.6%) were men. They had a mean age of 48 ± 0.58 (median age of 45, ranging between 25 and 83) years, a mean time in surgical practice of 17.4 ± 0.54 (ranging between 1 and 52) years, and a mean time at surgery room of 16.2 ± 0.6 (ranging between 0.5 and 65) hours per week.

Table 1 shows the subspecialty of these surgeons.

Knowledge

In response to "What percentage of your patients do you believe are positive for HIV, HBV, and HCV?" they

TABLE 1
Subspecialty of the Surgeons

Variables	No. (%)
General surgeon	256 (59.8%)
Gynecologist and obstetrics	33 (7.7%)
Orthopedist	22 (5.1%)
Thorax surgeon	18 (4.2%)
Plastic surgeon	16 (3.7%)
Pediatric surgeon	14 (3.3%)
Other	71 (16.2%)

gave $8.8\% \pm 1.2\%$, $12.0\% \pm 1.2\%$, and $11.1\% \pm 1.3\%$, respectively. Correct knowledge of seroconversion rates secondary to a needlestick injury from HIV, HBV, and HCV was 22.1%, 21.4%, and 14.6%, respectively (HIV, 1/300; HB, 1/10; HC, 1/20). Most surgeons underestimated the seroconversion rates with exposure to a patient with HBV (77.9%), HCV (63.8%), and HIV (45.1%).

Attitude

Surgeons ordered blood tests to screen for: HIV, HBV, and HCV for $32.1\% \pm 2.8\%$, $38.7\% \pm 3.1\%$, and $24.8\% \pm 2.9\%$ of their patients, respectively. Concern about being infected with HIV, HBV, and HCV was 78.7 ± 1.8 , 70.7 ± 1.8 , and 76.5 ± 1.7 (from a total score of 100), respectively. They also mentioned that 42.7% of them were extremely, 36.5% were moderately, and 20.8% were a bit worried about HIV infection during surgery.

Practice

Only 12.9% of surgeons always used double gloves. The most common reasons for not always using double gloves were: causing difficulty in hand movement (71.8%), decreasing hand sensation (42.9%), producing hand pain (25.3%), hand tingling or numbness (22.1%) in the hands, and 25.8% of surgeons did not find any need for using them. There were 54.1% who never wore double gloves. About 54.5% of surgeons always used glasses and/or masks.

Vaccination against HB was done in 93.3% of surgeons. However, 23.7% of them had insufficient vaccination number (less than three times) and only 56.8% had checked their HB surface antibody (anti-HBs) level.

In response to "How often do you report an actual needlestick injury?" they answered always (3.2%), sometimes (6%), occasionally (12.4%), rarely (18.9%), and never (59.6%). They had 6.7 ± 0.5 times experiences of needlestick injuries in the last 3 years. They had been stuck by a needle while treating a patient positive for: HIV (5.4%), acquired immunodeficiency syndrome (AIDS: .9%), HBV (17.2%), and HCV (6.3%).

TABLE 2

The Influence of Different Factors on Surgeons to Wear Double Gloves

	Extremely or very important (%)	Moderately important (%)	Slightly or not important (%)
Patient gender	14.8	14.3	70.9
Patient race	20.1	14.4	65.5
Patient age	21.2	16.4	62.4
Patient marital status	22.6	20.1	57.3
Hospital	19.8	14.9	65.3
Type of surgery	40.9	16.6	42.5
Trauma case	30.9	15.5	53.6
IV drug user	85	2.5	12.5
HIV infected case	93	.8	6.2
Hepatitis carrier	89.4	3.1	7.5
Active AIDS	92.7	1.4	5.9
Active hepatitis	92.1	.9	7

Contamination of the surgeons' eye and mucosa by the secretions of a patient positive for HIV, AIDS, HBV, and HCV was reported by 3.9%, 0.3%, 7.8%, and 2.6% of them, respectively. Secondary to a needlestick injury, 3.9% and 15.2% had been treated with zidovudine and γ globulin, respectively.

The influence of different factors on surgeons to wear double gloves is shown in Table 2.

Those who were vaccinated against HBV had significantly lower periods of practice in surgery (16.5 ± 0.5 versus 28.5 ± 2.1 , $P < 0.001$).

Age Related Analysis

The following data about the older surgeons were obtained. They spent less hours in the operating room per week ($P < 0.001$), believed in a lower rate of HCV infection in their patients ($P = 0.032$), ordered more HIV and HCV tests for their patients ($P = 0.007$, $P = 0.015$, respectively), had lower rate of HBV vaccination ($P < 0.001$), and checked for anti-HBs after HBV vaccination ($P < 0.001$), were less willing to test HIV ($P = 0.001$), HBV ($P = 0.013$), and HCV ($P = 0.02$) for themselves during the past three years. They never used double gloves ($P = 0.001$), had no concern about contracting HIV through their practice ($P = 0.027$), never had microabrasions on their hands ($P = 0.009$), and believed that each patient known as i.v. drug users ($P = 0.006$), hepatitis carriers ($P = 0.001$), having active AIDS ($P = 0.044$), and active hepatitis ($P = 0.019$) are moderately important in influencing in their decision to wear double gloves.

Gender Related Analysis

Male surgeons were significantly older than female surgeons (50.1 ± 0.7 versus 40.4 ± 0.8 y old, $P < 0.001$),

with more years in practice (18.3 ± 0.6 versus 10.7 ± 0.9 y, $P < 0.001$), lower coverage of HBV vaccination (92.3% versus 100% , $P = 0.006$), and lower checking of anti-HBs after vaccination (54.2% versus 73.2% , $P = 0.002$), lower microabrasions most of the time (14.2% versus 27.1% , $P = 0.006$), lower percentage of ordering blood tests to screen HBV in their patients (30.2 ± 3.3 versus 58.3 ± 6.8 , $P < 0.001$), lower HBV test for themselves during the past three years (54.5% versus 68.7% , $P = 0.023$), and lower concern about infection with HBV (67.9 ± 2.3 versus 79.8 ± 3.7 , $P = 0.007$) and HCV (75.2 ± 2 versus 83.5 ± 3.3 , $P = 0.037$) during surgery.

Correlation Between Awareness, Attitude, and Practice

There was no statistically significant correlation between reported HIV and HCV concern and knowledge of seroconversion rates. However, surgeons with correct knowledge about seroconversion rate of HBV secondary to needlestick injury had significantly ($P = 0.022$) higher concern about HBV infection. Surgeons with correct knowledge about seroconversion rate of HIV ordered significantly lower HIV ($P < 0.001$) and HCV ($P = 0.006$) tests for their patients. Surgeons with correct knowledge about seroconversion rate of HCV estimated significantly ($P = 0.027$) lower percent of HBV infection in their patients than the other surgeons. There was no statistically significant correlation between reported double glove usage and knowledge of seroconversion rates (HIV, HB, or HC).

DISCUSSION

Our samples were middle-aged surgeons with relatively high experience in surgery. Most of them overestimated the percentage of infected patients with blood-borne diseases while underestimating the seroconversion rates. Surgeons need to be made aware of the risks of acquiring a blood-borne pathogen with exposure, and methods to reduce the risk. Only 13% of surgeons surveyed always used double gloves. It was 12% [22] and 27% [23] in other studies. The use of double gloves can increase protection by providing a second barrier [16, 19–21].

Although concern regarding blood-borne pathogens was high, the use of protection may be influenced by the perceived risk of transmission. We should make surgeons get used to constantly wearing double gloves and encourage this by making higher quality gloves available. The use of glasses and mask by the surgeons was not satisfactory either.

While the behavior of wearing double gloves by senior surgeons can affect the viewpoint of younger colleagues, in our study, unfortunately, older surgeons never used double gloves. It is necessary to focus on

this group. In our study, double glove use was more frequent in younger surgeons as was the case in a similar study [22].

Prevalence of needlestick injuries was 2.2 for each surgeon per year. Our study extends earlier observations indicating that needlestick injuries are common in surgeons [24–26]. Needlestick injuries pose a significant occupational risk for surgeons. Nearly 80% of surgeons never or rarely reported needlestick injuries, which was 70% [22], 93% [23], 65% [27], and 80% to 90% [25, 26] in other studies. So, surgeons do not usually report their needlestick injuries. Under-reporting on the part of surgeons may result in a substantial underestimation of the magnitude of the problem [28, 29]. Failure to report an occupational exposure may lead to the denial of subsequent claims [30]. Poor number of reports of injuries indicates the need for better education of the surgeons about the real rate of seroconversion, effective preventive methods, and setting up a hotline to receive reports. Other system-level changes that may increase reporting of needlestick injuries include timely reporting mechanisms [31], routine prompts [32], and peer education to create a culture that encourages speaking up [33].

Knowledge of seroconversion rates, an emphasis on the need for evaluation after exposure, and the potential usefulness of prophylactic therapy with drugs such as zidovudine ZT, interferon, or immunoglobulin may increase the number of reports of needlestick injuries.

Educating surgeons regarding correct techniques, using instruments as much as possible, passing the needle back to the assistant with the needle driver clamped to the suture rather than the needle itself are useful ways of decreasing the likelihood of a needlestick injury.

In our study, about 24% of the surgeons claimed that they were not administered a full course of vaccination (0, 1, or 2 doses of HB vaccine received) and 43% did not follow up to check anti-HBs. The percentage of HB vaccination in the present study was higher than similar ones [11, 18]. However, in our study as well as another one [11, 22], the younger surgeons were more likely to be vaccinated. We had a higher percentage of testing for anti-HBs than another similar study [11, 18]. Training, support, and follow up are necessary in this field.

Our results indicate that older surgeons need significantly more education about blood-borne diseases. They also showed that correct knowledge about blood-borne diseases caused higher concerns, less tests ordered, and better estimation of infection in the patients; unfortunately it did not make surgeons aware of the need for using double gloves, an issue that should be encouraged, as discussed. Fear from being infected by blood-borne diseases was higher in Iranian surgeons than other studies [34]. Another survey had also

shown that knowledge by health care workers on the risks associated with needlestick injuries and use of preventive measures was inadequate [23].

Because all information was self-reported, misclassification is possible, although the anonymous nature of the survey would be expected to facilitate accurate reporting. We lack data on outcomes, including results of serological testing for HIV or hepatitis infection among surgeons who sought care for their injuries.

CONCLUSIONS

Iranian surgeons are not aware of the correct percentage of infected patients and seroconversion rate of blood-borne diseases, do not adequately use double gloves, report their needlestick injuries, vaccinate against HBV, and check anti-HBs after HB vaccination. Although the knowledge and behavior of surgeons is relatively insufficient in Iran, their status is comparable with others and even better in HBV vaccination. Interestingly, correlations between our variables are very similar to other studies.

A standing order procedure should be formulated regarding needlestick injuries in our society, outlining precautions to be taken when dealing with blood and body fluids. It also must contain reporting procedures and management of all needlestick injuries. Educational talks must be given to health care workers on hazards, prevention, and postexposure prophylaxis to needlestick injuries, vaccination efficacy, obligated number of vaccination times, usefulness of checking anti-HBs, and wearing double gloves. Active monitoring, repeated educational programs with different methods, and facilitating the surgeons in reporting their needlesticks, vaccination, and checking the situation of their antigens/antibodies is necessary.

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