

## Knowledge of health care-associated infections among Georgian obstetricians and gynecologists

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### Abstract

**Background:** Knowledge of health care associated infections (HAIs) and adherence to infection control precautions in medical institutions, including obstetrics and gynecological settings, is important to prevent the transmission of infections among health care workers and patients. This study evaluated the level of knowledge of Georgian obstetricians and gynecologists (OBGYN) in the field of HAIs and standard precautions.

**Methodology:** The survey was conducted in nine maternity hospitals. An interviewer-administered questionnaire was used and a summary knowledge score was created from 10 questions estimating awareness of health care workers (HCWs). An acceptable knowledge was arbitrarily determined to be correctly answering six or more questions.

**Results:** The total number of surveyed HCWs was 433. Of these 49.2% were physicians and 50.8% were nurses. The data showed that 31.4% of HCWs had never received any educational intervention in the field of HAIs/safety precautions. By multivariate analysis factors related to knowledge score were age (HCWs > 35 years had higher scores), position (physicians had higher scores than nurses) and educational intervention on safety precautions.

**Conclusion:** This study demonstrates an acute need for educational interventions in the field of HAIs/safety precautions for HCWs in most OBGYN settings, particularly among nurses.

**Key words:** knowledge, health care associated infections, obstetrics and gynecology

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### Introduction

Knowledge of health care associated infections (HAIs) and adherence to infection control precautions in medical institutions, including obstetrics and gynecological settings, is important to prevent the transmission of infections among health care workers (HCWs) and patients. According to the United States Centers for Disease Control (CDC) data, HAIs are one of the top ten leading causes of death in the U.S. Little precise equivalent data exists in Georgia, but the risk of nosocomial infection is known to be high [1].

HCWs in the field of obstetrics and gynecology are exposed to blood and other body fluids daily [2]. Various studies show that compliance with universal safety precautions among physicians and nurses highly exposed to blood (surgeons, medical personnel of emergency departments, and intensive care units)

is not optimal [3]. Nosocomial transmission of infections is possible when infection control techniques or disinfection procedures are inadequate. Insufficient awareness levels among HCWs can impede prevention of HAIs, including those related to maternity care and abortions.

The burden of HAIs is particularly high in developing countries, including Georgia [1,4]. Hepatitis B (HBV) and hepatitis C (HCV), two important HAIs, are highly prevalent in this country [5], which increases the risk of their transmission in health care settings, including maternity hospitals.

The objectives of this study were to evaluate the level of knowledge of obstetricians and gynecologists in the field of HAIs and standard precautions and the type of training they ever received in these areas. Infectious complications are important causes of morbidity and mortality associated with abortions in

Georgia and worldwide. Prevention of post-abortion complications due to infections highly depends on the awareness of HCWs of proper techniques of pregnancy termination and management of septic abortion. In Georgia, abortion is still one of the most popular birth control methods, so this procedure remains as part of the routine work for many OB/GYNs [6]. To evaluate the knowledge of Georgian obstetricians and gynecologists in this field, questions were included to estimate perceived risk of infectious complications of abortion.

## Methods

The survey was conducted in nine maternity hospitals: three from Tbilisi (the capital), three from Eastern Georgian cities (Rustavi, Marneuli, Bolnisi) and four from Western Georgia (Kutaisi, Batumi, Zestaponi and Zugdidi). Consecutive samples from each hospital were included in the study proportional to the number of employees at each hospital. An interviewer-administered questionnaire was used. Face-to-face interviews were conducted with HCWs in private rooms. The survey instrument contained information on demographic and occupational characteristics; questions estimating occupational risk of exposure to blood and other body fluids; and the level of knowledge in the field of HAIs. A second part of the survey included questions regarding the sources of information about HAIs and standard precautions.

Multiple choice questions were provided to assess the knowledge. Major nosocomial pathogens were listed and respondents were asked to identify which of them are transmitted in hospitals.

A summary knowledge score was created from 10 questions estimating awareness of HCWs. An acceptable knowledge was arbitrarily determined to be correctly answering six or more out of 10 questions. The study was approved by the Institutional review board (IRB) of the Maternal and Child Care Union.

### *Statistical analysis*

Data were analyzed in statistical software SPSS 16, 0 and SAS 9.1.

Descriptive analysis was used to characterize the demographic and occupational data of the study group. Bivariate analysis was used to assess unadjusted associations between the outcome variable (knowledge score) and demographic and occupational characteristics. X<sup>2</sup> test was used for comparison. The knowledge score was modeled with

log-binomial regression to identify the contribution of various demographic factors in knowledge of HAIs among study participants, while controlling for all other factors. Comparisons were made using adjusted prevalence ratios (PR) with associated 95% confidence intervals.

## Results

Total number of surveyed health care workers was 433. Among them, 213 (49.2%) were physicians and 220 (50.8%) were nurses. Demographic characteristics of surveyed individuals are given in Table 1.

### *Sources of information of health care workers on standard precautions*

The survey showed that 31.4% of HCWs had never received any educational intervention in the field of health care associated infections or safety precautions. Among those who reported having received an educational intervention, the main educational activities were short seminars or presentations. Only 19% reported that some educational materials about safety precautions were available at their hospitals. The most commonly named materials were posters.

### *Occupational exposure*

The majority of HCWs overestimated the risk of occupational transmission of blood-borne viruses. The perceived risk of post-exposure HBV transmission was 90-100% in 181 (41.8%) study participants. About 65% of HCWs believed that human immunodeficiency virus (HIV) and HCV transmission risk after occupational exposure is 50-70%. Only 50.8% and 75.5% of HCWs knew about the existence of HIV and HBV post-exposure prophylaxis, respectively. Fifty-two percent believed that HCV post-exposure prophylaxis is available. The survey instrument contained a question about the body fluids containing human immunodeficiency virus, and results showed that 59.4% and 33.5% of respondents did not think that either vaginal fluid or semen contains HIV. On the other hand, most of the HCWs (93.8%) correctly identified blood as a body fluid containing HIV.

### *Nosocomial infections*

On the multiple choice question regarding which pathogens are transmitted nosocomially, most of surveyed HCWs did not recognize *Clostridium*

**Table 1.** Demographic and occupational characteristics of study participants

Demographics	N (%)
<b>Position</b>	
Physicians	213 (49.2%)
Nurses	220 (50.8%)
<b>Gender</b>	
Females	404 (93.3%)
Males	29 (6.7%)
<b>Residence</b>	
Tbilisi (capital)	271 (62.6%)
Regions	162 (37.4%)
<b>Age Group</b>	
> = 35	306 (72.2%)
< 35	118 (27.8%)
<b>Marital Status</b>	
Single	78 (18.2%)
Married	294 (68.5%)
Widow	31 (7.2%)
Divorced	26 (6.1%)
<b>Medical School Graduation Date</b>	
Before 1995	136 (32.2%)
At or after 1995	287 (67.8%)
<b>Place of Medical Education</b>	
Tbilisi	271 (67.6%)
Other cities of Georgia	61 (15.2%)
Other countries of Former Soviet Union (FSU)	69 (17.2%)

*difficile* (88.9%), MRSA (48.7%) and *Acinetobacter* (91.7%) as the nosocomial infection.

#### *Infectious complications of abortions*

Less than half (38.6%) of the study participants reported that they had experienced an infectious complication of abortion in their practice, and 33.5% reported seeing a complicated abortion in their department. Table 2 shows which complication of abortion is considered to be most frequent by HCWs.

#### *Universal safety precautions*

Only 63.4% of study subjects reported that they place used syringes and needles in the special disposable container; 13.7% believe that they should be placed in plastic bag; 12% in the ordinary trash; 5.5% in disinfection solution; and 4.6% in disinfectant first and then in a disposable container. Three quarters (75.6%) of OB/GYN physicians and nurses who participated in the study did not determine correctly when sterile versus unsterile gloves should be used. Most respondents overestimated the need of sterile gloves. Self-

compliance with glove use was high. Among those who do not always use gloves, the main perceived barrier was being too busy (28.2%) and not considering a particular patient to be at risk of having infection (13.6%).

#### *Availability of disposable devices*

The majority of HCWs reported that disposable gloves and disposable syringes are almost always available in their hospital (97.7% and 99.8%, respectively). The availability of disposable vaginal specula is limited, however. Only 38.8% reported always having access to disposable vaginal specula.

#### *Overall knowledge score*

Only 178 (41.1%) of the surveyed obstetricians and gynecologists had the score six or higher. In bivariate analysis, knowledge score was significantly associated with age group, position, medical school graduation date, and ever receiving educational intervention on safety precautions. Physicians were 1.7 times more likely to give correct answers compared to nurses (51.2% versus 30%, 95% CI: 1.34-2.17). HCWs aged  $\geq 35$  were more likely to have higher knowledge scores than their younger

**Table 2.** Most Prevalent Reported Complications of Abortion

Complication	N (%)
Pelvic inflammatory disease	282 (65.1%)
Urinary Tract Infection	65 (15%)
Sepsis	40 (9.2%)
Viral Hepatitis	9 (2.1%)
Don't know	37 (8.5%)

\* All PR are adjusted for all other variables in the model

colleagues aged < 35 years (45.1% versus 28%). HCWs reporting ever receiving educational intervention on safety precautions were 1.6 times more likely to give correct answers than those who never attended educational activities. Gender and marital status of HCWs were not significantly associated with knowledge score. In multivariate analysis, factors related to knowledge score were age, position and ever receiving educational intervention on safety precautions (Table 3).

## Discussion

Almost all surveyed health care workers (95.9%) reported being directly exposed to blood or other body fluids; however, only a small proportion of them showed adequate knowledge and practice of safety precautions. Despite the relatively low threshold of acceptable knowledge (the proportion of correct answers of 60% or more), the percentage of HCWs with acceptable knowledge on HAIs and standard precautions was only 41.1%. This finding is importantly lower than results reported by similar surveys. Unfortunately, however, different survey methodologies make direct comparison impossible [7,8]. One explanation for the low level of awareness among health care workers could be the lack of appropriate courses in the curricula of medical universities.

There is limited comparison data about HAIs in Georgia. A study conducted by the Georgian National Center for Diseases Control reported high prevalence of surgical site infections (16.7%) [4].

This number is higher than the data reported in developed countries [9]. These data together with high prevalence estimates of blood-borne infections in Georgia point to the high risk of acquiring HAIs in Georgian health care settings.

Even though there has been no reliable study to identify the rate of hepatitis transmission in health care settings in Georgia, studies from other former Soviet countries, whose health care systems share similar characteristics with those of Georgia, report the data on HBV and HCV transmission in health care institutions, including obstetrics and gynecology settings [10]. The available data indicate that parenteral procedures, not including blood transfusion, account for 40%-71% of HCV infections in Eastern European countries. Together with the lack of appropriate infrastructure for adequate disinfection and sterilization, low awareness among HCWs is one of the leading reasons for the high percentage of parenterally transmitted HCV [11].

Most of the respondents correctly identified pelvic inflammatory disease as a frequent complication of abortion. More than one third of those surveyed reported seeing infectious complications of abortion in their practice, which is much higher than the data from developed countries [12,13].

This study revealed a statistically significant difference in knowledge score between physicians and nurses. This finding is consistent with the study conducted among HCWs from other developing countries, where doctors had higher scores than

**Table 3.** Results of multivariate log-binomial regression to identify factors related to knowledge score among health care workers of maternity hospitals

Factors	Prevalence Ratio (95% CI)
Gender	0.94* (0.65, 1.37)
Residence	0.88*(0.69, 1.11)
Education on safety precautions	0.71* (0.54, 0.97)
Age	1.43* (1.04, 1.97)
Position	0.63* (0.49, 0.82)

nurses [8]. This is alarming given that nurses have a major responsibility in hospital settings for infection prevention. There are western studies where nurses and nursing students are more aware of universal precautions than physicians [14,15]. The disparity between knowledge of doctors and nurses may be explained by the fact that Georgian physicians are more involved in medical procedures and infection prevention than their colleagues from western countries, where nurses take most of the responsibilities for routine medical procedures. Nevertheless, it is cause for concern.

One of the limitations of the study is that it used consecutive sample as opposed to random sample. Another limitation is self-reported practice data. No direct observations were made within this study.

Despite the limitations, however, this study demonstrates an acute need for immediate educational interventions in the field of health care associated infections and safety precautions for HCWs in most obstetrics and gynecology settings, particularly among nurses. In Georgia, in-service training is typically designed and conducted only for physicians. Because prevention of health care associated infections is dependent on nurses' knowledge and compliance with safety precautions, special curricula for educating nurses working in maternity hospitals would make an important contribution toward prevention of infection transmission in Georgian hospitals.

Other essential interventions must also be undertaken in order to ensure that whatever is learned is put into the practice. Main supportive interventions, among others, are providing regular supplies; changing relationships between medical and nursing personnel, and establishing quality assurance mechanisms.

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