



**Assessment of knowledge, attitudes and practices of healthcare workers towards hospital acquired infections in a super speciality hospital**

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**Introduction**

Health care workers (HCW) are constantly exposed to a variety of pathogenic microorganisms which have the ability to cause severe or even lethal infections. Health care associated infections (HCAI) can be defined as an infection occurring in a patient during the process of care in a hospital or other healthcare facility which was not present or incubating at the time of admission<sup>1</sup>. Many studies have shown that the burden of HCAs is higher in resource limited settings and is estimated to be two to twenty times that of developed countries. One of the major reasons for these high rate HCAs is the lack of infection control programs, which have been neglected due to limited resources, competing priorities, and other barriers<sup>2</sup>. HCAs contribute to significant morbidity and mortality, longer duration of hospitalization, as well as increased cost of treatment in both developed and resource-poor countries. The prevalence in the developed world is reported to be 15% among hospitalized patients while it is as high as 37% for patients admitted into the Intensive Care Unit. The prevalence in developing countries is somewhat higher with up to 19% prevalence of HCAI among hospitalized patients<sup>1</sup>. Based on recommendations from World Health Organization (WHO) and the Centers for Disease Control, hand hygiene is the most important and easy way for the control of

hospital infections<sup>3</sup>. Healthcare associated infections (HAI) are nowadays more common due to increased utilization of invasive devices and often inappropriate use of antimicrobial therapy. The most important HAIs are those related to invasive devices: central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), ventilator-associated pneumonia (VAP) as well as surgical site infections (SSI). The case-fatality rate ranges from 2.3% to 14.4% depending on the type of infection. These are caused by multi-drug resistant organisms (MDRO) such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant Enterococci (VRE) and multi-resistant Gram-negative bacilli. Various factors contribute to HAI. Healthcare related factors include the use of invasive devices, surgical procedures, and excessive antibiotic use. Environmental factors include contaminated air-conditioning systems and the physical layout of the facility along with low staffing (e.g., nurse-to-patient ratio) and the lack of effective intervention programs designed to reduce HAI. Patient-related factors include; severity of underlying illness, use of immunosuppressive agents, and prolonged hospital stays<sup>4</sup>. The device utilization ratio constitutes an extrinsic risk factor for device-associated healthcare-associated infections (DA-HAI) and can serve as a marker for

severity of illness or the patient's intrinsic susceptibility to infection. If the device utilization ratio is greater than the 90th percentile, a specific hospital is considered a high outlier and further investigation of that specific practice could be warranted<sup>5</sup>.

HAIs create the socioeconomically impact on patients and nation's economy. HAIs caused the increased hospitalization stay, staff time, cost of laboratory tests on the pathogens and antimicrobial treatment. The antimicrobial treatment related financial cost is a main part of the health economic burden<sup>6</sup>. Healthcare-associated infections affect 5% to 10% of all hospitalized patients each year in the United States, account for nearly \$45 billion in direct hospital costs, and cause nearly 100,000 deaths annually<sup>7</sup>. HAI prevention interventions yield very positive cost-benefit estimations. The quality of economic evaluations should be improved to provide better information to healthcare policy makers and clinicians. On average, the savings of a prevention program were 11 times greater than the costs. Nevertheless, it should be noted here that the most important aspect of an infection prevention program is reduction of harm and loss of life<sup>8</sup>.

Universal HBV vaccination of all HCWs, continuous education and training, introduction of safety devices, appropriate waste and sharp disposal, ensuring reporting of all exposures, institution of appropriate PEP, psychological support and counselling of affected HCWs and stringent follow-up are all needed to reduce the burden of occupationally acquired infections in HCWs<sup>9</sup>.

Identifying existing infection control knowledge, attitudes, and practices (KAP) among health care workers is a first key step in developing and implementing a successful infection control program. In this study, we assess the KAP status of infection prevention among HCWs, in order to have a better understanding of the possible areas for improving infection prevention strategies and practices.

## **Methods**

### **Study setting and design**

This study is a cross sectional study conducted among the healthcare workers of a superspeciality hospital in New Delhi.

### **Study population**

50 Healthcare staff including doctors, nurses and other staff was enrolled.

### **Data collection method**

Data were collected by using self-administered semi-structured questionnaire which has different items such as: socio demographics, knowledge, attitude and practices towards infection prevention. The questionnaires were distributed on various wards of the hospitals to obtain responses from a wide range of health care workers.

### **Data analysis and interpretation**

The collected information was entered into Microsoft Excel to check and manage the data. Then, study findings explained in words, tables and other statistical summary techniques.

## **Results**

### **Socio-demographic characteristics among healthcare workers**

Total of 50 HCWs participated in this study. The majority of the respondents (21, 42%) were between the ages of 30-40 years. Twelve participants (24%) were aged 20-30. Eight (16%) were 40-50 years, seven (14%) were 50-60 years old and two (4%) of the health care workers were more than 60 years old. The majority of participants were female, comprising of 35 (70%) HCWs, while 15 (30%) were male. Of the 50 HCWs, 12 (24%) were doctors, 16(32%) nurses, 18(36%) technicians and 4 (8%) nursing orderlies. Among these HCWs, 12% have been working for less than a year, 16% for 1-5 years, 32% for 6-10 years, 20% for 11-15 years, and 20% for more than 16 years.

### **Knowledge of healthcare workers on infection prevention and control**

Most workers (80%) were aware that there is a manual on infection prevention and control policies and guidelines in the hospital (Table 1). However, only 64% of workers are aware that disinfection prevents hospital acquired infection, while only 60% are aware that antiseptic prevents hospital acquired infection. 60% did not know that sodium hypochlorite, in its stock form, is not effective. 40% and 50% of HCWs did not know chemical and physical sterilization respectively; and are to be used on all equipment in the hospital setting. 80% and 84% of hospital workers know that wearing protective clothing, and proper handling of working equipment respectively, decreases the risk of infections and contamination in the workplace. To assess the knowledge of the HCW in this hospital, a total of 12 questions were asked in this study.

### **Attitude of healthcare workers on infection prevention and control**

In the hospital, 80% of HCWs agree that a new pair of gloves should be worn for each new patient attended (Table 2). 84% agree that following standard operation procedures decrease the risk of contamination. 40% agree that using 10% sodium hypochlorite for 10 minutes is adequate to decontaminate equipment. 50% of workers agree that vaccination decreases hospital acquired infection and 54% agree that prophylaxis decreases infections in hospitals. The majority (88%) of HCWs agree that maintaining personal hygiene decreases risk of contamination. Additionally, most (86%) HCWs believe that a patient's awareness about transmission of microorganisms decreases the risk of hospital acquired infection. To assess the attitudes among HCWs about infection prevention in this study, nine questions were posed to the participants.

### **Practices of healthcare workers on infection prevention and control**

As revealed in Table 3, 80% of HCWs always wash their hands with soap and water after taking a sample, while 90% wash their hands immediately after coming in contact with blood and body fluids. 90% dispose of sharp materials in a safety box and 94% of workers dispose of used needles in its designated bin. 66% never recap their needles after use. 60% of workers never had a needle stick injury. In this study, a total of 12 questions were asked to assess practices among HCWs about infection prevention.

### **Discussion**

In a study by Unakal et al, the overall, the knowledge on infection prevention among HCWs was very poor (20.3%), that is, less than 70%. This is also confirmed in our study. In our study, most workers (80%) were aware that there is a manual on infection prevention and control policies and guidelines in the hospital as compared to 72.7% in the study by Unakal et al. 64% of workers are aware that disinfection prevents hospital acquired infection, while only 60% were aware that antiseptic prevents hospital acquired infection and 80% and 84% of hospital workers know that wearing protective clothing, and proper handling of working equipment respectively, decreases the risk of infections and contamination in the workplace. These findings are consistent with similar studies done in Nigeria and Trinidad and Tobago, where 91.6% and 84% of participants, respectively were knowledgeable about policies and guidelines regarding infection prevention and control<sup>2</sup>. However, the knowledge about policies and guidelines only indicates that the healthcare workers knew about the policies, it does not mean that everything in those policies was implemented. Poor implementation could be as a result of a great workload, time constraints or poor training. This is highlighted in a study by Sundaram et al, where there is

variable compliance amongst orthopaedic trainees in applying universal precautions, despite 74% having moderate-to-high concern regarding the transmission of blood-borne infections from patients to themselves<sup>10</sup>. In this study, only 68% of participants knew that there is a post exposure prophylaxis for HIV. In similar studies done in Jamaica, 95% of the participants had knowledge on PEP for HIV<sup>2</sup>. As a result, this would suggest that health care workers in our study are more susceptible to infection as opposed to those in Jamaica. According to Parmeggiani et al, participants' knowledge concerning the various aspects of HAIs was generally high and consistent with current scientific evidence. But there were wide areas where the knowledge was found to be lower, particularly regarding infections that a HCW can transmit to a patient. Based on this consideration, it was concluded that more education and training are required in order to reduce the rate of HAIs<sup>11</sup>.

In our study, most of the participants had a poor overall attitude towards hospital infection. In the hospital, 80% of HCWs agree that a new pair of gloves should be worn for each new patient attended while 84% agree that following standard operation procedures decrease the risk of contamination. This is in agreement with the study by Unakal et al, where the vast majority of participants (87.7%) agreed that new gloves should be used for each new patient visiting the hospital indicating its importance in infection control. While the WHO states that the same pair of gloves should not be worn when caring for more than one patient, it should be noted that the use of gloves does not replace hand washing with soap and water. Only 40% agree that using 10% sodium hypochlorite for 10 minutes is adequate to decontaminate equipment and 50% and 54% of workers agree that vaccination and prophylaxis, respectively decreases hospital acquired infection. The majority (88%) of HCWs agree that

maintaining personal hygiene decreases risk of contamination. Additionally, most (86%) HCWs believe that a patient's awareness about transmission of microorganisms decreases the risk of hospital acquired infection.

In general, HCWs displayed substandard practices towards infection prevention. Over 80% of the participants responded that they washed their hands with soap and water after taking a sample and that they washed their hands immediately when they came into contact with blood, bodily fluids or contaminated items as compared to the participants in the study done in Ethiopia where about 30% of participants responded that there was no need to carry out any form of hand hygiene prior to conducting procedures that did not involve bodily fluids. The goggles were largely not worn during procedures that generate blood or body fluids, attributed to the lack of available supplies. This problem is also similar with a study conducted in Nigeria, and it suggests a huge barrier to infection prevention in the healthcare setting<sup>2</sup>. A study by Conway et al also shows similar results<sup>12</sup>. The study by Madanil et al shows high HAI rates, the reasons for this were attributed to the lack of legal framework regarding IC programs, having restricted funds, low nurse-to-patient staffing ratios, over-crowded wards and insufficient supplies<sup>13</sup>. According to Dick et al, repeated prevalence surveys demonstrated a significant reduction in HAIs, particularly UTI<sup>14</sup>.

Our study points to the fact that maintaining a safe working environment for HCWs and changes in infection control measures must be a top priority for hospital administrators. The overall observation of level of KAP among the HCW workers we surveyed was poor. A major form of spread of infection occurs horizontally which is what could occur where there is lack of KAP among health care workers. Based on the results obtained, it was

determined that the knowledge, attitudes and practices of healthcare workers with respect to infection prevention was poor. These gaps should be addressed through educational initiatives, training, infection control campaigns and strict implementation of national guidelines of infection prevention and control policy.

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