



An Analysis of Infection Control Measures Among Public and Private Healthcare Professionals in the Hospitals of South Punjab, Pakistan

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Abstract

Nosocomial infections are defined as those developing 48 hours after admission, within 3 days of discharge, or 30 days of operation. They are mainly caused by bacteria, viruses, and fungi and until now they have been known to cause complications like sepsis and organ failure. A hospital-based cross-sectional analytical study was conducted among the healthcare workers for two districts comprising Bahawalpur and Rahim Yar Khan of south Punjab, Pakistan. Awareness: Analyzing the responses given by the patients, 90 % of patients practiced hand hygiene appropriately while 64.3% of the patients took sufficient preventive measures. Infection Distribution: 87.1% reported nosocomial infections in hospitals, making the most recurrent UTI at 55.7%, followed by pulmonary infections at 8.6%, and bloodstream infections at 2.9%. Prevention: Preventative measures cited included: Workshops and maintenance of cleanliness. High-Risk Groups: Patients with complications (71.4%) had more vulnerability than HCWs (2.9%) and visitors (5.7%). Sterilization: 97.1% said that asepsis was significant, pointing out that incorrect sterilization was leading to infection. Infrastructure: HEPA filters which are extremely important while controlling communicable airborne diseases were installed in the study sample hospitals and only 31.4% of hospitals had HEPA filters installed at the time of the study. Dissemination Factors: 29 of the respondents realized that soiled bed sheets were an important vector for embodying and disseminating infection, mentioning a value of 95%. A massive knowledge deficit of both nosocomial infections, preventive steps, and support structures can be deduced from the study. Maintaining hand hygiene and sterilization, and increasing the installation of infection-control amenities including the HEPA filters are critical.

Introduction

Infections that occur 48 hours after being hospitalized, up to three days after the discharge process, or 30 days after the operation are referred to as nosocomial infections (Davran & Karaca, 2021). In accordance with biological and clinical criteria, the National Health Care Safety Network and the Centers for Disease Control have classified 50 distinct

infections at nosocomial sites into 13 types for surveillance (Nimer, 2022). Any site can develop nosocomial infections, which can result in sepsis, organ failure, and death. Due to the interaction of salivary flow, mucus, secretory IgA, gastric acid, bile, and peristalsis, the stomach is typically a sterile environment. The use of urinary catheters is a secondary cause of the majority of nosocomial urinary tract infections (Helgeson, Levitt, & Festic, 2020). Nosocomial pathogens

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include bacteria, viruses, and fungal parasites (Förnkrantz & Walochnik, 2021). In order to prevent and control these new nosocomial infections, national surveillance must be increased, Rates of infections must be "risk-adjusted" to guarantee that hospital-to-hospital comparisons remain accurate (Park, 2019), new noninvasive infection-resistant devices are required, and present control mechanisms must be improved., such as hand hygiene, must be implemented by healthcare workers more effectively (Stewart et al., 2021). The pathogen responsible for the infection, which could be bacterial, viral, or fungal, as well as the source or type of infection, determines the etiology of HAI (Blot et al., 2022).

There is still no country that has made an effort to address this endemic problem because these infections are only discovered when they become epidemics. Additionally, refraining from using antibiotics that are not necessary prevents the emergence of resistance (Breathnach, 2013). In an effort to duplicate the anti-infectious properties of breast milk, prebiotics, synbiotics, and probiotics have all been tested with varied degrees of success (Dixit, Wagle, & Vakil, 2016). Also being studied is lactoferrin, a whey protein that binds iron and is present in high proportions in colostrum (Brück, 2006). A major problem with regard to public health is nosocomial or hospital-acquired infection (HAI) (Lemiech-Mirowska, Kiersnowska, Michałkiewicz, Depta, & Marczak, 2021). Nosocomial infections can be avoided in a number of ways, including aseptic wound management, frequent hand washing before and after contact with patients, and the sparing use of antibiotics (Audette & Cole, 2024). It is possible that hyperglycemia itself is a separate risk factor for the development of infection given the high rate of nosocomial infections seen in diabetic patients with poor glucose control (Casqueiro, Casqueiro, & Alves, 2012). Improved perioperative glucose homeostasis in diabetic patients may lessen the likelihood of nosocomial infection, which would lead to a better outcome (Ingels, Vanhorebeek, & Van den Berghe, 2018).

The etiology of clinical conditions with previously unidentified causes is being implicated by both newly discovered viruses and known viruses (Schwartz & Dhaliwal, 2020). Numerous types of viruses are important nosocomial pathogens in addition to frequently causing infections in the general population (Kollef, Torres, Shorr, Martin-Loeches, & Micek, 2021). Viruses easily account for more than 36% of the cases of hospital-acquired infections in many pediatric

settings, despite the fact that, it is generally agreed that it is underestimated the proportion of nosocomial infections that are viral due to a lack of routine monitoring (McFee, 2009). Indeed, as a result of numerous societal and demographic changes as well as changes in healthcare practices, the relative importance of viruses in this regard is rising (Charlton et al., 2018). It is challenging to evaluate nosocomial infection studies because of variations in the relative susceptibility of patients to acquiring such infections, the use of various surveillance techniques, and the frequent inability to differentiate between measurements of incidence and of prevalence (Isigi, Parsa, Alasqah, Mahmud, & Kabir, 2023). The purpose of this research is to provide awareness and control measures for hospital-acquired infections among healthcare personnel of public and private hospitals in South Punjab, Pakistan.

Materials and Methods

Study duration and sample size

This observational cross-sectional survey-based study was designed to provide an overview of the effects of awareness and control of nosocomial infections among healthcare workers in District Bahawalpur, and Rahim Yar Khan and their Tehsils level Hospitals. Patients were recruited keeping in mind the inclusion and exclusion criteria. Inclusion criteria were male/female Microbiologists, Pathologists, and Physician doctors working in the field for at least one year. Written informed consent was obtained from all subjects before and all possible benefits and expected risks were explained to participants. 60-70 Co-operative Health care workers were included. Majorly the questions consisted of two domains of yes and no, some also contained greater than two domains to get the information related to the nosocomial infection cause, type, and group of people mainly targeted to nosocomial infections. The following formula was used to determine an appropriate sample size for a study on prevalence and treatment:

$$n = \frac{Z^2 P(P - 1)}{d^2}$$

Where n denotes the sample size, Z denotes the statistic's level of confidence, and P denotes the researchers' own pilot study's precision (matching to effect size) and the p prevalence that can be found in the same study.

Data Analysis and Procedure:

Data was collected through a Questionnaire and analyzed by the latest version of statistical software named as SPSS 25.0 (Statistical Packages for social sciences). Basic descriptive statistics was calculated. (Including median and quartile, SD, max/min, and percentile). Then different statistical tests applied to get results.

Ethical Considerations:

Each participant signed a written informed consent form, which is attached. Confidential processing of all collected data and information was taken care. All reasonable precautions were taken to ensure that the participants' privacy is protected and their identities won't be made public in any publications emanating from this study

Results

The result were drawn on the basis of different parameters like Hand Hygiene, Health Care Worker, Prevention, Sterilization, Hepa Filter, and also on the basis of risk factors and treatment

Awareness of Hand Hygiene Distribution

Data collection of 70 respondents was done through the questionnaire. All medical professionals responded positively to the survey's awareness level question, indicating that they were all aware of the nosocomial infections. While the majority are conscious of the significance of using excellent hand hygiene, the others are not. (Fig 1)

Distribution of Awareness in Health Care Workers

Data collection of 70 respondents was done through a questionnaire. Out of 70 respondents 63 (90%) followed appropriate Hand hygiene practice and 7 (10%) were not following practice. While 45 (64.3%) doing enough to prevent health care associated infections and 25 (35.7%) were not doing enough. Mostly health care workers are the source of transmission of nosocomial infections (Fig 2).

Distribution of Infections in Different Hospitals

Data collection of 70 respondents was done through questionnaire. Out of 70 respondents 61 (87.1%) NCI'S were seen in hospital and 9 (12.9%) were not seen (Fig 3).

Distribution of Different Types of Nosocomial Infections

Data collection of 70 respondents was done through questionnaire. The majority of nosocomial infections in the

institute, including UTIs and wound infections, were found to be caused primarily by hospital exposure. Data obtained from the survey performed in various hospitals of South Punjab showed that patient infected with urinary tract infections were high in numbers as compared to Blood stream infections i-e, (2.9%) while hospital acquired pneumonia were (8.6%) (Fig 4).

Distribution According to Prevention/Control

Data collection of 70 respondents was done through the questionnaire. Out of 70 respondents 39 (55.7%) infections spread due to Hospital Exposure and 31 (44.3%) were not commonly seen. And this study indicates that having a workshop, maintaining cleanliness, and properly controlling infections can all be helpful with minimal risk of infection (Fig 5)

Distribution of Wards That are More Susceptible to NCI's

Data collection of 70 respondents was done through a questionnaire. A comparison of wards across hospitals revealed that general medicine and surgery wards were the hotspots of nosocomial infections, which may be related to a higher number of non-urgent patients in general medicine wards and the use of medical equipment in surgery wards, which can result in hospital-acquired infections. In Services Hospital, the orthopedic surgical wards were the most affected wards (Fig 6).

Distribution of Persons that are More Susceptible to NCI's

While visitors and healthcare professionals account for 5.7% and 2.9%, respectively, of hospital-acquired infections, according to the data gathered, immunocompromised patients account for 71.4% of these cases. Due to their weakened immune systems and inability to fend off any kind of invasion, immunocompromised patients are more likely to

contract infections from the hospital. Additionally, a comparison of hospitals revealed that everyone views

immunocompromised people as being particularly vulnerable (Fig 7).

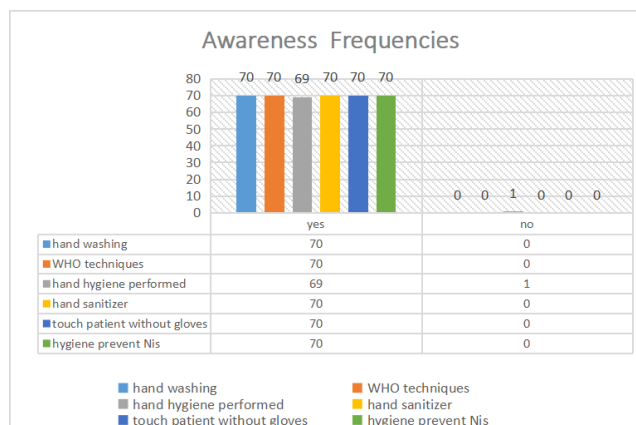


Fig 1: Distribution of respondents (awareness on hand hygiene)

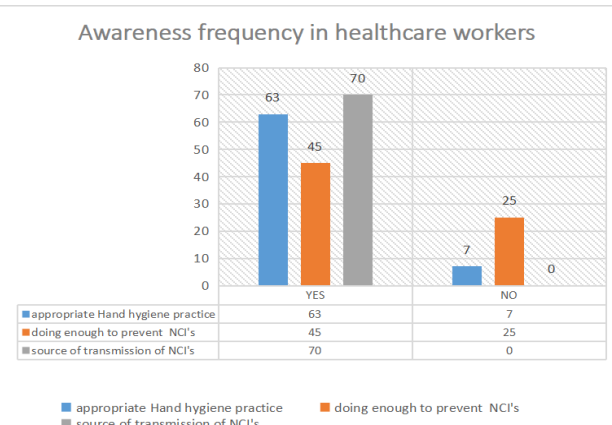


Fig 2: Distribution of respondents (awareness of healthcare workers about their duties to prevent NCI's)

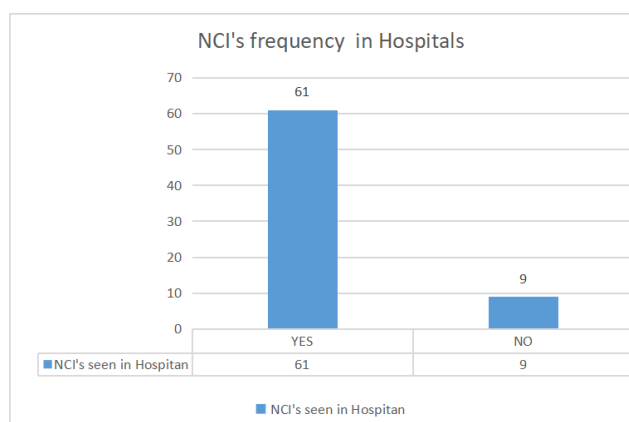


Fig 3. Frequency of NCI's commonly seen in hospitals

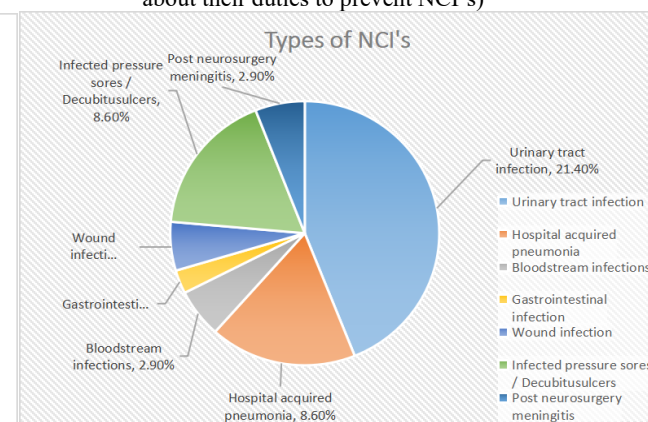


Figure 4. Frequency of NCI's types

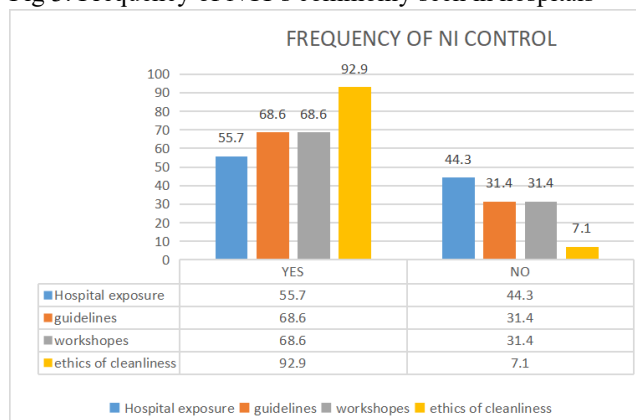


Fig 5. Frequency of NCI's prevention / Control

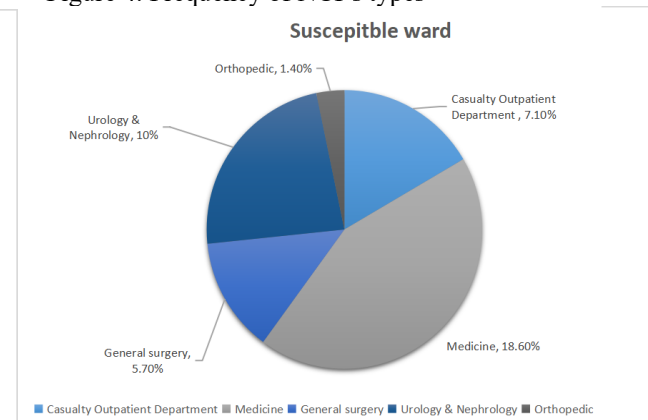


Fig 6. Percentage of Wards susceptible to Nosocomial Infections

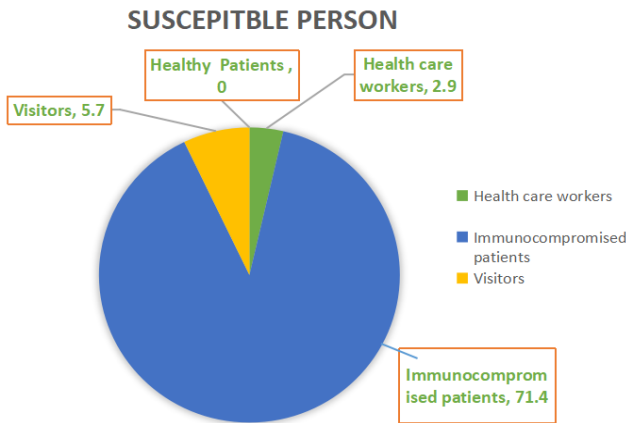


Fig 7. Persons more susceptible to Nosocomial infections

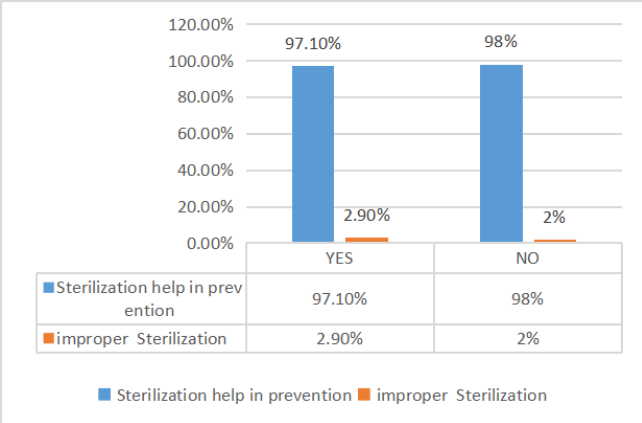


Fig 9. Frequency of Hepa filters

Distribution of Improper Sterilization

Data collection of 70 respondents was done through questionnaire. Out of 70 respondents 68 (97.1%) pointed out that sterilization might help in preventing nosocomial Infection and 2 (2.9%) were not sure. It was mentioned that improper sterilization of surgical instruments can cause maximum nosocomial Infections (Fig 8).

Distribution of Presence of Hepa Filters to Protect Environment from Air Borne Diseases

When asked if there are HEPA filters, experts gave the following percentages: Yes: 22 (31.4%), and no: 48 (68.6%). HEPA filters are crucial because they stop the spread of pathogens by capturing infectious agents. As a result, they should be present at hospitals to ensure the safety of the setting and the patients. However, the majority of hospitals do not have HEPA filters, as is evident from the responses of medical specialists (Fig 9).

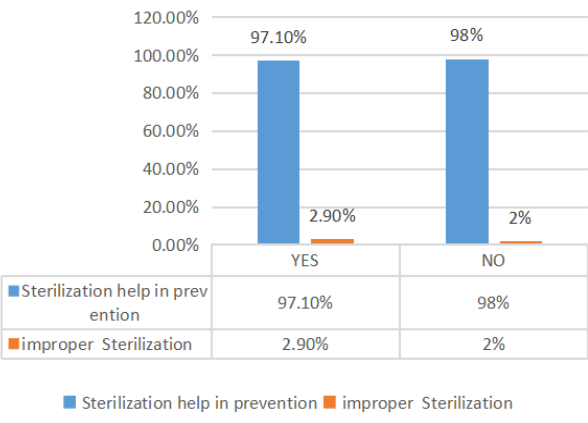


Fig 8. Percentage of use of sterilization.

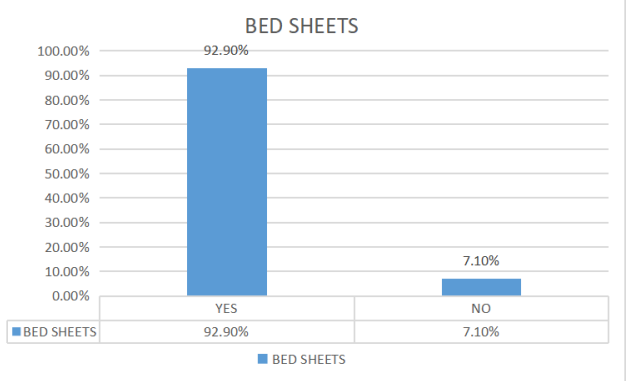


Fig 10. Frequency of bed sheets as a disseminating factor of NCI's.

Distribution of Health Care Workers on Bed Sheets as a Disseminating Factors of NCI's

95% of health care workers agreed that unclean bed sheets due to contact disseminate, so hospital bed sheets were seen to be the major disseminating factor. So it indicated that bed sheet are an important factor in the dissemination of infections (Fig 10).

Discussion

The majority of nosocomial illnesses in the institutes and hospitals, including UTIs and wound infections, were shown to be caused mostly by hospital exposure i-e, Infections in the urinary tract (42%) and infections of the lower respiratory tract (20%) etc. In a study conducted at multiple hospitals in Japan, primary sepsis (8%) and surgical site infections (15%) were the most common NIs. The greatest percentage of urinary tract infections (27.3%), according to data collected from a survey conducted in several Lahore hospitals, is

closely correlated with this study (Gastmeier et al., 1998). 2.67% out of every 100 admissions to the SICU that were complicated by nosocomial bloodstream infection occurred throughout the study period, which is comparable to the survey's bloodstream infection rate of 4.3%. This study (Richards, Edwards, Culver, & Gaynes, 1999) aimed to ascertain the lengthened hospital stay, increased expenses, and nosocomial bloodstream infection-related deaths in severely sick patients. In a US study, the most typical nosocomial illness was urinary tract infection, with a prevalence of 3.1%, followed by bloodstream infections in second place. These findings are very comparable to those of the survey that were before discussed (Horan et al., 1993). In this facility-based cross-sectional study, participants' self-reported information was gathered using a questionnaire. A random selection approach was utilized to provide each healthcare worker a chance of being selected for the study in an effort to reduce the study's shortcomings. The findings of this study can only be generalized to healthcare professionals who have direct patient care responsibilities and to government healthcare and private institutions, which is one of its limitations. The study was conducted using a cross-sectional design, which makes it impossible to determine if the explanatory and outcome factors are related. Self-reporting bias could be one of the study's shortcomings since participants self-reported their practices without having them cross-checked by having them seen in action; as a result, individuals might over- or under-report their practices. Controlling the length of exposure to medical invasive devices, such as an arteriovenous cannula, a central venous catheter, an indwelling urine catheter, mechanical ventilation, and a ventilator, is crucial for preventing HAIs in patients having invasive operations. In order to lower the rate of SSI, compliance with disinfection methods is also crucial. The risk variables for HAIs in our review are expected to interact with one another. For instance, our meta-analyses revealed that the three main risk factors for HAIs were immunosuppressive treatment, underlying disorders or comorbidities, and elderly individuals. Elderly people are more likely to have underlying illnesses or comorbidities, and require long-term care, and immunosuppressive medication.

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None

Conflict of Interest

The authors declare no conflict of interest.

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