Original Article

Assessment of Infection Control Program and Practices in Private Care Hospitals of Saudi Arabia; A Nationwide Cross-Sectional Study

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ABSTRACT

Background: Hospital acquired infections are still a health care problem across many countries. However, the implementation of the required and recommended infection control practices is unsatisfactory. ***Methods:*** This was a 6-month cross-sectional study in five regions' private hospitals in Saudi Arabia. ***Results:*** All the hospitals' infection control practices were below 75%. Administrators, doctors, nurses, and allied medical staff's were of practicing infection control varied across the five hospitals. Only the doctors and allied medical staff responded with more "yes" than "no" to infection control practice questions. ***Conclusion:*** The infection control program and practices in private hospitals in Saudi Arabia are still demanding. Unless these practices are improved across private-sector hospitals, the prevalence and burden of hospital acquired infections will remain in place.

Keywords: Infection Control; Hospital acquired infections; Nosocomial infections; Pathogens; Healthcare; Saudi Arabia

Introduction

Throughout the globe, hospital acquired infections (HAIs) have posed a burden to health care systems. These infections have caused the standing and increased morbidity, mortality, and healthcare costs across hospitals.[1,2] Globally, evidence shows that the risk of HAI for any person stands between 7.1% to 27.8%.[3] HAIs are majorly caused by bacteria, viruses, and fungus. Fungus can cause 40 cases of HAI while bacteria alone can cause around 80 percent of HAI cases.[4] HAIs are usually responsible for community infections because the infected person carries it out from the hospital

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and can transmit it to other healthy people and then to others within the community. Many hospital staff especially in the developing countries have either neglected the existence of HAI or have underestimated its prevalence, hence, aggravating the problem.

Commonly, HAIs affect the respiratory system, urinary tract system, bloodstream, and surgical wounds with ICU, mechanically ventilated, catheterized, prolonged stayed patients being affected most.[1] HAIs can enter the body within 48 hours of hospital admission and remain there up to 3 days of discharge.[5] When the germs enter the body during a surgical procedure, the infection can live inside the body for up to 30 days.[6] HAIs are very unusual diseases because the patient is admitted for some other reasons and gets infected from another disease within the hospital. In most cases, the hospital is responsible for the transmission of the HAI because of their unhygienic activities and carelessness or even failure to adhere to the standard infection control and prevention practices. On many occasions hospital admitted patients get HAIs because of their weakened immune systems because of the disease for which they were admitted. The hospital stays and long-standing primary illnesses by default weaken the immune system making the body more susceptible to any prevailing germs, hence, the HAI attack rate increasing.[7]

The transmission of HAIs can be direct or indirect. Direct transmission involves direct body surface to body surface contact and physical transfer of microorganisms takes place between host and infected person.[8] This direct transmission can take place between patient-patient or staff-patient. In the indirect type of transmission, the infection enters the victim by indirect means;[9] usually by objects like contaminated instruments, contaminated dressing, needles and contaminated gloves that are not changed during patient's treatment, the improper use of syringes, bags and vials. Symptoms are key to diagnosing HAIs; many doctors determine whether or not an infection is hospital acquired by observing the symptoms.[10] This observation is possible through history taking and laboratory testing before and during patient treatment.

Universal precautions play a huge role in controlling of HAIs in any country, Saudi Arabia inclusive. However, precautions are sometimes not applied conscientiously in many hospitals. Precautions usually incline on reducing patient-to-patient/staff interactions, cleaning hospitals and sterilizing equipment, stopping reusing of unsterilized equipment, and administering appropriate and effective drugs to patients suffering from HAIs. Although private hospitals in Saudi Arabia were expected and assumed to be conducting hospital activities in a way that controls HAIs, there was a need to assess the extent to which these kinds of hospitals were adhering to the infection control program. This study, therefore, aimed at assessing the infection control program and practices in private care hospitals in Saudi Arabia.

Materials and Methods

Study design and setting

This was a cross-sectional study in private care hospitals in five regions of Saudi Arabia; central, western, eastern, northern, and southern regions of Saudi Arabia. From each region, three to four secondary private hospitals were chosen randomly, then those chosen hospitals' data were collected through a survey. Data was collected in six months.

Study Population and Inclusion Criteria

All private hospitals in five regions had doctors, nurses, and allied medical staff who are officially recognized by their licensing bodies. These doctors, nurses, and allied medical staff were eligible to be included in this study if they consented; those who did not consent were excluded from this study. Additionally, five private hospitals administrators among five regions, one from each region were interviewed using a yes/no survey.

Sample size and Sampling

The sample size of 704 participants was determined using the formula; $n= P (1-P) * Z\alpha^2 / d^2$ where n is the calculated sample size, p is expected proportion in population-based on previous studies, Z is the z-value for the selected level of confidence (95%), and d is absolute error or precision (0.05).[11] Each of the five regions, private care hospitals were treated as a stratum and a stratified sampling technique was employed to determine the sample size for each stratum. The southern region's private care hospitals contributed 46 doctors, 50 nurses, and 45 medical allied staff. The Eastern region's private care hospitals contributed 46 doctors, 50 nurses, and 45 medical allied staff 34 doctors, 26 nurses, and 38 medical allied staff. Western region's private care hospitals contributed 63 doctors, 44 nurses, and 45 medical allied staff. Central region's private care hospitals contributed 75 doctors, 77 nurses, and 66 medical allied staff. Northern region's private care hospitals contributed 32 doctors, 23 nurses, and 40 medical allied staff. In total, this study comprised 250 doctors, 220 nurses, and 234 medical allied.

Data Tool and Collection

A pre-selected and validated questionnaire by the Center of Disease Control (CDC)[12] was used to collect data for this study. This tool was participant-self-administered.

Ethical Approval

The Research Ethics Committee at Security Forces Hospital Program in Holy Capital (HAP-02-K-052) reviewed and approved conducting this research project. The approval number is ECM#0460-190122. Before, the participants filled in the questionnaires, they were requested to consent.

Data Management and Analysis

Data from all the collected questionnaires were entered in excel software, cleaned, and transported to SPSS v.22.0

software for analysis. Descriptive statistics were calculated for numerical variables. Cross-tabulation was used to measure Chi-square for the association where needed.

Results

As shown in figure 1, out of the 704 participants, 35% were doctors, 31% were nurses, and 34% were medical allied staff. The mean participants were 50±18.64, 44±21.74, 46.8±11.17 for doctors, nurses, and other allied medical staff respectively.

As shown in table 1, doctors, nurses, allied medical staff, and the administrators were asked questions based on their key job roles that were related to infection control. The questions were adopted from the already existing infection prevention and control assessment tool for outpatient settings.[12] The participants responded with "yes" or "no" to each of the questions. Considering the administrators' responses, all responses with "yes" were fewer than the responses with "no" apart from the responses from one region (Western). The "yes" responses from Western private hospitals were 65.3% but less than the 75% scores that would make them adherent to the infection control guidelines and practices to a reasonable percentage. Regarding the doctors' responses, all the responses with "yes" were more than those responses with "no." Almost all of these responses with "yes," were in the same score range across the five regional hospitals. However, all these scores were below 75%. The highest scores with "yes" were at western hospitals (65.6%).

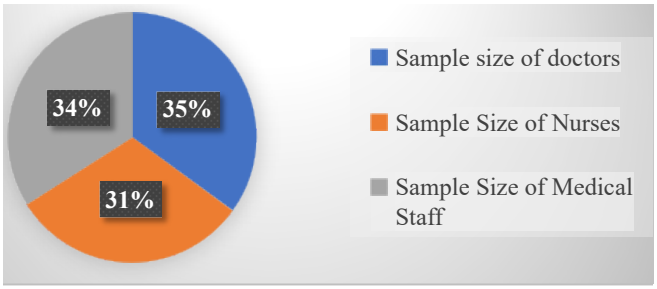

Fig. 1: Pie chart of Sample Sizes

Concerning the nurses' responses, only two regions (Western and central private hospitals) had scored with "yes" being more than the scores with "no." Nonetheless, all these scores with "yes" were less than 75% score which could be regarded as a reasonable score for standard adherence to infection control standards and guidelines. The highest scores with "yes" were at the Central region's private care hospitals (53.5%). Regarding the allied medical staff's responses, all the responses with "yes" were more than the responses with "no." Similarly, these responses with "yes" were less than the at least 75% standard. The highest responses with "yes" were registered at the Eastern region's private care hospitals (65.6%).

Discussion

According to the Center for Disease Control and Prevention (CDC), although HAIs are on a decline annually, their rate remains high.[13] The findings in this study resonate with this CDC observation. Information from the hospital administrators, doctors, nurses, and allied medical staff shows that there is a pursuit to practicing standards that control HAIs. However, this practice across the five region's private care hospitals was below 75% score which can be considered a reasonable score for a hospital to be implementing an effective infection control program. Research shows that implementing infection control programs is largely affected by knowledge, attitude, and compliance of the practitioners.[14,8] As knowledge and attitude increase, so does the implementation of infection control programs. However, these three aspects come in handy with knowledge and skills. Therefore, given the fact that the highest score was 65.6%, there is a need to provide refresher training on infection control for the hospital administrators, doctors, nurses, and allied medical staff.

The findings that all doctors and allied medical staff at the five centers scored more "yes" than "no" on all the questions compared to the nurses who scored more "yes" at only two centers and the administrators who scored more "yes" at only one center. Although the administrators are not necessarily health workers are required to know the standards for which

Table 1: Participants' total responses to the infection control questions.

Participant category	*Responses to questions*	*Southern region's private care hospitals*	*Eastern region's private care hospitals*	*Western region's private care hospitals*	*Central region's private care hospitals*	*Northern region's private care hospitals*
Administrators	Yes	33(46%)	36(50%)	47(65.3%)	32(44.5%)	31(43.05%)
	No	39(54%)	36(50%)	25(34.7%)	40(55.5%)	41(56.95%)
Doctors	Yes	659(62.3%)	500(63.7%)	971(65.6%)	1126(63.4%)	515(62.2%)
	No	399(37.7%)	285(36.3%)	509(34.4%)	650(36.6%)	313(37.8%)
Nurses	Yes	185(48.7%)	57(43.8%)	111(50.5%)	206(53.5%)	49(48.5%)
	No	195(51.3%)	73(56.2%)	109(49.5%)	179(46.5%)	52(51.5%)
Allied medical staff	Yes	906(62.8%)	1056(65.6%)	1188(62.8%)	1740(63.9%)	1052(62.6%)
	No	537(37.2%)	553(34.4%)	705(37.2%)	982(36.1%)	629(37.4%)

their hospitals operate, unfortunately, this isn't the case with the administrators at all the five region's private care hospitals. It's also very clear that the doctors, nurses, and allied medical staff are trained differently (although similarly) and accredited by different bodies. The difference in training and accreditation might be the reason for this observed difference. As such, training on infection control within the respective hospitals has to be designed and implemented for all the staff so that they are all on the same page. Pieces of training increase one's knowledge and subsequently their attitude toward the infection control practices, hence, complying with the infection control standards.[14] On the contrary, Brooks et al.[15] assert that training alone can never be sufficient to change people's behavior towards a program like infection control. However, these authors strongly believe that a recent training in infection control can have a significant association with short-term infection control outputs.

Apart from training, other factors that have been previously reported to affect compliance with the infection control program include the health worker's availability and perceived difficulty, effectiveness, inconvenience, discomfort, or impact on patient care.[15,16] It's, therefore, critical that hospital administrators get to know these barriers and plan appropriate mitigation measures across the five region's private care hospitals.

Different hospitals were observed to have different scores with "yes" for the administrators, doctors, nurses, and allied medical staff. The doctors and administrators at the Western region's private care hospitals had a higher score with "yes" compared to the same staff at other regions' private care hospitals. The highest score with "yes" for the nurses was observed at Central region's private care hospitals while the highest score with "yes" for the allied medical staff was observed at Eastern region's private care hospitals. These observations imply that different hospitals have different infection control program implementation strengths.[7,17] The staff from each of the hospitals can collaborate and capitalize on each other's strengths for the betterment of control of HAIs in Saudi Arabia.

Although this study shades light on the infection control program in Saudi Arabia, more rigorous studies are needed that can cater for the influence of socio-demographic characteristics on the implementation of infection control programs. A qualitative study might also be better than a quantitative study in capturing objective and exploratory data from the participants

Conclusion

Through this study, it's clear that the implementation of the infection control program across the five regions of private hospitals in Saudi Arabia is still wanting. Differences exist between the way administrators, doctors, nurses, and allied medical staff implement the infection control program. There is, therefore, a need to harmonize these differences as well as improve the practices around the prevention of HAIs across Saudi Arabia. Increasing the health workers' knowledge and attitude towards the required infection control practices will most likely change the status quo.

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