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Original Research Article

Assessment of knowledge, attitudes, and practices towards infection prevention among healthcare workers in Trinidad and Tobago

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ABSTRACT

Background: The objective of the study was assessment of knowledge, attitudes, and practices (KAP) towards infection prevention among healthcare workers (HCW) in Trinidad and Tobago.
Methods: A cross-sectional study was conducted among 300 HCWs from three regional hospitals in Trinidad and Tobago about their knowledge, attitude, and practice towards infection prevention in the country. All information's were collected through interview using structured questionnaires. The data was collected from April to June 2016; thoroughly checked and cleaned for completeness before analysis with SPSS version 20 statistical software. The 95% confident interval and the p value were used to check for association between the dependent and independent variables. A p value of <0.05 was considered statistically significant. Finally, the findings of the study were explained using tables.
Results: A total of 300 HCW participated in the study, with a 100% response rate. In this study only 20.3% respondents were knowledgeable, 46.7% had good attitude and 44% had good practices toward infection prevention, suggesting less than satisfactory scores in this study.
Conclusions: The results highlight generally poor knowledge, attitudes and practices towards infection prevention in the three hospitals in Trinidad and Tobago. Therefore, policies and measures should be put in place to ensure regular training programs for HCW, providing strong understanding and a positive outlook on infection prevention.

Keywords: Infection, Prevention, Healthcare workers, Trinidad and Tobago

INTRODUCTION

Health care workers (HCW) are constantly exposed to pathogenic microorganisms. Many of which can cause severe or even lethal infections.[1] Workplaces are the focal point for practical occupational health activities.[2] Recent researches propose that the burden of health care associated infections (HCAIs) are disproportionally more resource limited hospital settings and estimated to be two to twenty times that of developed countries.[3-5] One of the major reasons for these high rate HCAIs is the lack of infection control programs, which have been neglected due to limited resources, competing priorities, and other barriers.[3]

Several studies have shown varying trends in knowledge about infection control based on a group of HCW and their years of experience.[6,7] Recent literatures also found differences in terms of actual knowledge of infection transmission and control, its understanding and application by HCW.[8,9] Internationally, it is crucial that effective infection prevention strategies associated with health care are implemented in order to achieve optimum response to disease outbreaks and by extension overall

patient care and protection of HCWs from occupational risk of contracting diseases.

Healthcare-acquired infections (HCAIs) are significant causes of morbidity and mortality among hospitalized patients worldwide. In 2009 World Health Organization (WHO) launched the global patient safety challenge: clean care is safer care campaign.[10] A cornerstone of the program is to decrease HCAIs through improving hand hygiene among healthcare workers. This campaign has outlined a framework for adherence of safety measures measure to reduce HCAIs.[11,12] HCWs are always exposed to potential hazards, particularly infections from contagious patients but risks can be decreased by strict adherence to infection prevention protocol. It is emphasized however that the successful application of infection prevention and control strategies is dependent on the knowledge, attitudes and practices of HCWs.

The emanation of severe infections like SARS and re-emerging infectious diseases such as tuberculosis have reiterated the necessity of effective infection control programs in all healthcare facilities. HCWs should be aware that patient blood or bodily fluids are hazardous and can result in infections regardless of the patient's state of health. Along with standard precautions, additional procedures that are required based on the mode of disease transmission (e.g. direct/indirect contact, droplet or air) should be followed.

A recent study in Jamaica highlights that though the healthcare workers are aware of the risk of transmission of infection, the compliance with universal precautions was inadequate and recommended a need for an improvement in knowledge and practice with clear guidelines and a comprehensive programme to educate HCWs regarding compliance with universal precautions.[13]

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.[3] This study was designed to assess the KAP status of infection prevention among HCWs, and to have a better understanding of the possible areas for improving infection prevention strategies and practices in Trinidad and Tobago.

METHODS

Study setting and design

This study was a cross sectional study conducted among the HCWs of three public hospitals in Trinidad and Tobago.

Study population

The study population were 300 HCW from three of the five regional general hospitals from Trinidad and Tobago.

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 were entered into Epi-info to check and manage the data, and finally analysed with statistical package for social sciences (SPSS) statistical software version 20. Then, study findings explained in words, tables and other statistical summary techniques. Proportion for categorical variables compared using chi-square test. In all cases p value less than 0.05 was taken as statistically significant.

Ethical consideration

This study was conducted after obtaining approval from the Institutional Ethical committee of the University of the West Indies, St. Augustine Campus, Trinidad and Tobago**.** Consent was obtained from all participants in the study after permission was granted by the hospital administration of the study sites.

RESULTS

Socio-demographic characteristics among healthcare workers

From the three hospitals, a total of 300 HCWs participated in this study. As shown in Figure 1, the response rate was 100%. The majority of the respondents (118, 39.3%) were between the ages of 21-25. Four (1.3%) were less than 20 years old, and 32 participants (10.7%) were aged 26-30. Fifty seven (19%) were 31-35 years, 41 (13.7%) were 36-40 years old and 48 (16%) of the health care workers were more than 40 years old. The majority of participants were female, comprising of 231 (77%) HCWs, while 69 (23%) were male. The majority of workers (108) were Black/African Trinidadian, with the second highest ethnic group being Indo Trinidadians (92). The workers of mixed heritage made up the third major ethnicity that worked in the three hospitals were 70. The majority of respondents (179) were University graduates, 113 obtained a diploma, while 8 workers had a master's degree or above as their educational status. Among these HCWs, 17% have been working for less and a year, 43% for 1-5 years, 21% for 6-10 years, 9.7% for 11-15 years, and 9.3% for more than 16 years.

Most workers (72.7%) were aware that there is a manual on infection prevention and control policies and guidelines in Trinidad and Tobago (Table 1). However, only 51.3% of workers are aware that disinfection prevents hospital acquired infection, while only 53.7%

are aware that antiseptic prevents hospital acquired infection. 61.3% did not know that sodium hypochlorite, in its stock form, is not effective. 65% and 62.7% of HCWs did not know chemical and physical sterilization respectively; and are to be used on all equipment in the hospital setting. 75.3% 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.

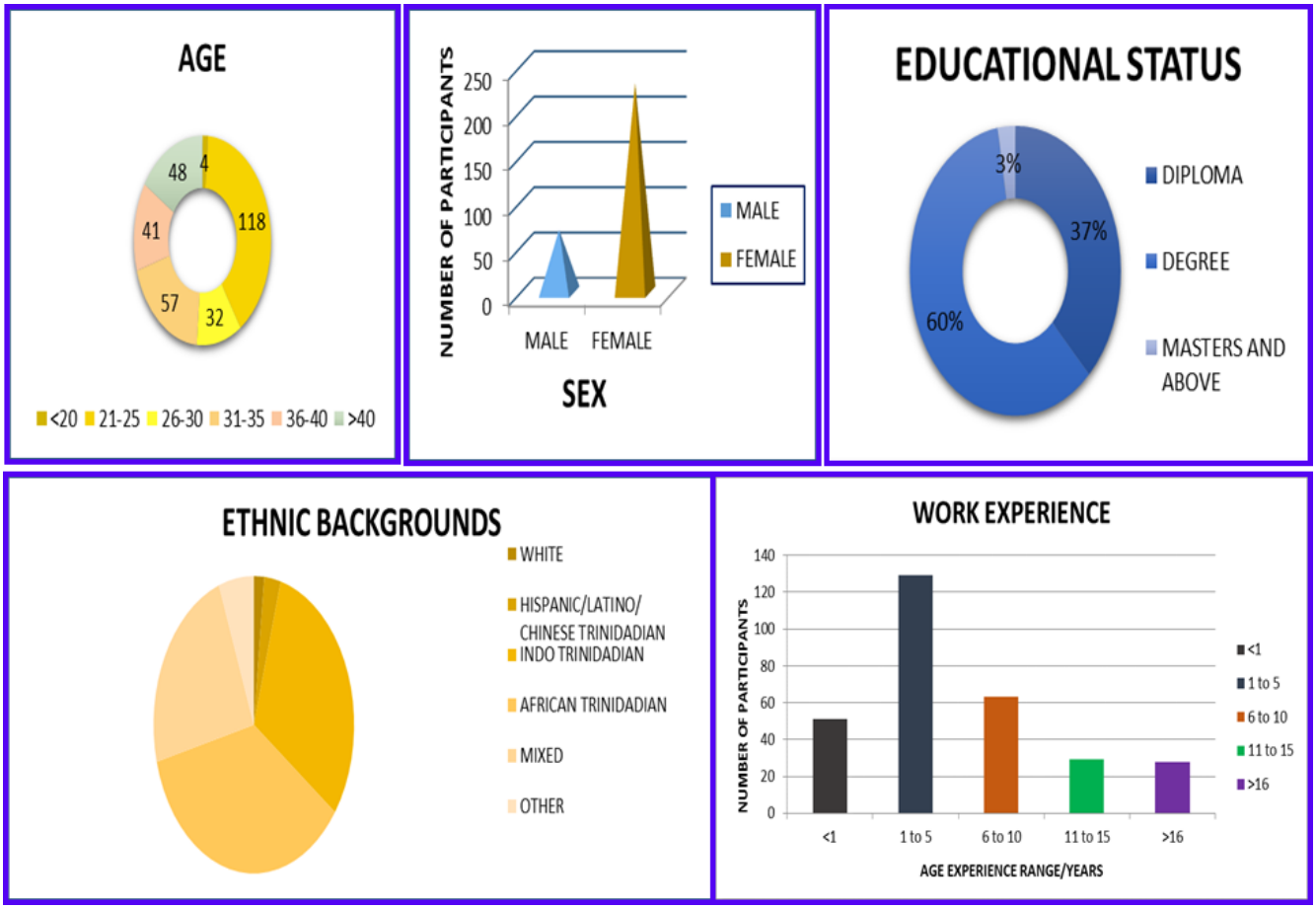

Figure 1: Socio-demographic characteristics of the study participants (age, sex, educational status, ethnic background and work experience).

To assess the knowledge of the HCW in these three hospitals, a total of 12 questions were asked in this study. 239 (79.7%) of the medical workers had no knowledge of about infection control and prevention measures. Overall, study participants had a negative response (<70%) to knowledge related questions. There is no significance between age, gender, educational status and work experience, and their knowledge ($p>0.05$). However there was a significant association between ethnicity and knowledge ($p<0.05$) (Table 4).

Attitude of healthcare workers on infection prevention and control

In all three hospitals, 87.7% of HCWs agree that a new pair of gloves should be worn for each new patient attended (Table 2). 86% agree that following standard operation procedures decrease the risk of contamination. 32.3% agree that using 10% sodium hypochlorite for 10 minutes is adequate to decontaminate equipment. 56.7% of workers agree that vaccination decreases hospital

acquired infection, while only 45.7% agree that prophylaxis decreases infections in hospitals. The majority (83.3%) of HCWs agree that maintaining personal hygiene decreases risk of contamination. Additionally, most (76.3%) 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. The responses or findings are depicted in Table 4 and showed that 140 (46.7%) of the workers had a positive attitude towards infection prevention, while, 160 (53.3%) of workers did not have a good attitude. Overall, they had a negative response (<70%) to attitude related questions. As per the socio-demographic variables, this study showed that there is no significant

association between age, sex and educational status with attitude (p>0.05). However, there was significant association between ethnicity and work experience with attitude (p<0.05).

Practices of healthcare workers on infection prevention and control

As revealed in Table 3, 86.3% of HCWs always wash their hands with soap and water after taking a sample, while 83.1% wash their hands immediately after coming in contact with blood and body fluids. 94% dispose of sharp materials in a safety box and 95.7% of workers dispose of used needles in its designated bin. 52% never recap their needles after use. 67.3% 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. The findings in Table 4 showed that, 132(44%) of workers had good practices, while 168 (56%) of workers did not have good practices. Overall, they have a negative response (<70%) to practice related questions. There was no significant association between socio-demographic variables with their practices (p>0.05).

Table 1: Knowledge on infection prevention among healthcare workers.

Question	Responses	Frequency (%)
6. Are you aware that there is a manual listing the infection prevention and control policies and guidelines for health care workers in Trinidad and Tobago?	Yes	218 (72.7)
	No	55 (18.3)
	I Don't Know	27 (9.0)
7. Does disinfection prevent hospital acquired infection?	Yes	154 (51.3)
	No	119 (39.7)
	I Don't Know	27 (9.0)
8. Does antiseptic prevent hospital acquired infection?	Yes	161 (53.7)
	No	112 (37.3)
	I Don't Know	27 (9.0)
9. Is the chemical sterilization technique used for all equipment?	Yes	59 (19.7)
	No	195 (65.0)
	I Don't Know	46 (15.3)
10. Are physical sterilization (heat and radiation) techniques employed for all equipment used?	Yes	47(15.7)
	No	188 (62.7)
	I Don't Know	65 (21.7)
11. Do you believe that all microorganisms including spores are destroyed by autoclaving?	Yes	122 (40.7)
	No	108 (36.0)
	I Don't Know	70 (23.3)
12. Is sodium hypochlorite effective in stock form?	Yes	66 (22.0)
	No	50 (16.7)
	I Don't Know	184 (61.3)
13. Does all equipment need decontamination before sterilization?	Yes	172 (57.3)
	No	61 (20.3)
	I Don't Know	67 (22.3)
14. Does protective clothing minimize hospital acquired infection?	Yes	226 (75.3)
	No	48 (16.0)
	I Don't Know	26 (8.7)
15. Does the proper handling of working equipment decrease the risk of contamination?	Yes	252 (84.0)
	No	27 (9.0)
	I Don't Know	21 (7.0)
16. Did you know that there is a post exposure prophylaxis for HIV?	Yes	201 (67.0)
	No	36 (12.0)
	I Don't Know	63 (21.0)
17. Do you believe that drug resistant microorganisms are restricted to health institutions?	Yes	62 (20.7)
	No	170 (56.7)
	I Don't Know	68 (22.7)

Table 2: Attitude towards infection prevention among healthcare workers.

Question	Responses	Frequency (%)
18. Do you think that a new pair of gloves should be used for each new patient visiting the hospital?	Agree	263 (87.7)
	Intermediate	32 (10.7)
	Disagree	5 (1.7)
20. Do you believe that following standard operation procedures decreases the risk of contamination?	Agree	258 (86.0)
	Intermediate	36 (12.0)
	Disagree	6 (2.0)
21. Do you believe that decontaminating equipment with 10% sodium hypochlorite for 10 minutes is enough?	Agree	97 (32.3)
	Intermediate	151 (50.3)
	Disagree	52 (17.3)
23. Do you think that vaccination decreases hospital acquired infection?	Agree	170 (56.7)
	Intermediate	75 (25.0)
	Disagree	55 (18.3)
24. Do you think that prophylaxis decreases hospital acquired infection?	Agree	137 (45.7)
	Intermediate	124 (41.3)
	Disagree	39 (13.0)
25. Do you believe that keeping proper personal hygiene decreases the risk of contamination?	Agree	250 (83.3)
	Intermediate	37 (12.3)
	Disagree	13 (4.3)
26. Do you believe that overcrowding of the working area increases transmission of infection?	Agree	263 (87.7)
	Intermediate	33 (11.0)
	Disagree	4 (1.3)
28. Do you think that an increased workload increases the risk of hospital acquired infections?	Agree	205 (68.3)
	Intermediate	65 (21.7)
	Disagree	30 (10.0)
29. Do you think that a patient's awareness about transmission of microorganisms decreases the risk of hospital acquired infection?	Agree	229 (76.3)
	Intermediate	56 (18.7)
	Disagree	15 (5.0)

Table 3: Practices associated with infection prevention among healthcare workers.

Question	Responses	Frequency (%)
31. Do you wash your hands with soap and water after taking a sample?	Always	259 (86.3)
	Sometimes	35 (11.7)
	Never	6 (2.0)
32. Do you wash your hands immediately when you come into contact with blood, body fluids or contaminated items?	Always	272 (83.1)
	Sometimes	23 (7.7)
	Never	5 (1.7)
33. Do you discard sharp materials in a safety box?	Always	282 (94.0)
	Sometimes	11 (3.7)
	Never	7 (2.3)
35. Do you discard needles in the sharp bin?	Always	287 (95.7)
	Sometimes	11 (3.7)
	Never	2 (0.7)
37. Do you wear goggles to protect your eyes during procedures that generate spray of blood or body fluids?	Always	133 (44.3)
	Sometimes	69 (23.0)
	Never	98 (32.7)
39. Do you wear a mask during sputum sample collection and processing?	Always	159 (53.0)
	Sometimes	80 (26.7)
	Never	61 (20.3)
41. Do you recap needles before disposal?	Always	54 (18.0)
	Sometimes	90 (30.0)
	Never	156 (52.0)
42. Do you wear a gown properly for every procedure?	Always	119 (39.7)
	Sometimes	156 (52.0)

	Never	25 (8.3)
43. Do you cover wounds and cuts on your skin before you start your work?	Always	229 (76.3)
	Sometimes	60 (20.0)
	Never	11 (3.7)
44. Are you vaccinated for common pathogens (e.g. Influenza virus, Hepatitis virus, etc.)?	Always	184 (61.3)
	Sometimes	85 (28.3)
	Never	31 (10.3)
46. Do you eat or drink in your work area?	Always	70 (23.3)
	Sometimes	140 (46.7)
	Never	90 (30.0)
47. Have you ever had a needle stick injury?	Yes	98 (32.7)
	No	202 (67.3)

Table 4: Association of socio-demographic variables with knowledge, attitude and practice of healthcare workers.

Category	Having knowledge (%)	Having no knowledge (%)	X^2 (p value)	Having good attitude (%)	Not having good attitude (%)	X^2 (p value)	Having good practice (%)	Not having good practice (%)	X^2 (p value)
1. Age									
<20	1 (0.33)	3 (1.0)	0.892	0 (0.0)	4 (1.3)	0.076	1 (0.33)	3 (1.0)	0.107
21-25	25 (8.33)	93 (31.0)		49(16.3)	69 (23.0)		46 (15.3)	72 (24.0)	
26-30	4 (1.3)	28 (9.3)		16(5.3)	16 (5.3)		9 (3.0)	23 (7.7)	
31-35	13 (4.3)	44 (14.7)		25 (8.3)	32 (10.7)		30 (10.0)	27 (9.0)	
36-40	9 (3.0)	32 (10.7)		20 (6.7)	21 (7.0)		22 (7.3)	19 (6.3)	
>40	9 (3.0)	39 (13)		30 (10.0)	18 (6.0)		24 (8.0)	24 (8.0)	
Total	61 (20.3)	239 (79.7)		140 (46.7)	160 (53.3)		132 (44.0)	168 (56.0)	
2. Gender									
Male	10 (3.33)	59 (19.7)	0.170	29 (9.7)	40 (13.3)	0.379	36 (12.0)	33 (11.0)	0.119
Female	51 (17.0)	180 (60.0)		111 (37.0)	120 (40.0)		96 (32.0)	135 (45.0)	
Total	61 (20.3)	239 (79.7)		140 (46.7)	160 (53.3)		132 (44.0)	168 (56.0)	
3. Ethnicity									
White	1 (0.33)	4 (1.33)	0.005	2 (0.7)	3 (1.0)	0.00	2 (0.7)	3 (1.0)	0.057
Hispanic/Latino/ Chinese Trinidadian	0 (0.0)	8 (2.7)		2 (0.7)	6 (2.0)		1 (0.3)	7 (2.3)	
Indo Trinidadian	22 (7.3)	70 (23.3)		51 (17.0)	41 (13.7)		44 (14.7)	48 (16.0)	
Black or African Trinidadian	20 (6.7)	88 (29.3)		39 (13.0)	69 (23.0)		51 (17.0)	57 (19.0)	
Mixed	9 (3.0)	61 (20.3)		33 (11.0)	37 (12.3)		23 (7.7)	47 (15.7)	
Other	9 (3.0)	8 (2.7)		13 (4.3)	4 (1.3)		11 (3.7)	6 (2.0)	
Total	61 (20.3)	239 (79.7)		140 (46.7)	160 (53.3)		132 (44.0)	168 (56.0)	
4. Educational status									
Diploma	16 (5.3)	97 (32.3)	0.074	44 (14.7)	69 (23.0)	0.113	55 (18.3)	58 (19.3)	0.207
Degree	42 (14.0)	137 (45.7)		92 (30.7)	87 (29.0)		72 (24.0)	107 (35.7)	
Master's degree and above	3 (1.0)	5 (1.7)		4 (1.3)	4 (1.3)		5 (1.7)	3 (1.0)	
Total	61 (20.3)	239 (79.7)		140 (46.7)	160 (53.3)		132(44.0)	168 (56.0)	
5. Work experience									
<1 year	9 (3.0)	42 (14.0)	0.547	17 (5.7)	34 (11.3)	0.027	21(7.0)	30 (10.0)	0.885
1-5 years	23 (7.7)	106 (35.3)		54 (18.0)	75 (25.0)		54(18.0)	75 (25.0)	
6-10 years	16 (5.3)	47 (15.7)		38 (12.7)	25 (8.3)		30(10.0)	33 (11.0)	
11-15 years	5 (1.7)	24 (8.0)		16 (5.3)	13 (4.3)		13(4.3)	16 (5.3)	
>16 years	8 (2.7)	20 (6.7)		15 (5.0)	13 (4.3)		14(4.7)	14 (4.7)	
Total	61 (20.3)	239 (79.7)		140 (46.7)	160 (53.3)		132(44.0)	168 (56.0)	

DISCUSSION

We set out to 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 in Trinidad and Tobago. In this KAP assessment study conducted at three regional hospitals in Trinidad, we made an overall observation of poor level of knowledge, attitude and practices among participants. This was an alarming observation and calls for a need to take appropriate steps to address this gap.

We asked several questions on the knowledge, attitudes and practices in this study. Overall, the knowledge on infection prevention among HCWs was very poor (20.3%), that is, less than 70%. However, expounding on the data obtained from the questionnaires, 218 (72.7%) participants knew about the manual listing of the infection prevention and control policies and guidelines for health care workers in Trinidad and Tobago, 226 (75.3%) participants knew that protective clothing minimized hospital acquired infection and 252 (84%) participants knew that proper handling of working equipment decreased the risk of contamination. These findings are consistent with similar studies done in Nigeria, where 91.6% of participants were knowledgeable about policies and guidelines regarding infection prevention and control.[14] Their knowledge about policies and guidelines, however, only showed that the healthcare workers knew about the policies, it did not mean that everything in those policies were implemented. Poor implementation could be as a result of a great workload, time constraints or poor training.

In this study, only 201 (67%) 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. In addition, of this 95%, 84% of participants knew that it should commence within 24 hours of injury for optimal effectiveness.[13] As a result, this would suggest that health care workers in Trinidad are more susceptible to infection as opposed to those in Jamaica.

Less than half of the participants (46.7%) in this study had an affirmative attitude towards infection prevention, highlighting the poor attitude of HCWs overall. This finding is lower than that of a study conducted in Bahir Dar (Ethiopia) in which 55.6% of participants had a positive attitude to infection prevention.[15] 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/using an alcohol-based hand sanitizer.[16] Despite the fact that 258 (87.7%) respondents believed that following standard operation procedure decreases the risk of contamination, only 97 (32.3%) respondents agreed that using 10% sodium hypochlorite for 10 minutes is sufficient to decontaminate equipment.

In general, HCWs displayed substandard practices towards infection prevention, with only 44% of participants having good practices to prevent hospital acquired infections and contamination. 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 29% of physicians along with 25% of nurses responded that there was no need to carry out any form of hand hygiene prior to conducting procedures that did not involve bodily fluids.[17]

When asked if goggles are always worn during procedures that generate blood or body fluids, only 44.3% of HCWs said they practice this. This is due to the lack of available supplies, which was also found when conducting the questionnaire as many respondents commented on not being able to obtain such 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.[14] We assume that our data in this study are imperative in convincing hospital management to advance in maintaining a safe working environment for HCWs, changes in infection control measures must be a top priority for hospital administrators and leaders in the Ministry of health.[18]

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. Akpaka et al have reported or delineated that methicillin resistant *Staphylococcus aureus* (MRSA) and vancomycin resistant *Enterococci* (VRE) infections have occurred intra and between these regional hospitals where the current analysis were performed.[19,20] We could hypothesize that these infections by these organisms could have been spread from one patient or HCW to another patient or HCW because of their poor KAP of infection control measures.

CONCLUSION

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 in Trinidad 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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