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A cross sectional study on the cross contamination through white coats

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Abstract--White coats are known to be potential transmitting agents of microorganisms including multi-drugs resistant organisms. Most studies that advocate this viewpoint analyzed cross sectional based on results taken from the white coats in the hospitals. Far less is known about the acknowledgement of the community regarding this issue and the effect on their thoughts of handling it. This study is conducted mainly to find out the public's awareness on the cross contamination through white coats. Furthermore, the purpose of this study is to investigate the association between the sociodemographic factors (age, gender, ethnicity, education levels etc.) with the awareness status regarding cross contamination of the white coats among public respondents. Other than that, this study helps in determining the best way to reduce cross contamination through white coats. This information may be useful to Public Health Malaysia.

Keywords---Cross-contamination; White coats; Awareness; Association.

Introduction

The white coats are worn primarily for identification as well as it is associated with standard of professionalism and caring. It is also an emblem of the trust doctors must earn from patients. The white colour was specifically chosen to associate physicians with purity and cleanliness.

White coats are not only worn by the physicians but so do the laboratory assistants and the medical students. As there is no changing area in the hospital or clinical areas, it is not uncommon to see white coats left on chairs or carried around the hospital compound (Muhadi et al., 2007).

Over the past 2 decades however, the white coat has become highly debated with regards to its capacity to harbour and spread infectious diseases. Study has shown that the white coats are known to be potentially transmitting pathogenic bacteria in hospital settings. (Zachary et al., 2001; Chacko et al., 2003; Burden et al., 2011; Burden et al., 2013; Robati et al., 2013). While various study have reported that the *Staphylococcus Aureus* is the predominant microorganism, *Pseudomonas Aeruginosa* and *Escherichia Coli* were also identify in some cases (Qaday et al., 2015; Treacle et al., 2009; Siva et al., 2015).

Further evidence shows that pathologic microbes, particularly resistant strains can be isolated on parts of the white coat and suggest that the coats might act as a vector for patient-to-patient transmission (Treacle et al., 2009).

It is the interest of this study to determine whether the whitecoats are safe to be utilized among the medicinal services experts in the clinic setting and to assess people's mindfulness of the cross tainting through white coats. The possibility and the degree of pathogenic bacteria contamination in parts of the white coats as well as identifying possible precautions that are to be taken in order to prevent the risk of transmitting the agents in the hospital setting was also investigated.

Method

1.1 Background

This study was conducted on public visitors of Melaka General Hospital, Malaysia. It is the largest government hospital located in Melaka City. The hospital serves as a tertiary care and a referral centre for patients from primary and health centres in the state as well as the northern part of Johor and the Tampin district of Negeri Sembilan. Providing effective and efficient expertise in multidisciplinary care for both inpatient and outpatient, this hospital also serves as the main teaching hospital for a few universities namedly Cyberjaya University, Melaka Manipal Medical College, Melaka Nursing School etc.

There are two main buildings which were connected with a bridge, that locate the wards, operation theater, emergency and trauma, laboratory, clinics and pharmacy. Up until December 2017, there are a total of 1,420 beds. The hospital is open for 24 hours however there is a strict guideline

regarding the visiting hours. Time allocated to visit patients in any wards is from 1.00 p.m to 2.00 p.m and from 5.00 p.m to 7.00 p.m.

1.2 Participants

80 public visitors were randomly selected based on the inclusion criteria, of which 41.3% were males and 58.8% were females. All of the visitors were the visitors of outpatient and inpatient wards of Melaka General Hospital. All the visitors were asked to read the consent form and permission was granted to conduct the study.

1.3 Procedure

A structured interview manner whereby the interviewer asked the interviewee a series of questionnaires was used to collect demographic data and information on the awareness regarding cross contamination through white coats. The first part of the questionnaire is meant to collect the demographic datas including age, gender, ethnicities, religion, marital status, occupation, and education level.

The second part of the questionnaire consists of the frequency of going to hospital for the past 12 months (never, once, more than once), whether the respondents has seen someone wearing white coat in the hospital (yes, no), the reason why they think medical practitioner need to wear white coat (professional image, ease of identification, hygiene purpose, neatness, tradition, display of self confidence), what type of white coat they prefer for medical practitioner to wear (short-sleeve white coat, long-sleeve white coat), whether they are aware of cross contamination through white coat (yes, no), which part of the white coat contribute the most in cross contamination (mouth of the pocket, handcuff, others), and they get to choose the best way to control cross contamination through white coat (have more than one white coat, wash white coat regularly, wear in the hospital compound only, do not wear white coat at all).

The data were analysed by using Statistical Package for the Social Sciences (SPSS) data analysis software. The following analyses were done on the data set,

- i) the prevalence of public's awareness on the cross contamination through white coats,
- ii) correlation analysis between sociodemographic data and awareness on the cross contamination through white coats,
- iii) the best ways to prevent cross contamination through white coats.

Statistical Analysis

Chi square test was used to analyse the association between gender and awareness regarding cross contamination through white coats with significance level of $P < 0.05$ was employed.

Fisher exact test was also employed to determine the association between education level and awareness among the public on cross contamination through white coats. The significance level of $P < 0.05$ was applied.

Results

4.1 Awareness Regarding Cross Contamination

Table 1: The Prevalence of Public's Awareness on The Cross Contamination Through White Coats

Awareness	Number of Respondent (n)	Prevalence (%)
Yes	38	47.5
No	42	52.5
Total	80	100.0

The prevalence of respondents who are aware of cross contamination through white coats is 47.5%

Table 2: The Way To Control The Cross Contamination Through White Coats

Ways To Control	No of Respondent (n)	Total (%)
Have more than one white coat	18	22.5
Wash white coat regularly	40	50.0
Wear in the hospital compound only	11	13.8
Do not wear white coat at all	11	13.8
Total	80	100.0

The best way to control cross contamination through white coat is by washing white coat regularly (50.0%), followed by having more than one white coat

(22.5%), wear in the hospital compound only (13.8%), and do not wear white coat at all (13.8%).

4.2 Correlation Between Sociodemographic Factors and Awareness Among Public

Table 3: Association Between Gender and Awareness Among Public

Gender	No of Respondent (%)		p-Value
	Yes	No	0.033
Male	13.8	27.5	
Female	33.8	25.0	
Total (%)	47.5	52.5	

This table shows the association between gender and awareness regarding cross contamination through whitecoats, the highest prevalence of awareness is among the females (33.8%). The p-value is <0.05 , so there is an association between gender and awareness regarding cross contamination through white coats.

Table 4: Association Between Education Level and Awareness Among Public

Education Level	No of Respondent (%)		p-Value
	Yes	No	0.001
School Level	12.5	33.8	
College Level	35.0	18.8	
Total	47.5	52.5	

This table shows the association between education level and awareness regarding cross contamination through whitecoats. The highest prevalence of awareness is among the college level (35.0%). The p-value is <0.05 , so there is an

association between education level and awareness regarding cross contamination through white coats.

Discussion

1. Association Between Gender and Awareness Among Public

From the result, there is an association between gender and awareness regarding cross contamination through white coats, the highest prevalence of awareness is among the females which is 33.8%. There is a proof for an association between gender and awareness regarding cross contamination through white coats as the p-value is less than 0.05.

Findings from our study showed that female respondents had the highest level of awareness at 33.8% while the male respondents had a level of awareness at 13.8%. In comparison to the previous study done by Muhadi S.A et al, 48.9% of students thought that white coats are always contaminated while 41.9% considered it completely clean if there was no stain on it and the remaining 9.2% thought it is considered clean if the collar and pockets are clean.

The male respondents were found to have less awareness among medical practitioners regarding the possibility of white coats becoming a reservoir for pathogens. This is probably because there are other significant factors such as visitors that have high potential to carry deadly pathogens from outside can spread it while in contact with the patients. Furthermore, white coats should only be worn while in the hospital settings especially in the wards and clinics. So, the possibility of carrying the pathogens from outside is low.

According to a research study done by Reza Robati (2013), out of 32 white coats which belonged to the male subjects, 20(62.5%) were contaminated, while 13(72.2%) white coats out of 18 white coats which belonged to the female subjects were contaminated. Even though females have more awareness regarding the cross-contamination through white coats but they are still the highest by percentage whose white coats are contaminated compared to the males.

2. Association Between Education Level and Awareness Among Public

From the result, there is an association between education level and awareness regarding cross contamination through white coats which the highest prevalence of awareness is among the college level respondents of 35.0%. There is a significant association between education level and awareness regarding cross contamination through white coats as the p-value is less than 0.05.

According to our study 35.0% of respondents from the college level are aware that white coats are a possible vehicle for cross contamination, compared to 12.5% of respondents who are at school level. This is supported by a study done by Rashmi Rai (2016), among undergraduates and postgraduates dental students, 52.5% students believed that white coats are a potential source for spreading infection. Another study done by Trupti Naik (2016), among second year medical students in India showed that 83.3% of the students believed that white coat can be a

potential transmitting agent for pathogens. While other study done among private medical school students in Perak, Malaysia by Muhadi (2007), revealed that 85.8% thought that white coats carry germs and 89.4% believed that white coats can be potential transmission vehicles for pathogens.

From this limited study, it provides evidence of high association between education level and the level of awareness. In tertiary institutions, the intellects have better understanding, greater exposure toward the environment as well as concern with the surrounding. On the other hand, those from lower educational backgrounds may have otherwise. Beerli et.al demonstrate that with higher education level improved the understanding of one's disease. Balkhy et.al. similarly reported that higher levels of education and older participants and males are more concerned and aware regarding the H1N1 disease. These findings were also supported by study results presented in *Journal of Health Psychology* that higher education was associated with higher self efficacy and health consciousness.

As the results revealed that there were significant gaps in the public's awareness about the white coats as a transport for pathogens, it is advisable that the both parties should take precautions. One's should initiate and increase awareness among the public regarding this issue, meanwhile the medical practitioners that used white coats daily should maintain good white coat hygiene in regards of reducing the cross contamination from one patient to another and eventually eradicate its transmission.

Conclusion

This study shows that only 47.5% of the public are aware that white coats can cause cross-contamination. Majority of the public was not aware of this matter. There is also an association between socio-demographic factors with the awareness status regarding cross-contamination of the white coats among public respondents. This information can be used to spread awareness among the public and discuss more on the intervention that can be done to control the cross-contamination through white coats.

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