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Research Article

Assessment of Infection Prevention and Control Practices among Medical Students of a Medical College in Chengalpattu District, Tamil Nadu

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A B S T R A C T

Introduction: The incidence of healthcare-associated infections (HCAIs) and their complications has been known for several years. The only way to reduce HCAI rates, and to improve the knowledge of standard precautions and abidance among doctors is by incorporating infection prevention and control (IPC) measures in the curriculum of medical students.

Objective: To determine the knowledge and practice of infection prevention and control measures among medical students.

Materials and Method: This cross-sectional study was conducted among 146 medical students in the 2nd, 3rd, and 4th year of their MBBS in a private medical college, Chengalpattu, Tamil Nadu. Students were asked to fill a pretested semi-structured questionnaire comprising questions on socio-demographic details, knowledge and practice on hand hygiene and standard precautions, cough etiquette and respiratory hygiene, and personal protective equipment usage. The collected information was analysed using SPSS software version 21.0.

Results: 134 students had adequate knowledge about the standard precautions and hand hygiene, 143 had adequate knowledge of cough etiquette and respiratory hygiene and 115 had adequate knowledge about the use of personal protective equipment. Only 21 students always followed all 8 steps of hand-washing, and 46 students followed proper donning and doffing instructions. Female students were found to have adequate knowledge of precautions and hand hygiene.

Conclusion: It is clear from the study that students' knowledge about IPC measures is adequate but their practice is not satisfactory which can be improved by conducting practical sessions and workshops on IPC and multilateral strategies approach.

Keywords: Infection Prevention, Medical Students, Healthcare-Associated Infections

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Introduction

The infections that are acquired while getting healthcare, are developed in a hospital or other healthcare facilities within 48 hours or more after hospital admission, or within 30 days after having obtained the healthcare.[1] According to CDC, among 31 patients in a hospital and 43 nursing home residents, one acquires hospital-acquired infection (HCAI).[2] The incidence of HCAIs and undesirable complications due to them have been known for several years. During the course of healthcare treatment, HCAIs occur unanticipated and result in significant patient sickness and decease (morbidity[3] and mortality[4]), prolonged stay in the hospital,[5] and bring the burden of need for extra diagnostic and therapeutic procedures, which indeed add additional expenses to those already smitten by the patient's underlying illness. Hence HCAIs are considered dreadful. As they are preventable, their incidence is recognised as an indicator of the quality of patient care.[6] HCAIs are seen in both developed and developing countries indicating some lacunae in the entire healthcare system. Hence CDC has been conducting surveillance, along with investigations and research on the outbreak and prevention of HCAIs. Knowledge incurred through these activities is used to detect infections and also to develop new strategies to prevent HCAIs. The top priority of the US Department of Health and Human Services (HHS) is the prevention and diminution of HCAIs. In July 2008, the HHS Steering Committee for the Prevention of HCAIs was constituted. The committee, along with its scientists and programme officials, formulated the HHS Action Plan to prevent HCAI, by pioneering a road map for HCAI prevention in acute care hospitals.[7] It has been observed that proper use of these standard precautions and guidelines can significantly crimp the occupational exposure to blood thereby decreasing the incidence of HCAIs.[8] Despite this careful and elaborate road map, the knowledge and practice of these standard precautions and abidance among doctors are inadequate, even in developed countries.[9] The only way to reduce HCAI rates and improve the required knowledge and practice is by incorporating infection prevention and control measures in the curriculum of medical students. The undergraduate medical education is the formative phase and the most befitting period for acquiring the necessary knowledge and skills.[10] This fact has been established in several other similar studies also. Good knowledge and hygienic practice among students will indicate a better curriculum. A better curriculum can bring a change in HCAIs. Hence this study aims to assess the students' knowledge and practice of IPC measures.

Methodology

Study Design: Descriptive cross-sectional study was used.

Study Population and Site: Medical students in a private medical college in Chengalpattu, Tamil Nadu.

Inclusion Criteria

2nd, 3rd and final year MBBS students studying in the private medical college of Chengalpattu, Tamil Nadu.

Exclusion Criteria

The students who were not approachable even after three attempts.

Study Duration: 8 weeks from July 2021 to August 2021.

Sample Size Determination

According to a study by Sugathan S et al.[11] on awareness, attitude and practice of infection control among clinical year medical students of a private medical school in Malaysia, 66.7% of the students had good knowledge of infection control measures. Considering this as the prevalence with 95% confidence interval, allowable error of 8% and non-response rate of 10%, the sample size was obtained as 146.

Sampling

After enlisting the 2nd, 3rd and final year MBBS students in the college, 146 students were selected through simple random sampling.

Study Tool

After obtaining informed consent from the students, infection prevention and control measures were assessed using a semi-structured pretested questionnaire. The questionnaire was framed with the help of former literature to include key areas of IPC guidelines, including standard precautions and hand hygiene, cough etiquette and respiratory hygiene, and personal protective equipment usage.

The knowledge part of the questionnaire was evaluated to know the adequacy of knowledge among them. A score of 1 was given for the right answers and a score of 0 was awarded for the wrong answers. Each section in the knowledge part had five questions. A score of 3 and above in the section corresponded to adequate knowledge in that section. The practice part of the questionnaire had Likert scale questions with options such as never, rarely, sometimes, mostly and always.

Ethical Committee Approval

Approval was obtained from the Institutional Human Ethics Committee prior to collecting data.

Data Collection

Each student was approached directly and was explained about the study. After getting informed consent, the semi-structured questionnaire was filled by the investigator through the interview method.

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Data Entry and Analysis

The collected data were entered in Microsoft Excel and analysed with the help of SPPS software version 21.0. Qualitative variables were expressed in proportions and quantitative variables in mean (SD)/ median (IQR). Chi-square test was applied to find the predictors of adequate knowledge and healthy practice of infection prevention and control measures among students.

Results

A total of 146 students participated in the study, of which, 62 (42.4%) were 19-20 years old, 53 (36.3%) were 21-22 years old, and the remaining 31 (21.3%) were more than 22 years old. A total of 93 (63.7%) female students actively took part in the study as compared to 53 (36.3%) boys. The distribution of MBBS students belonging to various years was almost proportional, with 42 (28.8%) students from 2nd year, 54 (37%) from 3rd year and 50 (34.2%) from final year. Most of the students (79, 54.1%) who took part in the study were day-scholars, and the rest (67, 45.9%) were hostelers (Table 1).

Table 1.Participant's Socio-demographic Characteristics

S. No.	Variables	n (%)
1.	**Age (years)**	
	19-20	62 (42.4)
	21-22	53 (36.3)
	> 22	31 (21.3)
2.	**Gender**	
	Male	53 (36.3)
	Female	93 (63.7)
3.	**Academic year**	
	2nd	42 (28.8)
	3rd	54 (37.0)
	4th	50 (34.2)
4.	**Residence**	
	Day-scholar	79 (54.1)
	Hosteler	67 (45.9)

Knowledge of Infection Prevention and Control Measures

134 (92%) students had adequate knowledge about standard precautions and hand hygiene which is depicted in Figure 1.

Figure 2 depicts the participant's knowledge of cough etiquette and respiratory hygiene. 143 (98%) students had adequate knowledge of cough etiquette and respiratory hygiene.

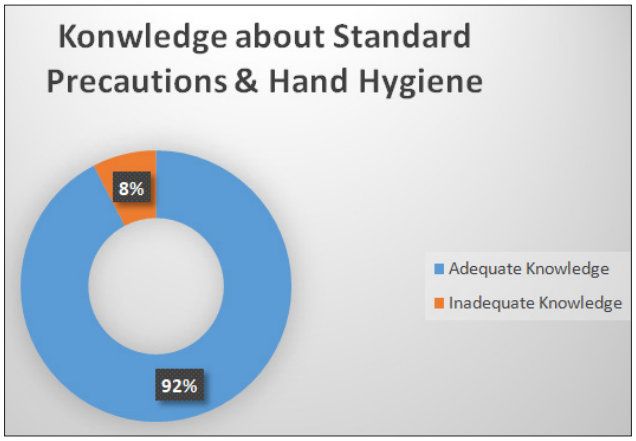

Figure 1.Participant's Knowledge about Standard Precautions and Hand Hygiene

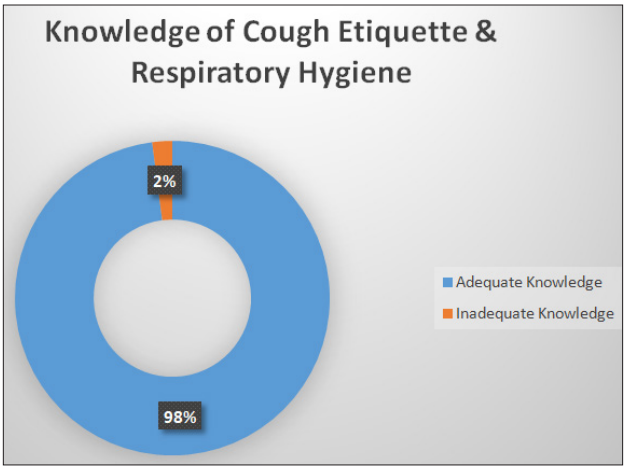

Figure 2.Participant's Knowledge of Cough Etiquette and Respiratory Hygiene

Figure 3 depicts the participant's knowledge about the use of personal protective equipment. 115 (79%) students had adequate knowledge of PPE usage.

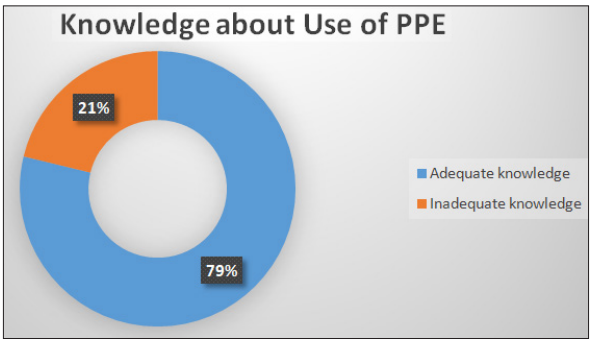

Figure 3.Participant's Knowledge about the Use of Personal Protective Equipment

Table 2 shows the association between knowledge about infection prevention and control measures and characteristics of medical students. It is clear from the Table that female students had better knowledge of the standard precaution and hand hygiene as compared to male students (p = 0.046).

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Table 2.Association between Knowledge about Infection Prevention and Control Measures and Characteristics of Medical Students

S. No.	Variables	Knowledge of Standard Precaution & Hand Hygiene		Knowledge of Cough Etiquette & Respiratory Hygiene		Knowledge of Use of PPE	
		Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
1.	**Academic year**						
	Second	38	4	42	1	34	9
	Third	53	2	52	2	43	11
	Fourth	43	6	49	0	38	11
	P value	0.118		0.181		0.921	
2.	**Gender**						
	Male	45	8	50	2	43	10
	Female	89	4	93	1	72	21
	P value	0.046		0.057		0.452	

Practice of Infection Prevention and Control Measures

Table 3 depicts the practice of infection prevention and control measures among medical students. Only 21 (14.4%) students always followed all the 8 steps of handwashing. Only 30 (5.5%) students washed their hands even if they didn't touch the patient. Handwashing with alcohol-based preparation/ soap and water was followed almost always by 62 (42.5%) students. Most of the students (77, 52.7%) wore surgical masks when dealing with patients who cough or sneeze. It is to be noted that only 19 (13%) students got vaccinated against influenza every year. Only 16 (11%) students never wore jewels or kept their personal belongings while wearing PPE.

Table 4 shows the association between the practice of infection prevention and control measures and the characteristics of medical students. It is clear from the table that the healthy practice of cough etiquette and respiratory hygiene is seen more among females compared to male students (p = 0.012).

Table 3.Practice of Infection Prevention and Control Measures among Medical Students

S. No.		Always N (%)	Mostly N (%)	Sometimes N (%)	Rarely N (%)	Never N (%)
Practice of standard precautions and hand hygiene						
1.	Do you follow all the 8 steps of handwashing?	21 (14.4)	52 (35.6)	57 (39.0)	12 (8.2)	4 (2.7)
2.	Do you wash your hands even if you did not touch the patient?	30 (5.5)	50 (14.4)	37 (25.3)	21 (34.2)	8 (20.5)
3.	Do you wash your hands with alcohol-based preparation/ soap and water?	62 (42.5)	59 (40.4)	18 (12.3)	4 (2.7)	3 (2.1)
4.	Do you wash your hands for 20-30 secs?	41 (28.1)	62 (42.5)	31 (21.2)	10 (6.8)	2 (1.4)
5.	Do you wear your coat or scrub while going outside the hospital?	18 (12.1)	10 (6.8)	38 (26.0)	36 (24.7)	44 (30.1)
Practice of cough etiquette and respiratory hygiene						
6.	Do you wear surgical masks when dealing with patients who cough or sneeze?	77 (52.7)	34 (23.3)	18 (12.3)	7 (4.8)	10 (6.8)

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7.	Do you cough/ sneeze over the shoulder if a napkin is not available?	47 (32.2)	28 (19.2)	39 (26.7)	13 (8.9)	19 (13.0)
8.	Do you perform hand hygiene after coughing/ sneezing?	56 (38.4)	48 (32.9)	28 (19.2)	10 (6.8)	4 (2.7)
9.	Do you get yourself vaccinated against influenza yearly once?	19 (13.0)	18 (12.3)	28 (19.2)	24 (16.4)	57 (39.0)
Practice of personal protective equipment						
10.	In case of possible splashes and spills of any body fluids, do you wear the necessary personal protective equipment (PPE) such as gloves, aprons, goggles, and masks?	48 (32.9)	41 (28.1)	34 (23.3)	11 (7.5)	12 (8.2)
11.	Do you follow proper donning and doffing instructions?	46 (31.5)	51 (34.9)	35 (24.0)	8 (5.5)	6 (4.1)
12.	Do you follow hand hygiene before donning and after doffing?	55 (37.7)	48 (32.9)	30 (20.5)	6 (4.1)	7 (4.8)
13.	Do you wear your jewels or keep your personal belongings while wearing PPE?	63 (43.2)	24 (16.4)	26 (17.8)	17 (11.6)	16 (11.0)

Table 4.Association between Practice of Infection Prevention and Control Measures and Characteristics of Medical Students

S. No.	Variables	Practice of Standard Precaution & Hand Hygiene		Practice of Cough Etiquette & Respiratory Hygiene		Practice of PPE	
		Healthy	Unhealthy	Healthy	Unhealthy	Healthy	Unhealthy
1.	**Academic year**						
	Second	38	4	35	7	39	3
	Third	41	13	50	4	47	7
	Fourth	44	6	46	4	48	2
	P value	0.101		0.269		0.240	
2.	**Gender**						
	Male	46	7	52	1	49	4
	Female	77	16	79	14	85	8
	P value	0.524		0.012		0.823	

Discussion

The concept of infection prevention and control is age-old but is of paramount importance as it is the core of medical practice ensuring the safety of patients and healthcare professionals including medical students. Awareness in this regard is very essential, however, awareness alone is not sufficient for achieving safety goals without the proper practice of the standards of infection control protocols. This cross-sectional study was carried out among 146 undergraduate medical students in a medical college in Chengalpattu, Tamil Nadu to assess the knowledge and practice of infection prevention and practices.

Standard precautions and hand hygiene is one of the key components of infection prevention and control. 92% of the students had adequate knowledge of the standard precautions and hand hygiene. These results are concurrent with the study by Sharif F et al.[12] done among the medical students of a private medical college in Karachi. 98% of the students had adequate knowledge of cough etiquette and respiratory hygiene which is similar to the study done

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by Ibrahim AA et al.[13] in which the study participants were medical students from Weill Cornell Medical College, Qatar. Regarding the knowledge of the use of personal protective equipment, 78% of the students had adequate knowledge but this is comparatively on the lower side among other measures of infection prevention and control. This result was in contrast with the results of a study by Sharif F et al.[12] in which study participants had poor knowledge regarding PPE usage while 49.51% of the study participants in our study had adequate knowledge regarding PPE usage. Though this result is contradicting, the study participants of both studies had poor knowledge regarding IPC measures.

Analogous to other studies on the assessment of knowledge and practice on infection prevention and control measures, this study also demonstrates poor practice. Only 14.4% of the participants followed all 8 steps of handwashing and only 28.1% of the study participants washed their hands for 20-30 seconds. It was also observed by Ibrahim AA et al.[13] that among most of their study participants, 61.29% washed their hands for less than 20 seconds. 6.8% and 2.7% of the participants rarely and never performed hand hygiene after coughing/ sneezing. 39% of the participants rarely got themselves vaccinated against influenza yearly indicating the poor practice of cough etiquette and respiratory hygiene. Sugathan S et al.[11] reported that most of their study participants wore the required PPE like gloves, apron, goggles, and masks, in case of any anticipated splashes and spills of any body fluids indicating the good practice of PPE usage, whereas only 32.9% and 28.1% of this study's participants wore the necessary PPE indicating poor practice.

While trying to understand the association between knowledge about infection prevention and control measures and characteristics of medical students, a significant association was noted between gender and standard precaution and hand hygiene knowledge ($p = 0.046$). Likewise, a positive association was noted between the practice of cough etiquette and respiratory hygiene ($p = 0.012$). This significance seen between gender denotes the negligence, laziness and impatience among boys. These results contradict the results of Bahadur S et al.[14] study done among medical students of Jinnah Medical College, Peshawar. Their study shows no significant difference in scores between the genders. Kulkarni V et al.,[15] in their study on medical students of Kasturba Medical College, Mangalore, observed a statistical significance between participants across different phases of MBBS and their exposure to the subject of HCAIs, but this was not observed in this study.

Limitations

The practical knowledge of the participants was questioned in this study rather than being assessed making it a limitation in the study. It has been exclusively carried out among students of one particular college, thus affecting the external validity of the study.

Conclusion

It is clear from the study that students' knowledge about infection prevention and control measures is adequate but their practice is not satisfactory. The practice of IPC can be improved by increasing the number of practical sessions and workshops on IPC. Negligence, laziness and impatience were seen among boys in the study, hence it is recommended to use multilateral strategies to overcome them.

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Conflicts of Interest: None

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