Knowledge Regarding Methicillin Resistant Staphylococcus aureus (MRSA) among Second, Third and Fourth year B.Sc. Nursing Students at Three State Universities in Sri Lanka

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Abstract—

Methicillin Resistant Staphylococcus aureus (MRSA) infections are becoming more prevalent in clinical settings. This results in increased morbidity and mortality, and increased health care costs. Nursing students are at high risk of being exposed MRSA. Nursing students' noncompliance with infection control precautions has its effects not only on patients, but also on nursing students themselves.

Methods

A descriptive cross- sectional study was conducted among 252 undergraduate B.Sc. Nursing students at universities of Sri Jayewardenepura, Ruhuna and Peradeniya. A validated self-administered questionnaire was used to assess the knowledge regarding MRSA. Data analysis was done in the SPSS Version 16.0 and Chi square test was used to determine statistical significance.

Results

Total of 252 participants, nearly 45 % were from University of Ruhuna, 28 % were from University of Sri Jayewardenepura and 27 % were from University of Peradeniya. The majority were females (71.1 %) and 28.9 % were males. The majority of the students had used more than one type of media to get information regarding MRSA and these included lectures, written materials and discussions with hospital staff members.

Majority of participants had good knowledge (63.1%) regarding MRSA whereas only a few had excellent knowledge (6 %). Nearly 61 % of female students and almost 69 % of male students had Moderate knowledge regarding MRSA. There was no significant association between sex and the knowledge level of the participants (p=0.065). The majority of fourth year students (70.5 %) had good knowledge compared with other academic years. There was a statistically significant association between academic year and knowledge level regarding MRSA (p=0.00).

Conclusion

Study showed that the majority of the B.Sc. Nursing undergraduates of universities of Sri Jayewardenepura, Ruhuna and Peradeniya possessed good knowledge about Methicillin Resistant Staphylococcus aureus.

Keywords— Knowledge, MRSA, undergraduate nursing students

I. INTRODUCTION

Antibiotic resistant bacteria have become a significant problem in the practices of medicine and nursing, particularly in the hospital setting. One of the most troublesome bacterial strains is the methicillin resistant *Staphylococcus aureus* (MRSA). *Staphylococcus aureus* is gram positive coccus bacterium which becomes pathogenic opportunistically and is the major pathogen causing both nosocomial and community-associated infections to humans (Bearman et al, 2009).

This organism has reduced susceptibility to the beta-lactam class of antibiotics such as oxacillin, penicillin and amoxicillin and also resistant to agents such as clindamycin, erythromycin and tetracycline.

The antibiotic Methicillin, was introduced in 1959 and Methicillin-resistant *Staphylococcus aureus* (MRSA) was discovered in 1961 in Europe. The

MRSA is now the cause of 40% of *Staphylococcus aureus* infections in hospitals and is a main hospital acquired pathogen worldwide (Raboud et al., 2005).

The bacterial cell wall contains a protein called penicillin-binding protein which has an enzymatic action in the synthesis of the peptidoglycan layer of the cell wall of the bacteria. Normally, penicillin-binding proteins have a high affinity to bind beta-lactam antibiotics; in MRSA this affinity is reduced and antibiotic resistance occurs (Askarian, 2009).

The MRSA a global public health problem associated with considerable mobility and mortality especially in developing countries. It causes a range of infections affecting the skin, soft tissue, respiratory system, bone, joints and endovascular tissue which spread and cause infection in contact.

In health care settings there are heavy patient loads and limited facilities which pose challenges to establish screening, isolation and other recommended infection control measures (Thevanesam et al,2003).

Colonized or infected persons with MRSA spread the organism in to the environment through their contaminated skin (Oie et al, 2007).A person with MRSA present, growing, and multiplying without any clinical symptoms, tissue invasion or cellular injury is said to be colonized. The most common sites of colonization are the anterior nares, axillae and the perineum. A person becomes infected when the bacteria invade their tissues and cause an immune response and cellular changes. This is manifested as clinical signs of illness such as fever, elevated white blood count, purulence and inflammation.

Transmission of MRSA may occur primarily through the contaminated hands of healthcare workers when they do not follow appropriate infection control measures. Among health care workers nurses" understanding of infection control in MRSA is the most important thing because in the hospital setup nurses are the persons who are in direct contact with patients at all times. Most probably they act as a reservoir as well as a vehicle of spread within healthcare settings.

Nurses should consider how they can address infection prevention as well as control and management within health care settings (Mikkelsen, 2008).

The general principles of infection control should be adopted for patients with MRSA, including patient isolation, appropriate cleaning and decontamination of clinical areas. Shortage of staff especially amongst nurses, leads to the increased prevalence of MRSA.

Educating nursing students about the MRSA infection, prevention of MRSA and management of MRSA in the hospitals and communities is an important part of nursing education. The ultimate goal of this education is to prevent the spread of MRSA organisms and to decrease the related costs of treating MRSA infections. (Jennings-Sanders and Jury, 2010).

One of major goals of the nursing education is promotion of compliance with infection control precautions , which can start at nursing schools or nursing faculty where nurses receive their basic infection control knowledge (Darawad and Al-Hussami, 2012).

The purpose of this study is to measure the level of knowledge, attitudes and practices among nursing students at University of Sri Jayewardenepura, university of Ruhuna and University of Peradeniya, Sri lanka.

II. METHODOLOGY

A.Ethical Clearance
Ethical clearance was obtained from the Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura (Nursing 10.13).

As this research did not include any invasive procedures, there was no physical harm to the participants. Informed written consent was obtained from every participant prior to their involvement of the study. Participants were also made aware about their right to refuse to participate in the study.

Privacy and confidentiality of the participants and their information were ensured at every stage of the study. The data gathered was shared only

between the supervisor and the investigator only and not with the third party.

B. *Study setting*
Faculty of Medical Sciences, University of Sri Jayewardenepura, Faculty of Medicine, University of Ruhuna and Faculty of Allied Health Sciences in University of Peradeniya were selected as study setting.

C. *Study population*
All undergraduate B.Sc. Nursing students (except first year students) in the above 3 Universities comprised the student population.

D. *Study design*
The study was carried out as a descriptive cross sectional study.

E. *Sampling*
All second, third and final year undergraduate Nursing students from University of Sri Jayewardenepura, University of Ruhuna and University of Peradeniya were included in the sample.

F. *Data collection*

1) *Study instrument:*
A pre-tested self-administered questionnaire to cover knowledge regarding MRSA was used.
The Self-administered questionnaire included questions under 02 sections. Those were,

Section "A" included Demographic data.
Section "B" included Knowledge regarding MRSA.

The questionnaire was created in English. Questionnaire was pre tested to determine acceptability, feasibility, comprehensibility and appropriateness. The questionnaire included questions on,

Questions 1-10 in the questionnaire is demographic data, including age, sex, university, academic year, name of the hospitals of clinical training and source of method of knowledge.

Questions 11 – 51 in the questionnaire assessed the knowledge of MRSA.

There were 40 questions regarding MRSA and 5 marks were given each correct answer. Then total mark converted to percentage and divided knowledge level in to three groups as poor knowledge, good knowledge and excellent knowledge.

Knowledge level:
0-49%   - Poor knowledge
50- 75%   - Good knowledge
76- 100%   – Excellent knowledge

2) *Pre-testing of the instrument:*
Pre-testing of the instrument was carried out with the participation of 10 first year undergraduate Nursing students from University of Sri Jayewardenepura who were not included in the study sample.

3) *Data collection method:*
Prior permission for the study was obtained from Deans of the three faculties following ethical approval. After explaining about the research with an information sheet, written informed consent was obtained from the volunteer students. The self-administered questionnaire was administered to the participants during their lunch time or leisure time. The participants were asked to complete the questionnaire individually without discussing with others. Questionnaires were collected soon after the completion.

4) *Data analysis:*
Sample characteristics were analysed by using descriptive statistics, using SPSS version 16 as the data analysis tool.

III. RESULTS

There were 252 Nursing students from universities of Sri Jayewardenepura, Ruhuna and Peradeniya. Majority of the students (45.2%) were participated from the University of Ruhuna for this study and nearly 28% and 27% from the university of Jayewardenepura and Ruhuna. The majority of the students in all universities (71%) were female and nearly 29% students were male students. Among participants majority of the student were in the second year which is nearly 40%. Approximately 37% students were third year and 25% students were from forth year.

Table 1. *Frequency distribution of Academic Year with Universities*

University	Academic year			Total
	2nd Year	3rd Year	4th Year	
University of Sri Jayewardenepura	21 (30%)	24 (34.3%)	25 (35.7%)	70 (100%)
University of Ruhuna	52 (43.3%)	41 (34.2%)	27 (22.5%)	120 (100%)
University of Peradeniya	25 (40.3%)	28 (45.2%)	9 (14.5%)	62 (100%)
Total	98 (38.9%)	93 (36.9%)	61 (24.2%)	252 (100%)

Most of the students had used more than one media to get the information and 27.4% students had used other media except the ones mentioned above.

Table 2. **Frequency distribution of media of getting information about MRSA.**

Media	Number	Percentage %
Lectures	246	97.6
Written materials	110	43.7
Hospital staff members	158	62.7
Practice	162	64.3
Others	69	27.4

The majority of the participants had Good knowledge (63.1%) regarding MRSA while few participants had excellent knowledge.

Table 3. *Frequency distribution of knowledge regarding MRSA*

Category	Number	Percentage %
Poor knowledge	78	31
Good knowledge	159	63.1
Excellent knowledge	15	6
Total	252	100

Chi-square analysis was done to detect statistically significant differences between knowledge level and other variables such as gender and academic year. Nearly 61% of female students and 69% male students had good knowledge whereas nearly 5% female students and 10% male students had excellent knowledge regarding MRSA. There was no significant association observed between sex and knowledge level regarding MRSA (X^2= 5.468, df=2, p=0.065).

Table 4. *Relationship of knowledge levels and sex.*

	Knowledge Level			
		Poor Knowledge	Good knowledge	Excellent knowledge	Total
Sex	Female	62 (34.6%)	109 (60.9%)	8(4.5%)	179 (100%)
	Male	16 (21.9%)	50 (68.5%)	7(9.6%)	73 (100%)
Total		78 (31%)	159 (63.1%)	15(6%)	252 (100%)

According to the results majority of fourth year students (63.1%) had good knowledge compared with other academic years. Nearly 38% of second year students and 37% third year students had poor knowledge. There was a statistically significant association between academic year and knowledge level regarding MRSA (X^2=31.862, df=4, p=0.00).

Table 5. *Relationship of knowledge levels and academic year*

Academic Year	Knowledge Level			
		Poor Knowledge N (%)	Good knowledge N (%)	Excellent knowledge N (%)	Total
	2nd year	37 (37.8%)	57 (58.2%)	4 (4.1%)	98 (100%)
	3rd year	34 (36.6%)	59 (63.4%)	0 (0%)	93 (100%)
	4th year	7 (11.5%)	159 (63.1%)	15 (6%)	61 (100%)
Total		78 (31%)	159 (63.1%)	15 (6%)	252 (100%)

According to hospital where students attend for their clinical practice, there was a significant difference of knowledge level. Among students who attend Colombo South Teaching Hospital, nearly 76% had good knowledge level. Among students who attend Karapitiya Teaching Hospital, nearly 54% had good knowledge level. Among

students who attend KurunegalaTeaching Hospital, nearly 66% students had good knowledge level There was a statistically significant association between Teaching hospital where they attend for clinical practice and knowledge level regarding MRSA (X^2=11.76,df=4, p=0.019).

Table 6. *Relationship of knowledge levels and Teaching Hospital*

Teaching HOSPITAl	Knowledge Level			
		Poor Knowledge	Good Knowledge	Excellent Knowledge	Total
	Colombo South Teaching hospital	14 (20%)	53 (75.7%)	3 (4.3%)	70 (100%)
	Karapitiya Teaching Hospital	44 (36.7%)	65 (54.2%)	11 (9.2%)	120 (110%)
	Kurunaga Teaching Hospital	20 (32.2%)	41 (66.1%)	1 (1.6%)	62 (100%)

IV. DISCUSSION

A descriptive cross sectional study was conducted at University of Sri Jayewardenepura, university of Ruhuna and University of Peradeniya to assess the knowledge regarding MRSA among B.Sc. Nursing undergraduates.

Totally 252 participants responded to questionnaires and the response rate was 83.5%. According to the results, 71% were female students and 29% were male students. Knowledge of MRSA was not significantly different between the male and female students (p>0.05).

The majority of female students (60.9%) and male students (68.5%) had Good knowledge. Only five students had poor knowledge. A similar study was done in University of Jordan and 168(third and fourth year) students participated in this survey; 24% were males and 76% were female Nursing students. Knowledge level of the students was inadequate (Knowledge rate= 49.64%, SD=13.08). Attitudes of students were positive (attitude rate=89.8%, SD=4.16). Nursing students' compliance with the universal infection control precautions was moderate (compliance rate=75.91%, SD=10.33). Also, participants' attitude towards infection control precautions was found to be significantly correlated (r=0.51, p<0.01) with their compliance with those precautions (Darawad and Al-Hussami, 2012).

Almost all the students had received information from more than one medium regarding MRSA. The largest category of the study population (97.6%) used lectures as the medium to get information. They also used written material, hospital staff members and clinical practice to get information. Internet, researcharticles etc were used by 27.4% students.

The present study shows that majority of the fourth year students (70.5%) had good knowledge which could attribute to the experience guide when increasing in seniority. As well as 63.4% third year students and 58.2% second year students had good knowledge regarding MRSA. There was a statistically significant association between academic year and knowledge regarding MRSA.A similar study was done Cleveland State University in Cleveland (Jennings-Sanders,A, Jury,L. 2010). This study was conducted among Nursing students and the study revealed that there was no significant difference between the level of students and MRSA survey scores.

There was a significant difference of knowledge level according to hospital where students attend for their clinical practice. Among students who attend Colombo South Teaching Hospital, nearly 76% had good knowledge level. Among students who attend Kurunegala Teaching Hospital, nearly 66% students had good knowledge level. Among students who attend Karapitiya Teaching Hospital, nearly 54% had good knowledge level.

VI. CONCLUSION

According to the findings of this study, the majority of the participants possessed good knowledge about MRSA. Excellent knowledge was observed in high in Fourth Year students.

There was a correlation of knowledge level with academic year and Teaching hospital where they attend for their clinical practice.

VII. RECONDITIONS

Continuous learning sessions and practical programmes for all undergraduate Nursing students with special focus on new knowledge and practice can be introduced.

An orientation programmes for all students to understand the hospital function and policies are recommended.

Conduct research study to assess knowledge, attitude and practice regarding MRSA in all B.Sc. Nursing students in Sri Lanka.

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