

# Awareness and practice of standard precautions among Kerala State Health Services personnel in Neyyattinkara

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## Research Article

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# Abstract

**Introduction:** Standard precautions are the basic infection control precautions that should be followed in any setting where health care is delivered. This study aims to determine the level of awareness and practice of standard precautions among health personnel, factors that influence practice and the possible hindrances in practice of the same.

**Methodology:** This cross-sectional study was done using a structured interview schedule among 78 doctors, 151 nurses, 80 nursing assistants and 16 lab technicians working in the State health service institutions of Neyyattinkara Taluk. SPSS version 21 software was used for analysis.

**Results:** The findings of the study show that 86.5 percent of the health care personnel (HCP) had good awareness in hand hygiene (HH), 64 percent in use of personal protective equipment (PPE), 78.8 percent in respiratory hygiene (RH), 93.5 percent in safe injection practices (SIP) and 18.5 percent in waste disposal and decontamination (WD). Good practice was seen in 9.2percent of HCP for HH, 69.5 percent in PPE, 94.2 percent in RH, 86.8 percent% in SIP and 97.8percent for WD respectively. When all elements were analysed together nurses were the most likely to have good awareness (15.9%) and doctors were the most likely to have good practice (8.97%). Significant association was noted between age and awareness in HH ( $p=0.012$ ) and RH ( $p=0.049$ ), between availability of resources and practice in RH( $p=0.004$ ), PPE( $p=0.042$ ) and HH( $p=0.045$ ) and between trainings received and practice in RH( $p=0.037$ ). Hepatitis B vaccination was taken by 68.6 percent of respondents only

**Conclusion:** Awareness and practice of standard precautions are much deficient among the study population. Trainings and availability of resources have some positive effect in practice. Training coverage and Hepatitis B vaccination coverage were deficient. The needs for extensive trainings and for making the resources available are suggested.

## Introduction

'Standard Precautions' are the minimum infection prevention practices that apply to all patient care, in any setting where healthcare is delivered.(1) The 'Standard Precautions' concept replaced the earlier Universal precaution in 1996.(2) Standard Precautionary Measures are a set of infection control practices used to prevent infection from the health personnel to the patients and caregivers and vice versa.(3, 4) When health professionals do not follow infection control measures then the health care settings will be a source for infections and at times it may also be a cause for outbreaks in the community.(5, 6)

Strict instructions and training are given to all categories of staff in the healthcare systems and settings worldwide. However, many health care providers do not seem to follow these precautions. A literature review by Gammon J et al, for compliance of healthcare workers to standard precautions reported internationally prevalent suboptimal compliance to infection control precautions. There was also evidence suggesting the compliance to each aspects of standard precaution varied, and the health workers followed only few of the standard practices.(7) Low compliance to standard precautionary

measures in healthcare settings have serious consequences, including the spread of infectious diseases like HIV, Nipah(8), Ebola(9), and Marburg.

Both the patients and health care providers are at risk for Healthcare-Associated Infections. Healthcare-Associated Infections affect hundreds of millions of patients each year, and most of these are preventable.(6) The chance of getting a HIV infection after a prick from an infected person is 0.3%, Hepatitis C virus is 1.8%, and Hepatitis B virus infection ranges from 6% – 30% respectively.(10)

Translation of the precautionary guidelines into practice has been studied in varied health care settings. Many of the studies based on observing the healthcare providers in field or simulated settings have reported breaching(11), and low compliance of standard precautions.(12). The poor compliance persists in the different service sectors in health care delivery. An evaluation of Clinical laboratories in Karachi, Pakistan, on adherence to standard precautions using an observational checklist revealed the non-usage of gloves, protective gowns, and disinfectants, as well as the non-availability of needle cutters, and incinerators in majority of the laboratories evaluated.(13)

Knowledge-Practice surveys of healthcare workers have also reported low levels of understanding(14), and practice(15) of the standard precautions, or Universal Precautions. Review of Needle Stick Injuries (NSIs) in a tertiary level hospital in Tamil Nadu, India, reported that more 25% of the NSIs were caused by the recapping of needles, and other improper disposal of the sharps.(16) It is also documented that longer duration of practice in health sector is associated with higher compliance to the precautionary measures.(14)

In Kerala, the infection control policy in health care is an integrated, mandatory policy under the quality assurance programme – Kerala Accreditation Standards for Hospitals (KASH).(17) The KASH standards set criteria for accreditation of all levels of healthcare organizations in the state from Primary Health Centres, to District Hospitals, General Hospitals, and Speciality Hospitals, and are based on global benchmarks for ensuring safe, quality health care, with due importance given to infection control.(17) It has been established that awareness is only the base, and it is the practice of standard Precautions that can reduce the load of Health Care Associated Infections. Though there are a lot of studies conducted on practice of standard precautions in other countries, studies in Indian context are limited. There is also a dearth of published data on the Kerala context.

The present study focuses to study the level of awareness and practice of these precautionary measures and the factors hindering the practices among health personnel in Neyyattinkara Taluk, Thiruvananthapuram district.

## **Materials And Methods**

The present study was of a cross sectional study design. The study was conducted among all institutions under the State Health Services in Neyyattinkara Taluk of Thiruvananthapuram district, Kerala State. Four categories of health providers from various Institutions under the State Health Services in Neyyattinkara

Taluk in Thiruvananthapuram district of Kerala State were studied. The four categories include doctors, staff nurse, nursing assistants and lab technicians. There were 15 Primary Health Centres, 6 Community Health Centres, 1 Taluk hospital and 1 General hospital, making a total of 23 institutions under the Neyyattinkara Taluk area. The health care providers included 94 doctors, 243 nurses, 99 nursing assistants and 16 lab technicians, making a total of 452 healthcare providers.

Stratified random sampling of the four categories of health personnel was used, and a total sample of 325 was calculated ( $n=4pq/d^2$ ) [Table 1].

**Table 1. Sampling frame**

Category	Population Size	Sample Size
Doctors	94	78
Staff Nurses	243	151
Nursing Assistants	99	80
Lab Technicians	16	16
Total	452	325

Those who had joined the service within six months were excluded from the study.

The data was collected through a structured interview schedule focussing on the awareness and practice of standard precautions among the health personnel.

The data collection was done from June 16th to August 31<sup>st</sup> of 2014, by the principal investigator. The permission from the Director of Health Services was obtained. Permission from the respective superintendents was taken prior to data collection. The list of the health personnel was also taken from the respective superintendents. From the list a stratified random sample of four categories of health personnel who did not fit in to the exclusion criteria were included. The interview schedule and the consent form had been translated to the local language Malayalam. The interview schedule had been back translated and tested for content validity. The staff nurses, lab technicians and nursing assistants were interviewed using Malayalam schedule. An informed consent was obtained prior to the interview. Privacy and confidentiality of all the informants was maintained. Interviews were performed in the respective institutions at a place and time convenient for the informant and the investigator, without causing any hindrances to their daily routine. The collected data was stored and used for analysis. Univariate and bivariate analyses were conducted using SPSS version 21. The study was conducted after obtaining ethical clearance from the Institutional Ethics Committee. The informant had the freedom to deny answering any questions.

## Results

## **Characteristics of the Study Population**

Mean age of respondents was 40.54 ±9.3 years and 74.5% were females. The mean years of service was 10.64 years which was nearly same among the four groups. Only 82.5% of the subjects had received any training and only 33.8% received training in standard precautions. Infection control protocol was followed by 82.5% of the population. Hepatitis B vaccination coverage was only 68.6%.

There was significant association for profession with training received and hepatitis B vaccination status. Doctors had received the most training in infection control. Hepatitis B vaccination coverage was highest among doctors.

The essential resources readily available in the institutions where the respondents worked were gloves (94.8%) puncture free containers (86.5%), colour coded bags (77.8%) and signboards (71%). Alcohol based hand rub (9.2%) and safe receptacles (0.9%) were least available.

## **Distribution of Awareness and Practice in Standard Precautions**

Good awareness in standard precautions was found in 11.38% only and in 15.9% of nurses which was the highest across various professions. Among doctors it was much lower (5.1%). No lab technician had answered all the questions correctly. When considered separately, most respondents had good awareness in safe injection practices and the least in waste disposal. The results of analysis is represented in Fig. 1.

Good practice was seen only in 5.5% of respondents and in 8.97% of doctors which was the highest across various professions. The analysis of practice of individual elements is represented in Fig 2.

### **Awareness on Standard Precautions:**

It was found that as age increased good awareness in hand hygiene also increased. Profession had significant association with good awareness of hand hygiene. Nursing assistants were the most to have good awareness in hand hygiene (97.5%). Doctors (91%) and nurses (82.1%) were comparable. But only half of the lab technicians were having good awareness.

Nursing assistants were the most to have good awareness on use of PPE (78.75%) and on safe injection practices (98.75%) which were both significant. Age had significant association on respiratory hygiene. The study respondents between 35 and 44 years were more likely to have good awareness on respiratory hygiene (86.73%).

### **Practice of Standard Precautions:**

There was significant positive association for profession, training received and availability of resources with good practice of hand hygiene. Doctors were the most likely to have good practice. Table 2. The association between independent variables and practice of PPE is detailed in the table 3 and that of safe injection practices is represented in Table 4.

There was significant association for profession, availability of resources and training received with practice of respiratory hygiene. Nurses were the most likely to have good practice (98%). Table 5. Result of bivariate analysis on practice on waste disposal is represented in Table 6.

**Table 2. Bivariate Analysis regarding practice on hand hygiene as outcome variable**

Variable name		N	Good practice	P value
Age	<24	6	0	0.178
	25-34	99	4(4.04)	
	35-44	98	10(10.20)	
	45-54	110	14(12.73)	
	>54	12	2(16.67)	
Sex	Male	82	11(13.41)	0.130
	Female	243	19(7.82)	
Profession	Doctor	78	12(15.38)	0.030
	Nurse	151	8(5.3)	
	NA	80	10(12.5)	
	Lab Tech	16	0	
Training Received	Yes	238	26(10.92)	0.081
Std Precaution/HIV	No	87	4(4.6)	
Total service in years	½ - 10	195	14(7.2)	0.273
	11- 20	94	11(11.7)	
	>20	36	5(13.9)	
Specific protocol in use	Yes	268	21(7.84)	0.060
	No	57	9(15.79)	
Availability of resources (ABHR)	Yes	30	6(20)	0.045
	No	295	24(8.14)	

**Table 3. Bivariate analysis regarding practice on use of PPE**

Variable name		N	Good practice	P value
Age	<24	6	3(50)	0.735
	25-34	99	67(67.68)	
	35-44	98	67(68.37)	
	45-54	110	80(72.73)	
	>54	12	9(75)	
Sex	Male	82	53(64.63)	0.264
	Female	243	173(71.2)	
Profession	Doctor	78	51(65.38)	0.199
	Nurse	151	111(73.51)	
	NA	80	56(70)	
	Lab Tech	16	8(50)	
Training Received	Yes	238	170(71.42)	0.221
Std Precaution/HIV	No	87	56(64.37)	
Total service in years	½ - 10	195	127(65.1)	0.058
	11- 20	94	69(73.4)	
	>20	36	30(83.3)	
Specific protocol in use	Yes	268	190(70.9)	0.239
	No	57	36(63.15)	
Availability of resources	Yes	138	104(75.4)	0.324
	No	187	122(65.24)	

**Table 4. Bivariate analysis regarding practice of SIP**

Variable name		N	Good practice	P value
Age	<24	6	4(66.67)	0.154
	25-34	99	82(82.83)	
	35-44	98	88(89.8)	
	45-54	110	99(90)	
	>54	12	9(75)	
Sex	Male	82	76(92.69)	0.068
	Female	243	206(84.77)	
Profession	Doctor	78	75(96.15)	0.006
	Nurse	151	121(80.13)	
	NA	80	72(90)	
	Lab Tech	16	14(87.5)	
Training Received	Yes	238	211(88.66)	0.097
Std Precaution/HIV	No	87	71(81.61)	
Total service in years	½ - 10	195	167(85.6)	0.909
	11- 20	94	83(88.3)	
	>20	36	32(88.9)	
Specific protocol in use	Yes	268	235(87.69)	0.290
	No	57	47(82.46)	
Availability of resources	Yes	281	246(87.5)	0.297
	No	44	36(81.8)	

**Table 5. Bivariate analysis regarding practice of respiratory hygiene**

Variable name		N	Good practice	P value
Age	<24	6	6(100)	0.506
	25-34	99	92(92.93)	
	35-44	98	90(91.84)	
	45-54	110	106(96.36)	
	>54	12	0	
Sex	Male	82	77(93.9)	0.911
	Female	243	229(94.24)	
Profession	Doctor	78	67(85.9)	<0.001
	Nurse	151	148(98)	
	NA	80	78(97.5)	
	Lab Tech	16	13(81.25)	
Training Received	Yes	238	228(95.79)	0.037
Std Precaution/HIV	No	87	78(89.66)	
Total service in years	½ - 10	195	182(93.3)	0.637
	11- 20	94	89(94.7)	
	>20	36	35(97.2)	
Specific protocol in use	Yes	268	254(94.78)	0.300
	No	57	52(91.22)	
Availability of resources	Yes	231	223(96.5)	0.004
	No	94	83(88.3)	

**Table 6. Bivariate analysis regarding practice of waste disposal**

Variable name		N	Good practice	P value
Age	<24	6	6(100)	0.965
	25-34	99	97(97.98)	
	35-44	98	96(97.96)	
	45-54	110	107(97.27)	
	>54	12	12(100)	
Sex	Male	82	81(98.78)	0.500
	Female	243	237(97.53)	
Profession	Doctor	78	77(98.72)	0.564
	Nurse	151	147(97.35)	
	NA	80	79(98.75)	
	Lab Tech	16	15(93.85)	
Training Received	Yes	238	232(97.48)	0.451
Std Precaution/HIV	No	87	86(98.85)	
Total service in years	½ - 10	195	190(97.4)	0.622
	11- 20	94	92(97.9)	
	>20	36	36(100)	
Specific protocol in use	Yes	268	262(97.76)	0.819
	No	51	56(98.25)	
Availability of resources	Yes	224	220(98.2)	0.68
	No	101	98(97)	

## Discussion

### Level of awareness and practice in Standard Precautions

Good awareness in standard precautions was found in 11.38% only. Among doctors, it was still lower (5.1%) and no lab technician could answer all the questions correctly. These findings are in line with a 2012 Nigerian study, by Abdulraheem et al, where only 13% of the respondents had adequate knowledge of universal precautions.(18) But the findings are in contrast to a 2013 French study, which showed that 39.3% of subjects had good knowledge of standard precautions.(19) The difference could

be due to the background settings, as the present study and the Nigerian study took place in public sector institutions in low- and middle-income countries, where health care spending is significantly lower than that of a high-income country like France.(20)

Good awareness was seen the most among nurses (15.9%), and Nursing Assistants (11.3%), similar to a study in Jamaica, where more nurses were very knowledgeable of the universal precautions than the respondents in other job categories.(21)

The respondents, in general, exhibited varying levels of awareness in the different elements of standard precautions. In hand hygiene 86.5% had good awareness, which was in line with a Nigerian study(22) where it was 83%. Good awareness in personal protective equipment use was found in 64% of the respondents, cough hygiene in 78.8% and safe injection practices in 93.5%. This points to the relative importance given by the health personnel to each precautionary element. Importance of self-protection, and respiratory hygiene has been underestimated by the staff, and the sensitizations and job-trainings in these aspects of the standard precautions are not having the desired impact.

It was also noted that the respondents in different job-categories had varying levels of knowledge in the different aspects of the standard precautions. Nurses were the most to have good awareness in waste disposal and decontamination (24.5%). Nursing assistants were the most to have good awareness in hand hygiene (97.5%), use of PPE (78.8%), safe injection practices (98.8%), and respiratory hygiene (82.3%). Doctors had better awareness in hand hygiene (91%), and respiratory hygiene (80.8%), than use of PPE (51.3%), safe injection practices (84.6%), while lab technicians exhibited better awareness of safe injection practices (75%), use of PPE (56.3%), and respiratory hygiene (56.3%), and least in waste disposal (6.25%). This shows that the awareness of the respondents tends to be more on the aspects of standard precautions which they put into practice more in relation to their routine duties.

Good practice is seen in 5.5% of respondents, similar to a recent Ethiopian study.(23) Good practice in personal protective equipment use, cough hygiene, safe injection practices and waste disposal were seen in 69.5%, 94.2%, 86.8% and 97.8% respectively. Only 9.2% had good practice in hand hygiene which is in line with a study from Kolkata which showed only 12.5% washed their hands before injection. (24)

Doctors were most likely to have good practice (8.97%), whereas none of the lab technicians had good practice in standard precautions. Doctors were the most likely to have good practice in hand hygiene (15.4%) and safe injection practices (96.15%) when the components are taken separately. Nurses were the most likely to have good practice in cough hygiene (98%) and PPE use (73.5%) which confirms a Jamaican study in which more frequent use of protective equipment was seen among nurses.(21)

## **4.2. Factors affecting Practice**

Good practice of hand hygiene was seen more towards older age groups and among males. Training received, length of service and availability of resources also had positive association. These

findings are in confirmation with a 2002 Geneva study which showed that availability of alcohol-based hand rubs increased hand hygiene compliance.(25)

Good practice in PPE use also increased with age. Female gender, training received length of service and availability of resources also had positive association. This finding is in line with a Jamaican study by Vaz et al.(21)

Good practice in SIP is similar to that in hand hygiene as there is positive association with increasing age, male sex, training received, increase in total years of service, specific protocol uses and availability of resources.

There was significant association for training attendance and availability of resources with practice of respiratory hygiene. Practice of respiratory hygiene and waste disposal and decontamination was also almost equal among different age groups and between the two sexes. Use of specific protocol and availability of resources both had positive association with good practice of waste disposal.

### **Hindrances to Practice**

There was a positive effect for availability of resources on practice of standard precautions. So, lack of these resources was a hindrance to the practice of standard precaution. The essential resources readily available were gloves (94.8%) puncture free containers (86.5%), colour coded bags (77.8%) and signboards (71%). Alcohol based hand rub (9.2%) and safe receptacles (0.9%) were least available. This could be one of the reasons due to which good awareness in hand hygiene was not reflected in the practice.

### **Other Findings**

Significant positive association was noted between increasing age and awareness in respiratory hygiene and hand hygiene. There was significant association between profession and training attendance. Trainings in standard precautions and blood safety were more likely to be attended by lab technicians.

The Hepatitis B vaccination was taken by 68.6% of respondents only. This was comparable with the findings of a study among nurses in Kolkata where only about 52.5% respondents were protected by hepatitis B vaccination(24). Doctors were most likely to be vaccinated (97.4%). Only 33.7% of nursing assistants were vaccinated.

## **Strengths And Limitations Of The Study**

The study included four categories of health personnel from four different types of health care settings. The response rate across the four categories was complete. The collection of data was done entirely by direct interview by the same investigator to reduce bias.

This study is limited to the Public sector institutions in one Taluk, so the results may not be generalised. Also, the data was collected purely by subjective means.

## Conclusion

The study revealed that awareness, and practice of standard precautionary measure were only 11.38%, and 5.5% respectively, but the relative awareness and practice in individual aspects of the standard precautions varied the job category, availability of resources, and training obtained. It was seen that good awareness on certain aspects of the standard precautions were not translated into practice due to unavailability of resources that will facilitate the practice. It was also observed that availability of resources like protocols, signboards etc made up for the comparatively low awareness of some other aspects to some extent and facilitated the practice of these measures. In light of these findings, it can be concluded that the trainings on standard precautions to the health personnel needs to be reviewed to suit each job category, and adequate resources be made available in the health care settings to ensure good awareness and practice of the standard precautions.

## Declarations

**Conflict of Interest:** There is no conflict of interest.

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## Figures

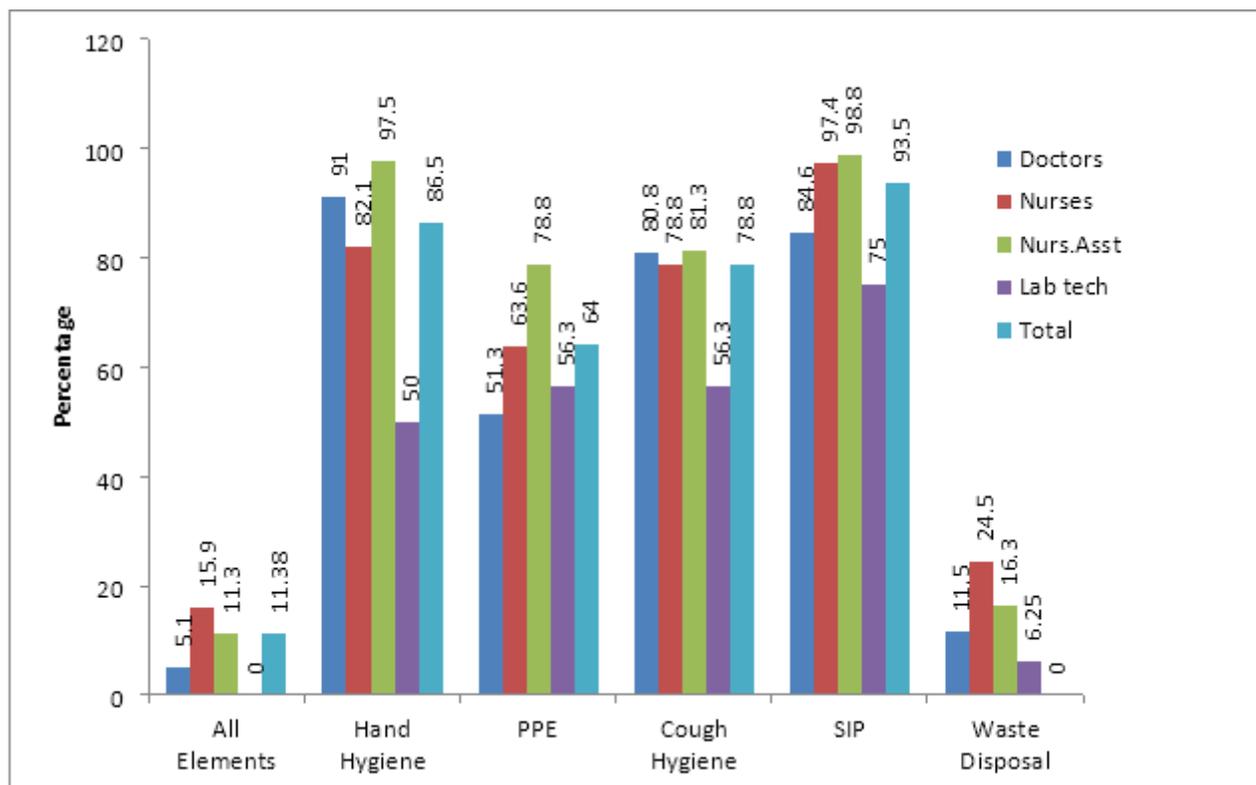


Figure 1

## Awareness on Standard Precautions

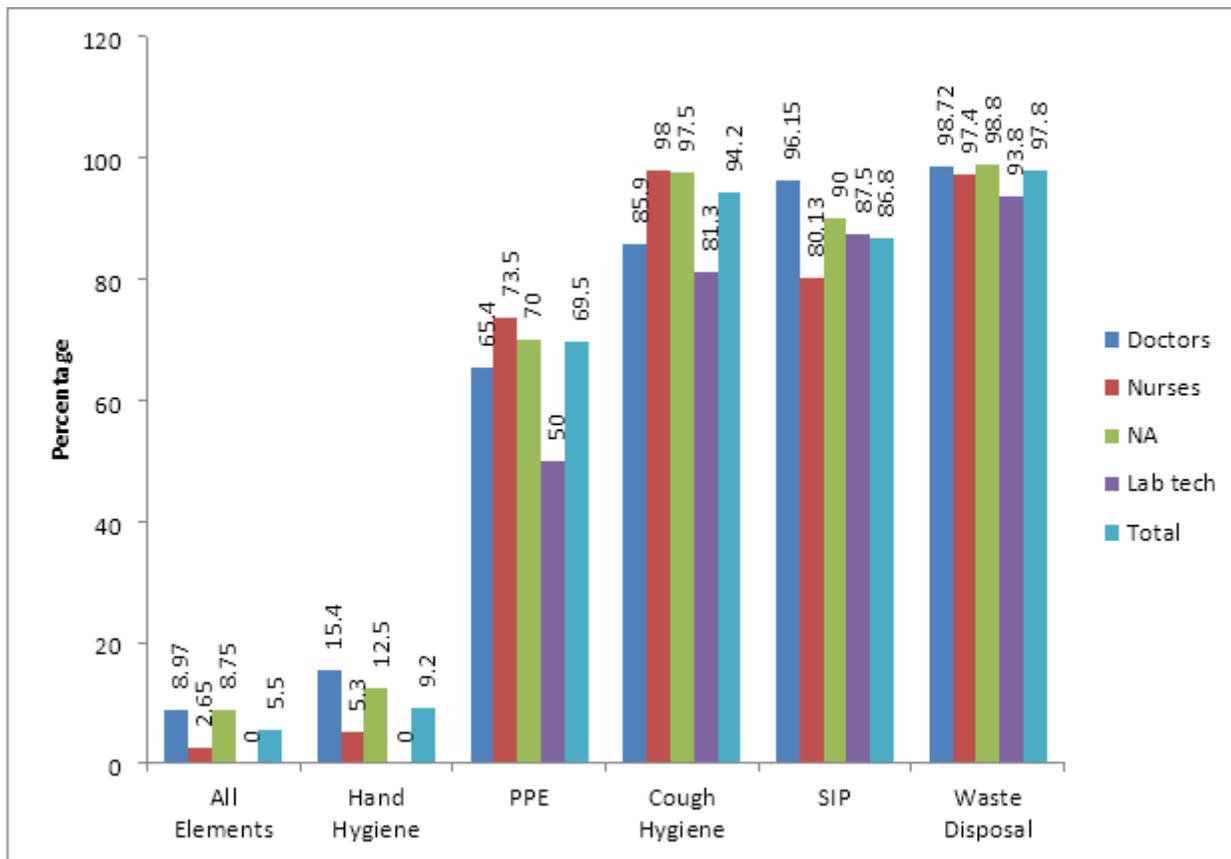


Figure 2

Practice of standard precautions