



CHAPTER IV

RESULTS

The results of this cross-sectional survey, conducted to assess the ‘level of knowledge, attitude, and practice of standard and transmission-based precautions in tertiary and secondary health care settings of Maldives, will be presented in the following sequence.

- 4.1 Socio-demographic data
- 4.2 Questionnaire return rate
- 4.3 Descriptive data on knowledge, attitude, and practice of standard and transmission-based precautions
- 4.4 Association of standard and transmission-based precautions practice and the following factors: age, sex, education, years of work experience, and training on infection control practices and place of work
- 4.5 The level of knowledge, attitude, and practice of standard and transmission-based precautions among doctors and nurses in tertiary and secondary health care settings
- 4.6 Association of knowledge and standard and transmission-based precaution practice
- 4.7 Association of attitude and standard and transmission-based precaution practice
- 4.8 Findings of observation

4.1 Socio-demographic data

The total number of respondents was 294 which include 70 doctors and 224 nurses. Sampled population of IGMH, ADK hospital and Thinadhoo R. hospital include doctors (58.6%, 28.6%, and 12.9% respectively) and nurses (67.4%, 20.5%, and 12.1% respectively). The age group was less than 40 years for both doctors and nurses. Among respondents 75.0% of doctors were male, and 95.8% nurses were female. Majority of the respondents (doctors and nurses) were married. Percentage of medical officers, registrars and consultants were (38.6%, 34.3% and 27.1% respectively). Positions held by nurses consisted staff nurses, senior staff nurses, and clinical nurses / ward sisters (81.3%, 13.4%, and 5.4% respectively). Focusing on years of work experiences 29.4% doctors and 55% nurses were in the category (0-5 years). Looking into training on infection control practices nearly half of the respondents which is 44.9% (36.2% of doctors and 47.5% nurses) did not attend any form of training program. Details of socio-demographic characteristics are given in the table (4.1)

Table 4.1: Distribution of frequencies and percentages of doctors and nurses by socio-demographic data

Socio-demographic data		Group [n (%)]		
		Doctors n=70	Nurses n= 224	Total
Place of work	IGM Hospital	41 (58.6)	151 (67.4)	192 (65.3)
	ADK Hospital	20 (28.6)	46 (20.5)	66 (22.4)
	Th. Regional Hospital	9 (12.9)	27 (12.1)	36 (12.2)
Age (years)	< 40	54 (79.4)	206 (92.8)	260 (89.7)
	> 40	14 (20.6)	16 (7.2)	30 (10.3)
Gender	Male	51 (75.0)	9 (4.2)	60 (21.1)
	Female	17 (25.0)	207 (95.8)	224 (78.9)
Marital status	Single	17 (24.3)	94 (42.2)	111 (37.9)
	Married	53 (75.7)	129 (57.8)	182 (62.1)
Working area	Medical	14 (51.9)	13 (48.1)	27 (9.3)
	Surgical	6 (33.3)	12 (66.7)	18 (6.2)
	Specialty	27 (22.5)	93 (77.5)	120 (41.2)
	Others	22 (17.5)	104 (82.5)	126 (43.3)

Table 4.1: (continued) Distribution of frequencies and percentages of doctors and nurses by socio-demographic data

Socio-demographic data		Group [n (%)]		
		Doctors n = 70	Nurses n = 224	Total
Position	Medical officers	27 (38.6)		27 (9.2)
	Registrars	24 (34.3)		25 (8.2)
	Consultants	19 (27.1)		19 (6.5)
	Staff nurses		182 (81.3)	182 (61.9)
	Senior Staff nurses		30 (13.4)	30 (10.2)
	CN/WS/Supervisor		12 (5.4)	12 (4.1)
Education	MBBS	26 (37.1)		27 (8.8)
	PG/MD	44 (62.9)		44 (15.0)
	DN		181 (61.6)	181 (61.6)
	Bsc. Nursing		41 (13.9)	41 (13.9)
	Msc. Nursing		2 (0.9)	2 (0.7)
Work experience (years)	0-5	26 (29.4)	118 (54.9)	144 (51.2)
	6-10	17 (25.8)	74 (34.4)	91 (32.4)

Table 4.1: (continued) Distribution of frequencies and percentages of doctors and nurses by socio-demographic data

Socio-demographic data		Group [n (%)]		
		Doctors n=70	Nurses n= 224	Total
Work experience (years)	11-15	8 (12.1)	15 (7.0)	23 (8.2)
	> 15	15 (22.7)	8 (3.7)	23 (8.2)
Training on infection control practices	No training	25 (36.2)	105 (47.5)	130 (44.8)
	Training program	13 (18.8)	37 (16.7)	50 (17.2)
	Workshop/Seminar	17 (24.6)	29 (13.1)	46 (15.9)
	In-service education program	14 (20.3)	50 (22.6)	64 (22.1)

4.2 Frequencies and percentages of socio-demographic data by place of work

Majority of the respondents were less than 40 years of age in all the three institution. The percentage of females was very high as most of the nurses working in these hospitals were females. The proportion of married people was highest in IGMH which was 52.8%, 50.01% and 68.1% respectively. Looking into position the highest percentage (15.2%) of specialized doctors was from ADK hospital and The highest percentage (11.1%) of registrars was from Thinadhoo R. hospital which was and

medical officers from IGMH (10.4%). The highest percentage (34.8%) of degree nurses was from ADK hospital and majority of the respondents (72.2%) from Thinadhoo R. Hospitals were diploma level nurses. Work experience of the respondents is in the category of 0-5 years from all three hospitals (73.5%, 63.9% and 43.0% respectively). The highest percentage (43.1%) of respondents who completed a training program on infection control practices was ADK. Highest percentage (56.3%) of respondents with no training was reported from IGMH.

Working area or departments were divided as 'medical', 'surgical', 'specialties' and 'others', as there were several departments. Some departments consist of only 1 or 2 doctors. Doctors and nurses working only in medical and surgical areas were separated and the rest of the specialized doctors were kept in the specialized category. Doctors and nurses working in 'other' departments were those who work in miscellaneous departments. In this regard the highest number of staff comprised from IGMH was working in the 'medical field' and at ADK Hospital and Thinadhoo R. Hospital in 'other' departments (27.8% and 21.4%).

Table 4.2: Distribution of frequencies and percentages of socio-demographic data by place of work

Socio demographic data		Institution			
		Thindhoo R. Hospital [n (%)]	ADK Hospital [n (%)]	IGMH [n (%)]	Total [n(%)]
Age	< 40	22 (64.7)	61 (93.8)	177 (92.7)	260 (89.7)
	> 40	12 (35.3)	4 (6.2)	14 (7.3)	30 (10.3)
Gender	Male	11 (32.4)	18 (27.7)	31 (16.8)	60 (21.1)
	Female	23 (67.6)	47 (72.3)	154 (83.2)	224 (78.9)
Marital status	Single	17 (47.2)	33 (50.0)	61 (31.9)	111 (37.9)
	Married	19 (52.8)	33 (50.0)	131 (68.1)	183 (62.1)
Education	MBBS	3 (8.3)	3 (4.5)	20 (10.4)	26 (8.8)
	Specialized	6 (16.6)	17 (25.8)	21 10.9	44 15.0
	DN	26 (72.2)	23 (34.8)	132 (68.8)	181 (61.6)
	BSc Nursing	1 (2.8)	23 (34.8)	17 (8.9)	41 (13.9)
	MSc Nursing	0 (0.0)	0 (0.0)	2 (1.0)	2 (0.7)

Table 4.2: (continued) Distribution of frequencies and percentages of socio-demographic data by place of work

Socio-demographic data		Institution			
		Thinadhoo R. Hospital [n (%)]	ADK Hospital [n (%)]	IGMH [n (%)]	Total [n(%)]
Position	Registrars	4 (11.1)	6 (9.1)	14 (7.3)	24 (8.2)
	Consultants	2 (5.6)	10 (15.2)	7 (3.6)	19 (6.5)
	Staff nurses	25 (69.4)	32 (48.5)	123 (64.1)	180 (61.4)
	Senior staff nurses	2 (5.6)	12 (18.2)	16 (18.3)	30 (10.2)
	Clinical Nurse/Ward sister	0 (0.0)	2 (3.0)	12 (6.3)	14 (4.8)
Department	Medical	1 (2.8)	3 (4.6)	23 (12.1)	27 (9.3)
	Surgical	3 (8.3)	2 (3.1)	13 (6.8)	18 (6.2)
	Specialties	5 (13.9)	25 (38.5)	90 (47.4)	120 (41.2)
	Others	27 (75.0)	35 (53.8)	64 (33.7)	126 (43.3)
Training on infection control practices	No training	16 (14.8)	6 (9.2)	108 (56.3)	130 (44.8)
	Training program	5 (15.2)	28 (43.1)	17 (8.9)	50 (17.2)
	Seminar / Workshop	5 (15.2)	13 (20.0)	28 (14.6)	46 (15.9)
	In-service education	7 (21.2)	18 (27.7)	39 (20.3)	64 (22.1)

4.3 Questionnaire return rate:

Questionnaire return rate was 84.03%. The return rate both by doctors and nurses of ADK hospital were 100%. Questionnaire return rate was lowest by doctors in both Thinadhoo R. Hospital and IGMH (75.0% and 67.2% respectively).

Table 4.3: Questionnaire return rate

Institution	Groups	Total Number of questionnaires distributed	Total number of questionnaires returned	Returned rate
IGMH	Doctors	61	41	67.2
	Nurses	159	151	95.0
ADK Hospital	Doctors	20	20	100
	Nurses	46	46	100
Thinadhoo R Hospital	Doctors	12	9	75.0
	Nurses	32	27	84.4
Total		337	294	84.03

4.4 Knowledge, attitude, and practice of standard and transmission – based precautions by the respondents in the 3 health care facilities

4.4.1 Knowledge regarding standard and transmission – based precautions

Majority of the participants had low to moderate level of knowledge in all the three health care facilities. As shown in the table (4.3) 117 persons (60.2%) had low level of knowledge, 107 persons (36.4%) had moderate level of knowledge. Only 9 (3.4%) respondents reported high level of knowledge. In reference to individual institutions knowledge was lowest at IGMH. The level of knowledge represented by ADK hospital was better than the other two institutions. Details of the knowledge level are given in the table below.

Table 4.4: Frequencies and percentages of doctors and nurses knowledge level according to the place of work

Institution	Level of Knowledge (%)		
	Low	Moderate	High
IGMH	25 (69.4)	9 (25.0)	2 (5.6)
ADK Hospital	37 (56.1)	29 (43.9)	0 (0.0)
Thinadhoo R. Hospital	115 (59.9)	10 (27.8)	8 (4.2)
Total	117 (60.2)	107 (36.4)	10 (3.4)

Inquiries regarding knowledge included various components of standard and transmission-based precautions including definitions and aims of standard and transmission-based precautions. Details of the questions are given in the table (4.4).

One of the knowledge area deprived was about the time required to apply transmission-based precautions with 27.9% of correct answers. There was a problem in selecting appropriate barrier for respiratory protection as well. Scores of correct answers for this question (no.14) was 21.2%. Poor performance was found for the question regarding change of gloves if hands moved from contaminated 'body site' to 'clean body site'. Only 38.4% of answers were correct. The weakest area of knowledge amongst all was 13.3% for the questions on cause of skin irritation after hand washing.

Table 4.5: Frequencies and percentages of correct and incorrect answers among health care workers for questions related to knowledge.

S.No	Item of knowledge regarding standard and transmission-based precaution	Participants answer the questions correctly [n (%)]	Participants answer the questions incorrectly [n (%)]
1	Definition of standard precautions	249 (84.7)	40 (13.6)
2	Aim of standard precautions	202 (68.7)	90 (30.6)
3	Hand washing after removing gloves	225 (86.7)	35 (11.9)
4	Cause of skin irritation due to hand washing	39 (13.3)	245 (83.3)
5	Removing gown and washing hands before leaving patient's environment	232 (78.9)	60 (20.4)
6	Immediate actions required for sharp injuries	251 (85.4)	40 (13.6)

Table 4.5: (continued) Frequencies and percentages of correct and incorrect answers among health care workers for questions related to knowledge.

S.No	Item of knowledge regarding standard and transmission-based precaution	Participants answer the questions correctly [n (%)]	Participants answer the questions incorrectly [n (%)]
7	The most appropriate and most cost-effective barrier during venepuncture	163 (55.4)	129 (43.9)
8	Change of gloves if hands moved from 'contaminated body site' to 'clean body site'	114 (38.8)	176 (59.9)
9	The role of hospital administration for adequate sterilization of equipments	241 (82.0)	47 (16.0)
10	Linen handling	228 (77.6)	64 (21.8)
11	Health care providers as part of waste management program	244 (82.7)	45 (15.3)

Table 4.5: (continued) Frequencies and percentages of correct and incorrect answers among health care workers for questions related to knowledge.

S.No	Item of knowledge regarding standard and transmission-based precaution	Participants answer the questions correctly [n (%)]	Participants answer the questions incorrectly [n (%)]
12	Whom to apply transmission-based precaution	82 (27.9)	210 (71.4)
13	Characteristic of ideal protective environment	170 (57.8)	112 (38.1)
14	Item required for respiratory protection in transmission-based precautions	62 (21.1)	229 (77.9)
15	Isolation of patients with infectious diseases	151 (51.4)	141 (48.0)

4.4.2 Attitude towards standard and transmission – based precautions

Majority of the respondents had neutral attitude towards standard and transmission-based precautions as shown in the table 4.5. The level of neutral attitude was 73.4% in comparison with 11.3% negative attitude and 15.4% positive attitude. The highest positive attitude was demonstrated by the respondents of ADK hospital (36.4% compared with 8.3% and 14.3%).

Table 4.6: Attitude towards standard and transmission – based precautions

Institution	Level of attitude [n (%)]		
	Negative	Neutral	Positive
IGMH	27 (14.1)	149 (77.6)	16 (8.3)
ADK Hospital	2 (3.0)	40 (60.6)	24 (36.4)
Thinadoo R Hospital	4 (11.4)	26 (74.3)	6 (14.3)
Total	33 (11.3)	215 (73.4)	45 (15.4)

Opinions obtained from the participants regarding standard and transmission-based precautions included the purpose of standard and transmission-based precautions, use of PPE in different circumstances, hand washing and various other components of standard and transmission – based precautions. Details of the questions are given in the table (4.5).

The principle that standard and transmission-based precautions practice can prevent spread of infection was very strongly believed with a mean score of 4.61. Even though majority of the respondents had neutral attitude, scores of question number 4 and 7 demonstrated negative attitude. The mean score for question number 4* 'standard precaution is not easy to follow' was 3.30. And mean score for question number 7* 'wearing PPE is difficult to work' was 3.42. These findings indicate that the respondents were not as positive as they were towards other statements.

Table 4.7: Frequencies, percentages and mean scores of doctors and nurses level attitude towards standard and transmission-based precautions.

Statement	Frequency [n (%)]					Mean
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	
1.Standard and transmission-based precautions can prevent spread of infection	4 (1.4)	4 (1.4)	1 (.3)	82 (27.9)	195 (66.3)	4.61
4*.Standard precaution is not easy	66 (22.4)	79 (26.9)	60 (20.4)	56 (19.0)	19 (16.5)	3.42

Table 4.7: (continued) Frequencies, percentages and mean scores of doctors and nurses level attitude towards standard and transmission-based precautions

Statement	Frequency [n (%)]					Mean
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	
5. Multi-dose vials should be provided rather than single dose vials	5 (1.7)	6 (2.0)	15 (5.1)	127 (43.2)	131 (44.6)	4.31
6*. All should ensure availability of protective barriers	13 (4.4)	35 (11.9)	29 (9.9)	137 (46.6)	73 (24.8)	3.77
7. Wearing PPE is difficult to work	28 (9.5)	71 (24.1)	18 (6.1)	122 (41.5)	45 (15.3)	3.30
8. Wear gloves for venepuncture	4 (1.4)	10 (3.4)	37 (12.6)	79 (26.9)	160 (54.4)	4.31

Table 4.7: (continued) Distribution, frequencies, percentages and mean scores of doctors and nurses level attitude towards standard and transmission-based precautions

Statement	Frequency [n (%)]					Mean
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	
9*. Preference to wash hand before and after procedure	5 (1.7)	14 (4.8)	22 (7.5)	119 (40.5)	128 (43.5)	4.22
10*. Using PPE harm patients psychologically, so should not use them	8 (2.7)	13 (4.4)	6 (2.0)	65 (22.1)	199 (67.7)	4.49
11*. No need to change heavily contaminated gloves during procedures	7 (2.4)	20 (6.8)	16 (5.4)	105 (35.4)	141 (48.0)	4.22
12. Telephones, door knobs are not sources on infections	8 (2.7)	18 (6.1)	16 (5.4)	123 (41.8)	122 (41.5)	4.15
13. Segregation of waste prevents transmission of infections	7 (2.4)	17 (5.8)	21 (7.1)	133 (45.2)	111 (37.8)	4.11

Table 4.7:(continued).Frequencies, percentages and mean scores of doctors and nurses level attitude towards standard and transmission-based precautions

Statement	Frequency [n (%)]					Mean
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	
14. Adequate disinfection of equipments should be ensured by all staff	5 (1.7)	7 (2.4)	6 (2.0)	105 (35.7)	164 (55.8)	4.44
15*. Using transmission-based precaution for suspected cases is waste of resources	13 (4.4)	35 (11.9)	27 (9.2)	72 (24.5)	140 (47.6)	4.01

4.4.3 Standard and transmission based - precautions practices

In accordance with the self reported questionnaire, the practices reported regarding standard and transmission-based practice were moderate to high. The percentage for high level of practice 47.0% was achieved by ADK hospital. The lowest score 28.6% for high practice was obtained by IGMH.

Table 4.8: Frequencies and percentages of doctors and nurses level of practice by place of work

Institution	Level of practice (%)		
	Low	Moderate	High
IGMH	20 (10.4)	117 (60.9)	55 (28.6)
ADK Hospital	7 (10.6)	28 (42.4)	31 (47.0)
Thinadhoo R. Hospital	3 (8.8)	17 (50.0)	14 (41.2)
Total	30 (10.3)	162 (55.5)	100 (34.2)

Table 4.9: Frequencies, percentages, and mean scores of standard and transmission - based precaution practice

	Frequency [n (%)]					Mean
	Never	Seldom	Sometimes	Often	Very often	
1. Wash hands immediately if obviously soiled	2 (.7)	3 (1.0)	5 (1.7)	53 (18.0)	228 (77.6)	4.73
*2. Wash hands before and after procedure	1 (.3)	22 (7.5)	97 (33.0)	164 (55.8)	284 (96.6)	4.49
3. Wash hands or use hand rub in-between patients	8 (2.7)	10 (3.4)	59 (20.1)	97 (33.0)	106 (36.1)	4.00
*4. Do not wear gown and gloves for contact precaution	148 (50.3)	43 (14.6)	52 (17.7)	26 (8.8)	11 (3.7)	4.02
5. Protect face and eyes if likely to get soiled with blood and body fluids	40 (13.6)	28 (9.5)	47 (16.0)	76 (27.9)	95 (32.3)	3.56

Table 4.9: (continued) Frequencies, percentages, and mean scores of standard and transmission based precaution practice.

	Frequency [n (%)]					Mean
	Never	Seldom	Sometimes	Often	Very often	
*6. Do not wear mask during suctioning	136 (46.3)	35 (11.9)	57 (19.4)	39 (13.3)	23 (7.8)	3.76
7. Wear mask if indicated for airborne precaution	4 (1.4)	4 (1.4)	23 (7.8)	73 (24.8)	182 (61.9)	4.49
8. Wear gloves for venepuncture	4 (1.4)	10 (3.4)	37 (12.6)	79 (26.9)	160 (54.4)	4.31
*9. Does not use mask to care patients with pneumonia	151 (51.4)	33 (11.2)	55 (18.7)	30 (10.2)	22 (7.5)	3.89
*10. Avoid PPE if in hurry to attend emergencies	18 (6.1)	26 (8.8)	126 (42.9)	39 (13.3)	80 (27)	3.47

Table 4.9: (continued) Frequencies, percentages, and mean scores of standard and transmission based precaution practice

	Frequency [n (%)]					Mean
	Never	Seldom	Sometimes	Often	Very often	
*11. Recap needles use both hands	133 (45.2)	22 (7.5)	28 (9.5)	57 (19.4)	49 (16.7)	3.46
12. Dispose sharps into a puncture resistant container	9 (3.1)	5 (1.7)	6 (2.0)	46 (15.6)	221 (75.2)	4.62
13. Report incidents of needle stick injury	13 (4.4)	12 (4.1)	27 (9.2)	93 (31.6)	145 (49.3)	4.19
14. Advise or change wound dressing if soiled with blood and body fluids	3 (1.0)	1 (.3)	20 (6.8)	75 (25.5)	191 (65.0)	4.55
15. Ensure regular cleaning and disinfection of working environment	0 (.0)	5 (1.7)	11 (3.7)	82 (27.9)	190 (64.6)	4.59

4.5 Association of socio-demographic data and practice of standard and transmission-based precautions

The socio-demographic characteristic that has shown a significant association with standard and transmission – based precaution was marital status with p - value of 0.002. A marginally significant association was found between training on infection control practices with p-value of 0.09. Other socio-demographic characteristics such as age, gender, profession, educational status, position, working area, and years of work experience had no significant association (p values- 0.458, 0.202, 0.145, 0.194, 0.183, 0.588, 0.258 respectively). Training on infection control practices was just marginally significant with p – value of 0.09.

Some of the socio-demographic data had low expected value (< 5) more than 20% of cells which was not suitable for Chi-Square. Therefore these particular socio-demographic characteristics were combined to form new groups. Marital status was grouped into married and single (single, divorced, and widows were combined). The level of education was divided into three groups. Postgraduate level 1 included all specialized doctors. Postgraduate level 2 included MBBS doctors and Masters and Bachelor degree nurses. The next was undergraduate level and all diploma nurses were in this group. Training on infection control practices were made into two groups combining all who had any form of training into one group.

Table 4.10: Association of socio-demographic data and practice of standard and transmission-based precautions

Socio-demographic data	Practice level			Total [n (%)]	Chi Square	df	p-value
	Low	Mod.	High				
Age							
< 40	27 (10.4)	141 (54.2)	92 (35.4)	260	1.564	2	.458
> 40	3 (10.3)	19 (65.5)	7 (24.1)	29			
Gender							
Male	7 (11.7)	38 (68.3)	15 (25.0)	60	3.202	2	.202
Female	21 (9.5)	118 (53.2)	83 (37.4)	222			
Marital status							
Single/Widow/divorced	7 (6.4)	52 (47.3)	51 (46.4)	110	12.154	2	.002
Married	23 (12.7)	109 (60.2)	49 (27.1)	181			
Profession							
Doctor	10 (14.3)	42 (60.0)	18 (25.7)	70	3.739	2	.154
Staff Nurse	20 (9.0)	120 (54.1)	82 (36.9)	222			

Table 4.10 (continued) Association of socio-demographic data and practice of standard and transmission-based precautions

Socio-demographic data	Practice level			Total [n]	Chi Square	df	p-value
	Low	Mod	High				
Education							
Postgraduate level 1	7	46	19	69	6.072	6	.194
Specialized doctors	(15.9)	(66.7)	(27.5)				
Postgraduate level 2	4	46	19	44			
MBBS	(5.8)	(66.7)	(27.5)				
MSc/BSc Nursing							
Undergraduate	19	94	66	179			
Diploma in Nursing	(10.6)	(52.5)	(36.9)				
Position							
Medical officers/Registrars	6	32	13	51	8.833	6	.183
Consultants	4	10	5	19			
Staff Nurses	16	91	71	178			
	(9.0)	(51.1)	(39.9)				
Senior Staff nurses	4	29	11	44			
	(9.1)	(65.9)	(25.0)				

Table 4.10 (continued) Association of socio-demographic data and practice of standard and transmission-based precautions

Socio-demographic data	Practice level			Total [n]	Chi Square	df	p-value
	[n (%)]						
	Low	Mod	High				
Working area							
Medical	2 (7.4)	12 (44.4)	13 (48.1)	27	4.663	6	.588
Surgical	2 (11.1)	11 (61.1)	5 (27.8)	18			
Specialty	14 (11.7)	71 (59.2)	35 (29.2)	120			
Others	11 (8.9)	67 (54.0)	46 (37.1)	124			
Work experience							
0-5 years	12 (8.5)	72 (50.7)	58 (40.8)	142	7.743	6	.258
6 – 10 years	10 (11.0)	57 (62.6)	24 (26.4)	91			
11-15 years	1 (4.3)	13 (56.5)	9 (39.1)	23			
15 years	3 (13.0)	15 (65.2)	5 (21.7)	23			

Table 4.10 (continued) Association of socio-demographic data and practice of standard and transmission-based precautions

Socio-demographic data	Practice level			Total [n]	Chi Square	df	p-value
	[n (%)]						
	Low	Mod	High				
Training on infection control practices							
No training	16 (12.6)	77 (60.6)	34 (26.8)	127	4.747	2	.093
Trained	14 (8.7)	85 (52.8)	62 (38.5)	161			

To obtain the association between knowledge, attitude, and standard and transmission-based precaution practice in the three institutions, the three levels (low, moderate and high) were divided into two groups due to low expected value (< 5) more than 20% of cells were not suitable for Chi Square test. The knowledge level was divided into 'low and 'moderate to high' groups combining both groups. Likewise attitude was divided into 'negative' and 'neutral to high' groups. And practice was divided into 'low' and moderate to 'high' groups.

As shown in the table 11 majority of staff (60.2%) had low level of knowledge. Most number of staff which was 69.4% from Thinadhoo R Hospital had

low level of knowledge compare with ADK hospital and IGMH (56.1% and 59.9% respectively). The attitude level shown towards standard and transmission-based precautions was highest by the staff of ADK hospital (97.0% compared with 88.6%, and 85.9% respectively). The association was significant with a p – value of 0.05 as shown in the table 12. Majority of the staff had moderate to high level of practice (9.9% and 90.1% respectively). The highest number for the moderate to high level of practice was reported from Thinadhoo R. Hospital (91.2%, 89.4%, and 90.4% respectively).

Table 4.11: Association of knowledge and standard and transmission-based precautions in three health care facilities

Institution	Level of Knowledge (%)		Total [n]	Chi Square	df	p-value
	Low	Moderate to high				
Thinadhoo R. Hospital	25 (69.4)	11 (30.6)	36	1.764	2	.414
ADK Hospital	37 (56.1)	29 (43.9)	66			
IGMH	115 (59.9)	77 (40.1)	192			
Total	177 (60.2)	117 (39.8)	294			

Table 12: Association of attitude and standard and transmission – based precautions in three health care facilities

Institution	Level of Attitude (%)		Total [n]	Chi Square	df	p-value
	Low	Moderate to high				
Thinadhoo R. Hospital	4 (11.4)	31 (88.6)	35	5.982	2	.050
ADK Hospital	2 (3.0)	64 (97.0)	66			
IGMH	27(14.1)	165 (85.9)	192			
Total	33(11.3)	260 (88.7)				

Table 13: Association of standard and transmission – based precautions practice in three health care facilities

Institution	Level of Practice (%)		Total [n]	Chi Square	df	p-value
	Low	Moderate to high				
Thinadhoo R. Hospital	3 (8.8)	31 (91.2)	34	.081		.096
ADK Hospital	7(10.6)	59 (89.4)	66			
IGMH	19(9.9)	173 (90.1)	192			
Total	29(9.9)	263 (90.1)	292			

4.6 Correlation between knowledge, attitude and practice of standard and transmission –based precautions

Improvement in attitude also enhanced the level of transmission-based precautions practice, for which Pearson correlation was significant at the level 0.001 ($r = .412^{**}$). No significant correlation between knowledge and practice was found ($r = -.001$, $p = .993$), however the relationship tend to be negative signifying that increase in level of knowledge may decrease the level of performance of practice.

Table 4.14: Correlation between attitude and practice

		Sum of attitude	Sum of practice
Sum of attitude	Pearson Correlation	1	.412(**)
	Sig. (2-tailed)		.000
	N	292	291
Sum of practice	Pearson Correlation	.412(**)	1
	Sig. (2-tailed)	.000	
	N	291	293

Table 4.15: Correlation between knowledge and practice

		Sum of knowledge	Sum of practice
Sum of knowledge	Pearson Correlation	1	-.001
	Sig. (2-tailed)		.993
	N	294	294
Sum of practice	Pearson Correlation	-.001	1
	Sig. (2-tailed)	.993	
	N	294	294

4.7 Observation standard and transmission-based precautions practice

All the three hospitals were observed prior introducing the questionnaire to the participants. On an average 3-4 days and 7-8 hours was daily spent in each institution. In all hospitals, the researcher was introduced by the management to the clinical staff, as a MPH student or just as a student who would observe some activities of the wards. The particular activities were kept blind.

All areas of the hospital were observed in Th. Regional hospital and in ADK Hospital including theatre and labour room. Around 11 departments among 19 were observed at IGMH including surgical ward, medical ward, neonatal intensive care unit and intensive critical care unit. Overall, availability of equipments in each hospital was observed even though this activity was not included in the initial observation guidelines. Performance of hand hygiene, use of PPE, sharp disposal procedure

including method of recapping, segregation of waste, and linen handling were observed.

4.7.1 Thinadhoo R. Hospital

Availability of facilities: Wash basins were access in each ward. Soap was available along with a towel kept for common use. Single disposable syringes gloves, ordinary masks, sharp box were available in all areas. According to nursing staff gowns, respirators and face protective equipments were not available.

Practice: Hand hygiene was performed a few times by all staff before and after contact with patients. The most frequent hand washing was performed in the dressing room both by doctors and nurses. Staff contact with blood, was noticed without immediate hand disinfection. Single disposable syringes and needles were used for all patients. Needles were recapped with both hands after use. Use of gloves for venepuncture was observed only once in the pediatric ward. Appropriate procedure for segregation of waste and linen handling were not followed.

4.7.2 ADK Hospital

Availability of facilities: Items required for hand washing were available in all premises including hand dryers. A common towel was kept in some of the areas. Single disposable syringes gloves, ordinary masks, sharp box were available in all areas. A needle destroyer was kept in the ER. According to nursing staff gowns, respirators and face protective equipments were not available even in this hospital. Proper arrangements for segregation of waste and linen were observed.

Practice: Hand hygiene was performed a few times in between patients. Single disposable syringes and needles were used for all patients. Needles were recapped with both hands after use. Two observations were made of failure to apply mask during tracheal suctioning. Only a few staff used gloves for venepuncture during the observation period. No appropriate protocols were followed for linen and waste handling such as segregation and identifying with 'bio-hazard labels'.

4.7.3 IGMH

Availability of facilities: Adequate facilities for hand hygiene were seen in all wards. Wash basins, antiseptic containing soap, paper towels, also several bottles of alcohol- based hand rub (sterillium solution) are placed in easily accessible areas. Disposable syringes, needles, sharp containers were available. In all areas of the hospital bins were kept labeled identified, for the purpose of segregation of waste (general waste and infectious waste).

Practice: More frequent hand disinfection and use of gloves for venepuncture was observed in this hospital. Except a few times most doctors used hand disinfectants during. Hand washing was least followed before procedures both by doctors and nurses. Single use, disposable syringes and needles are used for giving injections. Needles were recapped with both hands after use. Puncture proof sharp disposal containers are available in all wards. Gowns were worn by all staff in working areas such as labour room, ICCU, Neonatal Intensive Care Unit and in other such areas. Not all staff followed the protocols for segregation of waste, linen, and sharp disposal.

A better working environment was observed at IGMH compared to the other two hospitals observed. However, optimal standard and transmission-based precautions were not followed in any either hospital.