Original Research Article

Knowledge, Compliance and Determinants of Use of Standard Precautions for Infection Control among Health Care Workers – A Teaching Hospital Based Study

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Abstract

Introduction: Standard Precautions, which are easily implementable and universally acceptable interventions, can help reduce the transmission of infections in the health care setting. However, knowledge and compliance with regard to Standard Precautions remains unsatisfactory.

Materials and Method: This cross sectional study was conducted on 200 health care workers (HCWs) at ESIC Medical College & Hospital, Faridabad. A self-administered structured questionnaire with specific subsections to assess knowledge, attitude and practice of Standard Precautions was used for data collection. Regression analysis was used to analyze the relation between knowledge, attitude and compliance. Chi Square test was used to determine relation between various determinants and the knowledge and practice of Standard Precautions.

Results: Mean knowledge, attitude and compliance scores among HCWs were 11.47 ± 4.16, 7.09 ± 1.46 and 10.72 ± 2.57 respectively. A moderately positive correlation was observed between knowledge and attitude scores ($r=0.421$, $p<0.001$). Mean knowledge scores were higher for females, higher professional posts, those with previous Hepatitis B immunization and those with history of recent occupational exposure. Compliance scores were higher for females, for those with more professional post and in those with history of recent needle stick injury. A significantly greater number of females ($p=0.02$), trained HCWs ($p=0.003$), doctors & nurses ($p=0.003$), Hepatitis B immunised personnel ($p=0.003$) and those with history of recent occupational exposure ($p<0.001$) within the past 1 year had satisfactory knowledge scores. Similarly, significantly more number of female HCWs ($p=0.004$), nurses ($p=0.001$), experienced HCWs ($p=0.01$), and those with history of recent needle prick injury ($p=0.04$) achieved satisfactory compliance scores.

Conclusion: The knowledge and compliance of Standard Precautions is generally poor. Pre- induction and periodic in- house training in Standard Precautions should be mandatory for all health care workers along with compulsory Hepatitis B immunization to reduce the risk of occupational exposure in the health care setting.

Key Words: *Standard Precautions, Infection Control, Health Care Workers*

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Introduction

Standard Precautions are a set of easily implementable infection prevention interventions based on the principle that all blood and body fluids are potential sources of infection regardless of diagnosis, presumed infectious

status or health care setting.[1] These broadly include hand hygiene, use of personal protective equipment, safe handling of sharps and provision of a protective environment.[2] The prevalence of health care associated infections is 7.6% in the developed and 10.1% in the developing world.[3] 40% of Hepatitis B and C infections and 2.5% of all HIV infections in health care workers (HCWs) are occupationally acquired. 90% of these occur in developing countries.[4]The reasons for low adherence to Standard Precautions include limited knowledge, lack of appropriate facilities and staffing, non-availability of funds and high patient load. Awareness and compliance were significantly associated with training in Standard Precautions.[5] Reasons for poor adherence to Standard Precautions include work stress, time constraint, lack of supply of personnel protective equipment, lack of display of guidelines and emergency situations. [6] Assessment of the prevailing knowledge, notions and practice of Standard Precautions is thus mandatory to identify knowledge deficits and plan effective interventions specifically tailored to local needs for effective infection control.

Objectives

1. To assess the knowledge, attitude and compliance of Standard Precautions among HCWs

2. To identify determinants of knowledge and practice of Standard Precautions in HCWs

Methodology

Study setting and participants

A cross sectional study was conducted in August 2018 on HCWs working at ESIC Medical College, Faridabad to assess the knowledge, attitude and practices and identify determinants which influence the knowledge of and compliance to infection control. A sample size of 197 was calculated with 95% confidence interval and 5% margin of error. This was rounded up to 200 HCWs. Ethical approval was taken from the Institutional Ethics Committee. Participants were selected by simple random sampling from an institutional list of health care workers. All doctors, nursing staff, laboratory/OT technicians and nursing orderlies/porters and house-keeping staff employed full- time in the hospital were eligible to participate in the study. Those who refused to participate were excluded.

Study Tool

Data was collected through a self-administered questionnaire based on CDC[1], NHS[7] and WHO[8] guidelines for Standard Precautions. The structured questionnaire comprised of 4 main sections- one each on demographic data, knowledge, attitude and compliance related questions. The questionnaire was tested for content validity by experts in Standard Precautions and for internal consistency (Cronbach's alpha = 0.72). After informed consent, the questionnaire was administered to participants. For those with language-related difficulties, translation was provided. The demographic details in Part I included data on age, gender, professional post held, marital status, prior training in Standard Precautions, total job experience, history of immunisation against Hepatitis B and needle prick injury. In Part II, 10 multiple choice questions tested knowledge of Standard Precautions. One point was awarded to each correct answer. No points were awarded for incorrect answers. In order to reduce guessing and chance selection of an option, questions were designed so that a question could have multiple correct answers. The knowledge score ranged from 0-20. Part III comprised of 10 questions that tested attitude towards Standard Precautions use. A correct response was given 1 point and an incorrect response was given no points. Attitude score ranged from 0 to 10. Part IV comprised of 15 multiple choice questions testing compliance to Standard Precautions. Correct response was awarded one point and no points were given for incorrect response. Score ranged from 0 to 15.

Statistical Analysis

For any HCW, knowledge, attitude or compliance score of $\geq$ 70% was considered satisfactory and < 70% was considered unsatisfactory. Data was checked for completeness and consistency and was statistically analysed using SPSS 17.0 software. Frequencies and percentages of demographic variables, and average scores with Standard Deviation (SD) for knowledge, attitude and compliance of Standard Precautions were obtained. The knowledge, attitude and compliance among HCWs was evaluated vis-a-vis demographic variables, h/o training in Standard Precautions, immunization and h/o needle prick injury. Chi Square test was used to measure association between the categorical variables and $p \leq$

0.05 was considered significant. Regression analysis was used to investigate the association between knowledge, attitude and practice of Standard Precautions.

Results

The baseline characteristics of the study population are detailed in Table1. Only 68.5 % had received complete Hepatitis B immunization. Of these, 33 (52.4%) HCWs were occupationally exposed in the past 1 year. Only 56.5 % of the HCWs had received prior training in Standard Precautions. Amongst the exposed, majority (56.3%) were untrained in Standard Precautions (p=0.001).

Only 28%, 36% and 54.5 % of the HCWs attained satisfactory knowledge, attitude and compliance scores respectively. (Figure 1)

The mean knowledge, attitude and compliance scores among HCWs were 11.47 $\pm$ 4.16, 7.09 $\pm$ 1.46 and 10.72 $\pm$ 2.57 respectively. A significant moderate positive correlation was observed between mean knowledge and attitude scores (r=0.421, p<0.001).

Females had significantly higher mean knowledge scores (p=0.01). Mean knowledge scores were also significantly higher (p=0.006) for higher professional posts held. Also, mean knowledge scores were significantly higher in HCWs who had received prior Hepatitis B immunization (p=0.024). Similarly, scores were significantly higher in those with occupational exposure in the preceding year (p=0.003). No significant difference in scores was seen with respect to age, marital status, years of experience and prior training in use of Standard Precautions.

Mean compliance scores were significantly higher for females (p=0.001). They also increased significantly with higher professional post (p<0.001). Mean scores were higher in those who received a needle prick in the preceding year. (p=0.003)

Mean attitude scores were significantly higher for older (p<0.001) and married HCWs (p=0.012). Mean attitude score was also better in those who had received prior training in use of Standard Precautions (p=0.001) and in those who had sustained needle prick/ sharps injury in the previous 1 year (p=0.004).

Further, after grouping HCWs as per satisfactory and unsatisfactory knowledge, attitude and compliance scores, determinants of good performance under each of these categories were then analysed.

A significantly greater number of female HCWs (p=0.02), trained HCWs (p=0.003), doctors & nurses (p=0.003), Hepatitis B immunised personnel (p=0.003) and those with history of recent occupational exposure (p<0.001) within the past 1 year had satisfactory knowledge scores. (Figure 2) Similarly, significantly more number of female HCWs (p=0.004), nurses (p=0.001), experienced HCWs (p=0.01), and those with history of recent needle prick injury (p=0.04) achieved satisfactory compliance scores. (Figure 3)

Table 2 demonstrates data regarding compliance to certain key components of Standard Precautions in our subjects and compares it with data from other authors.[6,9,10,11,12]

Table 1. Baseline characteristics of study population

	No of HCWs (N=200)	**Percentage**
Age distribution		
< 30 years	122	61.0
31-40 years	55	27.5
41-50 years	18	9.0
50-60 Ears	2	1.0
>60 years	3	1.5

Cont... **Table 1. Baseline characteristics of study population**

Sex		
Male	90	45.0
Female	110	55.0
Marital status		
Married	122	61.0
Unmarried	78	39.0
Professional Post held		
Doctor	110	55.0
Nursing staff	39	19.5
Lab technicians	23	11.5
Nursing orderlies	14	7.0
Housekeeping staff	14	7.0
Years of Experience		
<1 year	32	16.0
1-5 years	102	51.0
6-10 years	32	16.0
>10 years	34	17.0
Whether received training in Standard Precautions		
Yes	113	56.5
No	87	43.5
Received Hepatitis B immunization		
Yes	137	68.5
No	63	31.5
Overall Significant Occupational Exposure within last 1 year		
Yes	87	43.6
No	113	56.5
Needle Prick/Sharps Injury within last 1 year		
Yes	65	32.5
No	135	67.5

Table 2. Comparison of the Practice of Standard Precautions by HCWs in various studies

	Chaudhari et al6	Fayaz et al9	Kotwal et al10	Ogoina et al11	Paul et al12	Present study
Glove use when exposed to body fluids/blood/products	24%	92.6%	85%	96.5%	87%	94%
Hand hygiene	79.6%	83.0%	52%	95.8%	79%	91%
Use facemask to prevent splash	35.2%	87.7%	54%	-	74%	72%
Do not recap needle after use	18.2%	42.2%	60%	47.7%	53%	39%
Practice proper waste sharp disposal	61.2%	90.3%	89%	-	-	48.4%

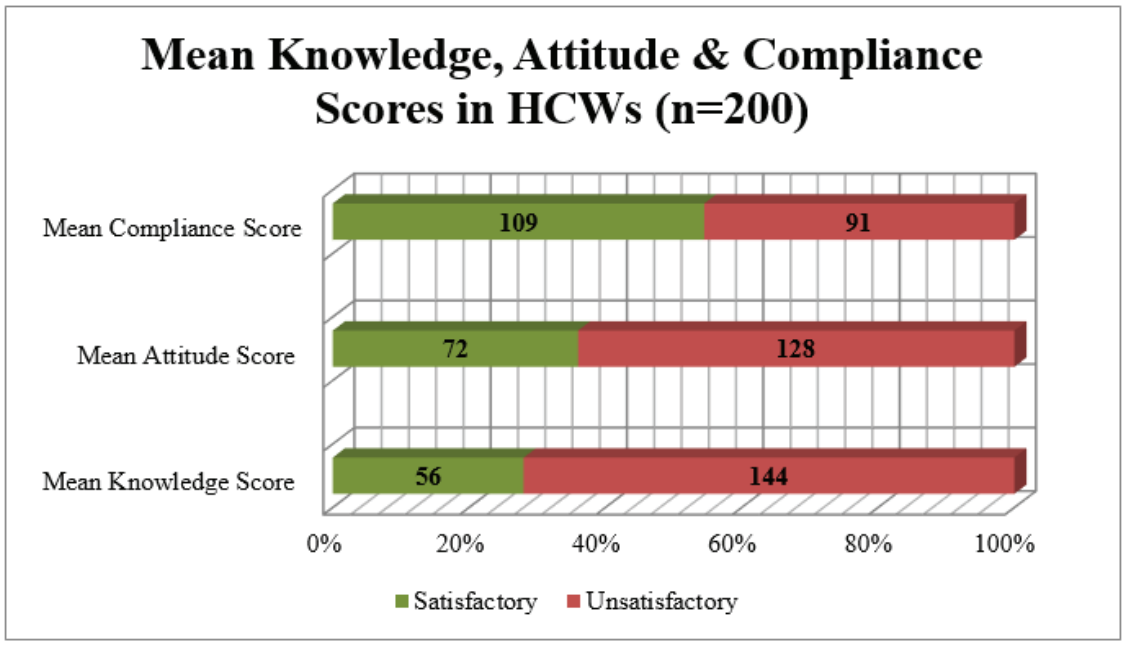

Figure 1. Distribution of HCWs vis-à-vis Satisfactory and Unsatisfactory Scores

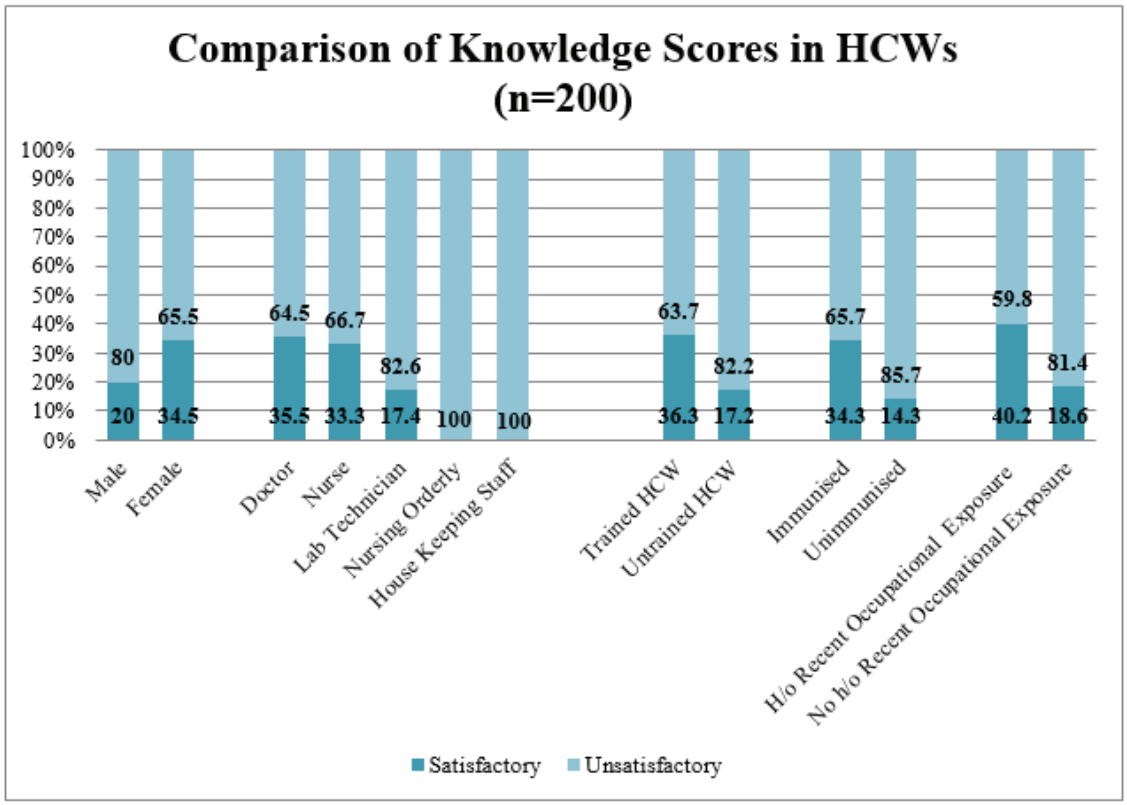

Figure2. Determinants of "Satisfactory" Knowledge of Standard Precautions amongst HCWs

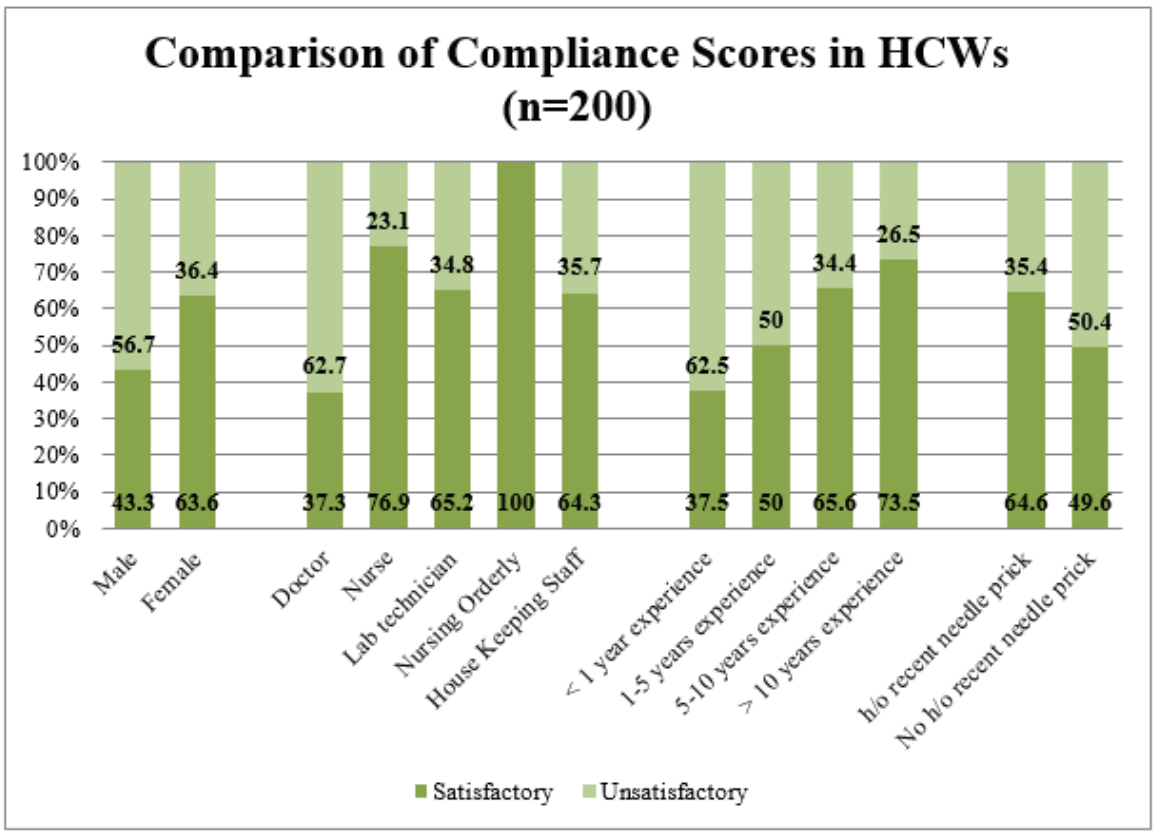

Figure 3. Determinants of "Satisfactory" Compliance to Standard Precautions amongst HCWs

Discussion

Mean per cent knowledge, attitude and compliance scores (in per cent) were 57.3%, 70.9%, 71.46%. Knowledge of Standard Precautions in HCWs was found to be very unsatisfactory. Attitude and compliance scores were satisfactory. The discrepancy in knowledge and practice, and the observed upward trend in scores from knowledge to attitude to compliance could be result with a social desirability bias amongst the participants. The actual compliance is likely to be lower amongst HCWs. A similar discrepancy in mean knowledge and practice scores is detailed in another study.[5] In a study conducted on Iranian subjects, the mean knowledge, attitude and practice scores were 83.5%, 72.4% and 73.4% respectively. Only 45% HCWs were found to possess 'Good' knowledge. Despite a high mean compliance score in HCWs, only 45.5% were able to attain a compliance score of >70%.[13]

A moderately positive correlation was observed between knowledge and attitude scores but not among other parameters. Mean knowledge scores were higher for females, higher professional posts, those with previous Hepatitis B immunization and those with history of recent occupational exposure. Compliance scores were higher for female HCWs, for those with higher professional posts and those with history of recent needle prick injury. In the previously quoted Iranian study, knowledge scores were higher in married HCWs (40.28 v/s 36.17, p=0.01). Practice scores were similarly higher in married HCWs (35.15 v/s 32.00, p=0.002) and in trained professionals (35.45 v/s 31.81, p=0.01).[13] Other researchers have noted that the odds of having adequate knowledge of as well as compliance to Standard Precautions were significantly greater in older HCWs, in those with more years of service and higher professional post held. Also, increasing age and history of Hepatitis B immunization improved odds of good knowledge but did not significantly affect compliance.[9]

We observed that use of gloves, hand hygiene and personal protective equipment has achieved acceptable, but not ideal levels. With respect to sharp handling and disposal, we lag behind other comparable studies.[6,9,10,11,12] (Table 3)

Amongst our subjects, 32.5 % reported a needle stick/sharps injury in the preceding year. This is lower than studies in other teaching hospitals where incidence ranges from 47%- 53%.[5,14,15,16]

68.5% of HCWs were immunized against Hepatitis B. Of the 63 non immunized individuals, 42.7% had sustained a needle prick injury in the past 1 year alone. This suggests that there is a need to specifically target younger HCWs, newer recruits and those at lower professional rungs by quality induction and periodic in- house training and orientation of HCWs. Similarly, Hepatitis B immunization could be made mandatory before induction to duty and active 'mop-up' immunization drives could target non immune in- house candidates.

It was noted that training in Standard Precautions had significantly improved attitude towards use of Standard Precautions. However, there was no appreciable difference in knowledge or compliance amongst trained and untrained HCWs which indicates a need for improvement in the quality and content of training.

We encountered a participation bias and over representation of doctors in the sample due to reluctance in other HCWs to participate. Also, the observed disproportion between knowledge and compliance scores (social desirability bias) could be avoided by introducing an OSCE or clinical observation component in future studies.

Conclusion

The knowledge and compliance of Standard Precautions is generally poor amongst a majority of health care workers. The factors responsible for poor knowledge and compliance include male sex, younger age, less years of service, lower professional post and lack of prior training of Standard Precautions. There is a moderate correlation between knowledge of Standard Precautions and attitude towards compliance. It is concluded that pre- induction and periodic in- house training in Standard Precautions should be mandatory for all health care workers along with compulsory Hepatitis B immunization to reduce the risk of occupational exposure in the health care setting.

Conflicts of Interest: Nil

Sources of Funding: Self

Ethical Clearance: Taken from Institutional Ethical Committee

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