Journal of INFECTION CONTROL
ISSN 2316-5324 | Ano II . Volume 2 . Número 2 . 2013

ORIGINAL ARTICLE

Individual, work-related and institutional factors associated with adherence to standard precautions

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Received: 1/12/12
Accepted: 4/12/2012

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SUMMARY

Standard Precautions (SP) are essential to protect patients and healthcare workers from acquiring pathogenic microorganisms. **Objective:** To analyze the factors associated with adherence to standard precautions for healthcare workers from a private institution. **Method:** Cross-sectional study with a sample of 291 nursing professionals, proportionally distributed among nurses, nurse technicians and nurse assistants. For data collect, a tool including sociodemographic questions and Likert scales according to the theoretical reference "Explanatory Model of Adherence to Standard Precautions" was used. **Results:** 78.0% (226/291) of the subjects reported using SP when caring for patients. In the multivariate analysis, adherence was associated with individual, work-related and institutional factors. **Conclusions:** Interventions designed to improve adherence should be directed not only to in-service training, but also to actions aimed to reduce obstacles and improve the institutional safety environment.

Key words: *Nursing staff; Universal Precautions; Occupational Health.*

INTRODUCTION

Healthcare workers (HCWs) are potentially exposed to blood and other body fluids during the workday and are thus at greater risk of infection by pathogens, including human immunodeficiency virus (HIV), hepatitis C virus (HCV) and hepatitis B virus (HBV).[1]

Exposure to blood can occur through a percutaneous injury (e.g., needlestick injury) cutaneous mucus exposure (e.g. splashes of blood or fluids containing blood in the eyes, nose or mouth) or contact with non-intact skin.[1] To prevent these exposures, there are standard precautions, which include a group of infection prevention practices that apply to all patients, regardless of the condition of confirmed or suspected infection.[2,3]

Although standard precautions (SP) have been routinely recommended for nearly 15 years, full adherence is unsatisfactory. Non-adherence to SP has been linked to a number of factors, including lack of knowledge, lack of personal protective equipment (PPE), high workload, low risk perception and low perception of institutional safety environment[4,5]

The aim of this study is to analyze the factors associated with adherence to standard precautions among nurses from a private institution, located in the city of São Paulo, and identify the variables associated with adherence.

METHOD

The present is a cross-sectional study of adherence to SP. The professional nursing staff that provided direct care to patients during the period of data collection was included in the study. Nursing professionals that had administrative functions were excluded. The list of nurses was obtained from the Human Resources Department of our institution. Based on this this list, sample size was calculated and the professionals were chosen to participate in the study by drawing lots.

Data were collected from October 01, 2010 to January 5, 2011. The study was approved by the Research Ethics Committee of the institution.

Data was collected through a tool consisting of two parts. The first part consisted of sociodemographic variables (gender, age, place of work, work shift, function, educational level, time working in the profession, time on the job) and questions regarding knowledge of the SP (how they became aware of it, whether they have received training on the SP at the institution, use of SP in the care of all patients).

The second part of the tool used the theoretical basis of the Explanatory Model of Adherence to Standard Precautions,

translated and validated into Portuguese by Brevidelli.[6] This tool consists of nine psychometric scales (scale of the Knowledge of Occupational Transmission of HIV; scale of Availability and Training of Personal Protective Equipment; scale of Barriers to Standard Precautions; Risk Personality scale; Workload scale; scale of Perception of SP Effectiveness; Risk Perception scale; scale of Management Actions of Support for Safety; scale of Feedback on Safety Practices), Likert-type, with 5 response options, and a total of 44 items.

The data were analyzed using the software Social Package for Social Science (SPSS), release 16.0, using descriptive and inferential statistics. Median scores were established for each of the scales by adding the Likert items, with the purpose of demonstrating the perception of nursing professionals in the face of factors that could influence adherence to SP.

RESULTS

Of the 291 nurses who participated in the study, 192 (66.0%) were females. The median age was 35.6 years, ranging from 24.6 to 63.3 years. The most frequent professional category was the "nurse tech" (44.3%), followed by "nursing assistant" (36.1%). Half of the sample had completed high school and the most frequently mentioned workplace was "other inpatient units" (30.6%) followed by "adult ICU" (22.3%). Most respondents worked the night shift (50.5%) and had no other jobs (62.9%).

The median time working as a nurse/nurse tech/assistant was 11 years, ranging from 1.5 to 40 years. The median time on the job was 4 years, ranging from 0.3 (4 months) to 17 years.

Only four professionals (1.4%) said they did not know the standard precautions and most acquired knowledge on the precautions at vocational courses (81.4%). Two hundred and forty-three professionals (83.5%) received training on SP at the hospital and 78.0% said they used them when caring for all patients. The median time elapsed since the last training session at the institution was 12 months, ranging from 1 to 92 months (7.7 years).

Regarding individual factors, the nurses had higher knowledge scores of occupational transmission of HIV, high score of risk perception, low score of risk personality and high score of prevention effectiveness perception. Regarding work-related factors, the study subjects had low score of obstacles to standard precautions and high score of workload. As for the institutional factors, participants showed a high score on the scale of PPE availability and training, high score on the scale of management support for safety and a high score on the scale of feedback on safety practices (Table 1).

To assess the influence of sociodemographic characteristics, individual, work-related and institutional factors related to adherence to SP, models of bivariate logistic regression analysis were used. This model allowed us to identify characteristics individually associated with better adherence.

Among the individual factors, we identified the age of the professional, time working in the nursing area, time on the job, work shift, how knowledge was obtained on the SP, have received training on SP the institution, knowledge on occupational transmission of HIV and perception of prevention effectiveness. Regarding the work-related factors, we identified the perceived obstacles to SP and workload, and as for the institutional factors, the availability of PPE and training, management support and feedback on safety practices were significant (Tables 2,3,4).

When these characteristics were analyzed together in a multiple logistic regression model, it was observed that adherence was more frequent among younger professionals (and, consequently, those working for a shorter period of time in the nursing area), those who received training on PP at the study institution, those who had lower perception of obstacles to follow the SP and higher perception of safety environment at the institution (Table 5).

Table 1 - Overall scores (minimum, medium, maximum) that comprised the individual, work-related and institutional factors. São Paulo, SP, Brazil. 2010-2011.

Factors	Scales	Minimum	Median	Maximum
Individuais	Knowledge of Occupational Transmission of HIV*	7	31	35
	Risk Perception	3	10	15
	Risk Personality	4	8	20
	Perception of prevention effectiveness	3	14	15
Work-related	Obstacles to follow SP†	6	12	30
	Workload	3	12	15
Institutional	PPE‡ availability and training	6	27	30
	Management Actions of Support for Safety	11	27	35
	Feedback on safety practices	5	18	25

** HIV human immunodeficiency virus / † SP standard precaution / ‡ PPE = personal protective equipment*

Table 2 - Bivariate analysis through the logistic regression method of the sociodemographic and professional factors associated with adherence to standard precautions for nursing professionals from a private institution. São Paulo, SP, Brazil. 2010- 2011.

Characteristic	SP adherence		Unadjusted odds ratio (95% CI)	p value
	Yes (n=226)	No (n=65)		
Gender				
Female	151 (78,6%)	41 (21,4%)	1,18 (0,66;2,09)	0,575
Male	75 (75,8%)	24 (24,2%)	1	---
Age*				
Up to 35 years	136 (93,2%)	10 (6,8%)	8,31 (4,03;17,15)	<0,001
Older than 35 years	90 (62,1%)	55 (37,9%)	1	---
Level of schooling				
Elementary school	36 (75,0%)	12 (25,0%)	1	---
High School	110 (75,9%)	35 (24,1%)	1,14 (054;2,38)	0,737
College/University	45 (81,8%)	10 (18,2%)	1,81 (0,69;4,70)	0,226
Graduate School	35 (81,4%)	8 (18,6%)	1,58 (0,58;4,28)	0,368
Function				
Nurse	42 (73,7%)	15 (26,3%)	1	---
Nurse tech	99 (76,7%)	30 (23,3%)	1,18 (0,58;2,42)	0,653
Nurse assistant	85 (81,0%)	20 (19,0%)	1,52 (0,71;3,26)	0,285
Time working in nursing (years)*	10,0 (7,0-13,0)	17,0 (13,0-22,0)	0,79 (0,74;0,84)	<0,001
Time working at the institution (years)*	3,0 (2,0-6,0)	6,0 (2,0-12,0)	0,86 (0,81;0,92)	<0,001
Work shift				
Morning	55 (77,5%)	16 (22,5%)	1,24 (0,64;2,42)	0,525
Afternoon	63 (86,3%)	10 (13,7%)	2,28 (1,06;4,87)	0,034
Night	108 (73,5%)	39 (26,5%)	1	---
Has another job (yes)	81 (75,0%)	27 (25,0%)	0,79 (0,45; 1,38)	0,403
Work place				
Intensive care	88 (73,3%)	32 (26,7%)	1	---
Semi-intensive care	116 (79,5%)	30 (20,5%)	1,41 (0,80;2,49)	0,241
Emergency	22 (88,0%)	3 (12,0%)	2,67 (0,75;9,52)	0,131

*95% CI: confidence interval / *Data described in median (Interquartile Interval)*

Table 3 - Bivariate analysis through the logistic regression method on the knowledge about standard precaution, associated with adherence by the nursing staff from a private institution. São Paulo, SP, Brazil. 2010- 2011.

Characteristic	SP Adherence		Unadjusted odds ratio (95%CI)	p value
	Yes (n=226)	No (n=65)		
How knowledge was obtained on the SP				
Refresher courses	192 (81,0%)	45 (32,2%)	2,84 (0,96;8,40)	0,058
Institution	25 (64,1%)	14 (21,5%)	1,19 (0,35;4,04)	0,780
Others	9 (60,0%)	6 (12,0%)	1	---
Received training on SP at the institution (Yes)	218 (89,7%)	25 (10,3%)	43,6 (18,4;103,5)	<0,001
Time since training at the institution (months)*	12,0 (7,5-15,5)	12,0 (10,0-12,0)	0,99 (0,96;1,02)	0,488

*95% CI: confidence interval. / *Data described in median (Interquartile Interval)*

Table 4 - Bivariate analysis through the logistic regression method, of individual, work-related and institutional factors associated with adherence to standard precautions for healthcare professionals from a private institution. São Paulo, SP, Brazil. 2010- 2011.

Characteristic	SP Adherence		Unadjusted odds ratio (95%CI)	p value
	Yes (n=226)	No (n=65)		
Knowledge of Occupational Transmission of HIV				
Lower knowledge	121 (77,1%)	36 (22,9%)	1	---
Higher knowledge	105 (78,4%)	29 (21,6%)	1,08 (0,62;1,88)	0,793
PPE availability and training				
Lower availability	126 (71,6%)	50 (28,4%)	1	---
Higher availability	100 (87,0%)	15 (13,0%)	2,65 (1,40;4,99)	0,003
Obstacles to follow the SP				
Lower perception of obstacles	159 (89,8%)	18 (10,2%)	6,20 (3,35;11,45)	<0,001
Higher perception of obstacles	67 (58,8%)	47 (41,2%)	1	---
Risk Personality				
Lower risk personality	146 (79,8%)	37 (20,2%)	1,38 (0,79;2,42)	0,260
Higher risk personality	80 (74,1%)	28 (25,9%)	1	---
Workload				
Lower load	146 (79,8%)	43 (20,2%)	1	---
Higher load	80 (78,4%)	22 (21,6%)	1,07 (0,60;1,92)	0,817
Perception of Prevention Effectiveness				
Lower perception	130 (75,6%)	42 (24,4%)	1	---
Higher perception	96 (80,7%)	23 (19,3%)	1,35 (0,76;2,39)	0,306
Risk perception				
Lower perception	137 (76,1%)	43 (23,9%)	1	---
Higher perception	89 (80,2%)	22 (19,8%)	1,27 (0,71;2,27)	0,419
Management Actions of Support for Safety				
Lower number of actions	101 (67,8%)	48 (32,2%)	1	---
Higher number of actions	125 (88,0%)	17 (12,0%)	3,49 (1,90;6,45)	<0,001
Feedback on Safety Practices				
Less frequent	93 (63,3%)	54 (36,7%)	1	---
More frequent	133 (92,4%)	11 (7,6%)	7,02 (3,49;14,14)	<0,001

*95% CI: confidence interval. / *Data described in median (Interquartile Interval)*

Table 5 - Final model of multiple logistic regression analysis of individual, work-related and institutional factors associated with adherence. São Paulo, SP, Brazil. 2010-2011.

Characteristic	Adjusted odds ratio (95%CI)	p value
Age < than 35 years	3,35 (1,38;8,14)	0,008
Received training on SP at the institution (yes)	34,63 (11,74;102,12)	<0,001
Lower perception of obstacles to follow SP	4,51 (1,91;10,65)	0,001
Higher perception of safety environment*	5,73 (2,11;15,55)	0,002

*95% CI: confidence interval. / *scale of Management Actions of Support for Safety + scale of Feedback on Safe Practices (Ranging from 12 TO 60; Median = 46)*

The estimates obtained through the model showed that the chance of using the SP in the care of all patients among nursing professionals under 35 years of age are three times the chance found among professionals older than 35 years [odds ratio (95%CI) 3.35 (1.38, 8.14)]. This chance for a professional who has received training on SP at the institution is estimated at 34.63 times the same chance for a professional who has not received training at the study institution (95% CI: 11.74, 102.12).

Regarding the perceived obstacles to follow the SP, it is estimated that among those with lower perception of obstacles, the chance of adhering to the SP is 4.5 times the chance verified among those with higher perception [Odds ratio (95%CI): 4.51 (1.91, 10.65)], and for professionals who perceive a greater safety environment this chance is 5.73 times the chance verified among those who have a lower perception of safety environment [Odds ratio (95%CI): 5.73 (2.11; 15.55)].

DISCUSSION

Regarding the knowledge of the SP, the results of this study were superior to those reported in the literature, as it was observed that most nursing professionals had adequate knowledge on the subject. [7-8] This result is quite positive, as studies have shown that adherence is associated with the degree of professional knowledge on the subject.[9]

When asked about participating in trainings on the SP at the institution, it was observed that most of the study subjects mentioned having received it in the previous year. A recent study described that specific training on SP can improve the knowledge of HCWs on infection control .[10]

Despite the high degree of knowledge on SP and participation in institutional training, in this study the self-reported adherence to standard precautions was suboptimal, demonstrating that education, knowledge and adherence did not correlate, with our results being consistent with those published in the literature.[4,8] It is a matter of concern to know that some professionals declared they did not adopt the SP in the care of all patients, which exposes them to unnecessary occupational hazards.

Regarding the individual factors, this study showed that nursing professionals, regardless of their function, have high levels of knowledge on occupational transmission of HIV, high risk perception, low risk personality and high perception of prevention effectiveness.

A study carried out with emergency service professionals in eight hospitals in Italy found high levels of knowledge and high perception of the risk of acquiring infections associated with health care among the nurses participating in the study.[11] On the other hand, an investigation performed in 28 centers in primary health care in two districts of Western Region Development in Nepal between 2003 and 2004, showed that only 22% of the professionals (n = 100) had adequate knowledge on the SP, showing that there are still differences in adherence rates between developed and developing countries.[8]

As for the work-related factors, it was observed that nursing professionals have low perception of obstacles and high workload. The perception of obstacles has shown significant importance in other studies on adherence to SP,[11-13] as the greater the perception of obstacles, the lower the adherence to SP.[14]

Regarding the institutional factors, there is a high perception of PPE availability and training, as well as management support for safety and feedback on safety practices. These results were similar to those published in the literature.[10,14]

In the multivariate analysis, individual factors (age less than 35 years, have received training on SP at the hospital), work-related factors (lower perception of obstacles) and institutional factors (greater perception of safety environment) were associated with adherence to SP . This result is similar to that published in the literature.[11]

The evaluation of these three factors allows a more comprehensive analysis of adherence to SP, where the individual, work-related and institutional factors simultaneously influence the adoption of safe practices.

Based on these results, it is evident that there are many factors and reasons for insufficient adherence with the SP and future research should take a broad approach so that institutional, environmental, managerial and educational practice factors are considered and more stringently assessed.

CONCLUSIONS

This study evaluated the factors associated with adherence to standard precautions used by the nursing staff from a private hospital, and assessed the association between these factors and adherence to SP. This type of study represent an advance in knowledge in the field of nursing research, due to the comprehensive analysis of the investigation and lack of national studies that analyze the factors associated with adherence to SP.

The results showed that individual, work-related and institutional factors were jointly associated with adherence to the SP. However, this study has some limitations.

The first is related to the theoretical framework, the Explanatory Model of Adherence to Standard Precautions. Although it is the only tool that has been currently translated and validated in our country, it does not address all aspects of the SP, but rather the perceptions and attitudes related to HIV, which may have influenced the subjects to produce socially favorable responses. Thus, future research should develop and use alternatives to evaluate SP.

Another potential limitation of this study was the use of a questionnaire as data collection method. Although studies consider that this method tends to overestimate adherence to SP, in this investigation the report of adherence was lower than the knowledge of individuals on the subject and participation in institutional training, showing consistency among the results.

As the study was carried out in a large private and high-complexity institution that treats children and adults with cardiac disease, the generalization of the results to other health institutions should be restricted.

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