



## Adherence to standard precautions by nursing professionals in a university hospital\*

*Adesão às precauções-padrão de profissionais de enfermagem de um hospital universitário*

*Adhesión a las precauciones-patrón de profesionales de enfermería de un hospital universitario*

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### ABSTRACT

**Objective:** To describe and compare the scores of adherence to standard precautions (PP) by nursing professionals who worked in inpatient units of a university hospital in the state of São Paulo (Brazil). **Methods:** This was a transversal, quantitative, comparative study, using a psychometric scale to measure adherence to PP, developed by Gershon *et al.*, (1995), translated and validated by Brevidelelli and Cianciarullo (2009), that was conducted between September 1, 2009 and March 31, 2010, with 256 nursing professionals. **Results:** Findings indicated that 152 (59.4%) professionals presented higher mean scores for adherence to PP, equal to or greater than 4.5; 98 (38.3%) had intermediate scores between 3.5 and 4.49; and, six (2.3%) had low scores, i.e., below 3.5. **Conclusions:** There was no statistically significant difference between the scores and other variables, however, results highlighted the importance of the positive result encountered due to the continuing education actions within the institution.

**Keywords:** Universal precautions; Occupational risks; Nursing, team

### RESUMO

**Objetivo:** Descrever e comparar os escores de adesão às precauções padrão (PP) de profissionais de enfermagem que atuavam nas unidades de internação de um hospital universitário do Estado de São Paulo. **Métodos:** Trata-se de estudo quantitativo transversal, comparativo, com a aplicação da escala psicométrica de adesão às PP, desenvolvido por Gershon *et al.* (1995), traduzida e validada por Brevidelelli e Cianciarullo (2009), entre primeiro de setembro de 2009 e 31 de março de 2010, com 256 profissionais de enfermagem. **Resultados:** Evidenciou-se que 152 (59,4%) profissionais apresentaram escores médios altos para a adesão às PP, igual ou acima de 4,5; 98 (38,3%) escores intermediários, entre 3,5 e 4,49 e 6 (2,3%) baixos, ou seja, menor que 3,5. **Conclusões:** Não houve diferenças estatisticamente significativas entre os escores e outras variáveis, entretanto, destacou-se a importância do resultado positivo encontrado pela valorização das ações de educação permanente pela instituição.

**Descritores:** Precauções universais; Riscos ocupacionais; Equipe de enfermagem

### RESUMEN

**Objetivo:** Describir y comparar los scores de adhesión a las precauciones patrón (PP) de profesionales de enfermería que actuaban en las unidades de internamiento de un hospital universitario del Estado de Sao Paulo. **Métodos:** Se trata de un estudio cuantitativo transversal, comparativo, con la aplicación de la escala psicométrica de adhesión a las PP, desarrollado por Gershon *et al.* (1995), traducida y validada por Brevidelelli y Cianciarullo (2009), entre el primero de setiembre del 2009 al 31 de marzo del 2010, con 256 profesionales de enfermería. **Resultados:** Se evidenció que 152 (59,4%) profesionales presentaron scores medio altos para la adhesión a las PP, igual o encima de 4,5; 98 (38,3%) scores intermedios, entre 3,5 e 4,49 y 6 (2,3%) bajos, o sea, menor que 3,5. **Conclusiones:** No hubo diferencias estadísticamente significativas entre los scores y otras variables, entre tanto, se destacó la importancia del resultado positivo encontrado por la valorización de las acciones de educación permanente por la institución.

**Descriptores:** Precauciones universales; Riesgos laborales; Grupo de enfermería

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## INTRODUCTION

Since the discovery of human immunodeficiency virus (HIV), occupational exposure involving potentially contaminated biological material has been of concern to all health professionals who work in direct care, because of the possibility of contact with blood and other body fluids.

Among the diverse types of occupational exposure, the percutaneous route is considered the most common, as it is the category that most affects nursing<sup>(1-4)</sup>.

A study conducted in the state of São Paulo (Brazil) showed more than 22,000 exposures to biological material involving health professionals, in the period of 2000 to 2007<sup>(3)</sup>. Another survey conducted in the city of Rio de Janeiro revealed more than 20,000 exposures between 1997 and 2008<sup>(4)</sup>.

With the intention of minimizing the risk of pathogen transmission such as HIV and hepatitis B (HBV) and C (HCV) viruses, several safety measures were established in the health services, among them standard precautions (SP)<sup>(5)</sup>. However, although there is some knowledge on the part of nursing staff regarding the importance of the use of SP, adherence does not regularly occur in practice<sup>(6)</sup>. This SP adherence has been evidenced in the literature through various methods, such as interviews, direct observation and questionnaires covering a specific aspect, such as hand washing or wearing gloves.

Treatment is a multifactorial problem; great difficulty was shown in measuring adherence to SP by health professionals, since no validated instruments exist in the literature that address all involved aspects.

In this regard, differences in adherence were observed when comparing the results of observational studies with research using forms or questionnaires. Many times the adherence is lower in the observational studies than those that employed instruments to which the professional responded<sup>(7-10)</sup>. Also, differences in adherence to SP were noted when comparing groups of health professionals, such as nurses and physicians,<sup>(8)</sup> and experienced and inexperienced professionals<sup>(9,10)</sup>.

With the objective of investigating the rates of adherence to SP among health professionals, and the motives that lead them to fail to comply with the recommendations and standards related to occupational exposure involving potentially contaminated material, such as the use of Personal Protective Equipment (PPE), two theoretical models of adherence to SP were developed in the United States: the Work System Model<sup>(11)</sup> and the Model of Adherence to SP<sup>(12)</sup>.

The Model of Adherence to SP, by means of Likert-type scales, has three conceptual areas that reflect the behavior of adherence to SP, namely: a) individual and

sociodemographic factors, such as occupation, working hours, knowledge of SP; b) psychosocial factors, such as fear, work-related stress and professionals' attitudes about the individual living with HIV / AIDS; and, c) organizational factors, which include the organizational safety climate, support of the institution and participation in training<sup>(12)</sup>. With regard to the Work System Model, it also addresses adherence to SP, individual factors and those linked to the institution<sup>(11)</sup>.

Based on American models, researchers translated, adapted and validated a proposal for a theoretical model of adherence to SP for Brazil that addressed individual, work-related and organizational factors<sup>(13)</sup>.

Among the scales that compose this model, the Scale of Adherence to SP stands out, which contributes to assessing levels of adherence of health professionals regarding the use of Personal Protective Equipment (PPE), disposal of perforating objects and needle recapping.

For the present study, we chose to use the Scale of Adherence to SP, in order to investigate individual factors related to SP adherence.

Therefore, the objective of this study was to describe and compare the scores of adherence to SP by nursing professionals of the inpatient units of a university hospital in São Paulo.

## METHODS

This was a study using a quantitative, cross-sectional, comparative method, conducted in a large public teaching hospital, located in São Paulo state.

Data collection occurred between September 1, 2009 and March 31, 2010, with the professionals approached and interviewed during their regular work shift, by the investigator or research assistant. During this period, the hospital had 590 nursing professionals who worked in direct patient care in inpatient units.

By means of the professional relationships, and data obtained from the Department of Human Resources of the institution, it was possible to calculate the sample size for the finite population, considering  $\alpha = 0.01$ , effect size = 0.08, test power equal to 0.99, and number of predictors = 4, namely: professional category, duration of experience in the profession, sector of employment, and weekly working hours.

With the loss of the sample stipulated at 20% of subjects, a sample of 290 subjects was obtained. The professionals, randomly selected using a stratified sampling plan, participated in the study according to the following criteria: had worked a minimum of six months in the role of nurse, technician or nursing auxiliary at the institution; provided direct care to patients; workplace located in the unit selected for study, that is,

medical clinic, surgical clinic, intensive care unit (ICU) and gynecology. Exclusion criteria were considered to be those who exercised exclusively administrative activities and that were on sick leave or away from work.

For data collection, a form developed by the researcher was used, containing demographic variables such as: gender, age, function, weekly work hours, education and a psychometric scale, *Adherence to SP*<sup>(13)</sup>, with 13 items, which had options ranging from 1-5, conforming to a five-point Likert scale. The scale, translated and validated for use in our environment, was authorized by the authors<sup>(13)</sup>.

The levels of adherence to SP were analyzed by calculating the simple mean scores of each scale item, classifying them into: a) high: mean scores greater than or equal to 4.5; b) intermediate: for mean score values between 3.5 and 4.49; and, c) low: for mean scores with values below 3.5<sup>(13)</sup>.

The instrument variables were coded and cataloged in a dictionary (codebook). The database was constructed in the Excel spreadsheet for Windows 2003, and double entry and data validation were performed. Data analysis was performed using the software, Statistical Package for the Social Sciences (SPSS), version 15.0.

To analyze the results, the following statistical tests were utilized: a) Cronbach's alpha for statistical analysis of the reliability of the scale, b) Kolmogorov-Smirnov, for testing the normality of distribution of sample means of the scores of adherence to SP in groups with the number of subjects below 30; c) Pearson correlation, to identify the statistical association between the scores of adherence to SP, such as time in the profession and weekly working hours; d) analysis of variance (ANOVA), to analyze the difference between the mean scores of adherence to SP between the occupational categories within nursing, and the subject's work sector.

The research project, approved by the Ethics Committee of the aforementioned institution, was filed under number 4.620/2009. We considered the guidelines for research involving human subjects, preserving the anonymity and confidentiality of the subjects.

## RESULTS

Two hundred fifty-six nursing professionals participated, of which 178 (69.5%) were nursing auxiliaries; 27 (10.5%) were nursing technicians, and 51 (19.9%) were nurses. The loss of subjects was 34 (11.7%). The reliability analysis of the scale of adherence to SP was equal to 0.70, and the result was considered satisfactory.

Females predominated, with 202 (78.9%) subjects. The age ranged from 21.3 to 60.4 years, with a mean of 38.6 years; 164 (64.1%) reported having graduated

from high school, 45 (17.6%) from higher education and 27 (10; 5%) from graduate school.

By separately analyzing the items of the scale of adherence to SP, we found that, for the first item "Discard sharp objects in sharps container", 244 (95.3%) responses were allocated to the choice "always", as shown in the data in Table 1.

For item 2, 141 (55.1%) of professionals responded that they "always" treat all patients as if they were contaminated with the HIV virus and 174 (68.0%) "always" follow Standard Precautions with all patients irrespective of their diagnosis (item 3). Regarding hand hygiene after removal of disposable gloves, 237 (92.6%) responses were attributed to the response "always" (item 4).

Related to item 11 "recap needles for patient venipuncture", 136 (53.1%) answered that they "never" recap, 47 (18.4%) "rarely", 43 (16.8%) "sometimes", 19 (7.4%) "often", and 11 responses (4.3%) were attributed to "always."

The analysis of the scores of the scale of adherence to SP indicated that 152 (59.4%) nursing professionals presented high mean scores, that is, equal to or above 4.5, for 98 (38.3%) professionals the mean score was intermediate, between 3.5 and 4.49, and 6 (2.3%) were low, or less than 3.5.

It was verified that 123 (48.0%) subjects reported experience of more than 10 years. The Pearson correlation test showed no statistically significant correlation ( $r = 0.629$ ,  $p = 0.395$ ) between time working in the profession (not categorized) and scores of adherence to SP. Thus there was no correlation between more time working in the profession and adherence to SP.

To evaluate the mean scores for adherence to SP based on the hours worked per week, we considered the total employment workload in regard to the responses. It was verified that 193 (75.4%) worked in a single institution, 85.2% reported 30 hours per week, ranging from 10 (0.4%) to 90 (0.8%) hours.

The analysis of the scores of adherence to SP of health professionals, according to the weekly hours worked, was conducted using the Pearson correlation coefficient. It indicated no statistically significant correlation ( $r = -0.070$ ,  $p = 0.266$ ).

Regarding the professional category, nurses ( $n = 51$ ) presented mean scores of 4.614; the nursing technicians ( $n = 27$ ) obtained 4.443; and nursing auxiliaries ( $n = 178$ ) obtained 4.525. For the group of technicians, the sampling distribution of mean scores did not differ from normal distribution according to the Kolmogorov-Smirnov test ( $p = 0.774$ ).

By means of ANOVA for comparison of mean scores for adherence to SP among the occupational categories, there was no statistically significant differ-

**Table 1.** Distributions of responses of nursing professionals in a university hospital (n=256) based on the items of the Scale of Adherence to Standardized Precautions\*, Ribeirão Preto, Brazil, 2009-2010

Items of the Scale of Adherence to Standardized Precautions	Always		Many times		At times		Rarely		Never	
	f	%	f	%	f	%	f	%	f	%
1. Discard sharp objects in sharps container	244	95.3	0	0	8	3.1	2	0.8	2	0.8
2. Treat all patients as if they have been contaminated by HIV	141	55.1	42	16.4	36	14.1	10	3.9	27	10.5
3. Follow Standard Precautions with all patients irrespective of their diagnosis	174	68.0	60	23.4	18	7.0	3	1.2	1	0.4
4. Wash hands after removing disposable gloves	237	92.6	17	6.6	1	0.4	0	0	1	0.4
5. Use protective gown when there is possibility of soiling clothes with blood or other secretions	176	68.8	41	16.0	30	11.7	5	2.0	4	1.6
6. Use disposable gloves when there is possibility of contact with blood or other secretions	225	87.9	25	9.8	4	1.6	1	0.4	1	0.4
7. Use protective goggles when possibility of contact with blood or other secretions	147	57.4	51	19.9	45	17.6	5	2.0	8	3.1
8. Use disposable mask when there is possibility of splashing mouth with blood or other secretions	171	66.8	52	20.3	24	9.4	8	3.1	1	0.4
9. Clean all spills of blood or other secretions immediately with disinfectant	166	64.8	51	19.9	24	9.4	6	2.3	9	3.5
10. Handle with care scalpels or other sharp objects	244	95.3	5	2.0	5	2.0	0	0	2	0.8
11. Recap needles for patient venipuncture	11	4.3	19	7.4	43	16.8	47	18.4	136	53.1
12. Use gloves for patient venipuncture	158	61.7	54	21.1	34	13.3	9	3.5	1	0.4
13. Consider all materials that come in contact with patient saliva to be contaminated	201	78.5	25	9.8	21	8.2	6	2.3	3	1.2

\*(Brevidei; Cianciarullo, 2009)

**Table 2.** Mean score, standard deviation, confidence interval - lower and upper limits - of the scores resulting from Scale of Adherence to Standard Precautions\* conforming to the category of professional nursing at a university hospital (n=256), Ribeirão Preto, Brazil, 2009-2010

Professional Category	Mean Score	Minimum & Maximum Scores	Standard Deviation	Confidence Interval**
Nurse (n=51)	4.614	3.54 - 5.00	0.329	4.52 - 4.70
Nursing technician (n=27)	4.433	3.38 - 5.00	0.381	4.28 - 4.58
Nursing auxiliary (n=178)	4.525	1.85 - 5.00	0.412	4.46 - 4.58
Total (n=256)	4.533	1.85 - 5.00	0.395	4.48 - 4.58

\*(Brevidei; Cianciarullo, 2009)

$F_{2,255} = 1,976; p=0,141$

\*\* Lower/Upper limit

ence between categories ( $F_{2, 255} = 1.976$ ,  $p = 0.141$ ) according to the data in Table 2.

The ANOVA test was used to compare the mean scores for adherence to SP between the work sectors of medical clinic (mean = 4.507, SD = 0.348), surgical clinic (mean = 4.527, SD = 0.473), gynecology (mean = 4.549, SD = 0.371) and ICU (mean = 4.754, SD = 0.058). Results showed no statistically significant difference in scores of adherence to SP between these sectors ( $F_{3, 255} = 1.902$ ,  $p = 0.130$ ) (Table 3). The Kolmogorov-Smirnov test showed the normal distribution of sample means ( $p = 0.099$  and  $p = 0.762$ , respectively) for groups of professionals working in the fields of gynecology and ICU.

**Table 3.** Mean score, standard deviation, confidence interval - lower and upper limits - of the scores resulting from Scale of Adherence to Standard Precautions\* as sector of employment of nurses at a university hospital (n=256), Ribeirão Preto, Brazil, 2009-2010

Work sector	Mean Score	Minimum & Maximum Scores	Standard Deviation	Confidence Interval**
Medical Clinic (n= 128)	4.506	3.38 - 5.00	0.307	4.44 - 4.56
Surgical Clinic (n=90)	4.527	1.85 - 5.00	0.499	4.42 - 4.62
Gynecology (n=22)	4.549	3.46 - 5.00	0.791	4.38 - 4.71
ICU (n=16)	4.754	4.23 - 5.00	0.058	4.63 - 4.87
Total (n=256)	4.533	1.85 - 5.00	0.024	4.48 - 4.58

\* Upper/lower limit

\*\* (Brevidei; Cianciarullo, 2009)

$F_{3,255} = 1,902$ ;  $p=0,130$

## DISCUSSION

In analyzing the scores of the items of the scale, results showed that 53.1% responded that they “never” recapped needles. Despite recommendations not to participate in this practice, it is considered common in health services and is reported in the literature as a risk factor for the occurrence of accidents<sup>(1, 3, 6)</sup>.

In Brazil, an investigation involving the use of the scale for adherence to SP was conducted with 273 nursing professionals and 57 physicians; nurses had higher levels of adherence to the items corresponding to the handling and disposal of objects, however, the authors stressed that adherence was not rigorous<sup>(13)</sup>.

American studies involving the use of the scale for adherence to SP in professionals working in non-hospital environments showed a high score of adherence to SP, with mean scores of 4.54<sup>(14,15)</sup>.

Regarding the use of PPE, the majority (68.8%) of subjects responded that they “always” used protective gowns when faced with the possibility of soiling clothes with blood and other secretions, as well as using disposable gloves in the possibility of contact with blood and other secretions (87.9%), and the use of gloves to perform venipuncture (61.7%). On the other hand, we obtained a lower frequency of responses “always” on items concerning the use of protective eyewear in the possibility of contact with blood or other secretions.

In a study conducted in the state of Virginia (USA) with 311 professionals working in prehospital care, 83% of respondents reported “always” wearing gloves. Those who reported not using gloves at all times indicated, as justifications: patient “appears to be at low risk for transmission of the disease” (51%) and “forgetting” to put them on at the time of the procedure (43%)<sup>(16)</sup>.

Another study conducted with the nursing team also showed that 84.4% of venipunctures were performed without gloves, and 29.7% of procedures were conducted without prior washing of hands, even though the materials were available for this purpose<sup>(17)</sup>.

There was no correlation between working hours and greater adherence to SP, according to the scores of the scale of adherence. In this regard, some studies indicate that the time worked contributes to a lower adherence to SP<sup>(9,18)</sup>. In the present study, data analysis indicated that there were no statistical differences in scores of adherence to SP among professionals with more hours worked per week. But, in a case-control study with nursing staff in the same hospital, results showed that the professionals who worked 50 hours or more per week had an increased likelihood of exposure to contaminated sharps, with a relative risk of 2.47 (CI (95%): 1.07 to 5.67)<sup>(19)</sup>.

Because it was a self-administered instrument which evaluated only individual aspects relating to prevention of occupational exposure involving biological material, it is evident that the use of the scale of adherence to SP was not sufficient for covering all factors that may be associated with occupational exposure to biological material.

Thus, the application of this instrument together with other methods of investigation, such as observation coupled with the application of a scale, can contribute to identifying other aspects relating to adherence to SP in the clinical practice of nursing.

Although the analyses do not indicate statistically significant differences, the results showed high and medium adherence to SP, according to data presented, which denotes knowledge on the part of the nursing professionals about their usage. In this regard, a study of 317 health professionals identified that although they have the same knowledge about the SP, in practice adherence was considered low<sup>(20)</sup>.

In this study, 161 (62.9%) subjects reported that they had participated in courses on the use of SP and on the Regulatory Standard N<sup>o</sup>. 32. These data, combined with scores of adherence to SP of the present study, caught the attention of researchers who consulted the Center for Continuing Education in Nursing in search of data that identified investments in health education, addressing the issue of SP.

It was found that between January 1, 2007, and August 30, 2010, 1270 hours of training classes were delivered that included the participation of 1,270 nursing professionals, contributing to the knowledge of this team on preventing accidents with potentially contaminated biological material. Although these data have not been associated with the results of the levels of adherence to SP and the scores of the scale, there was great concern from the leaders of the institution about this question and updating and providing courses, to enhance the knowledge of the team, which reinforces and contributes to compliance to SP.

Studies showed that the use of this scale together with others that measure organizational and psychosocial aspects proved to be adequate, and showed other factors associated with occupational exposure to biological material, as well as non-adherence to SP<sup>(12-14)</sup>.

It is noteworthy that, despite the limitations of a self-administered instrument, it contributes to the identification of behaviors of non-adherence to SP, which is useful for developing strategies designed to improve clinical practice of nursing.

## CONCLUSIONS

There were no statistically significant differences in mean scores of adherence to SP, among the oc-

cupational categories of the nursing professionals, in working hours, weekly work schedule, or work in different sectors.

Thus, statistically significant differences between the scores and other variables did not occur, highlighting the impact of the positive result found by the valuation of the actions of continuing education by the institution.

Because this instrument was easy to understand and apply, the scale of adherence to SP can be used routinely in health services in order to contribute towards the identification of the levels of adherence to SP in general and above all in the identification of items that have low adherence by professionals, such as the use of PPE.

Thus, nurses working in leadership positions allied to the professionals working in infection control committees that are planning materials and continuing education may develop more specific strategies to prevent occupational exposure with biological material, according to the results of applying a validated instrument.

The present study has important contributions for existing knowledge on the subject, especially in Brazil, highlighting the importance of using a validated instrument, as this is a difficulty faced by Brazilian nursing because of the lack of available instruments.

## Limitations of the study

The study was conducted in a large teaching hospital, with highly complex care, restricting, therefore, the generalizability of the data to other institutions. Because it is a self-administered instrument, the results do not reflect reality in its entirety.

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