



## Injectable medications: self-reported practices of nursing professionals\*

Práticas de medicações injetáveis: conduta referida de profissionais de enfermagem

Prácticas de medicaciones inyectables: conducta referida de los profesionales de enfermería

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### ABSTRACT

**Objective:** To identify the self-reported injectable medications of nursing professionals in the state of São Paulo. **Method:** Survey study that assessed the self-reported frequency of injection medications through a validated electronic questionnaire, applied from September to December 2017. **Results:** The 1,295 computed responses showed non-compliances such as sharing multidose vials for two or more patients (10.8%), reusing single-use supplies, such as use of saline flush syringes for different patients (1.2%) and needle recapping after use (4.9%). Greater adherence to glove use for administration of intravenous injections (80.5%) and lack of training for handling safety devices (13%) were reported. Correlational data showed that, the older the age, the better the self-reported injecting practices. **Conclusion:** Although most practices are within Safe Injecting practices, there are reports of risky practices, such as sharing single-use supplies. Training for the use of safety devices is not yet a reality for all professionals, since many reported it as rare.

### DESCRIPTORS

Nursing Care; Injections, Intramuscular; Injections, Intravenous; Injections, Subcutaneous; Medication Therapy Management; Patient Safety.

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## INTRODUCTION

Safe injecting practices include measures such as rational use of supplies by trained and qualified professionals, use of sterile syringes and needles and disposal of sharps in a designated container<sup>(1)</sup>. The World Health Organization (WHO) defines safe injections as those that do not harm the patient, do not expose the health professional to preventable risks and do not release hazardous waste to the population<sup>(2)</sup>.

In the United States, since 2001, there have been more than 50 infection outbreaks associated with unsafe injecting practices<sup>(3)</sup>. In developing countries, there are reports of unsafe injecting practices that lead to diseases such as Hepatitis B, Hepatitis C and HIV<sup>(4)</sup>.

Non-adherence to well-established safe injecting practices, such as recapping needles after use<sup>(1,5-6)</sup>, not using gloves to give injections or reusing disposable supplies<sup>(7)</sup>, can result in transmission of microorganisms to the patient<sup>(7-9)</sup>, accidents and exposure to biological material<sup>(10)</sup>, posing risks for the professional and for the community.

Considering the scarcity of national studies on the subject, this study aims to present a situational analysis of the self-reported injecting practices of nursing professionals in the state of São Paulo.

## METHOD

### STUDY TYPE

This is a survey that allowed identifying the self-reported frequency of activities related to the administration of injections among nursing professionals.

### POPULATION

According to data from the Federal Nursing Council, updated in May 2019, Brazil has 2,164,047 professionals (including midwives, nursing assistants, nursing technicians and nurses) enrolled in the council, with 534,459 professionals in the state of São Paulo. However, it should be considered that the same person may be registered in more than one professional category, and thus be counted more than once, which makes it difficult to accurately identify the total number of professionals<sup>(11)</sup>.

Nursing professionals from the state of São Paulo (Brazil) were invited by email to participate in the study. This e-mail contained the theme, objectives, stages and ethical aspects of the research, a link for electronic access to the questionnaire on SurveyMonkey®, and the Informed Consent Form (ICF).

### SELECTION CRITERIA

The selection criteria used were: being a nursing professional registered and active at the Regional Council of the State of São Paulo (COREN-SP), having a registered e-mail in that institution and developing or having developed work in the area of nursing (aspect verified after the return of the completed questionnaires).

## DATA COLLECTION

The COREN-SP collaborated in the development of the study by sending the invitation containing all the information relevant to this study to the email address of all registered nursing professionals. The questionnaire remained active for completion from September to December 2017.

The questionnaire used for data collection was created by the authors based on theoretical framework relevant to the theme and identified until the moment of its elaboration<sup>(12-17)</sup>. The questionnaire was validated by specialists regarding content and layout validity before being sent to the research participants. Each item had a Content Validity Index (CVI) greater than 0.78, and no item was excluded<sup>(18)</sup>. At the end of data collection, the instrument was analyzed for internal consistency (Cronbach's  $\alpha$ ).

Five judges (80.0% female) collaborated to validate the instrument, among which 100.0% were nurses, 80.0% had a doctorate degree, 100.0% had worked in the field for 11 to 20 years, and teaching was the main work developed (100.0%). Regarding the type of institution in which they were employed, 40.0% were in hospitals, 80.0% in colleges or universities, 20.0% in outpatient units or specialty centers/federal institute (the professional could have more than one employment bond).

The validated questionnaire was composed of 45 questions distributed in four domains (preparation of the environment, preparation of medications, medication administration and care after medication administration) and used a Likert-type scale: "always", "almost always", "sometimes", "almost never" and "never".

The knowledge about the subject was measured by adding the scores of the participants belonging to each variable (for example, level of education) in each domain and in the total of domains (the entire questionnaire), according to the self-reported frequency (always=1, almost always=2, sometimes=3, almost never=4 and never=5). These calculations considered the components already inverted according to the adequacy of the response to each practice. The higher the score, the worse the self-reported practice, that is, low scores indicate compliance with safe injecting practices. Thus, the score varies from 5-25 points for "preparation of the environment" ( $\alpha=0.542$ ), 9-45 points for "preparation of medications" ( $\alpha=0.504$ ), 24-120 points for "medication administration" ( $\alpha=0.668$ ), 7-35 points for "care after medication administration" ( $\alpha=0.320$ ), and a total of 45-225 points for the whole instrument ( $\alpha=0.790$ ).

Only the questionnaires completed in full were analyzed, since it was necessary to select an answer to proceed, so questionnaires that did not meet this requirement were disregarded.

## DATA ANALYSIS AND TREATMENT

The responses coded in Microsoft Excel® were analyzed according to the frequency of categorical variables, with values of absolute frequency (n) and relative frequency (%), and descriptive statistics (central tendency and dispersion)

of numerical variables. To compare the items of the scale between the categorical variables, the chi-square test and Fisher's exact test (for expected values lower than five) were used. To compare items and numerical variables, the Mann-Whitney test (for two categories) and the Kruskal-Wallis test (for three or more categories) were used, due to the absence of normal distribution of scores. Spearman's correlation coefficient was used to analyze the relationship between numerical variables. The level of significance was set at 5% ( $p$ -value  $<0.05$ ). The software SAS System for Windows (Statistical Analysis System), version 9.2 was used for analysis.

### ETHICAL ASPECTS

The research was approved by the Ethics Committee on Research with Human Beings of the Universidade Federal de São Carlos – UFSCar, protocol 2.139.384/2017, according to Resolution no. 466/2012, of the National Health Council. All participants signed the Informed Consent Form (ICF).

### RESULTS

The link was accessed 2,056 times, and 1,298 people agreed to participate in the study and answered the

questionnaire in full. Three questionnaires that did not meet the criterion “developing or having developed work in the area of nursing” were excluded. Thus, 1,295 responses were analyzed.

Among the participants, 47.0% were nurses, 39.1% were nursing technicians and 21.1% were nursing assistants, considering that it was possible to select more than one answer regarding professional category. As for the highest level of education achieved, 41.6% reported having a vocational education and training, 18.5% had a graduate degree and 39.5% had a post-graduate degree. The age varied between 18 and 74 years, with a mean age of 38.4 (years), a median of 38 (years), and standard deviation of  $\pm 9.4$ . The time of professional experience was up to five years for 31.8% of the participants, and between 11 and 20 years for 30.4% of the professionals. The main type of work developed, mentioned by 85.3% of the respondents, was assistance, and the hospital was selected as place of work by 57.5% of the sample.

Table 1 shows the relative frequency of injecting practices, considering all professionals who participated in the research.

**Table 1** – Relative frequency of injecting practices – São Carlos, SP, Brazil, 2017.

Injecting practices	Relative Frequency				
	Always	Almost Always	Sometimes	Almost Never	Never
Disinfection of trays before preparing an injection	74.6	17.8	4.7	1.5	1.3
Use of supplies with damaged packaging	7.6	1.2	2.3	6.5	82.4
Hand hygiene before and after preparing injections	86.0	11.1	1.9	0.7	0.3
Sharing saline vials for reconstitution of medication	7.3	9.7	14.2	15.4	53.4
Use of multidose vials for two or more patients	10.8	10.0	12.9	12.6	53.8
Disinfection of the rubber septum of multidose vials with 70% alcohol before entering	64.3	16.1	8.2	5.2	6.2
Disinfection of vials and ampoules with 70% alcohol before entering	63.8	15.7	8.2	5.8	6.6
Reuse of needles or syringes for the same patient when preparing medications	2.4	4.3	5.7	7.9	79.8
Reuse of needles or syringes for different patients when preparing medications	0.5	0.3	0.6	1.6	96.9
Hand hygiene with soap and water before administering intravenous medication	71.3	16.7	7.1	1.9	3.1
Hand hygiene with alcohol-based solution before administering intravenous medication	66.0	16.9	10.7	3.3	3.2
Use of gloves for the administration of intramuscular medications	65.4	7.5	9.3	9.0	8.8
Use of gloves for the administration of subcutaneous medications	59.5	7.8	8.7	11.6	12.4
Use of gloves for the administration of intravenous medications	80.5	8.0	4.9	3.6	2.9
Cleaning skin before the administration of intramuscular medications, except for vaccines	96.1	1.5	0.8	0.5	1.2
Cleaning skin before the administration of subcutaneous medications, except for vaccines	90.9	3.2	1.7	0.9	3.2
Contact with skin after cleaning and before administering injections	4.4	2.9	9.7	16.8	66.1
Sterile dressing for catheter fixation/maintenance	49.6	11.4	10.5	11.1	17.4
Changing peripheral access according to the standards of the service before signs of phlebitis	72.4	13.8	5.3	2.7	5.7

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Injecting practices	Relative Frequency				
	Always	Almost Always	Sometimes	Almost Never	Never
Disinfection of connectors before medication administration	57.8	13.8	9.2	5.7	13.5
Reuse of protection caps	8.3	15.5	17.1	10.0	49.1
Inadequate storage of protection caps of peripheral catheters for reuse	2.3	5.5	10.5	9.9	71.8
Reuse of syringes with a new needle for medication administration in a single patient	5.4	2.2	4.4	5.6	82.3
Reuse of syringe for saline flush of peripheral venous catheters of different patients	1.2	0.4	0.6	1.2	96.5
Training for handling needles and catheters with safety device	13.0	12.4	27.3	27.1	20.3
Needle recap after injection	4.9	4.6	9.0	10.3	71.3
Unprotected transportation of syringes and needles to the disposal site	20.1	10.4	14.6	16.4	38.6

Note: (n=1295).

The scores obtained by domain and in the total questionnaire according to the level of education of the work

categories that responded to the questionnaire can be seen in Table 2.

**Table 2** – Descriptive analysis of scores by domain and in the total questionnaire according to the level of education – São Carlos, SP, Brazil, 2017.

	Mean±SD	Median	Maximum	Minimum
<b>Preparation of the environment</b>				
Vocational Education and Training (N=538)	7.0±2.3	6.0	18.0	5.0
Graduate degree (N=239)	7.4±2.4	7.0	16.0	5.0
Post-graduate degree (N=511)	7.8±2.8	7.0	21.0	5.0
<b>Preparation of Medications</b>				
Vocational Education and Training (N=538)	14.7±4.6	14.0	36.0	9.0
Graduate degree (N=239)	15.2±4.3	14.0	30.0	9.0
Post-Graduate degree (N=511)	15.2±4.6	15.0	34.0	9.0
<b>Medication Administration</b>				
Vocational Education and Training (N=538)	43.0±8.8	42.5	72.0	24.0
Graduate degree (N=239)	43.0±8.7	42.0	68.0	28.0
Post-Graduate degree (N=511)	43.9±9.4	43.0	77.0	25.0
<b>Care after Administration</b>				
Vocational Education and Training (N=538)	14.0±4.1	14.0	26.0	7.0
Graduate degree (N=239)	14.5±4.1	14.0	27.0	7.0
Post-Graduate degree (N=511)	14.0±3.9	14.0	27.0	7.0
<b>Total Score</b>				
Vocational Education and Training (N=538)	78.7±15.1	77.5	139.0	49.0
Graduate degree (N=239)	80.0±14.1	79.0	128.0	55.0
Post-Graduate degree (N=511)	80.9±16.0	80.0	134.0	49.0

The p-value for the Kruskal-Wallis test was calculated to compare the scores between the three levels of education. A significant difference ( $p < 0.01$ ) was observed in the

domain “preparation of the environment”, suggesting better practices of the population with Vocational Education and Training in that domain.

The correlation between the domains of the instrument used for data collection, age and professional experience is shown in Table 3.

**Table 3** – Correlation between age/professional experience and scores of the domains and total instrument – São Carlos, SP, 2018.

Questionnaire Domains	Age (n=1271)	Professional Experience (n=1295)
Preparation of the Environment	r=-0.191 p<0.0001	r=-0.06 p=0.0425
Preparation of Medications	r=-0.062 p=0.0282	r=0.013 p=0.6447
Medication Administration	r=-0.095 p=0.0007	r=-0.017 p=0.5397
Care after Medication Administration	r=-0.111 p<0.0001	r=-0.060 p=0.0312
Total Score	r=- 0.138 p<0.0001	r=-0.036 p=0.1923

Note: r= Spearman's correlation coefficient; p=p-value; n= number of subjects.

## DISCUSSION

The self-reported injecting practices showed the relevance of themes that, although known by the literature, still require attention, as they are not completely inserted in the routine of health professionals. Despite the predominance of participants who work in hospital settings, the theme is equally important in other environments, as users and procedures have become increasingly complex, and professionals must give greater attention to the transmission of pathogens, even though these are settings with a low risk of infection<sup>(19)</sup>.

Studies carried out in Primary Health Care in Bengal<sup>(1)</sup> and Kenya<sup>(20)</sup> identified relevant aspects associated with injecting practices that were not in compliance with Safe Practices, even when there was higher compliance with infection control measures associated with safe injection and blood collection<sup>(20)</sup>. Non-compliance regarding vaccination against hepatitis B, insufficient sharp containers and needle recapping were factors that revealed the need to train, provide information and motivate health workers<sup>(1)</sup>.

Studies in hospital settings<sup>(8-10)</sup> point to aspects similar to those found in the present study (although in different numbers). A hospital outbreak of hepatitis B in a pediatric hematology and oncology unit in South Africa was linked to possible unsafe injecting practices, including non-compliance with standard precautions regarding the use of multidose vials, revealed after screening patients who were hospitalized in this setting. This scenario required re-educating the unit's personnel on the transmission routes and protective measures against the virus, standard precautions, use of gloves, appropriate waste disposal and abandonment of the use of multidose vials<sup>(8)</sup>.

Among the standard precautions, hand hygiene is considered as the most important and effective measure to prevent the transmission of microorganisms. It is also a

measure with low cost, supported by solid scientific evidence<sup>(21)</sup>. Direct observation of hand hygiene (HH) is considered a gold standard for research, as it is more accurate than self-reporting. However, it depends on an observer and it is more time consuming and expensive, while interviews can be carried out in an easier and faster way and also provides relevant results, although with less reliability, since data tend to be overestimated and influenced by social desirability bias<sup>(22)</sup>.

The use of gloves is one of the measures that minimize the risk of occupational exposure to biological agents, and it should be included in all actions with this type of risk. However, these measures are still not inserted in the routine of all health professionals. In this study, only 80.5% of professionals reported frequently using gloves for intravenous injections, a situation in which this measure is essential.

The importance of using gloves was also observed in a large teaching hospital in Brazil, where an analysis of occupational exposures incidents with nursing professionals from different care units showed that 80.7% of these incidents involved percutaneous exposure, 77% involved blood, and in 53.8% of the incidents the professionals were not using gloves<sup>(10)</sup>.

In the literature, the use of gloves in vascular access procedures is a well-defined and strongly recommended measure<sup>(23)</sup>. However, there is no consensus on whether it is mandatory in routine administration of intramuscular or subcutaneous medication<sup>(8,21,24)</sup>, so the use of gloves is at the discretion of the professional's previous assessment. However, it should be noted that the use of gloves does not replace HH, which must be performed before and after each procedure<sup>(21)</sup>.

The disinfection of the venous catheter hub before entering was a measure reported by most professionals. This is a relevant measure to minimize microbiological contamination since the colonization of connectors is attributed as the cause of 50% of infections related to the post-insertion of catheters. Failures in aseptic techniques and disinfection can lead to biofilm formation, increasing the potential for infection in peripheral and central venous catheters<sup>(24)</sup>.

The use of multidose vials for more than one patient, reported by less than 20% of the respondents, is allowed, as long as aseptic techniques, such as disinfecting the rubber septum and always entering the vial with a new needle and syringe, are respected, in order to avoid contamination of the content. A study carried out in eight American states reported that 43.2% of health professionals reentered multidose vials with the same syringe for an additional dose for the same patient. This practice would not place a risk of transmitting infection to subsequent patients if the vial were discarded. However, only 25.6% of those professionals reported this measure<sup>(3)</sup>. The results regarding disinfection of the rubber septum of vials were similar to a study carried out in Mexico, in which 48.3% of cases did not include disinfection<sup>(25)</sup>.

Despite the extremely low rate of syringe reuse for saline flushes in different venous access for different patients, this is a worrying practice. Examples of the severity of this practice

can be seen in reports such as the probable transmission of Hepatitis C through the use of syringes with saline solution for different patients, as a Texas nurse believed it was a safe and cost-saving practice, as blood was not withdrawn into the syringe<sup>(9)</sup>. A similar case occurred in South Asia, where the reuse of these devices was related to the transmission of the same disease<sup>(7)</sup>.

More than half of the interviewees reported using sterile dressing for peripheral venous catheters. However, this data was not corroborated in other studies, which found that 30% of the dressings observed in South America, 19% in Africa and 18% in Europe were performed with non-sterile tape<sup>(26)</sup>.

As for care after the administration of injections, needle recapping is still a common practice. A study carried out in Oman (Arabian Peninsula) with 141 public and private health facilities found that needle recapping was observed in 6% of public and 36% of private facilities<sup>(5)</sup>. This measure is frequently reported as the cause of sharps injuries<sup>(6,27)</sup>.

Surgical centers are the environment of 23% of sharps injuries. The factors associated with sharps injuries include all previously mentioned unsafe measures, and factors such as absence of accident reports and lack of post-exposure prophylactic treatment can be highlighted<sup>(28)</sup>. It is worth noting that the context around occupational incidents does not always involve emergency situations<sup>(29)</sup>, which shows the possibility of planning preventive actions in relation to these events.

Knowledge of safety devices and participation in training activities collaborate to minimize damage resulting from occupational exposure. Recognizing the importance of these factors is necessary so that injecting practices are safe for everyone involved.

The analysis of variables that could be associated with injecting practices showed that professionals with technical education had better practices only in aspects related to the preparation of the environment. As for age, a very weak inversely proportional correlation was obtained in the domains "preparation of the environment", "care after

injectable medications" and in the total of the questionnaire, that is, the higher the age, the lower the score obtained, meaning that the self-reported practice is better.

These gaps on Safe Injecting practices may be even more present in the other states of the country, as the state of São Paulo belongs to the Southeast Region of Brazil, which, together with the South Region, have the largest concentration of health professionals, medium and high socioeconomic development and a high number of health services<sup>(30)</sup>.

Despite the aforementioned aspects, this study is important to open this discussion, since, although the instrument used for data collection is generally reliable, its analysis indicates a need for reviewing its components and low consistency of the domains when evaluated separately. The use of technology is helpful, as it enables the achievement of responses from a large number of professionals. However, direct observation remains the gold standard for achieving results that are more in conformity with the routine of these professionals. Inferences on the subject must be taken with caution, since aspects such as social desirability may be influencing the answers, which might not faithfully represent the actions of nursing professionals. This bias is a limitation of this study.

## CONCLUSION

Most of the self-reported practices are within Safe Injecting practices. However, there are measures that, although well-established, are still not fully inserted in the routine of the nursing professional, such as: sharing of multi-dose vials, reuse of disposable supplies and lack of adherence to glove use. The total instrument was only associated with age, with a very weak negative correlation between age and safe practices.

Training for the use of safety devices is not a reality for these professionals, since the majority reported training as rare. Training can be understood as a strategy for the insertion of Safe Practices in the professional's routine.

## RESUMO

**Objetivo:** Identificar a conduta referida de profissionais da enfermagem, do estado de São Paulo, sobre Práticas de Medicamentos Injetáveis. **Método:** Estudo tipo *survey* que identificou a frequência referida sobre Práticas de Medicamentos Injetáveis mediante resposta de questionário eletrônico, validado, entre setembro e dezembro de 2017. **Resultados:** Considerando as 1.295 respostas computadas, foram identificadas inconformidades como compartilhamento de frascos multidoses para dois ou mais pacientes (10,8%), reutilização de insumos de uso único, como seringas para salinização de pacientes diferentes (1,2%) e reencape de agulhas após uso (4,9%). Foram referidas maior adesão ao uso de luvas para administração de injeções endovenosas (80,5%) e falta de treinamento para manipulação de dispositivos de segurança (13%). Dados correlacionais apontaram que, quanto maior a idade, melhor era a conduta referida na prática de injetáveis. **Conclusão:** Embora a maioria das condutas configure-se dentro das Boas Práticas de Medicamentos Injetáveis, há relatos de práticas de risco, como compartilhamento de insumos de uso único. O treinamento para uso de dispositivos de segurança ainda não é uma realidade para todos os profissionais, visto que muitos o referiram como raro.

## DESCRITORES

Cuidados de Enfermagem; Injeções Intramusculares; Injeções Intravenosas; Injeções Subcutâneas; Conduta do Tratamento Medicamentoso; Segurança do Paciente.

## RESUMEN

**Objetivo:** Identificar la conducta de profesionales de enfermería del estado de São Paulo sobre Práticas de Medicaciones Inyectables. **Método:** Se trata de un estudio tipo *survey*, el cual identificó la frecuencia de Práticas de Medicaciones Inyectables mediante respuesta de un cuestionario electrónico, validado entre septiembre y diciembre de 2017. **Resultados:** Teniendo en cuenta las 1.295 respuestas computadas, se identificaron inconformidades como el uso de frascos de dosis múltiples para dos o más pacientes (10,8%),

la reutilización de insumos de un solo uso, como jeringas para la salinización de diferentes pacientes (1,2%) y el reencapuchado de agujas después de su uso (4,9%). Sobresalió la adhesión al uso de guantes para las inyecciones intravenosas (80,5%) y la falta de capacitación sobre la manipulación de dispositivos de seguridad (13%). Los datos correlativos señalaron que, a mayor edad, mejor la conducta referida en la práctica de los inyectables. **Conclusión:** Aunque la mayoría de las conductas se configuran dentro de las Buenas Prácticas de Medicaciones Inyectables, se informa sobre la existencia de prácticas de riesgo, como el compartir insumos de un solo uso. La capacitación en el uso de dispositivos de seguridad aún no es una realidad para todos los profesionales y muchos han declarado que raramente se los entrena en esa área.

## DESCRIPTORES

Atención de Enfermería; Inyecciones Intramusculares; Inyecciones Intravenosas; Inyecciones Subcutáneas; Administración del Tratamiento Farmacológico; Seguridad del Paciente.

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