

Occupational biosafety from the perspective of nursing students

A biossegurança ocupacional na perspectiva do estudante de enfermagem

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ABSTRACT

This is a descriptive research that aimed to investigate the non-conformities regarding biosafety, committed by health professionals during service delivery, from the perspective of nursing students. Data collection was done through a self-administered questionnaire with 80 students, and were analyzed through thematic analysis. The study respected the ethical precepts related to human research. The prevalent non-compliance refers to workers' negligence to use Individual Protection Equipment by, justified by their lack of time, overload and lack of knowledge. Academics suggested permanent health education as a way of improving this scenario. It can be inferred that education can be a strategy for the safety culture of both the user and the worker.

KEYWORDS: Biosecurity; Student; Nursing

RESUMO

Trata-se de uma pesquisa descritiva que teve como objetivo investigar as não conformidades quanto à biossegurança cometidas pelos profissionais de saúde durante o cuidado, sob a perspectiva do estudante de enfermagem. A coleta de dados foi feita por meio de um questionário autoaplicável junto a 80 estudantes, que foram analisados mediante análise temática. O estudo respeitou os preceitos éticos envolvidos com a pesquisa em seres humanos. A não conformidade prevalente refere-se à negligência quanto ao uso de Equipamentos de Proteção Individual pelos trabalhadores, justificada pela falta de tempo, sobrecarga e desconhecimento do trabalhador. Para melhorar este cenário, os acadêmicos sugeriram educação permanente em saúde. Pode-se inferir que a educação pode ser uma estratégia para a cultura de segurança do usuário e do trabalhador.

PALAVRAS-CHAVE: Biossegurança; Estudante; Enfermagem

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INTRODUCTION

Organic Health Law n. 8.080, of September 19, 1990, which regulates the Brazilian Unified Health System (SUS), rules that health is determined and conditioned to factors such as food, education, housing and, among other factors, work¹. Therefore, the practice of safe work supports the promotion of worker health and is an essential adjuvant in the prevention of healthcare-associated infections (HAI).

In the current landscape of nursing practices, there is still no full worker compliance with the use of Personal Protective Equipment (PPE). Even if this equipment is available, many workers do not wear it because of overconfidence, carelessness, haste or discomfort². If PPE is considered uncomfortable and there are difficulties in compliance, then, rather than simply encouraging its use, PPE should be provided in the appropriate size and anatomical structure for those who will wear it^{2,3} always listening to the workers and their issues regarding compliance.

The conditions that are offered to workers significantly affect their exposure to occupational hazards and are responsible for occupational accidents, especially with biological material. According to a survey conducted by a Reference Center on Occupational Health (CEREST), over a third of the accidents involving healthcare professionals were due to exposure to biological material. Many workers do not wear gloves when administering medications, especially when handling saline solution side injectors and during the withdrawal of intravenous needles or catheters. Additionally, some workers do not wear gloves during venipuncture procedures⁴.

Needle recapping and patient agitation at the time of drug administration are some of the biological risk factors^{5,6}. Although there are recommendations⁷ against recapping, spraining, breaking or removing needles from the syringe manually and orientation to discard these materials in specific disposal containers, we can still see practices that neglect these recommendations. According to Regulatory Standard n. 32, manual recapping and disconnection of needles is prohibited and the use of piercing or cutting materials with a safety device must be ensured; moreover, it is the responsibility of the worker to dispose of any piercing or cutting material he or she has used⁸.

A study⁹ has shown that some of the causes that trigger accidents by biological agents are the lack of physical and mental aptitude and the incorrect motivation of the worker. Human error due to lack of physical and mental aptitude involves situations of tension or illness that can hinder the worker's performance, and error due to lack of motivation is related to negligence and/or malpractice, which favors exposure to risk.

In different settings, the nursing team's negligence and/or omission in relation to biosafety procedures, such as hand hygiene, use of PPE, compliance with universal precautions, among others, still challenges researchers^{10,11}, raising questions about work conditions, current education practices and activity management.

This study aimed at determining the non-conformities regarding biosafety committed by healthcare professionals at work, from

the perspective of the nursing student. The study also aimed at fostering the students' critical sense and meaningful learning starting from what they already know. This could create a strategy to promote their reflection on biosafety and the practice of continuing education in healthcare (CEH).

METHOD

This is a qualitative, descriptive study, conducted with 5th and 7th semester students of three Nursing courses of a Regional Community College located in the state of Rio Grande do Sul, Brazil. The three courses are offered by the same university, but at different campuses, in different cities, located in different regions of the state. They have common curricula and the subjects of Nursing in Communicable Diseases and Nursing in Occupational Health are taught in the 5th and 7th semesters, respectively, which warrants our option for these periods.

All the students of the selected semesters were invited to participate in the study, provided that they met the criteria of: being a nursing student who had already had practical experience in nursing care in a hospital and/or primary care setting; to be studying or have already studied the subjects of nursing in occupational health and/or nursing in communicable diseases, including discussions on biological hazards and communicable diseases. After signing the Declaration of Cooperating Institution and contacting the coordinator of the course, the students were approached in the classrooms. At that time, they were informed about the research and asked to sign the Free and Informed Consent Form should they agree to participate.

Data was collected through a self-administered questionnaire containing three essay questions, as follows: 1. If you already have witnessed situations of negligence of biosafety standards in your daily work in healthcare, please describe them, identifying the professional or student category; 2. In your opinion, what are the causes of these nonconformities? 3. How can these situations be dealt with?

We chose to perform thematic analysis to work on the search results¹². The study complied with Resolution n. 466 of December 12, 2012, which deals with research on human beings and was approved by the ethics committee of the Integrated Regional University of Alto Uruguai and Missões, campus of Santo Ângelo, Brazil, under Decision n. 228.606.

RESULTS AND DISCUSSION

A total of 80 students participated in the study. It was not the intention of the study to classify the students according to the location surveyed, but to have a global perspective since the curriculum is the same in all three courses. The results, arranged in categories, indicate the perception of the students regarding negligence and biosafety, situations that can cause illness and point gaps in Health Education.



Nonconformities with biosafety in the perception of the students

The majority of the respondents mentioned non-use of PPE and/or shortcomings in the provision of this equipment by the institution as the most common nonconformities in their daily work, followed by negligence of hand hygiene, needle recapping and disregard for biological waste.

I have already witnessed nursing technicians performing procedures such as venipuncture and dressing without gloves or glasses for eye protection. (Respondent 32)

I've seen technicians and nurses pass from patient to patient, medicating, checking vital signs without changing gloves or sanitizing their hands. I have also seen nursing technicians making dressings without the proper technique and nursing technicians and nurses puncturing without gloves (Respondent 4).

Nursing technicians performing procedures without gloves, nursing students not washing their hands; nursing technicians and students disposing of contaminated waste in inappropriate places and students reusing gloves. (Respondent 20)

I have witnessed a nursing technician cleaning the floor contaminated with blood without using gloves, only sheets of paper. I have also seen a nursing technician bed bathing several patients without changing gloves. (Respondent 48)

Not wearing gloves during procedures where gloves are necessary, both nursing technicians and doctors. No proper hand washing on the part of nursing technicians and doctors. (Respondent 45)

Performing venipuncture without gloves - technician and nurse. Making dressings without gloves and using the wrong technique - nurse. Performing aspiration in tracheostomy without wearing glasses/mask - technician. (Respondent 77)

According to Regulatory Standard n. 6 of Ministerial Act n. 3.214, of June 8, 1978¹³, PPE is any device or product of individual use used by the worker for the protection of risks that can threaten security and health at work. Employers have the responsibility of acquiring, guiding and demanding PPE appropriate to the risk of each activity, whereas employees must use and care for the PPE. This is still neglected by many workers, considering that Brazilian studies often report the lack of compliance of some workers with the use of personal protective equipment, whether due to negligence or lack of availability in an adequate place and/or amount, although many recognize the importance of PPE^{2,3,5,14}.

The reasons for the workers' low level of compliance with standard precautions relate to poor training, lack of awareness, unavailability of personal protective equipment and improper working conditions associated, in particular, with overwork, inadequate staffing and the fast pace of work. These conditions may lead to accidents, especially those caused by biological material, and to diseases¹⁵.

Contemporary studies identify incorrect hand hygiene. A bibliographical review¹⁶ pointed out that the great majority of health professionals have some theoretical and practical knowledge on hand hygiene, however, in practice, they behave differently, with no compliance or correct hand hygiene technique in their practice. A study done in Portugal¹⁷ confirmed that healthcare workers have poor practical knowledge. Among surgical assistants, doctors and nurses who participated in the research, compliance with routine hand hygiene was higher among the latter, a result also found in a study conducted in four hospitals in Brazil that identified nurses sanitizing hands more often than doctors¹⁸. Comparing interns and nursing staff, the latter demonstrated greater compliance with this activity too¹⁹. The results for nursing are good, but there are still fundamental shortcomings in the prevention of HAI.

Hand hygiene is a practice that, if neglected, can contribute catastrophically to the upward progression of HAI. Studies have shown that the hospital environment is a potential reservoir of *Staphylococcus aureus* resistant to methicillin (MRSA), *Enterococcus* resistant to vancomycin (VRE), *Pseudomonas aeruginosa*, *Clostridium difficile* and *Acinetobacter baumannii* and that these multiresistant microorganisms are present in the most different places of a hospital environment, including drains, sinks, handles, seats, sanitary seats, tables, taps, beds, monitors and keyboards²⁰. In association with the rational use of antimicrobial agents²¹, the adequate cleaning and disinfection of surfaces, the use of PPE and compliance with hand hygiene improve the control of these microorganisms²².

When asked about the causes of their negligence of biosafety concerns and the occurrence of nonconformities, they mainly gave answers involving overload of tasks, insufficient time for the execution of the tasks and consequent haste, lack of "inspection" by the manager, not having PPE available, in addition to overconfidence and lack of knowledge. It is worth mentioning that workers are often blamed for the occurrence of accidents due to the non-use of PPE, carelessness or lack of attention. However, we must reflect on the reality of these workers, which gives rise to stressful processes. Fear can generate protective attitudes like wearing the right PPE and reporting an accident at work. However, if ignored by the worker's defensive system, it can generate an attitude of negligence of one's own health²³.

I believe that because of the hasty routine of hospitals and healthcare units, professionals eventually forget these things, sometimes because of negligence and lack of knowledge. (Respondent 7)

Because they think nothing's going to happen to them. Because they think some material, say, blood, is not contaminated. Because they think they will not contaminate the patient. Or simply because they want to spare gloves or because the institution itself limits the number of gloves that can be used by each nurse during the day. (Respondent 48)



Extreme confidence in yourself, thinking that it will never happen to you. Hurry to perform the procedure. (Respondent 40)

Most of the time it is because we are in a hurry, with many other things to attend to or even because we “get used” to the wrong technique. (Respondent 72)

Some respondents also mentioned lack of commitment, irresponsibility, lack of continuing education, lack of attention, carelessness. A survey carried out with nurses in a mid-sized hospital in the state of Paraná, Brazil, found that these workers perceive the biological risk that they may become ill, but they do not see that this risk is present in their activities when they handle sharp objects contaminated with blood or other secretions⁹.

It is often lack of commitment to work and also lack of knowledge about contamination. I am a nursing technician myself and today I am more aware of some important things I was not familiar with before. (Respondent 35)

[...] Lack of knowledge and awareness about the need for PPE. And also because of some professionals' negligence [...]. (Respondent 10)

In some situations, I believe it is because of the professionals' schedule. It is often very demanding. There is also the lack of commitment of the professional to the health of his or her patients, and lack of knowledge is of course an aggravating factor. (Respondent 37)

In my opinion, some teams are irresponsible. Some institutions also stick to old practices, when we were not so strict in terms of prevention of transmission of infectious agents and personnel protection. I believe that in the institution in question there is a lack of continuing education actions for the professionals who work there, as well as lack of commitment and availability of PPE to all sectors of the institution. (Respondent 24)

Carelessness of the professionals, lack of time to do their job calmly. Technicians have no full understanding of the possible contamination and of the risk posed by lack of PPE. Quite often, too, the institution does not provide the right materials or PPE. (Respondent 27)

An investigation that sought to analyze the reasons, attitudes and beliefs of nursing workers regarding compliance with PPE identified that the low compliance with the use of this equipment is associated with organizational, managerial and relational aspects such as inadequate facilities (which affects the availability and accessibility of PPE), lack of routines, work overload, stress, improvisation and attrition in work relationships²⁴. This situation alerts us that in order to change this reality we need more spaces of reflection, education, critical analysis and consequent production of knowledge/solutions to the challenges of this work, resulting from the analysis and collective understanding of the situation.

A study demonstrated the tendency to associate risk with the workers' attitudes, strengthening the belief that the worker is to blame for the failures that occur in the work process. The idea, neglected in this intention, is to encourage these workers' critical spirit already in their early training, making them capable of managing their work environment and occasionally change it, improve it, reduce risks²⁵ and strengthen user protection practices, as well as self-protection.

Continuing education in health as a strategy for safety

Participants believe that, in order to minimize their negligence of their own safety and that of their patients, the main measures are continuing education, retraining, lectures and training sessions, as well as greater supervision by nurse-managers. They also find it important to raise these workers' awareness. The decrease in the pressure at work was also mentioned as a significant factor for the reduction of non-compliance with biosafety rules.

Through continuing education. Making nurses more familiar with the routine of their teams, because nurses have to know the work of one another and feel responsible for them. Proper accountability, talking to each employee whenever necessary. (Respondent 61)

With continuing education for the teams, with the availability of the necessary PPE and with better supervision by the administration of the institution and the health surveillance body. (Respondent 24)

Continuing education for all the staff. The institution should provide PPE to all professionals, and there must be a team or professional that supervises the use of this PPE. (Respondent 27)

Awareness-raising among healthcare professionals about the correct use of materials and the use of PPE that is indispensable. (Respondent 69)

There should be more rigorous surveillance and continuing education to minimize risks for healthcare professionals and patients. (Respondent 10)

They could be minimized by raising awareness about the importance of biosafety care through lectures, talks, posters, training sessions, so that all professionals can understand it better and use the right equipment for each type of situation. (Respondent 25)

Regulatory Standard n. 32, among other recommendations, states that in every place where there is the possibility of exposure to biological agents, written instructions must be provided to workers in an accessible language, informing the routines to be performed in that workplace and its measures for the prevention of accidents and work-related diseases. But education for health work goes far beyond that.

The professional training processes demanded in a unidirectional way, although very present, in the logic of the transmission of



technical knowledge, with content focused on the biological aspects of the health-disease process, are opposed to the one advocated by CEH, which proposes a movement in which the three spheres of management have the challenge of decentralizing the debate and management of health education involving cross-sector initiatives and local/regional bodies, under collegiate management, breaking the paradigm of vertically imposed training management and enabling the active participation of all those involved in the management and training of healthcare workers²⁶.

Ministerial Act n. 198/GM, of February 13, 2004²⁷, instituted the National Policy of Continuing Education in Health as a strategy of SUS for to train and educate its staff. It is about learning at work, where learning and teaching are incorporated into everyday work. It proposes that the training of healthcare professionals should take into account the health needs of individuals and populations, sector management and social control in health, contributing to the improvement of professional practices and the organization of work itself. These changes should start from reflection about the the work process itself²⁷. This fits with the present reflection, considering that the prevalent infraction refers to the negligence of the use of PPE by the workers, often justified by lack of time, overwork or ignorance of the worker.

The role of the CEH in this situation would be to contextualize the workplace and empower the workers to play a leading role in the discussion of how to qualify their work. Today, healthcare professionals are often subject to precarious labor conditions. Employers often focus on the exploitation of surplus value, profit making, suppression of labor rights, and workers eventually have to adapt to the demands of the market, with a production-oriented behavior and without the right to any criticism²⁸.

It is about a healthcare training initiative capable of including both technical and scientific qualification, intellectual ability and the development of work skills in multiprofessional teams, promoting interpersonal relationships and questioning of the work process. Articulating technical-scientific knowledge with critical reflection about their work seems to be a gap in the institutional training processes.

Throughout the history of nursing, different HE paradigms have been tested. Although based on different strategies, many of them were fairly reductionist. The social landscape of Brazil requires that we change health education, be it institutional, popular or academic, into spaces of integration and participation, a result of collective efforts. Nurses must develop and/or strengthen empowering educational practices, with focus on encouraging critical awareness, exchange of experiences and autonomy.

Dialogue-based education with free speech is still a challenge in the healthcare area, considering that not all healthcare professionals are familiar with this model or have not been educated to use it. Nevertheless, there has been some progress in this sense and professors should encourage the use of modern ways of educating for healthcare, making students eager to do their best whilst respecting the knowledge of each other^{29,30}.

It is worth mentioning that training for the biosafety culture can start very early. A study pointed out that 71% of those surveyed at a Healthcare School in Rio de Janeiro stated that biosafety education should begin in the fundamental cycle, demonstrating the need to place this discussion on the agenda of public policies for education, especially in science teaching. The beginning of biosafety teaching in the fundamental cycle of education can contribute to the acquisition of a culture of safety³¹.

By bringing this reflection to the training of healthcare professionals, we emphasize the importance of strengthening the CEH policy at the beginning of the professional training process. Its practice should be extended throughout the educational process, with links between training institutions, service management, attention and social control, developing knowledge from meaningful learning.

A study with medical interns found a substantial difference between the knowledge and practice of standard precaution measures. In view of this, the authors emphasize the need for continuous training with interns, with supervision and follow-up³². From the identification of the difficulties they experience, a reflection may be necessary. In the current landscape of the healthcare system, training for work presupposes the pedagogy of implication, the challenge of workers to position themselves ethically, politically, individually and collectively and to interrogate the world of work, both in the technical and scientific dimension, as well as in the development of interrelated skills²⁶.

Considering the gap between knowledge and practice, the solution could lie in the student's engagement as a social player in the learning situation, receiving opportunities for discussion. The collective participation of these students can suggest better ways of learning that consider their previous cognitive and subjective background rather than simply training them. The transmission of information would supervised horizontally by the teacher. Biosafety measures are more likely to be adopted if one is familiar with them, and this implies the articulation of care for oneself and the other with continuing education. After all, in order to take care of themselves and others, healthcare professionals need to know the risks and their forms of prevention³³.

Active teaching and learning methodologies can help bridge the gap between theory and practice. The use of conceptual maps may well fit the proposal to promote a new, more general and integrated view of this field of knowledge. In order to teach, professors must "break their routine and start thinking about the students' perspective, helping them perceive relationships with their previous knowledge, and then identify important similarities and differences, reconcile real and apparent discrepancies," in order to favor relations that allow the apprehension of other dimensions of the conceptual field in the biosafety teaching³⁴.

Thus, it can be inferred that CEH spaces can be an efficient strategy to discourage unsafe actions. Education for self-care, safety and prevention of occupational diseases adds value to the professional. Working together with the nursing students to make



them agents of change, discussing their challenges, considering their knowledge, in a constant movement of co-management with the workers and students, adds value to the work of nursing and assists in the prevention of infections, promoting excellence in healthcare.

CONCLUSIONS

This research enabled us to learn more about the construction of a nursing professional, considering that the topic of biosafety pervades all areas of the nursing practice. After the research, we noticed that the topic triggered the interest of the respondents and contributed to driving reflections and discussion. This demonstrates the importance of the researched topic, since it is related to the safety and health of healthcare professionals and the people who use health services.

We found that the non-use of PPE was one of the most commonly mentioned acts of negligence. That was often justified by lack of time, irresponsibility, lack of supervision and insufficient

knowledge. To remedy these situations, education was pointed out by many of the respondents as the best strategy. It can help raise awareness about PPE, including cognitive and interrelational aspects, management, among others, for the solution of learning difficulties and consequent negligence. This includes knowledge about biosafety and its implications, both in the field of knowledge, and in the field of management and active participation of the subjects for the co-management of safe practices in the care for themselves and for the others.

Finally, it is worth reflecting on the emergence of communicable diseases in the current Brazilian scenario and the proposal of the World Health Organization to use research to increase safety in healthcare practices. It is also important to emphasize the importance of the educator-nurse to involve his or her team in the management of a culture of safety, with a view to transforming practices. Partnerships with state and local health surveillance bodies are suggested in order to build mechanisms that guarantee this safety to all stakeholders.

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Conflict of Interest

Authors have no potential conflict of interest to declare, related to this study's political or financial peers and institutions.



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