

Biosafety and patient safety: the perspective of nursing teachers and students

Biossegurança e segurança do paciente: visão de professores e estudantes de enfermagem

Bioseguridad y seguridad del paciente: visión de profesores y estudiantes de enfermería

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Abstract

Objective: To identify the understanding of biosafety and patient safety from the perspective of nursing teachers and students in Brazil and Portugal.

Methods: This is a qualitative study involving 14 teachers and 44 students from 3 public educational institutions (2 in Brazil and 1 in Portugal). The study included students in their final year of high school as well as students enrolled in undergraduate and licensure courses because, by this stage of their studies, they had already covered topics related to biosafety and patient safety. It also included teachers of these subjects. Triangulation was used to collect data through interviews and observation. For organization and analysis, resources of the Atlas.ti 22 qualitative research software program were used in conjunction with the principles of thematic content analysis.

Results: It was evident in both countries that the teachers and students recognized the premises that involved biosafety and patient safety and that these should form part of nursing education in its transversality, emphasizing that biosafety and safety were interrelated in the prevention of adverse events. The importance of caring for oneself and others, the influence of the regulatory framework in guiding practice, and the existence of gaps in knowledge and practical application were all factors mentioned by the interviewees.

Conclusion: Biosafety and patient safety education and regulations, as well as the knowledge of teachers and students on these topics, affect safe practice and the quality of nursing care. Having a good understanding of these areas is therefore essential in health crises, especially for preventing infection, and it is important to raise awareness of the duty of safe health practices.

Resumo

Objetivo: Identificar o entendimento sobre biossegurança e segurança do paciente na visão de professores e estudantes de enfermagem, no contexto de Brasil e Portugal.

Métodos: Trata-se de estudo de abordagem qualitativa, composto de 14 professores e 44 estudantes de três instituições públicas de ensino, sendo duas brasileiras e uma portuguesa. Incluíram-se no estudo os estudantes das últimas fases dos cursos de nível médio, graduação e licenciatura, por já terem contemplados eixos relativos à biossegurança e a segurança do paciente, além dos respectivos professores da fase. A coleta se deu por triangulação, com uso de entrevistas e observação. Para a organização e a análise, usaram-se recursos do *software* para pesquisas qualitativas Atlas.ti 22 e preceitos da análise de conteúdo temática.

Resultados: Ficou evidente, nos dois países, que os professores e estudantes reconheceram as premissas que envolviam a biossegurança e a segurança do paciente, devendo compor o ensino de enfermagem em sua transversalidade, ressaltando que biossegurança e segurança se inter-relacionavam na prevenção dos

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eventos adversos. Foi notória a importância do cuidado de si e do outro, da influência do arcabouço normativo na orientação da prática e da existência de fragilidades no conhecimento e na aplicação prática.

Conclusão: O ensino e as normas da biossegurança e da segurança do paciente, como também do conhecimento dos professores e dos estudantes sobre os temas influenciam na prática segura e na qualidade dos cuidados de enfermagem. A solidez desses conhecimentos é essencial em crises sanitárias, assumindo relevância ímpar na prevenção das infecções e na sensibilização, para o dever do comportamento seguro em saúde.

Resumen

Objetivo: Identificar la comprensión sobre bioseguridad y seguridad del paciente según la visión de profesores y estudiantes de enfermería, en el contexto de Brasil y Portugal.

Métodos: Se trata de un estudio de enfoque cualitativo, compuesto por 14 profesores y 44 estudiantes de tres instituciones educativas públicas, dos brasileñas y una portuguesa. En el estudio se incluyeron estudiantes de las últimas fases de las carreras de nivel medio, de grado y licenciatura, por ya haber contemplado ejes relativos a la bioseguridad y seguridad del paciente, además de los respectivos profesores de esa fase. La recopilación se realizó por triangulación, con el uso de encuestas y observación. Para la organización y análisis, se usaron recursos del *software* para investigaciones cualitativas Atlas.ti 22 y principios del análisis de contenido temático.

Resultados: En los dos países, quedó demostrado que los profesores y estudiantes reconocieron las premisas relacionadas con la bioseguridad y la seguridad del paciente, que debe componer la enseñanza de enfermería en su transversalidad, y se destacó que la bioseguridad y la seguridad se interrelacionaban en la prevención de los eventos adversos. Fue notoria la importancia del cuidado de sí y del otro, la influencia de la estructura normativa en la orientación de la práctica y la existencia de debilidades en el conocimiento y en la aplicación práctica.

Conclusión: La enseñanza y las normas de bioseguridad y seguridad del paciente, así como también el conocimiento de los profesores y estudiantes sobre los temas, influyen en la práctica segura y en la calidad de los cuidados de enfermería. La solidez de estos conocimientos es esencial en crisis sanitarias, dada su relevancia única en la prevención de infecciones y en la sensibilización para el deber del comportamiento seguro en salud.

Introduction

The themes covered in the areas of biosafety education and patient safety are thought to be transversal to nursing education. Even without the knowledge of biosafety that we have today, Florence Nightingale and public health demonstrated the importance of cleaning and disinfection measures; keeping the environment clean; and the proper use of materials and equipment in health work.^(1,2)

The term “biosafety” was coined in 1995 and is defined as the safety of life. It refers to the set of actions designed to minimize exposure to the risks posed by the most diverse laboratory technologies, which have implications for people and the environment. It guides hospital infection control practices and defines safety measures in relation to exposure to microorganisms in various institutional health spaces, bioterium, and teaching and research laboratories. In educational institutions, these are spaces where a wide range of procedures are carried out by various people (including teachers, students, administrative technicians, and cleaners); thus, they require proper organization and well-defined protocols to serve their roles.^(3,4)

When studying this issue in the United States and in multilateral organizations, it was found

that the terms “biosafety” and “biosecurity” were commonly used to refer to the protection of human health and the environment from dangerous pathogens and the action of manipulated biological agents; they it also include the safe handling of biological and hazardous agents in laboratories. In France, the term is “*biosécurité*”; in Spain, “*bioseguridad*”; in Italy, “*biosicurezza*”; and in Brazil, biosafety. In Portugal, there is explicit knowledge about biosafety, but to refer to norms and protocols in that country, the term usually employed by health and teaching institutions is “hospital infection control”.^(3,5,6)

Biosafety should be part of the curricula of technical and undergraduate courses. Every nurse educator should understand the foundations of biosafety education and be aware of the impact of inadequate infrastructure, equipment, and materials available and accessible in teaching and practice.^(7,8)

There is an interface between biosafety and patient safety; the latter is addressed by an international movement, with the publication of the report, To Err Is Human, in 1999 serving as a landmark. Considering the importance of the topic, the World Health Organization published its World Alliance for Patient Safety in 2004, followed by the Patient Safety Curriculum Guide: Multi-Professional

Edition in 2011.⁽⁹⁾ These documents guide actions on patient safety by discussing the fundamental foundations that must be considered in the teaching plans for various types of health courses.

In Brazil, patient safety regulations became the theme of Ministry of Health decree 529 of 2013, which aims to keep the risk of harm associated with health care to an acceptable minimum. In 2014, the Ministry of Health launched its reference document for the National Patient Safety Program [*Programa Nacional de Segurança do Paciente*] (PNSP). In Portugal, patient safety is described in the National Patient Safety Plan [*Plano Nacional para a Segurança do Doente*] (PNSD, 2015-2020). Professional and patient safety and biosafety actions are essential in the daily life of health practitioners, with a particularly intense and vital impact in crisis situations, such as the current coronavirus pandemic, and teaching plays an important role in ensuring their effectiveness.⁽¹⁰⁻¹²⁾

The aim of this study was to identify the understanding of biosafety and patient safety among nursing professors and students in Brazil and Portugal.

Methods

This qualitative research involved nursing students and teachers in two countries: Brazil and Portugal. In Brazil, the research was conducted in two federal teaching institutions, both of which serve as references for high school and nursing graduation. In Portugal, the study was conducted at a college that trains nurses up to the degree level. The sampling was by intentionality and convenience considering the excellence and good representation of professional nursing training in both countries, as well as the researchers' access to the institutions involved. Both the students and the teachers included were in the final stages of their courses; by this stage, the students had basic scientific knowledge related to protection and safety, and the teachers were able to apply this knowledge in practical and teaching situations. Students and teachers who were on leave or absent due to sickness were excluded from the study.

Triangulation was used to collect data, which included semi-structured interviews and observation. Data was collected from March to December 2017 in Brazil and from April to June 2018 in Portugal. There were 58 respondents from the three mentioned educational institutions: 14 teachers and 44 students. Of the teachers, 13 were female; the average age was between 25 and 60 years; and all had a minimum of 5 years of teaching experience, 9 had PhDs, 4 had Master's degrees, and 1 was a specialist. Of the students, 41 were female, with an average age ranging from 17 to 42 years.

In both Brazil and Portugal, the interviews and observations were carried out by the first author. A semi-structured script was used for the interviews in order to capture the participants' perspectives on the theoretical foundations and teaching practices, including laboratories and the care network. The interviews were recorded and after the interviews, the researcher observed the mandatory supervised internship as well as practical classes in the school environments. The interactions between the teachers and students during biosafety actions, such as conducting, practicing, and guiding, were recorded in a field diary, along with the hygiene, safety, and protection measures implemented to protect themselves, others, and their patients.

Following thematic content analysis, the findings were organized using the qualitative data analysis resources of the software program Atlas.ti®, version 22. The interviews were transcribed and the notes from the observations recorded in word document. All of them were added to the program. Each document was explored by selecting significant excerpts from the interviews (quotations) and identifying the nuclei of meaning, to which codes were assigned based on the proposed investigation. Although the magnitude of the findings was considered, all the responses were analyzed in order to understand the set and complexity of the phenomenon.^(13,14)

In Brazil, approval to conduct the study was obtained from the Research Ethics Committee under 1,939,137. In Portugal, the recommendations of the Declaration of Helsinki were followed. To ensure confidentiality and anonymity, the teachers in

Brazil were identified as TB and the students as SB, while the teachers in Portugal were identified as TP and the students as SP. These were followed by the interviews being conducted in chronological order (Certificate of Presentation of Ethical Appreciation: 61514316.0.0000.0121).

Results

The results were presented without distinguishing between the Brazilian and Portuguese contexts because there was no variation that would justify doing so. Two analytical macro-categories emerged: “Biosafety from the perspective of nursing students and teachers” and “Patient safety from the perspective of nursing students and teachers.”

Biosafety from the perspective of nursing students and teachers

Figure 1 summarizes the understanding of biosafety among the teachers and students. The teachers’ view of biosafety addressed the importance of these topics in nursing education as well as the impact of the regulatory environment on their teaching practice. For teachers, biosafety (or hospital infection control, as known in Portugal) is part of their theoretical and practical teaching. It includes protective measures; it should be part of the curriculum of nursing courses; and it should be addressed in any health intervention. Biosecurity was also related to the prescription of legal regulations concerning

hand hygiene as well as the need to protect oneself, others, and the environment.

It is a concern of the school that the student [uses biosafety measures] in any health care procedure, as hand hygiene or using personal protective equipment, which are protection for the [student] himself/herself. Issues related to the protection of the health professional [and the] protection of who are sick [are fundamental], for this reason these measures are required in laboratory practice. TP1

When I think about biosafety, I think of issues related to professional safety, workplace accidents, sharps, and the environment. TB3

The students’ perspectives on biosafety can be summarized as “protection of oneself and others” (predominant), “good work practices,” especially hand hygiene, and the use of personal protection equipment.

Biosafety [...] is the study of my own safety and the patient’s safety. I have to pay attention [to] how I’m going to take care of him/her and follow the procedures. Take care of myself and him/her so that no one is endangered. SB11

Biosafety refers to the safety of the individual, who could be the nurse or user. We must pay attention to users, [...] just as we must pay attention to other patients who may bring microorganisms into the

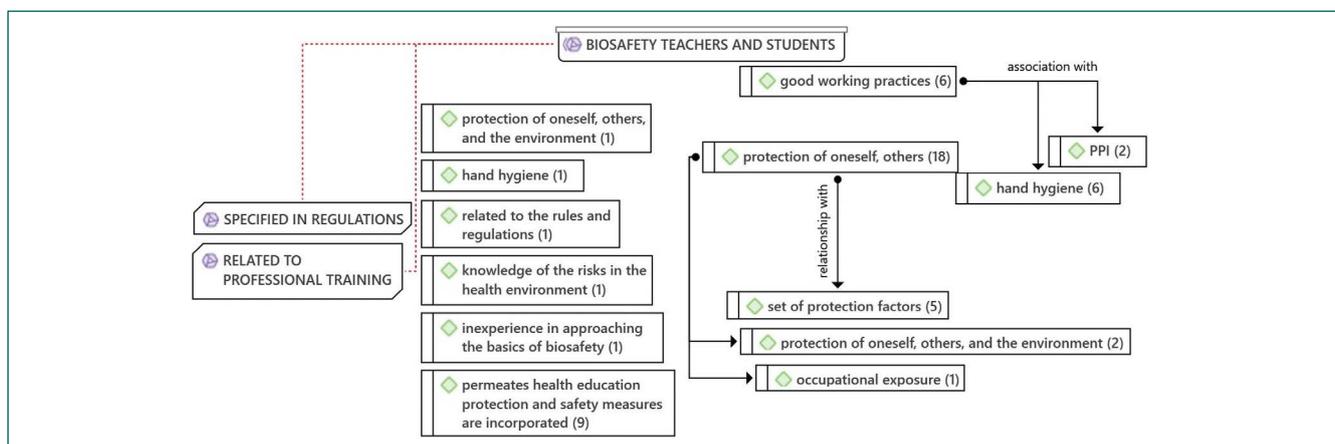


Figure 1. Biosafety from the perspective of nursing teachers and students

environment in which we will provide care. We must pay attention to hand washing and procedures. SP5

Hand hygiene is critical in everyday life, [...] washing hands as soon as we enter the wards; we have an external environment that is completely different from the hospital environment [...]. Use alcohol protection or a disinfectant. In the hospital context, we attended a theoretical class on hospital infection control, and they talked about hands washing because they are contaminated and spread microorganisms. SP10

Patient safety from the perspective of nursing teachers and students

Patient safety from the perspective of teachers and students is summarized in Figure 2 and is expressed in two themes, “its inclusion in nursing education” and “the legal regulations” such as the PNSP of Brazil and the PNSD of the General Directorate of Health of Portugal. There was a strong belief among the teachers that patient safety was a transversal theme in the curricula of nursing courses and that it should always be contextualized in care practices, even when it was not clear at the institutional level.

Although I do not work directly with this subject at university, because it is a transversal theme, we must use and recruit it with the student at all times in order to provide safe care for ourselves and the

patient. The institution’s position on this is not very clear. TB3

I consider patient safety not only when I perform a technique but also from the moment the patient enters the institution for treatment. It is not a topic that I study and am updated on. I know that it is a very broad area and that it is taking up more and more space in research [...] TB4.

Respect for and/or consideration of the legal regulations on patient safety was also identified in the teachers’ statements. The Brazilian teachers did not mention the PNSP, but the PNSD of the General Directorate of Health of Portugal was mentioned by the majority of Portuguese teachers.

Patient safety [...] is safety in all aspects, especially in physical issues such as falls occurring within the hospital. [Patients] falling off the examination table during examinations; and in the case of pediatric patients, falling off the bed. If you forgot to raise the side rail [...], why did he forget? Normally it’s being in a hurry to do something, so do you teach [...] to be calm and organized in what you’re doing, so that it becomes a routine. It’s making an access; an activity; changing a bed or a bandage, and raising the bed rail. In the case of pediatric patients, it only takes a minute for a child to fall off. [...] TB4

Regarding patient safety [...] it has been discussed more in recent years; previously, we would see

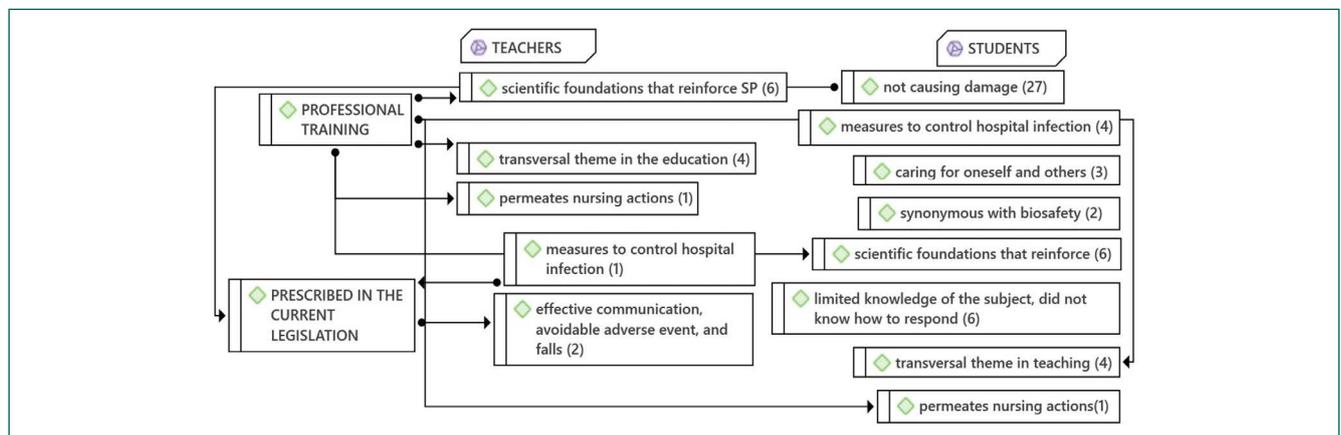


Figure 2. Patient safety from the perspective of nursing teachers and students

so many errors caused by healthcare because we weren't as careful, and then the policy was implemented to improve these aspects. [...] I teach the importance of communication between professionals; reading what other professionals have written about that care on the chart; and our notes. TB1

Every year, we update the norms of the General Directorate of Health in clinical teaching. These hand washing and infection control guidelines are distributed to students [...]. TP2

Almost all of the students participating in the research related patient safety to harm-prevention measures. They mentioned the provisions of the Brazilian PNSP, but there were students who were unaware of the PNSP's content.

There should be no harm and as little risk as possible. When I use medication, I check the dose of the medication on the medical record to make sure everything is there. Then, I talk to the patient to learn about the medication and any potential side effects.

This is patient safety. SB9

Patient safety is a whole, include asepsis, correctly explaining the procedure and what will be done to him/her. I think more about the hospital issue, lifting the bed rail so that he/she doesn't fall off, taking correct notes, checking if the medication is correct, and the dose. SP9

I don't know how to answer. SB2

During the observation, the relationship between the legal requirements and actual practice was verified in the teaching of biosafety and patient safety contents.

At the Escola Superior de Formação de Enfermeiros, Portugal, in all of the rooms where care practices are simulated, there is an aqueous alcohol-based solution (SABA), water, and soap for washing and antiseptic hand rubbing, as specified in the regu-

lations on the use of teaching laboratories and the regulations of the General Directorate of Health. Note from researcher's observation, Portugal

In Brazil, the institutions surveyed adhere to the Ministry of Health and the National Health Surveillance Agency (Anvisa) regulations, including the PNSP. However, no specific regulations governing hand hygiene or safe practices were observed or established in the laboratories. Researcher's note, Brazil

Discussion

According to the findings of this study, nursing students and teachers consider biosafety and patient safety to be fundamental for safe practice, and both topics should be included in the teaching and curricula of training courses for nursing professionals. The teachers also believed these topics should be transversal in nursing education and that teachers with up-to-date knowledge are needed in order to teach these themes to their students and future professionals. A survey of nursing teachers in Brazil indicates the need for this topic to be transversal in the curricula of health professionals, i.e., it is a theme that should be addressed across all disciplines, and teachers should seek specific knowledge within their area of expertise.⁽¹⁵⁾

Good labor practices are defined by protection and safety measures, which are enshrined in national and international policies. This regulatory framework serves as a guideline for care and educational institutions. Raising awareness of the culture of safety and protection is thus critical and falls under the purview of these institutions. It is important to dedicate a portion of the curriculum to teaching biosafety and patient safety that considers legal regulations as the standard for safe practice as well as invest in the continuing education of professionals in practice.⁽¹⁶⁻¹⁸⁾

Despite the importance of biosafety and patient safety, this study, like others in the literature, reveals suboptimal practice among teachers and students in these areas.^(16,18) This study, conducted

in nursing education reference institutions, identified a lack of knowledge and/or uncertainty about these topics among the students and teachers as well as within the institutional practices. A study conducted in a health faculty in Colombia, which questioned 78 teachers about their knowledge of biological risks and biosafety practices, revealed that 95% of the teachers were unaware of biological risk regulations. ⁽¹⁶⁾

International regulations and available knowledge about biosafety and patient safety are part of the legal framework in health in both Brazil and Portugal, serving as a reference for nursing teachers and students. However, there are some infrastructure deficiencies in teaching laboratories and care institutions, which are practice scenarios. This makes difficult to develop a safety culture; this has been reported in other studies as well. ⁽¹⁹⁾ According to this logic, a study conducted at nine universities in Italy found that the high incidence of infectious diseases during professional work could be avoided through work safety programs and training. Adequate education and protective measures are allies in safe practice. ⁽¹⁹⁾

The students who participated in this research demonstrated a solid understanding of the theoretical and practical foundations of biosafety, highlighting hand hygiene and the use of personal protective equipment. Hand hygiene is widely practiced as the main method of reducing cross-infection in healthcare settings. Nonetheless, studies show that this practice is still lacking, and it is important to raise students' awareness of biosafety attitudes as a fundamental principle for preventing the spread of microorganisms. ⁽¹⁹⁾ It is thus a predictive reality of epidemiological risk because the accuracy of this knowledge is essential in the management and prevention of health crises, such as the current pandemic caused by the new coronavirus. ⁽²⁰⁾ It is a strong protective measure that applies to professionals, nursing and health students, as well as the general population. ⁽¹⁸⁻²⁰⁾

Studies ⁽²¹⁻²³⁾ indicate that nursing students describe their institution's incentive to practice hand hygiene in teaching laboratories and specific curricular units. The students also reported that good

hand hygiene protects their health by breaking the chain of transmission of microorganisms.

The views of the study's respondents are consistent with the International Classification of Patient Safety, which defines adverse events as incidents that cause harm. Both teachers and students agreed that patient safety is about avoiding a potentially dangerous situation. Among the incidents that could cause harm to the patient, some of the procedures and practices mentioned involved medical prescriptions, the administration of medications and fluids, health care practices, falls, team communication, and professional attention. This classification is useful for executing plans and protocols to prevent incidents and classify those that do occur. ⁽²⁴⁾

Nursing courses in both Brazil and Portugal are heavily influenced by local and international biosafety and patient safety regulations, which serve as references for health practice. Despite the importance of the findings of this study, which was conducted in two countries with different political and institutional scenarios and provided a better understanding of the complexity of the phenomenon, it is worth noting that this viewpoint cannot be generalized. It is important to connect local realities to historical and political-institutional macro-contexts.

Conclusion

The results of this study indicate that teachers' and students' knowledge of the topics influences safe practice and the quality of nursing and health care. They also revealed weaknesses in the implementation of these contents in educational practice, which includes teachers, students, and teaching and care institutions.

Collaborations

Ribeiro G, Pires DEP, Martins MM, Vargas MAO, Melo JAC, and Misiak M contributed to the project design, data analysis and interpretation, writing the article, critical review of the intellectual content, and approval of the final version to be published.

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