



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

# IJDR

*International Journal of Development Research*  
Vol. 10, Issue, 01, pp. 33256-33261, January, 2020



RESEARCH ARTICLE

OPEN ACCESS

## BIOSAFETY: A REVIEW ABOUT THE TEACHING AND KNOWLEDGE OF THE THEME

<sup>\*1</sup>Ariane Sabina Stieven, <sup>1</sup>Beatriz Ribeiro Lima, <sup>2</sup>Beatriz Helen Facião  
and <sup>3</sup>Flávia Meneguetti Pieri

<sup>1</sup>Nurse, Master in Nursing from State University of Londrina; <sup>2</sup>Nurse Student at State University of Londrina; <sup>3</sup>Master in Public Health from the University of Sagrado Coração - USC. PhD in Public Health Nursing from the Ribeirão Preto School of Nursing (USP) and Post-Doctorate from the same Institution. She is Currently a Professor in the Nursing Department at the Health Sciences Center, at the State University of Londrina (UEL)

### ARTICLE INFO

#### Article History:

Received 17<sup>th</sup> October, 2019  
Received in revised form  
09<sup>th</sup> November, 2019  
Accepted 11<sup>th</sup> December, 2019  
Published online 29<sup>th</sup> January, 2020

#### Key Words:

*Nursing Education; Knowledge;  
Biosafety; Nursing; College education.*

**\*Corresponding author:**  
Ariane Sabina Stieven

### ABSTRACT

**Introduction:** Biosafety aims to promote infection control measures to protect the health team, academics and the community against exposure to potentially pathogenic biological agents. **Objective:** to analyze the scientific evidence available in the literature that refer to the teaching and knowledge of nursing students about biosafety. **Method:** integrative literature review using the LILACS, MedLine, Scielo, BDNF and PubMed databases. Publications from January 2000 to June 2018 were used. **Results:** Three categories emerged: Students' knowledge about biosafety; Teaching biosafety in undergraduate nursing courses; Challenges to be faced in favor of teaching biosafety. **Final Considerations:** Nursing students have little knowledge on the subject. As for the teaching method used, it has not been effective in covering the needs of students. There are many challenges to be faced in teaching related to the theme in Nursing.

*Copyright © 2020, Ariane Sabina Stieven et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

**Citation:** Ariane Sabina Stieven, Beatriz Ribeiro Lima, Beatriz Helen Facião and Flávia Meneguetti Pieri. 2020. "Biosafety: a review about the teaching and knowledge of the theme", *International Journal of Development Research*, 10, (01), 33256-33261.

## INTRODUCTION

Biosafety has the role of promoting strategies for the prevention, control, reduction and elimination of factors that may endanger human, animal and environmental health. In the field of health, its focus is to develop actions to promote the well-being of professionals, establishing infection control measures to protect the health team, academics and the community from exposure to potentially pathogenic biological agents (TEIXEIRA; VALLE, 2010; BRAND; FONTANA, 2014). In the health area, workers are exposed to numerous occupational risks, of a physical, chemical, biological, ergonomic and psychosocial nature, which can cause various types of damage, and those can lead to removal from the work environment. Among these damages, the nursing professional is the most exposed for living with biological agents throughout their period of activity. For Nursing students, the scenario is the same, as they live in the same environment as those already professionals and deal with the patient and all its particularities (NEVES *et al.* 2011; LOPES *et al.* 2011).

Since the 1990s, the theme "biosafety" has been included in the curriculum of undergraduate and graduate courses, as well as in public and private health institutions, in order to disseminate knowledge on the subject (REZENDE *et al.* 2013). It is essential for students to understand the importance of the topic while they are undergraduate, in order to have a positive impact on their professional performance (ANTUNES *et al.* 2010). In view of the importance of the topic in health education and the knowledge that academics have on the topic, the objective of this study was to analyze the scientific evidence available in the literature that refer to the teaching and knowledge of nursing students on biosafety.

## MATERIALS AND METHODS

The methodological framework consisted of evidence-based practice. The research permeated the following steps: elaboration of the research question; literature search for primary studies; data extraction; critical evaluation of the included primary studies; analysis and synthesis of results; and

synthesis of evidenced knowledge (MENDES *et al.* 2008). The formulation of the research question was based on the mnemonic PCC (Population, Concept and Context): "What scientific evidence is available in the literature that refer to the teaching and knowledge of nursing students about biosafety?". The objective, the inclusion criteria and the methods used to carry out the review were, in detail, specified and documented in a previously performed protocol. 1) Population: Nursing students with higher education; 2) Concept: studies that address the knowledge of nursing students on biosafety; 3) Context: studies that address the teaching of biosafety. The search for primary studies was carried out in August 2018, with free access at the study institution in the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (Medline), Scientific Electronic Library Online (Scielo), Nursing Database (BDENF), National Library of Medicine National Institutes of Health (PubMed) and Gray Literature Report. The controlled descriptors were selected from the Health Science Descriptors (DeCS) and Medical Subject Headings Terms (MeSH). Thus, for the search in LILACS, MEDLINE, SCIELO and BDENF, the descriptors were used: Biosafety; Nursing; Knowledge; Teaching. For PubMed, they were: *containment of biohazards; education, nursing; knowledge* (English language). The non-controlled descriptors (keywords) were: *biosafety; nursing education; knowledge* (English language). In the PubMed database, the terms were combined as follows: "*containment of biohazards*" [MeSH Terms] OR biosafety [Text Word] AND "*education, nursing*" [MeSH Terms] OR nursing education [Text Word] AND "*knowledge*" [MeSH Terms] OR knowledge [Text Word] and, in the LILACS, MEDLINE, SCIELO and BDENF databases, were: *Biosafety AND Nursing; Biosafety AND Knowledge; Biosafety AND Teaching; Biosafety AND Nursing AND Knowledge; and Biosafety AND Nursing AND Teaching*. The inclusion criteria were articles available in full or through an institutional account in Portuguese, English and / or Spanish, published between January 2000 and June 2018, which addressed the teaching of biosafety and the knowledge that nursing students have about the thematic. Exclusion criteria include: theses, dissertations, book chapters, case reports, course completion papers, protocols, reviews, book reviews, duplicates and letters to the editor.

It is worth mentioning that the reason why we chose to start the search in 2000 was due to the fact that it was linked to the appearance of the Immunodeficiency Syndrome (AIDS), in the 1980s, linked to cases of viral hepatitis, among other infectious diseases, which led to the need to implement National Curriculum Guidelines (DCN's) supported by Law No. 11,105 / 2005 (SOUZA *et al.* 2010; BRASIL, 2005a). The analyzes were carried out independently by two reviewers, and the synthesis of the studies is presented in Tables 1 and 2. In the first stage, articles were identified in the databases by two reviewers based on the reading of titles and abstracts. The same procedures were performed by reading the full text to assess the quality and extract the data. In the third stage, the eligibility of the articles was carried out by more than one evaluator and, in case of disagreement, the opinion of a researcher who did not participate in this stage was requested. For the organization of ideas and in order to qualify the discussion, the articles were listed in three categories: Table 1 - Students' knowledge about biosafety; Table 2 - Teaching on biosafety in undergraduate nursing courses; and Table 3 - Challenges to be faced in favor of teaching biosafety. The evaluation of the studies regarding the levels of evidence, in turn, was used independently by two pairs of reviewers, with the classification in seven levels, being considered as level 1 - strongest - the evidence from systematic review or from meta-analysis of randomized clinical trials; level 2, evidence derived from well-designed randomized clinical trials; level 3, evidence obtained from well-designed clinical trials without randomization; level 4, evidence from well-designed cohort and case-control studies; level 5, evidence from systematic review of descriptive and qualitative studies; level 6, evidence derived from a single descriptive or qualitative study; and level 7 - weaker -, with evidence from expert opinion (MELNY; FINEOUT-OVERHOLT, 2011).

## RESULTS

According to the inclusion and exclusion criteria, 2,713 articles were found. After reading the title and abstract, those who did not address the knowledge and teaching of the topic "biosafety" and articles that were part of the exclusion criteria were excluded, totaling 43 articles. When reading in full, 16 articles were left (Figure 1).

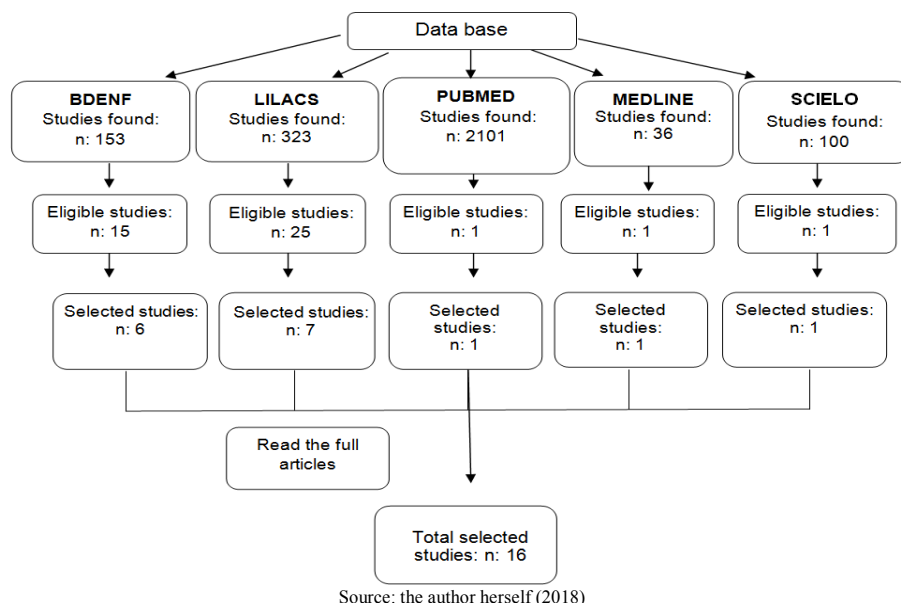


Figure 1. Process of identification and inclusion of studies - PRISMA Diagram flow, from January 2000 to June 2018

The syntheses of the studies were categorized into three tables: Table 1 - Students' knowledge about biosafety; Table 2 - Teaching biosafety in Nursing courses, presented in ascending

order according to the year of publication; and Table 3 - Challenges to be faced in favor of teaching biosafety. The following are the challenges to be faced in favor of teaching biosafety (Table 3).

**Table 1. Students' knowledge about biosafety, from January 2000 to June 2018– Londrina, Paraná Brazil, 2018. (N = 10)**

Article/Country	Qualis / Evidence Level	Main results
<sup>(01)</sup> SILVA, A. D. R. I.; MASTROENI, M. F. Biosafety: knowledge of trainees in the health field. Rev. Baiana Saúde Pública, Bahia, v. 33, n. 4, p. 654-665, 2009. Brasil	B3/EL=6	- Insufficient knowledge; - Course offers: job security for future professionals; course linked to the workload in practical activities and its relationship with several disciplines.
<sup>(02)</sup> MAIA, E. N. L.; VALENTE, G. S. C. Exposure to biological risks in the curricular stage of undergraduate nursing: implications for teaching. Rev. de Pesq.: cuidado é fundamental, online, v. 2, n. 2, p. 958-967, abr/jun. 2010. Brasil	B2/EL=6	- Little practical experience and interaction with the theory, leading to insecurity and nervousness of academics, in addition to the inappropriate use of Personal Protective Equipment (PPE).
<sup>(03)</sup> CARRARO, T. E. et al. Biosafety and patient safety in the view of nursing students. Rev. Gaúcha de Enferm., Rio Grande do Sul, v. 33, n. 3, p. 14-19, 2012. Brasil	B1/EL =6	- They relate to the preservation of the safety of the patient and his family in a hospital environment.
<sup>(04)</sup> MUSSI, T. V. F.; TRALDI, M. C.; TALARICO, J. N. S. Knowledge as a factor in vulnerability to tuberculosis among nursing students and professionals. Rev. Esc. Enferm. USP, São Paulo, v. 46, n. 3, p. 696-703, 2012. Brasil	A2/EL=6	- Evidence of vulnerability to TB among students and professionals related to knowledge about transmissibility, forms of prevention and measures of biosafety and diagnosis; - Graduates and professionals have the same knowledge when compared to the results.
<sup>(05)</sup> MARTINS, M. R.; FRANCO, L. A.; ZEITOUNE, R. C. G. Occupational risks and safety measures in the context of undergraduate nursing students' practice: a question of occupational health. Rev Cuid. Fundam., online, Ed. Supl., p. 61-64, 2012. Brasil	B2/EL=6	- Low adherence to the use of PPE due to lack of knowledge; - PPE used because it is the rule of the place, be it a hospital and / or primary care environment.
<sup>(06)</sup> SANTOS, J. S.; CORRÊA, I.; SALGADO, M. H. Knowledge of nursing students about the use of contact precautions. Investigación y Educación en Enfermería, online, v. 31, n. 3, 2013. Brasil	B1/EL=6	- Most undergraduates are aware of the measures to be adopted in contact precaution, however partially.
<sup>(07)</sup> MAGAGNINI, M. A. M. et al. Exposure to biological fluids and accidents with medical and nursing students. Rev. Cuid., v. 9, n. 1, p. 71-77, 2015. Brasil	B5/EL=6	- Most of the subjects reported sufficient knowledge about the conduct after accidental exposure to biological fluids. However, undergraduates are unaware of medical evaluation after accidents.
<sup>(08)</sup> EBERLE, C. C.; DA SILVA, A. P. S. S. Nursing students' understanding of patient safety. Rev. Baiana Enferm., Bahia, v. 30, n. 4, p. 1-9, 2016. Brasil	B2/EL=6	- Associations of the theme "patient safety" with "biosafety". - Protection of patients and workers to prevent the spread of diseases with the use of PPE. - Transversalization of the theme "patient safety" in the curricular matrices of undergraduate nursing courses, linking it to disciplines that address primary and hospital care, as well as the concepts of biosafety.
<sup>(09)</sup> MORENO-ARROYO, M. C. et al. What is the perception of biological risk by undergraduate nursing students? Rev. Latino-Am. Enfermagem, Ribeirão Preto, Epub 04. jul. 2016. Espanha	A1/EL=6	- The perception of biological risk of the third year student, when compared to that of the second year student, was higher, since the third year student had more theoretical-practical experiences.
<sup>(10)</sup> OLIVEIRA, J. S. et al. Biosafety from the perspective of nursing students. Rev. Enferm UERJ, Rio de Janeiro, v. 25, e14074, 2017. Brasil	B1/EL=4	- 52.2% of the participants attended a course or lecture on the topic; - Although 47.7% reported knowing about biosafety standards, only 21% knew about NR-32; - 96.3% of the graduates presented a vaccination card, 79.8% students reported having taken the Hepatitis B vaccine, showing the susceptibility of students to acquire immunopreventable diseases in the practical field.

Source: the author herself (2018)

**Table 2. Teaching on biosafety in undergraduate nursing courses, from January 2000 to June 2018– Londrina, Paraná Brazil, 2018. (N = 06)**

Article/Country	Qualis / Evidence Level	Main results
(11) SANTOS, M. J. et al. Teaching biosafety and the environment: an experience at the Oswaldo Cruz Foundation. <i>Ciênc Cogn</i> , v. 16, n. 1, p. 193-205, 2011. Brasil	B3/EL=6	- The teaching proposal and the strategies used enabled the assimilation of knowledge about risks and, consequently, reflections on the work process and better adherence to biosafety standards.
(12) CANALLI, R. T. C.; MORIYA, T. M.; HAYASHIDA, M. Prevention of accidents with biological material among nursing students. <i>Rev. Enferm. UERJ</i> , Rio de Janeiro, v. 19, n. 1, p. 100-106, jan/mar. 2011. Brasil	B1/EL=6	- Guidance on biosafety measures before the start of practical activities, among them the evaluation of the undergraduate vaccination portfolio, as a prophylactic measure; -Relationship between environmental factors (lack of PPE, high demand from customers, filling of the sharps disposal box and lack of material in a practical field) and / or psychosocial (inattention, non-use of PPE, haste, stress, inexperience, anxiety, fear and pressure exerted by the teacher) that favor the occurrence of accidents in the internship places.
(13) PEREIRA, M. E. C. et al. The importance of the contextual approach in the teaching of biosafety. <i>Ciência &amp; Saúde Coletiva</i> , online, v. 17, n. 6, p. 1643-1648, 2012. Brasil	B1/EL=6	- The contextualized teaching of biosafety related to previous knowledge: historical context; social changes; science as a product; scientific knowledge; - Content connections: history, human, social, ethical, economic, political, environmental and technical; - Skills development; - Structuring concepts in different areas.
(14) GIROTI, S. K. O.; GARANHANI, M. L. Infections related to health care in the training of nurses. <i>Rev. Rene</i> , v. 16, n. 1, p. 64-71, 2015. Brasil	B2/EL=6	- The theme "infections related to health care" is not addressed in a continuous and explicit way in the four years of the Nursing course. - From the second year onwards, the theme will be approached implicitly. - Only a third year module has the term "biosafety".
(15) SILVA, A. R. A. et al. Use of Simulators for Health Care-Related Infection Prevention Training. <i>Rev. Bras. Educ. Med.</i> , v. 39, n. 1, p. 5-11, 2015. Brasil	B2/EL=6	- The trainments about infections related to health care using simulators for small groups of undergraduate students in health and from different periods showed positive results in the acquisition of knowledge immediately after its completion.
(16) MELLEIRO, M. M. et al. Thematic patient safety in the curricular matrices of undergraduate schools in Nursing and Obstetrics. <i>Rev. Baiana Enferm.</i> , Bahia, v. 31, n. 2, 2017. Brasil	B2/EL=6	- The themes "patient safety" and "biosafety" described as indirect words were found in the syllabus analyzed, but in a disjointed way, making it imperative to seek teaching strategies that have an impact on student education.

Source: the author herself (2018)

**Table 3. Challenges to be faced in favor of teaching biosafety. Londrina, Paraná Brazil, 2018**

Category	Avtion	Total articles	Study Code
Challenges	Biosafety in the curriculum	8	1, 5, 6, 8, 10, 12, 14, 16
	Active methodologies to articulate theory and practice	4	3, 5, 6, 15
	Ignorance of communicable diseases <i>versus</i> biosafety	2	4, 6
	Research about the teaching of biosafety	4	6, 8, 9, 14
	Biosafety linked to patient safety	4	3, 8, 12, 16
	Awareness/teaching the use of PPE	1, 4	1, 2, 4, 5, 7
	Transversalization and multidisciplinary areas	4	7, 8, 11, 13
	Permanent and continuing education	3, 4	5, 11, 12, 14, 15
	Contextualization (theoretical-practical) prior to practices	4	5, 7, 12, 13

Source: the author herself (2018)

## DISCUSSION

The studies were unanimous in showing the fragile and incipient knowledge that students have about biosafety, especially when related to the precautionary measures used for each pathology and the actions after an accident with biological material. In addition, in teaching, the curricula of Nursing courses fail to explicitly address the theme, in a way that has meaning for the student. Studies affirm that education based mainly on the technical aspects of the theme is not effective in adding knowledge to undergraduates, and the contents should be structured in such a way as to stimulate the generation of competences, among them the formulation of problems, the formulation of solutions, the capacity to work in teams and technical capacity (COSTA; COSTA, 2010). Health institutions have invested in the construction of knowledge about biosafety with their professionals, since the university sector has not been suficiente (PEREIRA *et al.* 2010). In order to put it into context, it is necessary to highlight some aspects of undergraduate nursing and its history. Nursing as a profession was created from scientific bases, according to the understandings of Florence Nightingale, in England, being directly influenced by experiences in places where lay nursing care was performed and based on religious concepts of charity and donation. Since the beginning, Nursing has suffered direct influences from religious teachings, but it is known that, behind the profession's fraternity and altruism, there are also, today, the scientific bases that consolidate the profession (PADILHA; MANCIA, 2005).

In 1996, with the objective of regimenting the teaching methods of Brazilian education, the Law of Guidelines and Bases of National Education (LDB) was established. Since then, the adoption of minimal curricula has been extinguished, allowing greater autonomy for universities and the creation of progressive pedagogical projects (BRASIL, 1996). Due to the extinction of the minimum curricula, it was necessary to regulate the pedagogical projects of each undergraduate course through the National Curriculum Guidelines (DCNs), enacted in 2001. They were intended to promote the improvement of the teaching model, improving the structure of the curricula and aiming at training aimed at the main needs of the population in their socio-historical-cultural context (DA SILVA; COLANTONIO, 2014; BRASIL, 2001). Innovative curricular proposals, which proposed teamwork, a holistic approach to knowledge and the integration of the three pillars: teaching, research and practice, with the introduction of students into in-service practice as soon as possible, tend to encourage the construction of the professional profile that flees from the biological and preventive approach to humanized and integral care with a view to the conditioning and determinants of health (KELLER-FRANCO *et al.* 2012; ANJOS; AGUILHAR-DA-SILVA, 2017).

In view of the challenges found in the studies that were part of the research, it is clear that practically 50% of them bring the need to adapt the menu and curricular matrices of Nursing courses on the subject of "biosafety". In research with several courses, among them Nursing, it was observed that the course coordinators showed difficulty in evaluating the theme "biosafety", and the menus that support the curricular grids could address the theme more, showing that the challenge runs through the studies selected (SILVA, 2006). The great challenge for this beginning of the century is the search for new pedagogical methodologies that are capable of

transcending purely technical and traditional limits, so that it is possible to form ethical, critical, reflective, transforming and humanized human beings (GEMIGNANI, 2012). For this to be possible, one of the strategies to be used is permanent education for teachers, in order to update themselves, both on teaching methodologies and on specific topics. This transformation requires didactic changes in the curricula, since the current problems require innovative skills and specific knowledge, such as: collaboration and interdisciplinary knowledge, education in sustainable development, regional and global (GEMIGNANI, 2012). Reflecting on an innovative pedagogy is reflecting on an education critical, transformative, in which knowledge is constructed in a dynamic and continuous, interdisciplinary and transdisciplinary way, because only then will it be possible to contribute to the awareness of individuals to an emancipatory social practice (MILANI *et al.* 2009). Several studies have been carried out on patient safety (CAVALCANTE, 2015; SILVA *et al.* 2016), and according to the World Health Organization (WHO), patient safety is a fundamental principle in health care. Several countries have published studies showing that patients are harmed during health care, leading to permanent injuries, many in health institutions, some even being led to death (WHO, 2017). It is also worth mentioning that there is evidence, such as that of article (03) of the tables, in which students say the importance of the themes "biosafety" and "patient safety" linked to the way of minimizing or eliminating risks to the patient. In view of this fact, it is essential to approach the theme of biosafety linked to patient safety in the teaching of undergraduate nursing, in order to reduce the negative statistics in the face of the harm caused to patients. However, it is not enough to just address the theme, it needs to be understood by the student and, for that, it needs to be contextualized.

### Final Considerations

The present study allowed a comprehensive view of the teaching and learning context on biosafety, demonstrating that students little understood the theme in the way it was being passed on. Além disso, os estudos verificaram que os estudantes de Enfermagem, de modo geral, têm pouco conhecimento sobre o tema, sabem as precauções que existem e que podem ser utilizadas, no entanto não conseguem identificar em qual momento são necessárias, o que se torna preocupante, já que são estudantes que estavam em campo de prática. Entretanto, destaca-se o uso de metodologias inovadoras para o ensino, sem grandes tecnologias, que apresentaram resultado positivo para o aprendizado. The possible arguments for such a lack of publications on the topic may be related to the history of biosafety, which was structured in Brazil in the 19th century as a specific area in medical schools and experimental science, addressing notions about the risks and benefits regarding the realization of scientific work. Another limitation may be linked to the standardization of NR-32 by types of Occupational Risks, not by specific locations of health establishments since 2005. The fragility of teaching may be linked to the way in which, currently, the term "biosafety" is used implicitly in the law itself, that is, when analyzing NR-32, the terminology is identified only once, when refers to the "Class II B2 biological safety cabinet" (BRASIL, 2005b). This Standardization, namely, is present in several of the selected studies and is used as a synonym for "biosafety".

## REFERENCES

- ANJOS, D.R.L.; AGUILHAR-DA-SILVA, R.H. 2017. Questionário de Vivências Acadêmicas (QVA-R): avaliação de estudantes de medicina em um curso com currículo inovador. *Avaliação*, Campinas. 22 (1):105-123.
- ANTUNES, H.M. et al. 2010. Biossegurança e Ensino de Medicina na Universidade Federal de Juiz de Fora (MG). *Revista Brasileira de Educação Médica*. 34 (3):335 – 345.
- BRAND, C.I.; FONTANA, R.T. 2014. Biossegurança na perspectiva da equipe de enfermagem de Unidades de Tratamento Intensivo. *Rev. Bras. Enferm.* 67(1):78-84.
- BRASIL. 1996. Ministério da Educação. Lei nº 9.394, de 24 de dezembro de 1996. Estabelece as Diretrizes e Bases da Educação Nacional. *Diário Oficial da União*, 23 dez. 1996. Retrieved from <[http://www.planalto.gov.br/ccivil\\_03/leis/L9394.htm](http://www.planalto.gov.br/ccivil_03/leis/L9394.htm)>.
- BRASIL. 2001. Conselho Nacional de Educação. Câmara de Educação Superior. Parecer nº 3, de 07 de novembro de 2001. Institui as Diretrizes Curriculares Nacionais do Curso de Graduação em Enfermagem. Brasília: Ministério da Educação e Cultura. Retrieved from: <<http://portal.mec.gov.br/cne/arquivos/pdf/CES03.pdf>>.
- BRASIL. 2005a. Lei nº 11.105, de 24 de março de 2005. Regulamenta os incisos II, IV e V do § 1º do art. 225 da Constituição Federal, estabelece normas de segurança e mecanismos de fiscalização de atividades que envolvam organismos geneticamente modificados - OGM e seus derivados, cria o Conselho Nacional de Biossegurança - CNBS, reestrutura a Comissão Técnica Nacional de Biossegurança - CTNBio, dispõe sobre a Política Nacional de Biossegurança - PNB, revoga a Lei nº 8.974, de 5 de janeiro de 1995, e a Medida Provisória nº 2.191-9, de 23 de agosto de 2001, e os arts. 5º, 6º, 7º, 8º, 9º, 10 e 16 da Lei nº 10.814, de 15 de dezembro de 2003, e dá outras providências. t. 225 da Constituição Federal e dá outras providências. *Diário Oficial da União*: seção 1, Brasília, D.F., p. 103.
- BRASIL. 2005b. Ministério do Trabalho e Emprego. Portaria nº 485, de 11 de novembro de 2005. Aprova a norma regulamentadora nº 32 (Segurança e saúde no trabalho em estabelecimentos de saúde). *Diário Oficial da União*: seção 1, Brasília, D.F., 16 nov. 2005b. Retrieved from: <<https://www20.anvisa.gov.br/segurancadopaciente/index.php/legislacao/item/portaria-n-485-de-11-de-novembro-de-2005>>.
- CAVALCANTE, A.K.C.B. 2015. Cuidado seguro ao paciente: contribuições da enfermagem. *Revista Cubana de Enfermería*. 31 (4).
- COSTA, M.A.F.; COSTA, M.F.B. 2010. Educação em biossegurança: contribuições pedagógicas para a formação profissional em saúde. *Ciênc. Saúde Colet.* 15 (1): 1741-1750.
- DA SILVA, M.R.; COLONTONIO, E.M. 2014. As Diretrizes Curriculares Nacionais para o ensino médio e as proposições sobre trabalho, ciência, tecnologia e cultura. *Revista Brasileira de Educação*. jul/set, 19(58):611-628.
- GEMIGNANI E.Y.M.Y. 2012. Formação de Professores e Metodologias Ativas de Ensino-Aprendizagem: Ensinar para a Compreensão. *Revista Fronteira das Educação*, Recife, 1 (2).
- KELLER-FRANCO, E. et al. 2012. Inovação curricular na formação dos profissionais da saúde. *Revista E-curriculum*, São Paulo. 8 (2):1-14.
- LOPES, L.P. et al. 2011. Exposições acidentais com material biológico potencialmente contaminado envolvendo graduandos de enfermagem do último ano. *Rev. Eletr. Enf. out/dez*, 13(4):751-7.
- MELNYK, B.M.; FINEOUT-OVERHOLT, E. 2011. *Evidence-based practice in nursing & healthcare: a guide to best practice*. [S.l.]: Lippincott Williams & Wilkins.
- MENDES, K.D.S. et al. 2008. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Texto Contexto Enferm*, Florianópolis, out-dez, 17(4): 758-64.
- MILANI, A. H. et al. 2009. Como o gestor poderia relacionar conteúdos na perspectiva de tópicos geradores em um currículo flexível, levando em consideração a proposta institucional, nível de conhecimento dos alunos e avaliação dos resultados no processo de ensino e aprendizagem? *In: CAMPOS, D. A. (Org.) Docência no Cenário do Ensino para a Compreensão: Desempenhos de Compreensão*. São Paulo: UNICID.
- NEVES, H.C.C. et al. 2011. Segurança dos trabalhadores de enfermagem e fatores determinantes para adesão aos equipamentos de proteção individual. *Rev. Latino-Am Enfermagem*. 19(2):1-8.
- PADILHA, M.I.C.S.; MANCIA, J.R. 2005. Florence Nightingale e as irmãs de caridade: revisitando a história. *Rev. Bras. Enferm.* nov/dez, 58 (6):723-726.
- PEREIRA, M.E.C. et al. 2010. Construção do conhecimento em biossegurança: uma revisão da produção acadêmica nacional na área de saúde (1989-2009). *Saúde Soc.* São Paulo. 19 (2): 395-404.
- REZENDE, F.C.B.; ATZINGEN, N.C. 2013. Conhecimento e aplicação dos conceitos de biossegurança no dia a dia do trabalhador de saúde. *REAS, Revista Eletrônica Acervo Saúde*, 5(2): 410-425.
- SILVA, A.D.R.I. 2006. Conhecimento em biossegurança de formandos da área da saúde. 97 f. Dissertação (Mestrado em Saúde e Meio Ambiente) - Universidade da Região de Joinville, Joinville, Santa Catarina.
- SILVA, A.T. et al. 2016. Assistência de enfermagem e o enfoque da segurança do paciente no cenário brasileiro. *Saúde Debate*, Rio de Janeiro, out/dez, 40 (111):292-301.
- SOUZA, B.M.B. et al. 2010. A Política de AIDS no Brasil: uma abordagem histórica. *J Manag Prim Health Care*, 2010 1(1): 23-26.
- TEIXEIRA, P.; VALLE, S. 2010. Biossegurança: uma abordagem multidisciplinar. 2. ed. Rio de Janeiro (RJ): FIOCRUZ.
- WHO (World Health Organization). 2017 Patient Safety, Making health care safer. Retrieved from: <<http://apps.who.int/iris/bitstream/handle/10665/255507/?sequence=1>>

\*\*\*\*\*