

## Application of the Maguerez arch in an educational action on accidents with biological material in the nursing team

*Aplicação do arco de Maguerez em uma ação educativa sobre acidentes com material biológico na equipe de enfermagem*

Bianca Vitória Jansen Gomes, Cristal Ribeiro Mesquita, Gerciane Silva da Silva, Matheus Iarley Ribeiro Pará, Daniel Pinto e Silva

Authorship

Metadata

### ABSTRACT

**Introduction:** Occupational Accidents involving Biological Material (OABM) constitute a significant public health problem, especially among nursing professionals, due to high occupational exposure and gaps in adherence to biosafety measures. In this context, Continuing Health Education (CHE) is a fundamental strategy for improving work processes and strengthening worker safety. This study aimed to report the experience of an educational action focused on the prevention of OABM, developed from the application of the Maguerez Arc. **Methodology:** This is an experience report carried out in a university hospital, with the participation of nurses and nursing technicians. The intervention was structured according to the five stages of the problem-solving method: observation of reality, identification of key points, theorization, elaboration of solution hypotheses, and application to reality. The educational strategies included participatory dynamics, collective discussion, clarification of doubts, and the provision of digital educational technology through an e-book accessed via QR Code. **Results:** The initiative fostered critical analysis of practices related to the use of Personal Protective Equipment (PPE), accident reporting, and knowledge of institutional post-exposure care protocols. High participation from professionals was observed, encouraging the exchange of knowledge and strengthening the safety culture in the workplace. **Conclusion:** It is concluded that the use of the Maguerez Arc, combined with post-exposure prophylaxis (PEP), proved to be a powerful strategy for promoting critical reflection, fostering changes in professional practices, and contributing to the protection of worker health.

**KEYWORDS:** Health education. Accidents, Occupational. Occupational Exposure.

### RESUMO

**Introdução:** Os Acidentes de Trabalho com Material Biológico (ATMB) configuram-se como um importante problema de saúde pública, sobretudo entre os profissionais de Enfermagem, em razão da elevada exposição ocupacional e das lacunas na adesão às medidas de biossegurança. Nesse cenário, a Educação Permanente em Saúde (EPS) apresenta-se como uma estratégia fundamental para o aprimoramento dos processos de trabalho e para o fortalecimento da segurança do trabalhador. Este estudo teve como objetivo relatar a experiência de uma ação educativa voltada à prevenção de ATMB, desenvolvida a partir da aplicação do Arco de Maguerez (AM). **Metodologia:** Trata-se de um relato de experiência realizado em um hospital universitário, com a participação de enfermeiros e de técnicos de Enfermagem. A intervenção foi estruturada conforme as cinco etapas do método problematizador: observação da realidade, identificação dos pontos-chave, teorização, elaboração de hipóteses de solução e aplicação à realidade. As estratégias educativas contemplaram dinâmica participativa, discussão coletiva, esclarecimento de dúvidas e disponibilização de uma tecnologia educativa digital, por meio de um e-book acessado via QR Code. **Resultados:** A ação favoreceu a problematização das práticas relacionadas ao uso de Equipamentos de Proteção Individual (EPI), à notificação dos acidentes e ao conhecimento dos fluxos institucionais de atendimento pós-exposição. Observou-se uma elevada participação dos profissionais, com o estímulo à troca de saberes e ao fortalecimento da cultura de segurança no ambiente laboral. **Conclusão:** Conclui-se que a utilização do AM, articulada à EPS, mostrou-se uma estratégia potente para fomentar a reflexão crítica, para promover mudanças nas práticas profissionais e para contribuir com a proteção da saúde do trabalhador.

**PALAVRAS-CHAVE:** Educação em Saúde. Acidentes de Trabalho. Exposição Ocupacional.

## INTRODUCTION

Continuing Nursing Education refers to a set of educational activities traditionally focused on the integration of technical and scientific knowledge and the enhancement of professional skills, typically implemented through training, courses, and professional development programs for Nursing professionals that review the procedures and techniques they have developed. Although it plays a significant role in disseminating new knowledge and standardizing technical procedures, it still has limitations in conveying content, as this may be disconnected from the challenges faced in healthcare settings<sup>1</sup>

In contrast, Continuing Health Education (CHE) positions work as the central space for learning, as it is a continuous, collective process integrated into work, grounded in the problematization of practices and critical reflection on daily work routines, thereby transforming modes of care<sup>2</sup>. Thus, continuing education seeks to systematically integrate teaching and service to enhance work processes and promote sustained changes in professional practice.<sup>1</sup>

In this regard, it is important to note that the Ministry of Health, particularly its Department of Health Education Management (DEGES), is responsible for contributing to the development and monitoring of health professional education and the National Policy on Continuing Health Education within the Unified Health System (*Sistema único de Saúde – SUS*), based on the recognition of the need to provide cooperation, both from a technical and financial standpoint, for the implementation of the CHE policy in Brazil's states, the Federal District, and municipalities.<sup>3</sup>

CHE addresses knowledge gaps among Nursing professionals through initiatives aimed at enhancing healthcare work processes, taking into account local specificities and the demands of actual practice.<sup>4</sup> CHE focuses on transforming work practices and integrating education with clinical practice, thereby enhancing the competencies of future nurses and strengthening the culture of hospital safety, while continuously improving the quality of healthcare services.<sup>4</sup>

Thus, occupational health constitutes a body of interdisciplinary theoretical practices developed by various stakeholders and has become a democratic issue aimed at guaranteeing the fundamental rights of citizenship and the protection of workers.<sup>5</sup> Consequently, in a hospital setting, occupational health is a crucial topic for discussion given the exposure to biological materials, and it aims to prioritize biosafety.<sup>6</sup>

One of the main concerns regarding worker health is accidents involving biological materials. A biological risk is defined as the probability of occupational exposure to biological agents, which can be prevented through the use of personal protective equipment, appropriate clothing, and the ability to recognize and assess biological risks.<sup>6</sup> According to the Health and Environmental Surveillance Secretariat in Brazil, between 2018 and 2022, a total of 329,176

workplace accidents involving exposure to biological materials were recorded, of which 149,480 correspond to reports from Nursing technicians and aides, and 29,755 are cases reported among nurses.<sup>7</sup> Therefore, it is necessary to seek to understand the relationship between the reality experienced by these professionals and the increase in reports of accidents involving biological materials, particularly concerning their proper and safe handling.

Given this context, the study's guiding question was: How does the application of Maguerez's Framework, within the context of Continuing Health Education, contribute to the prevention of accidents involving biological materials among Nursing professionals at a university hospital?

In this regard, the study's general objective was to report on the experience of an educational initiative developed at a university hospital in the state of Pará, focused on the Prevention of Accidents Involving Biological Materials in Healthcare among the Nursing staff. The specific objectives were: to identify knowledge gaps regarding accidents involving biological materials and to describe the application of the Maguerez Framework in its five stages.

## METHODOLOGY

This is a descriptive study, in the form of a case report, with a qualitative approach, conducted by Nursing students during an educational activity. The activity took place as part of an outreach project titled "*Connecta Enfermagem*", affiliated with a federal university in the state of Pará.

The activity took place on September 25, in the morning, from 8:00 a.m. to 12:00 p.m., and was conducted in three Nursing clinics at a university hospital. The target audience consisted of nurses and Nursing technicians who were actively practicing in that setting at the time of the intervention.

The educational activity was conducted using an active teaching methodology based on problem-posing, structured in five stages: observation of reality, identification of key points, theorization, development of solution hypotheses, and reality application. These stages correspond to the Maguerez Arch (MA), which is a pedagogical framework designed to bridge theory and practice, fostering the development of critical thinking, reflection on the healthcare work process, and participant autonomy, with the instructor acting as a mediator of the educational process and the students as protagonists in the construction of knowledge.

## Ethical Considerations

This study is based exclusively on the systematization of academic and professional experiences, as well as on the analysis of institutional records in the public domain or those that

have been previously anonymized; there is no access to personal, sensitive, or confidential information.

Given this methodological nature, the study is exempt from review by a Research Ethics Committee (REC), as established by Resolutions No. 466/2012 and 510/2016 of the Brazilian National Health Council (CNS), which exempts research utilizing publicly available information or non-identifiable data from submission to the CEP/CONEP system. Nevertheless, strict ethical principles were adopted, ensuring confidentiality, anonymity, and respect for participants by omitting names, specific locations, and any elements that could enable their identification.

## **RESULTS**

The methodological approach to data collection, organization, and analysis was developed using the five phases of the Maguerez Arch (MA), arranged in the following sequential and interconnected manner: observation of reality, identification of key points, theorization, proposed solutions, and reality application. Based on this methodological framework, the data were systematized, resulting in the use of the MA as a guiding tool for the development of an educational initiative aimed at preventing the impacts resulting from Workplace Accidents Involving Biological Materials (WABM).

### **Observation of Reality**

The first stage of the Maguerez Arch consisted of the systematic observation of reality, intending to identify problem situations related to professional Nursing practice in the hospital setting. This observation took place during visits to Nursing clinics, allowing students to gain insight into the daily work routines of healthcare professionals.

While observing care activities, it was found that some of the professionals, especially Nursing technicians, were moving around the hospital environment wearing inappropriate footwear and handling medications and sharps without the correct use of Personal Protective Equipment (PPE). Such practices highlight weaknesses in compliance with biosafety standards in daily work.

Based on these findings, the researchers began engaging with professionals working in the sectors under study, seeking to understand the reality experienced in Nursing stations and to encourage reflection on the identified issues. Concurrently, reports from occupational health professionals and institutional documents were analyzed, which indicated that, in 2024, six workplace accidents involving biological materials occurred, distributed across three of the institution's seven clinics.

Thus, the observation revealed that workers were unaware of the institutional procedures regarding occupational accidents, particularly those involving biological materials. Similarly, it was found that the work routine led, over the long term, to professionals neglecting biosafety practices in pursuit of greater efficiency in patient care, given the existing work overload.

Thus, the main problem identified at this stage relates to the physical and mental fatigue associated with the high demands of hospital work, a factor that increases the risk of exposure for Nursing professionals and, consequently, for patients to contamination by biological materials.

### Identification of key points

In the second stage, the following key points were identified: (1) the recurrence of accidents involving biological materials, generally associated with the handling of sharps; (2) the difficulty professionals face in accessing institutional procedures related to the reporting and management of occupational accidents in a clear, objective, and efficient manner; (3) work overload, a determining factor for reckless behavior or neglect of good biosafety practices, contributing to an increased likelihood of accidents and to the risks of exposure for workers and patients to contamination by pathogenic agents.

### Theorization

In the third stage, a theoretical analysis of the key points was conducted to provide a basis for understanding the problem situation and to establish the theoretical framework for the educational intervention. This stage facilitated the integration of the observed reality with available scientific knowledge, thereby establishing the theoretical framework that guided the proposed interventions.

For the theoretical foundation, the search platforms Virtual Health Library (VHL) and Lilacs were used, based on the Health Sciences Descriptors (DeCS): “*Acidente Ocupacional*” and “*Material Biológico*”, linked via the Boolean operator “AND.” The inclusion criteria were primary studies in Portuguese, covering the period from 2019 to 2024. Theses, dissertations, review articles, incomplete publications, and those published more than five years ago were excluded.

Based on the study, it was found that, about WABM, the Nursing staff is the most affected, given that numerous recent studies have reported an increase in accidents in Brazil involving nurses, Nursing technicians, and biological materials (Forekevicz et al., 2020; Silva & Rozin, 2024)<sup>8,9</sup>. In light of this, the harmfulness of these accidents increases the risks of disease transmission, long-term health consequences, and even death among Nursing staff due to exposure to various pathogens, particularly viral Hepatitis B and Hepatitis C Viruses (HBV and HCV) and the Human Immunodeficiency Virus (HIV)<sup>10</sup>.

A study that analyzed the epidemiological profile of accidents involving biological materials among nurses and Nursing technicians from 2020 to 2023 in Brazil found that the upward trend is greater for Nursing technicians due to their high workload and lower level of autonomy. Furthermore, the majority of incidents occurred among women, as the profession is predominantly female, and in the 30-39 age group, indicating a likely more active and engaged phase in their careers. Concerning the northern region, it is also notable that Pará, during the study period, was the state with the highest number of cases, highlighting the need for more efficient regional public policies<sup>11</sup>.

Hospitals are the settings with the highest incidence of biohazard accidents; although the use of PPE has increased over the years, a high rate of non-use (76.5%) of these devices is still observed among healthcare workers who have suffered accidents involving biological materials. The lack of adherence to PPE use is likely due to work overload combined with a shortage of specific training and incentives from institutions, as well as the actual lack of PPE in the workplace. Furthermore, inappropriate practices, such as recapping needles, remain among the main factors related to the occurrence of accidents, especially when adequate protection is not used<sup>12</sup>.

Given this scenario, the importance of adequate staffing levels to ensure safe and quality care is highlighted. The reporting of workplace accidents, through the Work Accident Report (CAT), is a legal obligation of the employer and ensures labor and social security rights. However, underreporting remains frequent, especially in cases involving biological materials. Among the main associated factors are delays in post-accident care, staff overload, the trivialization of occupational risk, and a lack of knowledge regarding institutional protocols. This reality compromises the implementation of preventive measures and delays the initiation of appropriate treatment<sup>13</sup>.

## **Proposed Solutions**

Based on the findings from the previous stages, the fourth stage of the Maguerez Cycle began, aimed at formulating potential solutions to the challenges identified in the observed reality. This stage was grounded in the key points listed and in the planning of educational strategies targeted at nursing professionals to mitigate the risks associated with workplace accidents involving biological materials.

During a group meeting, the action plan and the outline of the activities to be carried out were defined, along with the participatory dynamics and the educational resources to be used during the intervention. The planning sought to ensure a didactic approach that was accessible and consistent with the demands of the hospital environment.

Given the importance of providing up-to-date and easily accessible information on institutional protocols and measures to prevent accidents involving biological materials, an e-book titled “*Prevenção de acidentes com material biológico para enfermeiros e técnicos de enfermagem*” was developed. The material was developed by Nursing students and made available via a QR code, allowing for quick access by professionals in inpatient clinics whenever necessary.

The e-book included updated content on workplace accidents involving biological materials, guidelines on key preventive measures, regulations governing the protection of healthcare workers, and the institutional flowchart provided by the hospital’s occupational health department. This educational technology was designed as a permanent support tool for professional practice and as a means of providing feedback on the educational activities conducted.

Furthermore, the institution’s occupational health department assigned a staff member from the field to assist with the educational initiative, to address questions regarding the workflows implemented at the hospital, and document requests and complaints raised by the professionals, for subsequent analysis and potential resolution.

Thus, the action plan was structured around the educational activity, which consisted of a participatory exercise, a presentation and dissemination of the informational material (e-book), followed by a Q&A session and a group discussion with the participation of the occupational health specialist. At the end of the activity, participants were thanked and presented with a symbolic gift as a strategy to value and recognize the professionals’ participation in the educational initiative.

### **Application to real-world situations**

The fifth and final stage of the MA corresponds to the application to real-world situations, the moment when proposed solutions are implemented in a practical context, to transform the identified situation. In this phase, the “Do or Pass” exercise was used as an active methodology, which enabled the critical examination of practices related to the handling of biological materials and the identification of factors associated with workplace accidents. The strategies discussed sought to modify observed behaviors, recognizing that their effects occur gradually and have a direct impact on the Nursing team’s daily practice.

For this reason, the activity took place in three Nursing units of the university hospital, lasting an average of 20 minutes per unit and involving 25 professionals available at the time of the activity. Initially, there was an explanation of the extension project and the theme of the activity; subsequently, the students instructed that for each statement or problem situation from the hospital routine presented, participants should raise one of the signs labeled “I Do” or “I Skip.” Thus, the “I do” sign indicated that the behavior presented was part of the participant’s

professional practice, while the “I don’t” sign represented the non-performance of the mentioned action.

The statements used in the activity were developed based on the e-book “*Prevenção de acidentes com material biológico para enfermeiros e técnicos de enfermagem*”, a resource created by the students themselves, based primarily on Regulatory Standard No. 32 (NR 32), which addresses the basic guidelines for implementing measures that ensure the protection and safety of healthcare workers, as well as situations observed during the assessment of the current situation. Based on the document, the following statements were formulated:

1. I usually recap the needle during procedures (wrong);
2. I dispose of sharps after use in the yellow sharps container (correct);
3. I do not wear gloves when administering intravenous medication to patients (wrong);
4. I wash my hands following the correct step-by-step procedure recommended by the WHO (correct);
5. I wear a mask in accordance with recommendations within hospital facilities (correct);
6. I close the yellow sharps container, always respecting the  $\frac{3}{4}$  capacity limit, and replace it with a new empty one (correct);
7. If I have an accident at work, I usually do not report it to management or the hospital (wrong);
8. I undergo annual exams provided by the occupational health team (correct);
9. I am properly vaccinated to protect myself from diseases (correct);
10. I do not know which documents protect workers’ health (wrong).

After each statement was read, the participants’ responses were analyzed based on the number of correct and incorrect answers. Furthermore, it was observed that after a high number of errors, discussions arose among the professionals regarding the causes and difficulties encountered by the Nursing team. Next, the students and the occupational health technician intervened with clarifications based on NR 32 and the hospital’s internal regulations, addressing the implications of accidents for worker health, the expected conduct in the situations presented, and the correction of inappropriate practices that had become ingrained over the course of their professional careers.

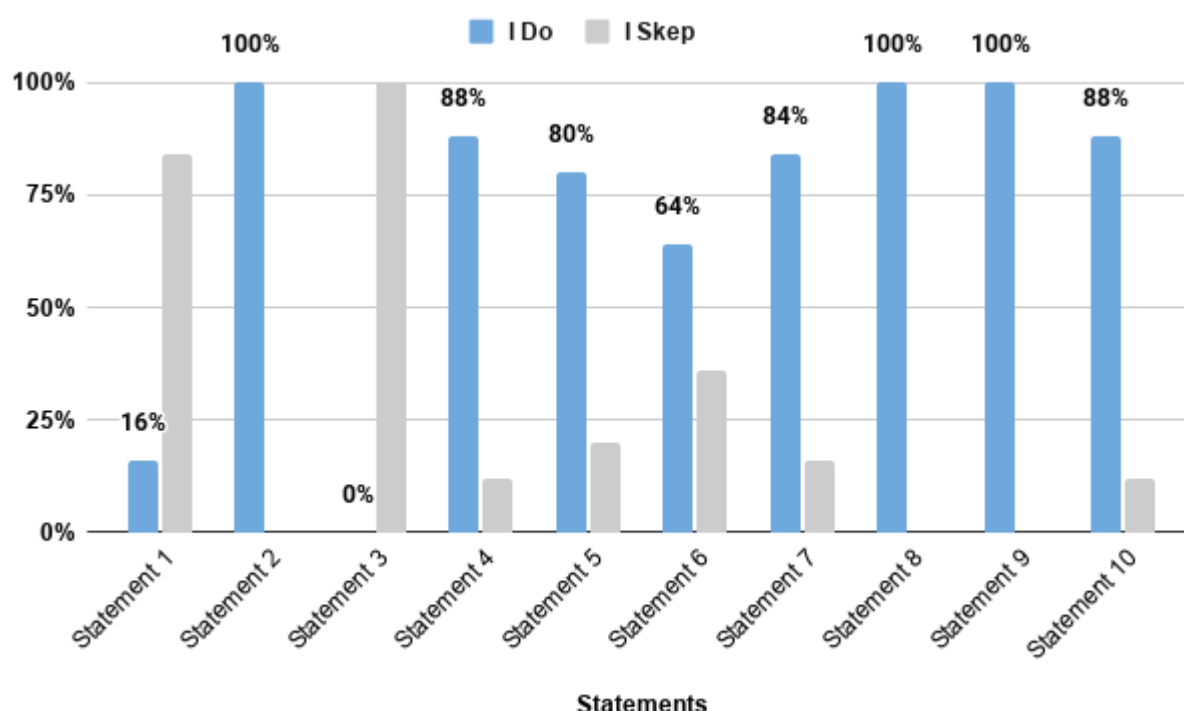
This space for dialogue facilitated critical reflection on care practices, fostering the exchange of experiences, the clarification of doubts, and the strengthening of knowledge regarding biosafety measures and institutional protocols related to accidents involving biological materials.

At the end of each educational session, a symbolic gift was presented to the staff of each clinic as a token of appreciation for their participation. The students also requested feedback from the professionals regarding the effectiveness of the activity. The evaluations were positive, highlighting the relevance of the discussion and the attentive listening to the concerns raised by nurses and Nursing technicians, which included: work overload associated with long working hours, impacting the quality of care; lack of infrastructure in the hospital, such as the absence of containers for chemical waste; difficulty communicating with the occupational health department; and perceived weaknesses in the effectiveness of the institutional protocol for handling accidents involving biological materials.

Based on the analysis of the mistakes and successes of the 25 professionals, it was possible to measure the performance level of the Nursing teams and the effectiveness of the dynamics in the final stage of the Maguerez Arch, the application to reality (Figure 1). From this perspective, the performance indicates that for statements 1 and 3, approximately 84% (21/25) and 100% (25/25) of the participants, respectively, raised the “Step” card. Therefore, a considerable percentage claims that recapping the needle during a procedure and not wearing gloves when administering intravenous medication are practices that should not be performed and are incorrect.

Consequently, questions 2, 8, and 9 received 100% “I do” responses, that is, correct answers demonstrating the initiative to dispose of waste properly, undergo annual exams, and get vaccinated periodically; however, the latter two behaviors are linked to institutional requirements.

Statement 6 received 64% (16/25) of “I do” and 36% (9/25) of “I skip,” indicating that 36% of nurses and technicians still have difficulties assembling the sharps container, in addition to pointing to a failure in internal management to delegate the replacement of the sharps container when it reaches the  $\frac{3}{4}$  capacity limit (Figure 1). This scenario contributes to workplace accidents, particularly during needle disposal. Consequently, there is both an institutional failure to implement effective continuing education and a lack of adherence by the Nursing staff to the provided updates and the subsequent application of best practices during their duties.

**Figure 1** – Percentage of “I do” and “I skip” responses by statement

Source: Prepared by the authors

In summary, statement 4 achieved an 88% (22/25) correct response rate and statement 5 an 80% (20/25) correct response rate, suggesting that the professionals are aware of the correct step-by-step handwashing procedure and the need to wear masks in specific settings. However, statements 7 and 10 achieved, respectively, 84% (21/25) and 88% (22/25) of the aforementioned signs, a concerning finding regarding the underreporting of workplace accidents and professionals' lack of awareness regarding occupational safety and their rights. It is worth noting that some participants stated they were familiar with the main regulatory standards; however, this does not guarantee that they fully understand and apply them in their daily work.

## DISCUSSION

WABM represent a significant health hazard for workers, particularly in the healthcare setting. This study's findings demonstrate an association between the occurrence of these injuries and carelessness, as well as the improper use or failure to use PPE, results similar to those described in studies conducted in other hospital settings across the country<sup>12</sup>.

The higher concentration of reported cases in hospital settings may be related to underreporting of WABM in non-hospital settings, which compromises the visibility of the problem and hinders the planning of effective prevention measures. Evidence indicates that professionals

with greater direct contact with patients are more vulnerable to occupational risks, particularly Nursing technicians, due to the continuous performance of care procedures<sup>15</sup>.

The predominant profile of affected workers is young women with a High School Education or higher, reflecting the historical composition of the Nursing workforce. Work overload, associated with double shifts and multiple employment relationships, is a factor that increases exposure to biological hazards and contributes to the occurrence of accidents.

It was observed that most WABM result from percutaneous exposures involving sharps, primarily needles, posing a high risk of pathogen transmission. These findings reinforce the need to strengthen biosafety practices and adherence to protective measures in the daily routine of healthcare work<sup>16</sup>.

Although aspects related to work dynamics influence negligence regarding the use of PPE, the literature highlights that adequate availability of these supplies in healthcare services is crucial for adherence to protective measures. Workers' health is guaranteed by the 1988 Federal Constitution and the Brazilian National Policy on Workers' Health (PNSTT), and it is the employer's responsibility to ensure safe conditions in the workplace<sup>17,18</sup>.

In this context, NR nº 32 serves as an important tool for the WABM prevention. However, when accidents do occur, the issuance of the CAT and reporting to the Notifiable Diseases Information System (SINAN) are essential for safeguarding workers' rights and for the epidemiological monitoring of these conditions.<sup>19</sup>

Despite regulatory advances, underreporting remains a significant challenge. Accidents involving sharps, although they account for the majority of incidents, are frequently underreported due to low-risk perception, fear of institutional punishment, and lack of knowledge regarding post-accident procedures. This reality highlights weaknesses in the safety culture of health services<sup>16</sup>.

Given this scenario, CHE stands out as a fundamental strategy for transforming work processes. By integrating teaching and learning into daily work routines, CHE fosters critical reflection, strengthens safe practices, and promotes shared responsibility among professionals in the prevention of occupational risks<sup>20</sup>.

The educational activities carried out enabled the analysis of real-life workplace situations, fostering dialogue, the sharing of experiences, and the collective construction of knowledge. These strategies contribute to behavioral changes and to strengthening worker safety within the SUS<sup>21</sup> framework.

In this process, MA proved to be a relevant active methodology, as it values professionals' experiences and enables the identification and resolution of concrete problems in the work process. Its applicability across different levels of healthcare reinforces its potential for improving working conditions and promoting workers' rights<sup>22</sup>.

Thus, educational initiatives based on active methodologies such as MA are applicable to Primary Health Care (PHC) because they align with the principles of health education, as they encourage critical reflection on work processes and learning. In PHC, observing the service area and care routines enables the identification of occupational risks, such as exposure to biological material and weaknesses in biosafety practices, stimulating collective reflection and the development of context-specific preventive strategies<sup>23</sup>.

This approach strengthens the agency of professionals, increases adherence to protective measures, and improves care practices, contributing to the consolidation of a safety culture and the prevention of occupational injuries. Thus, the systematic incorporation of the Maguerez Arch into the CHE serves as a strategic tool for promoting worker health at this level of care as well, by transforming everyday problems into educational opportunities and inducing sustainable changes in the work process<sup>24</sup>.

## CONCLUSION

The study demonstrated that WABM remain a significant occupational health problem, particularly among Nursing professionals. Factors such as work overload, improper handling of sharps, low adherence to personal protective equipment, and lack of knowledge regarding institutional protocols contribute to the persistence of these injuries, highlighting weaknesses in the organization of healthcare work processes.

The limitations observed in biosafety practices, including failures in the assembly and replacement of sharps containers, underreporting of workplace accidents, and limited knowledge regarding rights and institutional protocols, indicate that theoretical knowledge does not always translate into safe behaviors in daily work. In this regard, the need for the continuous consolidation of the CHE as an essential strategy for promoting occupational safety and mitigating the risks associated with WABM is reinforced.

The application of MA in the context of primary health care contributes to the prevention of accidents involving biological materials among Nursing professionals by fostering critical, participatory learning grounded in the realities of the workplace, enabling a collective analysis of daily care practices, the identification of risky situations, and the examination of their underlying causes. This process promotes the integration of theory and practice and facilitates the shared development of preventive strategies, strengthening workers' agency, expanding knowledge about biosafety and labor rights, and encouraging greater adherence to protective measures.

Furthermore, the methodology encourages dialogue and active team participation, improves care practices, contributes to the training of the students involved, and drives changes in work processes, consolidating a culture of safety and reducing occupational exposure in the

university hospital setting, although the need for further studies to better understand the scope of the problem and refine interventions is acknowledged.

## REFERENCES

1. Silva CPG, Aperiência PGGs, Almeida Filho AJ, Santos TCF, Nelson S, Peres MAA. Da educação em serviço à educação continuada em um hospital federal. *Escola Anna Nery*. 2020. [Acesso em 2025 jan. 14]. . v. 24, p. e20190380. DOI: <https://doi.org/10.1590/2177-9465-EAN-2019-0380>
2. Ministério da Saúde. Política nacional de educação permanente em saúde: o que se tem produzido para o seu fortalecimento? Brasília: Ministério da Saúde, 2018. [Acesso em 2025 jan. 27]. Disponível em: <https://www.gov.br/saude/pt-br/composicao/sgtes/pneps>
3. Ministério da Saúde. Secretaria de Gestão do Trabalho e da Educação na Saúde. Manual Técnico: Programa para o Fortalecimento das Práticas de Educação Permanente em Saúde no SUS - PRO EPS-SUS. Brasília: Ministério da Saúde. 2018. [Acesso em 2025 jan. 14]. Disponível em: [https://bvsms.saude.gov.br/bvs/publicacoes/manual\\_tecnico\\_pro\\_eps\\_sus.pdf](https://bvsms.saude.gov.br/bvs/publicacoes/manual_tecnico_pro_eps_sus.pdf)
4. Falkenberg, MB, Mendes TPL, Moraes EP, Souza EM. Educação em saúde e educação na saúde: conceitos e implicações para a saúde coletiva. *Cien Saude Colet*. 2014. [Acesso em 2025 jan. 14]. v. 19, p. 847-852. DOI: <https://doi.org/10.1590/1413-81232014193.01572013>
5. Gomes CM, Costa SMFT. A construção do campo da saúde do trabalhador: percurso e dilemas. *Cad Saude Publica*. 1997. [Acesso em 2025 jan. 14]. v. 13, p. S21–S32. DOI: <https://doi.org/10.1590/S0102-311X1997000600003>
6. Ministério do Trabalho e Emprego. NR 32 - Segurança e Saúde no Trabalho em Serviços de Saúde. 2022. [Acesso em 2025 jan. 14]. Disponível em: <https://www.gov.br/trabalho-e-emprego/pt-br/acesso-a-informacao/participacao-social/conselhos-e-orgaos-colegiados/comissao-tripartite-partitaria-permanente/arquivos/normas-regulamentadoras/nr-32-atualizada-2022-2.pdf>
7. Ministério da Saúde. Secretaria de Vigilância em Saúde e Ambiente. Boletim Epidemiológico: Acidentes de trabalho com exposição a material biológico em profissionais da enfermagem, 2018-2022 [Internet]. Brasília: Ministério da Saúde; 2023. Acesso em 2026 jan. 18. Disponível: <https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2023/boletim-epidemiologico-volume-54-no-17>
8. Forekevicz G, Rossa R, Schwab A, Birolim MM. Acidentes com material biológico: uma análise com profissionais de enfermagem. *Rev. enferm. UFSM*. 2021 Aug 10;11:e60. [Acesso em 2025 jan. 14]. DOI: <https://doi.org/10.5902/2179769263570>
9. Silva LHC, Rozin L. Acidentes de trabalho com exposição a material biológico entre profissionais de enfermagem no Paraná. *Espaç. saúde* [Internet]. 2024 May 23 [cited 2024 Jun 7];25. [Acesso em 2025 jan. 14]. Disponível em: <https://espacoparasauade.fpp.edu.br/index.php/espacosauade/article/view/997/718>
10. Silva RAD, Silva BRD, Bragança C, Cruz AU, Silva JBS, Paula CRD, *et al.* Acidente de trabalho com material biológico na enfermagem. *Brazilian Journal of Health Review*. 2020. [Acesso em 2025 jan. 14]. 3(4):7780–96. DOI: <https://doi.org/10.34119/bjhrv3n4-047>
11. Oliveira FA, Nobre LA, Faustino, Carolina A, Maia JC, Moura C, *et al.* Análise dos acidentes de trabalho com exposição a material biológico entre profissionais de enfermagem entre no Brasil. *Observatório de la economia latinoamericana*. 2024 Oct 24. [Acesso em 2025 jan. 14]. 22(10):e7430–0. DOI: <https://doi.org/10.55905/oelv22n10-230>
12. Bertelli C, Martins BR, Reuter CP, Krug SBF. Acidentes com material biológico: fatores associados ao não uso de equipamentos de proteção individual no Sul do Brasil. *Ciênc. Saúde Colet.*. 2023 Mar. [Acesso em 2025 jan. 14]. 28(3):789–801. DOI: <https://doi.org/10.1590/1413-81232023283.08222022>

13. Vieira KMR, Vieira Jr FU, Bittencourt ZZLC. Subnotificação de acidentes de trabalho com material biológico de técnicos de enfermagem em hospital universitário. *Rev. baiana enferm* 2020.Sep 17. [Acesso em 2025 jan. 14]. 34. DOI: <https://doi.org/10.18471/rbe.v34.37056>
14. Maeyama MA, Souza GG, Carvalho TNN, Oliveira LAEL, Munaro CA, Kuhnen ÉR. Organização da atenção à saúde da pessoa idosa - relato de experiência a partir da técnica do arco de Maguerez. *Arquivos de Ciências da Saúde da UNIPAR* [Internet]. 2024 Mar 20 [cited 2024 Apr 14];28(1):1–23. [Acesso em 2025 jan. 14]. Disponível em: <https://revistas.unipar.br/index.php/saude/article/view/10507/5229>.
15. Assis DC, Resende DV, Araújo GFS. Acidentes de trabalho com material biológico entre trabalhadores de enfermagem de um hospital universitário. *Res., Soc. Dev.* 2022. [Acesso em 2026 fev. 7]. [S. l.], v. 11, n. 8, p. e8611830524. DOI: <https://doi.org/10.33448/rsd-v11i8.30524>
16. Mundim AM, Souza ALTD, Balbino CM, Rosa CSS, Ramos GC. Notificação de acidentes ocupacionais com material biológico e a enfermagem. *Obs. Econ. Latinoam.* 2024 set. 13. [Acesso em 2026 fev. 7]. Disponível em: <https://ojs.observatoriolatinoamericano.com/ojs/index.php/olel/article/view/6933/4373>
17. Da Silva FFV. Atenção integral em saúde do trabalhador: limitações, avanços e desafios. *Rev. Bras. Saude Ocup.* 2021. [Acesso em 2026 fev. 7]. DOI: <https://doi.org/10.1590/2317-6369000020719>
18. Aguiar BF, Silva RM, Camponogara S, Sarquis LM, Miranda FM. Acidentes de trabalho com material biológico e medidas protetivas adotadas na COVID-19. *Acta Paul Enferm.* 2023. 36:eAPE022632. [Acesso em 2026 fev. 7]. DOI: <http://dx.doi.org/10.37689/acta-ape/2023AO022632>
19. Souza DCP, Barbosa CML, Dos Reis NR, Reis SP. A Acidentes de trabalho com exposição à material biológico: análise comparativa entre registros do DATASUS e CEREST-MA em São Luís. *Obs. Econ. Latinoam.* 2025. [Acesso em 2026 fev. 7]. Disponível em: <https://ojs.studiespublicacoes.com.br/ojs/index.php/cadped/article/view/13391/7522>
20. Santos AR, Santos RMM, Franco TB, Silva M, Vilela ABA. Educação permanente na estratégia de saúde da família: potencialidades e ressignificações. *Rev Enferm UFPE.* 2021. 14:e245355. [Acesso em 2026 fev. 7]. Disponível em: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/245355/37470#>
21. Izaguirres AL, Silva CB, Lima AAA, Paz AA. Formação profissional da enfermagem para aprimoramento de competencias: revisao integrativa. *Rev Recien.* 2022. [Acesso em 2026 fev. 7]. Disponível em: <https://recien.com.br/index.php/Recien/article/view/647/650>
22. Sousa ES, Nunes AJRR. Atenção primaria a saude: metodologia do Arco de Maguerez na construçao de uma ontervencao para a garantia de direitos. [Acesso em 2026 fev. 7]. Disponível em: [https://repositoriobce.fepecs.edu.br/bitstream/123456789/1073/1/HRJ\\_v4n18\\_18a\\_APS-Arco-Marguerez%2b%281%29%20%281%29.pdf](https://repositoriobce.fepecs.edu.br/bitstream/123456789/1073/1/HRJ_v4n18_18a_APS-Arco-Marguerez%2b%281%29%20%281%29.pdf)
23. Silva CLF, Jorge TM. Permanent Health Education in primary care: Concepts and practices as perceived by workers. *Medicina (Ribeirão Preto)* [Internet]. 2023 Aug. 15 [cited 2026 Feb. 6];56(2):e-196780. Available from: <https://revistas.usp.br/rmrp/article/view/196780>
24. Martins YBM. Estratégias eficazes para educação permanente sobre biossegurança: um relato de experiência com profissionais de um laboratório. *Revista Interdisciplinar de Saúde e Educação.* 12 DEZ 2024. v. 5, n. 2, p. 305-317.[Acesso em 2026 fev. 7]. DOI: <https://doi.org/10.56344/2675-4827.v5n2a2024.17>

| Authorship                  |                                                                                                                                         |                                                                                           |                                                                                               |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Name                        | Institutional affiliation                                                                                                               | ORCID   | CV Lattes  |
| Bianca Vitória Jansen Gomes | Federal University of Pará (UFPA), Brazil                                                                                               | <a href="https://orcid.org/0009-0006-7656-0460">https://orcid.org/0009-0006-7656-0460</a> | <a href="http://lattes.cnpq.br/1196785143402012">http://lattes.cnpq.br/1196785143402012</a>   |
| Cristal Ribeiro Mesquita    | Federal University of Pará (UFPA), Brazil                                                                                               | <a href="https://orcid.org/0000-0002-1321-5719">https://orcid.org/0000-0002-1321-5719</a> | <a href="http://lattes.cnpq.br/4670973537956939">http://lattes.cnpq.br/4670973537956939</a>   |
| Gerciane Silva da Silva     | Federal University of Pará (UFPA), Brazil                                                                                               | <a href="https://orcid.org/0000-0001-6114-4049">https://orcid.org/0000-0001-6114-4049</a> | <a href="http://lattes.cnpq.br/9307192870647645">http://lattes.cnpq.br/9307192870647645</a>   |
| Matheus Iarley Ribeiro Pará | Federal University of Pará (UFPA), Brazil                                                                                               | <a href="https://orcid.org/0009-0005-9184-6953">https://orcid.org/0009-0005-9184-6953</a> | <a href="http://lattes.cnpq.br/2167449307730056">http://lattes.cnpq.br/2167449307730056</a>   |
| Daniel Pinto e Silva        | Federal University of Pará (UFPA), Brazil                                                                                               | <a href="https://orcid.org/0009-0005-7702-4881">https://orcid.org/0009-0005-7702-4881</a> | <a href="http://lattes.cnpq.br/6937495517410591">http://lattes.cnpq.br/6937495517410591</a>   |
| <b>Corresponding author</b> | Bianca Vitória Jansen Gomes  gomesbianca0304@gmail.com |                                                                                           |                                                                                               |

| Metadata                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Submission: 16 de janeiro de 2025                 | Approval: 10 de janeiro de 2026                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Publication: October 7th, 2026 |
| Cite this article (Vancouver)                     | Gomes BVJ, Mesquita CR, Silva GS, Pará MIR, Silva DP. Aplicação do arco de Magueréz em uma ação educativa sobre acidentes com material biológico na equipe de enfermagem. Rev. APS [Internet]. 2026; 29 (único): e292647161. DOI: 10.34019/1809-8363.2026.v29.47161. Também publicado em inglês, com o título ( <i>Also published in English, under the title</i> ): "Application of the Magueréz arch in an educational action on accidents with biological material in the nursing team" |                                |
| Assignment of first publication to Revista de APS | Authors retain all copyright over the publication, without restrictions, and grant Revista de APS the right of first publication, with the work licensed under the Creative Commons Attribution License (CC-BY), which allows unrestricted sharing of the work, with recognition of authorship and credit for the initial publication citation in this journal, including referencing its DOI and/or article page.                                                                         |                                |
| Conflict of interests                             | No conflicts of interest.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |
| Funding                                           | No funding.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                |
| Authors' contributions                            | Study design and planning: BVJG, CRM, GSS. Data analysis or interpretation: BVJG, GSS. Drafting: BVJG, GSS, MIRP, DPS. Critical review of the content: CRM. The authors approved the final version and agreed to take responsibility for all aspects of the work.                                                                                                                                                                                                                          |                                |

[Go to top](#)