Original article

Training model for hygiene and epidemiology residents to address disabilities caused by work-related accidents

Modelo formativo del residente de higiene y epidemiología para atender discapacidades por accidentes de trabajo

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ABSTRACT

Introduction: Addressing disabilities due to occupational accidents allows residents to develop skills to prevent and treat these health conditions. Comprehensive training strengthens the ability to promote safe work environments and contribute to the effective care of those affected.

Objective: To design a training model for hygiene and epidemiology residents to address disabilities due to occupational accidents.

Methods: This is an applied research project, with a methodological approach focused on the development of comprehensive training. The study was conducted at the Provincial Center for Hygiene, Epidemiology, and Microbiology of Camagüey, from January to December 2024. This training model can be implemented in educational and care environments.

Results: The model consists of three interrelated subsystems. The theoretical training provides fundamental knowledge, practical training offers real-life experiences to apply this knowledge, and evaluative assessment ensures the necessary feedback to improve the educational process. Together, these subsystems promote comprehensive training that enables residents to effectively address complex situations related to occupational health and safety.

Conclusions: The designed model will improve the care of disabilities caused by occupational accidents. This will not only enhance residents' skills but also contribute to better occupational health management by reducing the impact of these events on workers' lives. Residents will be prepared to ensure comprehensive, effective, and humane care for those affected.

Keywords: training model; disabilities; accidents; occupational health

RESUMEN

Introducción: El abordaje de las discapacidades por accidentes de trabajo le permite al residente desarrollar habilidades para prevenir y tratar estas situaciones de salud. Una formación integral fortalece la capacidad para promover entornos laborales seguros y contribuir a la atención efectiva de los afectados.

Objetivo: Diseñar un modelo formativo del residente de higiene y epidemiología para atender discapacidades por accidentes de trabajo.

Métodos: Se trata de una investigación aplicada, con un enfoque metodológico centrado en el desarrollo de una formación integral. El estudio se llevó a cabo en el Centro Provincial de Higiene, Epidemiología y Microbiología de Camagüey, durante el periodo de enero a diciembre de 2024. Se trata de un modelo de formación para ser implementado en entornos educativos y asistenciales.

Resultados: El modelo consta de tres subsistemas interrelacionados. La orientación teórica formativa proporciona conocimientos fundamentales, la preparación práctica formativa ofrece experiencias reales para aplicar esos conocimientos, y la determinación evaluativa garantiza la retroalimentación necesaria para mejorar el proceso educativo. Juntos, estos subsistemas fomentan la formación integral que permite al residente abordar de manera eficaz las situaciones complejas relacionadas con la salud y la seguridad laboral.

Conclusiones: El modelo diseñado permitirá mejorar la atención de las discapacidades por accidentes de trabajo. Esto no of 2025solo potenciará las habilidades del residente, sino que también contribuirá a una mejor gestión de salud laboral al reducir el impacto de estos acontecimientos en la vida de los trabajadores. El residente estará preparado para garantizar una atención integral, eficaz y humana de las personas afectadas.

Palabras clave: modelo formativo; discapacidades; accidentes; salud laboral

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Introduction

Hygiene and epidemiology are fundamental disciplines for public health, as they focus on the study of factors that affect the health of populations, as well as on the prevention and control of diseases. In the field of care for disabilities caused by occupational accidents, the importance of these disciplines becomes even more relevant. The creation of a model for training hygiene and epidemiology residents focused on the care of disabilities caused by occupational accidents is a fundamental step that can significantly contribute to improving the quality of life of those affected and to the implementation of effective prevention policies.[1,2]

Occupational accidents are one of the leading causes of disability in the workplace. Millions of them occur each year, sometimes resulting in permanent and disabling injuries. These situations not only negatively impact workers and their families but also generate significant economic costs for businesses and healthcare systems. Therefore, it is imperative to have trained professionals who not only understand the epidemiology of work accidents, but are also able to develop effective strategies for their prevention and management.[3,4]

The training of residents in hygiene and epidemiology must be comprehensive and multidisciplinary, capable of considering medical, social, economic, and legal aspects related to disabilities caused by work-related accidents. This implies that the curriculum must include theoretical knowledge about the epidemiology of accidents, as well as practical skills to assess and rehabilitate affected workers. Furthermore, it is essential to train these professionals in the implementation of surveillance and prevention programs so that they can contribute to the creation of safer work environments.[1,4]

In this sense, a training model is needed that includes key components for addressing and identifying risk factors in the work environment, promoting safe practices and health education, as well as developing protocols for the care of affected workers. Likewise, cultural and socioeconomic differences that may influence the perception and management of disabilities caused by work-related accidents must be considered, which will allow for more personalized and effective care.[5,6]

It is important to emphasize that addressing disabilities caused by occupational accidents is not limited to physical rehabilitation. It is also essential to address the psychological and social dimensions of disability. Many affected workers experience mental health problems, such as depression and anxiety, which requires a

holistic approach to treatment. Residency training in hygiene and epidemiology should prepare professionals not only to address medical needs but also to understand and manage the psychosocial implications of disabilities caused by occupational accidents.[5,7]

The development of a training model that addresses all these aspects represents an opportunity to improve both the care of affected workers and the prevention of future accidents. This model should be periodically evaluated and adjusted, based on research and international best practices in the field of hygiene and epidemiology. The incorporation of active learning methodologies, real-life case simulations, and interdisciplinary approaches will be essential to ensure that residents acquire the necessary skills to meet the challenges of their professional practice.[8]

Furthermore, the model should include evaluation mechanisms that allow for measuring its effectiveness and making continuous improvements. This could involve implementing follow-up studies for trained residents, assessing their impact on reducing work-related incidents, and consequently, improving the quality of life of affected workers.[9]

In essence, the creation of a model for resident training in hygiene and epidemiology aimed at addressing disabilities caused by work-related accidents is a necessary and urgent effort. It is essential that future specialists be trained to take an active role in preventing and managing the consequences of work-related accidents by integrating technical knowledge with a person-centered approach focused on the individual and their social context.[10]

The design of a model can contribute not only to reducing the incidence of disabilities related to work-related accidents, but also to building healthier and safer work environments, where the well-being of all workers is prioritized. A proactive and educational approach will be key to addressing the challenge posed by disabilities caused by work-related accidents in current and future settings. Therefore, it is proposed to design a training model for hygiene and epidemiology residents to address disabilities caused by work-related accidents.

Methods

This research presents a training model for hygiene and epidemiology residents focused on the care of occupational injury-related disabilities. The research was conducted using a methodological approach focused on developing specific competencies in residents. This is an applied research project, as its purpose was to develop a model for implementation in educational and healthcare settings.

The study was conducted from January to December 2024. The location was the Provincial Center for Hygiene, Epidemiology, and Microbiology of Camagüey, the training institution for residents in this specialty in the

province. The study is justified by the need for a specific training model to strengthen the preparation of future specialists in hygiene and epidemiology.

Various qualitative and quantitative techniques were used to collect data. First, structured surveys were conducted among hygiene and epidemiology residents and professionals to assess their perceptions of current training related to the care of occupational injury-related disabilities. In addition, semi-structured interviews were conducted with experts in the field, which allowed for a deeper understanding of critical aspects of the proposed model. A documentary analysis of existing academic programs and hygiene and epidemiology regulations governing residency training was also conducted.

Regarding the ethical aspects of the research, the confidentiality and informed consent of all participants were guaranteed. An ethics protocol was developed and approved by an institutional review board to ensure that all interventions respected the dignity and rights of the subjects involved. Transparency in the use of data and results was also promoted, with a commitment to sharing all findings responsibly and with the goal of improving educational and professional practices in the areas of hygiene and epidemiology.

The research not only seeks to offer an effective training model but also to contribute to the development of strategies that improve the care of disabilities due to occupational accidents, thereby promoting the health and well-being of workers. The bioethical principles contained in the Declaration of Helsinki were taken into account.[11]

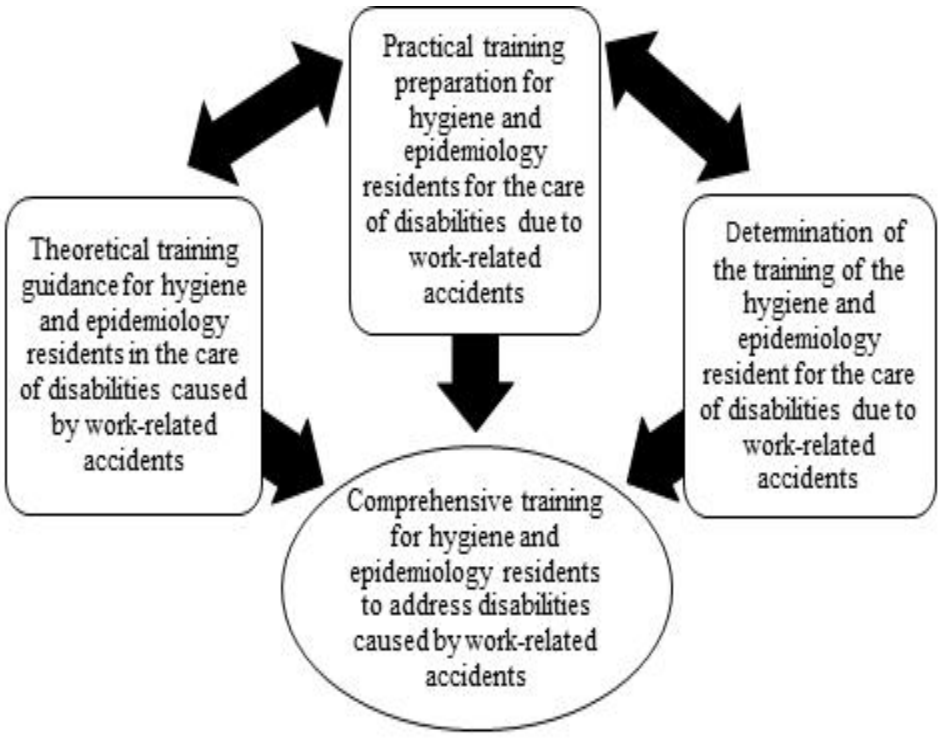
Results

The training model for hygiene and epidemiology residents focused on the care of occupational injury-related disabilities is structured into three key subsystems. The first corresponds to the theoretical training orientation, which provides basic knowledge and analytical skills regarding the guidelines, elements, and methods of hygiene and epidemiology, enabling residents to recognize and control occupational hazards.

The second subsystem represents practical training preparation, which provides infallible experiences in work environments, where residents acquire practical skills and then use them in specific situations. This approach provides residents with the opportunity to become more competent professionals with greater expertise.

Finally, the assessment process allows for the verification of academic progress and success. The interrelationship of the subsystems ensures that residents achieve the comprehensive training necessary for the care of occupational injury-related disabilities.

In general terms, the model aims to train professionals capable of contributing to health and safety in the workplace. Likewise, through a proactive approach, it advocates for the prevention and treatment of these cases (figure 1).



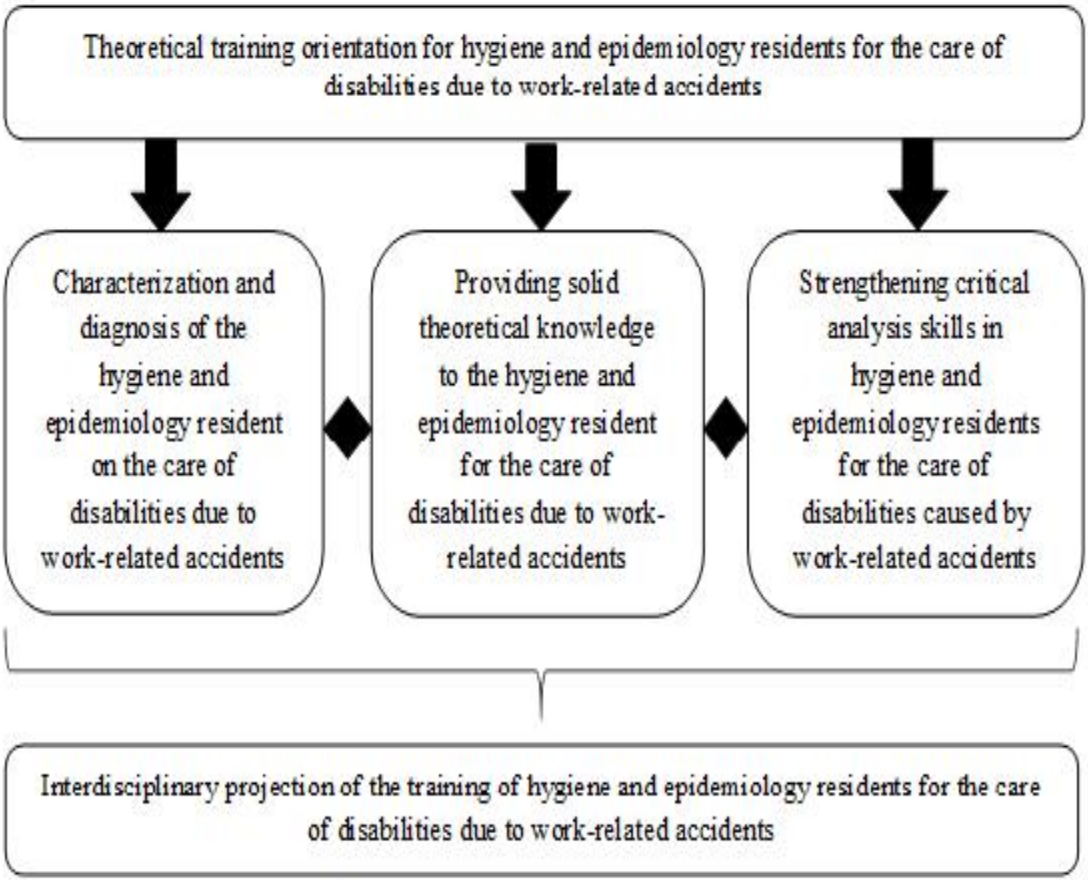
Source: Self elaboration.

Fig. 1. Hygiene and epidemiology resident training model aimed at addressing disabilities resulting from occupational accidents.

The theoretical orientation subsystem for training hygiene and epidemiology residents focuses on addressing disabilities resulting from occupational accidents. One of its components is the characterization and diagnosis of resident training, which aims to identify the specific educational needs of future specialists, so that they understand the context of their practice. The component corresponding to the provision of solid theoretical knowledge provides residents with a robust conceptual foundation, essential for effectively addressing disabilities resulting from accidents and promoting occupational health.

The component, strengthening critical analysis skills, is essential for residents to develop reflection and evaluation skills in work environments. This fosters a proactive approach to improving working conditions, promoting the active participation of all workers to generate a safer and healthier work environment.

Broadly speaking, the model promotes an interdisciplinary approach capable of integrating various areas of knowledge. The implementation of this approach enables the development of more prepared and competent professionals to effectively address the various challenges facing occupational health (figure 2).



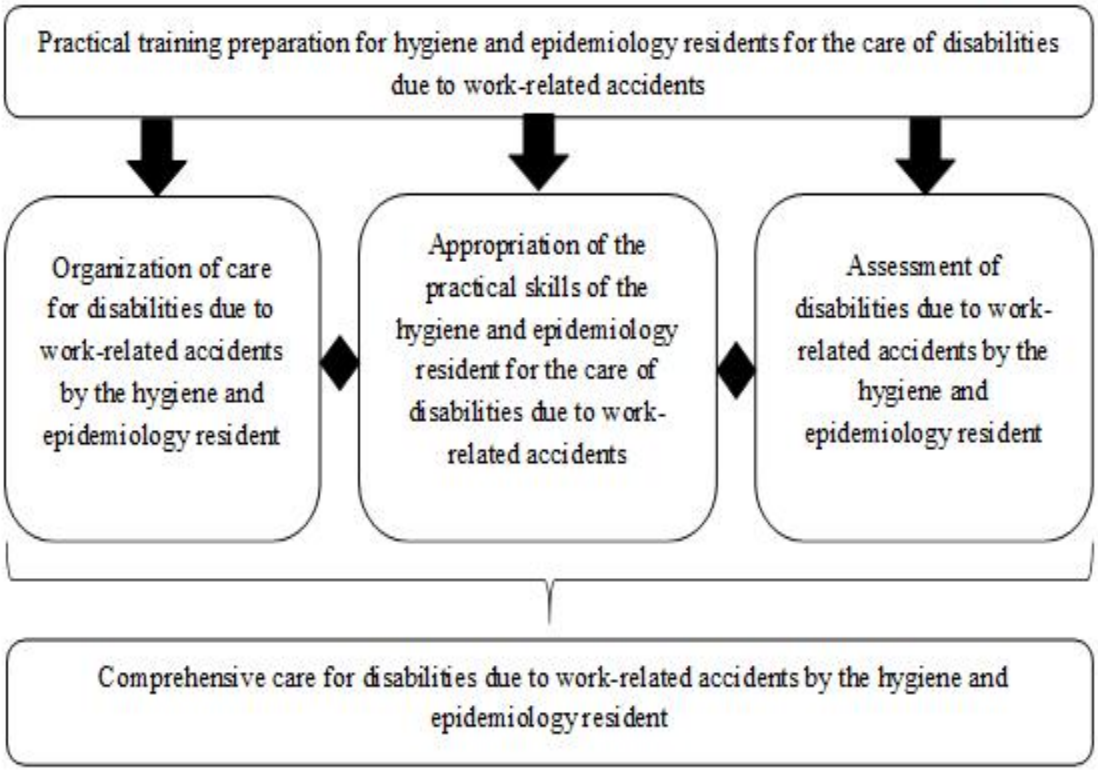
Source: Self elaboration.

Fig. 2. Subsystem: Theoretical training orientation for the hygiene and epidemiology resident in the care of disabilities due to occupational accidents.

The practical training preparation subsystem for the hygiene and epidemiology resident addresses the care of disabilities due to occupational accidents, highlighting their crucial role in this context. The organization of such care involves a systematic approach, where the resident not only coordinates resources but also promotes a culture of prevention.

The acquisition of practical skills is essential; residents must acquire specific competencies that allow them to effectively assess and treat those affected. This practical training is complemented by the assessment of disabilities due to occupational accidents, so that the resident is able to understand and respond to the individual needs of patients.

Consequently, these components result in comprehensive care that allows not only for the physical rehabilitation but also for the social reintegration of injured workers. Thus, the resident becomes a key agent in improving the quality of life of people affected by workplace accidents and contributes to a safer and healthier work environment (figure 3).



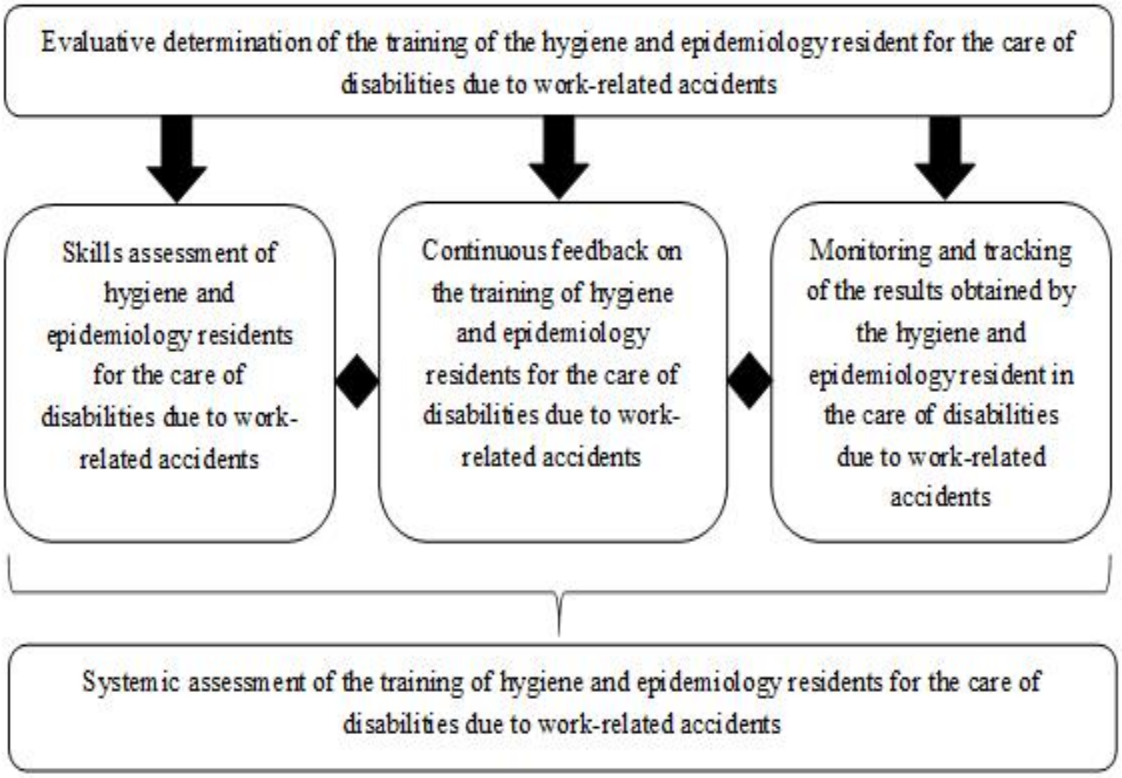
Source: Self elaboration.

Fig. 3. Subsystem: Practical training preparation of hygiene and epidemiology residents for the care of disabilities caused by occupational accidents.

The evaluative determination subsystem for the training of hygiene and epidemiology residents focuses on ensuring that professionals are adequately prepared to address disabilities caused by occupational accidents. It is made up of three fundamental components: skills assessment, which measures the resident's performance and ability in real-life situations; continuous feedback, which provides valuable information on progress and areas for improvement; and monitoring and follow-up, which allows for a detailed analysis of the results obtained in the care of these disabilities.

Together, these elements generate a systematic assessment of resident training to ensure that the educational process not only focuses on theory but also integrates practical experiences and critical reflections. In this way,

meaningful learning is fostered that strengthens the resident's ability to face challenges in the field of occupational health and improve the quality of care for those affected (figure 4).



Source: Self elaboration.

Fig. 4. Subsystem: Evaluative determination of the training of the hygiene and epidemiology resident for the care of disabilities due to work accidents.

Discussion

The residency training model in hygiene and epidemiology, which focuses on the management of disabilities due to occupational accidents, is structured into three interrelated subsystems: theoretical training, practical training, and evaluative assessment. The theoretical approach provides the essential foundations for the prevention and management of disabilities, aligning with the proposals of authors such as González et al.,[12] who argue that solid theoretical training is essential for developing competent professionals.

On the other hand, practical training allows residents to apply their knowledge in real-life settings, thus reinforcing theory with practice. This aspect aligns with the view of Busso et al.,[13] who argue that practical experience is essential for developing specific skills in the field of occupational health.

For its part, evaluative assessment of resident training ensures a continuous feedback process, essential for professional growth. The comprehensive training resulting from these subsystems not only reflects technical ability but also a thorough understanding of the realities of the work environment. Compared to traditional models, this systemic approach promotes more holistic and adaptive training, responding to the contemporary needs of the world of work.

The theoretical guidance subsystem for training hygiene and epidemiology residents is based on three components: resident characterization and diagnosis, provision of solid theoretical knowledge, and enhancement of critical analysis skills. This approach is essential for addressing disabilities caused by occupational accidents through the integration of various disciplines.

In his work, Ortega[14] highlights the importance of adequate diagnosis in training programs, suggesting an in-depth analysis of the resident's profile in order to personalize the educational process. Similarly, Triana[15] emphasizes that building robust theoretical knowledge is essential for residents to understand the epidemiological and social context of occupational accidents. This theoretical foundation, integrated with practical work, facilitates meaningful learning.

Furthermore, enhancing critical analysis skills, as suggested by Garcia et al.,[16] empowers future specialists to address complex problems through an interdisciplinary approach. This not only improves their ability to identify and assess risks, but also promotes collaboration with other specialists, enabling the creation of a holistic model for addressing work-related disabilities. In short, this subsystem is vital for achieving an interdisciplinary approach where competent professionals can effectively respond to current challenges in the fields of hygiene and epidemiology.

The practical training subsystem for hygiene and epidemiology residents in the care of disabilities due to occupational accidents is composed of three essential components: organization of disability care, development of the resident's practical skills, and disability assessment. This approach allows for comprehensive care, which is essential for improving the quality of life of those affected.

Compared with the model proposed by Gallardo et al.,[17] who emphasize the importance of an interprofessional approach, the analyzed subsystem presents certain organizational similarities, as it advocates a clear structure for comprehensive care. On the other hand, the work of Morales et al.[18] emphasizes the need for solid practical skills; in this regard, practical training adequately addresses the development of competencies, although a greater number of simulations could be included to maximize learning.

Finally, disability assessment, as evidenced by Pérez and Rodríguez,[4] is essential for understanding the impact of accidents on daily life. While the subsystem provides tools, it could benefit from a more holistic approach

that considers sociocultural factors. Together, these elements highlight the need for solid, multidimensional training for residents in hygiene and epidemiology.

The evaluative determination subsystem of resident training in hygiene and epidemiology comprehensively addresses the capacity to provide care for disabilities due to occupational accidents. This subsystem is supported by three critical components: resident skill assessment, continuous feedback, and monitoring and follow-up of the results obtained.

Comparing this approach with the training model proposed by authors such as Peinado and Valencia,[19] who emphasize the importance of self-assessment and self-management in adult learning, highlights that skill assessment allows residents to recognize their areas of strength and weakness. Furthermore, continuous feedback resembles the postulates of Espinar and Vigueras[20] on experiential learning, where feedback is essential to closing the learning and improvement cycle. Meanwhile, monitoring and tracking of results are essential for a systemic assessment, which supports the idea of competency-based education, defended by authors such as Obaya et al.[21] By integrating these components, an effective model is established that not only evaluates, but also encourages the professional growth of the resident in a critical field such as the care of disabilities due to work accidents.

The study has significant scope in addressing the training of residents in a critical area of public health. The model seeks to offer theoretical and practical tools that allow future specialists to identify, prevent, and manage disabilities resulting from occupational accidents through a comprehensive and multidisciplinary approach.

However, there are certain limitations, such as the potential lack of generalizability of the results due to the specific context in which it is applied. Furthermore, variability in the implementation of training strategies may influence their effectiveness.

The scientific contribution of this research lies in the creation of a reference framework that systematizes essential knowledge and skills, thereby contributing to improved clinical practice and reducing the consequences of occupational accidents for the affected population.

Conclusion

The designed model will improve the care of disabilities resulting from occupational accidents. This will not only enhance the skills of residents but also contribute to better occupational health management by reducing the impact of these events on workers' lives. The resident will be prepared to ensure comprehensive, effective, and humane care for affected individuals.

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Conflicts of interest

The authors declare to have not conflicts of interest.

Authorship contribution

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Methodology: Yoánderson Pérez Díaz, Rolando Rodríguez Puga.

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Visualization: Yoánderson Pérez Díaz, Yamilet Alarcón Castillo.

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