

Original article

Pedagogical strategy for the training of Immunology residents in breastfeeding



**Estrategia pedagógica para la formación de residentes de Inmunología en
lactancia materna**

**Estratégia pedagógica para a formação de residentes de Imunologia em
aleitamento materno**

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ABSTRACT

Immunology is a transdisciplinary specialty that intervenes in all medical functions, contributing to the solution of population health problems related to immune system disorders, especially in early life. The study assesses the shortcomings in the training of immunology residents regarding the benefits of breastfeeding, which hinders their adequate professional performance and constitutes a problem. The objective was to develop a teaching strategy for breastfeeding training. Scientific methods such as analysis-synthesis, historical-logical, systemic-structural-functional, and statistical-mathematical methods were used, as well as the empirical technique of surveying faculty and residents, which allowed the research to be directed toward the process under investigation. As a

result, improved performance was evident in guidance, educational, and preventive actions by immunologists with pregnant women and mothers. It was concluded that the dynamics of the aforementioned process, where education-prevention and the comprehensive approach to this procedure from a psycho-neuro-endocrine-immunological perspective, are its distinctive essence, with a view to influencing the reduction and rates of the appearance of infectious diseases in the first 720 days after birth and the subsequent health promotion.

Keywords: strategy; training; breastfeeding; immunology residents.

RESUMEN

La Inmunología es una especialidad transdisciplinaria que interviene en todas las funciones médicas, contribuyendo a la solución de los problemas de salud de la población relacionados con las afecciones del sistema inmune, sobre todo en las primeras edades de la vida. En el presente artículo se valoraron las insuficiencias que presenta la formación de los residentes de Inmunología en relación con los beneficios que ofrece la Lactancia Materna, lo que atenta contra su adecuado desempeño profesional, erigiéndose como problema. El objetivo estuvo dirigido a la elaboración de una estrategia didáctica para la formación en Lactancia Materna. Se emplearon métodos científicos como el análisis-síntesis, el histórico-lógico, el sistémico-estructural-funcional y el estadístico-matemático, así como la técnica empírica encuesta a profesores y residentes, que permitieron direccionar la investigación hacia el proceso investigado. Como resultado, se evidenció un mejor desempeño en acciones de orientación, educativas y preventivas por parte de los inmunólogos hacia gestantes y madres. Se concluyó que la dinámica del mencionado proceso, donde la educación-prevención y el abordaje integral de este proceder desde lo psico-neuro-endocrino-inmunológico son su esencia distintiva; con vistas a incidir en la disminución de los índices de aparición de enfermedades infecciosas en los primeros 720 días del nacimiento y la posterior promoción de salud.

Palabras clave: estrategia; formación; lactancia materna; residentes de inmunología.

RESUMO

A Imunologia é uma especialidade transdisciplinar, que intervém em todas as funções médicas, contribuindo para a solução dos problemas de saúde da população relacionados às afeções do

sistema imunológico, especialmente nas primeiras idades da vida. Avaliam-se as insuficiências que a formação dos residentes de Imunologia apresenta em relação aos benefícios oferecidos pelo Aleitamento Materno, o que compromete seu adequado desempenho profissional, configurando-se como problema. O objetivo foi desenvolver uma estratégia didática para a formação em Aleitamento Materno. Foram empregados métodos científicos como análise-síntese, histórico-lógico, sistêmico-estrutural-funcional e estatístico-matemático, bem como a técnica empírica de inquérito a professores e residentes, que permitiram direcionar a pesquisa para o processo investigado. Como resultado, evidenciou-se um melhor desempenho em ações de orientação, educativas e preventivas por parte dos imunologistas junto a gestantes e mães. Concluiu-se que a dinâmica do referido processo, onde a educação-prevenção e a abordagem integral deste proceder a partir do psico-neuro-endócrino-imunológico são sua essência distintiva, visando influenciar na redução e nos índices de aparecimento de doenças infecciosas nos primeiros 720 dias após o nascimento e na posterior promoção da saúde.

Palavras-chave: estratégia; formação; aleitamento materno; residentes de imunologia.

INTRODUCTION

In the field of Medical Sciences, Immunology is a transdisciplinary specialty that plays a role in all medical functions (promoting, preventing, diagnosing, treating, and rehabilitating). In this way, it addresses health problems related to immune system disorders, which constitute the etiopathogenesis of numerous diseases and their interrelation with other systems. It is a biomedical, clinical, basic, and diagnostic science of public health, and understanding its essential principles will aid throughout the training of physicians, as well as in their chosen specialty.

According to the Cuban Ministry of Public Health, an immunology resident is a medical professional who enters a Faculty/University, a receiving medical unit, or other accredited postgraduate teaching institution to pursue this specialty. The training process for an immunologist is characterized by a set of academic, clinical, and research activities that must be completed within a timeframe stipulated in the residency program of the country where the residency is undertaken.

The training of the Immunology resident is of singular importance to Medical Sciences since the contemporary nature, as well as the transdisciplinarity of this specialty, demands a high level of

performance from immunologists, which promotes better care for the health problems of the population, especially in the early ages of life, particularly regarding Breastfeeding or natural breastfeeding (BF), which constitutes a psycho-neuro-endocrine-immune process.

The limited knowledge among expectant mothers regarding the undeniable value of exclusive breastfeeding is the cause of the high rates of illness in the infant population, as assessed by Cuba's Maternal and Child Health Program (PAMI). Internationally, it has been shown that increasing the practice of exclusive breastfeeding could prevent approximately 823,000 infant deaths and 20,000 maternal deaths from breast cancer each year (Martín *et al.*, 2022).

In accordance with the above, the World Health Organization (WHO) recommends that the baby be exclusively breastfed from the first hour of birth until six months of age, at which time appropriate and safe complementary feeding should begin, continuing breastfeeding until 24 months or longer, if both mother and child so wish (PAHO/WHO, Pan American Health Organization, 2015).

Breastfeeding is essential for fulfilling infants' right to health and achieving optimal growth and development, as it offers unparalleled benefits to the physical and emotional health of both infants and their mothers that will last throughout their lives (Morales López *et al.*, 2022). It is the process by which the child feeds directly from the mother's milk, and its benefits for the child's overall development are widely recognized. The numerous benefits of breastfeeding position it as an effective means not only for maternal and child health but also for planetary health, by minimizing environmental damage. It is the fundamental food for the beginning of a healthy and sustainable food system (Oblitas Gonzales *et al.*, 2022).

Thus, breastfeeding offers various advantages, from economic and psychological benefits (mother-child bonding) to nutritional ones, due to its greater digestibility, balanced chemical composition, biologically active proteins, immune factors, and absence of allergens, contributing to development and protection against infections up to one year of age (Maldonado García *et al.*, 2024). The importance of promoting breastfeeding has been highlighted by international organizations such as the WHO, the United Nations Children's Fund, and the Food and Agriculture Organization of the United Nations, which have emphasized the challenge of implementing breastfeeding today, establishing it as one of the main public health objectives for the future health of the population.

Given that breastfeeding depends on an integrated and interconnected series of reflexes in both mother and child, it must be understood as a psycho-neuro-endocrine-immune process by

immunologists, immunology residents, and all healthcare professionals who work daily with mothers and children (Hernández Guzmán *et al.*, 2022; García *et al.*, 2023). Through this, the newborn and child can be fed with breast milk, which is a highly nutritious food produced by the mother, recognized by many international organizations as the "gold standard" for infant nutrition exclusively until six months and complemented with food until two years (Freire Salazar & Caluña López, 2025).

Based on the above, the current relevance of the topic, and this author's more than 30 years of experience teaching and practicing as a Second-Degree Specialist in Basic and Clinical Immunology, it is evident that there is limited collaboration between immunology specialists and residents in the specialty regarding breastfeeding. There is also a lack of outreach activities for pregnant women and their families aimed at understanding the benefits of exclusive breastfeeding for the first six months of a child's life and continued breastfeeding until 24 months, as well as the risks of using formula. Similarly, there are isolated initiatives by some professors to use digital teaching materials in their courses, containing educational content related to breastfeeding, to support the teaching and learning process. However, there is a lack of support and guidance, both familial and social, for expectant mothers regarding exclusive breastfeeding.

On the other hand, isolated experiences exist at the national and international levels regarding the use of medical literacy in medical education, which emphasize the training programs for immunology residents. These programs specify the curriculum, the duration of the residency, the general objectives, and the presence of this content. However, there are no apparent didactic-methodological proposals to guide this process, considering the teaching methods and resources employed; the main organizational structures; the interaction (activity and communication) among the participants; or other aspects related to the dynamics of this process. This represents a theoretical gap not addressed by the Educational Sciences, resulting in shortcomings in the training of immunology residents in relation to the benefits offered by this approach. This, in turn, undermines their professional performance and constitutes a problem.

In this regard, education and prevention of diseases, especially those that cause high morbidity and mortality in children, have been studied from various analytical perspectives by different researchers. Infectious diseases in the early stages of life have been specifically addressed by authors such as Morales López *et al.* (2022), Otálora Pineda *et al.* (2023), Fernández Ruiz *et al.* (2024) and Gamboa Camacho *et al.* (2024), who highlight the need for prevention of these conditions through exclusive

breastfeeding during the first six months after birth, as a way to reduce risk factors, prevent diseases and promote health in the infant population.

That is why the development of a didactic strategy for the training in LM of the Immunology residents, based on a model of the educational-preventive training dynamic of said process.

In this regard, the research aimed to develop a pedagogical strategy for training Immunology residents in breastfeeding, which is based on a theoretical model of the preventive educational-formative dynamics of this process.

MATERIALS AND METHODS

The methodology used is based on the dialectical-materialist method, which, based on principles, laws, and categories, underpins this educational research conducted during the 2023-2024 academic year and establishes guidelines for all research operations. Various theoretical, empirical, and mathematical-statistical methods were used, which are summarized below.

Analysis-synthesis: applied to the entire study, it allowed the investigation of the scientific problem until arriving at the generalizations of the essential ideas that characterize the training process in LM, of the Immunology residents and its dynamics.

Historical-logical: to carry out the historical analysis of the training process in LM of the Immunology residents and its dynamics, determining the essential characteristics in the historical evolution of this process.

Systemic-structural-functional: in the development of the strategy for training in LM, of Immunology residents.

Statistical-mathematical: descriptive statistics were used for the processing of the data obtained in the different stages of the investigative process.

The research was conducted in accordance with the ethical principles for medical research and was therefore supported by the research project Application of eHealth in the training processes of Medical Sciences, evaluated and approved by the scientific council and ethics committee of health research, both of the University of Medical Sciences of Santiago de Cuba.

RESULTS

The proposed strategy is based epistemologically on dialectical materialism, which allows for the interpretation, understanding, and general explanation of the model that supports it, as a theoretical construction of the training process in LM, of the Immunology residents; this process, by its nature, is social, complex, holistic, systemic, and systematic, aimed at changes and transformations in the professional performance in training, based on the recognition of the multiple contradictions and relationships expressed in the process.

Therefore, it finds its foundation in Dialectical Materialism (Lorences González *et al.*, 2009), essentially in Lenin's Theory of Knowledge, which constitutes the epistemological basis of the aforementioned process. This idea affirms that the dialectical path of human knowledge progresses from lived experience to abstract thought, and from there to practice. From this philosophical perspective, it is understood that, in the process of training in LM, the subject learns in a process through which reality is reflected and reproduced in human thought.

The most significant characteristics of this strategy revealed its structural systemic nature, so the properties of the system were considered, due to the scientific-methodological need to sequence its stages, moments and actions in an integrated way, so that it would allow the aforementioned process to be carried out.

The strategy (Figure 1) began with a diagnostic assessment aimed at determining the current state of the cognitive and evaluative needs of Immunology residents regarding breastfeeding. This assessment would enable them to provide educational guidance to expectant mothers about this practice and to explain why exclusive breastfeeding is essential for the first six months of life, considering that breastfeeding is also a psycho-neuro-endocrine-immune process. The assessment also allowed for an evaluation of the teaching and methodological preparation of the professors to lead the breastfeeding training process for these residents.



Figure 1. Strategy for the training of Immunology residents in breastfeeding

The results obtained from the diagnosis allowed for the proper adjustment of this training process with an educational-preventive approach for the promotion of present and future health, according to the changes or transformations that occurred in the residents and in the other subjects participating in that process, which made it possible to verify the evolution of their ideas and the knowledge initially diagnosed.

The diagnosis was carried out through surveys and interviews, exchange workshops with specialists and professors of the residents, as well as the observation of the professional performance of the latter in their contexts of action; all this made it possible to detect the knowledge, skills, values, assessments, motivations and professional interests of these in relation to the LM, with a view to achieving a better performance of these in the comprehensive approach to it, to prevent the not practicing it from becoming a health problem in the child population, thus affecting the PAMI.

Premises and requirements

The premises constituted the conditions, both favorable and unfavorable, that conditioned the conception and implementation of the strategy; while the requirements are those conditions that were imposed so that it could be successfully developed.

The following premises were established:

- Interest and motivation of Immunology residents, professors and other subjects participating in the training process to delve deeper into the study of LM.
- Professional commitment to achieving a comprehensive approach to breastfeeding as a psycho-neuro-endocrine-immune process, which promotes holistic assessments of expectant mothers.
- Recognize the need for an educational-preventive approach to health promotion in relation to breastfeeding, which promotes a decrease in the rates of occurrence of infectious diseases in the early ages of life.

The requirements were as follows:

- Professional preparation regarding LM, by residents, teachers, specialists and other subjects involved in the training process.
- Methodological preparation of professors to conduct the training of Immunology residents in relation to LM.
- Material conditions (human and material resources necessary for the implementation of the strategy), bibliography and existing media.

Based on the above, the objective of the strategy is to guide the actions to structure, execute and evaluate the training process of Immunology residents in everything related to LM, for its comprehensive approach, from an educational-preventive approach.

The strategy was conceived in two stages: the preparatory and the executive.

Preparatory stage

Its objective was to raise awareness among Immunology residents and their professors about the importance of training in LM to achieve the best professional performance of the former.

During this stage, a series of actions were developed aimed at ensuring the necessary conditions for the educational-preventive training dynamic in LM to be carried out in the training of Immunology residents, among which the following can be cited:

- The organizational forms, fundamental methods and teaching aids that were to be used in the training process of Immunology residents for the study and deepening of the contents about LM were determined.
- LM as part of the training of the future immunologist were specified.
- Case studies (real or theoretical) related to LM were carried out in academic and/or professional contexts.
- A system of specific teaching activities was developed and implemented in each year of residency to achieve the objective of training future immunologists in relation to LM, promoting the development of personal and professional values in them.
- In each teaching activity with the residents, self-assessment of their professional role as future immunologists in the comprehensive approach to LM was promoted.
- The residents' independent work was organized, which included guiding them in the study of various health situations concerning LM, which they were to delve deeper into.
- A system of continuous evaluation was conceived throughout the training process for residents, which made it possible to identify the fulfillment and achievement of the objectives initially set and, therefore, the transformations that were occurring in them.
- The impact of training activities in LM, of the Immunology residents, was evaluated in the socio-labor-research context of the same.
- Systematic monitoring of the residents' professional performance was carried out to determine their level of development in terms of implementing guidance, educational-preventive actions in LM in the care of pregnant patients and their families.

Executive stage

Its objective was to specify the actions aimed at achieving the ideal performance in LM of the Immunology residents, from the systematization of the education-promotion-prevention of said procedure in the training process of the same, tending to generalize the integral practice of these in the approach to pregnant women.

The stage was conceived in two phases: the medical significance of LM and the implementation of education-prevention in LM, which are in full accordance with the educational-preventive training dynamic for Immunology residents.

Phase of medical significance of LM

Its objective was to guide actions aimed at ensuring that Immunology residents, from their training process, professionally incorporate breastfeeding (BF) as a psycho-neuro-endocrine-immune process with a meaning and sense of transformation, culturally appropriating it in order to give correct educational guidance to future mothers, so that they are able to carry out successful breastfeeding, thereby promoting and guaranteeing health for the present and future of their children.

Among the actions carried out by the teachers were:

- To familiarize residents with aspects related to breastfeeding, emphasizing its importance as a sole source of nutrition, ideal for the cognitive and sensory development of the newborn.
- To guide the participation of residents in plenary sessions on LM in primary health care.
- To guide the review of updated materials about the immunological components of breast milk, which make it protective and inducer of the maturation of the immune system.
- Promoting communication between residents and individuals in a given community, including patients and families, tends to encourage the acquisition of negative information about LM by the same.
- To provide information on various health situations associated with not practicing breastfeeding, which they may face as future immunologists.
- To present health situations whose analysis encourages exchange between residents and different specialists related to LM.
- To promote the sharing of clinical cases and immunological procedures associated with LM, fostering the exchange of ideas, opinions, and points of view among residents and other participants in their training process.
- To assess the behavior of residents in addressing LM, through the solutions they are able to offer to the different cases presented to them in various work scenarios or contexts.
- To assess the transformations that have taken place in the thinking and actions of residents in relation to breastfeeding, which lead to the adoption as physicians of actions aimed at educating, guiding and preventing diseases in the early ages of children.
- Constantly evaluate the level of professional updating of residents in everything related to LM, enabling them to make new interpretations and analyses regarding it.

Medical implementation phase of education-prevention in LM

The objective was to carry out the actions that contributed to promoting the generalization of the comprehensive practice in LM of the Immunology residents, based on the formative orientation of education-prevention in LM and the execution of the medical practice in context by said professionals.

Among the actions carried out by the teachers were:

- To transmit to the residents their experiences as specialists in Immunology and to give instructions for the development of different behaviors to follow with pregnant women, postpartum women, husbands and other family members.
- To guide and motivate residents in the routine of preventive orientations, through educational plenaries for health promotion, with a view to achieving the recovery and promotion of breastfeeding and reaching the prevalence rate proposed by the WHO for 2030.
- To guide medical conduct in cases of negative attitudes and thoughts about the advantages of feeding newborns with their mother's natural milk.
- To verify the knowledge, as well as the skills, values and assessments of the residents when analyzing certain health situations in the context of their professional performance.
- Promote the participation of residents in projects, research, academic and scientific networks, which focus on breastfeeding as a health problem due to the lack of practice of it.
- To promote the exchange of residents with specialists (national or foreign) from diverse professional contexts related to LM, with a view to fostering a comprehensive approach with a psycho-neuro-endocrine-immune focus on LM.
- To assess the levels of professional interaction established between Immunology residents and those from other specialties related to the care of LM.
- To assess the effectiveness of educational and preventive actions for health promotion, by residents working together with other specialties, leading to comprehensive treatment of LM.

Strategy evaluation and control system

This system aimed to assess the qualitative transformations occurring in the educational and preventative training dynamics in LM, based on verifying the validity of the actions developed in the proposed stages. Therefore, the following control actions were established:

- Systematically verify compliance with the actions at each stage of the strategy.
- Redesign actions that are considered insufficient to meet the objectives of the strategy or propose others.

Based on the above, for a more accurate assessment of the transformations achieved by Immunology residents during their training in LM, achievement patterns were established that show the degree of development reached by them, based on the following indicators:

- Level of awareness of residents regarding the need and importance of incorporating everything related to breastfeeding into their professional performance to improve the health indicators of mothers and newborns.
- Level of development of knowledge, skills, attitudes, values and assessments about breastfeeding, as an expression of the medical meaning that it has acquired for them (Figure 1).

DISCUSSION

The study reaffirms that exclusive breastfeeding, as a physiological phenomenon, has a long-term social, cultural, and economic impact on society. This is because infants breastfed with their mother's milk experience a reduced incidence of acute illnesses, autoimmune diseases, and future neurodegenerative conditions. Therefore, exclusive breastfeeding for the first six months of life has a social impact by decreasing the number of hospitalizations for both the child and the mother, thus reducing the associated economic costs for healthcare institutions, families, the government, and society as a whole.

We agree with Alanis Rufino (2022) regarding the cultural impact of breast milk as an age-old practice that forms part of humanity's cultural heritage, wisely passed down from mothers to daughters, and which had been lost. Therefore, in the last three decades, the low rates of incidence and duration of breast milk have been recognized as a present and future public health problem worldwide. Hence the relevance and necessity of directing the training of Immunology residents in breast milk with an educational-preventive approach.

In accordance with Martin *et al.* (2022), the actions of the proposed strategy for the training of Immunology residents in LM as a psycho-neuro-endocrine-immune process have a great social impact, since it influences the education of future mothers, thus contributing to the prevention of

diseases in the infant population and therefore promoting health in the same from the nutritional, biological, immunological properties that the feeding of babies from the maternal breast contains.

In line with the above, the WHO in 2023 stated that breastfeeding education and prevention should contribute in practice to the progressive recovery of this age-old practice for the good of society, starting with Immunology residents being able to provide holistic care, transmitting guiding, validated and coherent information to future mothers about the importance and value of breastfeeding their children with their natural milk and that they do so exclusively for the first six months and complemented with other foods.

Once the strategy was applied, through an observation guide, a better performance was found in guidance, educational and preventive actions by the immunologists in training towards pregnant women and mothers, which was evidenced in the deep assimilation of the knowledge acquired as a result of the investigative activities; active position in the search for professional information; independence and responsibility in the decision-making process and the effective performance of the activities related to this procedure, among others.

A thorough understanding of the benefits of breastfeeding, particularly in the early stages of life, is vitally important for the optimal professional performance of Immunology residents.

The systematic practice of breastfeeding is necessary because it constitutes a psycho-neuro-endocrine-immune process that can prevent health problems in infants and their mothers, due to the unquestionable benefits that breast milk offers.

A comprehensive understanding of breastfeeding requires guidance, education, and prevention actions by immunologists towards pregnant women and mothers, with a view to achieving better health indicators, reflected in Cuba's Maternal and Child Health Program.

The strategy for training in LM for Immunology residents constitutes an important methodological instrument that allows the educational-preventive training dynamic to be implemented in practice for these health professionals.

The strategy developed, through the actions planned for each stage, is aimed at fostering successive transformations in Immunology residents in relation to LM, contributing to their continuous professional improvement in relation to this ancient practice.

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Conflict of interest

Authors declare no conflict of interests.

Authors' contribution

The authors participated in the design and writing of the article, in the search and analysis of the information contained in the consulted bibliography.



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