Causes and Solution Strategies for Hanseniasis in Children: Ishikawa Diagram

Causas e Estratégias de Soluções para Hanseníase em Crianças: Diagrama de Ishikawa

Causas y Estrategias de Soluciones para Hanseniasis en Niños: Diagrama de Ishikawa

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ABSTRACT

Objective: The study’s target has been to analyze the causes and solutions strategies for leprosy in children using the Ishikawa Diagram. Methods: It is a literature review based on the Ishikawa Diagram production, which was carried out over April 2017 in the databases of PubMed, Virtual Health Library (VHL), EBSCO and SciELO. Results: It was identified that the prevalence of leprosy in children is due to social, environmental and cultural factors, where: socioeconomic conditions, population cluster and lack of professional qualification correspond to 70% of the mentioned causes. Conclusion: It was evidenced the need for intensifying epidemiological surveillance, promoting larger investments in preventive actions, such as health education, including the adoption of professional training towards the professionals directly responsible the disease diagnosis.

Descriptor: Leprosy, Child, Causality.

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INTRODUCTION

Leprosy is a chronic infectious disease caused by the bacterium manifesting in the form of the bacillus *Mycobacterium Brazil*, characterized as an obligate intracellular parasite that has a predilection for the Schwann cell (the type of glial cell that forms the axon of the neurons in the peripheral nervous system) and skin. Therefore, the main manifestations of the disease are related to peripheral nerves and cutaneous lesions.

It is emphasized that despite the availability of powerful therapies with the association of several drugs, physical incapacity can occur in the patients. The prevalence of leprosy can be influenced by biological, socioeconomic and emotional aspects.

In the earliest reports of leprosy (period of old and average age), because the deformation caused by the disease was unknown, men believed that it was related to divine punishment, referring to sins and practices of malicious attitudes.

Segregation of patients with leprosy occurs from the earliest stages of the disease. Although it is a curable disease, patients may suffer from psychological disorders related to prejudice and discrimination, and therapeutic workshops are effective in preventing psychological manifestations in patients with leprosy.

Transmission of the disease occurs through direct and prolonged contact with an infected person through the elimination of bacilli by the respiratory tract. Infection after the bacillus reaches the lymph nodes can last from months to years in a silent struggle with the immune system.

There are several clinical forms of leprosy infection: indeterminate; tuberculoid; borderline or virchowian. Although there are differences, the symptoms are similar, from spots on the skin to changes in the skeletal muscles, causing deformities in the limbs.

Brazil, despite advances against the proliferation of leprosy, still has a high rate, described by the World Health Organization (WHO) in 2013, as one of the countries with the highest number of cases of the disease, as well as India. Socioeconomic and housing (geographic) factors are essential to understand the reason for not either eradicating or at least stabilizing the number of cases of this pathology.

Due to the high incidence of leprosy cases and the lack of specific protection for this disease, the Brazilian Health Ministry indicates some actions to be taken, including: treatment until cure; prevention and treatment of disabilities; epidemiological investigation for the timely diagnosis of cases; examination of contacts, guidelines and application of BCG (despite being a vaccine for tuberculosis, there is a relation in the efficacy against leprosy).

A study carried out in Bangladesh/Asia aimed to observe the influence of the BCG vaccine on the prevention of leprosy, and it was detected that it performs inductions to cross-reactive immune responses to *M. Brazil*.

Concerning the cases of leprosy in Brazil, in 2015 the *Sistema de Informações de Agravos de Notificação* (SINAN) [Information System of Notification Aggravations] recorded 35,131 cases, of which 2,384 were in persons within the age group from 0 to 14 years old.

Undoubtedly, the number of infected persons in this age group is considerable in the country, especially in the North, Northeast and Midwest States.

Analyzing the factors related to leprosy is of extreme importance for society. The disease, still endemic in the country (Brazil), can have the number of cases reduced through health education. Nursing professionals are an important link between clinical treatment and care. Then, knowing this infection is essential to designing both prevention and treatment strategies.

Given this perspective, this study pursues to answer the following question: What are the causes and strategies of solutions for leprosy in children?

Hence, this work seeks to analyze the causes and strategies of solutions for leprosy in children.

METHODS
Integrative review using the Ishikawa Diagram also known as cause and effect diagram or fishbone in order to directly expose the causes and solutions for leprosy in children. Three phases were followed to build the diagram, as described below.

First phase: After defining the theme to be worked, a brainstorming was carried out, composed of three nursing undergraduates attending the parasitology discipline, allowing the identification of possible causes and solutions for the studied problem. Brainstorming is a method of brainstorming.

Second stage: Construction of the Ishikawa Diagram, following the stages of the Integrative Review through the PICOS strategy, where: P = problem population; I = intervention; C = comparison; O = outcome. This strategy has the capacity to expand the search for evidence in the databases, avoiding unnecessary searches.

In this study, intervention and comparison were not used because it is not adequate for the objectives of the study. The “P” was represented by children and “O” by leprosy.

Herein, it was sought to answer the following guiding question: What are the causes and the solution strategies for leprosy in children?

Third phase: Literature search strategies in the databases: Virtual Health Library (VHL), PUBMED (NHI), EBSCO and SciELO. We used controlled descriptors to perform the searches: children AND leprosy.

Inclusion criteria were as follows: articles available in full, with humans, no cost for access, summary available, children with leprosy, published in Portuguese, English or Spanish between 2007 and April 2017.

The exclusion criteria were as follows: do not approach the topic, review articles, case study, pilot study, repeated articles, articles whose subjects are not children with leprosy, paid articles, articles completely unavailable.

Table 1 describes the search strategies performed in each of the databases, which occurred in April 2017. Boolean operators AND were respected. After identifying the articles, reading the titles and summaries of the 383 articles, 346 articles were excluded. 37 articles were selected for reading in full. All 37 articles were read in their entirety and afterward, four articles were excluded, being the final sample of 33 articles.

Fourth phase: Building the results and the Ishikawa Diagram.

The results were obtained following a data collection instrument. For each article analyzed, a data collection instrument was filled out, with the articles identified in Table 2.

We observed the level of evidence of the articles ranging from one to seven, being number one, five and seven excluded, according to the exclusion criteria of the study. Level two is considered strong and corresponds to clinical trials, randomized, controlled and well-delimited studies; level three is moderate and consists of controlled clinical trials without randomization; level four is moderate and concentrates trials of controls and cohort cases; level six is weak and encompasses a single, descriptive and qualitative study.

RESULTS AND DISCUSSION

After reading the entirety of the 33 articles that composed the sample, Table 2 was then built with characteristics of the studies, and the professional training of the authors of this integrative review was represented by 39.4% (13) physicians, 27.3% (9) nurses, 21.2% (7) physiotherapists, 3% (1) biologist, and 9.1% (3) other academic areas. The most prevalent levels of evidence were level 6 with 81.8% (27), level 3 with 9.1% (3), level 4 with 6.1% (2), level 5 with 3% (1). The highest quantitative countries were Brazil with 81.9% (27), India with 12.1% (4), the Philippines and Paraguay presented 3% (1), respectively.
Table 3 – Characteristics, causes and solutions for children with leprosy according to studies found in the Literature Review.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Poor living conditions and socioeconomic situation.</td>
<td>- Lack of public and private control of transmission focus.</td>
</tr>
<tr>
<td>Lack of resources and household protection activities.</td>
<td>- Implementation of specific preventive and control measures for the target group of the population.</td>
</tr>
<tr>
<td>- Infectious contact and health conditions.</td>
<td>- Development and implementation of specific control and prophylactic measures for leprosy.</td>
</tr>
<tr>
<td>- Inadequate social development and health conditions.</td>
<td>- Integration and treatment of social and health conditions for the population.</td>
</tr>
<tr>
<td>- Lack of basic health services.</td>
<td>- Occupational health and social support.</td>
</tr>
<tr>
<td>- Inadequate diagnostic and treatment services.</td>
<td>- Training of health workers in the control and diagnosis of the disease.</td>
</tr>
<tr>
<td>- Exposure to environmental factors.</td>
<td>- Training of the health teams in the control and diagnosis of the disease.</td>
</tr>
<tr>
<td>- Excessive drug resistance level.</td>
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Note - The titles were kept as in their original language.
The method used to build the Ishikawa Diagrams, as shown in both Tables 1 and 3, is exhibited in the following Figures 1 and 2.

**Figure 1** - Ishikawa Diagram regarding the causes of leprosy in children.

**Figure 2** - Ishikawa Diagram considering the solutions of leprosy in children.

Causes of leprosy infection in children

The focal behavior of leprosy occurs in urban space, this statement is related to a set of elements that contribute to its emergence, such as income distribution, social cohesion, as well as environmental and cultural factors.\(^\text{16}\)

The municipalities with the greatest social inequality have the highest coefficients of detection and prevalence of leprosy, reinforcing that socioeconomic and environmental indicators are also important predictors of leprosy. Nevertheless, the relationship between leprosy and social inequality should be highlighted. By observing the geographical distribution of the disease in the world and in different regions of the same territory with areas of lower Human Development Index, they present higher leprosy indicators.\(^\text{17}\)

Leprosy is considered an adult and young adult disease, however, there are a large number of cases in age groups younger than 15 years old. They indicate early exposure and persistent transmission of the disease, becoming a sensitive element to assess its size, contributing to the perception of the endemic pattern of leprosy in a particular place.\(^\text{16}\)

The young population with leprosy identifies fragilities in the health services, besides showing multibacillary cases without diagnosis and treatment, as well as public policies that do not attend the confrontation with the disease. Because of the long incubation period, clinical manifestations in children rarely occur before the age of five. Still, cases of leprosy have been reported in children under the age of two, aged seven months, six months and up to two months.\(^\text{18}\)

Brazil is today the only country in the world not to eliminate leprosy, say reduce its prevalence to less than one case per 10,000 inhabitants.\(^\text{19}\) Thinking about leprosy as a public health problem implies multiple analyzes, mainly due to the social problems that can be generated in people affected, with emphasis on those related to physical disabilities and consequent functional, social and emotional injuries. In this sense, it is worth highlighting the transcendence of the disease, understood here as the social impact caused in the patient’s daily life, such as prejudice, suffering and abandonment.\(^\text{18}\)

In endemic countries, the general population of children is in early contact with the bacilliferous patient. A large number of cases of leprosy in the age group of less than 15 years old indicates hyperendemicity in the community, as well as a deficiency in surveillance and control of the disease, which causes a possible lack of implementation of effective health policies aimed at the diagnosis precocious disease, especially in this age group.\(^\text{20}\)

The diagnostic difficulty favors the maintenance of the sources of infection. Most patients, when diagnosed early, do not present with disabilities.\(^\text{21}\)

Due to the lack of intensification in the strategies and activities of health education in schools and in home visits, as a way of improving the knowledge of the disease in the population, leprosy is spreading.\(^\text{22}\)

It is necessary to intensify the actions of leprosy surveillance, aimed at greater effectiveness in the diagnosis and treatment of the disease, especially in the regions of greater...
concentration of the country. Moreover, it is important to continually improve information systems, a fundamental activity to ensure the adequate monitoring of the epidemiological situation of leprosy in the country, with a view to achieving the goal of eliminating the disease as a public health problem.23

Solution strategies for combating leprosy in children

There are several methods for combating leprosy in children, but for them to be carried out competently it is necessary to improve the quality of health services, better management system, improved quality of case records and accessibility to specialized services; resources to ensure disability prevention and rehabilitation where necessary, and promote integration and partnerships with other institutions.24

Furthermore, professional training is needed to enable early diagnosis and immediate and appropriate treatment, family follow-up, and active search of transmission outbreaks. Nonetheless, only active search will not solve the problem of leprosy, a continuation of actions is still important. Interventions are needed such as continuing education with an effective, simple and objective approach with adjustment to the social level of the clientele and expansion of the coverage of care with the help of the Family Health Strategies (FHS).24

The surveillance of contacts in endemic areas becomes useful for the discovery of new cases among those who live or live together in a prolonged way, with the new case of leprosy diagnosed. It also aims to discover possible sources of infection in or out of the home.4

Usually, with active search for cases of leprosy to perform early diagnosis, evaluation of the communicators of all cases found, administration of the BCG vaccine, dissemination of leprosy control actions, and commitment of the multi-professional team to ensure continuous treatment for each patient will be found to control the disease, interrupting the transmission cycle and reducing cases in children.25

Health education is an indispensable process to obtain control of leprosy, especially in the school age group, in which the detection rates are high and are indicative of active transmission cores.26

It aims to collaborate in the formation of a critical conscience, resulting in the acquisition of practices aimed at promoting, maintaining and recovering the health and health of the community of which it is a part. More attention is needed in cases of leprosy in children due to difficult diagnosis.27

It is also necessary to train professionals to act effectively in the fight against disease, responsible for the processes of practice and care, with greater preparation for the reception, paying attention to the bond created with the users and also to the education and encouraging the correct notification when the disease is confirmed, as leprosy is a compulsory notifiable and mandatory disease.9

Lessons learned through efforts to eliminate leprosy show that the reduction in treatment time made possible by multidrug therapy has been insufficient to achieve the goal proposed by the World Health Organization in 1991.28

The lack of any specific and effective vaccine against this disease has hampered control actions that continue to focus exclusively on reducing the sources of infection by treating patients.29

The major obstacles to the development of control actions relate to individuals who are unable to provide any information about their source of contact. In these situations, the source of infection may indeed be unknown or the information may not be readily available due to the social stigma attached to the disease, which often prevents the patients from revealing the disease in the family.29

The fact that children under 15 years old are infected with leprosy makes this scenario even more worrying, since it indicates that a significant proportion of cases are not being detected or treated in a timely manner to at least decrease the sources of infection and also either prevent or reduce transmission of the agent.29

The limitation of the transmission focuses also occurs from the identification of the areas of greater risk. A set of policies and actions should be implemented, thereby reducing the burden of disease in the community. Leprosy mappings also demonstrate that the space category cannot be forgotten when the desire is to know the epidemiological scenario of a disease and its temporal behavior. It is therefore understood that leprosy does not occur randomly in the municipality.26

Among the strategies for leprosy control carried out by the Secretaria Estadual de Saúde do Maranhão (SESMA) [State Health Department from the Maranhão State] are as follows: epidemiology, management, integral care, communication and education, as well as municipal supervisions.30

The first important intervention is the decentralization of care, which adds actions of diagnosis, treatment and surveillance of the household contacts to the FHS in order to improve patients’ access. At the same time, there is a strengthening of human resources training for leprosy. Concomitant to this action, the municipality actions were also performed aiming the assessment and local monitoring of the epidemiological and operational indicators.30

CONCLUSIONS

This study meant to investigate the causes and solution strategies for leprosy in children, and among the causes are the following: low family income, schooling, late diagnosis, lack of professional training, fragility of control actions. Regarding the solutions, the following stand out: active search, early diagnosis, health education, lectures, and policy implementation for the target population.

Therefore, interventionist actions should not only focus on the patient but also the transmission of the disease, avoiding other individuals to acquire the disease, especially those under the age of 15 years old. The commitment of the team to investigate, treat and make the notifications, together with...
actions carried out by the Ministry of Health, are the main steps for the leprosy eradication.

Bearing this in mind, it is a challenge to control the contagion and the nursing team included in the multi-professional team must act severely in the search for professional qualification. Through holistic humanized work teams should assist patients in the various stages of the disease, from detection and acceptance to healing.

It is necessary to address this issue in Nursing Graduation Courses in order to train professionals capable of attending to this population in an effective and resolute manner, besides eliminating the prejudice and stigma of people diagnosed with leprosy.

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