

# Epidemiological characterization of varicella cases in patients of a university hospital located in Recife

## *Caracterização epidemiológica dos casos de varicela em pacientes internados em um hospital universitário da cidade do Recife*

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## **Abstract**

Varicella is an extremely contagious cosmopolitan disease. It is caused by the Varicella-Zoster Virus<sup>1</sup>. Although it is not considered harmful in childhood, it has currently shown a rising incidence in several complications with a high mortality potential in previously healthy children and adults. The present work had as objective to characterize the epidemiological profile of varicella cases in patients of a university hospital located in Recife. It is a descriptive-exploratory study with a quantitative approach, performed from January 2004 to January of 2005, with patients admitted with varicella in a university hospital, Oswaldo Cruz, in Recife. Out of a total of 225 patients hospitalized with varicella, 53% were male; in 77.3% of cases, secondary bacterial infections were identified as the main complication, of which cellulites was the most frequent with 62.2% of cases; patients evolved to cure, albeit 2% of cases led to death. The cost-effectiveness study proved that R\$ 61,710 would be saved if the study population had been vaccinated. Data shown in this research bring on the rationale of the importance of reduction in the number of cases of the disease, because there is a possibility of a non-satisfactory clinical course leading to death. In this sense, findings may lead managers to adopt preventive measures and plan health actions.

**Keywords:** Characterize Epidemiological. Varicella. Complications.

## Resumo

A varicela é uma doença cosmopolita, com contagiosidade extremamente acentuada, causada pelo vírus Varicela – Zoster. Embora considerada uma doença benigna da infância, atualmente tem-se demonstrado uma crescente incidência de complicações severas com um alto potencial de morbimortalidade em crianças e adultos previamente saudáveis. O trabalho tem como objetivo caracterizar o perfil epidemiológico dos casos de varicela em pacientes internados em um hospital universitário da cidade do Recife. Trata-se de um estudo do tipo descritivo-exploratório com abordagem quantitativa, realizado no período de janeiro de 2004 a janeiro de 2005 em pacientes internados por varicela no Hospital Universitário Oswaldo Cruz da cidade do Recife. Observou-se que, do total de 255 pacientes internados por varicela, 53% eram do sexo masculino; 77,3% dos casos apresentaram como complicação predominante as infecções bacterianas secundárias da pele, sendo a celulite a mais freqüente, em 48,1% dos casos; verificou-se que 2% evoluíram a óbito; constatou-se na análise dos custos e benefícios que ocorreria uma economia de R\$ 61.710,00 se a população em estudo fosse vacinada. A pesquisa apresenta dados que fundamentam a importância da redução no número de casos da doença, tendo em vista que existe a possibilidade de uma evolução não satisfatória e, inclusive, evolução ao óbito. Nesse sentido, esses achados poderão nortear os gestores de saúde na adoção de condutas preventivas e no planejamento das ações de saúde.

**Palavras-chaves:** Caracterização epidemiológica. Varicela. Complicações.

## INTRODUCTION

Chickenpox is acute infectious disease, highly transmissible, caused by the Chickenpox-zoster virus (VZV). It is characteristically a childhood disease, high morbidity, low mortality and Universal distribution.<sup>1</sup>

In the National Health Interview Survey (NHIS) database of 1980 to 1990, statistics in the United States advise that about four million cases of the disease occur each year in the country, and 80% occurred in children under the age of 10 years old, mainly in the winter and spring season.

The mean number of lethality was of 6,7 deaths /10.000 cases, prevailing under the age of 5 year old groups and older than 20. Although chickenpox is habitually considered as a benign disease, it is important to state out that about 90 children die each year by chickenpox and its complications in the United States, in which becomes an immune-preventable disease that mostly killed children in that country.<sup>2,3,4</sup>

In Brazil, Chickenpox is not a compulsory notification disease and the studies about the disease in the country are limited<sup>5</sup>, however the current outbreaks resulting in day cares, preschool, schools and in the community in general, should be reported in the Information Resulting System (SINAN). In 2003, almost 60.000 cases of chickenpox were reported in the State of São Paulo, with a total of 60 deaths<sup>6</sup>.

According to the Infectology Committee of Pediatrics Society in the State of Rio de Janeiro, Chickenpox is a serious disease, susceptible to prevention through immunization, and besides leading with direct costs (hospitalization and the use of medication) and indirect costs (lack of schools) present a great potential of morbidity and mortality<sup>7</sup>.

Chickenpox is a disease that suffered a deep image change. Considered years ago as a benign childhood disease, uncomfortable for which all children had to go through this disease sooner or later. Nowadays, it is seen as a serious problem that can be taken into severe complications and even death<sup>8</sup>.

The option foundation for the theme

resides in characterizing the inpatients' profile with chickenpox and identifying the relationship between treatment and vaccination in a University hospital in the city of Recife, subsidizing means for their prevention and perspective tending to view a few existing studies in Pernambuco and in Brazil.

## METHODOLOGY

It is a descriptive-exploratory type study with a quantitative approach, accomplished in the period of May to October 2005, in the University Hospital Oswaldo Cruz (HUOC). The hospital is located in Recife, the capital of the state of Pernambuco, Brazil, with a traditional university teaching, having been a reference in the North and Northeast on Infectious and Parasitic Diseases (DIP) and Reference Center of Special Immunobiologics (CRIE), and also offers intensive care units, hospital-day for HIV and emergency 24hours.

The universe was constituted of 255 cases that correspond to 100% of the inpatients with chickenpox during the period of January 2004 to January 2005. The information was obtained through the increase of cases reported by the Information Resulting System (SINAN), version 5.1 of the Epidemic Surveillance nucleus; in the active search in the inpatients' medical report file in the DIP at HUOC, Recife-PE.

### Statistic Analysis

The data were analyzed in a descriptive-exploratory matter, using the absolute and relative frequency, being demonstrated in graph and table forms and with literature foundation.

The statistical analysis was performed on Microsoft Office Excel 2003 program. Evaluating the association among the variables, a Qui-square test was used, with a confidence rate of 95%.

The studied variables were: gender, age group, origin, complications (defined as all the symptoms or lesions that are added

to the existing disease and those that appear after the last ones)<sup>9</sup>, evolution (cures/deaths), hospitalization time, relationship between the treatment and vaccination.

### Ethics Consideration

This research was submitted and approved by the Committee of Ethics and Research of Centro Integrado de Saúde Amaury de Medeiros and Universidade de Pernambuco (CISAM / UPE) under the process number of: 106/05.

## RESULTS

Table 1 presents a detailed description of the distribution for age and gender, in total of 255 cases hospitalized with chickenpox, it was observed that the male gender corresponded to 53% in relation to the female gender with 47%, which does not implicate any significant statistic difference  $p=0.546$ . The age group with the largest percentile was of 1 to 4 years old (42,4%), followed by 5 to 9 years age group (22,7%), and under the age of 1 (20%), having a total of 94,5% under the age of 15, presenting a minor percentile in the 15 year-old age group or more (5,5%).

Observe illustration 1, the age group of 1 to 4 years, 49,3% of the cases presented complications.

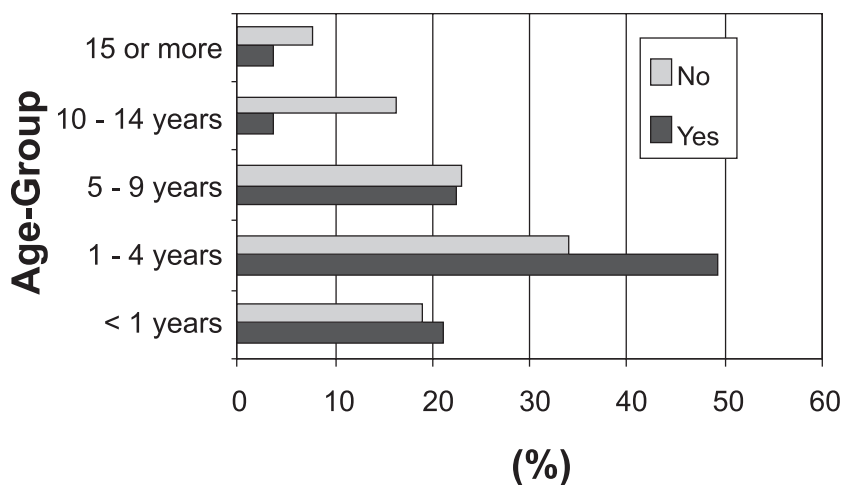
In relation to chickenpox complications, in table 2, was observed that 154 patients (60,4%) out of 255, presented current complications of the disease. A large proportion for dermatologic complications represented 119 cases (77,3%), cellulite, the most predominant complication (48,1%); followed by diseases of breathing equipment as the second most frequent complication. 4 study cases (2,6%) were developed by septicemia regarding to other complications.

In this study period, it is necessary to point out that some death complications were developed, among them we have: encephalitis associated to pneumonia; pneumonia; hemorrhagic chickenpox associated with septicemia; septicemia, and immune-depressed patient. In this period

**Table 1** - Distribution of cases hospitalized due to varicella according to sex and age. Recife - PE, January 2004 to January 2005.

| Age Groups (years) | Gender |      |      |      | Total | %    |
|--------------------|--------|------|------|------|-------|------|
|                    | Female |      | Male |      |       |      |
|                    | N      | %    | N    | %    |       |      |
| <1                 | 24     | 20.0 | 27   | 20.0 | 51    | 20.0 |
| 1   4              | 57     | 47.5 | 51   | 37.7 | 108   | 42.4 |
| 5   9              | 23     | 19.2 | 35   | 26.0 | 58    | 22.7 |
| 10   14            | 10     | 8.3  | 14   | 10.3 | 24    | 9.4  |
| 15 ou +            | 6      | 5.0  | 8    | 6.0  | 14    | 5.5  |
| Total              | 120    | 47   | 135  | 53   | 255   | 100  |

Source: Information Resulting System (SINAN), Epidemiology Nucleus. p=0,546



Source: Information Resulting System (SINAN), Epidemiology Nucleus

**Figure 1** – Distribution of cases hospitalized due to varicella according to age group and presence of complications. Recife - PE, January 2004 to January 2005.

studied having a total of 5 deaths. There was a presence of 1 study case (0,8%) with fascíte necrozante, extensive lesion on the right thigh, which was submitted to a plastic surgery for graft.

In the present study, it was verified that 112 (99,1%) study cases developed a cure and were from Recife, followed by the Metropolitan Area with 87 (98,9%), 5 (2,0%) study cases of death were observed in the respective age groups of 1, 4, 7, 13 and 55

years old, among all of them, 3 (5,5%) came from the countryside. It is believed that the most serious cases from the countryside were hospitalized in the capital.

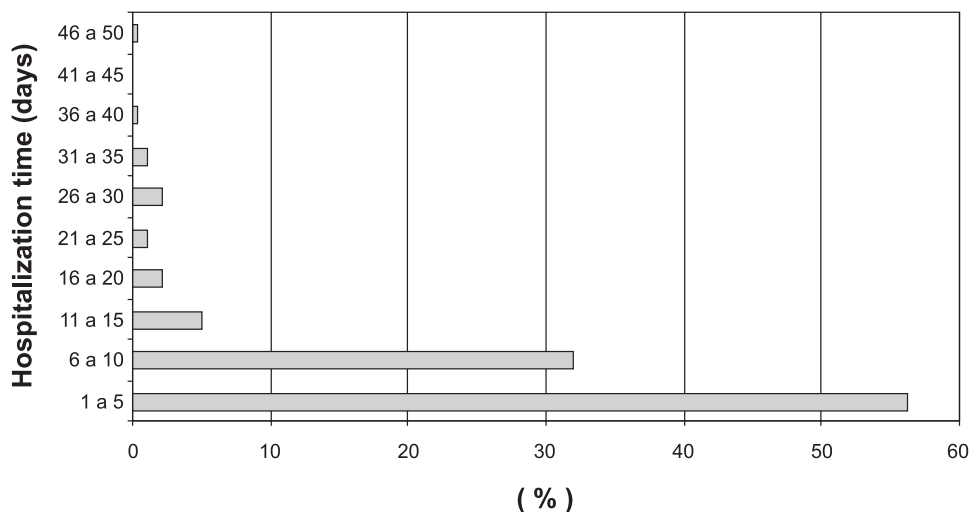
As for hospitalization time due to chickenpox, it was verified in illustration 2, a larger frequency of hospitalizations in the period of 1 to 5 days 56,4%. The mean of hospitalization time was of 7,5 (1 to 50) days.

In this study, it was observed that the value of the whole treatment was R\$ 67.830,

**Tabela 2** - Percentage of complications identified among patients hospitalized due to varicella. Recife - PE, January 2004 to January 2005.

| Complications                                      | N          | %          | Sub-classification         | N          | %          |
|--|------------|------------|----------------------------|------------|------------|
| Dermatological(Secondary Skin Bacterium Infection) | 119        | 77.3       | Cellulite                  | 74         | 48.1       |
|  |            |            | Scrum                      | 23         | 15.0       |
|  |            |            | Abscess                    | 13         | 8.5        |
|  |            |            | Gangrene                   | 4          | 2.6        |
|  |            |            | Erysipelas                 | 2          | 1.3        |
|  |            |            | Scarlet Fever              | 2          | 1.3        |
|  |            |            | Fasceíte Necrozante        | 1          | 0.6        |
| Respiration  | 11         | 7.1        | Pneumonia                  | 10         | 6.5        |
|  |            |            | Pneumonite                 | 1          | 0.6        |
| Renal  | 8          | 5.2        | Glomerulonefrite           | 8          | 5.2        |
| Nervous System                                     | 6          | 3.9        | Encefalite                 | 5          | 3.3        |
|  |            |            | Cerebelite                 | 1          | 0.6        |
| Hematology   | 2          | 1.3        | Pig Fever Trombocitopênica | 1          | 0.6        |
|  |            |            | Hemorrhage Chickenpox      | 1          | 0.6        |
| Others   | 8          | 5.2        | Septicemia                 | 4          | 2.6        |
|  |            |            | Pinkeye                    | 3          | 2.0        |
|  |            |            | Arthritis                  | 1          | 0.6        |
| <b>Total</b>                                       | <b>154</b> | <b>100</b> |                            | <b>154</b> | <b>100</b> |

Source: Information Resulting System (SINAN),Epidemiology Nucleus. Excluding variable



Source: Information Resulting System (SINAN), Epidemiology Nucleus.

**Figure 2** – Distribution of cases hospitalized due to varicella according to length of hospitalization. Recife - PE, January 2004 to January 2005

**Tabela 3** - Distribution of cases hospitalized due to varicella according to clinical course and origin. Recife - PE, January 2004 to January 2005.

| Procedência       | Clinical Evolution |      |       |     | Total | %    |
|-------------------|--------------------|------|-------|-----|-------|------|
|                   | Cure               |      | Death |     |       |      |
|                   | N                  | %    | N     | %   |       |      |
| Recife            | 112                | 99.1 | 1     | 0.9 | 113   | 44.3 |
| Metropolitan Area | 87                 | 98.9 | 1     | 1.1 | 88    | 34.5 |
| Countryside       | 51                 | 94.4 | 3     | 5.5 | 54    | 21.2 |
| Total             | 250                | 98   | 5     | 2.0 | 255   | 100  |

Source: Information Resulting System (SINAN), Epidemiology Nucleus.

meanwhile if the same population would receive the vaccination, the cost would perhaps be R\$ 6.120 reais (Brazilian currency). Considering that the price of 1 vaccine dose for the public service cost about R\$ 24,00 reais for the Information System on Stock and Distribution of Immune-biologics of the Cold Center of the Secretary State of Health in Pernambuco. (Sistema de Informação de Estoque e Distribuição de Imunobiológicos da Central de Frio da Secretaria de Saúde Estadual de Pernambuco) (PNI). According to the Medical Bill section of the hospital in this study, through the SUS DATA Unified Table Administration System of SUS Procedures, each patient with chickenpox, the hospital has an initial cost of R\$ 266,00 reais, regarding to chickenpox treatment with estafilococcias in the system, viewing that it does not consist of AIH denomination. It is stated out that the value is not charged if the patient presents other diseases when elapsing the treatment, only being added at the end of the invoice.

## DISCUSSION

In this study, a large prevalence was observed accounted by chickenpox among the male gender with 53% in relation to the female gender with 47% ( $p=0.546$ ). In a similar study accomplished in 4 Brazilian cities in 1996 to 1997, the largest prevalence of the disease occurred in the female gender<sup>10</sup>. However, other studies<sup>11</sup> confirm that indi-

viduals of both genders are equally infected.

The largest number of patients with chickenpox occurred in preschools, schools and more than 90% of the cases occurred under the age of 15.<sup>11,12</sup> Corroborating with data found in this study, the age group under 15 years represented 94,5%.

It was observed in this study, the age group of 1 to 4 years old presented as being the most infected by the disease and being the absolute large number of complications (49,3%). Probably in this 1 to 4 years age group, the immunological system is still in development and there might be a higher complication risk.<sup>13</sup>

In this study, 60,4% of the cases occurred from complications, being previously of most healthy children.

The secondary bacterial skin infections are constituted of the most common chickenpox complication corresponding to 77,3%, causing extensive tissue loss and many times, needing grafts 0,6%, confirmed data in other literatures.<sup>14,15</sup>

Another study confirms that the most frequent complication of chickenpox is the secondary infection of the skin, caused by *Staphylococcus aureus* and *Streptococcus pyogenes*, and including impetigo, furuncle, abscess, erisipela and cellulite, this last one being the more frequent one<sup>11,12</sup>.

In the most serious complications, septicemia, gangrenes and fasciite necrozante can occur.<sup>2</sup> The lack of hygiene habits and basic sanitation also influence the presence

of complications mainly when it refers to the secondary bacterial infections of the skin.<sup>13</sup>

The current study presented 7,1% of breathing diseases, pneumonia being predominant with 6,49%. Pneumonia powder-chickenpox is the most serious complication of breathing equipment and it occurs more commonly in adults (up to 20% of the cases) and in immune-depressed ones.<sup>14,15</sup>

In relation to the nervous system complications presented in this study, 5 out of 6 cases (3,39%), presented encephalitis cases, this could have developed before or after the illness<sup>16</sup>.

The USA data reports encephalopathy occurrence in chickenpox with 3,9/10.000 cases and a mean lethality of 18,7%, representing 10% of all deaths. The encephalitis<sup>14,15</sup> is the most serious complications in chickenpox and the mortality tax varies between 5 to 35%.<sup>2</sup>

The hematological complications found were of 2 cases (1,3%) of purple thrombocytopenic and hemorrhagic chickenpox, also included in other studies fulminate purple, epitaxial, gengivorrhagia and petéquias.<sup>12,16</sup> Arthritis, Glomerulonephritis and purple thrombocytopenic are seldom complicated<sup>1</sup>.

Important aspects to be discussed referring to the patient's clinical condition in a negative evolution of the disease. The immune-depressed literature reports<sup>11</sup> that chickenpox is often serious, having a disseminated and hemorrhagic progressive form, it can be fatal. In patients infected by the Human Immunodeficiency Virus (HIV), it can be more aggressive presenting on a disseminated chart and more commonly involving in the central and ocular nervous system.<sup>17</sup>

Viewing the growth of chickenpox complications within the increase of age, the study data also understands, in a consisted matter giving the importance of immunization in susceptible individuals to chickenpox and those having a larger probability of serious disease complications in close contact with infected people (as for: health professionals, immune-depressed

home contact) and also those with a larger exposure, as well as non-pregnant women in fertile age. This study emphasizes that 5,5% of the patients correspond to 15 year olds or more age group.

There are studies that reveal that about 25% of chickenpox death occur in adults and the chances of dying above the age of 20 years, is 25 times more than in children, viewing that adult behaves as an immune-depressed one, not being able to produce an adequate immune cellular response to the VVZ.<sup>1</sup>

In 2003, in the state of São Paulo, 60 deaths were registered associated to chickenpox and its complications, 85% in smaller children under the age of 5 years old. Since 2003, the Secretary of Health in the State of São Paulo extols the vaccination in day cares as one of the disease control measurement, viewing that complication and mortality taxes are higher in children that go to these establishments.<sup>18,19</sup>

In this present study, it was verified that 112 (99,1%) developed a cure and are from Recife, followed by 87 (98,9%) in the Metropolitan area, however, five deaths (2,0%), 3 (5,5%) came from the countryside, it is worthily to point out that generally severe cases from the countryside look for hospitalization in the city capital.

A study accomplished at HUOC between 1998 to 2003, had been observed a large number of complicated cases from Recife 43,6%, followed by 39,4% in the Metropolitan area and 16,8% in the countryside.<sup>13</sup>

A high demographic density has been pointed out as one of the main factors for the acquisition of the infection.<sup>5</sup> The chickenpox occurrence tends to be smaller in the rural areas, resulting to a larger proportion of adults who have not had the disease at childhood (susceptive), being particularly a concern to the possibility that those individuals acquiring the disease (a serious risk in this age group) while immigrating to the urban areas.<sup>2</sup>

In a retrospective study accomplished in hospitalized children with chickenpox in the Del Niño Hospital of Panama, January

1991 to December 2000, the mean of hospitalization was of 8,9 (1 the 27) days. 13 In a study accomplished in the USA between 1988 to 1995, before the introduction of the vaccine against the chickenpox, it was reported a mean of hospitalization 5,4 days approximately corresponding to 57000 hospitalization days in a year.<sup>20</sup>

Among the main results of this study, it stood out that the expenses and the representation of the vaccine in the economy have been studied on the prism of the economical analysis in different countries, it was verified that in the analysis of the costs and benefits could occur an economy of R\$ 31.110 reais if the study population was vaccinated.

It is worthily to point out in this study presents few resources for an economical analysis. A similar study in Uruguay revealed the annual cost with vaccination reaches US\$ 822.500,00 while the direct costs of the disease reach US\$ 2.332.000,00.

The prevention of chickenpox implicates an economy of US \$ 1.509.500,00<sup>21</sup>. Another accomplished study in the Hospitalar Pereira Rossell Center in Uruguay shows a clear number reduction in hospitalizations for chickenpox after the introduction of the vaccine, that is, in the period of 1997 to 1999 corresponded to 233 cases, comparing with 119 cases in the interval from 2000 to 2002 after the installation of the vaccine.<sup>22</sup>

The use of the vaccine against chickenpox is still limited in Brazil. It is believed for two reasons: first, chickenpox is seen many times as a benign disease 19 and secondly, the cost of the vaccine would be expensive to the country.

The countries that adopted the children's systematic vaccination against chickenpox obtained a significant downfall number of cases and deaths. In the USA, during the last 5 years after introducing the vaccine, approximately in 1 year, 11,000 hospitalizations occurred and about 100 deaths were due to chickenpox.<sup>2</sup>

Other studies<sup>23,24</sup> have demonstrated that the vaccine against chickenpox is highly effective. In Brazil, it refers there are

few studies about the epidemic situation, which hinders the economic analyses. According to the Secretary of Surveillance in Health of the Ministry of Health, the reason for the non inclusion of the vaccine in PNI is the high cost of the vaccine dose which costs about of R\$ 24,00 reais for the public service.<sup>10</sup>

Although in most cases this does not present complications, chickenpox previously presents a social and economical, even considering previously healthy children, these costs include medical expenses, consultations, the use of symptomatic therapeutics or antiviral, hospitalizations due to complications and, mainly, financial obligation related to the parents' absents at work and the children needing to be kept away from school or day care.

Data of surveillance areas showed that since 1995, with the liberation of the vaccine a reduction of cases of the disease had occurred (around 90%) and mortality (about 66%). The largest downfall occurred was in the primary objective vaccination group, children between the ages of 1 to 4 years old.<sup>6,25,26</sup>

According to the Informative Bulletin of the Epidemiology Nucleus at HUOC (2004), chickenpox is not of compulsory notification, however due to the situation of the disease presented in the Acute Breathing Diseases meeting in Brasília, in October 2003 and a great number of complications observed in the inpatients, this became serious and started to take part of DNCs (Diseases of Compulsory Notification) at HUOC and in other health units started on January 2004.<sup>27</sup>

The vaccine against chickenpox does not take part in the PNI being available in the private service and gratuitously CRIES in special situations.<sup>28</sup> The vaccine is recommended by the Brazilian Society of Pediatrics (SBP) and for the Brazilian Society of Immunizations (SBIIm) for all non-immune population over 1 year of age.

The research reported that children previously healthy had a pathology considered benign at childhood and obtained an



unsatisfactory evolution such as complications and even death. The study that maybe an economy of R \$ 61.710 reais could occur if the population in question was vaccinated, however the indirect cost were not analyzed (absents at work and in school) and the expenses of the disease are above the price range

It recommends to foment the incentive of scientific researches in the sense of

evaluating the cost-benefit of the use of the vaccination, as well as, the insertion of chickenpox as a compulsory notification disease, although this study is not permitted an economical analysis, so that all the federal units implement the epidemic investigation in the Brazilian population and the inclusion of the vaccine against chickenpox in PNI, because the disease can represent a number of important complications and deaths.

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