Physical disability and social participation in patients affected by leprosy after discontinuation of multidrug therapy

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Summary

Objectives: To describe the social participation frequency and the physical disability of patients who were discharged after the multidrug therapy (MDT/WHO) and factors associated with these variables.

Method: A cross-sectional and analytical study, examining associations, which took place Nova Iguacu/Brazil. A random sample of patients treated with multidrug therapy from 1997 to 2006 was selected. The rationale for sample size was determined by the estimated proportion of physical disability in the amount of 23%, with an acceptable sampling error rate of 5%; significance level was established as 5% among the 1080 patients finally a total sample of 225 patients. The evaluations were performed from January 2010 to December 2011 and Socio-demographic and clinical data were collected from the applications completed in the national notifiable diseases information system (SINAN).

Results: In the period of interest, 2179 cases were diagnosed with leprosy; 1080 met the criteria for inclusion. Of these, 225 were randomly selected patients who had mean age 56·12 (± 17·34 years), 55·6% were women, 39·9% went to high school and 28·9% were Caucasians. A total of 55·3% (125) showed multibacillary form, with a predominant dimorphous leprosy in 40·4%. Physical disability was present in 60·9% and social restrictions in 24·9% of patients. The variable physical disability was associated with the therapeutic regimen multibacillary and social participation.

Conclusion: We observed a high frequency of disability and social restriction after long period after the start of MDT/WHO suggesting the late diagnosis of leprosy
or inadequate follow-up after discharge. This study highlights the importance of systematic monitoring of these patients with their own criteria which could be held at the Family Health Strategy.

Introduction

Leprosy is characterised by the occurrence of multiple mononeuritis, which can occur during the MDT treatment or after bacteriological discharge. These episodes of neuritis may come with reactional status or unique cases of neuritis, and are often responsible for the installation of physical disability.\textsuperscript{1,2} Besides the physical repercussions, social and psychological aspects can be affected, making the quality of life of these individuals an important subject to be evaluated and considered with greater attention from the Health Services.\textsuperscript{3,4}

In 2011, Brazil contributed 16% of the new cases worldwide.\textsuperscript{5} The percentage of individuals with physical disability at the moment of diagnosis and discharge MDT/WHO were 30%\textsuperscript{6} and 23%, respectively.\textsuperscript{2,7} The data referring to Rio de Janeiro state highlighted a drop of coefficient in leprosy detection from 21·3 per 100 thousand habitants in 2001 to 12·4 in 2009, although this was still considered high compared to the national level.\textsuperscript{5} Nova Iguaçu city council showed a detection coefficient of 18·59 per 100 thousand habitants in 2011, which was the highest index since 2007.\textsuperscript{9}

The main measure to control this endemic during the last three decades has been the implementation of multidrug therapy (MDT/WHO, 1982) which resulted in a cure on these patients.\textsuperscript{10} The actual criteria of therapeutic regularity to provide discharge by cure does not consider the installed sequels or occurrence of reactional episodes after discharge.\textsuperscript{11} In order to ensure the principle of integrality (comprehensiveness) of health care, for people affected by leprosy, proposed in the areas of Basic Assistance and Family Health (Programs) is important to consider and provide assistance for reactional events that may occur after the patient has been discharged following multidrug therapy, not only at the diagnostic moment, but also during the treatment of MDT, in a perspective of continuation of care.\textsuperscript{2,12}

The millenary stigma involved with this illness has a huge impact on the physical, psychological and social-economic welfare of the patient and mainly occurs due to the possibility of the patient developing a physical disability and/or deformity.\textsuperscript{13,14}

This study aims to describe a general frequency of physical disability and social participation in those people who were affected by leprosy after the discharge period of (MDT/WHO), in the city council of Nova Iguaçu/RJ and to study analytical features between physical disability, social participation and socio-demographic and clinical variables.

Materials and Methods

A cross-sectional and observational study was performed in Nova Iguaçu city council, located in Rio de Janeiro, Brazil. This city council, which covers an area of 558 km\textsuperscript{2} and contains a population of 865,089 inhabitants, was one of the first city councils to implement MDT/WHO to treat patients with leprosy in Rio de Janeiro State.\textsuperscript{9}

The inclusion criteria were the following: patients who were leprosy discharged by cure in the period from January 1997 to December 2006 in Nova Iguaçu city council; patients who had physical disability evaluated during the discharge; patients considered as new case
according to the evaluation sheet of SINAN (National Notifiable Diseases Information System); and those who were older than eighteen years old (regardless of gender).

In other hand, patients who had received another type of treatment (monotherapy, alternative treatment with Rifampicin, Ofloxacin, and Minocycline), people who also suffer from other neurological incapacitating, trauma-orthopaedic, and rheumatologic diseases, those mentally incapable of answering the questionnaires and those who did not signed the term of agreement by their own choice were excluded of the study.

The sample size was determined by the estimated proportion of physical disability in the amount of 23%,\(^2,7\) calculation based on the precision of the estimate (width of the 95\%CI) of \(\pm 5\%\); significance level was established as 5\% among the 1080 patients finally a total sample of 225 patients. Patients were randomly selected by computer-generated random numbers.

The patients were selected from SINAN’S database, through a contact established with the Municipal Secretaria of Nova Iguacu. Each patient was contacted by telephone and invited to attend unit reference municipal health in order to discuss the research and evaluations anticipated by the study, which were performed from January 2010 to December 2011. Those patients who could not attend were evaluated at home. The home visits occurred from Monday to Sunday according to the availability of the patient.

Those who could not be located for any reason received another home visit, making a total of three visits. If they were not located after this, they were excluded from the sample and replaced immediately, so that the study could be completed.

The evaluation of each patient was done by the main researcher (LED) and assistant researchers under the supervision of the main researcher. It is important to point out that the assistant researchers were undergraduate students with scholarships.

The disability was evaluated by the “degree of physical disability” (DPI/WHO) and by the Eyes-Hand-Foot (EHF) score. The DPI, measured by simplified neurological evaluation and preconized by the Health Ministry, evaluates eyes, hands and feet. It uses a scale with three possible results (0, 1, and 2) and the EHF is the result of the total of the degree in eyes, hands and feet, varying from 0 (no disability) to a maximum of 12 points. The last element is more operationally-sensitive and useful during the monitoring and evaluation of disabilities.\(^15\)

The Scale of Participation, version 4.6, was the instrument used to measure the social participation, the domains for which can be found in the International Classification of Functioning, Disability and Health Domains (ICF). It is a validated questionnaire comprised of 18 items that quantify the patient’s restrictions of experienced participation affected by leprosy and other disability illness. The score varies from 0 to 90. The cut-off point to establish the presence of social restriction is 12 points. The classification of social restriction considers from 13 to 22 as slight restriction, from 23 to 32 as moderate restriction, from 33 to 52 as serious restriction and from 53 to 90 as extreme restriction.\(^3,16\)

The statistical analysis used the SPSS program version 18.0 (SPSS Inc., Chicago, II). To study the associations, univariate and multivariate association measures were used, with odds ratio (OR) confidence intervals of 95\% and statistical significance at \(p < 0.05\).

The variable degree of disability was categorised as “presence of disability” (corresponding to individuals who, at the time of interview, had physical disabilities rated 1 and 2) and “no disability” (individuals who had disability grade 0).The variable score of participation was categorised in “restriction presence” (corresponding to individuals who showed score PAR slight, moderate, serious and extreme) and the “restriction absence” (corresponding to individuals who showed PAR without restriction).
The study investigated an exploratory association between: (i) physical disability as an outcome and socio-demographic and clinical; (ii) the association between social participation restriction as an outcome and socio-demographic, clinical and disability.

We used multivariate logistic regression to assess the simultaneous influence of socio-demographic and clinical variables on disability and social participation. The explanatory variables for the model were the initial bivariate analysis, which was referenced as follows: gender male; age 18–64 years; race white (black + brown); schooling to the high school/University Course; clinical form indeterminate (tuberculosis + borderline dimorphous + virchowiano); therapeutic scheme paucibacillary; occupation active; physical disability degree absence and social participation no restriction. The process of variables selection was the “stepwise forward” at the level of 5%.

The study was approved by the Ethics Research Committee of the University Hospital Clementino Fraga Filho (ERB/UHCFF), located at the Federal University of Rio de Janeiro, with the register number of 160/09.

Table 1. Characterization in respect to social restriction

<table>
<thead>
<tr>
<th>Characterization in respect to social restriction</th>
<th>N (225)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No restriction</td>
<td>169</td>
<td>75·1</td>
</tr>
<tr>
<td>Slight restriction</td>
<td>24</td>
<td>10·7</td>
</tr>
<tr>
<td>Moderate restriction</td>
<td>13</td>
<td>5·8</td>
</tr>
<tr>
<td>Serious restriction</td>
<td>17</td>
<td>7·6</td>
</tr>
<tr>
<td>Severe restriction</td>
<td>2</td>
<td>0·9</td>
</tr>
</tbody>
</table>

No restriction (0–12); Slight (13–22); Moderate (23–32); Serious (33–52); Severe (53–90).

The study investigated an exploratory association between: (i) physical disability as an outcome and socio-demographic and clinical; (ii) the association between social participation restriction as an outcome and socio-demographic, clinical and disability.

We used multivariate logistic regression to assess the simultaneous influence of socio-demographic and clinical variables on disability and social participation. The explanatory variables for the model were the initial bivariate analysis, which was referenced as follows: gender male; age 18–64 years; race white (black + brown); schooling to the high school/University Course; clinical form indeterminate (tuberculosis + borderline dimorphous + virchowiano); therapeutic scheme paucibacillary; occupation active; physical disability degree absence and social participation no restriction. The process of variables selection was the “stepwise forward” at the level of 5%.

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Table 2. Association between Physical disability (presence or absence) with socio-demographic and clinical variables. Results of univariate analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Presence of Disability (n = 137)</th>
<th>Absence of Disability (n = 88)</th>
<th>OR</th>
<th>CI</th>
<th>P valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>67  67·0</td>
<td>33   33·0</td>
<td>1·59</td>
<td>0·92–2·75</td>
</tr>
<tr>
<td></td>
<td>Female*</td>
<td>70  56·0</td>
<td>55   44·0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>18–64*</td>
<td>83  65·7</td>
<td>66   44·3</td>
<td>0·026</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;64</td>
<td>54  71·1</td>
<td>22   28·9</td>
<td>1·95</td>
<td>1·08–3·52</td>
</tr>
<tr>
<td>Formal Education</td>
<td>Elementary Education</td>
<td>33  68·8</td>
<td>15   31·2</td>
<td>3·83</td>
<td>1·42–10·39</td>
</tr>
<tr>
<td></td>
<td>High School</td>
<td>63  63·6</td>
<td>36   36·4</td>
<td>2·87</td>
<td>1·23–6·81</td>
</tr>
<tr>
<td></td>
<td>High School/University Course*</td>
<td>14  37·8</td>
<td>23   62·2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>Paucibacillary*</td>
<td>39  39·0</td>
<td>61   61·0</td>
<td></td>
<td>&lt;0·001</td>
</tr>
<tr>
<td></td>
<td>Multibacillary</td>
<td>98  78·4</td>
<td>27   21·6</td>
<td>5·67</td>
<td>3·16–10·19</td>
</tr>
<tr>
<td>Occupation</td>
<td>Active*</td>
<td>74  58·3</td>
<td>53   41·7</td>
<td>1·28</td>
<td>0·74–2·21</td>
</tr>
<tr>
<td></td>
<td>Inactive</td>
<td>63  64·3</td>
<td>35   35·7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

aChi-squared or Fisher Exact tests; OR: Odds ratio; CI: 95% Confidence interval *Used as reference to risk comparison.
In the period studied from January 1997 to December 2006 in Nova Iguacu city council 2179 cases of leprosy were diagnosed and were leprosy discharged by cure in. Among these, 1080 patients fit the inclusion criteria. From this pull of patients only a sample of 225 patients (this number was estimated from a proportion of physical disability in the amount of 23% supported by the literature reviewed) were randomly selected and were evaluated. During the study, 66 patients were substituted by other patients for the following reasons: 14 patient’s addresses were not found, 27 patient’s address had changed to other cities and/or states, 18 patients had passed away, 2 patients did not want to participate in the study, 1 case of relapse, and 4 exclusions because of physical condition (1 cerebral vascular accident and amputated lower limb, 1 medullar syndrome, 1 Alzheimer disease, 1 bilaterally blind).

### Table 3. Association between social participation (presence or absence) with socio-demographic and clinical variables. Results of univariate analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Presence of restriction (n = 56)</th>
<th>Absence of restriction (n = 169)</th>
<th>OR</th>
<th>CI</th>
<th>p value&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>27</td>
<td>73</td>
<td>1·22</td>
<td>0·66–2·24</td>
<td>0·512</td>
</tr>
<tr>
<td></td>
<td>Female*</td>
<td>96</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>18–64*</td>
<td>37</td>
<td>112</td>
<td></td>
<td></td>
<td>0·978</td>
</tr>
<tr>
<td></td>
<td>&gt; 64</td>
<td>19</td>
<td>57</td>
<td>1·00</td>
<td>0·53–1·91</td>
<td>0·312</td>
</tr>
<tr>
<td>Formal Education</td>
<td>Elementary Education</td>
<td>16</td>
<td>32</td>
<td>2·14</td>
<td>0·77–5·93</td>
<td>0·312</td>
</tr>
<tr>
<td></td>
<td>High School</td>
<td>25</td>
<td>74</td>
<td>1·44</td>
<td>0·76–5·44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High School/ University Course*</td>
<td>7</td>
<td>18·9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>Paucibacillary*</td>
<td>17</td>
<td>83</td>
<td></td>
<td></td>
<td>0·014</td>
</tr>
<tr>
<td></td>
<td>Multibacillary</td>
<td>39</td>
<td>86</td>
<td>2·21</td>
<td>1·16–4·21</td>
<td>0·262</td>
</tr>
<tr>
<td>Occupation</td>
<td>Active*</td>
<td>28</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inactive</td>
<td>28</td>
<td>70</td>
<td>1·41</td>
<td>0·77–2·59</td>
<td>&lt;0·001</td>
</tr>
<tr>
<td>Physical Disability</td>
<td>Absence*</td>
<td>8</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presence</td>
<td>48</td>
<td>89</td>
<td>5·39</td>
<td>2·40–12·08</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Chi-squared or Fisher Exact tests; OR: Odds ratio; CI: 95% Confidence interval
*Used as reference to risk comparison.

### Results

In the period studied from January 1997 to December 2006 in Nova Iguacu city council 2179 cases of leprosy were diagnosed and were leprosy discharged by cure in. Among these, 1080 patients fit the inclusion criteria. From this pull of patients only a sample of 225 patients (this number was estimated from a proportion of physical disability in the amount of 23% supported by the literature reviewed) were randomly selected and were evaluated. During the study, 66 patients were substituted by other patients for the following reasons: 14 patient’s addresses were not found, 27 patient’s address had changed to other cities and/or states, 18 patients had passed away, 2 patients did not want to participate in the study, 1 case of relapse, and 4 exclusions because of physical condition (1 cerebral vascular accident and amputated lower limb, 1 medullar syndrome, 1 Alzheimer disease, 1 bilaterally blind).

### Table 4. Association between physical disability and socio-demographic, clinical and social participation variables. Final model in multivariate analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>CI</th>
<th>p value&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multibacillary treatment</td>
<td>5·03</td>
<td>2·73–9·31</td>
<td>&lt;0·001</td>
</tr>
</tbody>
</table>

OR: Odds ratio; CI: 95% Confidence interval
The study sample included patients with ages from 18 to 101 years old, showing an age rate of 56·12 years old (± 17·34 years old), with an average of 57 years. Of these, 55·6% (125) were female, 39·9% (91) had graduated from high school and 66 (28·9%) were Caucasian. Among the participants who had a formal job, 78 (34·7%) were service workers, sales assistants, and belonged to group 5, according to Brazilian classification of occupation. Among the evaluated patients, 42·9% (98) were inactive employees during the interview period, including housewives (56), unemployed (13), and retired (29).

The most predominant clinical form was the dimorphous (borderline) 40·4% (91) and 55·3% (125) showed multibacillary form. Regarding neural damage, the tibial nerve most frequently affected, with 58·7% (132) of affected people.

On the subject of the physical disability (DPI/WHO), 48% were classified as grade 1 and 12·9% as grade 2, which totalled 60·9% of disabled people. Of the interviewees, 24·9% had some degree of restriction (as shown in Table 1), with the median the participation scale of 5 (the PS score ranged from 0 to 57 points).

Table 2 shows the relation between socio-demographic and clinical-epidemiologic variables with physical disability. It was possible to observe that the group with presence of disability was associated with >64 years (OR = 1·95; CI = 1·08–3·52 and \( p = 0·026 \)), education up to primary school (OR = 3·09; CI = 1·56–6·52 and \( p < 0·002 \)) and multibacillary treatment (OR = 5·67; CI = 3·16–10·19 and \( p < 0·001 \)) significantly higher than the group with no disability. There was no significant association at the 5% level in the other variables between the groups with and without physical disability.

Table 3 shows the relation between the socio-demographic and clinical-epidemiologic variables with social restriction. It was observed that the group with presence of restriction showed multibacillary treatment (OR = 2·21; CI = 1·16–4·21 and \( p = 0·014 \)), and presence of disability (OR = 5·39; CI = 2·40–12·80 and \( p < 0·001 \)) that were considerably higher than the group with no restriction.

In the final model of the multivariate analysis, with regard to having a physical disability, outcomes included only multibacillary treatment (OR = 5·03; CI = 2·73–9·31 and \( p < 0·001 \)) was independent predictor variable (Table 4).

In the final model of the multivariate analysis, with a social restriction outcome included, only the degree of disability 1 (OR = 4·02; CI = 1·74–9·30 and \( p = 0·001 \)) and the degree of disability 2 (OR = 14·17; CI = 5·02–39·94 and \( p < 0·001 \)) were independent predictors (Table 5).

**Table 5.** Association between social restriction and socio-demographic, clinical and social participation variables. Final model in multivariate analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>CI</th>
<th>( p ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>4·02</td>
<td>1·74–9·30</td>
<td>0·001</td>
</tr>
<tr>
<td>Grade 2</td>
<td>14·167</td>
<td>5·02–39·94</td>
<td>&lt;0·001</td>
</tr>
</tbody>
</table>

OR: Odds ratio; CI: 95% Confidence interval
In this study, two-thirds (60.9%) of patients had some degree of physical disability and a quarter (24.9%) had social restriction after an average of 7.5 years after treatment. The variables multibacillary treatment regimens and social participation moderate/large/extreme were associated with physical disability, while the presence of physical disability (grades 1 and 2) was associated with social participation.

Studies in Brazil have evaluated the degree of disability and social restriction after discontinuation of multidrug therapy. In the study by Nardi et al., 32% of individuals had some degree of disability and 35.4% had some social restriction; Barbosa reported levels of 40.6% and 7.2%, respectively. In the present study, these percentages were higher for physical disability, as 48% were grade 1 and 12.9% grade 2. Our results suggest that a late diagnosis of leprosy associated with inadequate follow-up of patients after MDT may have occurred in the sample.

About 30% of people affected by leprosy may have leprosy reactions, including discharge by cure after the MDT. The multibacillary disease is a known risk factor for impairment. If neural function is normal during the diagnosis (grade 0), there is a 16% chance that the patient will present reactive episodes during the MDT. In cases of previous neural damage in MB patients, this percentage increases to 65%.

According to the International Classification of Functioning, Disability and Health domains (ICF), disability is a terminology that concerns impairment, limitations of activity or restriction of participation. One of its dimensions is social participation, which is the involvement in life situations, including areas such as education and applying knowledge, communication, mobility, self-care, domestic life, interpersonal interactions, social and civic life and major life areas. In the context of leprosy, restriction of social participation is often caused by stigmatising attitudes that have been associated with the disease during decades and the self-stigmatisation of the patient about his own condition.

The restrictions in the workplace represent one of the major problems related to participation suffered by patients with leprosy. In respect to social restriction domains reported in ICF and contained in the Participation Scale, Barbosa reports that work and economic contribution domains related to home were the most frequent problems with his outpatients. The present study highlights the fact that the main problems faced by the patients were work and mobility domains, as published by Lesshafft in 2010.

The limitation of activities caused by physical disability prevents certain types of efforts, and frequently makes the employee search for occupations that do not require intense strength and repetition, in order to avoid the worsening of his condition. Marriage problems, social interaction difficulties and loss of respect within society also affect those people who feel shame, depression, anxiety and isolation in society, in some cases interfering in adherence to treatment. The self-care group may already constitute increased social participation for some people.

The millenary stigma involved with the disease has a huge impact on physical well-being, psychological and socioeconomic status of patients and occurs mainly due to a fear of contagion, and the possibility of developing some physical disability and/or deformity. Generally, it comes with other stigmatised conditions such as poverty and low level of education. As a result, it is highly recommended in some endemic countries that rehabilitation programs be established in communities, based on interventions realised by local supervisors (usually volunteers from the community) for people with physical disabilities aiming to increase their mobility, autonomy, optimising their confidence and,
consequently their social reintegration. These interventions involve the persons with disabilities being based on home visits to help with the training of daily activities, encouragement for social reintegration of children in schools, social-economic rehabilitation with guidance in finding remunerated activities, and when necessary, performing vocational training as well as self-care groups aiming at a greater risk awareness of disabled people.

Former patients who have been discharged from treatment may have a variety of problems, such as self-care issues and disability prevention, as well as the occurrence of late leprosy reactions. The traditional model of health care based on disease presents fragilities and discontinued assistance, with many patients showing a worsening during the period after discharge from MDT in relation to physical disabilities, without any systematic monitoring in Health Care Service. Thus, in the context of the improvement of quality life of these patients it is essential to emphasise the interdisciplinary work for teams during and after the specific MDT treatment period.

The results of this study suggest the need for decentralisation of leprosy control units with reference to municipal units of the Family Health Strategy, with training of health staff aimed at disability prevention and follow-up of these patients after discharge. In addition, further studies are needed, particularly with qualitative methodologies, to understand deeper aspects of social restriction in these patients in our country.

The limitations of this study can be highlighted, such as the absence of an approach in individuals who were under 18 years old. Operational difficulties regarding the location of some addresses of patients were noted during the course of the visits. It was not possible to assess the quality and reliability of the data collected by the SINAN. Additionally, the evaluators received theoretical and practical training by the principal investigator, which minimised errors in measurement evaluations. There was no sample size calculation to study social participation due to the huge variability in the percentages of the two major national studies on this theme.

Conclusion

In the patients studied, a high frequency of disability and social restriction was observed after a long period after the end of the standard treatment. In addition, physical disability was found to be intrinsically associated with social restriction. These results suggest that there may have been a delayed diagnosis of leprosy or inadequate patient follow-up after discharge. As a result, the importance of systematic monitoring and determination of criteria for the follow-up of these patients is highlighted. The results also suggest the need for decentralisation of leprosy control units with reference to municipal units of the Family Health Strategy aimed at greater comprehensiveness of health care.

Acknowledgements

The authors would like to thank: the Municipal Secretaria of Nova Iguacu, specially the municipal coordinator of leprosy Ana Maria Fernandes Nascimento, who provided a place to evaluate patients and access SINAN database; undergraduate students for their participation collecting data; Professor Ronnir Raggio and Rosangela Noé for giving support with statistical analysis; and Anielle Silva and Mariana Schwantes for working on the English version. The authors declare that there is no conflict of interests.
Contributorship

Luiz Eduardo de Castro – took part in stages of drawing, conducting, evaluation, data interpretation, final version preparation and revision.

Antonio José Ledo Alves – data interpretation, final version preparation and revision.

Ana Paula Fontana – data interpretation, final version preparation and revision.

Vera Lucia Rabello de Castro Halfoun – data interpretation, final version preparation and revision.

Maria Kátia Gomes – took part in stages of drawing, conducting and data interpretation, final version preparation and revision.

References


