

# Epilepsy and occupational accidents in Brazil

## A national statistics study

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### ABSTRACT

Epilepsy may restrict the patient's daily life. It causes lower quality of life and increased risk for work-related accidents (WRA). The aim of this study is to analyze the implantation of the Epidemiologic and Technical Security System Nexus (ETSSN) and WRA patterns among patients with epilepsy. Data regarding WRA, between 1999 and 2008, on the historical database of WRA Infolog Statistical Yearbook from Brazilian Ministry of Social Security were reviewed. There was a significant increase of reported cases during the ten year period, mainly after the establishment of the ETSSN. The increased granted benefits evidenced the epidemiologic association between epilepsy and WRA. ETSSN possibly raised the registration of occupational accidents and granted benefits. However, the real number of WRA may remain underestimated due to informal economy and house workers' accidents which are usually not included in the official statistics in Brazil.

**Key words:** epilepsy, occupational accidents, Epidemiologic and Technical Security System Nexus.

### Epilepsia e acidentes de trabalho no Brasil: um estudo das estatísticas nacionais

### RESUMO

A epilepsia pode restringir o cotidiano do paciente, levando a comprometimento da qualidade de vida e risco aumentado de sofrer acidentes. O objetivo deste trabalho é analisar o impacto do Nexo Técnico Epidemiológico Previdenciário (NTEP) sobre os acidentes de trabalho envolvendo pacientes com epilepsia. Pesquisando as estatísticas de acidentes de trabalho, ocorridos entre 1999 a 2008, na Base de Dados Históricas do Anuário Estatístico de Acidentes de Trabalho do Ministério da Previdência Social, observou-se aumento no número de acidentes de trabalho neste período de dez anos. Houve um aumento significativo no número de casos registrados, intensificado após a instituição do NTEP. O aumento de benefícios concedidos pela Previdência Social possivelmente se deve à aceitação do vínculo entre epilepsia e acidentes de trabalho sem necessidade de demonstração individualizada. Entretanto, grande parte dos acidentes pode não constar das estatísticas por acontecer na economia informal ou entre trabalhadores domésticos. **Palavras-chave:** epilepsia, acidentes de trabalho, Nexo Técnico Epidemiológico Previdenciário.

Epilepsy is a chronic disorder that impairs quality of life and inflicts large expenditures over a nation's health care budget<sup>1</sup>. Epilepsy, due to its seizures and

chronicity, is a condition which alters individual's life both physical and emotionally. It is a stigmatizing condition and usually restricts the patient's daily activities,

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interfering in school, family, leisure and work<sup>2</sup>, where patients with epilepsy (PWE) are overprotected or rejected<sup>3</sup>.

Work has always been associated with psychosocial adjustment, including the construction of the individual's identity, since it provides the sense of being useful and valuable to the society<sup>4</sup>.

If, on one hand, working is a source of physical and mental health - often denied to PWE<sup>5-7</sup> - on the other hand, it is also a source of diseases. It is not uncommon that professional activities may cause epilepsy: either by direct<sup>8,9</sup> and indirect aggression to the brain<sup>10</sup>, or by triggering epileptic seizures<sup>11</sup>. Brazil, meanwhile, is facing a shortage of investigations concerning PWE and their interface with work. Even in international level, there is insufficient information about how many PWE on productive age are unemployed<sup>8,12</sup>.

According to the Ministry of Social Security (MSS)<sup>13</sup>, work-related accidents (WRA) are classified into four groups: typical accidents with Workplace Accident Communication (WAC), causing body injury or functional disorder leading to death, permanent or temporary loss or reduction of labor capability; route accidents with WAC; occupational diseases and accidents without WAC.

Since April 2007, the National Social Security Institute (NSSI) has adopted a new system for granting benefits. Resolution No. 1,236/2004 from National Council of Welfare (NCW) has approved the methodology, allied to WAC, in order to minimize the underreporting of WRA and occupational diseases. Comparing statistical and epidemiological studies to the code of the International Classification of Diseases (ICD-10) and the National Classification of Economic Activities (NCEA), it was created a matrix of association among injuries, dis-

eases and health conditions with activities undertaken by any worker. This matrix was named as Epidemiologic and Technical Security System Nexus (ETSSN)<sup>14</sup>.

The aim of this study is to analyze the implantation of the ETSSN and WRA patterns among patients with epilepsy.

## METHOD

To estimate the number of WRA among PWE and analyze possible changes after the establishment of ETSSN, we reviewed the historical database on Work-Related Accidents Infolog Statistical Yearbook (WRASY)<sup>15</sup> from the MSS, which provides statistics of accidents occurred from 1999 to 2008. The search was performed according to the International Classification of Diseases (ICD-10: G40=Epilepsy), depicting the number and type (with or without WAC, typical or route) of accidents that occurred during this period. Data management and statistical analysis were performed using SPSS for Windows 17.0 Standard Version (SPSS Inc., Chicago, IL, USA) software. Bivariate correlation of WRA were evaluated by Pearson's correlation coefficient that was considered significant at the  $p < 0.01$  value. A linear regression model was fitted using the least squares approach, data points with large residuals and outliers, were analysed by Z-Score and Cook's distance ( $D_i > 1$ ).

## RESULTS

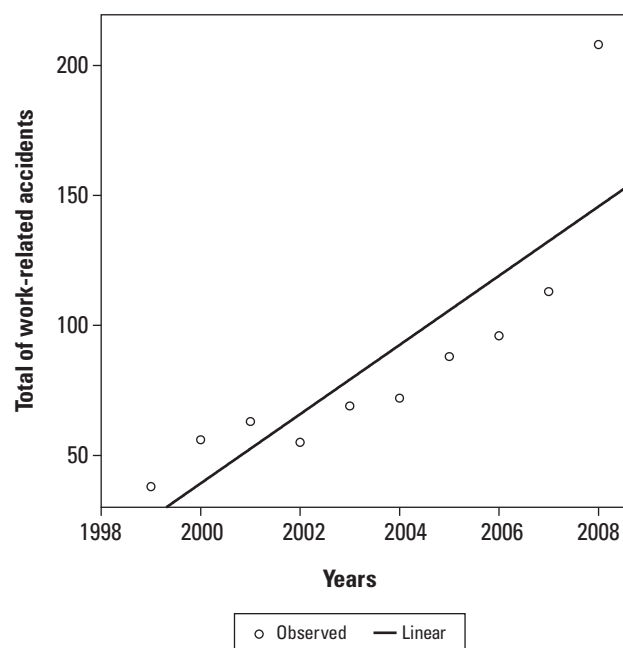
Analysing the WRASY Infolog database from the MSS, there was an increasing trend in the number of reported accidents over the period of ten years (Table). A mathematical model for predicting this tendency was obtained by linear regression (Fig 1).

The linear regression equation may be represented by  $y = 13.309 (\pm 3.085)x + 26.578 (\pm 6181.222)$  and its Pear-

**Table.** Number of accidents suffered by PWE between 1999 and 2008. Adapted from the Work-Related Accidents Infolog Statistical Yearbook (WRASY) of the Ministry of Social Security<sup>19</sup>.

Year	Typical with WAC	Route with WAC	Occupational disease	Without WAC	Total
1999	30	3	5	0	38
2000	44	7	5	0	56
2001	51	8	4	0	63
2002	40	8	7	0	55
2003	47	16	6	0	69
2004	42	17	13	0	72
2005	54	16	18	0	88
2006	59	12	25	0	96
2007	44	14	16	39	113
2008	48	2	4	154	208
Total	459	103	103	193	858

WAC: work place accident communication.



**Fig 1.** Linear regression of work-related accidents involving PWE in Brazil between 1999 and 2008.

son's coefficient  $r=0.836$  ( $p=0.003$ ). For year 2008, Z-Score was  $Z=2.22$  and Cook's distance was  $D_i=1.99$ .

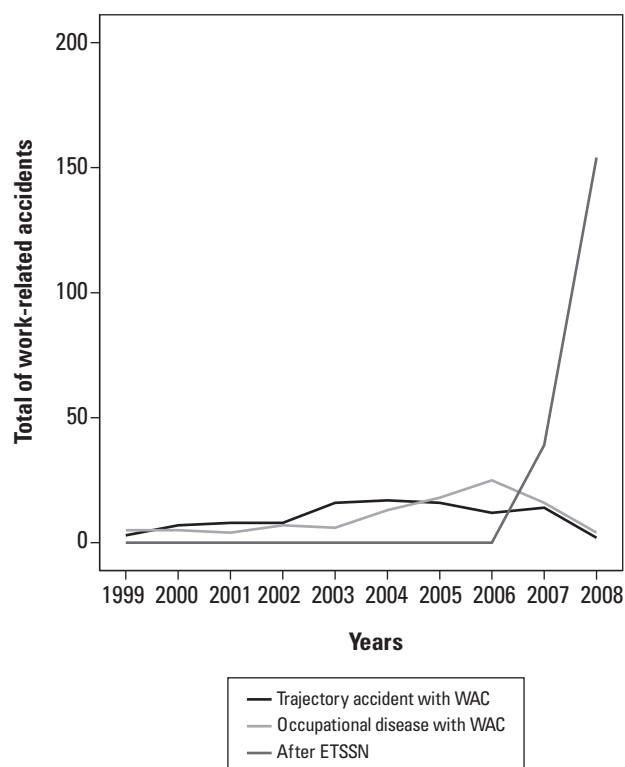
The Pearson's correlations concerning WRA "occupational diseases with WAC", "route accidents with WAC" and "notifications without WAC", after ETSSN, demonstrated a perfect negative correlation of  $r= -1$  (Fig 2).

Epilepsy was responsible for an elevated number of work-related accidents and its consequent provision of associated benefits, totalizing 858 records over the analyzed period of ten years.

## DISCUSSION

At the second year after the adoption of a simplified system for identification and characterization of WRA - ETSSN - the number of accidents without WAC (154) represented 74% from the total registered accidents involving PWE. The WRA categorized "occupational diseases with WAC" and "route accidents with WAC" were negatively correlated ( $r= -1$ ) with the category "accidents without WAC", after the ETSSN implementation. This situation evidenced the fact that notifications without WAC comprised the cases that were previously reported in other categories.

The total reported cases, during the ten years period could be represented by a linear regression model, which was significantly correlated ( $r=0.836$ ;  $p=0.003$ ). The second year of ETSSN implementation, 2008, was considered an outlier because  $Z=2.22$  is a high Z-Score and as demonstrated by Cook's distance,  $D_i=1.99$ , had high influence over the model. These findings might in-



**Fig 2.** Negative correlation between "work-related occupational diseases with WAC", "route accidents with WAC" and "notifications without WAC", after ETSSN.

dicating changes regarding the previous years' patterns and might indicate a transition period for granting benefits to workers with epilepsy. However, MSS had records solely of the first two years after ETSSN implementation, which prevented further analysis of this new pattern of benefit granting.

The considerable increase in benefits granted by the MSS may be due to the recognition of the link between epilepsy and WRA without the need for individualized proof, according to ETSSN. Therefore, many PWE may currently claim their right for assistance and WRA benefits. Unfortunately, the statistics provided by the MSS do not specify professions, gender and specific conditions under which the WRA occurred, precluding further analysis of the sample. Moreover, there is not any information about the number of PWE which are employed and how many are working informally.

In the study of Borges and Pissolati<sup>16</sup> on employability of 81 PWE, 21 (25.9%) were unemployed, 23 (28.4%) were unpaid workers and 8 (9.9%) worked in the informal economy. This finding demonstrates that a large percentage of WRA with PWE are not included under official statistics since house workers and voluntarily individual contributors are not covered by the NSSI and not entitled to receive its benefits. Therefore, we may

infer that even with the increased reporting of accidents resulting from the establishment of ETSSN, these figures remain underestimated and many workers remain without any benefit at all.

Employees with epilepsy represent an important contingent of insured people under social security benefits, such as those with working illness and working disability benefit<sup>16</sup>. In an outpatient unit for neurological evaluation of patients' labor capacities for the NSSL, the group of PWE was the most numerous with medical complaints related to the nervous system<sup>17</sup>. Although MSS ensures a range of income replacement benefits for epileptic employees with working disabilities, it is also important to provide vocational rehabilitation, resource often rejected by workers<sup>13</sup>.

Thus, it is necessary a social welfare approach to these individuals. People with epilepsy have the ability to work, as long as their occupation is appropriate and does not offer risky situations. In addition to adequate control of seizures and treatment of psychiatric comorbidities, higher levels of education and professional qualification would prevent the large number of WRA and increase their participation and return to formal labor market.

Work-related accidents and professional success of PWE depend on many factors, from seizure control and comorbidities to their schooling. The advent of the ETSSN by MSS has increased the number of registered WRA and granted benefits. However, a large percentage of accidents are not included in the official statistics, since they are associated to informal economy or domestic workers. PWE should receive incentives to develop professional skills through educational and vocational measures. The termination of welfare benefits and

vocational rehabilitation, when necessary, encourage the patient to exercise their professional activity and reintegration into society.

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