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ORIGINAL ARTICLE

Profile of pediatric pacients hospitalized for neurologic disorders

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Abstract

Objective: This study aimed to gather clinical and demographic information from pediatric patients hospitalized for neurological disorders and individuals diagnosed with neurological conditions admitted to the Teaching Hospital of the University of Brasília for adverse neurological events. **Method:** This retrospective descriptive observational study was carried out at the Teaching Hospital of the University of Brasília (HUB) and included the data of inpatients seen from January 2015 to May 2018. The Ethics Committee of the Brasília Teaching Hospital approved the study design. **Results:** Epileptic seizures ranked atop all causes of hospitalization at HUB. Most of the individuals hospitalized for neurological disorders were aged ≥ 1 and < 5 years. On average, our patients were hospitalized for a long period of time, which increases the risk for hospital-acquired infection. After discharge, half of the patients remained on outpatient care at HUB. **Conclusion:** The data collected in this study may provide input to the development of preventative health measures and encourage discussions on the actual need to hospitalize pediatric patients in order to ensure improved care to this population.

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INTRODUCTION

Pediatric patients suffering from neurological disorders are more frequently admitted to intensive care units, present higher death rates, and require more intensive level care compared with children admitted for other conditions. The complexities of providing care to children with neurological disorders are also reflected in the disproportionate number of individuals fitting this description admitted to pediatric hospitals, longer duration of hospitalization, and higher care costs.[1] These factors speak to the relevance of looking more carefully at this group of patients.

Seizures may be triggered by a wide array of events and rank atop all causes of hospitalization of children with neurological disorders.[1] As a result of the single most common neurological disorder to affect the pediatric population, 4-10% of children will seize at least once by the age of 16. The most frequent etiologies vary geographically, with febrile seizures taking the lead in tropical countries.[2]

The purpose of collecting information on this patient population is to enhance current knowledge and delineate a profile of hospitalized children and adolescents and the most common neurological conditions affecting them. The data collected may serve as input in the development of healthcare programs and aid in the definition of priorities in pediatric care.[3]

This study aimed to gather clinical and demographic information from pediatric patients hospitalized for neurological disorders and individuals diagnosed with neurological conditions admitted to the Teaching Hospital of the University of Brasília - a participating hospital in the Brazilian Public Healthcare System - for adverse neurological events. Information on the causes of hospitalization and referral to outpatient care at the same hospital were also included.

METHOD

This retrospective descriptive observational study was carried out at the Teaching Hospital of the University of Brasília (HUB) and included the data of inpatients seen from January 2015 to May 2018. The Ethics Committee of the Brasília Teaching Hospital approved the study design (CEP/CONEP certificate no. 1.453.723).

The study was originally designed to include only indigenous inpatients. However, the study population was expanded for the following reasons: a) the books containing the records of all pediatric inpatients prior to 2015 were missing; b) we were unable to find the list of pediatric inpatients in the archives at HUB; c) an insignificant number of indigenous children were hospitalized in the study period.

The next step involved collecting the names and records from the pediatric care and surgery registry of patients diagnosed with neurological disorders requiring hospitalization, individuals suffering from neurological manifestations during hospitalization regardless of underlying condition, and subjects diagnosed with neurological disease. Patient chart hardcopies and HUB statistics were also analyzed.

The study included all patients aged 0-18 years admitted to the pediatric ward at HUB for purposes of clinical examination and/or surgery. Patients with incomplete medical charts or missing information in their medical files were excluded. Only the most recent hospitalization of patients admitted more than once within the study period was considered in data analysis.

Collected demographic data included age, sex, and ethnicity/skin color. The following clinical data were collected: etiology of disease; length of hospitalization; number of hospitalizations; reason for hospitalization; and complications observed during hospitalization. Outpatient follow-up was assessed in terms of whether the patients were followed at HUB, how often, and whether they complied with prescribed therapy.

RESULTS

A total of 2867 pediatric patients were hospitalized, 2021 to undergo clinical examination and 846 for surgery. Sixty-seven were admitted for neurological disorders, of which three had surgery and 64 underwent clinical examination. Table 1 shows the incidence of neurological disorders per annum and throughout the study period.

Demographic Profile

Fifty-one percent of the pediatric patients included in the study were males. Their mean age was 4.84 years. In terms of age ranges at the time of hospitalization (Table 2), 14 patients were aged less than one year; 31 were aged ≥ 1 and < 5 years; 16 were aged ≥ 5 and < 13 years; and six were aged 13-18 years.

The medical charts contained a few inconsistencies and missing data in regard to ethnicity/skin color. The patients were categorized as follows: 58 had brown skin; 9 had white skin; one child came from a quilombola community; one child was of indigenous descent; and in the medical charts of five children the field concerning ethnicity/skin color was blank.

Table 1. Patient distribution - January 2015 to May 2018.

Year	Individuals admitted to the pediatrics outpatient ward (absolute numbers)	Individuals admitted to the pediatrics outpatient ward for neurological conditions for future hospitalization and individuals with neurological conditions admitted for adverse clinical events
2015 (Jan-Dec)	817	2.57% (21)
2016 (Jan-Dec)	724	3.03% (22)
2017 (Jan-Dec)	905	2.09% (19)
2018 (Jan-May)	421	1.18% (5)
Total	2867	2.3% (67)

Table 2. Patient distribution by age range

Age ranges	Individuals admitted to the pediatrics outpatient ward for neurological conditions for future hospitalization and individuals with neurological conditions admitted for adverse clinical events
Infants aged up to 11 months	20.89% (14)
Children aged 1-5 years	46.26% (31)
Children aged 5-12 years	23.88% (16)
Adolescents aged 13-18 years	8.95% (6)

Clinical Profile

Twenty-two individuals were hospitalized for convulsive seizures; 12 for genetic syndromes or congenital malformations; nine for infection; three to undergo surgery; four for behavioral disorders; two for neurovascular conditions; and 16 for miscellaneous reasons. Table 3 describes some of the reasons in more detail for each of the subgroups. The charts of 14 patients excluded from the study were incomplete or missing.

The patients included in the study were hospitalized twice on average within the study period, and 49.21% had not been hospitalized before. The mean length of hospitalization was eight days (8.30).

Seventeen patients (25.37%) had sequelae and/or complications after hospitalization. The complications included need to use home oxygen therapy; frequent mild spasms; atypical gait; hospital-acquired pneumonia; and death. One infant in the group of 67 individuals hospitalized for neurological disorders diagnosed with Steinert disease (a.k.a. myotonic dystrophy type 1) died at the age of four months and 29 days.

In the group of 67 patients, 38 were followed at the pediatric neurology ward, one at the psychiatry ward, and 28 were not followed at HUB. Sixteen of the patients followed at HUB (42.1%) belonged to the group of individuals hospitalized for epileptic seizures. Five patients were lost to follow-up. The mean time between medical appointments in the group of patients with complete medical charts was 3.91 months. Data derived from follow-up visit notes indicated that 11.42% of the patients did not fully comply with prescribed therapy for miscellaneous reasons.

DISCUSSION/CONCLUSION

Having a clearer understanding of the reasons why children and adolescents with neurological disorders are hospitalized may help to develop healthcare plans to prevent the exacerbation of disease and decrease the need for hospitalization.[3]

The proportion of patients with neurological disorders observed in our series was similar to the percentages cited in the dissertation thesis published by Ferrer APS[4], in which the following stood out as the most commonly identified conditions leading to hospitalization: respiratory system diseases (38%); infectious and parasitic diseases (21%); perinatal-onset conditions (10%); digestive system diseases (6%); and external causes (5%). Similarly to our series, neurological conditions accounted for approximately 2% of all hospitalizations in this study. Our series, however, included central nervous system infections, a group of conditions analyzed separately by Ferrer APS, indicating that hospitalizations for neurological disorders were underestimated in our study.

The HUB is a tertiary referral hospital without a Neurology or Neurosurgery Residency, and with a recently opened Pediatric Neurology Residency program. And in the Federal District there are two referral hospitals for neurological conditions, the IHBDF - equipped with a Neurocardiology Service - and the HMIB - a maternity/pediatric hospital. The two hospitals combined absorb a significant portion of complex neurological emergencies channeled through the public healthcare system. Besides, the HUB is not equipped with a pediatric intensive care unit, a fact that despite the existence of a neonatal ICU at the hospital speaks of its limitations in pediatric neurology care. Since patients with neurological disorders are more likely to need referral to an ICU and many require surgery, they tend not to be sent to the HUB.

The information on the medical charts about ethnicity/skin color was not as useful as we thought, since many failed to describe it in clear terms. Most of the patients were described as having brown skin, one as a person of indigenous descent, and another as a member of a quilombola community. Most of the individuals hospitalized for neurological disorders were aged ≥ 1 and < 5 years. The group least affected by neurological disorders was aged 13-18 years. A study carried out in the United States of America in 2015 found that incidence peaked among individuals aged 19-364 days and hit its lowest in the 10-18 year age range.[1]

In regard to sex, the proportions of girls and boys were quite similar. Other authors have described increased risk of morbidity from neurological disorders among boys regardless of gestational age and weight at birth.[5] Our study did not find an association between increased risk and male sex.

Shedding light on the main causes of hospitalization for neurological disorders - convulsive seizures, according to our study - may provide input to improve outpatient follow-up and management, and thus decrease the number of hospitalizations for these reasons. Epilepsy is the third most common neurological disorder in the general population[6] and an equally relevant condition in pediatric neurology. Some 4-10% of children will seize at least once, and the incidence of epilepsy in childhood is in the 1-2% range.[7] Epileptic seizures were the primary cause of hospitalization in our study, similarly to what has been described in previous publications.[1,2]

Miscellaneous reasons ranked second, followed by genetic syndromes and congenital malformations, and infection. Head trauma is a common cause of hospitalization, as shown

Table 3. Patient distribution in terms of reasons for hospital admission.

Category	Number	Proportion in relation to total	Examples of causes included in the groups
Convulsive seizures	22	32.8%	Epilepsy (complex tonic seizures) Febrile seizures Partial convulsive seizures
Genetic syndromes and congenital malformations	12	17.91%	Hydrocephalus Spina bifida West syndrome Steinert disease Leigh syndrome Ohtahara syndrome
Infection	8	13.47%	Meningitis Acute viral encephalitis Acute viral myositis Toxoplasmosis
Behavioral disorder	3	4.47%	Generalized anxiety disorder Conversion disorder
Surgery	3	4.47%	Ptosis repair Ventriculoperitoneal shunt Ventriculoperitoneal shunt blockage repair
Neurovascular conditions	2	2.98%	APS secondary to ELS Head trauma
Other	16	23.88%	

in a study conducted in the United States.[1] However, trauma patients are not referred to the HUB, since the hospital, albeit a tertiary referral center, does not have a trauma residency program or a trauma team.

The patients in our study stayed in hospital for eight days on average. A study performed in China reported long hospitalization periods (six days) for pediatric patients admitted on account of epileptic seizures with good prognoses. In 2017, patients stayed on average for three days in the pediatric ward, which is less than what our study found. Prolonged hospitalization increases the risk of patients developing hospital-acquired infection.[2] Therefore, length of hospitalization should be decreased whenever possible.

Approximately half of the patients were followed at HUB after discharge, and most complied with prescribed therapy. Outpatient follow-up care improves prognoses, prevents complications, and decreases the chances of hospitalization.

Hospitalization may jeopardize the psychological development of children in the cognitive and affective domains.[8] Therefore, preventing or decreasing the length of hospitalization, whenever possible, may be beneficial to patients in the long run and preclude neuropsychological impairment.

The data collected in this study may provide input to the development of preventative health measures and encourage discussions on the actual need to hospitalize pediatric patients in order to ensure improved care to this population.

To sum up with:

1) Epileptic seizures were the main cause of hospitalization among the individuals included in the study.

2) Most of the individuals hospitalized for neurological disorders were aged ≥ 1 and < 5 years.

3) On average, our patients were hospitalized for a long period of time, which increases the risk for hospital-acquired infection.

4) After discharge, half of the patients remained on outpatient care at HUB.

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