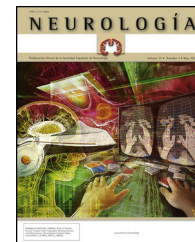




SOCIEDAD ESPAÑOLA  
DE NEUROLOGÍA

# NEUROLOGÍA

[www.elsevier.es/neurologia](http://www.elsevier.es/neurologia)



## ORIGINAL ARTICLE

### Has clinical activity in paediatric neurology changed in the past 11 years?☆



B. Martínez Menéndez\*, E. Escolar Escamilla, A. Pinel González, M. Cerezo García, F.J. Martínez Sarries, L. Morlán Gracia

Unidad de Neurología Pediátrica, Sección de Neurología, Hospital Universitario de Getafe, Getafe, Madrid, Spain

Received 29 June 2014; accepted 22 September 2014

Available online 27 October 2016

#### KEYWORDS

Medical care;  
Healthcare  
administration;  
Child neurology;  
Paediatric neurology;  
Neurodevelopment;  
ADHD

#### Abstract

**Introduction:** We believe that the demand for paediatric neurology (PN) care has increased over the past decade, and that reasons for requesting consultations have also changed. The objective of this study is to complete a registry study to profile the demand for PN care in 2013 and compare results to those from a study performed in 2002.

**Methods:** A prospective registry of PN healthcare activities was completed at Hospital Universitario de Getafe in 2013. Results were compared with those from a prospective registry study conducted in 2002.

**Results:** The number of visits increased from 1300 in 2002 to 1982 in 2013 (a 52.46% increase), and from 32.6 visits per 1000 children to 57.48 (a 76.32% increase). Outpatient consultations accounted for 92.2% of all PN consultations in 2013. Currently, attention deficit-hyperactivity disorder (ADHD) is the most frequent diagnosis (27.6% in 2013 vs 8.1% in 2002). Although the percentage of headache consultations has decreased (19% in 2013 vs 22% in 2002), headache was still the most common reason for an initial visit in 2013 (32.1%), followed by ADHD (19.1%). Epilepsy remains the most frequent diagnosis in hospitalised patients (30.3% in 2013 vs 36.7% in 2002).

**Conclusions:** PN is fundamentally an outpatient activity that has increased considerably in recent years. This increase is mainly due to neurodevelopmental disorders, especially ADHD. We might state that the role of ADHD in PN is comparable to that of dementia in general neurology.

© 2014 Sociedad Española de Neurología. Published by Elsevier España, S.L.U. All rights reserved.

☆ Please cite this article as: Martínez Menéndez B, Escolar Escamilla E, Pinel González A, Cerezo García M, Martínez Sarries FJ, Morlán Gracia L. ¿Ha cambiado la actividad asistencial de la neurología pediátrica en 11 años? Neurología. 2016;31:606–612.

\* Corresponding author.

E-mail address: [bmmenendez@salud.madrid.org](mailto:bmmenendez@salud.madrid.org) (B. Martínez Menéndez).

**PALABRAS CLAVE**

Actividad asistencial;  
Gestión sanitaria;  
Neurología infantil;  
Neurología  
pediátrica;  
Neurodesarrollo;  
TDAH

**¿Ha cambiado la actividad asistencial de la neurología pediátrica en 11 años?****Resumen**

**Introducción:** Pensamos que en la última década ha existido un aumento en la demanda de atención de neurología pediátrica (NP) por parte de la población pero también con un cambio cualitativo en las patologías que se atienden.

Por este motivo planteamos realizar un segundo registro (2013) y analizar si existían o no diferencias con el efectuado en el año 2002.

**Métodos:** Se realiza un registro prospectivo de actividad asistencial de NP en el Hospital Universitario de Getafe en 2013 y se compara con otro registro prospectivo previo realizado en 2002.

**Resultados:** Se ha pasado de 1.300 consultas a 1.982 (incremento del 52,46%) y de 32,6 consultas/1.000 niños al año a 57,48 (76,32% de aumento).

La actividad en consulta supone el 92,2% de toda la asistencia neuropediátrica del 2013; actualmente el trastorno por déficit de atención e hiperactividad (TDAH) es la patología más frecuente (27,6% en 2013/8,1% en 2002). Aunque las cefaleas siguen siendo muy frecuentes han disminuido (19% en 2013/22% en 2002). Como primeras consultas la cefalea sigue siendo la más frecuente en 2013 (32,1%), seguida del TDAH (19,1%). En régimen de hospitalización la epilepsia continúa siendo el diagnóstico más frecuente (30,3% en 2013/36,7% en 2002).

**Conclusiones:** La NP continúa siendo una actividad básicamente ambulatoria, con un incremento considerable en los últimos años. Este aumento se debe fundamentalmente a los trastornos del neurodesarrollo y muy especialmente al TDAH. Podríamos decir que el TDAH es a la NP lo que la demencia a la neurología general.

© 2014 Sociedad Española de Neurología. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

**Introduction**

In an article drafted in 2002, we stated that care statistics for paediatric neurology (PN) were masked by the figures for paediatrics and for neurology.<sup>1</sup> Today, the situation remains the same, at least in the region of Madrid, and this poses a organisational problem for PN care. As correctly proposed by Monge et al.,<sup>2</sup> organising any medical discipline, including PN, requires awareness of the real needs of the population, which are constantly changing. Multiple factors contribute to these changes: age distribution and the socioeconomic characteristics of the population to be cared for, the technical and scientific advances made over time, health and healthcare expectations of the population, and the structure of the healthcare system.

Several studies in the literature have analysed PN care in Spain,<sup>1–12</sup> but only 2 examine how it has evolved over time.<sup>2,9</sup>

We believe that the past decade has seen a significant increase in requests for NP care in our population, in addition to changes in the reasons for consultation.

Therefore, we decided to complete a new registry and determine whether its results differ from those analysed in 2002.<sup>1</sup> In our study, we assessed PN care by keeping a prospective registry for one year. We then compared our registry with neurology department records of patients older than 15, and paediatric department records, using data provided by the hospital's IT department. In our hospital, PN is included in the neurology department.

**Material and methods**

We performed a prospective study of PN care in 2013. All consultations (new and follow-up) were contrasted with the data from the IT department of the hospital to confirm veracity. Neurology department data for patients older than 15 (adult neurology, AN) and population data were provided by the IT and the communications departments at our hospital.

We compared the results with those of the previous study which we published.<sup>1</sup> Certain variables in the registry were modified in order to categorise data from neonatal patients and diagnostic data from the emergency department. Data included results from diagnostic tools used to differentiate between neurodevelopmental disorders. All the above data were included in a Microsoft Access 2003 database. To quantify changes in the 2011 data, we calculated the variation coefficient,<sup>13</sup> defined as the percentage of increase or decrease with respect to the 2002 data.

Two significant changes have taken place in the past few years which may affect medical care. In 2008, a new hospital was inaugurated in the town of Parla. Since then, our hospital has not been the only hospital in the area, and its assigned population has also been reduced. Since 2010, patients in Madrid are offered free choice of doctors and hospitals within the Madrid public healthcare system.<sup>14</sup> Considering that this development could invalidate population-based estimates, we asked the IT department to provide the number of patients choosing the

new option. This number was negligible (34 patients) compared to the total number of attended children.

Given the socioeconomic characteristics of this area, few patients seek care outside the public system. The population younger than 15 represents 16.44% of the total, compared to 14.2% in 2002.

Apart from the listed exceptions, there were no relevant changes in how care is provided to patients, but we did observe changes in how medical care was recorded in the hospital. The PN department provides in-hospital consultations to patients referred by primary care. Patients have free choice of their doctor and hospital. AN patients are attended in specialist care centres in the health district, as well as in general and specialised hospital clinics.

Emergency care for both children and adults is provided from 8.00 to 15.00, Monday through Friday, and always at the request of another doctor in the hospital.

Hospitalised patients younger than 15 are always admitted by the paediatric department. Paediatric neurologists act as consultants regardless of whether the neurological condition is the reason for admission or a secondary condition. Patients older than 15 may be admitted by the neurology ward or by other wards; we have also observed intercurrent neurological problems in patients in this age group who were admitted for other reasons. Since digital records were implemented, it is practically impossible to separate cases seen in the emergency department from the referrals from other departments. Data for adult patients is not comparable to those from 2002, since the prospective registry is limited to neuropaediatric care.

Statistical analysis of variables was performed using SPSS software version 18.0.

Although other studies on this subject have been published, they were conducted in other countries,<sup>15–17</sup> and we believe that the differences in healthcare systems do not permit comparison.

All per capita estimates were performed considering the population aged 15 and younger for PN (children) and older than 15 for AN (adults).

Patients may have been assigned more than one diagnosis (as in the 2002 study).

## Results

In-hospital consultations represented 92.2% of all PN care in 2013. Table 1 shows the exact numbers of consultations provided, as well as how they have changed with respect to 2002.

The number of children admitted to or attended in the emergency department (between 8.00 and 15.00) and assessed by a paediatric neurologist is also shown in Table 1.

Neurological consultations for patients aged 15 and younger represent 16.4% of the total, 15.5% of all new consultations, and 18.3% of the follow-up visits (Fig. 1).

The mean age of children seen in in-hospital consultations was 7.8 years (range, 0–15), while mean age of admitted children was 2.12 (0–14.75); mean age of children attended by the emergency department was 6.6 (0.25–14).

Of the total cases, 41.2% were girls and 58.8% were boys. However, of the patients admitted to the hospital,

**Table 1** Care activity in paediatric neurology.

	2002	2013	VC (%)
<i>Consultations</i>			
New cases	428	532	24.30
Follow-up	872	1450	66.28
Total	1300	1982	52.46
Ratio of new consultations/follow-up visits	2.04	2.62	28.43
New cases/1000 children	10.70	15.43	44.19
Follow-up consultations/1000 children	21.90	42.05	92.01
Total/1000 children	32.60	57.48	76.32
<i>Hospitalisation</i>			
Admitted children	94	69	–26.60
<i>Emergency department</i>			
Admitted children + emergencies	135	127	–5.93

VC, variation coefficient =  $[(n\ 2013 - n\ 2002)/n\ 2002] \times 100$ .

61.4% were girls and 39.6% were boys, and of those seen in the emergency department, 47% were girls and 53% were boys.

Table 2 shows the conditions most frequently assessed in the PN department. Although headaches are still very frequent (comprising 19% of the consultations in 2013 vs 22% in 2002), the most frequently assessed disease at present is attention-deficit/hyperactivity disorder (ADHD) (27.6% in 2013 vs 8.1% in 2002). In 2013, 10.7% of the consultations involved children with learning disorders, 4.7% were children with pervasive developmental disorders, and 4.2% were children with behaviour disorders. In the analysis of initial consultations only, headache remains the most frequently assessed complaint in 2013 (32.1%), followed by ADHD (19.1%). The ratio of follow-up visits to new consultations in the case of headache was 1.2 vs. 4.4 for ADHD.

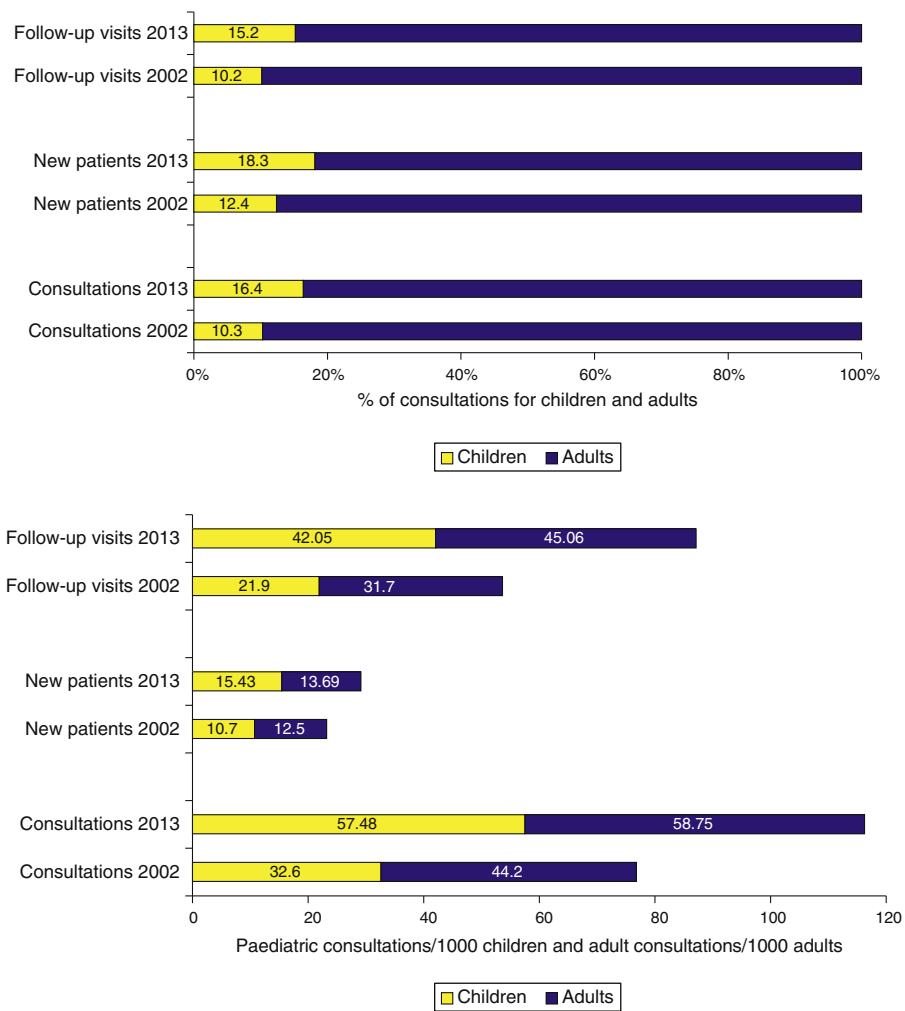
Among patients admitted to hospital, epilepsy remains the most common diagnosis (30.3% in 2013 vs 36.7% in 2002), with twice as many cases as the second most frequent diagnoses (non-evolving encephalopathy at 15.2% in 2013 and hypoxic-ischaemic encephalopathy at 15.1% in the same year). These entities coexist with epilepsy in most cases (Fig. 2).

Table 3 shows the most frequent diseases during and following the neonatal period.

The emergency department requested the most consultations with the paediatric neurologist in cases of headache (26.8%), but epilepsy (21.4%) and febrile seizures (14.6%), together with their differential diagnosis of non-epileptic paroxysmal events (21.4%), form the most numerous group as a whole.

## Discussion

Understanding the demand for healthcare in a given population is essential for administering the necessary resources.



**Figure 1** Breakdown of consultations by age (children and adults). Consultations per 1000 children or 1000 adults. Changes over time.

In the past few years, studies showing increasing demand for neurological care have been published.<sup>2,13,18,19</sup> These studies state that population ageing, with its subsequent increase in degenerative disorders, especially cognitive impairment, is

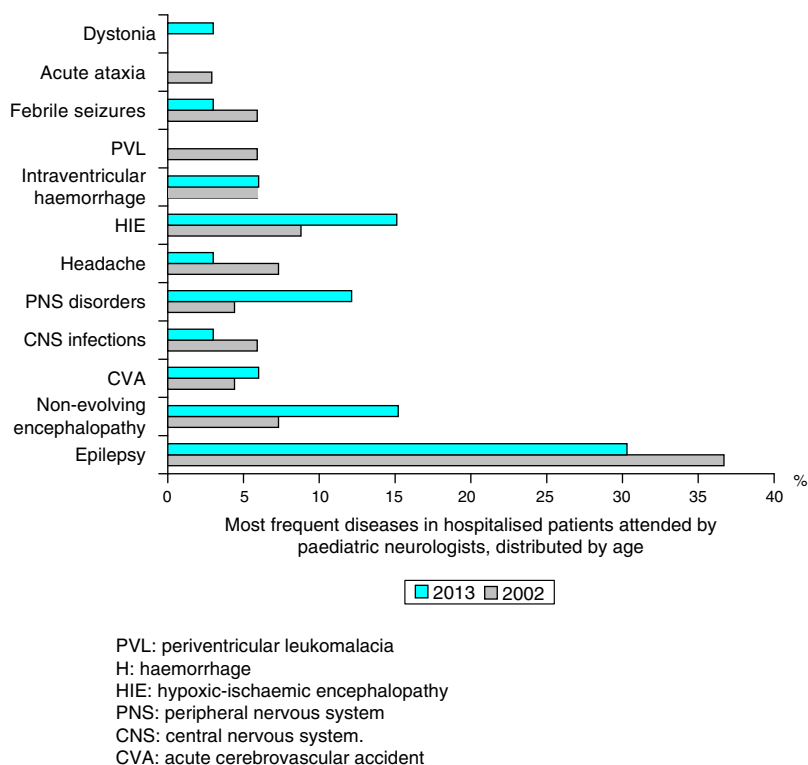
the main cause of rising demand, with a variation coefficient exceeding 100% or 200% in a 5-year period.<sup>13,18,19</sup>

Our study shows that the increase in the demand for medical care in our health district in a 10-year

**Table 2** Most frequent diseases in paediatric neurology consultations.

	% of total consultations			% of first consultations		
	2002	2013	VC (%)	2002	2013	VC (%)
Perinatal disease	11.3	16.6	46.9	7.5	7.8	4
Headache	22	19	-13.6	34	32.1	-5.6
Epilepsy	21.5	12.9	-41.9	8.5	5.3	-60.4
Febrile convulsions	2.5	2.1	-16	3.5	3	-14.3
Non-evolving encephalopathy	10.5	15.4	46.6	7.5	8.6	14.7
PNS disorders	3.5	2	-28.3	1.5	1.9	26.7
Movement disorders	5.7	2.8	-50.8	5	3	-40
Phakomatosis	2.6	1	-61.5	1	0.8	-20
ADHD	8.1	27.6	240.7	9.9	19.1	101.1
SLI	5.1	10	49	4	9.1	127.5

VC, variation coefficient =  $[(\% 2013 - \% 2002) / \% 2002] \times 100$ ; PNS, peripheral nervous system; ADHD, attention-deficit/hyperactivity disorder; SLI, specific language impairment.



**Figure 2** Most frequent diseases in hospitalised patients attended by paediatric neurologists. Comparison between 2002 and 2013.

period is significant, in both children and adults. Studies conducted in paediatric populations display a similar trend.<sup>2,9</sup>

There is an overall increase in in-hospital consultations, despite having a smaller assigned population. This cannot be attributed to free choice of doctor/hospital since only a few children have exercised that right. Neither is it related to shorter waiting lists. The logical result is an even steeper increase in the number of consultations per 1000 children, with nearly twice the number of follow-up visits as before. In 2002, the number of consultations per 1000 children was 32.6, which is not far removed from 31.1/1000, the mean

number of consultations in patients aged up to 14 years in the Spanish study published by Tomás et al.<sup>11</sup> after conducting a survey in 2001. In contrast, the 57.48 consultations per 1000 children estimated for 2013 represent a considerable increase.

In our study, we observe parallel increases in consultations per 1000 children and per 1000 adults. The literature provides scarce data for adult populations. We can compare our series with the number of consultations per 1000 patients older than 14 published in the literature (5.8-27.5)<sup>20</sup>; our figures of 12.4 in 2002 and 13.9 in 2013 fall in the middle range.

**Table 3** Most frequent disorders in hospitalised patients treated by neuropaediatricians (distributed by age).

Neonatal admissions		Admissions outside the neonatal period	
Disease	%	Disease	%
Hypoxic-ischaemic encephalopathy	31.3	Epilepsy	41.7
Neonatal seizures	18.8	NEPE	23.5
Very preterm	18.8	Non-evolving encephalopathy	11.8
Intraventricular haemorrhage	12.5	Febrile convulsions	5.9
CVA	12.5	Headache	5.9
Plexopathy	12.5	CP	5.9
Other focal neuropathies	12.5	Metabolic disease	5.9
Malformations of the CNS	12.5	Mental retardation	5.9
Phakomatosis	12.5	Psychomotor retardation	5.9
Hypotonia	6.3	Chromosomal disorder	5.9
		Dystonia	5.9
		Meningitis	5.9

CVA, acute cardiovascular accident; NEPE, non-epileptic paroxysmal events; CP, cerebral palsy; CNS, central nervous system.

There is an increase in paediatric consultations as a percentage of total neurological consultations. This is due in part to the increase in the percentage of patients younger than 15 in our assigned population.

Based on the above, we can conclude that the 'amount' of neurological care in patients younger than 15 is similar to that in older patients. We then may wonder: if there is more demand for neurological care in adults due to cognitive disorders, why would it increase in children?

In our opinion, the reasons are the same. When we consider the diseases most commonly seen in our clinic, we find a very significant increase in neurodevelopmental disorders and especially in ADHD. In fact, ADHD has become the most frequent reason for consultation, edging out epilepsy which was listed as the most frequent in 2002. Although headaches are still the most common motive for new consultations, a significant increase in ADHD has been observed. The study by Monje et al.<sup>2</sup> also showed this increase, although their figures are clearly different from ours, since their percentage of admitted patients is much higher than our own. This probably also provides a partial explanation for the increase in follow-up visits, since the ratio of new consultations to follow-up visits is much higher in patients with ADHD than in those treated for headache. Another reason for the increase in follow-up visits may be the time elapsed; we observe that follow-up visits increased in both adults and children. We must recall that most neurological diseases are chronic processes with low mortality; therefore, the older the neurology department the larger its chronic patient population and the subsequently higher number of follow-up visits.

Learning disorders, developmental language disorder, and behavioural disorders represent a significant percentage of everyday PN consultations. These disorders, as with cognitive disorders in adults,<sup>13,18</sup> require longer consultation times and input from other professionals such as neuropsychologists.<sup>21</sup> These requirements add to the increase in activity.

We have observed that the most frequent cause of hospitalisation is epilepsy, diagnosed in more than 40% of the children admitted to the hospital, followed by non-epileptic paroxysmal events, which are usually identified while performing the differential diagnosis of epilepsy. Paroxysmal events (epilepsy, febrile convulsions, and non-epileptic paroxysmal events) are also very frequent in the study by Monje et al.<sup>2</sup> These researchers found a decrease in neurological consults for febrile convulsions owing to a better knowledge of their good prognosis, but we found no such association.

In the case of children treated in the emergency department, we observed once again that paroxysmal events account for more than 50% of all cases, followed by headaches. These 2 processes are likely to result in emergency visits because they cause concern in family members. While cerebrovascular disease is the most frequent cause of all neurological emergencies,<sup>22</sup> this is not the case in childhood as could be expected; outside the neonatal period, it is very rare.<sup>23</sup> During the first month of life, however, it is frequently diagnosed, as shown by our series.

In conclusion, we can state that care activity in PN consultations has increased considerably over the past few years, and that this increase is mainly due to neurodevelopmental disorders, especially ADHD. It could be said that

ADHD is to PN what dementia is to general neurology.<sup>13,18</sup> If we consider the prevalence of these disorders (5.3% in the case of ADHD),<sup>24</sup> we realise that it is not possible to attend to and monitor all these patients in specialised care. We do not necessarily mean PN in this case, since many of these children are treated in mental healthcare centres. In fact, the English-language literature is mainly generated by the psychiatric field.<sup>24</sup> However, Spanish PN clinics are crowded, probably due to such different factors as having a less biological approach to psychiatry, parents being more reluctant to let their children be treated by psychiatrists than by neurologists due to social and cultural reasons, and especially, the high prevalence rates of the disease. Therefore, we should work with primary care to develop monitoring and coordination protocols to be able to meet societal demand; although the most important interventions take place in the educational setting, medication has clearly shown its effectiveness, and therefore, many of these children will need medical treatment.

This study has not been presented in any Annual Meeting of the SEN or in any other meeting.

## Funding

This study has not received any public or private funding.

## Conflicts of interest

The authors have no conflicts of interest to declare.

## Acknowledgements

Javier Moreno Ramiro. Head of the IT section. Hospital Universitario de Getafe. Javier Gómez. Head of Communications. Hospital Universitario de Getafe. Consuelo García-Velasco García. Hospital Admissions Coordinator. Hospital Universitario de Getafe.

## References

1. Martínez-Menéndez B, Martínez-Sarriés FJ, Morlán-Gracia L, Balseiro-Gómez JJ, Pinel-González AB, Saez-Pérez E. Actividad asistencial de la neurología pediátrica en un hospital de nivel 3. Estudio comparativo con la neurología de adultos y la pediatría no neurológica. *Rev Neurol*. 2004;38:1018–22.
2. Monge Galindo L, López-Pisón J, Samper Villagrasa P, Peña Segura JL. Evolución de la demanda asistencial neuropediátrica en un hospital español de tercer nivel a lo largo de 20 años. *Neurología*. 2014;29:36–41.
3. Mateos F, Simón R, Torres J, Martínez B, Cebreros M. El trabajo asistencial de una Unidad de Neurología Infantil del sur de Madrid. Análisis de una década. *Pediatría*. 1994;87:8–13.
4. López-Pisón J, Rebage V, Arana T, Baldellou A, Arcauz P, Peña-Segura JL. Estudio de la demanda asistencial de Neuropediatría en un hospital de referencia regional II. Motivos de consulta. *Rev Neurol*. 1997;25:1685–8.
5. López-Pisón J, Baldellou A, Rebage V, Arana T, Gómez-Barrena V, Peña-Segura JL. Estudio de la demanda asistencial de



- Neuropediatría en un hospital de referencia regional. Presentación del trabajo y resultados generales. *Rev Neurol*. 1997;25:1535–8.
6. Garaizar C, Sousa T, Lambarri I, Martín MA, Prats JM. Los datos clínicos de la demanda asistencial en la consulta neuropediátrica. *Rev Neurol*. 1997;25:187–93.
  7. López-Pisón J, Arana T, Rebage V, Baldellou A, Alija M, Peña-Segura JL. Estudio de la demanda asistencial de Neuropediatría en un hospital de referencia regional. V Exámenes complementarios. *Rev Neurol*. 1998;26:208–14.
  8. López-Pisón J, Arana T, Baldellou A, Rebage V, García-Jiménez MC, Peña-Segura JL. Estudio de la demanda asistencial de Neuropediatría en un hospital de referencia regional III. Diagnósticos. *Rev Neurol*. 1997;25:1896–905.
  9. Peña-Segura JL, López-Pisón J, Marco-Olloqui M, Mateos-Hernández J, Agrados-Razola I, Jiménez-Bustos JM. Asistencia neuropediátrica en el Hospital General Universitario de Guadalajara. *Rev Neurol*. 2004;39:816–20.
  10. Garaizar C, Martínez-González MJ, Sobradillo I, Ferrer M, Gener B, Prats JM. La práctica clínica neuropediátrica en un hospital terciario del País Vasco. *Rev Neurol*. 1999;29:1112–6.
  11. Tomás Vila M, Gisbert Mestre J, Peñalver Giner O. Actividad asistencial neuropediátrica en los hospitales españoles: la oferta y la demanda. *Ann Pediatr*. 2003;58:322–6.
  12. Garaizar C, Sobradillo I, Martínez-González MJ, Prats JM. Labor asistencial telefónica en la consulta neuropediátrica: cuantificación y contenido. *Rev Neurol*. 1999;29:999–1002.
  13. Morera-Guitart J, Pedro Cano MJ. Análisis de la asistencia neurológica en el distrito sanitario Marina Alta. *Neurología*. 2003;18:417–24.
  14. Decreto 51/2010, de 29 de julio, del Consejo de Gobierno, por el que se regula el ejercicio de la libertad de elección de médico de familia, pediatra y enfermero en Atención Primaria, y de hospital y médico en Atención Especializada en el Sistema Sanitario Público de la Comunidad de Madrid [Internet]. Available from: [http://www.madrid.org/wleg/servlet/Servidor?opcion=VerHtml&n norma=6640&cdestado=P#\\_ftnref1](http://www.madrid.org/wleg/servlet/Servidor?opcion=VerHtml&n norma=6640&cdestado=P#_ftnref1) [accessed 09.06.14].
  15. Izuora GI, Iloeje SO. A review of neurological disorders seen at the Paediatric Neurology Clinic of the University of Nigeria Teaching Hospital, Eunugu. *Ann Trop Paediatr*. 1989;9:185–90.
  16. Wammanda RD, Onalo R, Adama SJ. Pattern of neurological disorder presenting at a paediatric neurology clinic in Nigeria. *Ann Afr Med*. 2007;6:73–5.
  17. Lagunju IA, Okafor OO. An analysis of disorders seen at the Paediatric Neurology Clinic, University College Hospital, Ibadan, Nigeria. *West Afr J Med*. 2009;28:38–42.
  18. Huerta-Villanueva M, Baiges-Octavio JJ, Martín-Ozaeta G, Muñoz-Farjas E, Rubio-Borrego F. Evolución de la demanda de asistencia neurológica ambulatoria y patología atendida en la consulta de neurología de la región sanitaria de Tortosa, Tarragona. *Rev Neurol*. 2005;41:68–74.
  19. López-Hernández N, Espinosa-Martínez J. Análisis descriptivo de la asistencia neurológica ambulatoria en Elche, Alicante. *Rev Neurol*. 2007;45:219–23.
  20. Martín Santidrian MA, Jiménez M, Trejo Gabriel y Galán JM. Análisis descriptivo de la demanda asistencial neurológica ambulatoria en el área sanitaria de Burgos. *Neurología*. 2011;26:39–44.
  21. Martínez Menéndez B, Cerezo García M, Escolar Escamilla E, Aladro Benito Y, Morlan Gracia L, Pinel González A. Estudio trasversal de la necesidad de valoraciones neuropsicológicas en una Unidad de Neurología Pediátrica. *Neurología*. 2011;26:243.
  22. Casado V. Atención al paciente neurológico en los Servicios de Urgencias. Revisión de la situación actual en España. *Neurología*. 2011;26:233–8.
  23. Freundlich CL, Cervantes-Arslanian AM, Dorfman DH. Pediatric stroke. *Emerg Med Clin N Am*. 2012;30:805–28.
  24. Feldman HM, Reiff MI. Clinical practice attention deficit-hyperactivity disorder in children and adolescents. *N Engl J Med*. 2014;370:838–46.