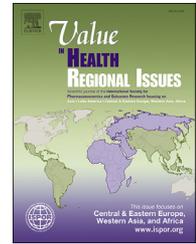


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## Economic Evaluation

# Analysis of Direct Monthly Cost of Outpatient Hospital-Based Care for Children With Cerebral Palsy in Kano, Nigeria

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### ABSTRACT

**Background:** Children with cerebral palsy require effective, accessible and affordable medical and rehabilitation care. **Objective:** The aim of this study was to evaluate the direct monthly cost of outpatient hospital-based care for children with cerebral palsy (CP) in Kano City, Nigeria. **Methods:** The study was a cross-sectional survey. Consenting participants were recruited using the purposive sampling technique. Data on cost of medical and physiotherapy consultations, number of consultations per month, cost of diagnostic investigations, and out-of-pocket expenditures were captured using a researcher-designed questionnaire. Data were analyzed with descriptive statistics using Microsoft Excel and SPSS version 20. **Results:** A total of 106 children with CP and their caregivers participated in this study. The mean age of the children was  $3.18 \pm 1.90$  years and that of their caregivers was  $27.32 \pm 4.63$  years. The average direct cost of outpatient care per month was ₦14 295.38 (Nigerian naira) (\$46.87)  $\pm$  ₦13 211.52 (\$43.32). The average

monthly cost of physiotherapy was ₦503.77 (\$1.65)  $\pm$  ₦220.79 (\$0.72), whereas those for transportation and radiological investigations were ₦1861.49 (\$6.10)  $\pm$  ₦1435.06 (\$4.71) and ₦3771.46 (\$12.37)  $\pm$  ₦5135.32 (\$16.84), respectively. **Conclusion:** The average direct monthly cost of providing outpatient hospital-based care for children with CP in Kano City, Nigeria may not be affordable because most of the participants earned very meager monthly incomes. The highest medical cost was incurred from radiological investigation, whereas transportation was the most important out-of-pocket cost. The Nigerian government should make a policy decision for the automatic enrollment of all children diagnosed with CP into the National Health Insurance Scheme. **Keywords:** cost, cerebral palsy, outpatient, Kano, Nigeria

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## Introduction

Cerebral palsy (CP) describes “a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed to non-progressive disturbance that occurred in the developing fetal or infant brain.”<sup>1</sup> Most children with CP require routine medical care and rehabilitation services throughout their lifespan.<sup>2,3</sup> The long-term activity limitation caused by CP has made it one of children’s conditions with the highest costs per case,<sup>4</sup> and the financial burden incurred by families of children with disabilities can be substantial.<sup>5</sup> Finance-related problems can have negative impact on the health status of both the caregiver and the child with CP.<sup>6</sup>

The costs of providing care for children with CP can be direct or indirect.<sup>5,7,8</sup> Direct costs may include the cost of inpatient and outpatient medical and rehabilitation services, diagnostic investigations, and cost of medications.<sup>7,9</sup> Indirect costs may

include costs of mortality, loss of productivity or earnings, and the cost of home modifications.<sup>5,7,8,10</sup> The cost of caring for children with CP is also influenced by the severity of their neurologic impairment.<sup>11–13</sup> A study found that the cost of managing children with CP who also had associated impairments was higher than the cost of managing children with CP alone.<sup>13</sup> Furthermore, the cost of caring for children with the spastic CP type was higher than for the dyskinetic and ataxic CP types.<sup>12</sup> In addition, the finding of another study showed that the cost of caring for children with quadriplegic CP was considerably higher when compared with the cost incurred for managing children with other CP types.<sup>11</sup>

Evaluation of the cost of medical care for children with CP may contribute preliminary data to cost-of-illness studies on CP,<sup>14</sup> and this may be used to provide information to policymakers on the impact of the condition on families and society.<sup>10</sup> The cost of providing care for children with CP has received great attention in

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Europe,<sup>15,16</sup> the United States,<sup>2,4,11</sup> and Asia<sup>10,12</sup> but it is yet to be reported from Africa. This study assessed the direct monthly cost of outpatient hospital-based care for children with CP with the view of providing preliminary data for further studies.

## Methods

A cross-sectional survey design was used for the study. The participants were children with CP and their caregivers who presented at the outpatient physiotherapy departments of Aminu Kano Teaching Hospital (AKTH), Murtala Mohammed Specialist Hospital, Muhammad Abdullahi Wase Specialist Hospital, and Hasiya Bayero Paediatric Hospitals, all in Kano City, Nigeria. The direct monthly costs incurred were obtained from the caregivers using a researcher-designed questionnaire. Before data collection, the questionnaire was pretested for reliability on 30 of the caregivers, and it was found to have an internal consistency of  $\alpha = 0.54$ . Ethical approval was sought and obtained from the research ethics committees of AKTH (NHREC/21/08/2008/AKTH/EC/1792) and Kano State Ministry of Health (MOH/OFF/797/T.I./137). All children who had been diagnosed with CP and their caregivers were recruited, except for children who were being treated on humanitarian grounds (not paying for any treatment) and their caregivers. The participants were recruited after they had given written informed consent of participation. The study lasted 4 months from June 10, 2016 to October 14, 2016. The study was conducted from the perspectives of children with CP who require cost-effective medical and rehabilitative care; the caregivers who directly incur the cost of caring for the children; and government, whose responsibility is to make policies that will ensure that the children get effective, accessible, and affordable care with provision of adequate financial support to their caregivers.

In this study, the caregiver-related variables surveyed included their occupational status, level of educational attainment, level of monthly income, and marital status. Level of income was categorized as follows: less than ₦18 000 = below minimum, ₦18 000 to 49 000 = low income, ₦50 000 to 99 000 = average income, and ₦100 000 and above = high income.

The children-related variables surveyed comprised the type of CP and gross motor functional classification system (GMFCS) score. The CP type was categorized as pyramidal (spastic), extrapyramidal (ataxic, athetoid, and choreiform), or mixed (occurrence of both pyramidal and extrapyramidal). The spastic was classified based on limb involvement: monoplegia (1 limb affected), hemiplegia (1 upper limb and 1 lower limb on the same side affected), diplegia (both lower limbs affected), and quadriplegia (all 4 limbs and trunk affected). Also, the children were categorized based on GMFCS as follows: (1) able to walk indoors and outdoors without restriction except that of advanced gross motor skills; (2) able to walk indoors without restriction but have limitations walking outdoors; (3) able to walk with assistive mobility devices; (4) independent mobility limited to rolling, creeping on stomach, or crawling but without reciprocal leg movement (older children may use powered mobility); and (5) severe limitation of independent mobility even with the use of assistive technology.<sup>17</sup>

### Determination of the Cost of Outpatient Care

The cost of providing outpatient care in this study was the sum of the cost of direct outpatient medical care and the cost of out-of-pocket expenditures. The direct medical care cost included costs of medical and physiotherapy consultations, and the costs of assistive devices, drugs, laboratory, and radiological investigations. The direct out-of-pocket expenditure included the costs of transportation, meals, and water during hospital visits. It also

included the cost of hiring a paid caregiver and that of treating illnesses that are related to caregiving stress.

Direct cost of outpatient care = direct cost of medical care + direct cost of out-of-pocket expenditure.

### Monthly Cost of Outpatient Medical Care

The monthly cost of outpatient physiotherapy was assessed by evaluating the consultation fee per hospital visit multiplied by the number of visits per month.<sup>18</sup> In this study, monthly costs of medical consultation, drugs, laboratory and radiological investigations, and assistive devices were obtained by dividing the total costs for 6 months by 6. This was necessary because the monthly direct cost was unavailable owing to infrequent medical consultation, and in many instances, tests, investigations, or assistive devices were not frequently prescribed. Therefore, the costs incurred in the last 6 months were used. Assistive devices in this study included orthotics, mobility devices, and positioning devices.

### Monthly Cost of Out-of-Pocket Expenditures

This was assessed by evaluating the cost of transportation to-and-from and that of meals and drinking water per hospital visit, and this was multiplied by the number of hospital visits per month.<sup>18</sup> Out-of-pocket expenditures also included the monthly salary being paid to a hired caregiver (nanny).<sup>8,10</sup>

Currency conversions were done using the official exchange rate as of October 14, 2016; it was \$1 to ₦305 (Nigerian naira).<sup>19</sup>

### Data Analysis Procedure

Descriptive statistics of mean, standard deviation, frequencies and percentages were used to analyze the data. The analysis was conducted using SPSS version 20 and Microsoft Excel.

## Results

A total of 106 children with CP and their caregivers participated in this study. The children comprised 57 (53.8%) boys and 49 (46.2%) girls. The mean age of the children was  $3.18 \pm 1.90$  years, age range 1 to 11 years, and that of their caregivers was  $27.32 \pm 4.63$  years, age range 20 to 40 years. Forty-seven (44.3%) of the caregivers were unemployed, 23 (21.7%) never attended school, and 85 (80.2%) earned incomes that were below the minimum wage (Table 1). The major source of funding for treatment of children with CP was the parents themselves (100, 94.3%), followed by financial help from relatives (3, 2.8%) as presented in Table 1. Slightly less than one-third of the children, 32 (30.2%), had a GMFCS score of 5. Twenty-five (23.5%) children were diagnosed with a mixed type of CP (Table 1). Only 31 (29.2%) of the 106 caregivers reported that they paid for medical consultation; however, all of them (106, 100%), paid for physiotherapy consultation and drugs. Although only 33 (31.1%) incurred cost of radiological investigations and 23 (21.7%) hired nannies, the majority (78, 73.6%) procured assistive devices as presented in Table 2. In this study, the mean number of physiotherapy visits per month was  $3.90 \pm 0.70$  (range 2-4). Similarly, the analysis of frequency of contacts with health professionals over 6 months showed that physiotherapy was the most frequently accessed healthcare service, with mean contacts of  $21.96 \pm 4.69$  (range 4-24), which was followed by medical consultations, with a mean of  $3.19 \pm 1.55$  (range 1-12) contacts as presented in Figure 1.

The physiotherapy consultation fee per visit ranged between ₦100 and ₦200, whereas the cost of medical consultation per visit was ₦100, but medical consultation was free in some hospitals for most of the study participants (75, 70.8%). The cost of transportation per hospital visit was between ₦50 and ₦3000. The cost of food and water per hospital visit was between ₦20 and

**Table 1 – Characteristics of study participants (children with CP and their caregivers).**

Variables	Frequency
Characteristics of caregivers	n (%)
Occupation	
Unemployed	47 (44.33)
Self-employed	36 (33.96)
Civil servant	23 (21.7)
Level of education	
None	23 (21.7)
Informal	16 (15.1)
Primary education	8 (7.5)
Secondary education	29 (27.4)
Higher education	30 (28.3)
Level of monthly income	
Below minimum	85 (80.2)
Low	16 (15.1)
Average	4 (3.8)
High	1 (0.9)
Marital status	
Divorced	15 (14.2)
Separated	4 (3.8)
Widow	11 (10.4)
Married	76 (71.7)
Funding source	
NHIS	2 (1.9)
Private insurance	1 (0.9)
Parents	100 (94.3)
Relatives	3 (2.8)
Others (philanthropists, NGOs)	0 (0)
Characteristics of children with CP	
Sex	
Male	57 (53.8)
Female	49 (46.2)
Type of CP	
Quadriplegic	15 (14.2)
Diplegic	13 (12.3)
Hemiplegic	20 (18.9)
Athetoid	19 (17.9)
Mixed	25 (23.6)
Ataxic	2 (1.9)
Choreiform	12 (11.3)
GMFCS score	
I	17 (16.0)
II	12 (11.3)
III	24 (22.6)
IV	21 (19.8)
V	32 (30.2)

CP indicates cerebral palsy; GMFCS, gross motor function classification system; N, frequency; NGO, nongovernmental organization; NHIS, National Health Insurance Scheme.

₦500, and the average cost was ₦190.13. Some caregivers reported that they consumed only biscuits together with sachet water at the cost of ₦20.

### Cost of Outpatient Medical Care

The average monthly cost of physiotherapy was ₦503.77 (\$1.65) ± ₦220.79 (\$0.72). The average monthly cost of drugs was ₦2110.79 (\$6.92) ± ₦1550.54 (\$5.08) while that of radiological investigations was ₦3771.46 (\$12.37) ± ₦5135.32 (\$16.84) (Table 3).

**Table 2 – Proportion of participants (caregivers) who incur costs that are related to the provision of outpatient care for children with CP (N = 106).**

Variables	Frequency n (%)
Outpatient medical care	
Medical consultation	
No	75 (70.8)
Yes	31 (29.2)
Laboratory investigations	
No	54 (50.9)
Yes	52 (49.1)
Radiological investigations	
No	73 (68.9)
Yes	33 (31.1)
Physiotherapy consultations	
No	0 (0%)
Yes	106 (100%)
Drugs	
No	0 (0%)
Yes	106 (100%)
Assistive device	
No	28 (27.4)
Yes	78 (73.6)
Additional home physiotherapy	
No	105 (99.1)
Yes	1 (0.9)
Out-of-pocket expenditure	
Transportation	
No	5 (4.7)
Yes	101 (95.3)
Treating illnesses relating to caregiving burden	
No	90 (84.9)
Yes	16 (15.1)
Food and water during hospital visits	
No	27 (25.5)
Yes	79 (74.5)
Hiring a nanny to help with providing CP care	
No	83 (78.3)
Yes	23 (21.7)

CP indicates cerebral palsy; N, sample size.

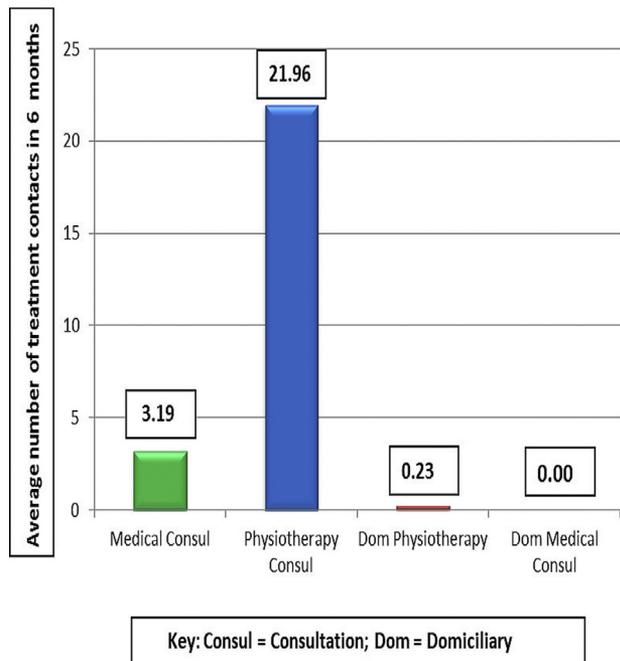
### Cost of Out-of-Pocket Expenditures

The average monthly cost of hiring a nanny was ₦3326.09 (\$10.91) ± ₦1173.66 (\$3.85), and the average monthly cost incurred on transportation was ₦1861.49 (\$6.10) ± ₦1435.06 (\$4.71) (Table 3).

### Monthly Direct Cost of Outpatient Care

The monthly direct cost of outpatient management of children with CP (medical cost plus out-of-pocket expenditure) was ₦14295.38 (46.87USD) ± ₦13211.52 (\$43.32) (Table 3).

Furthermore, the mean monthly direct cost of outpatient medical care for children with CP was ₦7741.89 (\$25.38). In addition, this study found that the mean cost of medical consultation per month ₦64.52 (\$0.21) constituted 0.83% of monthly medical costs, laboratory investigation ₦355.77 (\$1.17) 4.6%, radiological investigation ₦3771.46 (\$12.37) 48.71%, and physiotherapy consultations ₦503.77 (\$1.65) 6.5% as presented in Figure 2. In addition, the mean cost of hiring a nanny per month ₦3326.09 (\$10.91) accounted for 50.75% of the average monthly out-of-pocket expenditure of ₦6553.49 (\$21.49) as presented in Figure 2.



**Fig. 1 – The average number of treatment visits prescribed for children with cerebral palsy within 6 months.**

**Discussion**

Managing children with CP could pose a major economic challenge as individuals and society bear costs that are directly related to the actual payment for therapy or incur out-of-pocket costs on transportation, dwindling caregiver health, and hiring of outside caregivers. This study was carried out to investigate the direct cost

of outpatient hospital-based management of children with CP in Kano City, Nigeria.

The average monthly cost of outpatient management of children with CP in Kano city was ₦14 295.38 (\$46.87). This amount may not be affordable to most of the caregivers in this study considering that the majority earn monthly incomes that are below the minimum wage (<₦18 000 [\$59.01] as at October 2016). It would certainly be very difficult for most of the participants in this study to adequately satisfy their basic household needs and at the same time spend such huge amounts in providing outpatient care for their children considering their meager incomes. Furthermore, the possible reason for the unaffordability of the monthly cost could be because very few of the caregivers, as observed in this study, enjoyed support from external sources such as the National Health Insurance Scheme and private insurance. In contrast, most of the costs of managing individuals with CP in another study<sup>15</sup> were borne by health insurance.

The average monthly direct cost of outpatient medical care for children with CP of ₦7741.89 (\$25.38) in this study was higher than the direct cost of outpatient stroke management in the same environment.<sup>18</sup> This is because the present study considered direct medical cost as the combined costs of physiotherapy, medical consultations, medication, and supportive devices, whereas the previous study<sup>18</sup> considered the cost of physiotherapy care as the only direct cost. Evidently, the average monthly cost of physiotherapy alone (₦503.77 [\$1.65]) is affordable. The cost of physiotherapy that accounted for 6.47% of direct costs is very similar to the 8% reported in another study,<sup>15</sup> though the actual components of direct costs in the 2 studies are different. This strengthened the finding that physiotherapy and rehabilitation services could be very affordable.<sup>18</sup>

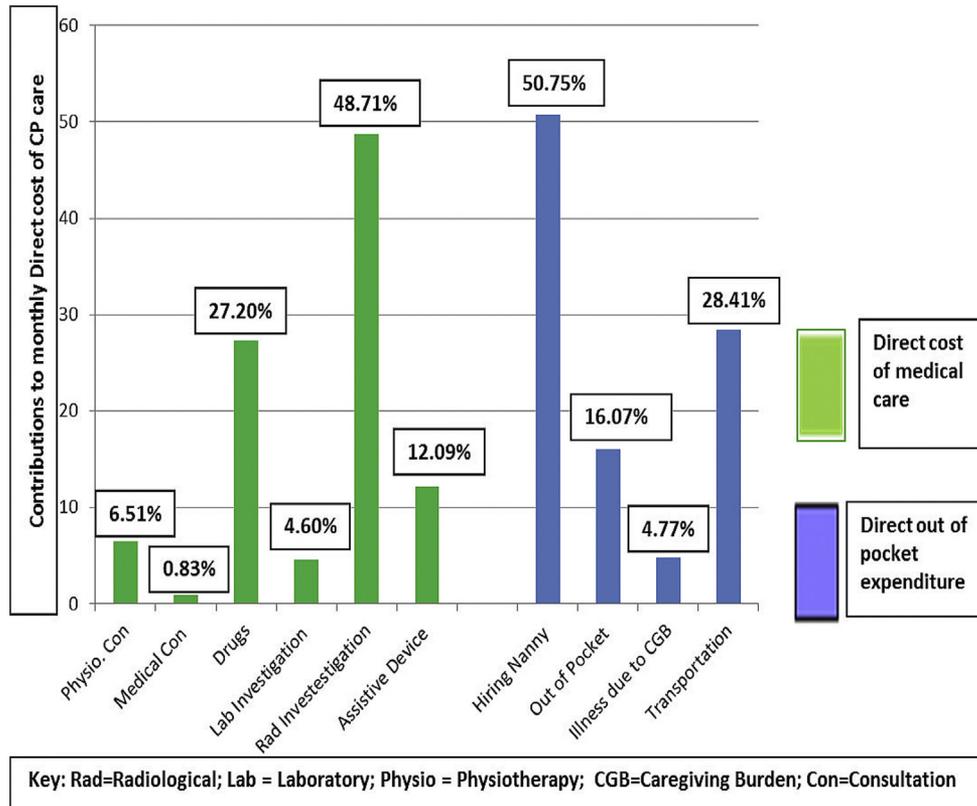
The cost of radiological investigation in this study was about 1.8 times higher than the cost of medication and about 7.5 times higher than the cost of physiotherapy. Therefore, the cost of radiological investigations may not be affordable considering that most of the caregivers earned very meager incomes. This calls for concerted effort from government to make policies to reduce the high cost of radiological investigations, especially for children with CP. This

**Table 3 – Direct monthly costs of outpatient management of children with CP (N = 106).**

	n (%)	Total cost (₦)	Mean cost ± SD (₦)	Mean cost ± SD (USD)
<b>Direct costs of medical care per month</b>				
Physiotherapy	106 (100)	53 400.00	503.77 ± 220.79	1.65 ± 0.72
Medical consultation	31 (29.2)	2000.00	64.52 ± 40.31	0.21 ± 0.13
Drugs cost	106 (100)	223 743.33	2110.79 ± 1550.54	6.92 ± 5.08
Laboratory test	52 (49.1)	18 500.00	355.77 ± 325.14	1.17 ± 1.07
Rad. investigations	33 (31.1)	124 458.33	3771.46 ± 5135.32	12.37 ± 16.84
Device*	78 (73.6)	72 975.00	935.58 ± 626.45	3.07 ± 2.05
<b>Total</b>		<b>495 076.66</b>	<b>7741.89 ± 7898.55</b>	<b>25.38 ± 25.89</b>
<b>Direct costs of out-of-pocket expenditure per month</b>				
Hiring nanny	23 (21.7)	76 500	3326.09 ± 1173.66	10.91 ± 3.85
Food and water	79 (74.5)	83 220	1053.41 ± 2243.71	3.45 ± 7.36
Caregiver illness	16 (15.1)	5000	312.5 ± 460.54	1.02 ± 1.51
Transportation	101 (95.3)	188 010	1861.49 ± 1435.06	6.10 ± 4.71
<b>Total</b>		<b>352 730</b>	<b>6553.49 ± 5312.97</b>	<b>21.49 ± 17.42</b>
<b>Monthly costs of outpatient management of children with CP</b>				
Direct out-of-pocket expenditure per month		352 730	6553.49 ± 5312.97	21.49 ± 17.42
Direct cost of medical care per month		495 076.66	7741.89 ± 7898.55	25.38 ± 25.89
<b>Total direct monthly cost</b>		<b>847 806.66</b>	<b>14 295.38 ± 13, 211.52</b>	<b>46.87 ± 43.32</b>

CP indicates cerebral palsy; ₦, Nigerian naira sign; rad., radiological; USD, US dollar.

\* These include orthotics, mobility devices, and positioning devices.



**Fig. 2 – Contribution of the costs of different aspect of care to direct monthly cost of providing care to children with CP. G indicates cost; CGB, caregiving burden; CP, cerebral palsy.**

finding was supported by the research report, which stated that caring for children with CP demands enormous spending on healthcare services.<sup>13</sup> Moreover, the highest monthly out-of-pocket expenditure was incurred in the hiring of nannies, but it was observed that only about 22% of the study participants actually hired a nanny. In contrast, the average monthly cost of transportation, ₦1861.49 (\$6.10), may arguably be the most important out-of-pocket expenditure since it is being incurred by more than 95% of the participants and is affordable. A similar study<sup>5</sup> reported that the cost of home modifications was highest followed by cost of transportation, supportive devices, and paid caregivers. In another study, the cost of homecare and guidance was highest, followed by cost of special equipment and rehabilitation.<sup>15</sup>

This study, however, has some limitations. The sample size may not be adequate as there was no sample size determination. Due to the absence of a comprehensive healthcare utilization register to depict the cost of healthcare for different age groups of individuals with CP in Kano City, Nigeria, the study used a cross-sectional survey to obtain cost data from caregivers of children with CP; however, a longitudinal study design may be more appropriate. Furthermore, the outcome of this study may not be representative of all patients with cerebral palsy in Nigeria, since it was conducted in only 1 city. Other possible limitations include the potential for recall bias and the fact that data collected from patients/caregivers may underestimate or overestimate the costs.

## Conclusion

The average direct monthly cost of outpatient hospital-based care for children with CP may not be affordable, considering that most

of the participants (80.4%) are of low income level. The highest direct medical care cost was incurred from radiological investigations, whereas transportation was the most important out-of-pocket expenditure. The Nigerian government should make a policy decision for the automatic enrollment of all children diagnosed with CP into the National Health Insurance Scheme.

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