Prognosis for Ambulation in Cerebral Palsy: A Population-Based Study

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ABSTRACT. *Objectives.* To determine independent predictors of ambulation among children with cerebral palsy and to develop a simple tool that estimates the probability that a child will walk.

Methods. In a retrospective study of all children with cerebral palsy who were not yet walking at 2 to 3½ years of age, while receiving services from the California Department of Developmental Services during the years 1987–1999, we analyzed medical and functional data obtained annually by Department of Developmental Services physicians and social workers. Using logistic regression analyses, we determined independent predictors of a child's ability to walk well alone at least 20 feet, without assistive devices, by age 6. We then estimated the probabilities of walking at various levels of ability over time, using multistate survival analysis.

Results. Of 5366 study subjects, 2295 (43%) were evaluated at age 6; 12.8% could walk independently and 18.4% walked with support. Independent predictors of successful ambulation included early motor milestones such as sitting (odds ratio: 12.5; 95% confidence interval: 5.8–27.2) and pulling to a stand (odds ratio: 28.5; 95% confidence interval: 13.4–60.4) when compared with lack of rolling at age 2, cerebral palsy type other than spastic quadriparesis (odds ratio: 2.2; 95% confidence interval: 1.5–3.1), and preserved visual function (odds ratio: 2.4; 95% confidence interval: 1.1–5.4). Our ambulation charts depict the probability of remaining nonambulatory, transitioning to 1 of 3 possible ambulatory states, or expiring at all subsequent ages through age 14.

Conclusion. The ambulation charts provide a simple straightforward way to estimate the probability that a child with cerebral palsy who is nonambulatory at 2 to 3½ years of age will eventually walk with or without support. *Pediatrics* 2004;114:1264–1271; *cerebral palsy, ambulation, prognosis.*

ABBREVIATIONS. GMFCS, Gross Motor Function Classification System; GMFM, Gross Motor Function Measure; CDER, Client Development Evaluation Report; DDS, Department of Developmental Services.

Parents of children with cerebral palsy frequently ask whether their children will ever walk. For health care providers of children with cerebral palsy, knowledge of future ambulatory potential may help establish appropriate treatment plans and long-range goals.

Previous studies of ambulation in cerebral palsy involved relatively small numbers of patients recruited from single clinics,[1–7] and the results were sometimes conflicting. For example, estimates of the percentage of children with spastic quadriplegia who might eventually walk ranged from 0% to 72%, depending on the study population and study design.[3,4,7]

The validated Gross Motor Function Classification System (GMFCS),[8] with motor development curves based on the Gross Motor Function Measure (GMFM),[9,10] have improved our understanding of gross motor development among children with cerebral palsy. However, we still lack a simple tool for predicting ambulation among children with cerebral palsy. The GMFM calculates a score from 66 to 88 separate items.[11] Although the majority of children at GMFCS levels I and II will achieve the ability to walk 10 steps unsupported whereas less than one-half of children at GMFCS levels III, IV, and V will do so,[10] the exact probabilities of ambulating, with and without support, based on GMFCS levels have not been reported. Finally, the GMFCS level determined in the first years of life was shown to predict walking ability at age 6 to 12[12]; however, >38% of the 85 study participants were already walking, with or without support, at 2 to 4 years of age, and the positive predictive value of GMFCS level for ambulation among individuals with more severe motor disability was as low as 62%.

Certain clinical characteristics may be useful in predicting future ambulation, including location and type of cerebral palsy, presence of epilepsy, degree of cognitive impairment, and underlying cause of cerebral palsy.[4,5,7,13] To our knowledge, no study has yet evaluated the independent or combined contributions of these factors. Therefore, more data are needed to generate estimates of prognosis for ambulation for children with cerebral palsy. In a retrospective cohort study of 5366 children with cerebral palsy who were not yet walking at 2 to 3½ years of age, we set out to determine predictors of ambulation and to develop a simple tool for estimating the probability that a child will walk.

METHODS

Study Population

Our retrospective cohort consisted of all children with cerebral palsy who were not yet walking at 2 to 3½ years of age (henceforth referred to as age 2), when they received services from the State of California Department of Developmental Services (DDS), between January 1, 1987, and December 31, 1999. The DDS provides early intervention, occupational and physical therapy, equipment, case management, respite care, and social services for all state residents with substantive disability resulting from cerebral palsy.[14] Cerebral palsy is defined as "a group of nonprogressive lesions or disorders in the brain characterized by paralysis, spasticity, or abnormal control of movement or posture, such as poor coordination or lack of balance. These disorders may be due to developmental anomalies of the central nervous system or injury of the brain during intrauterine life, the perinatal period, or within the first few months of life, and are manifest prior to age 2 or 3 years."[15(pVI.6.1)]

Measurements

Each year, individuals receiving services from DDS undergo a comprehensive evaluation that generates a document called the Client Development Evaluation Report (CDER).[15(pVI.24.6)] This report contains >200 medical, functional, behavioral, and cognitive items and is completed by physicians and social workers. A staff physician records data regarding medical diagnoses such as cerebral palsy and epilepsy, whereas a social worker determines the child's functional, behavioral, and cognitive status. The data are obtained through interviews with family members or the child's caregivers, as well as through observation of the child when possible. The inter-rater reliabilities for the motor function variables in the CDER exceed 0.85.[16]

We electronically searched all CDER records collected during the study period for children with cerebral palsy who were assigned an ambulation level of "does not walk" at age 2 years. If a child received 2 evaluations within this age range, we used data from the earlier evaluation only. We were interested in congenitally acquired cerebral palsy and therefore excluded children with diagnoses suggesting cerebral palsy of postnatal origin (traumatic brain injury, near-drowning, motor vehicle accident, brain tumor, and other acquired injuries), as well as children with diagnoses suggesting an underlying disorder other than cerebral palsy (autism and degenerative disorders). The remaining children constituted the final study population.

Clinical Information

Several clinical factors were considered potentially useful in predicting ambulation. These included type of cerebral palsy (spastic, ataxic, dyskinetic including dystonia and choreoathetosis, hypotonic, or other), distribution of limb involvement (quadriplegia, diplegia, hemiplegia, triplegia, monoplegia, or other), presence of spastic quadriplegia (yes or no), gross motor function (rolling, sitting, and standing milestones), expressive language (use of words versus no use of words), hand use (raking motion or better versus no functional use), ability to feed self (does so independently, needs assistance, or unable), history of seizures (yes or no), and legal blindness (yes or no).

Outcome Measures

We defined full ambulation as the ability to walk well alone at least 20 feet without assistive devices, on the basis of the CDER definition for ambulation at level 4, ie, "Walks well alone at least twenty (20) feet; also balances well. Clients who have an unusual or awkward gait but who are not in danger of stumbling or falling should also be rated at this level. . . . If a client typically uses a wheelchair, rate at level 1 (no ambulation)."[15] First we analyzed full ambulation at age 6 as a dichotomous outcome, among all children who survived and received a CDER evaluation at age 6 during the study years. Then we considered 3 levels of ambulation, ie, 1) walks with support or assistive devices, 2) walks unsteadily alone at least 10 feet without assistive devices, and 3) walks well alone at least 20 feet without assistive devices (full ambulation). We determined the probability of each of these outcomes at various follow-up times by using multistate survival techniques (see below).

Mortality information was obtained from annual computer files from the State of California (1987–1999) and was linked to the subjects in our study population on the basis of name, date of birth, and Social Security number when available. All children who stopped receiving an annual evaluation within the DDS and who were not identified in the state mortality database were considered to be lost to follow-up monitoring.

Statistical Methods

We used logistic regression[17] to determine predictors of full ambulation at age 6. All significant ($P < .05$) predictors of ambulation in the univariate analyses were entered into the multivariate model, and backward elimination was then used to determine the variables most significantly and independently predictive of future ambulation ($P < .10$ was used as the cutoff for retention in the model). Possible interactions were considered.

Next we estimated the probabilities of ambulation at various levels (eg, with and without support) at all ages through age 14, using Aalen-Johansen estimators of long-term transition probabilities.[18,19] This nonparametric technique of multistate survival analysis accounts for censoring and death and is similar to the Kaplan-Meier estimator used in simple survival analyses.[19] With this technique, we created "ambulation charts" that illustrate the probabilities for different states of ambulation with time.[20–22]

Finally, we partitioned the study cohort into 4 mutually exclusive groups on the basis of the early motor milestones that were found to be most strongly predictive of future ambulation. For each of these subgroups, a separate ambulation chart was created to illustrate the prognosis for ambulation specific to each group. All statistical analyses were performed with SAS statistical analysis software (version 6.12; SAS Institute, Cary, NC), and figures were created with S-Plus (version 4.0; MathSoft, Seattle, WA). All study procedures were approved by the institutional review board of the University of California, San Francisco.

RESULTS

Description of Cohort

We identified 6480 children with cerebral palsy who were nonambulatory at age 2 (Fig 1). After exclusion of those with an exclusion diagnosis, the remaining 5366 children constituted our study cohort.

The mean age at entry into the study was 2.7 years (SD: 0.4 years), and male subjects represented 56% of the study population (Table 1). At initial evaluation, more than one-third of the children could not roll over, 25% could roll but not sit, and approximately one-third could sit with minimal or no support. The majority (80%) had some functional hand use, although most could not feed themselves. One-quarter of the children exhibited at least some expressive language, 12% were legally blind, and 20% had a history of seizures. Spastic quadriplegia was the most common type of cerebral palsy, constituting 46% of our study population.

Univariate Analyses

The mean follow-up period was 5.8 years (SD: 3.6), and a total of 348 children (6.8%) had expired by the end of the study period. Of the 2295 children (43%) who were alive and evaluated at age 6, 8.5% had achieved full ambulation (could walk well alone at least 20 feet without assistive devices), 4.3% could walk unsteadily alone at least 10 feet without assistive devices, and 18.4% could walk with support or assistive devices. Children whose outcomes at age 6 were not available included 1128 (21%) who were not yet 6 years of age at the end of the study period, 857 (16%) who were seen after age 7 but had not undergone a CDER evaluation at age 6, 793 (15%) who
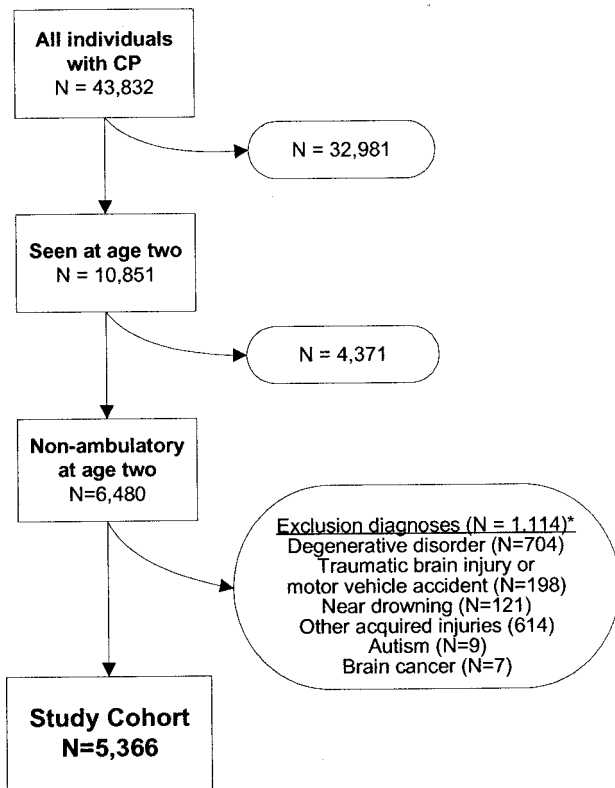
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All individuals
with CP
N = 43,832
          → N = 32,981

Seen at age two
N = 10,851
          → N = 4,371

Non-ambulatory
at age two
N=6,480
          → Exclusion diagnoses (N = 1,114)*
             Degenerative disorder (N=704)
             Traumatic brain injury or
             motor vehicle accident (N=198)
             Near drowning (N=121)
             Other acquired injuries (614)
             Autism (N=9)
             Brain cancer (N=7)

Study Cohort
N=5,366
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Fig 1. Selection of the study cohort. *Children who were excluded sometimes had >1 exclusion diagnosis.

were lost to follow-up monitoring, and 293 (6%) who had expired by age 6.

Univariate predictors for full ambulation included type and location of cerebral palsy, motor and language function, and presence of visual impairment (Table 2). As expected, motor milestones were particularly strong predictors of eventual ambulation. For instance, the odds of achieving full walking were 26 times higher for children who were sitting without support at 2 years of age than for those who could not yet roll over at the initial evaluation. Ataxia and hypotonic cerebral palsy were associated with better prognoses for future ambulation than were spastic and dyskinetic cerebral palsy. Increasing hand function, the ability to feed self or say simple words, lack of visual impairment, and lack of seizures were also associated with better chances of achieving full ambulation.

Multivariate Analysis

To determine independent predictors of ambulation, we entered all factors associated with ambulation in the univariate analyses into a logistic regression model. The clinical factors independently associated with successful ambulation at age 6 included early motor milestones such as the ability to sit or pull to a stand, the absence of spastic quadriplegia, and the absence of blindness (Table 3). Other variables, such as hand use, expressive language, and epilepsy, did not provide additional information beyond that obtained from the significant predictors identified in the multivariate model.

TABLE 1.   Clinical Characteristics of 5366 Children With Cerebral Palsy Who Were Nonambulatory at 2 Years of Age

	No.	%
Gender		
Male	3029	56.4
Female	2337	43.6
Ethnicity		
White	1849	34.5
Hispanic	1946	36.3
Black	535	10.0
Asian	242	4.5
Other	454	8.5
Unspecified	340	6.3
Type of motor dysfunction		
Spasticity	3348	62.4
Ataxia	110	2.1
Dyskinesis (dystonia or athetosis)	120	2.2
Hypotonia	884	16.5
Other (including mixed)	904	16.9
Location of motor dysfunction		
Quadriplegia	3733	69.6
Diplegia	633	11.8
Hemiplegia	310	5.8
Monoplegia	83	1.5
Triplegia	62	1.2
Other	545	10.2
Rolling and sitting		
Does not roll over	2086	38.9
Rolls front to back only	331	6.2
Rolls front to back and back to front	981	18.3
Sits with support at least 5 min	717	13.3
Sits independently at least 5 min	433	8.1
Assumes and maintains sitting position	818	15.2
Crawling and standing		
Does not crawl, creep, or scoot	3155	58.8
Crawls, creeps, or scoots	1370	25.5
Pulls to a stand	320	6.0
Stands with support 1 min	442	8.2
Stands unsteadily alone 1 min	47	0.9
Stands well alone 5 min	32	0.6
Hand use		
No functional use of hand	1091	20.3
Rakes or grasps with hand	2574	48.0
Has pincer grasp	911	17.0
Uses fingers independently	790	14.7
Eating		
Does not feed self	3352	62.5
Finger-feeds but needs assistance	762	14.2
Finger-feeds self without assistance	1252	23.3
Expressive language		
Uses no words	4027	75.0
Says simple words at least	1339	25.0
Vision		
Legally blind	663	12.4
Not legally blind	4703	87.6
Seizures		
Seizures within the past year	916	17.0
History of seizures, none in past year	186	3.5
No history of seizures	4264	79.5

Ambulation Charts

We then graphed the probabilities of achieving 3 levels of ambulation at various follow-up times. The resulting ambulation chart (Fig 2) illustrates the probability of remaining nonambulatory at subsequent ages or transitioning to 1 of the 4 possible states (expired, walks with support or assistive devices, walks unsteadily alone at least 10 feet without assistive devices, or walks well alone at least 20 feet without assistive devices). The ambulatory outcomes at age 7 can be determined by examining the vertical line depicted in Fig 2. As indicated by the line segments designated with the letters A through F, the

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TABLE 2. Univariate Odds Ratios for Achieving Full Ambulation by 6 Years of Age Among 2295 Children With Cerebral Palsy Who Were Nonambulatory at 2 Years of Age

	Odds Ratio	95% Confidence Interval	P Value
Gender			
Male	1.0	Ref	Ref
Female	1.0	0.7–1.3	.82
Ethnicity			
White	1.0	Ref	Ref
Hispanic	1.2	0.8–1.7	.43
Black	1.5	0.9–2.4	.10
Asian	1.4	0.7–2.7	.31
Other	1.2	0.7–2.2	.48
Unspecified	1.3	0.7–2.4	.50
Type of motor dysfunction			
Spasticity	1.0	Ref	Ref
Ataxia	3.7	1.7–8.3	.001
Dyskinesis (dystonia or athetosis)	1.0	0.3–3.2	.96
Hypotonia	2.4	1.7–3.5	.001
Other (including mixed)	1.7	1.2–2.5	.01
Location of cerebral palsy			
Quadriplegia	1.0	Ref	Ref
Diplegia	2.4	1.6–3.6	.0001
Hemiplegia	4.3	2.7–6.7	.0001
Monoplegia	3.3	1.3–8.2	.01
Triplegia	1.9	0.6–6.5	.29
Other	2.0	1.3–3.2	.002
Spastic quadriplegia			
Present	1.0	Ref	Ref
Absent	3.5	2.4–4.9	.0001
Rolling and sitting			
Does not roll over	1.0	Ref	Ref
Rolls but does not sit	4.2	1.9–9.1	.0003
Sits with support	7.6	3.4–16.9	.0001
Sits without support	26.1	12.6–54.0	.0001
Crawling and standing			
Does not crawl, creep, or scoot	1.0	Ref	Ref
Crawls, creeps, or scoots	3.1	2.1–4.6	.0001
Pulls to a stand at least	9.8	6.7–14.4	.0001
Hand use			
No functional use of hand	1.0	Ref	Ref
Uses raking motion or grasps	5.1	2.2–11.7	.0002
Has pincer grasp	10.5	4.4–24.6	.0001
Uses fingers independently	15.6	6.7–36.6	.0001
Eating			
Does not feed self	1.0	Ref	Ref
Finger-feeds but needs assistance	1.8	1.2–2.9	.007
Finger-feeds without assistance	2.9	2.1–4.0	.0001
Expressive language			
Uses no words	1.0	Ref	Ref
Says simple words at least	2.1	1.5–2.8	.0001
Vision			
Legally blind	1.0	Ref	Ref
Not legally blind	3.7	1.7–8.0	.001
Epilepsy			
Seizures within the past year	1.0	Ref	Ref
History of seizures, none in past year	0.3	0.1–1.4	.09
No history of seizures	1.1	0.7–1.6	.73

Odds ratios refer to the odds of being able to walk well alone at least 20 feet without assistive devices, compared with the odds of not doing so by age 6. Ref indicates the reference group, with odds ratio of 1.0 by definition.

majority of children still could not walk by age 7 and 8% had expired. Of the 27% who had achieved ambulation by age 7, approximately one-third could walk without support (Table 4).

We then created 4 separate ambulation charts, each depicting the ambulatory potential of children sharing a similar motor developmental profile at 2 years of age (Fig 3). As expected, children who were not rolling by age 2 years demonstrated the lowest probability of achieving ambulation and the highest mortality rate. However, a small proportion (2%) of these children did eventually walk without support

by age 7 (Table 4). Similarly, among children who were unable to sit independently but who could roll at the study onset, 7% could walk without support by age 7 and an additional 20% could walk with support. For children who were already pulling to a stand by 2 years of age, the likelihood of walking with or without support by age 7 was as high as 75%. In a separate analysis, we found that, among all children who were alive, uncensored, and fully ambulatory at age 10, 65% had become fully ambulatory by age 6 and 96% had at least walked with support by age 6.

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TABLE 3. Multivariate Odds Ratios for Achieving Full Ambulation by 6 Years of Age Among 2295 Children With Cerebral Palsy Who Were Nonambulatory at 2 Years of Age

	Odds Ratio	95% Confidence Interval	P Value
Motor milestones			
Does not roll	1.0	Ref	Ref
Rolls, does not sit without support	4.6	2.2–9.6	.0001
Sits without support,* does not stand	12.5	5.8–27.2	.0001
Pulls to stand	28.5	13.4–60.4	.0001
Type of cerebral palsy			
Spastic quadriplegia	1.0	Ref	Ref
Other	2.2	1.5–3.1	.0001
Vision			
Totally or legally blind	1.0	Ref	Ref
Not blind	2.4	1.1–5.4	.03

Odds ratios refer to the odds of being able to walk well alone at least 20 feet without assistive devices, compared with the odds of not doing so by 6 years of age. Ref indicates reference group, with odds ratio of 1.0 by definition.
* Sitting refers to the ability to maintain a sitting position without support or the ability to achieve a sitting position on one's own.
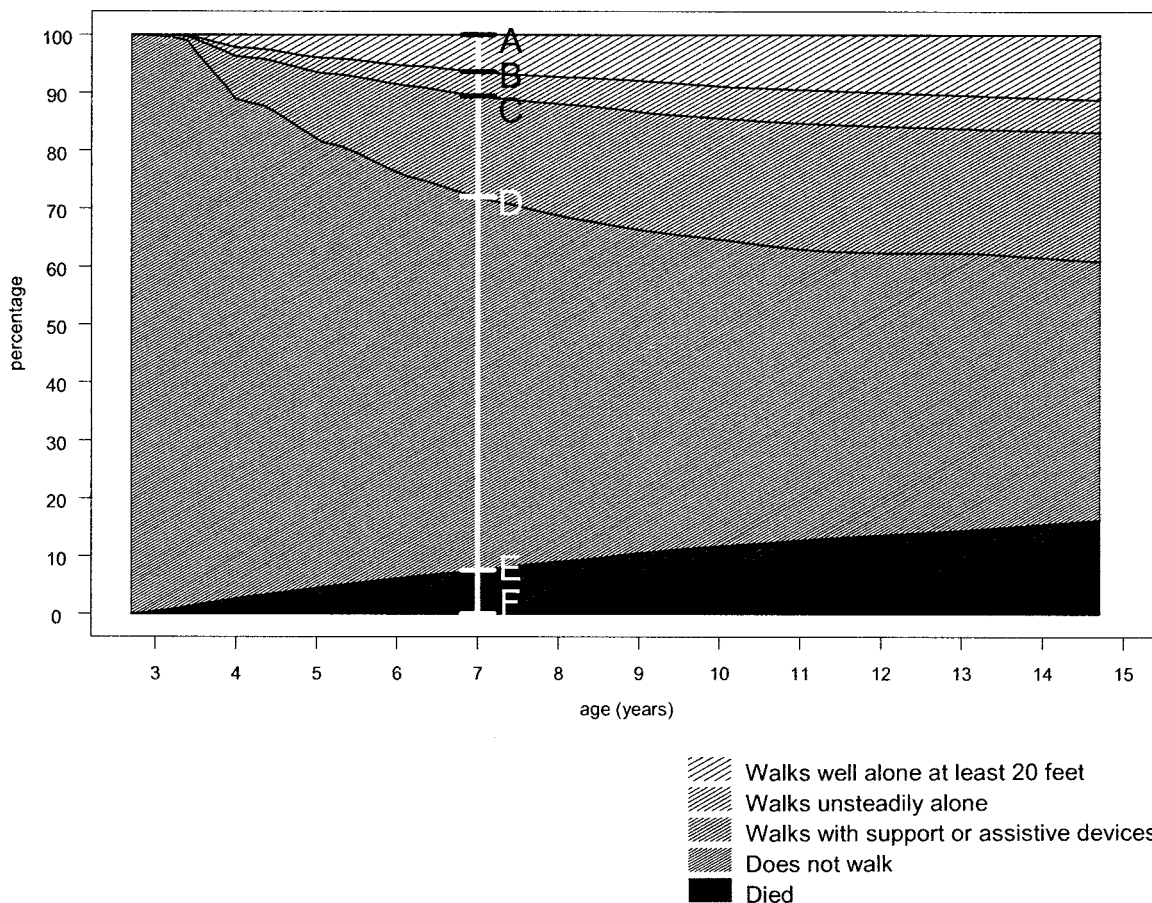
Fig 2. Ambulation chart showing probabilities of various levels of ambulation with time for children who were initially nonambulatory at a mean age of 2.7 years. Letters A through F indicate the various percentages of the 5 possible outcomes at age 7 (Table 4).

DISCUSSION

In this largest study of cerebral palsy and ambulation reported to date, we found that, among children who were not yet walking at age 2, 10% were able to walk independently by age 6 to 7 and an additional 17% could walk with support. The clinical factors most useful in predicting future ambulation were motor milestones at age 2 (ability to roll, sit, or stand), the type of cerebral palsy, and blindness. On the basis of motor function at age 2, the prognosis for future ambulation can be determined at each subsequent year of age with ambulation charts that reflect the experience of 5366 children with cerebral palsy, 3152 of whom were monitored past age 6.

Previous studies of cerebral palsy focused on persistent primitive reflexes, levels of motor function, and clinical type of cerebral palsy as predictors of future ambulation.[4–7,13] The ability to sit by 2 years of age was emphasized as a particularly strong predictor of ambulation. For instance, pre-

TABLE 4. Probability of Walking at 7 Years of Age, Stratified by Motor Milestones at 2 Years of Age

Ambulation at Age 7	Vertical Segment*	Probability, %				
		Entire Cohort (N = 5366)	Does Not Roll (N = 1733)	Rolls, Does Not Sit† (N = 2382)	Sits, Cannot Pull to Stand (N = 636)	Pulls to Stand (N = 615)
Walks well alone	AB	6	1	4	11	28
Walks unsteadily alone	BC	4	1	3	8	16
Walks with support	CD	17	5	20	31	32
Does not walk	DE	64	78	68	47	23
Died	EF	8	15	5	2	2

* Refers to vertical segments depicted on Figure 2.
† Sitting refers to the ability to maintain a sitting position without support or the ability to achieve a sitting position on one's own.
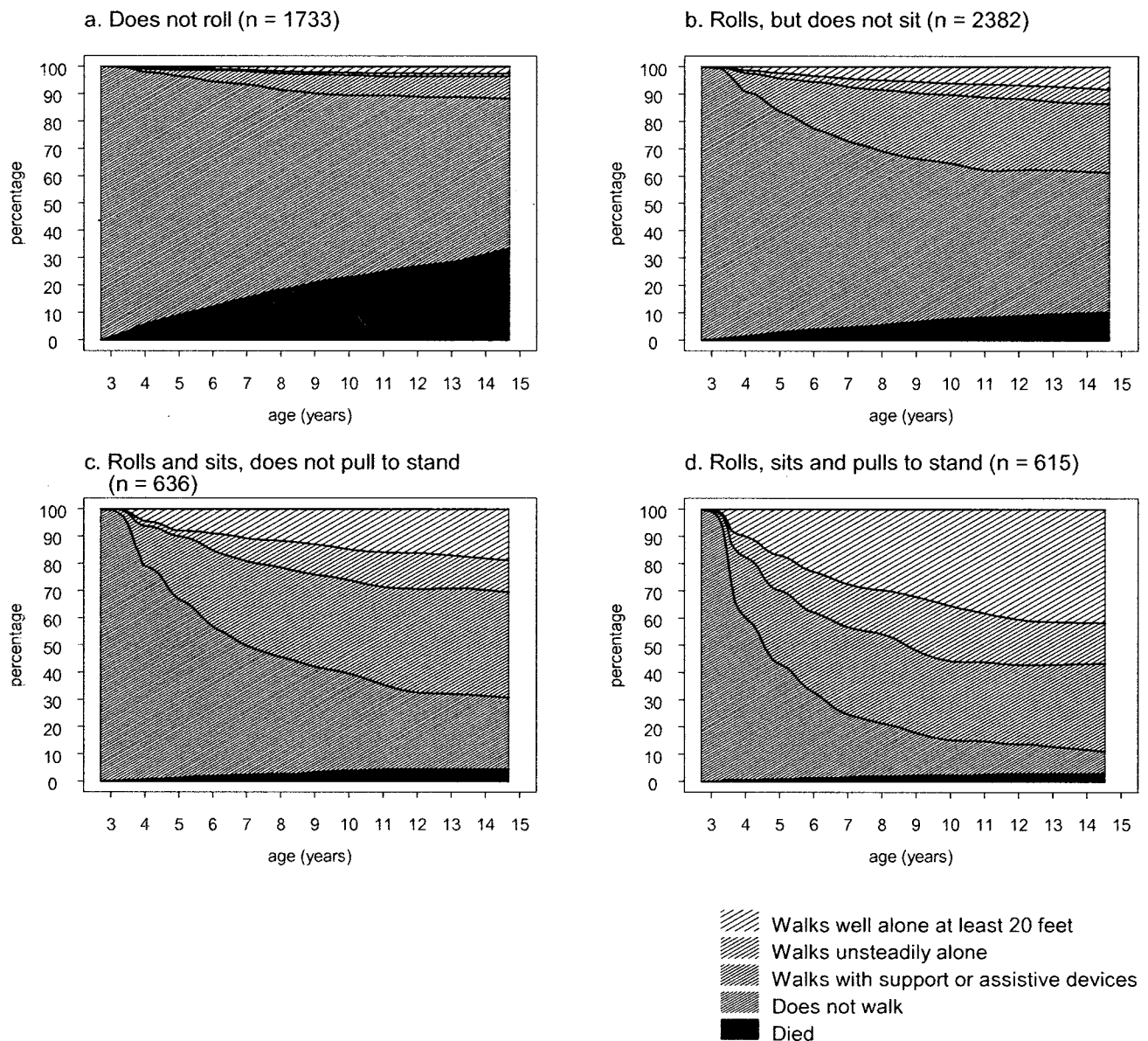
Fig 3. Ambulation charts showing probabilities of various levels of ambulation with time for children who were initially nonambulatory at a mean age of 2.7 years, stratified according to early motor milestones at age 2. Rolling refers to the ability to roll over from front to back or from back to front. Sitting refers to the ability to maintain a sitting position without support or the ability to achieve a sitting position on one's own.

vious studies found that 98 to 100% of children who could sit by age 2 eventually walked with or without support.[3,7] Those studies were smaller, however, and others found that >60% of children with cerebral palsy who eventually walked did not sit until after age 2.[4] Although most previous studies defined sitting as the ability to maintain a seated position independently after being placed

in this position by others,[3,7] not all studies provided a clear definition of sitting.[4]

In our study, the ability to maintain a sitting position independently at age 2 was a good prognostic sign for future ambulation. However, if a child was not also pulling to a stand at that age, then we found only a 50% chance of walking with or without support by age 6. Among children who were both sitting and pulling to a stand at age 2, 76% could walk with or without support by age 6.

Our study is subject to a number of important limitations. First, children with milder motor dysfunction might have been preferentially lost to follow-up monitoring. This would result in a study population with a greater proportion of severely affected children, and the chance of walking would be higher than that depicted in our results. Second, compared with the ethnic composition of California described in the 2000 census (60% white and 7% black), our cohort included a smaller proportion of whites (35%) and an overrepresentation of blacks (10%). Some of this discrepancy might be explained by the different coding systems used to record ethnicity and race, as well as by the increased prevalence of cerebral palsy noted among blacks.[23,24] However, the ethnic disparity may also reflect the tendency of individuals of higher socioeconomic status to forego state-sponsored services in favor of other benefits that are available to them through private insurance or other means.

Other limitations include the fact that the interrater reliabilities of terms such as spastic quadriplegia and dystonic have not been adequately studied and the fact that specific details regarding the type of sitting (eg, "W-sitting") and the quality of ambulation were not available to us. In addition, our data did not include neuroimaging findings or the types of physical therapy and spasticity treatments received. Finally, our measure of ambulation ability did not provide information regarding the actual amount of time that the child walked in various conditions and environments. These limitations are offset by several strengths of the study, including the large numbers, the ability to provide prognostic information regarding several different levels of ambulation with time, and the analysis of several different types of clinical factors together in a multivariate model, to determine the most useful independent predictors of future ambulation.

In a comprehensive prospective study of gross motor function among 657 children with cerebral palsy,[10] it was found that classification into 1 of 5 GMFCS strata was useful for predicting the ability to walk 10 steps unsupported. Specifically, children who functioned at the higher GMFCS levels (I and II) had an excellent chance of achieving this motor milestone, with the assumption that they stayed within their GMFCS levels with time,[12] whereas less than one-half of children at GMFCS level III achieved this goal. Our results are consistent with those previous findings. Although we did not include children at GMFCS level I, because by definition those who could already walk at age 2 were excluded, our children who could sit independently and pull to a stand (GMFCS level II) had an ~40% chance of achieving full ambulation by age 14, whereas very few of those who could roll but not sit independently (GMFCS level IV) eventually reached this goal.

Previous work suggested that, on average, children with cerebral palsy reach 90% of their motor potential (as measured with the GMFM-66) by age 5 and those with a greater degree of motor disability have gross motor function curves that plateau even earlier.[10] Similarly, we found that, among those who achieved full ambulation by age 10, the majority had already done so by age 6 and almost all (96%) were at least walking with support by age 6.

For families and practitioners caring for children with cerebral palsy, the ambulation charts can provide useful information in a simple straightforward way. On the basis of a child's motor ability at age 2, the probability that a nonambulatory child will walk with or without support at any subsequent age through age 14 can be determined. Although it is impossible to say where any individual child will be in the range of ambulation potential with time, these probabilities derived from a large population of similarly affected children may help guide interventions such as physical therapy.

How ambulation potential changes as a child with cerebral palsy enters adolescence deserves additional study. Adults with cerebral palsy often experience a decline in walking ability, attributed to increasing fatigue, inefficiency of ambulation, or increased joint pains.[25–27] However, this loss of ambulation is documented primarily among adults >20 years of age, and studies of ambulation among children rarely include adolescents. Our data suggest that, on average, children continue to gain ambulation potential into their early teens. This is consistent with the finding that some adults with cerebral palsy can improve in walking ability even into their early twenties.[26] However, our study spanned a period of only 12 years, and a child who was 2 years of age at the beginning of the study could be monitored at most until 14 years of age. Additional work is needed to determine the prognosis for ambulation among children with cerebral palsy as they enter their teenage years.

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THE POLITICS OF CONSUMPTION

"American output per worker hour increased by 60% from the 1870s to 1900. It rose again another 69% in the next 20 years. That productivity, more than legal reforms, became the base for the consumers' democracy. The decline of a political vision of social equality made a culture of mass consumption seem a natural and inevitable alternative. Increasingly more fragmented, mobile, and unorganized, Americans joined 'consumption communities' that did not require an active citizenry but were comprised, according to historian Daniel Boorstin, of 'people who have a feeling of shared well-being, shared risks, common interests, and common concerns that come from consuming the same kinds of objects.' Americans defined their status and dismissed boredom and anxiety by joining the crowd who bought Life Savers . . . or Lincolns."

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Submitted by Student