THE ASSESSMENT OF RESULTS IN THE CONSERVATIVE TREATMENT OF CEREBRAL PALSY

BY

J. H. CROSLAND

From St. Margaret's School for Cerebral Palsy, Croydon

(RECEIVED FOR PUBLICATION APRIL 14, 1950)

In order to assess the progress made by a child undergoing treatment for the physical defects associated with cerebral palsy, it is necessary to adopt a scheme which is simple, easy to work, capable of alteration and, above all, free from ambiguity. Such terms as 'improved,' 'making progress,' mean little or nothing and lead to a dangerous self-deception on the part of those employed in any scheme of treatment. Complicated assessments sooner or later succumb to human error and become observed in the breach. Inelastic schemes need constant recasting.

The following procedure is based on the use of skill charts very similar to those designed by Phelps. It will be seen that these charts are expressed entirely in terms of physical functions and that these functions are of the simplest form, but are, at the same time, fundamental for complete physical ability. In this scheme the skill charts are of two kinds, viz., physiotherapy charts and occupational therapy charts. This merely represents the division of the work undertaken by the two departments, and the arrangement can be altered where no occupational therapy department exists. The physiotherapy charts show the functional ability of the lower limbs and trunk muscles rather than that of the upper limbs, though, for a few, upper limb movement is also necessary. On the other hand, the occupational therapy charts are almost exclusively concerned with upper limb and neck function. Taken together they give a very fair idea of a child's physical ability and, if any one is missing, he cannot be said to possess normal function. Each child should be tested every month and the charts filled up accordingly. If necessary, graphs of the progress made in selected functions can be drawn, and are particularly useful in stimulating a child's interest in his achievement. There are, of course, obvious criticisms. For instance, a child may be able to perform the necessary movement, but the quality of that movement may not be good. Nevertheless, quality can be learnt only after the movement can be performed. Again, a child may be able to perform 127 of the total of 128 skills and yet not walk downstairs without aid. It is, however, very unlikely that one missing function would persist when all the others had been learnt.

Skill Tests

Physiotherapy

ROLLING

Back to abdomen over R. arm.
Back to abdomen over L. arm.
Abdomen to back over R. arm.
Abdomen to back over L. arm.
Back to either side.
Abdomen to either side.

CRAWLING

Prone: can hold head, shoulders, and chest off floor momentarily.
Prone: can sustain the above.
Prone: can hold L. hip off floor.
Prone: can hold R. hip off floor.
Prone: can hold both hips off floor momentarily.
Prone: can sustain the above.
Prone: can progress using arms only.
Can support weight on all fours momentarily.
Crawls and reciprocates limbs to move along.
Supine: flexes knees and reciprocates to progress.

SITTING

Tailor fashion with support at hips only.
Tailor fashion, alone momentarily.
Tailor fashion, sits alone.
Sits in straight chair unsupported and untied.
Sits unsupported on stool.

RECIPROCATION

Has active assisted leg reciprocation in lying.
Has active leg reciprocation lying.
Reciprocates legs while standing with support.
Reciprocates legs while standing without support.

Physiotherapy (cont.)

BALANCE

Pulls from sitting to standing.
Kneels unsupported momentarily.
Kneels unsupported.
Supports own weight with help.
Supports own weight holding furniture.
Stands unsupported momentarily.
Stands unsupported.
Has R. leg balance momentarily.
Has R. leg balance sustained.
Has L. leg balance momentarily.
Has L. leg balance sustained.
Knows correct way to fall.
Regains standing position after falling with help.
Regains standing position after falling without help.

WALKING (with and without callipers recorded separately)

Walks holding on to furniture.
Walks in parallel bars.
Walks and turns in parallel bars.
Walks on skis with assistance.
Walks and turns on skis unaided.
Walks with doll's pram.
Walks with minimal support.
Walks unaided on floor.
Walks unaided on pavement.
Walks unaided on grass.
Walks 50 steps in one minute.
Walks upstairs with help.
Walks upstairs holding rail.
Walks upstairs without aid.
Walks downstairs with help.
Walks downstairs holding rail.
Walks downstairs without aid.
Walks with correct posture.

Occupational Therapy (right and left hands recorded separately)

FEEDING

Can grasp spoon.
Can release grasp on spoon.
Can pick spoon from table.
Can take hand to mouth.
Can take spoon to mouth.
Can put food into mouth from spoon without spilling.
Can take all the food from spoon into mouth.
Can use fork.
Can use a spoon and fork.
Can use a knife and fork.
Can put biscuit or sandwich into mouth.
Can drink from mug, cup, or glass half filled.
Can drink from mug, cup, or glass filled.
Can drink through a straw.

DRESSING

Can take off sock.
Can put on sock.
Can take off pullover.
Can put on pullover.
Can undo large buttons.
Can undo small buttons.
Can do up large buttons.
Can do up small buttons.
Can take off cardigan.
Can put on cardigan.
Can take off shoes.
Can put on shoes.
Can lace up boot.
Can tie a knot.
Can tie a bow.
Can knot a tie.
Can brush and comb hair.
Can fix grip or slide in hair.

DRAWING

Can keep hands flat on 15 sq. in. paper.
Can draw a circle inside a 2 in. square.
Can draw inside ½ in. square.
Can draw recognizable objects.
Can hold paper still when drawing.
Can turn pages of book.
Can sit on ordinary chair at ordinary table when drawing.

Procedure

In the completed table showing the progress made by 34 children at present in St. Margaret's School, it will be seen that the physiotherapy and occupational therapy skills have been added together. This has been done purely to save space. At St. Margaret's School these records are kept separately, and it is possible to see at a glance where the incidence of the handicap is greatest, and whether the child is responding better to one or other of the two forms of therapy. This arrangement shows where alterations in treatment schedules should be made. Taken over a period of years it should be possible to gain a reasonable idea of the types and ages likely to benefit most.

Examination of the figures in Table 1 provides some more general information, although its value is limited by several factors: (1) The groups of cases of different types are small. (2) The patients are a selected group of children over 5 years old, with handicaps which had prevented them from going to school but were not severe enough to make them bedridden. They are not subject to frequent epileptic attacks. These children were chosen because they appeared, when examined by a paediatrician and myself, usually with the help of a psychologist, to offer the possibility of a good response to treatment. Furthermore, they are the patients who were at the school in December, 1949. One who was admitted in that month has been omitted, and also 18 who improved enough to go to other schools before December, 1949. Of a further 13 discharged before that date three went

to other institutions for cerebral palsy and 10 were discharged as unsuitable for treatment and represent early errors in selection. (3) With this set of tests, it is easier to make a large numerical advance from an initial low score than from a high one. Thus the 16 children with initial scores of 9-75 improved on the average by 28, while for those with initial scores of 76 to 104 the figure was 12. Due allowance for this must be made in considering improvement in relation to other factors. For example, age may affect the degree of improvement, although one would not expect it to do so in children over 5 years old, as almost all the skills are normally acquired at a much younger age. The 13 children aged 4-5 years improved by an average of 25 skills, but their average score on admission was 70. The 20 older children improved by 17, but their average initial score was 79. (4) The duration of treatment must affect the results if treatment is effective at all (Table 2).

TABLE 1

EVALUATION OF SKILLS BEFORE AND AFTER TREATMENT

Case No.	I.Q.	Age on Admission (Years)	Skills on Admission (Possible Maximum 128)	Duration of Treatment (Months)	Added Skills After Treatment
Hemiplegia					
1	93	5	78	18	19
2	116	6	95	11	10
3	92	6	104	9	2
4	70	8	56	34	24
Paraplegia					
5	116	5	103	6	3
6	93	5	62	27	40
7	90	7	65	35	28
8	90	5	73	3	30
9	76	7	98	19	8
10	94	7	95	3	3
11	118	4	76	37	28
Spastic Tetraplegia					
12	107	5	66	27	34
13	114	10	67	32	23
14	85	7	34	35	31
15	85	6	69	27	32
16	90	5	59	27	39
17	120	6	84	6	14
18	120	4	61	3	5
19	91	7	91	20	13
20	92	7	96	6	8
Athetoid Tetraplegia					
21	90	5	65	34	36
22	140	7	79	34	25
23	140	8	82	9	9
24	137	7	77	6	10
25	109	5	37	34	36
26	116	9	94	20	9
27	100	6	76	20	25
28	90	11	73	37	27
29	115	6	9	30	25
30*	84	5	68	26	39
31*	75	7	90	5	7
Ataxia					
32	103	9	98	9	2
33	98	4	86	6	15

* Tension athetoid.

TABLE 2

EFFECT OF DURATION OF TREATMENT ON NUMBER OF SKILLS ACQUIRED

Duration of Treatment (years)	No. of Patients	Average No. of Skills Acquired
Under 1 ..	13	9
1–1½ ..	5	15
2–3½ ..	15	31

Intelligence

The intelligence quotients of these children were calculated after repeated testing by Miss E. M. Dunsdon and Mrs. H. Clark working independently. In most cases the difference between the estimates was small. In Table 1 the mean of the intelligence quotients obtained by the two observers is stated. In 18 children the I.Q. was between 70 and 99 (average 88); in the other 15 children it was 100 to 140 (average 119). The two groups were fairly evenly balanced in respect of age, type of paralysis (Table 2), number of skills on admission, and duration of treatment (Table 3). Contrary to

TABLE 3

AVERAGE INCREASE OF SKILLS RELATED TO DURATION OF TREATMENT

I.Q.	Average Duration of Treatment (months)	Average Score on Admission	Average Increase with Treatment
70–99	21	77	22
100–140	17	74	18

expectation, the average increase in the score of skills was not lower in the children with low I.Q.s than in the highly intelligent children. This observation, based on the performance of a small selected group of children, none of whom was mentally defective, is perhaps not generally applicable, but one is so accustomed to the idea that high intelligence is needed if a child with cerebral palsy is to benefit much from skilled therapy that it is encouraging to find that some of the less intelligent can do well. Doubtless they will not benefit to a similar degree from further education, for these records of skills represent elementary achievements, which are nevertheless of immense practical value.

Types of Disease

In a similar way the progress of cases of different neurological types may be considered. There are too few hemiplegics and ataxics for this purpose, but children with paraplegia, spastic tetraplegia, and athetoid tetraplegia may be compared (Table 4). In paraplegics the effect is difficult to assess as they

TABLE 4

EFFECT OF DURATION OF TREATMENT ON NUMBER OF SKILLS ACQUIRED RELATED TO TYPE OF PALSY

Type	No. of Patients	Average I.Q.	Average Duration of Treatment (months)	Average Score on Admission	Average Increase with Treatment
Spastic paraplegia	7	95	19	82	20
Spastic tetraplegia	9	109	20	70	22
Athetoid tetraplegia	11	109	23	68	23

had already acquired manual skills, and thus had less opportunity to increase their scores. Spastic and athetoid tetraplegics improved about equally, and this again is surprising and encouraging, for we are accustomed to think that spastic tetraplegia holds a much less favourable prognosis compared with athetosis. Evans's (1946) experience that 90% of athetoid and 10% of spastic children are educable may be generally true, but it was not so in this small group.

Summary

A scheme for the assessment of progress in the treatment of cerebral palsy is described. Results obtained at St. Margaret's School since November, 1946, are tabulated. With these tests, it is easier to make a large numerical advance from an initial low score than from a high one.

In these cases greater improvement was observed with prolonged than with brief treatment. Improvement was not less in children with relatively low intelligence quotients than in the more intelligent, and spastic tetraplegia was as suitable for treatment as athetoid tetraplegia.

Sincere thanks are due to Miss P. Mayer, C.S.P., and Miss E. Byard, M.A.O.T., for their help in compiling the statistics.

REFERENCES

Evans, E. S. (1946). *Proc. R. Soc. Med.*, **39**, 6.