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Observational skills for identifying babies with CP

Abstract

Diagnosis of cerebral palsy is acknowledged as being difficult, with some cases remaining unidentified until two years of age. This study aimed to determine whether a training video enhanced health professionals' ability to identify abnormal motor signs in babies, which might indicate cerebral palsy. A within groups comparison using repeated measures was used. Twenty-nine health visitors and 29 GPs were recruited and subjects recorded any abnormal motor signs seen in babies on two assessment videos, one seen before and one after a training videotape. Analysis was by non-parametric statistics. The probability value for statistical significance was set at 5% ($p<0.05$). After seeing the video, groups improved significantly in their ability to detect signs of abnormal movement: health visitors p=<0.002; GPs p=<0.000. Health visitors' rates of correct diagnoses remained unchanged, but GPs showed an increase in incorrect diagnoses of normal babies after seeing the video p=0.013. The training video appeared to be effective in improving the ability of GPs (and trainees) and health visitors to detect abnormal movement in videotapes of babies over the short term. It did not appear to effect a positive change in diagnosis rates in this training situation.

Key words: Cerebral palsy, health visitor, GP, diagnosis, motor disorder

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The average GP sees one to two new children with CP in their working life... the average health visitor one new baby every five to 10 years[5]

Virginia Knox
Senior research physiotherapist
Bobath Centre for Children with Cerebral Palsy, London

Introduction

Early treatment of cerebral palsy

There is a widely-held view that early treatment can mitigate against the effects associated with cerebral palsy[1] and can lead to greater developmental progress.[2] However, late diagnosis is a problem in a significant percentage of children, with some remaining unidentified until two years of age. Abnormal movement patterns may then be habitual and deformities may have developed.[3]

Difficulty of diagnosis

Many factors contribute to the acknowledged difficulty of diagnosing cerebral palsy. Prevalence of cerebral palsy is 2 to 2.5:1000 live births.[4] Due to low prevalence, there is little opportunity for GPs or health visitors to practice diagnostic skills. Although both professions would usually refer on to a child development centre and/or paediatrician for final diagnosis, the initial suspicion of a diagnosis is often identified by those professions working in primary care.

The average GP sees one to two new children with CP in their working life and the average health visitor sees one new baby every five to 10 years.[5] Time allocated to the professions for training in developmental surveillance is limited, so the emphasis is on normal child development and common treatable conditions.[5]

Cerebral palsy is an 'umbrella' term, that includes many different motor disorders with different aetiologies, all grades of severity and a wide variety of cognitive ability. There are no accepted minimal diagnostic criteria, that is, no specific criteria have been identified, which if present indicate that cerebral palsy is definitely present. Substantial between and within observer diagnostic variability has been demonstrated.[6]

Methods of assessment that may lead to a diagnosis can include taking a history, checking milestones and physical examination, including eliciting reflexes and assessing tone. In suspected cases of cerebral palsy, the history does not always help to confirm or refute suspicion.

Risk factors known to be associated with a higher incidence of cerebral palsy include the complications of extreme prematurity such as low birthweight and intra-ventricular haemorrhage.[7] Also, there are perinatal risk factors such as prolapsed umbilical cord, breech birth and birth asphyxia.[7] However, the majority of children with such risk factors will not turn out to have cerebral palsy. Therefore, giving too much weight to a history including several risk factors could lead to over-diagnosis. Conversely, up to 21% of cases of cerebral palsy have no clear aetiology, which due to the lack of clear risk factors can lead to under-diagnosis.[8]

The importance of achievement or delay in attaining motor milestones can be over-emphasised or misinterpreted, respectively. There is a wide distribution of age during which acquisition of a motor skill is within normal limits.[9] Most late walkers do not have cerebral palsy and conversely many children with cerebral palsy achieve their early milestones within the time designated as 'normal'. Ignoring how a milestone is achieved may lead to overlooking pathology. For example, a baby may lift its head up while in prone at the appropriate age, however if its head is abnormally high or other aspects of motor development are delayed, this may be due to an increase in abnormal extensor muscle tone indicative of a neurological problem.[10]

The assessment of primitive reflexes is often a part of the diagnostic process. However, primitive reflexes as a group 'are the least reliable and valid predictors of later motor handicap'[11] (p339). Standardised developmental tests such as the Griffiths Locomotor assessment and the Denver Developmental Screening assessment are occasionally used in primary care, but time limitations exist for training and using a test does not guarantee effective developmental surveillance.[12-13]

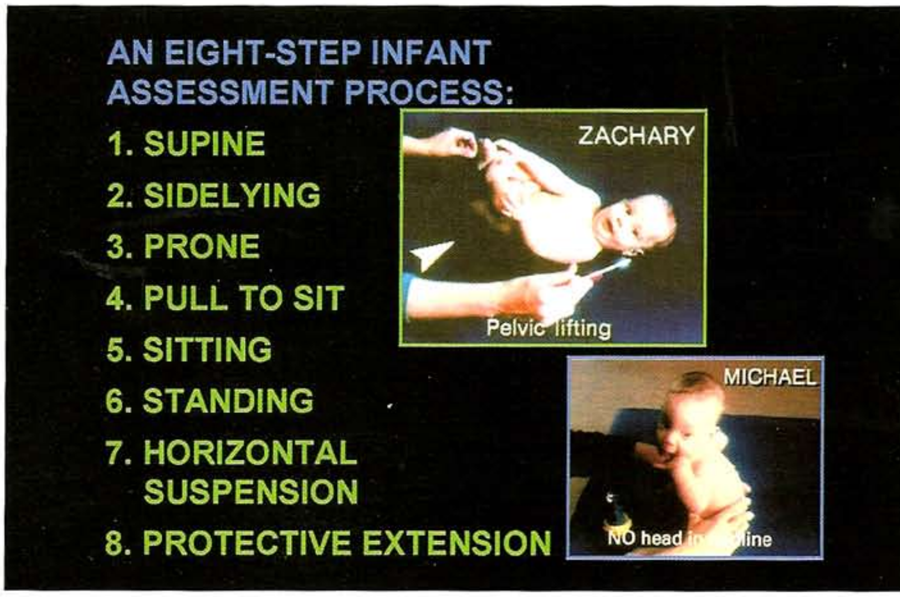
Many authors agree that analysis of movement that deviates from the norm is of greater diagnostic value than assessment of muscle tone and primitive reflexes alone.[12,14-15] Observation of the spontaneous movements of the premature[16] and term infant[17] has been used as a diagnostic tool. A stronger correlation between later abnormal neurological outcome and movements identified as being abnormal than with neurological examination[17] or ultrasound scan results has been found.[16]

Skills in observing the difference between normal and abnormal movement in infants are perhaps those skills where there is least opportunity for practice for health professionals. Video instruction might prove a useful training tool.

Use of video for training purposes

The use of video has been shown to be more effective than traditional methods of teaching in improving retention and developing clinical skills.[18-20] Medical students receiving video instruction, in addition to or instead of other media, for example didactic lecture or audiotapes, showed greater improvement in their interpretation of abnormal movements, greater diagnostic reliability of rare neurological conditions and demonstrated improved clinical skills.[21-23]

The purpose of this study was to determine whether the use of an educational video was effective in enhancing health professionals' ability to identify babies with abnormal motor signs.



Method

Subjects

A geographically convenient sample was used, consisting of groups of health professionals who met for continuing professional development: 29 health visitors from two South London PCTs who met in two different groups for training; 14 GPs with between one and five years' experience, who met for training at a hospital in South West London, and 15 GP trainees who met for training at a South London Post Graduate Medical Centre.

The aim was to recruit an equal number of health visitors and GPs, but this did not prove possible. Therefore, GP trainees were recruited, although it was recognised that they would have less experience than the GPs. All subjects approached gave verbal consent following explanation of the study.

Equipment

The training video, 'Early Infant Assessment Redefined', included observations of movement in two six-month-old babies, one showing normal and one abnormal movement. The babies were seen in eight positions: supine, sidelying, prone, pull to sit, sitting, standing, ventral suspension and protective extension within this last position. The video demonstrated the abnormal movement signs, that are considered to be predictors of neurological abnormality.[24-25]

A pre-intervention questionnaire was devised, which asked about training and experience of cerebral palsy. It also asked subjects to rate their current overall level of confidence regarding their ability to identify a baby with suspected cerebral palsy, using a visual analogue scale ranging from 0 to 100% confident.

Two assessment videos (A and B) were produced using five babies with no known or suspected diagnosis of cerebral palsy or other movement disorder (aged three to seven months), and six babies (aged seven to 14 months) with a known or suspected diagnosis of cerebral palsy. The discrepancy in ages of the groups (corrected for prematurity), allowed all babies to be at similar developmental stages.

Care was taken to ensure that the babies with a suspected diagnosis of cerebral palsy were not significantly larger in weight or height. This did not present a significant problem as many of these babies had been premature or of low birthweight. Each video contained two-minute vignettes of seven babies, three showing normal movement and four abnormal movement, in a random order.

The videos were subject to peer review by three paediatric physiotherapists and deemed appropriate for the purpose. On viewing the videos at this stage they appeared to be of equal difficulty: there were a similar number and type of abnormal signs present in the babies on each video. The abnormal motor signs most apparent in each baby were recorded and a scoring system devised. For each baby, subjects recorded any observed abnormal movements in each of eight positions. Separate scores were given for each correctly identified sign and each misinterpreted sign (where normal movement was interpreted as abnormal).

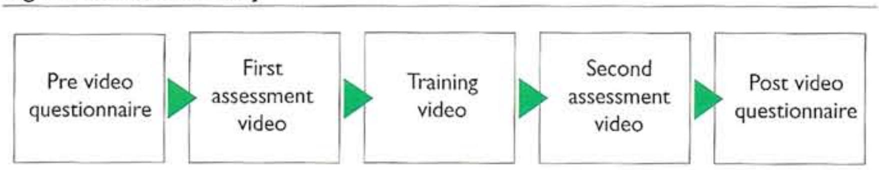
Also recorded were judgements as to whether the subject suspected each baby's overall movement of being normal or abnormal. This information was recorded on a specially devised form. A post experiment questionnaire asked subjects about their opinion of the training video on a 7-point Likert scale (strongly agree: 1, to strongly disagree: 7) as to whether they considered the video useful, interesting, informative, well-structured and clinically applicable. It also repeated the visual analogue scale rating their current overall confidence regarding their ability to identify a baby with suspected cerebral palsy. Subjects were not reminded of their previous self-assessed confidence level.

Experimental design

The data were analysed using a within groups comparison of repeated measures. The first set of measures recorded for each group acted as their own control. Subjects received the initial questionnaire about their training and recorded any signs of abnormal movement while watching the first assessment video. They then watched the training video and recorded signs of abnormal movement while watching the second assessment video and then completed the final questionnaire. Figure 1 illustrates the project design.

Change was expected in the number of identified abnormal movements pre and post viewing the training video. Change was not expected in the number of correctly diagnosed babies since there were only a few

Figure 1: Plan of study



babies with cerebral palsy on each assessment video. In addition, health professionals were aware that the teaching session was about identifying children with possible cerebral palsy. Therefore, alertness was raised to look for cerebral palsy which might have resulted in some bias, with professionals identifying more babies at baseline than would otherwise have been anticipated.

Procedure

Training sessions took place at the professionals' training centres during their usual designated training time for continuing professional development. Typical training session times were as follows: health visitors = 2 hours, GP trainees = 1 hour 30 minutes, and GPs = 1 hour 15 minutes. The procedure was expected to take 1 hour 10 minutes. Subjects were asked not to talk during collection of data, except asking for clarification regarding the procedure. Health visitor training sessions took place within the same week and GP trainee and GP training sessions took place a fortnight later but on different days.

Ethical issues

Ethical approval was sought from Queen Mary's University Hospital and the Roehampton Institute, University of Surrey, but was not deemed necessary as no research was taking place on the babies. Informed written consent was sought from all parents of babies filmed for the study. An information letter and consent form for parents were approved by the ethical committees, stating that if parents chose to participate, a video would be made of their baby's movement and this would only be used for the above purpose. Following explanation of the study, verbal consent was sought from the health professionals participating in the study.

Analysis

Data from the pre and post-intervention questionnaires were largely nominal or ordinal (Likert scales). The data from the assessment videos (number of abnormal signs and the number of misinterpreted signs recorded for each baby) were also ordinal.

Descriptive statistics were used to display the range and variability of data. Non-parametric statistics were also used: the repeated measures data were analysed with the Wilcoxon Signed Rank Test. Each of the four groups was analysed separately. However, to avoid any order effect from the two assessment videos, the order was varied, with one GP and one health visitor group seeing Video A then Video B and the other groups vice versa. Therefore, the primary analysis looked at health visitors as one group and GPs and GP trainees as another group, although it was recognised that there might be some variation in experience within the GP/GP trainee group. No specific evidence was found to suggest that the various professions would have more or less skill in identifying abnormal movement or diagnosing possible cases of cerebral palsy. If any differences had been detected, these would have been subject to further analysis.

Results

Data were collected from a total sample of 14 GPs, 15 GP trainees and 29 health visitors (seen in two different groups (group 2, n=12; group 3, n=15). Two health visitors were present for only part of the sessions, so were excluded from analysis.

Previous training and experience of being the first health professional to suspect a diagnosis of cerebral palsy is illustrated in Table 1. GPs (n=11) and GP trainees (n=12) had received similar amounts of training by lecture, which exceeded that of health visitors (n=5). Practical training had been received by six GPs and six GP trainees but only two health visitors. However, more health visitors (n=8) had had the experience of being first to suspect a diagnosis of cerebral palsy in a child, whereas only two GPs and one GP trainee had had this experience.

Correct and misinterpreted signs, correct and incorrect diagnoses are displayed for the whole group of health visitors and the group containing both GPs and GP trainees (Tables 2 and 3).

Abnormal signs of movement

The data were also analysed using Wilcoxon Signed Rank Test. Health visitors were considered as one group and GPs and GP trainees as another group, to avoid an order effect (see method section).

Slight differences were identified in the two assessment videos by checking the number of correct and incorrect diagnoses for each baby. One normal baby in Video B had a very high rate of incorrect diagnoses and one baby with cerebral palsy had a slightly higher rate of incorrect diagnoses. Reviewing the videos again, it was apparent that the video vignettes were not as clear for these babies, making it easier to misinterpret their movement. Therefore, Video B was slightly more difficult to rate. Interpretation of results is therefore more straightforward when considering the group containing all health visitors and the group containing all GPs, since half of these groups observed each assessment video, thus countering the effect of the difference in difficulty between the two videos.

Following the training video, there were significant increases in the number of correct abnormal signs identified by both groups: health visitors (p=0.002), GPs and GP trainees (p=0.000) (Table 4). GPs and GP trainees when considered separately also show significant increases in correct abnormal signs, but the improvement in trainees was less than that of GPs.

There were no significant changes in the number of misinterpreted signs identified by health visitors, GPs or GP trainees, when analysed with the Wilcoxon Signed Rank Test. Numbers of misinterpreted signs remained very low throughout all subjects (Tables 2 and 3). Changes occurred in the language used by professionals to describe

Table 1: Training and experience of health professions

Professions	Lecture on CP during training	Practical training session during training	First to suspect a diagnosis of CP
Hvs (n=27)	5 (17%)	2 (7%)	8 (27%)
GPs (n=14)	11 (79%)	6 (43%)	2 (14%)
GP trainees (n=15)	12 (80%)	6 (40%)	1 (7%)

Table 2: Correct and misinterpreted abnormal signs; correct and incorrect diagnoses: health visitors' responses (n=27)

		N	Range	Mean
Correct signs	Pre video	27	3-30	20.78
	Post video	27	11-40	25.44
Misinterpreted signs	Pre video	26	0-9	2.42
	Post video	27	0-6	1.29
Correct diagnoses	Pre video	26	4-7	5.57
	Post video	27	1-7	5.15
Incorrect diagnoses	Pre video	25	0-3	1.28
	Post video	26	0-3	1.46

Table 3: Correct and misinterpreted abnormal signs; correct and incorrect diagnoses: GPs' and GP trainees' responses (n=29)

		N	Range	Mean
Correct signs	Pre video	29	12-32	21.51
	Post video	29	10-57	25.79
Misinterpreted signs	Pre video	24	0-10	3.17
	Post video	24	0-12	4.45
Correct diagnoses	Pre video	29	2-7	5.20
	Post video	29	2-6	3.65
Incorrect diagnoses	Pre video	28	0-4	1.32
	Post video	26	1-4	1.96

abnormal movement. Following the training video, terms used in the video which had not previously been used by subjects, were subsequently used appropriately, for example 'no anti-gravity movement of legs' and 'inability to keep head in midline'.

Diagnoses

Analyses to detect any differences between number of correct and incorrect diagnoses pre and post training video were undertaken. This analysis should be read in the context that there were only seven babies on each assessment video. The mean correct diagnoses prior to seeing the training video was <5 for both groups, so the potential for change in score was already limited.

For the health visitors, there were no statistically significant differences in the number of correct or incorrect diagnoses. In the GPs and GP trainees' group as a whole, there was a significant decrease in correct diagnoses (z=-2.151, p=0.031) and a significant increase in the incorrect diagnoses (z=2. 492, p=0.013). Doctors became more likely to over-diagnose 'normal' babies as having CP.

For both the entire group and the two individual groups, self-assessed confidence scores improved significantly after having viewed the training video (Table 5). The training video was received well and highly rated by the entire group, with most respondents finding it very useful and informative (Figure 2).

Discussion

This study focussed on the ability of 29 health visitors, 14 GPs and 15 GP trainees to identify signs of abnormal movement in babies on videotape. Having viewed the training video significant improvement took place in all subjects' ability to identify correctly abnormal movement signs in babies.

Table 4: Correct abnormal signs identified pre and post training video

Profession	Wilcoxon's z value	p value
Health visitors (n=27)	-3.106	0.002
GPs and GP trainees (n=29)	-4.01	0.000
GPs (n=14)	-3.184	0.001
GP trainees (n=15)	-2.041	0.041

Table 5: Self-assessed confidence scores pre and post training video

	GPs and GP trainees		Health visitors	
	Pre video	Post video	Pre video	Post video
Number	29.0	29.0	26.0	24.0
Minimum	23.0	40.0	1.0	20.0
Maximum	79.0	94.0	84.0	91.0
Mean	49.2	70.9	43.2	61.0
Standard deviation	15.7	14.9	20.9	18.1
Wilcoxon Signed Rank Test (z score)	-4.601		-3.037	
P value	0.000		0.002	

The training video appeared to be effective in assisting learning in the very short term. Learning includes understanding, and subjects demonstrated this by applying recently learned language appropriately to images on the second assessment video.[26-27]

Overall, it can be said that watching the training video improved the healthcare professionals' ability to detect signs of abnormal movement in the babies in the videos. It is not possible to say whether the professionals would retain this information and be able to use it at a later date, as no later assessment of their skills took place.

GPs, when considered separately, showed a greater increase in identifying correct abnormal signs than GP trainees. This may reflect a difference in ability or that the trainees saw the slightly more difficult assessment video second. There were no statistically significant differences in the number of correct or incorrect diagnoses by health visitors, but by GPs there was a significant decrease in correct diagnoses and significant increase in incorrect diagnoses (identifying normal babies as possibly having cerebral palsy).

From this evidence, the training video did not appear to enhance diagnostic ability which is of concern. This finding was not unexpected as the number of babies requiring diagnosis was small, making it less likely that improvements would be detected and alertness was raised to look for cerebral palsy, possibly contributing towards the high baseline ability to identify those babies. However, it may also confirm the view, that 'it is difficult for the attending physician, who rarely sees cerebral palsy, to make appropriate observations and interpret them correctly'[28] (p385).

It might have been more effective to use a training video that included other diagnostic skills such as history taking and examination in addition to movement observation. However, the main aim of the study was to see if detection of abnormal movement improved, rather than overall rate of diagnosis.

If the training video were to continue to be used in the long term and raise GPs' rates of false positive diagnoses, this would have several implications. Parents would be given unnecessary anxiety about their child having a potentially serious condition. Children would be referred to a paediatrician unnecessarily, having financial implications. Children might undergo unnecessary tests and investigations to confirm or refute the diagnosis. Further research would be needed about these issues, including investigating the longer-term effects of the training video and its effects on other populations of health professionals, along with more comprehensive assessment of their diagnostic skills.

Differences between professions may be explained by the following observations: health visitors' client population have a high proportion of babies, for which they have ►