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Clin Rehabil 1999; 13; 48

DOI: 10.1191/026921599701532126

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Current practice and clinical relevance of somatosensory assessment after stroke

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Received 29th December 1997; returned for revisions 12th April 1998; revised manuscript accepted 2nd May 1998.

Objective: To examine the perceived clinical relevance, current practice and knowledge of somatosensory testing in three professional groups involved in the management and rehabilitation of stroke.

Design: Structured postal questionnaire sent to therapists and doctors.

Subjects: One hundred and eighty occupational therapists from the National Association of Neurological Occupational Therapists (NANOT), 180 physiotherapists from the Association of Chartered Physiotherapists with an Interest in Neurology (ACPIN) and 360 doctors from the Association of British Neurologists (ABN) and the British Geriatrics Society (BSG).

Setting: Hospitals and rehabilitation centres in the UK.

Results: Replies were obtained from 84 occupational therapists (47%), 98 physiotherapists (55%) and 78 doctors (22%). Sixty-four occupational therapists (77%), 82 physiotherapists (84%) and 66 doctors (87%) indicated that they routinely performed somatosensory assessment as part of their clinical assessment. The two most commonly used measures were proprioception and light touch. Seventy-eight occupational therapists (93%), 88 physiotherapists (90%) and 67 doctors (91%) regarded sensory assessment as clinically significant in determining prognosis after stroke.

Conclusions: Despite published reservations concerning its usefulness and reliability, most therapists and doctors routinely assess somatosensory loss after stroke. All three professions agreed that somatosensory testing presented useful information for prognosis. Furthermore, all professional groups believe somatosensory assessment to be clinically relevant.

Introduction

Somatosensory loss after stroke has been reported in over 60% of patients and has been shown to have an important influence on the diagnosis and outcome of stroke rehabilitation.^{1–4} Despite these research findings, methods of

somatosensory assessment have received scant attention from clinicians.³ Although there are many well-established clinical measures of motor dysfunction, e.g. the Rivermead Motor Assessment⁵ and the Motricity Index,⁶ the systematic investigation and quantification of sensory loss has been comparatively overlooked.^{3,6} Consequently, there are few standardized clinical somatosensory assessment procedures currently capable of informing diagnosis and guiding treatment.⁷

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This neglect of formal sensory assessment after central nervous damage is surprising given that most clinical therapeutic approaches, including Bobath, Brunnstrom, Rood, Ayres, Johnstone, and Carr and Shepherd emphasize the use of afferent input in the treatment of adult hemiplegia.⁸⁻¹⁰ None of the approaches, however, presents a template for assessment that is systematic, multi-impairment, up-to-date and scientific. Many standard neurology texts are often incomplete.¹¹ Reasons for this neglect include the perceived lack of clinical value, low reliability of sensory assessment, relative insensitivity and apparent subjectivity.^{7,12-17} Furthermore, many clinical measures used were developed in the early part of this century^{15,18} or were designed to assess peripheral nerve damage.^{3,19}

In the course of developing a standardized assessment of somatosensory performance, we set out to establish the perceived clinical relevance of somatosensory testing for some of those professions involved with stroke management (doctors, occupational therapists and physiotherapists). This paper presents the results of a postal questionnaire survey. The results are relevant in that they provide a 'snapshot' of current clinical practice and opinion. So far as we are aware, no similar study has been published.

Method

A postal questionnaire was sent to 720 therapists and doctors in the UK. In order to obtain a representative sample of those currently working with stroke, we identified therapists from Special Interest Groups (SIGs) within their respective professional body. In the case of physiotherapy, ACPIN (Association of Chartered Physiotherapists with an Interest in Neurology) with a UK membership of over a 1000 was contacted. For occupational therapy, NANOT (National Association of Neurological Occupational Therapists) with a UK membership of 267 was contacted. Doctors were identified from two medical specialties; the ABN (Association of British Neurologists) and the BGS (British Geriatrics Society). In total, we randomly selected 180 occupational therapists, 180 physiotherapists and 360 doctors from current membership lists using a

computer program. Questionnaires were sent with a covering letter which contained an explanation of the aims of the study.

Questionnaire development

The questionnaire covered five main themes: (1) whether clinicians currently perform somatosensory assessment, (2) the main types of tests currently used in clinical practice, (3) beliefs about the relevance of somatosensory assessment, (4) how clinicians learn about somatosensory assessment, and (5) the extent to which different therapeutic approaches influence the way therapists test for somatosensory loss.

Questions were based in part on published reviews and comprised both 'open-ended' and 'closed' response questions. Open-ended questions permit greater depth and quality of information. Closed questions limit the respondent to a specified range of options and were of three types: option lists, ranks and a Likert scale. The questionnaire was initially piloted on 10 local therapists and doctors to check for potential problems. Their subsequent feedback was used to revise the questionnaire prior to the formal postal study. The questionnaire was then sent to the three professional groups: occupational therapists and physiotherapists and doctors. The therapists' questionnaire also contained specific questions regarding treatment approaches.

Results

In total, 260 completed questionnaires were returned, representing an overall response rate of 36%. The individual response rate for occupational therapists was 84 (47%), for physiotherapists 98 (55%) and for doctors 78 (22%). The postal survey was supplemented by contacting local occupational therapists ($n = 6$), physiotherapists ($n = 17$) and doctors ($n = 24$) not previously chosen. The 'supplemented' response rate was 1 occupational therapist (17%), 10 physiotherapists (60%) and 7 doctors (29%).

The range of grades and years of experience for therapists within each professional grouping is summarized in Table 1. Of the 77 doctors who replied, 67 (87%) were consultants and 10 (13%) senior registrars. The mean number of years of

Table 1 Range of therapist grades

Grades	Occupational therapists (n = 78)	Physiotherapists (n = 95)
Head/Superintendent 2/3 Years experience	12 (15%) mean = 11 years	9 (9%) mean = 16 years
Senior 1/Superintendent 4 Years experience	50 (64%) mean =10 years	56 (59%) mean =11 years
Senior 2 Years experience	16 (21%) mean = 6 years	25 (26%) mean = 7 years
Others	0 (0%)	8 (8%)

experience was 23 and 10 years, respectively. Given the general emphasis on motor assessments after stroke in the medical and therapy literature,^{6,9,20,21} it seemed important to establish the number of respondents who currently use somatosensory assessment in their clinical practice. Surprisingly, a large number from all professions – 66 doctors (87%), 64 occupational therapists (77%) and 82 physiotherapists (84%) – routinely performed somatosensory assessment as part of their clinical assessment of stroke.

We found that 51 occupational therapists (80%) and 76 physiotherapists (93%) assess somatosensory functioning on admission. Table 2 summarizes when therapists perform these assessments. Most therapists (from both professional groups) tended not to reassess prior to discharge. In fact, only 36 therapists (25%) used predischARGE assessments. A minority of 19 occupational therapists (23%), 16 physiotherapists (16%) and 10 doctors (13%) indicated they did not routinely assess somatosensory functioning. The main reason for nonassessment by therapists, was the assumption that other professionals would carry out the assessment (e.g. doctors, other therapists), and time constraints. Some

therapists indicated that they would use somatosensory assessment only if a sensory disturbance specifically presented itself as a problem. Other therapists felt that a ‘hands on’ motor-based assessment procedure provided sufficient information about a patient’s somatosensory functioning such that it did not warrant a formal objective assessment. No therapist suggested that somatosensory assessment was clinically irrelevant.

Main types of tests currently used in clinical practice

Doctors and therapists were asked to identify those tests commonly employed, their method of application and the equipment used. The two most commonly used measures were proprioception and light touch; 66 doctors (87%), 74 occupational therapists (97%) and 94 physiotherapists (100%) routinely assessed proprioception, while 71 doctors (93%), 74 occupational therapists (97%), 93 physiotherapists (99%) routinely assessed light touch. Results for those tests commonly used are reported in Table 3.

Within occupational therapy, stereognosis and temperature were considered important (68 (89%); 66 (87%)). A large number of doctors also tested for sensory extinction and vibration (62 (82%); 56 (74%)). The method and equipment employed for each of the tests varied between therapists and between therapists and doctors. For example, in the case of light touch, the equipment used ranged from: ‘light finger brushing or stroking’ to ‘tissue paper’ and ‘cottonwool or finger touch’. Methods included touching ‘three times each side, comparing one

Table 2 When therapists performed assessments

Time post onset	Occupational therapists (n = 64)	Physiotherapists (n = 82)
Admission	51 (80%)	76 (93%)
Weekly	8 (13%)	6 (7%)
Monthly	10 (16%)	10 (12%)
PredischARGE	16 (25%)	20 (24%)

Table 3 Types of somatosensory tests used

	Occupational therapists (<i>n</i> = 76)	Physiotherapists (<i>n</i> = 94)	Doctors (<i>n</i> = 76)
Light touch	74 (97%)	93 (99%)	71 (93%)
Pin prick	53 (70%)	43 (46%)	66 (87%)
Pressure	59 (78%)	51 (54%)	11 (14%)
Pain	29 (38%)	27 (29%)	30 (39%)
Temperature	66 (87%)	33 (35%)	31 (41%)
Vibration	4 (5%)	8 (9%)	56 (74%)
Two-point discrimination	23 (30%)	20 (21%)	29 (38%)
Stereognosis	68 (89%)	48 (51%)	38 (50%)
Proprioception	74 (97%)	94 (100%)	66 (87%)
Extinction	20 (26%)	39 (41%)	62 (82%)
Other	8 (11%)	12 (13%)	16 (21%)

side with the other' or 'on a scale of 1–10 a comparison with the other side'. There were many variations in the methods used.

The body areas usually assessed by therapists and doctors are shown in Table 4. Given the traditional emphasis of occupational therapy on treating the upper limb, it is not surprising to discover that over 90% of occupational therapists target the upper arm, forearm and hand as compared with 30% for the lower limb. Both therapy professions, however, placed least emphasis on testing the trunk and face. This contrasts with doctors who usually test the face (54 (75%)). Other areas frequently tested by doctors include the hand (66 (88%)), forearm (55 (73%)) and feet (52 (69%)).

Beliefs about the relevance of somatosensory assessment

Table 5 shows the range of clinicians' opinion concerning the clinical relevance of somatosen-

sory assessment. Sixty-six doctors (91%), 78 occupational therapists (93%) and 88 physiotherapists (90%) considered somatosensory assessment to be clinically significant. Asked to explain further, the replies could be grouped into five categories: (1) diagnosis, (2) prognosis, (3) treatment and treatment planning, (4) education of patient and carer, and (5) 'other'. The number of responses for each of these five categories is shown in Table 5. The categories were not mutually exclusive since it was possible for respondents to hold more than one belief. From Table 5, it can be seen that a large percentage of doctors (compared with occupational therapists and physiotherapists) regard somatosensory testing as clinically important for diagnostic purposes. Doctors indicated that somatosensory testing was particularly important in establishing the extent and degree of stroke, whereas therapists regarded diagnosis as important for establishing treatment plans and rehabilitation direction.

Table 4 Body areas commonly tested

	Occupational therapists (<i>n</i> = 78)	Physiotherapists (<i>n</i> = 94)	Doctors (<i>n</i> = 75)
Face	21 (27%)	39 (41%)	54 (75%)
Trunk	15 (19%)	52 (55%)	22 (29%)
Upper arm	71 (91%)	85 (90%)	41 (55%)
Forearm	73 (94%)	92 (98%)	55 (73%)
Hand	76 (97%)	92 (98%)	66 (88%)
Thigh	21 (27%)	82 (87%)	35 (47%)
Calf	25 (32%)	85 (90%)	41 (55%)
Ankle	22 (28%)	86 (91%)	29 (39%)
Feet	33 (42%)	91 (97%)	52 (69%)
Toes	16 (21%)	76 (81%)	37 (49%)

Table 5 Reasons given for the clinical relevance of somatosensory assessment and for its relevance for motor function

	Clinical relevance			Relevance for motor function		
	Occupational therapists (n = 78)	Physiotherapists (n = 93)	Doctors (n = 64)	Occupational therapists (n = 79)	Physiotherapists (n = 93)	Doctors (n = 66)
Diagnosis	27 (35%)	10 (11%)	32 (50%)	17 (22%)	47 (51%)	21 (32%)
Prognosis	41 (53%)	49 (53%)	48 (75%)	63 (80%)	82 (88%)	51 (77%)
Education	37 (48%)	14 (15%)	5 (8%)	22 (28%)	11 (12%)	1 (2%)
Treatment	29 (38%)	66 (71%)	15 (23%)	32 (41%)	27 (29%)	4 (6%)
Other	1 (1%)	2 (2%)	7 (11%)	1 (1%)	4 (4%)	5 (8%)

Occupational therapists (37 (48%)) indicated that the purpose of somatosensory testing was to educate the patient or carer about managing impairments and related safety issues, whereas physiotherapists (66 (71%)) indicated its relevance for specific treatment and treatment planning. Therapists regarded the assessment of somatosensory performance as a necessary adjunct to treatment. All three groups (and predominantly doctors) regard testing as important for prognosis.

Since previous research has indicated that sensation has an important influence on motor recovery,²² we further enquired whether somatosensory assessment was considered important in determining motor function. As before, responses could be broken into five categories, and again these were not mutually exclusive. Table 5 also shows an important change from the previous more general question. When motor function is specifically considered by therapists, prognosis is now regarded as the most important by both groups (occupational therapists 63 (80%) and physiotherapists 82 (88%)).

Where clinicians learn about somatosensory assessment

Table 6 shows which educational sources most influenced clinical assessment. Most therapists (32 occupational therapists (42%) and 28 physiotherapists (29%)) rated professional peers as the single strongest influence. Other strong influences within physiotherapy included personal experience (25 (26%)) and student training (21 (22%)). Occupational therapists were similarly divided for these categories but had lower ratings (9 (12%) and 11 (14%)) respectively. Amongst doctors, the main influence was personal experience (25 (34%)) and student training (15 (20%)). No group considered the role of ‘courses, lectures or research publications’ to be particularly influential.

Given the existence of several different approaches for stroke rehabilitation within the UK, we were interested to find out whether specific therapeutic approaches influenced the way in which therapists measure somatosensory loss. Although several approaches are typically employed, the dominant approach in the UK (particularly for physiotherapy) is Bobath.²³ The results in Table 7 indicate that the ‘Bobath approach’ was the single strongest therapeutic

Table 6 Main influences on clinical assessment

	Occupational therapists (n = 77)	Physiotherapists (n = 96)	Doctors (n = 74)
Student training	11 (14%)	21 (22%)	19 (26%)
Professional peers, clinical educators	32 (42%)	28 (29%)	15 (20%)
Custom and practice	10 (13%)	7 (7%)	7 (9%)
Courses, lectures and research publications	14 (18%)	15 (16%)	4 (5%)
Personal experience	9 (12%)	25 (26%)	25 (34%)
Other	1 (1%)	0 (0%)	4 (5%)

Table 7 Influence of therapeutic approach on somatosensory assessment

	Occupational therapists (<i>n</i> = 80)	Physiotherapists (<i>n</i> = 99)
Bobath	50 (63%)	85 (86%)
Carr and Shepherd	6 (8%)	5 (5%)
Peto	0	0
Johnstone	1 (1%)	0
Rood	6 (8%)	3 (3%)
Function	22 (28%)	6 (6%)
Other	0	0

influence (50 occupational therapists (63%) and 85 physiotherapists (86%)). Twenty-two occupational therapists (28%) favoured a functional approach. When asked, however, if the choice of treatment approach influenced the type of somatosensory assessment employed, 46 occupational therapists (70%) and 54 of the physiotherapists (66%) indicated that it did not.

Discussion

Before discussing the findings in detail, it is important to consider the limitations of the study. The response rates of 47% and 55% for occupational therapists and physiotherapists were reasonable for a postal questionnaire.²⁴ The return rate for doctors at 22%, however, is low and probably not representative. This incomplete response rate makes interpretation of the results difficult as we do not know to what extent respondents are representative of nonrespondents and to what extent respondents constitute a biased group.²⁵

Many established texts consider somatosensory assessment difficult to implement, tedious and unreliable, particularly as assessments are often performed at the end of motor testing when both patient and clinician are tired.^{7,11,13,15} Although there is little evidence in medical texts to suggest the case that somatosensory assessment is clinically relevant, our study confirms that over 80% of therapists and 87% of doctors who responded, routinely perform somatosensory assessment as part of their clinical assessment of stroke. In the unlikely event that all nonrespondents actually did not undertake somatosensory assessment

then we can still say that 41% of therapists and 18% of doctors do nevertheless routinely undertake such assessments.

The results of the questionnaire also suggest that many therapists and doctors in current practice consider the role of somatosensory assessment as important for a variety of reasons including diagnosis, prognosis and planning treatment. However, important differences emerged between the three professions. Doctors considered somatosensory testing important in the context of establishing the extent and degree of stroke, whereas therapists regard diagnosis as important only in as much as it could be used to establish treatment plans and rehabilitation direction. All three professions agreed that somatosensory testing presented useful information for prognosis.

When reviewing the 'treatment' and 'education' categories, it is worth noting the difference between the two therapy groups. Occupational therapists (37 (48%)) indicated that the purpose of somatosensory testing is to educate the patient or carer about managing impairments and related safety issues, whereas physiotherapists (66 (71%)) indicated its relevance for specific treatment and treatment planning. Doctors regard issues of treatment and education as less relevant than therapists. It would appear that occupational therapists predominantly regard themselves as educational facilitators, whereas physiotherapists were more likely to undertake specific interventions.

The timing of somatosensory assessments was particularly interesting; most therapists carried out assessment on admission. Only 36 therapists (25%) used predischARGE assessments. In other words, most therapists did not employ their somatosensory assessment as an indicator of the patients' rehabilitation outcome.

The most commonly used somatosensory measures for all professions were proprioception and light touch, while two-point discrimination was the least popular. Between professions, it was apparent that certain modalities received more attention than others. Doctors in particular valued vibration and extinction whereas occupational therapists considered stereognosis, temperature and pressure important. It is interesting that doctors place more emphasis on test-

ing vibration whereas therapists rarely consider its use.

Our results concerning the influence of therapeutic approaches on assessment require further discussion. Most therapeutic approaches for stroke share the aim of enabling the patient to regain normal posture and movement by reducing abnormality in muscle tone and posture.⁹ As a starting point for treatment, most approaches agree on the importance of careful assessment.^{21,26} The Bobath approach, which is the dominant treatment for stroke in the UK emphasizes this.²⁷ Courses advocating the Bobath approach currently tend not to emphasize formal somatosensory assessment in favour of obtaining similar information through movement assessment, 'handling' skills and observation.²³ Since a range of potential impairments may contribute to motor dysfunction, systematic assessment is necessary to identify contributing impairments. Given current teaching practice, it is therefore surprising to find that the majority of therapists continue to cite Bobath as the main influence for their formal assessment of somatosensory loss. This potential discrepancy between current teaching practice and therapists using sensory assessment can be explained by the current climate within the UK National Health Service (NHS), which encourages therapists to employ standardized measures in order to quantify the effectiveness of their therapy.²⁸ In other words, despite a lack of formal standardized measures, therapists continue to employ some type of formal assessment of somatosensory loss.

Conclusions

Within the limitations of the study, and despite published reservations regarding the reliability and validity of current clinical assessment, our findings suggest that many therapists and doctors regard the assessment of somatosensory performance after stroke as clinically important for both diagnosis and prognosis. The need to develop a standardized reliable set of instruments is evident from the fact that many continue to use unstandardized forms of assessment in current practice, many of which do not provide an ade-

quate database to inform diagnosis and guide rehabilitation programmes.

Acknowledgements

The authors would like to thank the therapists and doctors who participated in the survey, the Stroke Association for their financial support and Richard Bohannon and Leeanne Carey for their comments on an earlier draft.

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