SHORT REPORT

Getting closer to patients: the INCAT Overall Disability Sum Score relates better to patients' own clinical judgement in immune-mediated polyneuropathies

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See Editorial Commentary, p 899

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Objective: To determine which widely used disability measure in Guillain-Barré syndrome (GBS) and chronic inflammatory demyelinating polyneuropathy (CIDP) shows the strongest association with patients' rating scores.

Methods: Five disability scales and the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) were assessed serially in 20 patients with newly diagnosed GBS (n=7) or CIDP (n=13). Also at each visit, the patient's condition was self-assessed as being worse, unchanged or better. Longitudinal regressions were carried out to determine the association between disability scales (independent variables) and SF-36 and patients' rating scores (dependent variables).

Results: Higher associations with the SF-36 were found in the Overall Disability Sum Score (ODSS) than other disability measures. A higher correlation with ODSS changes was also found in the rating scores of the patients.

Conclusion: In addition to literature findings, higher associations were found between Inflammatory Neuropathy Cause and Treatment Group ODSS and outcome assessed from patients' perceptions in immune-related polyneuropathies than in other commonly used disability scales.

During the past 8 years the Rotterdam Inflammatory Neuropathy Cause and Treatment (INCAT) Group published various papers considering outcome measures in patients with Guillain-Barré syndrome (GBS) and chronic inflammatory demyelinating polyneuropathy (CIDP), focusing primarily on their scientific properties such as being simple and easily applicable, valid, reliable and responsive.^{1–3} By consensus among the INCAT group, the disability level was proposed as the main level of measuring therapeutic response and the INCAT Overall Disability Sum Score (ODSS) was proposed as a preferential outcome measure for treatment trials of these conditions for the following reasons. The ODSS

- covers not only mobility disturbances but also upper limb dysfunction;
- has good clinimetric properties, especially greater responsiveness; and
- captures a higher proportion of variance of disability explained by impairment qualities.^{4, 5}

During these investigations, we questioned whether the ODSS, an instrument applied by clinicians, would have the best correlation with patients' own judgement of their

clinical condition, when compared with other disability scales. Therefore, in patients with GBS and CIDP, we investigated the possible association between selected disability measures and patients' own clinical judgement using (1) the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) status and (2) a self-assessed rating score of being worse, unchanged or better at each visit.⁶ The INCAT group's hypothesis was that the ODSS would be more strongly related to patients' perception than would other measures.

PATIENTS AND METHODS

Patients

Twenty consecutive patients with recently diagnosed GBS (n=7) or CIDP (n=13) were enrolled in the study. All patients met the international criteria for their illness.^{7, 8} The follow-up period was 1 year.

Outcome assessed by clinicians

The INCAT group selected five scales that assessed disability as classified by the World Health Organization.⁹ Selection was based on the ability of the scales to cover the main clinical aspects of GBS and CIDP, and their widespread use in these disorders and experts' opinions.^{1, 2}

The INCAT ODSS combines arm and leg disability in a total score ranging from 0 (no signs of disability) to 12 (most severe disability score).⁴ It provides a good functional description of the arms and legs in a checklist form suitable for interviewing patients. Daily arm activities such as dressing the upper part of the body, doing and undoing buttons and zips, washing and brushing hair, using a knife and fork, and turning a key in a lock are scored as being "not affected", "affected but not prevented" or "prevented". The leg scale highlights problems with walking, taking into account the use of a device.⁴

For comparison with the ODSS, the 9-Hole Peg (dexterity) Test, the 10 m Walking (mobility) Test, the modified Rankin Scale and the GBS Disability Scale were chosen.^{10–12}

Outcome assessed by patients

The clinical applicability of the SF-36 was recently shown in patients with GBS and CIDP.¹³ This generic health questionnaire adequately portrays clinical aspects from patients' perspectives and consists of 36 items, assigned to the domains of physical functioning, role functioning-physical, role functioning-emotional, social functioning, body pain,

Abbreviations: CIDP, chronic inflammatory demyelinating polyneuropathy; GBS, Guillain-Barré syndrome; INCAT, Inflammatory Neuropathy Cause and Treatment; ODSS, Overall Disability Sum Score; SF-36, 36-Item Short Form Health Survey

Table 1 Association between disability scales and quality of life in immune-mediated polyneuropathies

QoL	Disability measures						9-Hole Peg Test	9-Hole Peg Test
	Disability Sum Score	Disability Sum Score rank order	GBS Disability Scale	Modified Rankin Scale	10 m Walking Test		R	L
SF-36								
PhF	0.87**	1st	0.86**	0.81**	0.76**		0.61**	0.60**
RFPPh	0.67**	1st	0.56**	0.60**	0.51**		0.51**	0.52**
RFE	0.50**	1st	0.42**	0.48**	0.37**		0.46**	0.41**
SF	0.62**	3rd	0.69**	0.67**	0.61**		0.35*	0.32*
BP	0.40**	1st	0.24*	0.33*	0.14 ^{NS}		0.35*	0.35*
MH	0.58**	1st	0.49**	0.40**	0.57**		0.52**	0.48**
VIT	0.50**	1st	0.40**	0.41**	0.37*		0.39**	0.35*
GHP	0.52**	1st	0.46**	0.46**	0.30*		0.46**	0.39**
PCS	0.75**	1st	0.68**	0.69**	0.49**		0.52**	0.56**
MCS	0.47**	2nd	0.41**	0.42**	0.49**		0.45**	0.39**

BP, body pain; GBS, Guillain-Barré syndrome; GHP, general health perception; L, left hand; MCS, Mental Component Summary Score; MH, mental health; NS, not significant; PCS, Physical Component Summary Score; PhF, physical functioning; QoL, quality of life; R, Right hand; RFE, role functioning: emotional; RFPPh, role functioning: physical; SF, social functioning; SF-36, 36-Item Short Form Health Survey; VIT, vitality.

Univariate linear regressions were carried out, including a restricted cubic spline function on independent variables (see section Statistics and Herndon and Harrell).¹⁴ Intraclass correlation coefficients are shown).

* $p < 0.01$. ** $p \leq 0.001$.

mental health, vitality, general health perception, and change in health.¹³ The corresponding Physical and Mental Component Summary Scores were also calculated.

At each visit, the patients were requested to judge whether their clinical condition deteriorated (coded 1), remained stable (coded 2) or improved (coded 3) when compared with the previous visit (patients' clinical-judgement scores). At study entry, the patients compared their clinical condition with their physical state in the 2 weeks before the start of the study.

Test procedures and treatment

All participants gave informed consent before the study. The ethics committee of the Erasmus University Hospital approved the study. Assessments were carried out randomly. Patients were also instructed on how to fill in the SF-36. Before patients left, all SF-36 items were checked for possible missing values and were completed where necessary.

One clinician (ISJM) examined longitudinally 20 consecutive patients with GBS or CIDP. Disability scales were assessed randomly at weeks 0, 2, 4, 8, 12, 16, 21, 26, 32, 40 and 52 of follow-up in each patient. The SF-36 was concurrently assessed at weeks 0, 4, 12, 26, 32, 40 and 52. All but one mildly affected patient was initially treated with intravenous immunoglobulin (Ig). One patient with CIDP non-responsive to intravenous Ig received prednisone.

Statistics

For SF-36 correlation studies, only the data collected at visits where the SF-36 was assessed were used. Univariate regression studies were carried out between the dependent (SF-36 domains and summary measures) and independent (disability scales) variables through a systematic evaluation of constructed graphs with linear regressions, including a restricted cubic spline function on the independent variables, striving for the best fit (association expressed as the intraclass correlation coefficient (r) for each regression analysis).¹⁴

For each disability scale in each patient, the differences between every pair of consecutive values were calculated (eg, ODSS change = ODSS value at visit- i - ODSS value at visit- $(i-1)$). These differences were correlated with the corresponding patient's clinical-judgement scores (deteriorated, stable or improved) through random-effects linear regression analyses using the model "xtreg" in STATA, an approach comparable with ordinary regression analyses, but taking

into account the associations caused by the longitudinal structure of the data (STATA Statistical Software, release V.7.0). Analyses were performed in STATA V.7.0 for Windows. A value of $p < 0.05$ was considered significant.

RESULTS

Eight women and 12 men (7 with GBS, 13 with CIDP; median age 54.0, range 15–70 years) were examined longitudinally. The patients with GBS had a median time of 7 days from onset of symptoms to admission and diagnosis; the corresponding median time in patients with CIDP was 73 days. At study entry, 13 patients were unable to walk independently (4 with GBS, 5 with CIDP) or were bedbound (2 with GBS, 2 with CIDP), and 1 required artificial ventilation (1 with GBS). The remaining 7 patients (1 with GBS, 6 with CIDP) could walk independently. Two hundred and one visits were completed. During these 201 visits, SF-36 was concurrently assessed on 147 occasions (5–10 visits per patient). The follow-up period was 52 weeks. All patients experienced deficits in daily functional activities. Six patients with GBS were treated with intravenous Ig and one patient with GBS received no treatment. Twelve patients with CIDP responsive to intravenous Ig needed interval treatment with intravenous Ig to maintain the achieved improvement. Eventually, all the patients showed a general improvement in functional abilities and quality of life during follow-up.

Table 1 shows the correlation values between the disability scales and the SF-36 dimensions. The ODSS almost consistently showed higher associations with SF-36 values (see rank order in table 1). Higher correlations were seen between the ODSS and the physically oriented dimensions (physical-functioning, role-functioning-physical, and physical-component-score).

Patients graded their clinical condition 53 times as "deteriorating", 38 times as "stable" and 110 times as "improving". These values showed a higher association with changes in ODSS: $r = 0.66$ ($p = 0.007$); with Rankin changes: $r = 0.60$ ($p = 0.02$); and with GBS Disability Scale changes: $r = 0.56$ ($p = 0.04$). Associations with changes in the 10 m Walking and 9-Hole Peg tests were not significant.

DISCUSSION

The INCAT ODSS shows its close relationship with patients' perception of illness by higher associations with SF-36 domains and patients' own clinical condition ratings in immune-mediated polyneuropathies than other disability

scales.⁴ The direct consequences of GBS and CIDP, such as physical dysfunction, were related to the ODSS, but less tangible quantities, such as emotional state, mental health and vitality, determinants from the patients' point of view, also showed acceptable correlations.

The ODSS has good construct validity with reliability values ranging from 0.90 to 0.95. Also, the ODSS is more responsive than generally applied impairment and disability scales in immune-mediated polyneuropathies.⁴⁻⁵ The clinical applicability of the ODSS was also shown in a trial evaluating the efficacy of intravenous Ig as against oral prednisolone in patients with CIDP.¹⁵

With respect to the aims of this study, some methodological issues need to be considered. Firstly, univariate linear regression analyses for the GBS Disability and Rankin Scales were carried out, although these are ordinal measures. An ordinal logit estimation model (described as "ologit" in STATA) was also applied to these ordinal variables, with similar results. As the description of these analyses was rather complex, we decided to present the data as such, for clarity. Secondly, because the examined group consisted of only 20 patients, it is not clear whether the same rank ordering can be generated in a more substantial group of patients. Despite these limitations, this study underscores the value of the ODSS as an outcome measure in trials of treatment for immune-mediated polyneuropathies by showing its significant association with patients' own perception of their clinical condition. These qualities commend the ODSS as a primary outcome measure at the disability level in therapeutic trials for GBS and CIDP.

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