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# “INTERMED”: A Method to Assess Health Service Needs

## II. Results on Its Validity and Clinical Use

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**Abstract:** *The validity and clinical use of a recently developed instrument to assess health care needs of patients with a physical illness, called INTERMED, is investigated. The INTERMED combines data reflecting patients' biological, psychological, and social characteristics with information on health care utilization characteristics. An example of a patient population in which such an integral assessment can contribute to the appropriateness of care, are patients with low back pain of degenerative or unknown origin. It supports the validity and the clinical usefulness of the INTERMED when clinically relevant subgroups in this heterogeneous population can be identified and described based on their INTERMED scores. The INTERMED was utilized in a group of patients (N = 108) having low back pain who vary on the chronicity of complaints, functional status, and associated disability. All patients underwent a medical examination and responded to a battery of validated questionnaires assessing biological, psychological, and social aspects of their life. In addition, the patients were assessed by the INTERMED. It was studied whether it proved to be possible to form clinically meaningful groups of patients based on their INTERMED scores; for this, a hierarchical cluster analysis was performed. In order to clinically describe them, the groups of patients were compared with the data from the questionnaires. The cluster analysis on the INTERMED scores revealed three distinguishable groups of patients. Comparison with the questionnaires assessing biological, psycho-*

*logical, and social aspects of disease showed that one group can be characterized as complex patients with chronic complaints and reduced capacity to work who apply for a disability compensation. The other groups differed explicitly with regard to chronicity, but also on other variables. By means of the INTERMED, clinically relevant groups of patients can be identified, which supports its use in clinical practice and its use as a method to describe case mix for scientific or health care policy purposes. In addition, the INTERMED is easy to implement in daily clinical practice and can be of help to ease the operationalization of the biopsychosocial model of disease. More information on its validity in different patient populations is necessary. © 1999 Elsevier Science Inc.*

### Introduction

#### *Development of the INTERMED*

The INTERMED has been developed to integrate, in a standardized manner, the biopsychosocial aspects of disease with the organization of the health care system in an increasingly complex care delivery system [1–3]. The documentation system is conceived for clinical (assessment of case complexity and health care needs), scientific (case mix description; stratification of populations in controlled trials), educational (problem-oriented teaching), and health care policy purposes (quality management). During its conceptualization and development, the face validity of its clinical variables have been extensively discussed among an international group of general hospital psychiatrists [4] and their colleagues from internal medicine, rheumatology, and palliative care. In a first study, the reliability of INTERMED has been evaluated by double scoring

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a series of patients [1]. In the present paper, the evaluation of the validity and clinical use of the INTERMED in a population with varying degrees of case complexity is reported.

### *Patients with Low Back Pain: Complex Patients with Co-morbidities*

Due to an increasing incidence of patients with benign low back pain in industrialized countries over the last decades [5] and the economic impact that a small minority with chronification and disability represents [6], major efforts have been undertaken to investigate this patient population. Meanwhile, it is well established that a clear correlation among biological variables, medical interventions, and course of disease is lacking [7,8]; that psychosocial factors play an important role, especially in those patients who become disabled [9,10]; and that combined medical and psychosocial interventions are more successful than medical interventions alone [11,12]. The impressive amount of knowledge about risk factors for low back pain disability related to biological [13], psychological [9,10], sociodemographic [14], and social aspects [15] of the individual, as well as related to the medical [16], legal [17], and socioeconomic and sociocultural system [18] stresses that this patient population—especially the chronified and disabled—is most adequately described in terms of co-morbidity and case complexity. These patients clearly vary on biological, psychological, and social variables and their medical care utilization. Low back pain patients therefore represent a suitable population to evaluate the validity of the INTERMED. If it is possible to distinguish clinically meaningful groups based on the integral data assessed with the INTERMED, this would support its validity and clinical use as a case mix instrument for the assessment of case complexity and health care needs.

## **Method**

### *Subjects*

Subjects ( $N = 108$ ) were recruited between November 1995 and November 1996 and were divided into two groups. Group 1 ( $N = 55$ ) consisted of consecutive patients with acute, subacute, or chronic low back pain who were attending the department of Rheumatology outpatient clinic of the University Hospital of Lausanne. Group 2 ( $N = 53$ )

consisted of consecutive patients with chronic low back pain applying for disability compensation at the center for disability evaluation of the University Medical Outpatient Clinic. Inclusion criteria for both groups were low back pain of a degenerative or unknown origin; patients with low back pain due to specific diseases such as inflammatory or neoplastic conditions were excluded from the study.

### *Instruments*

**INTERMED.** The INTERMED is an assessment system of case complexity and health care needs, and provides a biopsychosocial description of the patient based on clinically relevant variables. The INTERMED was scored based on a written report with information regarding the patient's medical history, the results of the current medical examination, and a structured interview with the patient, in which topics regarding the patient's past and present psychosocial functioning and his/her relation to the health care system was addressed. All variables of the INTERMED were scored in a range from 0 (absent) to 3 (strongly present). The different variables on the biological, psychological, social, and health care domain in the context of time (history, current state, and prognosis) are illustrated in Table 1.

**SF-36.** The SF-36 is a self-rated questionnaire assessing limitations in physical, emotional, and social functions and role activities. It consists of 36 questions evaluating 8 subscales. The subscales measure "physical activity," "limitations due to the physical state," "pain," "life and relations with others," "mental health," "limitations due to psychological state," "vitality," and "perception of health" [19,20]. The instrument has been widely used in patients with different somatic diseases [21,22] and proved to differentiate between patients having serious vs. minor medical conditions [23]. In the present study we used a French version which has been validated elsewhere [24].

**HADS.** The Hospital Anxiety and Depression Scale [25] is a self-rated questionnaire assessing symptoms of anxiety (7 items) and depression (7 items) with a score for each item ranging from 0 (absence of a symptom) to 3 (severe intensity of a symptom). This scale has been especially developed to be used in patients with somatic diseases, since it does not include physical symptoms of depression

**Table 1.** Domains and variables

	History	Current state	Prognoses
Biological	Chronicity Diagnostic uncertainty	Severity of illness Clarity of diagnostic profile	Complications and life threat
Psychological	Restrictions in coping Premorbid level of psychiatric dysfunctioning	Treatment resistance Severity of psychiatric symptoms	Mental health threat
Social	Family disruption Impairment of social support	Residential instability Impairment of social integration	Social vulnerability
Health care	Intensity of prior treatment  Prior treatment experience	Organizational complexity at admission or referral  Appropriateness of admission or referral	Care needs

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or anxiety such as constipation, tremor, or fatigue, which could be caused by an underlying physical illness [26]. We have utilized a validated French version of the HADS [27].

**Social Scales.** The social scales used in this study included a rating of the social network (6 items), social support (13 items), and social stress (6 items). The scales were developed especially to assess patients with somatic diseases, and results from the application of this scale in patients with chronic diseases are available [28]. A French version of the questionnaire was produced according to the forward and back translation method by bilinguals [29].

**Visual Analogue Scales.** In order to study the patient's perception of his/her health and quality of life we used Visual Analogue Scales (VAS). These are well-established scales to assess perceptions in patients with physical diseases [30,31] and consist of lines of 100 mm on which the patient can indicate with a mark how he feels about a given question. We assessed the patient's perception of health and quality of life on a scale of 0 (worst possible) to 100 (best possible health or quality of life).

In addition, patients were asked about physical co-morbidity, chronicity of low back pain, vocational impairment, and the number of medical consultations during the last 6 months. Physical co-morbidity was assessed with a checklist developed for patients with rheumatological diseases [32,33]. The first appearance of low back pain was recorded by asking the patients "since when do you suffer

from low back pain." Percentage, reason, and time since the patient was on sick leave was obtained by asking the patient, and double checked with the medical chart. Number and types of medical outpatient consultations were asked and the total number of medical consultations was calculated by adding the number of specialist consultations and consultations by the general practitioner over the last 6 months.

#### *Procedure*

For all patients, a written report with information of their medical history and results of the current medical examinations was available to the principal researcher, who was experienced with the INTERMED, since he was one of the main team members participating in its development. The patients underwent an interview by the principal researcher covering the variables of the INTERMED and were then assessed with the other instruments.

#### *Data Analysis*

Data analysis was aimed at two aspects of validation of the INTERMED: its capacity to identify clinically relevant subgroups of patients and its validity in terms of concurrent validity. We used hierarchical cluster analysis to form subgroups of patients based on their pattern of scores on the INTERMED. Hierarchical cluster analysis is a nonparametric method that identifies those patients who are most similar to each other based on euclidean distances on all specified variables [34]. For this analysis we

**Table 2.** Sociodemographic variables of the sample ( $N = 100$ )

Sex	Male (69%)	Female (31%)
Age	Mean (years) (41.0)	SD (9.0)
Language	Native (31%)	Non-native (69%)

entered all 20 items of the INTERMED. The patient groups resulting from the clustering were compared on the medical and sociodemographic data and the psychometric instruments by means of Chi-square tests and analysis of variance.

## Results

### Sample

Due to major communication difficulties, five patients were excluded from the study. In addition, one patient refused participation, which led to a definitive sample of 102 patients. Of these, there were two cases for which we did not have complete data on INTERMED, i.e., necessary to conduct hierarchical cluster analysis. Therefore, data analysis was performed on 100 patients, 49 of whom were applying for disability compensation. Tables 2 and 3 show the sociodemographic variables and results on the psychometric tests of the sample.

The research sample consists of patients varying in level of physical, psychological, and social functioning, which is an important prerequisite for the

further analyses. Hierarchical cluster analysis identified three groups of patients based on their INTERMED scores. Table 4 shows the median values of the INTERMED variables for the three different groups. Behind the median values is the percentage of patients within the specific group with the median score on the variable.

A clear distinction among the three patient groups can be seen from Table 4. In general, group 1 consists of the most complex cases, group 2 the least complex cases, and group 3 somewhere in between. More specifically, groups 1 and 2 differ on 17 of 20 variables, groups 2 and 3 on 12 variables, and groups 1 and 3 on 7 variables. Thus, the groups are quite different with regard to their INTERMED profiles. Within the groups most median scores reflect at least half of the patients, showing that they are quite homogeneous. Patient clusters were compared on the additional medical data by means of Chi-square tests. Analysis of variance was used to investigate whether any significant differences among the patients' clusters exist on the psychometric tests (Tables 4a and 4b).

Results indicate that differences among the clusters exist with regard to most of the medical data as well as the psychometric instruments. Cluster 1 mainly consists of patients with chronic symptoms (89%), a reduced capacity to work, and applying for disability compensation. About two-thirds of cluster 2 patients also suffer from chronic symptoms, but despite this chronicity, only a small proportion of them has a

**Table 3.** Distribution of the psychometric variables

	Mean	SD	Minimum	Maximum
HADS-anxiety ( $N = 99$ )	10.1	4.5	1	21
HADS-depression ( $N = 99$ )	8.7	6.0	0	20
SF-36				
Physical functioning ( $N = 97$ )	28.7	25.7	0	100
Role limitations due to physical health ( $N = 99$ )	27.0	30.4	0	100
Role limitations due to emotional problems ( $N = 97$ )	47.1	45.4	0	100
Energy/fatigue ( $N = 99$ )	27.9	19.2	0	80
Emotional well-being ( $N = 99$ )	50.0	21.6	0	92
Social functioning ( $N = 99$ )	59.7	30.6	0	100
Pain ( $N = 99$ )	27.3	17.0	0	90
General health ( $N = 98$ )	45.5	19.3	5	95
Social network ( $N = 99$ )	6.2	3.6	0	16
Social support ( $N = 98$ )	18.2	7.9	0	37
Social stress ( $N = 97$ )	4.5	3.2	0	13
VAS-health perception ( $N = 83$ )	39.7	24.2	0	92
VAS-quality of life ( $N = 80$ )	47.3	25.0	0	98

**Table 4** Typical INTERMED profiles of the three patient clusters (median values and percentage of patients with median value)

		Cluster 1 (N = 55)	Cluster 2 (N = 29)	Cluster 3 (N = 16)	
History	Biological				
	Chronicity	2 (78%)	2 (69%)	2 (75%)	
	Diagnostic uncertainty	3 (73%)	1 (48%) 0 (41%)	2 (62%)	
	Psychological				
	Restrictions in coping	2 (69%)	1 (76%)	2 (100%)	
	Premorbid level of psychiatric dysfunctioning	2 (82%)	0 (69%)	1 (56%)	
	Social				
	Family disruption	2 (36%) 1 (31%)	0 (52%)	2 (44%) 1 (25%)	
	Impairment of social support	1 (64%)	0 (66%)	1 (44%) 2 (31%)	
	Health Care				
	Intensity of prior treatment	3 (76%)	2 (66%)	2 (81%)	
	Prior treatment experience	2 (42%) 1 (35%)	0 (76%)	1 (50%) 0 (38%)	
	Current state	Biological			
		Severity of illness	2 (98%)	2 (55%)	2 (94%)
Clarity of diagnostic profile		3 (69%)	1 (59%)	2 (44%)	
Psychological					
Treatment resistance		2 (64%)	0 (59%)	2 (88%)	
Severity of psychiatric symptoms		2 (86%)	0 (66%)	1 (50%) 2 (50%)	
Social					
Residential instability		1 (66%)	0 (90%)	0 (88%)	
Impairment of social integration		2 (53%)	2 (41%) 0 (31%)	2 (88%)	
Health Care					
Organizational complexity at admission or referral		1 (71%)	0 (86%)	1 (56%)	
Appropriateness of admission or referral		1 (51%)	0 (79%)	1 (63%)	
Prognoses		Biological			
		Complications and life threat	2 (96%)	1 (59%)	1 (50%) 2 (50%)
	Psychological				
	Mental health threat	2 (78%)	0 (62%)	1 (56%)	
	Social				
	Vulnerability	3 (58%)	0 (59%)	2 (50%) 1 (31%)	
	Health care				
Care needs	1 (100%)	0 (55%)	1 (100%)		

reduced capacity to work and less need to apply for disability compensation. Less than half of the cluster 3 patients suffer from chronic symptoms, but compared with cluster 2, they have a similar rate of disability applications, a similar rate of incapacity to work, and a higher rate of medical consultations. With regard to results from the questionnaires, significant differences among the patient clusters exist on all scales except

for the social scales. The general pattern is that cluster 1 patients are most complex, cluster 2 are the least complex, and cluster 3 are somewhere in between.

## Discussion

The patients included in the study consist of two groups having similar principal complaints, i.e., be-



**Table 4a.** Comparison among the three patient clusters on medical data

	Cluster 1 (%)	Cluster 2 (%)	Cluster 3 (%)	p
Applying for disability	76%	17%	13%	<.05
Chronic symptoms (more than 2 years)	89%	70%	44%	<.05
Reduced capacity to work (at least 1 year)	78%	24%	19%	<.05
At least one more somatic disease	29%	17%	19%	n.s.
More than 5 GP visits last 6 months <sup>a</sup>	83%	34%	63%	<.05
More than one visit to specialist <sup>a</sup>	45%	52%	81%	<.05
At least one urgency visit <sup>a</sup>	24%	17%	19%	n.s.

<sup>a</sup> For low back pain

**Table 4b.** Comparison among the three patient clusters on the psychometric tests and testing of difference

	Cluster 1	Cluster 2	Cluster 3	p
HADS-anxiety ( <i>N</i> = 99)	11.6	8.1	8.4	<0.05
HADS-depression ( <i>N</i> = 99)	11.5	3.6	8.1	<0.05
SF-36				
Physical functioning ( <i>N</i> = 97)	18.6	45.9	31.9	<0.05
Role limitations due to physical health ( <i>N</i> = 99)	18.5	37.1	37.5	<0.05
Role limitations due to emotional problems ( <i>N</i> = 97)	34.6	66.7	54.2	<0.05
Energy/Fatigue ( <i>N</i> = 99)	19.3	44.1	27.5	<0.05
Emotional well-being ( <i>N</i> = 99)	41.9	61.9	56.0	<0.05
Social functioning ( <i>N</i> = 99)	52.1	72.8	61.7	<0.05
Pain ( <i>N</i> = 99)	20.7	38.7	29.1	<0.05
General health ( <i>N</i> = 98)	36.5	59.3	51.6	<0.05
Social network ( <i>N</i> = 99)	6.2	6.6	5.4	n.s.
Social support ( <i>N</i> = 98)	17.6	20.4	16.6	n.s.
Social stress ( <i>N</i> = 97)	5.1	3.8	4.1	n.s.
VAS-health perception ( <i>N</i> = 83)	29.2	53.1	45.3	<.05
VAS-quality of life ( <i>N</i> = 80)	38.4	59.8	51.1	<.05

nign low back pain, although having different medical and psychosocial characteristics, notably, applying for disability compensation or not. The INTERMED proves it possible to differentiate among three subgroups that differ from each other on a range of variables, seem to be homogeneous in themselves, and reflect clinically meaningful information.

The first group consists of patients with chronic symptoms and a reduced capacity to work. Over two-thirds are applying for disability compensation, representing those patients whose hope for amelioration of their physical condition and return to work is minimal. Not surprisingly, these patients had high scores on the instruments measuring psychological distress.

Of the other two subgroups, most patients were not applying for disability compensation. Still, differences exist, as indicated by the cluster analysis. Comparison on the variables regarding their medical complaints reveals that patients from cluster 2 tend to have chronic symptoms more often; in contrast, cluster 3 patients have had more visits to GPs, specialists, and other medical services in the last 6 months. This may suggest that cluster 2 patients have become chronified without utilizing more health care and that cluster 3 patients are less chronified but utilize more ambulant care, including paramedical treatments such as physical therapy. In accordance with this finding, the more chronic patients from cluster 2 tend to rate themselves as being in relatively good health and having

the highest quality of life despite their chronicity. They are doing well on most SF-36 scales except for role limitations due to physical health. In addition, they are the least depressed and anxious. On the other hand, cluster 3 patients may be high users of medical care who are on the way to becoming incapacitated despite a short duration of their symptoms. They are close to the complex patients in cluster 1 with regard to depressive symptomatology and SF-36 scores—except for limitations due to physical symptoms and the perception of health and quality of life. It is clear that treatment of these complex cluster 3 patients, who are probably at risk for disablement, should be different from cluster 2 patients, despite the fact that at this cross-sectional assessment they are similar in their capacity to work.

The multidimensional case complexity of benign low back pain patients described in the introduction was supported by the results of this study. This prevented us from specifically focusing on the divergent validity of the instrument in the present sample. To study divergent validity, patients from different populations should be assessed, with the INTERMED showing complexity only from a biological perspective, or having complex care needs without severe biological symptoms. The present study demonstrates the capacity of the INTERMED to identify homogeneous and clinically meaningful patient clusters within a population of low back pain patients with regard to their biopsychosocial profiles and related health service needs, and therefore supports the validity of the instrument. Since the two patient populations evaluated with the INTERMED are clearly different from each other, e.g., with regard to disability, the next step would be to evaluate whether the INTERMED also distinguishes among patients within more homogeneous subgroups of patients. In a related study we therefore analyzed subgroups within a large sample of patients with chronic low back pain and found that INTERMED scores in all domains were significantly different for patients in different phases of disability [35].

A concrete example demonstrating the utility of the INTERMED for some clinical, scientific, and health care policy purposes would be a patient with chronic low back pain who is presented by the general practitioner to the outpatient clinic of a rheumatology department for intensive rehabilitation treatment. Assessing the patient with the INTERMED at referral could help to detect psychosocial problems that might be anticipated early in

the patient's stay and could be helpful with regard to clinical decision making (e.g., choosing between intensive functional rehabilitation or ambulatory treatment with an accent on cognitive strategies and psychosocial support). Assessment of patients included in a clinical trial could help to scientifically evaluate treatment interventions by describing the heterogeneous population of somatic and psychiatric co-morbid patients by means of more homogeneous patient groups. Based on assessment of patient samples from specific wards, the INTERMED might also be helpful for a more rationally based allocation of human resources, such as the employment of a mental health specialist or a social worker as a team member on a ward with high psychosocial co-morbidity, than the classical consult model. Future studies should address the question of whether use of the INTERMED in routine clinical practice will lead to improved care for complex patients with somatic and psychosocial comorbidities by early detection and classification of care needs and the design of subsequent treatment strategies.

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