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Application of the ICIDH in survey research on rehabilitation: the emergence of the functional diagnosis

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Summary

The *International Classification of Impairments, Disabilities, and Handicaps* (ICIDH) has been hypothesized to be an excellent conceptual framework for the functional diagnosis, i.e. the evaluation of health problems by rehabilitation specialists. The ICIDH-based functional diagnosis was assessed in a series of survey studies on physical therapy, exercise therapy, occupational therapy, podiatry, and speech therapy. The results show that the functional diagnosis tends to be reliable; that treatment goals, derived from the diagnosis, offer a sensible characterization of care given by rehabilitation specialists; and that treatment goals validly predict the selection of interventions by rehabilitation specialists. It is concluded that the application of the ICIDH in research on the functional diagnosis is highly appropriate. In future studies the concept of the functional diagnosis and the diagnostic procedures should be further developed.

Introduction

The treatment of rehabilitation specialists† is based on an evaluation of their patients' health problems. This evaluation is primarily concerned with the patient's functional health.¹ It supplements the medical diagnosis which is primarily concerned with pathology. For example, in addition to the medical diagnosis 'osteoarthritis', the physical therapist adds information on pain, joint range of motion, muscle strength, etc. This information is used to select appropriate interventions. Similarly, in patients with the medical diagnosis 'stroke', the speech therapist evaluates the patient's communicative abilities and selects interventions in accordance with the results of this evaluation.

Recently, the evaluation of health problems by reha-

bilitation specialists has been designated a diagnosis. Examples include the physical therapy diagnosis or diagnosis in physical therapy,^{2,3} the occupational therapy diagnosis,⁴ and the speech therapy diagnosis.⁵ These designations suggest that these diagnoses are entirely specific for a certain discipline (e.g. physical therapy). However, this is not correct, and perhaps 'rehabilitation diagnosis' or 'functional diagnosis' would be a better designation. These labels indicate that the diagnosis is made by a rehabilitation specialist (instead of a physician) or that the diagnosis is concerned with problems in functional health (instead of pathology).

The *International Classification of Impairments, Disabilities, and Handicaps* (ICIDH)⁶ has been hypothesized to offer an excellent conceptual framework for the functional (or rehabilitation) diagnosis. The various diagnostic observations of rehabilitation specialists seem to fit adequately into the three conceptual levels of the ICIDH — the level of impairments, disabilities, and handicaps. However, it appears that certain modification, of the ICIDH are required. Heerkens *et al.*⁷ (elsewhere in this issue) describe the kind of modifications which are required in order to accommodate functional diagnosis into the ICIDH. These authors also argued that the functional diagnosis encompasses more information than the evaluation of the patient's health status in terms of impairments, disabilities, and handicaps.⁸ Thus, the concept of the functional diagnosis is far from being definitively moulded. Nevertheless, it seems that the (modified) ICIDH can be used to describe important aspects of the diagnostic observations of rehabilitation specialists.

Because the functional diagnosis is a relatively new concept, very little is known about its scientific foundation. In order to gain an insight into the functional diagnosis and its scientific status, we conduct a series of survey studies on care given by rehabilitation specialists. In these studies the functional diagnosis is assessed using a registration form based on the (modified) ICIDH. These studies are intended to answer three main questions:

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†The research reported in this article concerns physical therapists, occupational therapists, exercise therapists, speech therapists, and podiatrists. It should be noted that, although the phrase 'rehabilitation specialists' also includes rehabilitation physicians, nurses, and social workers, these disciplines were not covered.

Table 1 The relationship among diagnosis, treatment goals, and treatment

Aspect of the diagnosis	Treatment goals	Treatment
All impairments, disabilities, and handicaps that are observed in a patient	Subset of impairments, disabilities, and handicaps chosen as a basis for forming treatment goals; the treatment is primarily aimed at alleviation of these impairments, disabilities, and handicaps	Application of interventions aimed at alleviation of the impairments, disabilities, and handicaps chosen as treatment goals

- (1) Is the diagnosis made by rehabilitation specialists reliable (reproducible)? An affirmative answer to this question is a *sine qua non* for our survey studies: if the diagnosis cannot be assessed in a reliable way, there is no sense in assessing it in our survey studies. In addition, an affirmative answer to this question means that — with the aid of the ICDH — rehabilitation specialists can learn to use uniform terminology to describe their patients' health problems. This would be a considerable improvement, given the frequent terminological confusion among rehabilitation specialists.
- (2) Which diagnoses are made, and which are the primary treatment goals? Several impairments, disabilities, and/or handicaps may be observed in a single patient. It is expected, however, that only a subset of these are primary treatment goals (see Table 1). The description of diagnoses and treatment goals provides an empirical insight into health problems treated by various rehabilitation specialists.
- (3) Does the application of interventions depend on the treatment goals which are pursued? The primary goal of the functional diagnosis is to give direction to the selection of interventions (see Table 1). Therefore, it is expected that the application of interventions will depend on the specific treatment goal pursued. If such relationships among treatment goals (derived from diagnoses) and interventions can be demonstrated, the predictive validity of the ICDH-based functional diagnosis is supported.

Answers to these questions are or will be sought in survey studies on physical therapy, exercise therapy[‡], occupational therapy, speech therapy, and podiatry. Obviously the ICDH is at the heart of these studies. Consequently, the appropriateness of the application of the ICDH in rehabilitation can be evaluated: to the extent that these studies yield meaningful results, the application of the ICDH

‡In The Netherlands, two recognized professions on exercise therapy exist (Cesar and Mensendieck therapy). Certain differences exist between this kind of exercise therapy and exercise therapy as applied by physical therapists; physical therapists additionally use physical applications, massage, and manual therapy.

in care given by rehabilitation specialists can be deemed appropriate.

The goal of this article is to summarize the design of our studies and our results, as far as they are presently available. This allows an evaluation of the application of the ICDH in rehabilitation.

Design of the Studies

REGISTRATION FORM

For each profession, a registration form or survey questionnaire was developed. Each form consists of three main categories. The first category concerns general patient characteristics and the medical diagnosis (indication for referral). The second category concerns (aspects of) the functional diagnosis, while the third category concerns treatment goals and interventions. The second category (aspects of the functional diagnosis) was derived from the ICDH,⁶ an adaptation of the ICDH for rehabilitation specialists,^{7,9} and expert consultation. The third category (interventions) was based on expert consultation. Each of these registration forms has been described in detail elsewhere.¹⁰⁻¹⁴ Examples of the functional diagnosis include pain, joint range of motion, disabilities in personal care, and handicap in mobility. Examples of the interventions include ultrasound therapy, exercise therapy, training of domestic skills, and advice on personal care.

RELIABILITY STUDIES

The reliability of the assessment of the functional diagnosis was tested for each discipline separately. Two professionals independently examined a series of patients and scored their diagnostic observations in the registration form. The degree of agreement among these specialists (i.e. the reliability of the assessment of the functional diagnosis) was evaluated using appropriate statistics: Cohen's kappa¹⁵ and the percentage of agreement. Logistic difficulties forced us to make adaptations to this basic design in two studies: in the podiatry study,¹¹ two podiatrists examined the patient together, and then scored their observations separately; the occupational therapy study¹³ consisted of two parts: a study

in a rehabilitation centre, where each therapist examined a patient twice (intra-observer design); and a study in a psychiatric hospital, which used the original design (inter-observer design).

SURVEY STUDIES

In the survey studies, rehabilitation specialists assessed patients using the registration form. In the study on physical therapy, data on approximately 17 000 patients were compiled during a period of 4 years. The studies on the other disciplines were a bit more modest: for each discipline, approximately 1000 patients were (or — in the case of speech therapy — will be) assessed, during a period of approximately 1 year.

In the Netherlands, approximately 60% of all physical therapists work in primary health care. The survey focused exclusively on these physical therapists, who treat patients on an outpatient basis in private practices. Physical therapists in primary health care were approached in a random (non-selected) way in order to ensure a representative study. A comparison among physical therapists participating in the survey and all physical therapists in primary health care showed that, although there were certain differences, there was no reason to suspect substantial selection effects in our data.¹⁶

The studies on exercise therapy and podiatry were representative for the entire discipline. Because, in the Netherlands, these specialists work almost exclusively in primary health care, the survey also focused almost exclusively on primary health care.

Most occupational therapists in the Netherlands work in hospitals and other institutions. There is a strong trend towards occupational therapists working in primary health care but, at the time of the survey, this was still a small minority. The survey focused on occupational therapists working in hospitals, rehabilitation centres, nursing homes, and psychiatric hospitals. A representative sample of occupational therapists working in these institutions was selected.

Speech therapists in the Netherlands work in schools, primary health care, hospitals, and other institutions. The survey on speech therapy, which is still in progress, is intended to be representative for the entire profession.

For further methodological details, the reader is referred to the original publications.¹⁶

Results and discussion

RELIABILITY

The reliability of the assessment of impairments, disabilities, and handicaps was evaluated by means of two statistics:

the percentage of agreement and kappa. A percentage of agreement of 75% or higher is regarded as acceptable. A kappa value between 0.40 and 0.70 is regarded as fair to good, which we designated as satisfactory, while a kappa of 0.75 and higher indicates an excellent degree of agreement.¹⁷

For the purpose of this article the results of the reliability studies¹⁰⁻¹⁴ have been summarized in Table 2. For each discipline the median value of the percentage of agreement and the median value of kappa was determined separately for impairments, disabilities, and handicaps. Table 2 shows that the medians of the percentages of agreement and the medians of the kappas were above the criterion of 75% and 0.40, respectively. Thus, on average, the reliability was at least satisfactory, and even excellent in some cases.

However, from the ranges reported in Table 2 it is clear that certain items had insufficient reliability. Some of these items were dropped; other items, which apparently were not clearly differentiated, were amalgamated; and the definition of certain items was improved. Fortunately, this kind of alteration was necessary in only a limited number of items. Therefore, the overall conclusion in each of these studies was that, despite some deficiencies, the reliability of the assessment of the functional diagnosis was sufficient to warrant a survey study.

From the differences among disciplines, which can be read from Table 2, it cannot be concluded that these disciplines differ with regard to the reliability of their assessment. The studies differed with regard to their design (see Methods section) and the kind of items assessed. Therefore, it is not valid to conclude that the reliability of the assessment differs among disciplines.

DIAGNOSES AND TREATMENT GOALS

The diagnoses (in terms of impairments, disabilities, and handicaps) and the treatment goals derived from these diagnoses have been described for patients treated by physical therapists and other disciplines.¹⁶ Table 3 shows the distribution of treatment goals over the level of impairments, disabilities, and handicaps for various disciplines. Table 4 shows the three treatment goals which were most frequently chosen, separately for the impairment, disability, and handicap levels. Treatment goals, instead of diagnoses, are reported here, because the presence of a diagnosis does not necessarily mean that it is actually treated. Treatment goals are a selection of a diagnoses towards which treatment is actually directed (see Table 1). Therefore, these goals are better suited to characterize the disciplines.

In interpreting the data shown in Tables 3 and 4, one should keep in mind that the lists of potential treatment goals differed among the disciplines. For each discipline a selection of the most appropriate treatment goals was made. More

Table 2 Reliability of the assessment of the functional diagnosis: percentage of agreement and kappa

		Percentage of agreement			Kappa		
		Median	Range	n	Median	Range	n
Podiatry	I	100	94-100	17	0.94	0.87-1.00	2
Physical therapy	I	78	28-92	15	0.44	0.19-0.77	11
	D	88	76-100	26	0.68	0.40-0.91	19
Exercise therapy	I	90	66-100	20	0.65	0.26-0.94	15
	D	85	54-100	24	0.53	0.14-0.77	21
Occupational therapy somatic health care	I	96	89-100	12	0.82	0.69-1.00	8
	D	91	82-98	29	0.79	0.45-0.93	22
	H	82	75-88	6	0.69	0.45-0.76	6
psychiatric health care	I	93	72-100	12	0.78	0.65-0.91	6
	D	84	60-96	25	0.57	0.26-0.89	23
	H	80	70-88	6	0.63	0.52-0.69	6
Speech therapy	I	97	72-100	48	0.87	0.31-1.00	48
	D	95	63-97	10	0.86	0.57-0.93	10
	H	88	84-93	3	0.74	0.73-0.87	3

I = impairments; D = disabilities; H = handicaps; n = number of items assessed; because kappa was determined only if the diagnosis was made in at least 20% of the patients, the n is sometimes lower with kappa than with the percentage of agreement.

importantly, the scope of these goals differed; for example, in the study on occupational therapy rather broad categories of goals at the impairment level were used (e.g. reduction of motor impairments), while in the study on physical therapy these categories were rather specific (e.g. improvement of muscle strength). In addition, physical therapists indicated treatment goals in each session; in the analysis these goals were aggregated to the level of treatment as a whole. The other specialists indicated goals for treatment as a whole. For these reasons one should focus on the overall pattern of goals, ignoring minor differences among disciplines.

With regard to the level of treatment goals, the following can be read from Table 3. Both physical therapists and exercise therapists chose their goals primarily at the level of impairments; goals at the level of disabilities were chosen much less frequently. Occupational therapists, on the contrary, frequently chose goals at the level of disabilities. They also chose goals at the level of impairments and handicaps, but less frequently so. Podiatrists chose their goals exclusively at the level of impairments; goals at the other two levels were not even available, because — during the development of the form — no need for these goals was expressed.

Table 4 shows the specific content of the treatment goals. Reduction of pain is a primary treatment goal for physical therapists, exercise therapists, and podiatrists. Apparently, pain reduction is a cardinal issue in these disciplines' treatment. Two other goals frequently chosen by physical therapists are improvement of joint range of motion and

muscle tone. Exercise therapists chose improvement of posture and muscle strength, while podiatrists were concerned with reduction of stance deviations of the foot and the reduction of fatigue.

Occupational therapists in somatic health care were frequently concerned with the improvement of motor function, personal care, and locomotor skills. In psychiatry they were most frequently concerned with basic skills, intrapersonal functions, and leisure skills.

On the one hand, these results confirm professional profiles as they are described in text-books¹ and other papers.¹⁸ The goals of physical therapists and exercise therapists are primarily at the level of impairments; for occupational therapists all three levels are important, but the disability level seems to be the primary one. Podiatrists are exclusively concerned with the impairment level. On the other hand, these results also offer new perspectives on the rehabilitation disciplines. The emphasis on pain reduction in physical therapy, exercise therapy, and podiatry — but not occupational therapy — is a clear example.

In addition to the entirely descriptive results summarized above, the analysis of the data has been taken one step further. It has been determined whether it is possible to reduce the large number of diagnoses and goals to a limited number of clusters (or dimensions) of diagnoses and goals. This appeared to be a productive analysis: it was indeed possible to reduce the data in this way and the resulting clusters (or dimensions) could be interpreted in a meaningful way.

Table 3 Distribution of treatment goals over the level of impairments, disabilities, and handicaps (percentages)

	Treatment goals at the level of			
	Impairments	Disabilities	Handicaps	
Podiatry	100	—	—	100
Physical therapy	68	32	—	100
Exercise therapy	90	10	—	100
Occupational therapy				100
somatic health care	23	56	21	100
psychiatric health care	23	48	29	100

TREATMENT GOALS AND INTERVENTIONS

The relationship between treatment goals and interventions has been analysed for patients treated by physical therapists and other disciplines.¹⁶ It was found that the selection of interventions depends on which treatment goals are pursued. In other words, treatment goals determine which interventions are applied.

This conclusion will be illustrated with data on physical therapy.¹⁶ The wide range of interventions in physical therapy was summarized into a number of categories. Among these categories was exercise therapy (exercise therapy given by physical therapists differs in a number of ways from treatment by exercise therapists, but these details need not concern us here). If the physical therapist aimed at improvement of muscle strength, exercise therapy was frequently applied; if pain reduction was the treatment goal, exercise therapy was very infrequently applied. Another treatment category was interferential therapy (a physical application using electrical stimulation). With pain reduction as treatment goal, interferential therapy was frequently applied; but interferential therapy was never used to improve muscle strength. Similar relationships were found for other goals and interventions. These relationships were particularly marked with goals at the level of impairments; goals at the level of disabilities also determined the selection of intervention, but these relationships were much weaker. This seems to confirm the earlier observation that the impairment level is more important in physical therapy than the disability level. The overall conclusion from this study was that the selection of interventions in physical therapy depends on which treatment goals are pursued. This implies that the ICIDH-based functional diagnosis validly predicts the application of interventions. Thus, the ICIDH seems to offer an appropriate conceptual framework for aspects of the physical therapy diagnosis.

General discussion

Here, these results will be discussed in a general way.

focusing on the appropriateness of the application of the ICIDH in care given by rehabilitation specialists.

The results of the reliability studies were encouraging; although something remains to be desired, rehabilitation specialists generally agreed on the functional diagnosis of their patients. A notorious problem in rehabilitation is the widely divergent terminology used to describe the patient's condition. It seems that the ICIDH offers at least the beginning of a solution to this problem: rehabilitation specialists were able to describe their patient's conditions in terms of the ICIDH-based diagnoses, and they agreed on these diagnoses. However, one should not forget that the reliability studies used a modification of the ICIDH. Concepts and terminology used in rehabilitation were introduced into this modification. Of course, the conclusion with regard to the possibility of standardized terminology applies to this modification of the ICIDH.

The description of treatment goals offers an empirical characterization of the disciplines studied. Among disciplines, important differences were observed with regard to the level of treatment goals: podiatrists exclusively focus on impairments; physical and exercise therapists are concerned with goals at the level of impairments and disabilities, but the impairment level clearly is the primary one; occupational therapists are concerned with goals at all three levels, but primarily with goals at the disability level. The three levels of the ICIDH seem to allow an appropriate characterization of rehabilitation disciplines as far as treatment goals are concerned.

The description of the specific content of these goals offers a more detailed characterization of these disciplines. The emphasis on pain reduction in physical therapy, exercise therapy, and podiatry can be cited as an informative example. However, it should be noted again that a modification of the ICIDH was used. The modifications primarily concern the specific diagnostic items. The conclusion with regard to the appropriateness of the specific diagnostic items necessarily pertains to this modification.

In physical therapy, podiatry, exercise therapy, and occupational therapy, the selection of interventions was

Treatment goals; treatment directed towards alleviation or recovery of

The percentages refer to the percentage of patients for whom the treatment goal was chosen.

found to depend on treatment goals: these goals determine whether a therapist selects on intervention or not. Thus, the ICIDH-based diagnoses perform in the expected way. The primary goal of the functional diagnosis is to give direction to the treatment. Our findings suggest that the ICIDH-based diagnoses indeed perform in this way. Again, this is an indication as to the appropriateness of the application of the (modified) ICIDH in rehabilitation.

All of these conclusions refer to the application of the ICIDH in survey research. In clinical practice, therapists are in need of a much more fine-grained diagnostic system than is available in our registration form. It remains to be determined whether a refined diagnostic system, based on the ICIDH, really suits the needs of rehabilitation specialists. Our survey studies certainly suggest that this will be true.

It has been argued that the functional diagnosis is not equivalent to an evaluation of the patient's health problems in terms of impairments, disabilities, and handicaps. Rehabilitation specialists need to learn to identify the key impairments, disabilities, and handicaps instead of merely enumerating all health problems.¹⁹ In addition, in making their diagnosis rehabilitation specialists have to use other sources of information such as the medical diagnosis, and the patient's physical and social environment.⁹ Undoubtedly this is true: besides the diagnoses, the treatment goals were assessed in the survey studies precisely for this reason. At the same time, it is clear that the concept of the functional diagnosis is far from being definitively moulded, and it needs further development. The ICIDH seems to offer an excellent framework to accommodate these future developments. Finally, diagnostic tests and procedures should be developed for each impairment, disability, and handicap. At present only a limited number of diagnostic tests and procedures are available. Frequently the quality of these tests and procedures (e.g. sensitivity and specificity) has not been adequately evaluated.^{20,21}

In conclusion, the application of the ICIDH in rehabilitation seems highly appropriate: rehabilitation specialists tend to agree on ICIDH-based functional diagnoses; treatment goals can be formulated in terms of impairments, disabilities and handicaps and that these goals offer a sensible characterization of care given by rehabilitation specialists; and finally, these treatment goals validly predict the selection of interventions by rehabilitation specialists. These conclusions necessarily apply to the modification of ICIDH. In

future work the concept of the functional diagnosis and the diagnostic tests and procedures should be further developed.

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