Development of the Dutch ICF Activity Inventory: Investigating and evaluating rehabilitation needs of visually impaired adults

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Chapter 4

Low vision rehabilitation plans comparing two intake methods

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Abstract

Purpose: This qualitative study investigates possible differences in identified rehabilitation needs indicated by the usual intake procedures at a Multidisciplinary Rehabilitation Center (MRC) for visually impaired persons compared with those indicated by the use of a structured Dutch version [based on the International Classification of the Disability, Functioning and Health (ICF)] of the Activity Inventory (D-AI).

Methods: Twenty patients who enrolled at the MRC received a D-AI assessment by telephone, in addition to the usual intake. All patients received usual care, based on rehabilitation needs identified by the usual intake procedure at the MRC. Rehabilitation needs identified at the MRC were obtained from patient files retrospectively and were compared with rehabilitation needs identified by the D-AI.

Results: The mean number of rehabilitation needs reported in the patient files was 6.9 (±5.1) vs. 24.0 (±11.2) using the D-AI. Only 22.6% (±14.3) of the rehabilitation needs identified by the D-AI were present in the patient files; 79.3% (±28.2) of the rehabilitation needs reported in the patient files were identified by the D-AI. Overall agreement corrected for chance between both intake methods revealed a fair Cohen kappa of 0.27.

Conclusions: At the MRC, more needs were revealed using the D-AI compared with the usual intake procedure. The systematic character of the D-AI prevents important topics being overlooked. In the usual intake, it was not clear whether needs were investigated from the patient's perspective. This may hamper (medical) communication and shared decision making about the rehabilitation program that needs to be followed. Moreover, using the unstructured information from the patient files makes it difficult to evaluate rehabilitation outcomes. With the D-AI, although an extensive overview of rehabilitation needs is produced, it remains difficult to focus on the most relevant needs. However, after assessment with the D-AI, all aspects of the ICF, Disability, and Health scheme can be discussed in a process of shared decision making, which leads to the final determination of rehabilitation goals.

Introduction

Over the last decade, the concept of "patient-centered medicine" has gained increasing attention;[1–7] the general opinion is that patients should be involved in clinical decision making. It is suggested that shared decision making is particularly suitable for long-term decisions, especially for patients with a chronic impairment and when the intervention involves more than one session.[8] Decision making is often expressed in goal-setting approaches,[9–11] because these are reported to increase the patient's progress in rehabilitation[12] and to foster adherence to physicians' recommendations.[13] At the same time, there is increasing support for evidence-based medicine. Clinicians have greater credibility if they routinely collect and share outcomes that demonstrate the impact on health, function, and quality of life, as well as the economic benefits of intervention.1

Studying medical communication can help clarify what happens during medical consultations and, subsequently, whether the approach is effective. However, before effectiveness in rehabilitation medicine can be established, it must be clear which problems encountered by the patient form concrete goals in the planned rehabilitation program. It is obvious that in patient-centered medicine, patients have to be involved in formulating these goals. Subsequently, procedures and methods to evaluate the therapeutic usefulness of specific rehabilitation programs are needed.[11] Thus, in rehabilitation medicine, the need for instruments that help tackle these challenges is also increasing. Goal Attainment Scaling appears to be a promising outcome measure in heterogenic populations, for individual rehabilitation purposes.[12,14] This is an individualized outcome measure involving goal selection and goal scaling and has been used to evaluate services in different areas of rehabilitation.

In studying the effectiveness of visual rehabilitation, Stelmack et al.[15] showed that a specific vision rehabilitation program contributed to significantly improved patient-reported outcomes. In addition, other studies focusing on specific problems from the perspective of visually impaired persons, or on global rehabilitation goals and outcome measures, showed a positive effect of rehabilitation (e.g.[16–21]). In the Netherlands, most studies focus on specific domains of rehabilitation such as mobility, adjustment to vision loss or reading/fine work, or on other important outcome measures, such as vision-related quality of life (e.g.,[22,23]). However, van Nispen et al.[24,25] showed that low-vision rehabilitation of visually impaired elderly in the Netherlands did not contribute substantially to vision-related quality of life.

In the Netherlands, for visually impaired patients several options are available for assistance. First, optometric services are available in hospitals and

in the community; these mainly prescribe optical aids such as specific spectacles, telescopic devices, and electronic visual enhancement systems (EVES). Furthermore, most larger Dutch cities have a Multidisciplinary Rehabilitation Center (MRC) for visually impaired persons, which offers outpatient multidisciplinary care. Rehabilitation programs and additional care (such as prescription of low vision aids, mobility training, cooking training, psychological care, advice for environmental changes, or computer training) are provided by professionals such as optometrists, social workers, neurological psychologists, and occupational therapists. The rehabilitation program in the MRC may include several rehabilitation products that meet the individual and often complex needs of the patient, as investigated in the intake phase. The exact intake procedure differs between sites, professionals, and patients, which indicates a lack of evidence-based processes. This lack of evidence has stimulated MRCs in the Netherlands to collaborate in the development of evidence-based rehabilitation programs (e.g.[26,27]). Furthermore, they are willing to change their rehabilitation process.

Until now, during the intake process at the MRCs, the rehabilitation needs of the patients have not been investigated in a structured way and patients were not systematically involved in creating a rehabilitation program. However, such a system might be the key to more successful rehabilitation and better vision-related quality of life. With such a system, an effective rehabilitation plan can be composed, which is based more on the actual needs of the individual patient and not on what is offered by the MRC. Massof et al.[28–32] presented an interesting concept [the Activity Inventory (AI)] to systematically investigate the rehabilitation needs of visually impaired persons. The AI investigates rehabilitation needs from the patient's perspective and enables evaluation of rehabilitation outcome, which is an important step for evidence-based medicine. The AI makes the patient's wishes more apparent and yields priority scores (PRs) for specific rehabilitation needs (e.g., daily meal preparation). By quantifying the rehabilitation needs of a patient, the progress of the patient can be monitored. Moreover, the outcome measures of the AI will facilitate future research to evaluate whether the rehabilitation programs used can be labeled as evidence based. Finally, storing this information in the patient's records might improve communication between various care providers.

A Dutch version of the Dutch ICF Activity Inventory (D-AI) was recently developed.[33] The AI was translated, adapted, and extended by studying patient files and holding focus group discussions. The D-AI includes many additional tasks and goals. Moreover, all goals of the D-AI were categorized according to the "Activity and Participation" chapters of the ICF.[34] The ICF provides an

important international taxonomy for classifying and measuring functions, disabilities and health with standard concepts and terminology. Using a more universal language may contribute to better medical communication and understanding between researchers, rehabilitation professionals, and patients.[35]

A recent study on the D-AI supports the feasibility of the instrument. [36] It is expected to be more objective compared with the usual unstructured intake interview used by the MRCs, it makes the intake less dependent on the qualities/individual preferences of the intake assessor, and it is expected to prevent important topics being overlooked.[36] Moreover, a more systematic intake enables evaluation of rehabilitation outcome and may improve medical communication between, for example, providers, patients, policymakers, and insurance systems. Optometrists and MRCs may benefit from using the D-AI as part of their intake process.

This study investigates to what extent the rehabilitation needs identified by the usual intake in the MRCs in the Netherlands differ from an intake using the D-AI. Delving deeper into the content of the patient files of participants in the feasibility study,[36] this qualitative information may be of value to (i) better understand and clarify possible differences in the rehabilitation needs identified by the usual intake and by the structured intake using the D-AI and (ii) further improve the content of the D-AI.

Methods

Recruitment of Study Population

Patients were initially recruited for the feasibility study of Bruijning et al.36 In summary, eligible participants were at least 50 years old, spoke adequate Dutch, and had sufficient cognitive ability, as judged by the intaker. We use “intaker” throughout this article to mean the person who does the patient’s intake. Persons with low vision from any cause were allowed to participate. A sample of 32 patients was taken from patients who were enrolled at a specific site of an MRC in the Netherlands between September 2007 and November 2007. Patients were recruited after enrolment at the MRC. All patients met the study criteria as defined in the evidence-based guidelines on the referral of visually impaired persons to low-vision services in the Netherlands.[37] Following this Dutch guideline implies that the inclusion of patients was not limited to those who strictly meet the formal criteria for low vision as defined by the World Health Organization.[38] For example, patients with substantial visual field loss, problems with low or high light levels, or severe problems with reading were also allowed to participate. The study protocol was approved by the Medical Ethics Committee of

the VU University Medical Center Amsterdam and was consistent with the principles of the Declaration of Helsinki. All patients provided written informed consent.

Instruments and Data Collection Method

Dutch ICF Activity Inventory

After studying the literature and holding focus group discussions with experts and patients, a first version of the D-AI was developed.[33] To improve this version, the D-AI, was assessed by telephone and also used in a pilot study to test the feasibility of the D-AI.[36] Subsequently, the data from this feasibility study were supplemented with information from patient files used in this study. In essence, the D-AI consists of specific activities, described as "tasks," which are typically difficult for visually impaired people. Tasks that are performed in a coordinated manner for a common purpose represent a "goal." These goals are classified by the "Activity and Participation" domains of the ICF.A detailed explanation of the development process using focus group discussions is given by Bruijning et al.[33] In accordance with the AI published by Massof et al.,[28–32] the D-AI rates the importance of each goal on a scale of 0 (not important) to 3 (very important).[33] If the goal is important, the difficulty of this goal, attributable to the visual impairment, is rated on a scale of 0 (not difficult) to 4 (impossible), or not applicable (missing). Only goals that are at least "a little important" (score ≥1) and "a little difficult" (score ≥1) are fully assessed at the task level. Of the underlying tasks, only the difficulty is rated on the same difficulty scale. In addition, it is possible to calculate a PR for each goal (importance score * difficulty score). As suggested in the feasibility study of Bruijning et al., it is possible to rank all goals from the highest to the lowest PR to create a top priority list (TPL).[36]

Using Patient Files for Information on Usual Intake and Rehabilitation Program

In parallel to the assessment of the D-AI, patients underwent a usual intake procedure and rehabilitation program of the MRC. "Usual intake" indicates the process of investigating a patient's rehabilitation needs as is usually done by the MRCs. This procedure and program were observed retrospectively by studying the patient files. The intake procedure consisted of several steps. Generally, it started with a concise telephone conversation between the patient and an experienced professional intaker from the MRC, to clarify the rehabilitation needs. Because we wanted to compare the use of the D-AI with the current intake strategy, the intakers were not trained for this specific study. However, all

intakers had previously conducted “intake conversations” by telephone (as their specific job at the MRC), all had received on-the-job training, and all were highly experienced in their work. This conversation was usually followed by a “Visual Function Examination” (VFE) by a low-vision specialist (a clinical physicist or an optometrist) at the MRC. Ophthalmic information was received from the ophthalmologist and, if necessary, additional medical information was requested from other medical specialists (e.g., general practitioner, neurologist). If possible, rehabilitation was started after this first intake phase. However, for some patients, additional and more specific investigations were advised by the professional intaker or by the low-vision specialist based on the VFE, depending on the individual needs of the patient. Additional investigations were performed as part of the usual intake. Sometimes, the start of the rehabilitation and the additional investigations ran in parallel. Examples of additional investigations are investigating possible rehabilitation needs concerning computer use, an employment-related social work investigation, an occupational investigation, or a psychosocial investigation. Reports of all appointments, from the intake and from rehabilitation, were documented to keep the patient files up-to-date. The course of rehabilitation itself was based on the usual intake not on the results of the D-AI. Reports of rehabilitation included in the patient files revealed that, sometimes, additional rehabilitation needs became apparent during the rehabilitation process (e.g., during self-care training with an occupational therapist, an additional question arose concerning daily meal preparation). In May 2009, all patient files were screened for rehabilitation needs that were identified during the usual intake and the rehabilitation process.

Analysis

Identifying Rehabilitation Needs From the D-AI and the Usual Intake Procedure
For all patients, a TPL was created; PRs of all goals of the D-AI were calculated by multiplying the importance score by the difficulty score. Goals with a PR ≥1 were considered to be rehabilitation needs. As was suggested in the feasibility study,[36] for each patient, the TPL-15 (i.e., the list of goals with a PR higher than or equal to the 15th goal in the TPL) was created. In this context, any goals scoring outside this TPL-15 list were not considered to be rehabilitation needs. Concurrently, for each patient, all rehabilitation needs were collected (retrospectively) from the patient files, i.e., rehabilitation needs identified in the first phase of the intake (telephone interview, or VFE), and needs identified in the additional investigations (if applicable). Because it was not always possible to find the exact date on which the need was actually identified, those needs that

were identified after the intake was closed (i.e., the additional needs that emerged during rehabilitation) were also analyzed as needs identified during a usual intake.

Classifying and Comparing Rehabilitation Needs

In the usual intake procedure at the MRC, patients formulated their rehabilitation needs in different ways; for example, “I would like to have a low vision aid to be able to watch TV,” “I cannot read the subtitles anymore,” “I cannot distinguish different faces on the TV,” or “I cannot follow the news on TV.” Most rehabilitation needs recorded in the patient files were formulated as difficulties at the goal level (e.g., “It is difficult for me to watch TV”). To be able to compare the results from the D-AI at the goal level with the results from the usual intake, it was sometimes necessary to transcribe statements collected from the patient file. For example, if a specific rehabilitation need was formulated at the task level (e.g., “I cannot read the subtitles any more”), the statement was transcribed to the goal level (e.g., “watching TV”). Sometimes, difficulties associated with specific tasks could belong to different goals, e.g., “I cannot write down addresses or telephone numbers.” In this case, the one rehabilitation need formulated in the usual intake was transcribed to several possible goals that are formulated in the D-AI, such as “administration,” “personal correspondence,” “using telephone,” and “writing.” This means that one statement in the patient file could potentially address many different goals of the D-AI, even from different ICF domains. After all statements from the patient files were transcribed to the goal level, the rehabilitation needs identified from the patient files were compared with the goals identified using the D-AI. For this analysis, the exact value of the PR was not relevant.

Agreement Measures

As no gold standard is available for either of the intake methods, we calculated the observed agreement. In addition, using cross-tab boxes with columns for D-AI goals identified and not identified, and rows for usual intake goals identified and not identified, Cohen’s kappa could be calculated as a measure of agreement between the two intake methods.[39] Cohen’s kappa corrects for chance agreement and is determined as follows: $(p_o-p_e)/(1-p_e)$, where p_o is the observed proportion of agreement and p_e the proportion expected by chance. This correction for chance means that a skewed distribution results in a lower kappa value. Overall agreement was also calculated when only goals included in the TPL-15 were considered as rehabilitation needs. In addition, overall agreement was also determined without those goals for which the goal difficulty question was labeled as “not applicable” included in the analysis (missing). This

information may provide more insight into how to adapt the structure and/or algorithm to assess the D-AI.

Improving D-AI

The second aim of the study was to improve the content of the D-AI based on a comparison of the results of the D-AI and the results of the usual intake. Rehabilitation needs that showed up in the patient file, but not after assessing the D-AI, were further analyzed to establish why this topic did not result in a PR higher than 0.

Results

Study Population

The D-AI was administered in addition to the usual intake along with some additional characteristics and an evaluation as part of the feasibility study.[36] Of the 32 eligible patients, 20 (62.5%) agreed to participate (all of these patients completed the study). The main reason for non-participation was “too much effort involved” (five of the 32 patients, i.e., 15.6%). Patient characteristics are presented in Table 1; more details on the study population are given in the study of Bruijning et al.[36]

D-AI

The mean time to complete the D-AI was 88.8 (±41.0; range, 35 to 180) minutes, and the mean number of goals fully assessed at the task level (PR ≥1) was 22.7 (±13.8). Table 2 shows the most important results of the D-AI. For details on the feasibility of the D-AI, see ref. 36.

Usual Intake

The patient files showed that, after entering the MRC, 17 patients (85%) had a concise interview (by telephone) with an intaker about their rehabilitation needs. This conversation was unstructured and took place within a mean of 4.0 (±7.5; range, 0 to 30) weeks after enrolling in the MRC. In 15 patients (75%), this conversation was followed by a VFE, which took place within a mean of 15.1 (±10.5; range, 2 to 40) weeks after entering the MRC. Five participants (25%) combined the VFE with a visit to the “Information department” in which several low-vision aids and tools were demonstrated (e.g., speaking watches, large-print playing cards, easy-to-use cell phones, etc.). The patient files revealed that a mean of 43.4% of the rehabilitation needs identified during the rehabilitation process were identified in the first phase. After this first phase of the intake, the

following additional investigations were advised by the intaker or by the low-vision specialist from the VFE, as part of the usual intake: computer investigation (seven participants; 35%), employment-related social work investigation (one participant; 5%), occupational investigation (nine participants; 45%), or psychosocial investigation (five participants; 25%). After the usual intake procedure was closed, the rehabilitation program was started. The rehabilitation program sometimes started directly after the VFE (e.g., by providing low-vision aids, such as magnifiers). The D-AI was always assessed before the start of rehabilitation and, for nine participants (45%), after the concise interview and before the VFE. Additional rehabilitation needs were identified during the rehabilitation program, as could be seen in the reports in the patient files. Table 2 summarizes the most important findings identified using the usual intake procedure.

Rehabilitation Needs: Comparing D-AI and Usual Intake

In the patient files, no rehabilitation needs were identified that were not available as responses in the D-AI. Table 2 shows the goals that were identified as rehabilitation needs by assessing the D-AI and which rehabilitation needs were recorded in the patient files (after a usual intake and during the rehabilitation program). More details on these data are available in the Appendix (Table A1 available online at http://links.lww.com/OPX/A70). The mean number of rehabilitation needs (goals) identified in the patient files was 6.9 (±5.1) vs. 24.0 (±11.2) after assessing the D-AI. If the D-AI hypothetically was considered to be the gold standard, only 22.6% (±14.3) of the rehabilitation needs could be identified in the patient files. In contrast, if the content of the patient files hypothetically was considered to be the gold standard, 79.3% (±28.2) of the rehabilitation needs was identified by the D-AI.

Agreement Measures

Overall observed agreement between both intake methods was 73.0% and the overall Cohen´s kappa was 0.27. Table 2 shows how often specific rehabilitation needs were missed by the D-AI compared with the usual intake and vice versa. Observed agreement and Cohen´s kappa values were calculated between the two intake methods for individual goals and are also given in Table 2. When only those goals in the TPL-15 identified using the D-AI were considered as rehabilitation needs, the observed agreement and Cohen´s kappa values were 78.3% and 0.28, respectively. When all goals which were labeled as “not applicable” (on the goal difficulty question using the D-AI) were not included in

the analysis (missing), the observed agreement and Cohen´s kappa values increased to 76.2% and 0.31, respectively.

An Example

Figure 1 illustrates (for one individual patient) which goals were identified after the usual intake and which after assessing the D-AI. Comparison of the two intake methods reveals the differences in rehabilitation needs that were identified during the two intake methods for this specific participant.

Table 1: Characteristics of the patient population (n = 20)

Patient characteristic	**Specification**	**n (%) / mean (± SD) / [range]**
Age	Years	70.75 (± 10.3); [51-89]
Gender	Male	8 (40%)
Eye condition	Macular Degeneration	8 (40%)
(as reported	Cataract	5 (25%)
in patient file)	Glaucoma	2 (10%)
	Refractive error (severe)	2 (10%)
	Neurological problem	2 (10%)
	Arterial problem	2 (10%)
	Cornea diseases	1 (5%)
	Retinitis pigmentosa	1 (5%)
	Amblyopia	1 (5%)
	Unknown	1 (5%)
	More than one eye condition	5 (25%)
Visual Functioning		
Visual Acuity [a]	Better eye	
	≥ 0.3	10 (50%)
	≥ 0.1 and < 0.3	6 (30%)
	≥ 0 and < 0.1	4 (20%)
Visual field loss	Not specified	4 (20%)
Worse eye interferes	When looking with both eyes	3 (15%)
Co-morbidity	self-reported	14 (70%)
Education level	Low educated (≤ 6 years)	11 (55%)
	High educated (> 6 years)	9 (45%)
Employment	Employed	2 (10%)
	Volunteer work	1 (5%)
	(Partly) incapable	5 (25%)
	Retired	12 (60%)
Living condition	Alone (e.g. no partner, divorced, widow(er))	8 (40%)
	Together with partner	12 (60%)
Residence	Independent	18 (90%)
	Nursing home	2 (10%)

[a] As reported in the patient file. If the patient file reported more than one vision test, the patient's most recent data were used. Data of four patients were obtained by the ophthalmologist (measured with own correction). Data of one patient were obtained by another MRC (measured with the best possible correction). Data of 15 patients were obtained by the low-vision specialist of the MRC (measured without correction; for 9 patients a better correction was not possible).

Table 2: Comparison of rehabilitation needs identified from the patient files and by assessing the D-AI (n = 20)

D.G.	Goals	Goal identified in usual intake (pp)	Priority Score (≥1) using the D-AI (pp)	Goal missed in usual intake compared to using the D-AI (pp)	Goal missed using the D-AI compared to usual intake (pp)	Priority score using the D-AI (Mean)	Agreement (%)	Cohen's Kappa
1.1	**Reading**	15	18	4	1	7.3	75	0.17
1.2	**Writing**	4	17	13	0	5.5	35	0.08
1.3	**Watching TV**	13	19	6	0	5.9	70	0.18
2.4	**Personal administration**	6	14	10	2	5.8	40	-0.03
2.5	**Follow a schedule**	6	12	8	2	4.1	50	0.07
3.6	**Using computer at home**	9	6	1	4	2.2	75	0.48
3.7	**Personal correspondence**	7	15	10	2	5.2	40	-0.04
3.8	**Using telephone**	5	8	4	1	2.6	75	0.44
4.9	**Mobility at home**	2	4	2	0	1.1	90	0.62
4.10	**Mobility indoors somewhere else**	2	12	10	0	3.0	50	0.14
4.11	**Walking outdoors**	5	11	6	0	3.6	70	0.43
4.12	**Driving a vehicle for disabled**	1	2	1	0	0.7	95	0.64
4.13	**Riding a bike**	3	7	5	1	2.3	70	0.24
4.14	**Riding a motorised bike/scooter**	0	1	1	0	0.5	95	0.00
4.15	**Driving a car**	1	2	1	0	0.3	95	0.64
4.16	**Using public transportation**	3	9	6	0	3.8	70	0.35
5.17	**Dressing**	1	8	7	0	2.1	65	0.15
5.18	**Personal hygiene**	1	13	12	0	3.4	40	0.06
5.19	**Using a public toilet**	0	9	9	0	3.2	55	0.00
5.20	**Personal health care**	0	4	4	0	1.4	80	0.00
5.21	**Eating and drinking**	1	5	5	1	1.2	70	-0.09
6.22	**Household tasks**	1	12	11	0	3.5	5	0.02
6.23	**Doing laundry**	0	3	3	0	1.2	85	0.00
6.24	**Doing chores at home**	1	7	6	0	2.6	70	0.18

6.25	**Mending clothes**	1	7	6	0	2.6	70	0.18
6.26	**Withdraw or dealing with money**	0	8	8	0	3.5	60	0.00
6.27	**Daily shopping**	2	10	8	0	3.4	60	0.20
6.28	**Daily meal preparation**	1	5	4	0	1.8	80	0.27
6.29	**Guide dog care**	0	0	0	0	0.0	0	0.00
6.30	**Pet care**	0	0	0	0	0.0	0	0.00
6.31	**Shopping**	0	11	11	0	3.6	45	0.00
6.32	**Health care for an adult**	0	5	5	0	2.0	75	0.00
6.33	**Child care**	0	2	2	0	0.7	90	0.00
7.34	**Recognition & communication**	0	5	5	0	1.1	75	0.00
7.35	**Interaction with partner**	0	2	2	0	0.5	90	0.00
7.36	**Interaction with family**	0	1	1	0	0.5	95	0.00
7.37	**Interaction with relatives/friends**	0	1	1	0	0.3	95	0.00
7.38	**Interaction with colleagues**	1	1	0	0	0.2	100	1.00
7.39	**Interaction with strangers**	0	4	4	0	0.4	80	0.00
8.40	**Manage finance**	1	6	6	1	2.3	65	-0.09
8.41	**Make ends meet**	0	4	4	0	1.1	80	0.00
8.42	**Regulatory and information**	2	12	11	1	4.7	40	-0.03
8.43	**Education**	0	4	4	0	1.1	80	0.00
8.44	**Apply for a job**	0	0	0	0	0.0	100	n.a.
8.45	**Accessibility at work**	1	3	2	0	0.5	90	0.46
8.46	**Working activities**	1	1	0	0	0.3	100	1.00
8.47	**Using computer at work**	0	0	0	0	0.0	100	n.a.
8.48	**Attend meetings**	1	2	1	0	0.3	95	0.64
9.49	**Follow the news**	0	8	8	0	2.2	60	0.00
9.50	**Intellectual activities**	0	3	3	0	0.8	85	0.00
9.51	**Having visitors**	0	7	7	0	2.0	65	0.00
9.52	**Social events**	0	8	8	0	2.7	60	0.00
9.53	**Dining out**	0	4	4	0	1.1	80	0.00
9.54	**Social activities and trips**	0	6	6	0	2.0	70	0.00

Table 2 (Continued)

D.G.	Goals	Goal identified in usual intake (pp)	Priority Score (≥1) using the D-AI (pp)	Goal missed in usual intake compared to using the D-AI (pp)	Goal missed using the D-AI compared to usual intake (pp)	Priority score using the D-AI (Mean)	Agreement (%)	Cohen's Kappa
9.55	**Going on holiday**	0	6	6	0	2.8	70	0.00
9.56	**Gardening**	0	8	8	0	1.6	60	0.00
9.57	**Making music**	2	2	1	1	0.7	90	0.44
9.58	**Perform in public**	0	1	1	0	0.2	95	0.00
9.59	**Watching TV/film (recreational)**	13	18	6	1	6.8	65	0.08
9.60	**Using specific computerized tools**	0	4	4	0	1.5	80	0.00
9a.61	**Attend cultural events** [a]	1	4	4	1	1.3	75	-0.09
9b.62	**Playing games** [a]	7	9	2	4	2.0	70	0.29
9c.63	**Creative activities** [a]	3	1	2	0	2.5	90	0.69
9d.64	**Hobbies and crafts** [a]	1	2	1	0	1.1	95	0.64
9e.65	**Play sports** [a]	0	7	7	0	2.7	65	0.00
10.66	**Feeling fit**	1	15	14	0	3.3	30	0.03
10.67	**Handle feelings**	5	15	11	1	4.3	40	0.04
10.68	**Acceptance**	6	14	9	1	4.2	50	0.14

[a] These goals include several sub-goals. Scores of the main goal were copied from the underlying sub-goal with the highest Priority score. pp, participant(s); D.G., number of the Domain and number of Goal.

Rehabilitation Program

Patient records indicated that three (15%) participants received computer training and four (20%) participants received consultations by a psychologist or social worker. Eight (40%) participants were advised or trained by an occupational therapist; this consisted of mobility training (five participants; 25%), lighting advice (five participants; 25%), training on activities of daily living (three participants; 15%), training of viewing strategies and/or training with low-vision aids, such as an EVES magnifier (six participants; 30%), or other occupational training (five participants; 25%). Reports with detailed information on specific training sessions were not always included, making it difficult to derive from the patient files the specific goals (as formulated in the D-AI) for which a specific training was applied. For example, it was not always clear whether training of activities of daily living formulated in the usual intake was applied for "daily meal preparation," "self-care," "household tasks," "doing laundry," etc. Furthermore, by analyzing the patient files, it was not possible to identify why some rehabilitation needs that appeared in the usual intake were not integrated in the rehabilitation plan.

Adaptations Made in the Content of the D-AI

On the basis of the comparison between the rehabilitation needs identified by the D-AI and the usual intake, several adaptations were made to the D-AI to further improve the questionnaire. These results are summarized in Table 3. As suggested after the feasibility study,[36] analyzing the two different intake methods confirmed that the answer category "not applicable" had to be added to the question on goal importance. The results of this study also supported, after the feasibility study,[36] merging of some goals [e.g., "watching TV" and "watching TV/film (recreational)," see goals 1.3 and 9.59 in Table 2, respectively]. In addition, some questions needed to be formulated in more detail. Moreover, for some rehabilitation needs missed using the D-AI, it was decided not to change the content of the D-AI (Table 3) because the reason why the goal was missed was verified, or more data were needed before a conclusion could be drawn.

A. Rehabilitation needs collected from patient file

Patient file	Specification
Medical record:	Age: 76 years
	Sex: female
	Eye disease: cataract
	Visual acuity (in Snellen): VOD: 0.09; VOS: light perception.
Own help request:	I would like to have a low vision aid, in order to ***read*** and ***watch TV***. Also, ***light*** is inconvenient.
Concise interview:	Still manages *household tasks* and *daily shopping* with the help of her daughters and husband.
	She has ***become less mobile***, walks with a walking aid, and ***does not see obstacles on the sidewalk*** (….).
	She has problems with ***car lights***, as well as ***lights at home***.
	The most annoying thing for her is that she cannot ***read*** anymore (especially advertisements).
VFE	She wants to have a low vision aid for ***reading*** and ***watching TV.***

B. Results from systematic intake with the D-AI

No. in PR list	Goals - tasks	PR	I	D	No. in PR list	Goals - tasks	PR	I	D
1	Following a schedule	12	3	4	15	***Reading***	8	2	4
1	Withdraw or dealing with money	12	3	4	16	*Household tasks*	6	3	2
1	*Daily shopping*	12	3	4	16	Daily meal preparation	6	3	2
1	Shopping	12	3	4	16	Interaction with partner	6	3	2
1	Personal health care	12	3	4	16	Writing	6	2	3
						Mobility indoors			
1	Health care for an adult	12	3	4	20	somewhere else	2	1	2
						- glaring light			
1	Collecting information (e.g. legislation)	12	3	4		***(inside)***			3
1	Attending social events	12	3	3		*	0	3	0
9	***Watching television***	9	3	3					
9	***Walking outdoors***	9	3	3					
	- seeing obstacles on sidewalk			3					
	- navigate in low light levels			4					
	- navigate in high light levels								
	(e.g. sun shine or care lights)			4					
9	Interaction with family	9	3	3					
9	Feeling fit	9	3	3					
9	Handle feelings	9	3	3					
9	Acceptance	9	3	3					

Figure 1. Rehabilitation needs identified by a usual intake (A) and by using the D-AI (B).

PR (importance score * difficulty score); I: importance score; D: difficulty score. Bold and italic phrases are rehabilitation needs, which were identified in the patient files as well as after assessing the D-AI. Underlined and italic phrases are topics, which were recorded in the patient file but were labeled as not problematic. * The following goals had a PR of 0 [“very important” (3) and “not difficult” (0)]: “using telephone”, “mobility at home,” “dressing,” “personal health care,” “eating and drinking,” “doing laundry,” “recognition and communication,” “interaction with relatives and friends,” and “interaction with strangers.” All other goals were “not important” (0), so the difficulty was not assessed.

Table 3: Clarification of the goals missed by the D-AI and adaptations made to the D-AI (n = 20)

Domain. Goal	Goal	Goal missed by D-AI (n (%))	Reason(s) why goal was missed using the D-AI	Adaptation to the D-AI
1.1	**Reading**	1 (5)	- Reason unclear	- No adaptations (more data are needed).
2.4	**Personal administration**	2 (10)	-The question 'Do you have any problems using a computer (e.g. for administration or correspondence)' was asked. Therefore, it was impossible to exclude the possibility that 'Personal administration' was a rehabilitation need as well.	- No adaptation needed.
2.5	**Follow a schedule**	2 (10)	- Needs reported based on supply after visiting the 'Information department' in which several low-vision aids and tools were demonstrated.	- No adaptation needed.
3.6	**Using computer at home**	4 (20)	- Unclear formulation of question. - Unclear formulation of answers categories.	- Minor adaptation in question (i.e. 'using a computer' instead ´using your computer at home´). - Highlights need to change answer categories (as concluded in the feasibility study). - Highlights need for a conversation after assessing D-AI.
3.7	**Personal correspondence**	2 (10)	-The question 'Do you have any problems using a computer (e.g. for administration or correspondence)' was asked. Therefore, it was impossible to exclude the possibility that 'Personal correspondence' was a rehabilitation need as well.	- No adaptation needed. - Possibly omit or merge goal later (if more data have been collected).

Table 3 (continued)

Domain. Goal	Goal	Goal missed by D-AI (n (%))	Reason(s) why goal was missed using the D-AI	Adaptation to the D-AI
3.8	**Using telephone**	1 (5)	- Need reported based on supply after visiting the 'Information department' in which several low-vision aids and tools were demonstrated.	- No adaptation needed.
4.13	**Riding a bike**	1 (5)	- Patient file indicated that the patient could not ride a bike anymore, however, it was not reported that the patient wanted to do so and it was not included in the rehabilitation plan.	- No adaptation needed.
5.21	**Eating and drinking**	1 (5)	- This topic was included in the rehabilitation plan. However, it was not reported to be a need in the intake. It was impossible find out why this was included in the plan.	- No adaptations (more data are needed).
8.40	**Manage finance**	1 (5)	- Patient file reported ´manage finance´ or ´personal administration´ as one need (In the patient file it was reported that the patient 'had problems to manage administration or finance'. Therefore, it was impossible to exclude the possibility that 'Personal administration' and 'Manage finance' were both rehabilitation needs).	- No adaptation needed. - Possibly omit or merge goal later (if more data have been collected).
8.42	**Regulatory and information**	1 (5)	- Unclear question.	- Question specified (some examples were added).
9.57	**Making music**	1 (5)	- Patient file reported that the patient had trouble studying for her choir repetitions. This is probably caused by difficulty with reading (which was identified as a need).	- Possibly omit or merge goal later (if more data have been collected).

Table 3 (continued)

Domain. Goal	Goal	Goal missed by D-AI (n (%))	Reason(s) why goal was missed using the D-AI	Adaptation to the D-AI
9.59	**Watching TV/film (recreational)**	1 (5)	-Question rather similar to 'Watching TV'.	- Goal omitted.
9a.61	**Attend cultural events**	1 (5)	Question unclear (needs more details).	- Question specified (a few examples of cultural events were added to the question).
9b.62	**Playing games**	4 (20)	- Needs reported based on supply after visiting the 'Information department' in which several low-vision aids and tools were demonstrated.	- No adaptation needed.
10.67	**Handle feelings**	1 (5)	- Personal question and therefore answers are less reliable? - Difference between 'Handle feelings' and 'Acceptance' was not exactly clear in patient file.	- Highlights need for a conversation after assessing D-AI (which can focus on personal aspects). - Possibly merge goal with 'Acceptance' later (if more data have been collected).
10.68	**Acceptance**	1 (5)	- Personal question and therefore answers are less reliable?	- Highlights need for a conversation after assessing D-AI (which can focus on personal aspects).

Discussion

The results of this study support the results from the feasibility study.36 The systematic character of the D-AI prevents overlooking topics that are important for the patient and enables better evaluation of rehabilitation by using the Activity and Participation domains of the ICF. The results of this study emphasize the importance of investigating rehabilitation needs from the patient's perspective. Finally, a more systematic approach using the full ICF model may improve medical communication and shared decision making. However, assessing the D-AI may reveal an extensive overview of rehabilitation needs. Therefore, it is still a challenge to focus on the most relevant needs. Discussion between the patient and professional is needed to establish the rehabilitation needs with respect to the ICF.

Clarifying Differences in Identified Rehabilitation Needs between Usual Intake and D-AI

The overall agreement between the two intake methods was fair (Cohen´s kappa: 0.27). It is interesting to note that if only goals which showed up in the TPL-15 were considered as goals identified by the D-AI, the overall kappa increased slightly (Cohen´s kappa: 0.28), indicating that goals with higher PRs showed up more frequently in the usual intake process. More rehabilitation needs were identified after assessing the D-AI compared with the usual intake. In light of this, it is also interesting to note that only 43.4% of the rehabilitation needs that emerged during the entire rehabilitation program were recognized in the first phase of the usual intake (telephone interview and VFE). This indicates that many rehabilitation needs were identified during the course of rehabilitation. This raises the question whether all rehabilitation needs were in fact identified by the end of the rehabilitation program, which supports the opinion of the MRCs that a systematic approach (such as provided by the D-AI) is needed. Therefore, it is interesting to note that “reading” was recognized as a rehabilitation need in the usual intake for 15 patients. Looking at the patient files, “reading” was often first reported to be a problem. However, the individual priority lists show that other goals may be equally and/or more important and difficult. When investigating rehabilitation needs, it is important to keep in mind that patients and/or professionals (e.g., optometrists), tend to focus on some specific topics. Table 2 [column “Goal missed in usual intake compared to using the D-AI (pp)”] shows areas that were commonly missed by the usual intake and identified by the D-AI. It is remarkable that “writing” was often not recognized as a need for the patient in the usual intake. It is possible that patients first report problems with reading. However, optometrists may actively ask the patient about their writing skills and/or needs and take this into account when prescribing specific optometric devices. The same applies to the context of specific goals, which is often missed in the usual intake. For example, “personal administration” and “personal correspondence” may partly overlap with “reading” and “writing”; however, these goals are more informative about the context of the rehabilitation need. This may provide information about the type of optical aid or rehabilitation needed. Other areas that were less recognized by the usual intake were goals that may benefit from occupational therapy. For instance, mobility-related goals, personal hygiene, household tasks, and shopping were often not recognized as needs. Finally, rehabilitation needs related to mental aspects seemed to be easily missed in the usual intake. Considering the high prevalence of depression in visually impaired persons (e.g., 33.9% of the visually impaired persons in the United States suffered from major and subthreshold depression[40] and 44.3% of

the visually impaired elderly in the Netherlands reported to have moderate or severe problems with anxiety and depression[41]), professionals should be aware that many patients may need psychological help as well.

An important finding from studying the patient files, is that the rehabilitation plan could not always be derived from the rehabilitation needs identified in the patient file after a usual intake. For example, for participant number 9, “learn to eat and drink” was indicated as part of the rehabilitation plan. However, this need could not be identified in the reports of the intake phase (telephone interview, VFE, and an additional computer investigation). This situation also occurred the other way around: some needs identified in the usual intake were not reported to be part of the actual rehabilitation plan. We tried to report and transcribe as many rehabilitation needs formulated in the patient files as possible to be able to compare them to the D-AI results. Obviously, the way the information in the patient files is recorded might have hampered this comparative investigation. However, it confirms the idea that medical communication between rehabilitation providers at the MRC and monitoring the progress of patients were impaired using the unstructured usual intake. Again, this result appears to support the value of a systematic assessment and documentation of rehabilitation needs and outcomes.

Figure 1 shows that the patient file reported that this patient still managed to do household tasks and daily shopping with the help of her daughters and husband. However, the questions “How important/ difficult is it for you to [do the daily shopping]/[do household tasks] without anyone’s assistance” were rated as “very important” and as “impossible”/“moderate difficult,” respectively. This indicates that, from the patient’s perspective, this need was missed in the usual intake. However, it is noteworthy that the patient file reported that reading advertisements was “the most annoying thing for her,” but “reading” was not the goal with the highest PR after assessing the D-AI. A possible explanation for this is that “the most annoying” is not perceived as “the most important,” “the most difficult,” and “the highest PR.” In addition, it is impossible to discover whether the phrase “most annoying” was actually from the patient herself, or whether it was perhaps an interpretation of the intaker. Again, this makes a stronger case for assessing rehabilitation needs from the patient’s perspective using a systematic approach.

Comparison of both intake methods showed that, in the usual intake process, many patients attended the “Information department” at the MRC. The patient file frequently indicated that the patient was very interested in a specific assistive device (e.g., a speaking watch). As the “Information department” shows all kinds of assistive devices, the topics identified in a visit to this department are

based on supply. In a few cases, the patient indicated that the goal this topic belonged to in the D-AI, was “not important” or “not difficult” and was therefore not identified by the D-AI as a high priority goal. With the collected data, it is impossible to know whether the D-AI missed the rehabilitation need, or whether the interest of the patient was not in fact caused by an initial need. Nevertheless, in the patient files, the importance from the patients’ perspective of the topics could not be derived. This increases the risk that the rehabilitation services are driven by supply and not by the demand of the client.

Limitations of the Study Design

Both the study design and the analyses have some limitations. Assessment of the D-AI took place somewhere between enrolment in the MRC and the start of rehabilitation. It is possible that patients recall some rehabilitation needs that were mentioned previously during the other intake method; this might have influenced the results on the latter intake method. However, this has worked both ways and the number of participants is too small to compare possible patterns in the rehabilitation needs that emerged in each assessment order.

One reason why some goals were missed using the D-AI may be that these needs emerged more than 1 year after enrolling in the MRC. Changes such as a deterioration in visual acuity or an important change in the external factors for the patient, may have caused this additional need; however, this was not always clear. Another reason for the discrepancy between both intake methods may be that, as concluded in the feasibility study,36 some goals were missed in the D-AI because they were rated as “not important” by the assessor, whereas the participant in fact replied by saying “I never do this” or “I have assistance” (e.g., household tasks). Therefore, this study confirms the conclusion that “not applicable” must be added to the D-AI as a response category to the importance question.[36]

Another issue concerns the way both intake methods were compared. To structure the qualitative information in the patient files, all topics that were identified in the usual intake were nested under the appropriate goal of the D-AI. To prevent this from having a positive influence on the percentage of the rehabilitation needs identified by the D-AI, we included all potential rehabilitation needs from the patient file to compare these latter needs with those that were identified after assessing the D-AI. This was done even in cases in which the interest that the client showed (according to the patient record) was based on supply or when the need was identified after the rehabilitation program was (almost) finished. Because rehabilitation needs in the patient files were often formulated specifically (e.g., “I would like to be able to better recognize faces

when I am watching a quiz or the news"), they had to be transcribed to the goal level. In general, this transcription was easy as all specific rehabilitation needs were present as tasks under (more than) one goal. However, there was one exception; in 12 patient files (60%), it was reported that the patient was bothered by too low or high light levels. For five participants, this was further specified (e.g., "I am bothered by glare when I am watching TV" or "I would like to have a better amount of light for reading"), which made it possible to link this task to a specific goal. However, for seven participants, the context was unknown (e.g., "I am bothered by light"). As the goals in the D-AI are categorized by the "Activities and Participation" domains of the ICF, the D-AI was not developed to investigate external factors (e.g., light) or other aspects of the ICF scheme separately. Nevertheless, this information is relevant to the formulation of a rehabilitation plan and should be investigated.

Research to Further Improve the D-AI

Finally, an important strength of the D-AI is the extensive, systematic investigation of possible rehabilitation needs from a patient-centered perspective in ICF terms. However, this comprehensiveness might (at the same time) also be its weakness, as the number of rehabilitation needs with PRs might be too high for all of them to be included in a realistic rehabilitation plan. Therefore, we suggest that after assessing the D-AI, a feedback discussion between a patient and a rehabilitation expert should take place to determine which goals should be included in the rehabilitation plan. PRs may reflect the importance and difficulty of each specific goal, although it is not realistic to copy these goals one-by-one into a rehabilitation plan. In addition, some goals were rated as "not applicable" (and do not have a PR≥1). This may be due to several reasons, each of which may ask for a different approach. For example, in this study, some patients answered "not applicable" to the difficulty question of the goal "computer use" because the patient did not have a computer and needed advice about buying one, or because the goal was impossible to perform because of additional comorbidity. It is necessary to investigate the remaining (visual) functions, to find an appropriate intervention. Also, the other components of the ICF model (external factors, personal factors, and body functions and structures) have to be taken into account, as well as which "rehabilitation products" belong to specific problems.[42] The priority list enables a structured conversation between patient and professional on the basis of the needs from the patient's perspective. In the feedback conversation, the patient has to be informed which possible rehabilitation interventions belong to relevant goals. Knowing the specific content of each possible intervention and what can be expected as a result for a specific

individual may help the patient and professional formulate the actual rehabilitation plan. For example, to be able to reach the goal “walking outdoors” to visit family independently may require a patient to undergo intensive mobility training at the MRC. The rehabilitation professional needs to account for the rehabilitation potential of the patient in advising the patient whether this goal is realistic. Consequently, the patient will have to decide whether he/she thinks this goal is worth the effort of rehabilitation. It might be possible that rehabilitation professionals tend to give higher priority to those goals with a greater rehabilitation potential, so that the patient experiences success rather than becoming discouraged. However, these considerations must be discussed between the patient and professional together to develop an appropriate rehabilitation plan. The patient may have indicated that “walking outdoors” had the highest priority (e.g., “very important” and “impossible”), whereas this may imply that the patient has to follow an extensive rehabilitation program. In the shared decision-making process, a hypothetical patient may realize that low benefit is to be expected because of comorbid conditions that impair walking. This patient may then prefer to focus on a goal with a lower PR (e.g., “daily meal preparation”), which may be a more realistic goal (e.g., having a higher rehabilitation potential) according to both the patient and intaker. Moreover, a shared decision process based on the initial needs from the patient’s perspective may prevent intakers from simply avoiding goals they do not think they can meet. The exact protocol for this feedback conversation should be developed along with patients and rehabilitation professionals. To focus on the most relevant needs from the D-AI, use of the TPL-15 appears promising; however, the usefulness and feasibility of the TPL-15 needs further investigation. In addition, the protocol has to prescribe how goals that have been rated as “not applicable” should be discussed in the feedback conversation. Agreement measures between both intake methods were lower when goals categorized as “not applicable” to the patient were considered as no rehabilitation need (observed agreement: 73.0%; Cohen’s kappa: 0.27), compared with the analysis in which these goals were not included (missing) (observed agreement: 76.2%; Cohen’s kappa: 0.31). This indicates that these goals need particular attention in the feedback conversation.

In addition, more studies are needed on the psychometric properties of the D-AI. Also, as was concluded from the feasibility study, a shorter version of the D-AI needs to be developed. A larger validation study will be started for these purposes (e.g., studying the factor structure of the D-AI, test retest reliability, missing value analyses). Moreover, to gain insight into the validity of the PR, it is interesting to investigate the actual meaning of the PR, which has previously

been done by Massof.[29] This could be done by asking patients and professionals to rank order the goals for rehabilitation so that we can validate the PR. This study was not designed for this purpose.

Clinical Implications

MRCs in the Netherlands are planning to use the D-AI in their intake procedure to assess possible rehabilitation needs from the patient's perspective. MRCs expect that assessing the D-AI will help them to structure the intake procedure and that the results will enhance medical communication. Additionally, MRCs will use the D-AI to evaluate the results at the end of rehabilitation. In the future, it may be possible to administer the questionnaire before the first conversation at the MRC. The D-AI could, for instance, be administered via Internet (showing large letters, or using read-aloud functions). Then, in the first conversation with the professional and patient, a broad scale of needs from the patient's perspective is already known. We expect that discussing all possible priorities for rehabilitation at the beginning of the program will contribute to a more deliberate and balanced choice. This choice must be made by the patient and professional together as shared decision making is generally thought to improve the effect of rehabilitation for chronic impairments with multiple sessions.[8] Using this structured intake might facilitate the process of setting goals. However, not only MRCs may benefit from the D-AI. For optometrists, this structured intake may function as a screening instrument to refer patients with complex rehabilitation needs to MRCs by making optometrists aware of goals which often tend to be overlooked. Moreover, knowing more about relevant participation domains from the patient's perspective may help an optometrist to prescribe the most suitable assistive device, because the type of device may depend on the context in which a patient wants to perform a specific task. A subsequent step in this investigation is a larger validation study and an implementation study to further test and improve the feasibility of the D-AI as part of the rehabilitation process.

Conclusions

In conclusion, use of the D-AI has some major advantages compared with the usual intake. It is expected to improve the efficiency of rehabilitation by providing patient-centered PRs. Also, comparing rehabilitation needs before, during, and after rehabilitation permits monitoring the individual patient's progress and evaluation of the effect of rehabilitation at the group level; this is important in evaluating and improving rehabilitation programs for a better evidence-based practice. In addition, the patient-centered results from the D-AI facilitate shared decision-making and a more structured medical communication in ICF terms.

However, because a considerable amount of information is available after assessing the D-AI, care should be taken in making a rehabilitation plan. After assessing the D-AI immediately after enrolment, the next step in the intake procedure has to be a feedback conversation between the patient and the rehabilitation expert, in which the actual rehabilitation plan is discussed.

Appendix

The appendix is available online at http://links.lww.com/OPX/A70.

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Appendix. Comparison of rehabilitation needs found in the patient files and by assessing the D-AI (Importance score and Difficulty score).

Domain.		pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp
Goal	Goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.1	**Reading**	**3;2**	**3;2**	**3;3**	**3;3**	**3;2**	**3;4**	**2;4**	**3;3**	0;	**3;2**	**3;4**	**3;3**	**3;4**	0;	**3;2**	**3;1**	**2;3**	**3;3**	**3;3**	**3;3**
1.2	**Writing**	**2;1**	**3;1**	**3;4**	**3;4**	**2;2**	**3;3**	**2;3**	3;0	**3;1**	**3;1**	**3;4**	**3;3**	**3;1**	**2;3**	**3;1**	3;0	**2;2**	**3;3**	**3;3**	2;0
1.3	**Watching TV**	**3;2**	**3;3**	**3;2**	**2;3**	**2;2**	**3;3**	**3;3**	**2;3**	**1;1**	**3;2**	**3;3**	**3;3**	**1;2**	3;0	**3;2**	**3;1**	**2;3**	**3;3**	**3;3**	**3;1**
2.4	**Personal administration**	**3;4**	**3;1**	0;	**3;3**	**2;2**	**3;4**	0;	3;0	**3;1**	**3;2**	**3;4**	**3;3**	0;	0;	**3;3**	3;0	**3;4**	**3;3**	**3;3**	**3;2**
2.5	**Follow a schedule**	**3;2**	3;0	**3;1**	**3;3**	3;0	**3;2**	**3;4**	3;0	3;0	3;0	**3;4**	3;0	**3;1**	3;0	**3;1**	3;0	**3;3**	**3;3**	**3;1**	**3;2**
3.6	**Using computer at home**	0;	0;	0;	**2;2**	3;-	0;	0;	3;-	**3;1**	**3;2**	**3;4**	0;	0;	3;0	0;	0;	0;	**3;3**	0;	**3;3**
3.7	**Personal correspondence**	**2;1**	**3;1**	**3;4**	**3;3**	**2;2**	**3;4**	0;	3;0	**3;1**	**3;2**	**3;4**	**3;1**	3;-	**2;1**	**3;3**	3;0	0;	**3;3**	**3;3**	**3;3**
3.8	**Using telephone**	3;0	3;0	3;0	**3;2**	**3;2**	3;0	3;0	3;0	3;0	**3;1**	**3;4**	**3;1**	3;0	3;0	3;0	3;0	**2;3**	**3;3**	**3;2**	3;0
4.9	**Mobility at home**	3;0	3;0	3;0	**3;3**	3;0	3;0	3;0	3;0	3;0	3;0	**3;2**	3;0	3;0	3;0	3;0	3;0	3;0	**3;1**	**3;1**	3;0
4.10	**Mobility indoors somewhere else**	3;0	**3;2**	0;	**3;2**	**2;2**	3;0	**1;2**	**3;3**	3;0	3;2	**3;3**	1;0	3;0	**3;3**	3;0	**3;1**	3;0	**1;2**	**1;1**	**1;2**
4.11	**Walking outdoors**	3;0	**3;1**	3;0	**3;4**	3;0	3;0	**3;3**	**3;1**	**3;3**	**3;1**	**3;3**	**3;2**	3;0	**3;1**	3;0	3;0	3;0	**3;2**	**3;3**	0;
4.12	**Driving a vehicle for disabled**	0;	0;	**1;4**	**3;3**	0;	0;	0;	0;	3;0	0;	0;	0;	0;	0;	0;	0;	0;	0;	0;	0;
4.13	**Riding a bike**	**3;1**	**3;2**	0;	3;-	**3;2**	0;	0;	0;	3;-	**3;4**	**3;4**	3;-	0;	0;	0;	3;0	0;	0;	**2;2**	**3;1**
4.14	**Riding a motorised bike/scooter**	0;	**3;3**	0;	0;	0;	0;	0;	0;	3;-	0;	0;	3;-	0;	0;	0;	0;	0;	0;	0;	3;0
4.15	**Driving a car**	**3;1**	0;	0;	0;	0;	0;	0;	0;	3;-	0;	0;	3;-	0;	0;	3;0	**3;1**	0;	0;	0;	0;
4.16	**Using public transportation**	3;0	**3;3**	0;	**3;3**	**3;1**	0;	0;	**3;4**	**3;4**	**3;2**	**3;3**	3;0	3;-	0;	0;	**3;3**	0;	0;	**3;2**	0;
5.17	**Dressing**	3;0	3;0	3;0	**3;2**	**2;1**	3;0	3;0	3;0	**3;1**	**3;1**	**3;4**	**3;1**	3;0	3;0	3;0	3;0	3;0	**3;3**	**3;1**	3;0
5.18	**Personal hygiene**	3;0	**3;2**	**3;1**	**3;3**	**3;1**	3;0	0;	**3;1**	**3;2**	3;0	**2;4**	**3;2**	**3;1**	**3;1**	3;0	3;0	**3;1**	**3;4**	**2;1**	3;0
5.19	**Using a public toilet**	0;	**3;1**	**3;4**	**3;2**	**3;1**	0;	0;	**3;4**	3;0	**3;2**	**3;3**	0;	0;	**3;3**	3;0	3;0	0;	0;	**2;2**	0;
5.20	**Personal health care**	3;0	3;0	3;0	**3;3**	**3;1**	3;0	3;0	3;0	3;0	3;0	**3;4**	3;0	3;0	3;0	3;0	3;0	3;0	0;	**3;1**	3;0
5.21	**Eating and drinking**	3;0	3;0	0;	**3;2**	**3;1**	3;0	3;0	**3;1**	3;0	0;	3;0	3;0	3;0	3;0	3;0	3;0	3;0	**3;3**	**3;1**	3;0
6.22	**Household tasks**	3;0	0;	0;	**3;3**	**2;2**	0;	**3;2**	**3;1**	**3;1**	**3;1**	**3;4**	3;0	**3;2**	**3;3**	3;-	3;0	**3;2**	3;-	**2;1**	**3;2**
6.23	**Doing laundry**	3;0	3;0	0;	**3;3**	0;	0;	3;0	3;0	**3;1**	3;0	**3;4**	3;-	3;0	3;0	3;-	0;	0;	3;-	3;-	3;0
6.24	**Doing chores at home**	**3;1**	0;	0;	**3;4**	0;	0;	0;	0;	**3;2**	**3;2**	**3;4**	3;-	0;	0;	3;-	**3;3**	0;	0;	**1;4**	0;
6.25	**Mending clothes**	**3;3**	**3;1**	0;	**3;4**	0;	0;	0;	**3;1**	**3;3**	**3;3**	0;	3;-	0;	0;	3;-	0;	0;	0;	**2;3**	0;
6.26	**Withdraw or dealing with money**	**3;1**	3;0	0;	**3;4**	**3;4**	3;0	**3;4**	**3;1**	3;0	**3;3**	**3;3**	3;0	3;0	3;0	3;0	3;0	0;	0;	**3;3**	3;0
6.27	**Daily shopping**	**3;2**	3;0	0;	**3;3**	**2;1**	3;0	**3;4**	3;0	**3;4**	**3;1**	**3;3**	3;-	3;0	3;0	3;0	3;0	**3;1**	0;	**3;2**	**3;2**
6.28	**Daily meal preparation**	3;0	3;0	0;	**3;4**	**2;2**	0;	**3;2**	3;0	3;-	3;0	**3;4**	3;-	3;0	3;0	0;	0;	0;	0;	**1;1**	3;0
6.29	**Guide dog care**	0;	0;	0;	0;	0;	0;	0;	0;	3;-	0;	0;	3;-	0;	0;	0;	0;	0;	0;	0;	0;
6.30	**Pet care**	0;	0;	0;	0;	0;	0;	0;	0;	3;-	3;-	0;	3;0	0;	0;	0;	0;	3;0	0;	0;	0;
6.31	**Shopping**	**2;2**	3;0	0;	**3;4**	**2;1**	3;0	**3;4**	**3;4**	**3;1**	**3;1**	0;	0;	**3;2**	**3;1**	3;0	0;	0;	**3;4**	**3;1**	3;0
6.32	**Health care for an adult**	0;	3;0	0;	**3;3**	**3;3**	0;	**3;4**	3;-	**3;2**	**3;1**	0;	3;-	0;	0;	3;-	0;	0;	0;	0;	0;
6.33	**Child care**	3;0	3;0	0;	0;	**2;2**	0;	0;	3;-	3;0	3;0	0;	3;0	3;0	3;0	3;-	3;0	**3;3**	3;-	0;	3;0
7.34	**Recognition & communication**	3;0	3;0	3;0	3;0	**3;1**	3;0	3;0	3;0	3;0	3;0	3;3	3;1	3;0	3;1	3;0	3;0	**2;0**	3;0	3;1	3;0
7.35	**Interaction with partner**	0;	3;0	0;	3;1	**3;0**	0;	3;2	3;0	3;0	0;	3;0	3;0	3;0	3;0	3;-	3;0	**3;0**	0;	0;	0;
7.36	**Interaction with family**	0;	3;0	3;0	3;0	**3;0**	0;	3;3	3;0	3;0	3;0	3;0	3;0	3;0	3;0	3;0	3;0	**3;0**	3;0	0;	3;0

7.37	**Interaction with relatives/friends**	3;0	3;0	0;	**3;2**	3;0	3;0	3;0	3;0	3;0	3;0	3;0	3;0	3;0	3;0	3;0	3;0	2;0	3;0	3;0	2;0
7.38	**Interaction with colleagues**	0;	0;	0;	3;-	0;	0;	0;	0;	3;-	3;0	0;	3;-	0;	3;0	0;	0;	0;	0;	**3;1**	0;
7.39	**Interaction with strangers**	1;0	**3;1**	0;	**2;1**	1;0	3;0	3;0	0;	3;0	3;0	**1;1**	3;0	3;0	3;0	3;0	3;0	2;0	0;	**1;1**	3;0
8.40	**Manage finance**	0;	3;0	0;	**3;4**	**2;2**	3;0	0;	3;0	3;0	3;0	**3;4**	3;0	0;	**2;3**	3;0	3;0	3;-	0;	**3;3**	**3;1**
8.41	**Make ends meet**	3;0	3;0	0;	0;	**3;2**	3;0	0;	3;0	3;0	3;0	**1;3**	3;0	0;	**3;1**	3;0	3;0	3;-	0;	**3;3**	3;0
8.42	**Regulatory and information**	3;0	3;0	**3;4**	**3;3**	**2;2**	**3;2**	**3;4**	**3;4**	**3;2**	3;0	**3;3**	3;0	**3;2**	3;0	**3;1**	3;0	3;0	**0;**	**3;2**	**3;3**
8.43	**Education**	0;	0;	0;	0;	0;	0;	0;	0;	3;0	**3;2**	0;	3;-	0;	**3;3**	0;	**3;1**	0;	0;	**1;3**	0;
8.44	**Apply for a job**	0;	0;	0;	0;	0;	0;	0;	0;	3;-	3;0	0;	0;	0;	3;-	0;	0;	0;	0;	0;	0;
8.45	**Accessibility at work**	0;	0;	0;	0;	0;	0;	0;	0;	3;-	**3;1**	0;	3;-	0;	**3;1**	0;	0;	0;	0;	**3;1**	0;
8.46	**Working activities**	0;	3;0	0;	0;	0;	0;	0;	0;	3;-	3;0	0;	3;-	0;	3;0	0;	0;	0;	0;	**3;2**	0;
8.47	**Using computer at work**	0;	0;	0;	0;	0;	0;	0;	0;	3;-	0;	0;	3;-	0;	3;0	0;	0;	0;	0;	0;	0;
8.48	**Attend meetings**	0;	0;	0;	0;	0;	0;	0;	0;	3;-	**3;1**	0;	3;-	0;	0;	0;	0;	0;	0;	**1;3**	0;
9.49	**Follow the news**	3;0	3;0	**3;3**	**3;3**	**3;1**	**3;3**	0;	3;0	3;0	3;0	**2;2**	**2;1**	3;0	0;	3;0	3;0	2;0	**3;2**	**1;1**	3;0
9.50	**Intellectual activities**	0;	0;	0;	0;	**2;2**	0;	0;	0;	0;	**3;1**	0;	**3;3**	0;	0;	3;0	0;	0;	0;	0;	0;
9.51	**Having visitors**	3;0	3;0	0;	**3;3**	**2;4**	**3;2**	0;	3;0	**3;1**	3;0	**2;4**	3;0	3;0	3;0	0;	**3;1**	0;	0;	**2;1**	3;0
9.52	**Social events**	3;0	3;0	0;	**1;4**	**3;1**	**3;2**	**3;4**	**3;4**	**3;4**	0;	**1;1**	0;	3;0	0;	3;0	**3;1**	0;	0;	1;0	3;0
9.53	**Dining out**	3;0	3;0	0;	0;	**2;1**	0;	0;	**3;4**	0;	3;0	**1;2**	0;	3;0	**2;3**	3;0	0;	0;	0;	0;	1;0
9.54	**Social activities and trips**	3;0	3;0	0;	**3;4**	**1;2**	0;	0;	**3;4**	3;0	3;0	**1;4**	**3;1**	3;0	**3;2**	3;0	1;0	0;	0;	0;	3;0
9.55	**Going on holiday**	3;0	3;0	0;	**3;4**	**2;2**	0;	0;	**3;4**	**3;1**	**3;4**	**3;4**	3;0	0;	3;0	3;0	3;0	0;	0;	0;	2;0
9.56	**Gardening**	**3;1**	3;0	0;	**1;3**	1;-	3;0	0;	3;0	**3;1**	**3;1**	**3;4**	3;0	0;	0;	0;	**3;1**	**3;1**	0;	**1;1**	3;0
9.57	**Making music**	0;	0;	0;	0;	0;	0;	0;	0;	0;	0;	**1;4**	**3;3**	0;	0;	0;	0;	0;	0;	0;	0;
9.58	**Perform in public**	0;	0;	0;	0;	0;	0;	0;	0;	0;	**3;1**	0;	0;	0;	0;	0;	0;	0;	0;	0;	0;
9.59	**Watching TV/film (recreational)**	**3;2**	**3;2**	**3;3**	**2;3**	**2;2**	**3;2**	**3;3**	**2;3**	**3;1**	**3;3**	**3;4**	**3;3**	**3;3**	3;0	**3;0**	**3;3**	**3;3**	**3;3**	**3;3**	**3;2**
9.60	**Using specific computerized tools**	0;	0;	0;	0;	0;	0;	0;	3;-	**3;1**	**3;3**	0;	3;-	0;	3;0	0;	0;	0;	**3;3**	0;	**3;3**
9a.61	**Attend cultural events**[#]	3;0	3;0	0;	0;	**2;2**	0;	0;	0;	1;-	**3;1**	0;	**3;3**	1;0	0;	0;	**3;3**	0;	0;	0;	0;
9b.62	**Playing games**[#]	3;0	3;0	0;	**2;3**	0;	0;	0;	0;	3;-	0;	**3;4**	0;	**3;2**	1;0	3;0	**3;3**	0;	**3;2**	0;	0;
9c.63	**Creative activities**[#]	0;	3;0	0;	2;4	0;	0;	0;	**3;4**	**3;4**	**3;2**	**3;4**	0;	0;	0;	0;	0;	0;	0;	0;	0;
9d.64	**Hobbies and crafts**[#]	0;	0;	0;	0;	0;	0;	0;	0;	0;	0;	**3;4**	0;	0;	0;	0;	**3;3**	0;	0;	0;	3;0
9e.65	**Play sports**[#]	**3;2**	0;	3;0	**3;4**	3;0	3;0	0;	3;0	3;0	**3;4**	**3;4**	**3;1**	3;0	3;0	3;0	3;0	**3;2**	**1;2**	0;	3;0
10.66	**Feeling fit**	**3;2**	**3;1**	**3;1**	**3;2**	3;0	3;0	**3;3**	**3;1**	3;0	**3;1**	**3;2**	**3;1**	**3;1**	**3;3**	3;0	3;0	**3;1**	**3;1**	**3;1**	**3;1**
10.67	**Handle feelings**	**2;2**	**3;1**	**3;1**	**2;3**	**3;2**	3;0	**3;3**	**3;3**	3;0	**3;1**	3;0	**3;1**	**3;1**	**3;3**	**2;2**	**3;3**	3;0	**3;3**	**3;2**	3;0
10.68	**Acceptance**	**3;1**	**3;1**	**3;3**	**3;3**	**2;2**	**3;2**	**3;3**	**3;1**	**3;1**	3;0	3;0	**3;3**	3;0	**3;3**	3;0	**3;1**	3;0	**3;3**	**2;2**	3;0

D-AI: Dutch ICF Activity Inventory; pp: participant, Domain: the Activity and Participation domains of the International Classification of Functioning, Disability and Health, Numbers in the cells represent: Importance score ; Difficulty score ('-' means not applicable; no number means that the question was not asked because of the routing). Light grey cells: Goal showed up in the patient file. **Numbers printed bold**: Goal has a Priority score (= Importance score * Difficulty score) * ≥ 1 using the D-AI. [#] Scores of this main goal were copied from the underlying sub-goal with the highest Priority score.