

Towards a standardized nutrition and dietetics terminology for clinical practice: An Austrian multicenter clinical documentation analysis based on the International Classification of Functioning, Disability and Health (ICF)-Dietetics

Gäbler, G, Coenen, M, Lycett, D & Stamm, T

Published PDF deposited in Coventry University's Repository

Original citation:

Gäbler, G, Coenen, M, Lycett, D & Stamm, T 2018, 'Towards a standardized nutrition and dietetics terminology for clinical practice: An Austrian multicenter clinical documentation analysis based on the International Classification of Functioning, Disability and Health (ICF)-Dietetics' *Clinical Nutrition*, vol (in press), pp. (in press) <https://dx.doi.org/10.1016/j.clnu.2018.02.031>

DOI 10.1016/j.clnu.2018.02.031

ISSN 0261-5614

ESSN 1532-1983

Publisher: Elsevier

Under a Creative Commons [license](#)

Copyright © and Moral Rights are retained by the author(s) and/ or other copyright owners. A copy can be downloaded for personal non-commercial research or study, without prior permission or charge. This item cannot be reproduced or quoted extensively from without first obtaining permission in writing from the copyright holder(s). The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the copyright holders.



Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/clnu>

Original article

Towards a standardized nutrition and dietetics terminology for clinical practice: An Austrian multicenter clinical documentation analysis based on the International Classification of Functioning, Disability and Health (ICF)-Dietetics

Gabriele Gäbler^{a,*}, Michaela Coenen^b, Deborah Lycett^c, Tanja Stamm^{a,*}^a Medical University of Vienna, Center for Medical Statistics, Informatics, and Intelligent Systems, Section for Outcomes Research, Spitalgasse 23, 1090 Vienna, Austria^b Ludwig-Maximilians-Universität (LMU) Munich, Institute for Medical Information Processing, Biometry and Epidemiology – IBE, Chair for Public Health and Health Services Research, Research Unit for Biopsychosocial Health, Marchioninstr. 17, 81377 Munich, Germany^c Coventry University, Faculty of Health and Life Sciences, Priory Street, CV1 5FB Coventry, UK

ARTICLE INFO

Article history:

Received 27 October 2017

Accepted 26 February 2018

Keywords:

International Classification of Functioning, Disability and Health (ICF)-Dietetics
ICF linking rules
Terminology mapping
Nutrition and dietetics
Clinical documentation

SUMMARY

Background: High quality, continuity and safe interdisciplinary healthcare is essential. Nutrition and dietetics plays an important part within the interdisciplinary team in many health conditions. In order to work more effectively as an interdisciplinary team, a common terminology is needed. This study investigates which categories of the ICF-Dietetics are used in clinical dietetic care records in Austria and which are most relevant to shared language in different medical areas.

Method: A national multicenter retrospective study was conducted to collect clinical dietetic care documentation reports. The analysis included the “best fit” framework synthesis, and a mapping exercise using the ICF Linking Rules. Medical diagnosis and intervention concepts were excluded from the mapping, since they are not supposed to be classified by the ICF.

Results: From 100 dietetic records, 307 concepts from 1807 quotations were extracted. Of these, 241 assessment, dietetics diagnosis, goal setting and evaluation concepts were linked to 153 ICF-Dietetics categories. The majority (91.3%) could be mapped to a precise ICF-Dietetics category. The highest number of ICF-Dietetics categories was found in the medical area of diabetes and metabolism and belonged to the ICF component Body Function, while very few categories were used from the component Participation and Environmental Factors.

Conclusions: The integration of the ICF-Dietetics in nutrition and dietetic care process is possible. Moreover, it could be considered as a conceptual framework for interdisciplinary nutrition and dietetics care. However, a successful implementation of the ICF-Dietetics in clinical practice requires a paradigm shift from medical diagnosis-focused health care to a holistic perspective of functioning with more attention on Participation and Environmental Factors.

© 2018 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Abbreviations: NCPT, nutrition care process terminology; ICF, international classification of functioning, disability and health; ICD-10, international statistical classification of diseases and related health problems, 10th revision; A-DCP, dietetic care process of the Austrian association of dietitians.

* Corresponding authors.

E-mail addresses: gabriele.gaebler@meduniwien.ac.at (G. Gäbler), michaela.coenen@med.lmu.de (M. Coenen), deborah.lycett@coventry.ac.uk (D. Lycett), tanja.stamm@meduniwien.ac.at (T. Stamm).

<https://doi.org/10.1016/j.clnu.2018.02.031>

0261-5614/© 2018 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

It is widely agreed that standardized terminologies are essential to foster high-quality health care [1]. This is true also for nutrition and dietetics care [2,3]. A standardized terminology is required to evaluate clinical outcomes in a uniform way in order to compare results and merge data between different centers and countries [4–6]. Thus, definitions for relevant terms used in nutrition care have been provided by the European Society of Clinical Nutrition and Metabolism (ESPEN) [3,7] and by the German Society of

Nutritional Medicine [8]. Additionally, more and more countries in Europe have recently started to implement a standardized nutrition and dietetics terminology (e.g. most recently Norway, Switzerland) while other countries (e.g. Austria, German) are still discussing the implementation [9]. Potential candidate terminologies considered by European countries are the Nutrition Care Process Terminology (NCPT) [10], developed by the Academy of Nutrition and Dietetics, and the International Classification of Functioning, Disability and Health (ICF)-Dietetics [11] which corresponds to the Dutch Classifications and Coding Lists for Dietetics [12]. The content of NCPT and the ICF-Dietetics were compared in a recent unidirectional mapping study [9] using well-established ICF Linking Rules [13]. This comparison shows that the NCPT could largely be linked to the ICF-Dietetics and was comparable in terms of conceptual meaning. Taking into account that the NCPT and the ICF-Dietetics are based on different approaches, the harmonization of common parts of these different nutrition and dietetics terminologies, particularly within assessment, dietetics diagnosis and evaluation concepts, was found to be possible. In terms of multidisciplinary/interdisciplinary applicability the ICF-Dietetics would be preferable. It provides a framework and classification based on the biopsychosocial perspective [9].

Nutrition and dietetics care should be provided within an interdisciplinary collaboration [14]. An interdisciplinary team is required in a wide range of health-specific areas, such as general internal medicine, oncology, geriatrics, rehabilitation, social medicine and public health. Nutrition care contributes importantly to all these fields [3,14,15]. In order to work more effectively as an interdisciplinary team, a common terminology is essential.

The World Health Organization (WHO) provides the ICF as a framework to describe functioning and health of patients with any health condition in order to complement medical diagnosis [16] classified in accordance with the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) [17]. A considerable advantage of the ICF framework is its applicability to different health professionals' working fields which go beyond diagnosis. Several articles have been written to describe how the ICF framework can be used in multidisciplinary healthcare [18–22]. ICF Core Sets (sets of ICF categories relevant for patients with a certain health condition) have been developed and validated to facilitate multidisciplinary assessment, for example for diabetes mellitus, obesity and rheumatoid arthritis [23–28]. Furthermore, the ICF framework has been used to compare the content of instruments used in clinical care and research to measure functioning of patients [29–33] by using the ICF Linking Rules [13,34,35]. These ICF Linking Rules were developed for the mapping (linking) of items from health-status measures [34], updated and expanded to technical and clinical measures and interventions [35] and refined to increase the transparency and the reliability of this procedure [13]. Additionally, problems experienced from a patient perspective in daily life have been mapped and thus “translated” into ICF categories [36,37].

To date, comparisons between the ICF and other terminologies and classification systems have been performed by mapping studies [9,38,39]. Mapping has been necessary to harmonize concept systems [40] within a country and cross-border particular when more than one concept system is used within one discipline [1,41].

The ICF is applicable in multidisciplinary team care and provides a framework to facilitate the comparison of classification systems, health care measures and outcomes. Nevertheless, wide usability of the ICF has reduced its precision in separate professions. Therefore, to achieve an acceptable precision for nutrition and dietetics care, the ICF-Dietetics added approximately 900 dietetics-related categories [9]. However, before the ICF-Dietetics can be promoted as a

standardized nutrition and dietetics terminology, the usefulness of these categories need to be investigated.

The overall aim of this study was, therefore, to investigate for the first-time which categories of the ICF-Dietetics were used in clinical practice of the nutrition and dietetic care process in respect of different medical areas and of the NCPT.

The specific objectives were (a) to collect clinical dietetic care documentation reports of different medical areas, (b) to extract concepts contained in these reports with regard to different steps of the care process, (c) to map the extracted concepts to the ICF-Dietetics and finally, (d) to compare these results to the categories identified in the recent NCPT/ICF-Dietetics mapping exercise [9].

2. Materials and methods

2.1. Study design

An Austrian multicenter retrospective study was conducted using existing clinical dietetic care documentation reports provided by dietitians and dietetics students. The study included a qualitative analysis, the so-called “best fit” framework synthesis, and a mapping exercise using the ICF Linking Rules.

2.2. Data collection

Self-selection sampling was used. All Austrian Dietitians actual working in clinical practice ($n = 753$) and the program directors of all undergraduate dietetics study courses in Austria ($n = 5$) were asked via email to contribute anonymized dietetic care documentation reports. Reports were collected on patients that had been discharged from dietetic care. Records of all appointments in an episode of care (i.e. initial and follow-up consultations) were requested. The data collection started in October 2016 and was finished at the end of November 2016.

2.3. Data analysis

Data synthesis of the collected documents followed a modified form of the so-called “best fit” framework synthesis [42–44]. This is a deductive and systematic method of categorizing and organizing qualitative data [44]. The “best fit” framework means that prior to the qualitative analysis, a theoretical model is selected. The underlying themes of this model guides the qualitative analysis process and are called the a priori framework. This framework is then used primarily to group and classify concepts extracted in the analysis. As “best fit” framework, the Dietetic Care Process of the Austrian Association of Dietitians (A-DCP) [45], was chosen, as the use of the A-DCP is mandatory for documentation in clinical practice and education in Austria by law. Table 1 shows the themes and sub-themes (1st and 2nd column of Table 1) provided in the a priori framework.

In the first step of the analysis, all documents were read through carefully and segments/parts of the text that belong together being either a paragraph or a few words were marked (hereinafter “quotations”). Concurrently, these quotations were classified (coded) with one or more conceptual labels (hereinafter called “extracted concept”) which reflected the meaning of the quotation most appropriately. In this exercise, extracted concepts had to stay as closely to the words in the quotation as possible. In a further step, these extracted concepts were compared and assigned to the themes of the a priori framework. In addition, themes not yet mentioned explicitly in the A-DCP were established as they came up in the documents (column 3rd in Table 1). Figure 1 depicts an example of this procedure. The result of this process was a list

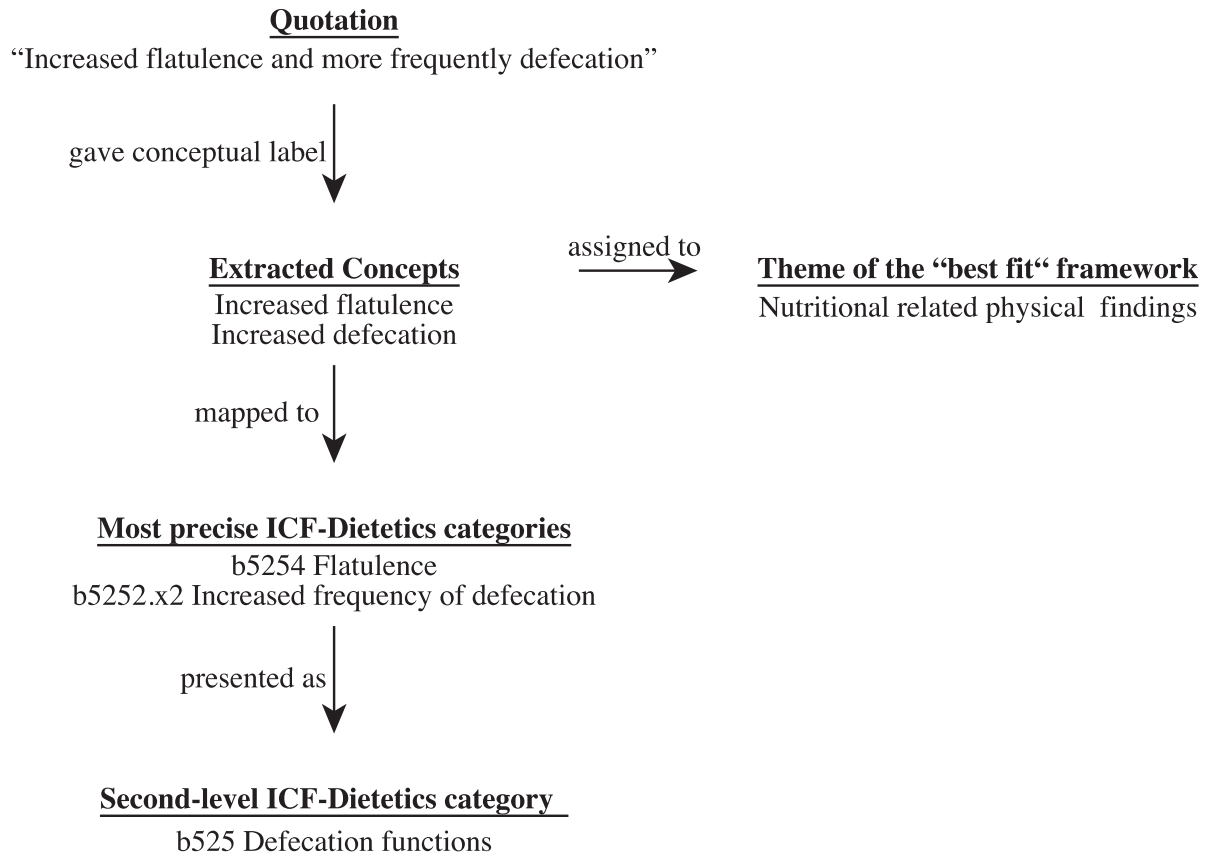


Fig. 1. Austrian clinical dietetic care documentation analysis and mapping: process shown with one example.

composed of a priori themes and subthemes and additional subthemes emerged from the care documentation and its subordinated extracted concepts (Table 1). Data analysis was performed by the first author (GG) with quality check by one further researcher (TS) using ATLAS.ti Version 1.0.51, Scientific Software Development GmbH, Berlin.

2.4. Mapping exercise

Subsequently, the extracted concepts derived from the analysis were mapped to the ICF-Dietetics. This mapping was performed using the first draft German ICF-Dietetics version [46] and the ICF Linking Rules [13]. Which are a commonly used and well-established process to map concepts to the ICF and its categories. Referral (mainly medical diagnosis) and intervention concepts are not classified in the ICF and were thus excluded from this mapping exercise. According to the ICF Linking Rules [13], concepts that could not be linked to an ICF category and were not Personal Factors (with regard to ICF-Dietetics definition [11]) were assigned “not covered”. If the information about the concept was not sufficient to make a decision about the most precise ICF-Dietetics category to which this concept could be linked, the concept was assigned “not definable”. If a concept referred to a medical diagnosis or a health condition according to the ICD, it was assigned “health condition.” As in Austria no standardized dietetics terminology is applied to date, neither for dietetics diagnoses nor for dietetics-related goals, some dietitians use rather unspecific overarching diagnoses or goals. For example, they used “Malnutrition” as diagnosis or “Blood pressure reduction” as intervention goal, which stress their contribution to a multidisciplinary treatment. These overarching diagnosis and goal-related concepts were also linked to an ICF-

Dietetics category and were not assigned to “health condition”. This was considered important due to the fact that currently, these concepts are part of the A-DCP and are overarching aims of a patient in terms of interdisciplinary/multidisciplinary team care. The mapping was performed by the first author (GG). To ensure accuracy of data analysis, a second experienced researcher (MC) performed the mapping process independently for 20% of the concepts. Differences between mapped categories were discussed and a consensus was established by the two researchers. A more detailed description of the mapping process, the hierarchical structure of the ICF-Dietetics and the differences to the NCPT is written elsewhere [9]. Figure 2 reflects the flow chart of the mapping process with frequencies of inclusion and exclusion concepts.

2.5. Statistical analyses

Descriptive statistics (absolute and relative frequencies) were used to depict the number of analyzed and mapped concepts, as well as to illustrate the number of assigned ICF categories. All results are shown stratified by medical area. To ensure quality of the mapping exercise, percentage agreement with 95% confidence interval (95% CI) between the two researchers involved in the exercise was calculated at the component to the fourth-level of the ICF classification. In addition, inter-rater reliability with Cohen's Kappa [47] was calculated. The strength of agreement associated to Cohen's Kappa statistics was interpreted as poor (<0), slight (0.00–0.20), fair (0.21–0.40), moderate (0.41–0.60), substantial (0.61–0.80) or almost perfect (0.81–1.00) [48]. Changes of the linking results after review and consensus discussion were documented separately. Statistical analyses were performed with IBM®

Table 1
Austrian clinical dietetic care documentation analysis: “Best fit” model (Austrian Dietetic Care Process) themes and sub-themes complemented with sub-themes derived from analyzed reports and examples for assigned concepts (translated from German into English).

Themes of “best fit” model	Sub-themes of “best fit” model	Additional sub-themes generated from reports	Examples of extracted concepts
Referral			Medical diagnosis, Reason for referral
Nutritional round (dietetics assessment)	General history	Medication	Medication interaction, Medication use (Drug history)
		Family history	Family genetic and disease history
		Biochemistry	Biochemistry
		Anthropometric data	Body weight, Waist circumference, Body mass index, Fat mass
		Nutritional related physical and mental findings	Diarrhea, Flatulence, Abdominal pain, Appetite; Anxiety, Stress, Depressed mood
		Physical activity history	Physical activity frequency, Physical activity intensity, Physical activity type
		Other lifestyle factors	Alcohol consumption, Smoking behavior, Cognitive functioning
		Social history	School type/Profession, Social economic status, Family status
	Diet history		Food and Beverage intake, Nutrient intake, Enteral Nutrition, Portion size, Meal frequency, Attitudes, Cooking knowledge
	Nutritional status		Malnutrition, Overweight, Morbid obesity (<i>are assigned to Clinical problem</i>)
Dietetics diagnosis		Assessment instruments	24 h Recall, Mini Nutritional Assessment, Grip strength
		Intake problem	Excessive protein intake, Low vegetable consumption
		Clinical problem	Poor appetite, FODMAP-intolerance, Loss of taste
		Behavioral-Environmental problem	No motivation for change, Low level of physical activity
		Other problem	No Nutritional problem
Goal-setting			Maintaining body weight, Increasing energy intake, Dietary sodium restriction
Intervention	Planning intervention		Energy and nutrient intake calculation, Energy and nutrient intake calculation-target/actual comparison
	Nutritional therapy		Oral Diet, Enteral nutrition, Fortified food, Consultation of family doctor
	Nutritional counselling		Topics, Atmosphere, Family member, Education, Cooking lessons
Evaluation and adjustment		Counselling tools	Food samples, Product samples, Cookbook, Diet information leaflet
			Biochemistry, Body weight, Waist circumference, Body fat mass, Nutritional knowledge

SPSS[®] Statistics Version 24, IBM 2016 and Excel for Mac Version 15.33, Microsoft 2017.

2.6. Ethical statement

Ethical committee approval was not required, since no personal patient data were used for this study; however, permission from internal review boards of the participating institutions was obtained. The dietitians who provided reports were informed in detail about the study procedures and gave written informed consent. In addition, all data were anonymized.

3. Results

3.1. Dietetic care documentation reports

In total, 100 reports were received. Of these, 83 (83%) were sent by practicing dietitians of eight centers/institutions and 17 (17%) by students. The students' documentation reports were provided by two (of five) dietetics bachelor degree universities of applied science of Austria and were more comprehensive than the reports provided by the practicing dietitians. The majority of the practicing dietitian reports, namely 68 (82%) were from university medical centers, 10 (12%) from general public hospitals and 5 (6%) from a private hospital. Of all documents, 16 (16%) were from the medical area diabetes mellitus and metabolism (hyperlipidemia, hypertension, overweight, hyperuricemia), 28 (28%) from gastroenterology (celiac disease, intolerance, fatty liver disease, pancreatitis, digestive problems), 19 (19%) from surgery (stoma, gastrectomy, liver and kidney transplantation, pancreatectomy, bariatric surgery), 18 (18%) from oncology and malnutrition and 19 (19%) from other medical disciplines (five from nephrology, seven from pediatrics, three from neurology, two from general healthy nutrition and two from wound management).

3.2. Descriptive results

The authors extracted 307 concepts from 1807 quotations of the reports. For example, the extracted concept *Biochemistry* was mentioned in 129 quotations, the concept *Nutritional Therapy Oral Diet* in 84 quotations, *Medication* in 76 quotations, and *Weight curve* in 30 quotations. In contrast, the most frequently extracted concept regarding the a priori framework theme Goal Setting, was *Maintaining body weight* and was included in nine quotations.

In total, 241 extracted concepts (without referral and intervention concepts) were included in the mapping process (Fig. 2) and linked to 153 ICF categories. Some extracted concepts had to be linked to two categories, such as *Enteral nutrition* was assigned to a570111 *Managing use of dietary products, dietary preparations and nutritional supplements* and to e11001 *Customized food*. Both aspects were included in this concept. Therefore, 264 assignments were done.

The majority of these assignments, 241 (91.3%), were done to a precise ICF-Dietetics category. In detail, 92.3% of assessment, 94.2% of dietetics diagnosis, 88.0% of goal setting and 71.4% of evaluation concepts could be assigned to a precise ICF-Dietetics category, while 23 (8.7%) could not be assigned to the ICF-Dietetics. Of those not assigned, nine were “health condition”, nine were “not definable” and five were “not covered”, for example, *Family history* and the goal *Prolonging remission*.

Most concepts (79%) of the second-level categories were found in reports dealing with diabetes and metabolism. Furthermore, the majority of the 63 second-level ICF categories, 36 (57%) were assigned to the ICF component Body Functions. Table 2 shows the absolute frequency of assigned second-level categories and all absolute and relative frequencies in respect of medical areas.

3.3. ICF-Dietetics categories relevant for nutrition and dietetics care in clinical practice

The most frequently assigned ICF-Dietetics categories used in all medical area and retained by NCPT/ICF-Dietetics mapping were

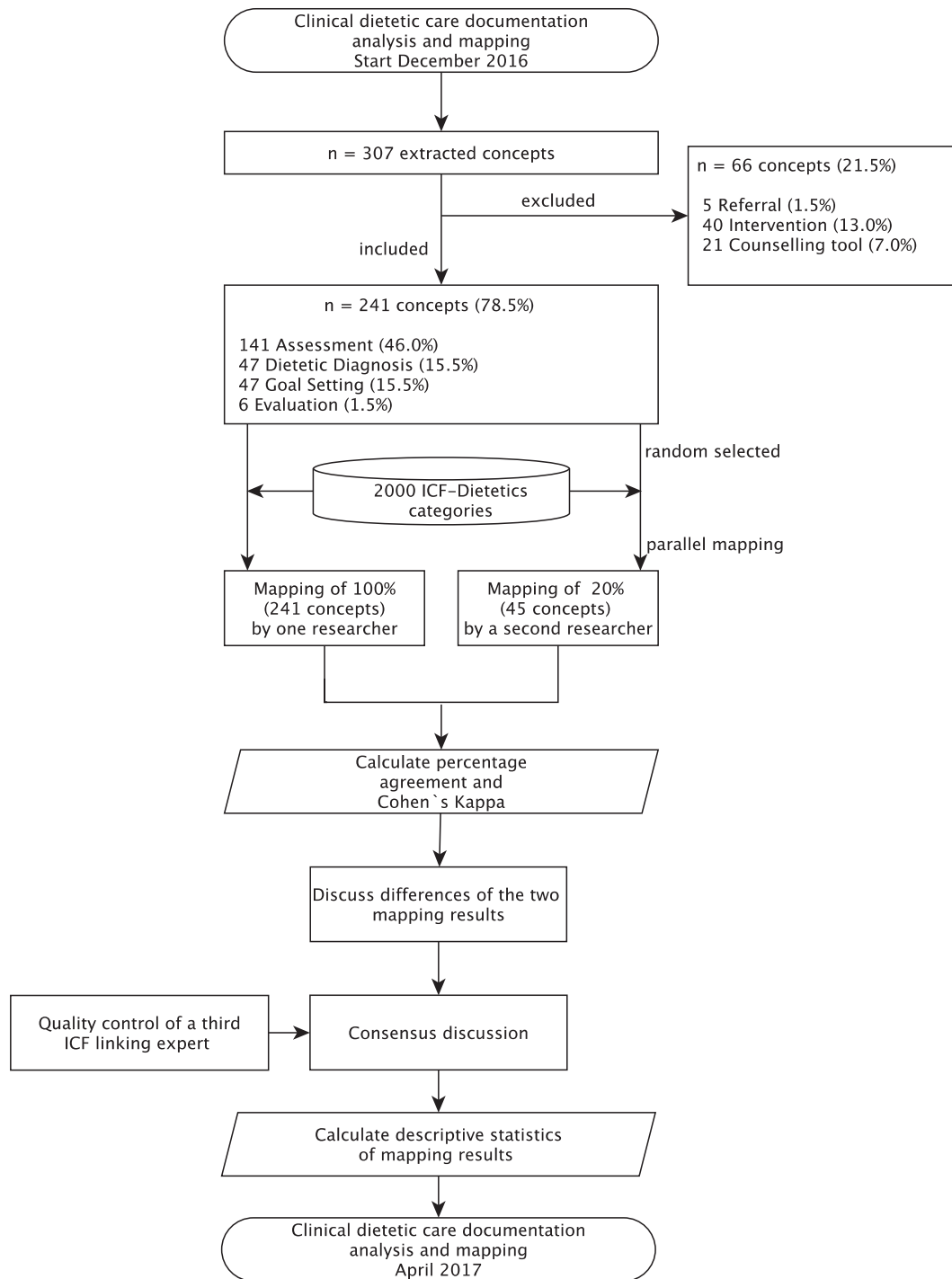


Fig. 2. Austrian clinical dietetic care documentation analysis and mapping: flow chart of the mapping process.

a570 *Looking after one's health*. Furthermore, frequently assigned categories in all medical area were b515 *Digestive functions*, b530 *Weight maintenance functions*, b535 *Sensations associated with the digestive system*, b130 *Energy and drive functions*, b280 *Pain*, b431 *Clinical chemical blood composition*, b433 *Hematological blood characteristics*, b510 *Ingestion functions*, b525 *Defecation functions*, b531 *Weight change*, b532 *Nutritional status*, e110 *Products or substances for personal consumption*, and e355 *Health professionals*. Additionally, three of total eight Personal Factors categories, such as *Socio demographic factors*, *Smoking habits* and *Profession* were

identified in all medical area. Table 3 illustrates the most frequent second-level categories and examples of its lower level categories.

3.4. Comparison with categories retained by the former NCPT/ICF-dietetics mapping [9]

This comparison resulted in 52 (37.7%) categories which are included in both lists, 13 (9.4%) categories are only in the actual mapping list and 73 (52.9%) categories retained from the NCPT are not in the actual mapping list. This means that these 73 categories

Table 2
Austrian clinical dietetic care documentation analysis: frequencies of analyzed reports, extracted concepts and assigned ICF-Dietetics categories in respect of medical area.

	Total	Diabetes and Metabolism	Gastroenterology	Surgery	Oncology	Others ^a
Frequency of documents (n)	100	16	28	19	18	19
Students	17	4	3	2	3	5
Clinical dietitians	83	12	25	17	15	14
Frequency of extracted concepts (n)	307 ^b	170	121	93	123	141
Percentage of total concepts, n = 307		74%	52%	40%	53%	61%
Frequency of concepts included in mapping process (n)	241 ^b	137	91	72	91	105
Percentage of total, n = 241		59%	39%	31%	39%	45%
Frequency of matched ICF categories	153 ^b	101	76	58	78	81
Percentage of total, n = 153		66%	50%	38%	51%	53%
Frequency of assigned second-level ICF categories	63 ^b	50	36	26	35	36
Percentage of total, n = 63		79%	57%	41%	56%	57%
Body functions (n)	36 ^b	32	18	17	22	21
Body structures (n)	4 ^b	2	1	2	2	2
Activities ^c (n)	8 ^{b,d}	4	5	2	2	3
Participation ^c (n)	2	2	1	0	0	1
Environmental factors (n)	5 ^b	3	5	2	3	4
Personal factors (n)	8 ^b	7	6	3	6	5

^a Other medical areas included nephrology, pediatrics, neurology, general healthy nutrition and wound management.

^b A concept could be used in different medical areas, thus, n is not the sum of them.

^c In contrast to the original ICF where Activities and Participation are classified together, the ICF-Dietetics differentiates between Activities and Participation as it is also given as an alternative option by World Health Organization [16].

^d The ICF component Activities contains the most frequently assigned category a570 *Looking after one's health*.

Table 3
Austria clinical dietetic care documentation concepts/International Classification of Functioning, Disability and Health (ICF)-Dietetics mapping: Most frequently used second-level categories with number of assignments and examples of its lower level (more detailed) categories.

ICF code	ICF-Dietetics code	ICF-Dietetics category	Number of assignments
b130	b130	Energy and drive functions	8
	b1301	Motivation	3
b1302	b1302	Appetite	4
b280	b280	Sensation of pain	8
b28012	b28012	Pain in stomach or abdomen	2
b28015	b28015	Pain in lower limb	1
b515	b515	Digestive functions	10
	b515101	Digestive enzyme functioning	2
	b515212	Carbohydrate absorption	2
b5153	b5153	Food sensitivity	3
b525	b525	Defecation functions	7
b5251	b5251	Faecal consistency	2
b5252	b5252	Frequency of defecation	3
b5254	b5254	Flatulence	1
b530	b530	Weight maintenance functions	10
	b532	Nutritional status	5
b535	b535	Sensations associated with the digestive system	10
b5350	b53500 ^a	Sensation of nausea	2
b5352	b53520 ^a	Sensation of abdominal cramps	1
d570	a570^b	Looking after one's health	77
d5701	a5701	Managing (regular) diet (and therapeutic diet) and fitness	1
	a5701011	Managing intake of adequate amounts	1
	a5701012	Managing proper choice of food products	10
	a570102	Managing intake of nutrients	4
	a5701020	Managing intake of fat	3
	a570103	Managing intake of energy	6
	a570111	Managing use of dietary products, dietary preparations and nutritional supplements	5
	a57013	Managing adequate physical activity	5
d5702	a5702	Maintaining one's health	5
d57020	a57020	Taking medication and follow up nutritional advice	2
e110	e110	Products or substances for personal consumption	10
e1100	e1100	Food	6
e1101	e1101	Drugs	3

^a By integrating categories from the ICF Children & Youth Version in the ICF by the World Health Organization (WHO), it was necessary to reuse some codes that were used by ICF-Dietetics 2012 [11].

^b In contrast to the original ICF, ICF-Dietetics differentiates between "Activities (a)" and "Participation (p)" as it is also given as an alternative option by WHO [16].

were not used by dietitians participating in this study. The entire list of both mappings with total 138 ICF-Dietetics second-level categories have been provided as [Table 4 \(available online\)](#).

3.5. Accuracy of mapping process

The two researchers agreed on 80.0% ($n = 36$) [95% CI 68.3–91.7] of the parallel linked concepts ($n = 45$) at the component-level, on 71.1% ($n = 32$) [95% CI 57.8–84.2] at the second- and the third-level and on 68.9% ($n = 31$) [95% CI 55.5–82.5] at the fourth-level of the ICF. The calculated k coefficients ranged between 0.71 at the component – and 0.67 at the fourth-level of the ICF-Dietetics classification, indicating high levels of agreement [48].

4. Discussion

4.1. Summary of main findings

Using the A-DCP as “best fit” model showed the integration of the ICF-Dietetics in nutrition and dietetic care process is possible. The highest number of ICF-Dietetics categories was found in the medical area of diabetes and metabolism and belonged to the ICF component Body Function, while very few categories were used from the component Participation and Environmental Factors. The most frequently assigned ICF category was a570 *Looking after one's health*.

4.2. Consistency of findings

Our results confirm the results of the previous NCPT/ICF-Dietetics mapping [10], that the majority of concepts used specifically for nutrition and dietetics care in the clinical setting can be mapped to a precise ICF-Dietetics category. We also found the A-DCP was a suitable ‘best fit’ model, and this model is comparable with other nutrition and dietetic care models [7,44]. The international and interdisciplinary ESPEN guidelines outline similar steps for the nutrition care process that we used here [3]. Therefore, we are confident that ICF-Dietetics can be used in any kind of dietetic care process models and thus be considered as a conceptual framework. The ICF-Dietetics together with a specific care process may both satisfy precision and foster multidisciplinary team care.

It could be argued that the ICF-Dietetics covers not all areas of dietetic practice (assessment, diagnosis, goal-setting and intervention), as its focus is mainly on functioning and contextual factors. We agree that the ICF and the ICF-Dietetics respectively is designed to classify “functioning” (defined as body functions, body structures and activities and participation domains) at one point in time. However, the assessment of functioning at different time points shows changes over time and whether predefined intervention goals were achieved. For example, the ICF-Dietetics provides a category for “too high energy intake”, namely, a570103 *Managing intake of energy*. This category specified with an ICF-qualifier, such as xxx.3 Severe (high, extreme) difficulty, describes the level of limitation. The ICF category a570103.3 *Managing intake of energy* might be the nutrition/dietetics-related problem reported as the dietetics diagnosis (with the etiology and the actual energy intake) and it might be the goal for nutrition and dietetics intervention(s). This category could be assessed and evaluated over time at determined time points. Therefore, we consider that it is possible to describe assessment, dietetics diagnosis, intervention goal and evaluation concepts using ICF-Dietetics categories.

Our study illustrates that Austrian dietitians in clinical practice in the area of diabetes and metabolism use more categories in their documentation of the care process than in other medical areas. A wide spectrum of diabetes-related changes in body functions and

activities is mentioned also by Ruof et al. [24], reporting the development of the ICF Core Set for diabetes mellitus. The authors mention, that this is because diabetes mellitus is a systematic disease affecting many parts of the body and so it was difficult to focus simply on diabetes mellitus itself and not on related complications. In our study, we focused on concepts dietitians used for their documentation of actual patient consultations (empirical data collection). The ICF Core Set development process uses evidence gathered from systematic reviews, empirical data collection and international expert surveys used in formal decision-making and consensus processes. They can therefore be used more broadly in multidisciplinary assessment. However, no dietitian was involved in the development of diabetes mellitus [24] and of obesity [28] Core Sets. Therefore, the findings of our study can be used to add information in terms of clinical relevance of ICF categories for nutrition and dietetics care.

The most frequently assigned ICF component in our study was the component Body Functions, defined as the physiological functions of body systems (including mental functions) [16]. Interestingly, the ICF category b250 *Taste function* was not in the NCPT-mapped list from our earlier study and b255 *Smell function* was not a result of the present study. However, both categories seem to be important for documentation of nutrition and dietetics care. In our results, however, taste was only used in Oncology and Nephrology. On the contrary, the category b525 *Defecation functions* was found in all medical areas; however, this category is not included in both ICF Core Sets neither of diabetes mellitus [24] nor of obesity [28].

In some areas, the ICF lacks precision for nutrition and dietetics care. Stucki et al. [28] stated that the ICF does not currently have either body composition (for example fat mass) or blood composition categories. Furthermore the category b430 *Hematological system functions* has been considered too general to cover the important marker HbA1C [24]. However, the ICF-Dietetics provides a couple of added categories for laboratory data (b431 *Clinical chemical blood composition* and b433 *Hematological blood characteristics*). The relevance of these categories was shown in our study as they were used to classify important laboratory markers for the given health condition in all medical areas.

Stucki et al. [28] also pointed out the lack of a category for waist circumference. ICF-Dietetics includes waist circumference and other anthropometric data (s705 *Anthropometrics*) in the component Body Structures of the ICF-Dietetics. The results of the present mapping showed that dietitians in Austria rarely use categories from this Body Structures component, however, in all medical disciplines the category s705 *Anthropometrics* was found. The NCPT mapping [9] obtained several more categories belonging to Body Structures. Equally, both ICF Core Sets for obesity and diabetes mellitus [24,28] provide more Body Structures related categories. The difference of the actual results and the existing ICF Core Sets can be explained since the ICF Core Sets are developed for multidisciplinary assessment. Additionally, the authors of the ICF recommend use of the Body Structures component parallel to the Body Functions component, this is not the case for the assessment in terms of the A-DCP so far.

The most frequent category in the ICF component Activities and Participation, defined as the execution of a task or action by an individual [16], was a570 *Looking after one's health*. This was the only category in that component which was found in all medical disciplines. The ICF-Dietetics has a lot of lower level categories added to this a570 category to describe nutrition and dietetic activities more precisely. It is questionable if all these detailed categories are needed. For example, there are the same categories for regular diet (a5701020 *Managing intake of fat*) as for therapeutic diet (a5701140 *Ensuring intake of fat according to diet*). Nevertheless,

the category d(a)570 was found to be important in both above mentioned ICF Core Sets [24,28]. Furthermore, in contrast to our findings, in these ICF Core Sets, more categories regarding *Mobility* are included possibly as a result of the multidisciplinary approach of these ICF Core Sets.

In our mapping, we found very few Participation categories which represents the societal perspective of functioning, namely only p660 *Assisting others* and p920 *Recreation and leisure*. Few categories were also used from the component Environmental Factors. This is not surprising since, the A-DCP has mainly a biomedical approach while the ICF was based on a biopsychosocial model and offers a wide range of Participation and Environmental Factors categories. Nevertheless, in our study, three of the five assigned Environmental Factors categories were found in each medical area. However, both ICF Core Sets [24,28] and the list of the NCPT/ICF-Dietetics mapping [9] provide more Environmental Factors categories. We suggest, that in future should be evaluated which Environmental Factors categories are relevant to nutrition and dietetics care in clinical practice, in particular in terms of patient's perspectives. These Environmental Factors might have a crucial effect on functioning, and thus, on nutrition and dietetic outcomes. Therefore, it will be important to include more Environmental Factors in a standardized assessment [36,49] to address the biopsychosocial perspective of health. Furthermore, we assume that if dietitians would use the ICF, more Activities and Participation and Environmental Factors categories will be targeted and the same goals will be followed in multidisciplinary teams by widening the perspective of each professional group.

4.3. Strengths and limitations

The present study is the first evaluation of clinical dietetic care documentation regarding used ICF-Dietetics categories. Our study was done in Austria; however, our findings may be applicable to other European countries, particularly where it is used. To date, the ICF-Dietetics is used in the Netherlands and Belgium and accepted by the Dutch WHO Collaborating Centre for the Family of International Classifications solely [9].

A main methodical challenge of the study was balancing the use of the “best fit” framework models with the holistic biopsychosocial model of the ICF. The ICF model can be regarded to be generic, whereas the dietetic care process is a profession specific therapeutic model. Nevertheless, the use of both models is a crucial step to implement the ICF in multidisciplinary team care and to keep the precision of professional specific models of care. To guarantee acceptance in dietetics care, we stayed close to concepts of the dietetic care process used in Austria and choose the A-DCP as the “best fit” framework model. Using the “best fit” synthesis method provided us with a relative rapid, transparent and pragmatic process of qualitative analysis [44].

A limitation of our study was that few dietitians were willing to provide us with their dietetic records. Our document sample were mainly from university medical centers. Consequently, the results are not representative of all clinical dietetic records in Austria. However, we suggest that the documentation from the university medical centers is likely to be more comprehensive and rigorous than other generally dietetic clinics and so such a sample for this type of study is in fact advantageous.

Another limitation of our study was that we did our analysis in terms of medical areas and not on specific health conditions. ICF Core Sets for example have been developed for specific health conditions. However, it is questionable if it is meaningful to divide nutrition and dietetic assessment tools (ICF Core Sets) in respect of sole medical diagnosis given the great number of multimorbid

chronic diseases were nutritional and dietetic professional are mostly involved.

5. Conclusion

The present study resulted in a list of ICF-Dietetics categories relevant in clinical nutrition and dietetic practice. In Austrian dietetic reports the majority of the categories are used in diabetes and metabolism area and belong to the ICF component Body Function. Few categories from the Participation and Environmental Factors components were used. Our study provides evidence that ICF-Dietetics is suitable to serve as a framework in nutrition and dietetics care. However, it also raises the question whether a successful implementation of the ICF-Dietetics in clinical practice requires a paradigm shift from medical diagnosis-focused health care to a holistic perspective of functioning with more attention on Participation and Environmental Factors. To this end, further investigations on this topic are needed as well as further feasibility and validation studies of the ICF-Dietetics with other members of the interdisciplinary team and in other countries.

5.1. Implication of findings

The present study investigated for the first-time the categories of the ICF-Dietetics that are used in the context of the nutrition and dietetic care process in clinical practice and in respect of different medical areas. Our findings could be a first basis for the development of future nutrition and dietetics specific ICF Core Sets. These are lists of ICF category subsets that are important and most typical for a certain condition or setting. Such ICF Core Sets could serve as a reference framework for nutrition and dietetics assessment. Thus, it can guide the dietetics diagnosis, the definition of intervention goals and finally the evaluation of interventions. Furthermore, it can be extended for multidisciplinary nutrition care which helps to improve the communication not only in the dietitian profession but also between different health professionals. Thereby positively influencing continuity and quality of patients' care.

Statement of authorship

All authors contributed to the design of this study and to the manuscript. G.G. performed the data collection, analysis and mapping, wrote the first draft of the manuscript and prepared tables and figures with supervision of T.S. and M.C., D.L. managed the translation of dietetic concepts and the potential application of this work for a wider audience.

Statement and funding sources

This study was partially funded by the Austrian Association of Dietitians, however, the Association had no involvement in the research or in the preparation of the article.

Conflict of interest

There is no conflict of interest.

Acknowledgments

We would like to thank all participating clinical dietitians, program directors of the universities of applied science and students who enabled the study to take place by providing us with dietetic records.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.clnu.2018.02.031>.

References

- [1] Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare; 2011. p. 45–65.
- [2] Hakel-Smith N, Lewis NM. A standardized nutrition care process and language are essential components of a conceptual model to guide and document nutrition care and patient outcomes. *J Am Diet Assoc* 2004;104:1878–84.
- [3] Cederholm T, Barazzoni R, Austin P, Ballmer P, Biolo G, Bischoff SC, et al. ESPEN guidelines on definitions and terminology of clinical nutrition. *Clin Nutr* 2017;36:49–64.
- [4] Koller M, Schutz T, Valentini L, Kopp I, Pichard C, Lochs H, et al. Outcome models in clinical studies: implications for designing and evaluating trials in clinical nutrition. *Clin Nutr* 2013;32:650–7.
- [5] Splett P, Myers EF. A proposed model for effective nutrition care. *J Am Diet Assoc* 2001;101:357–63.
- [6] Lacey K, Pritchett E. Nutrition care process and model: ADA adopts road map to quality care and outcomes management. *J Am Diet Assoc* 2003;103:1061–72.
- [7] Lochs H, Allison SP, Meier R, Pirlich M, Kondrup J, Schneider S, et al. Introductory to the ESPEN guidelines on enteral nutrition: terminology, definitions and general topics. *Clin Nutr* 2006;25:180–6.
- [8] Valentini L, Volkert D, Schütz T, Ockenga J, Pirlich M, Druml W, et al. Suggestions for terminology in clinical nutrition. *e-SPEN J* 2014;9:e97–108.
- [9] Gäbler G, Coenen M, Bolleurs C, Visser WK, Runia S, Heerkens YF, et al. Toward harmonization of the nutrition care process terminology and the international classification of functioning, disability and health-dietetics: results of a mapping exercise and implications for nutrition and dietetics practice and research. *J Acad Nutr Diet* 2018;118:13–20. e13.
- [10] Academy of Nutrition and Dietetics. Nutrition terminology reference manual (eNCPT): dietetics language for nutrition care.
- [11] Dutch Dietetic Association and Dutch Institute of Allied Health Care (NPI). English translation of the Dutch 'ICF-Diëtetiek'; July, 2017.
- [12] Nederlandse Vereniging van Diëtisten. Classificaties en codelijsten.
- [13] Cieza A, Fayed N, Bickenbach J, Prodinger B. Refinements of the ICF linking rules to strengthen their potential for establishing comparability of health information. *Disabil Rehabil* 2016;1–10.
- [14] Arends J, Bachmann P, Baracos V, Barthelemy N, Bertz H, Bozzetti F, et al. ESPEN guidelines on nutrition in cancer patients. *Clin Nutr* 2017;36:11–48.
- [15] Bischoff SC, Boirie Y, Cederholm T, Chourdakis M, Cuerda C, Delzenne NM, et al. Towards a multidisciplinary approach to understand and manage obesity and related diseases. *Clin Nutr* 2017;36:917–38.
- [16] World Health Organization. International classification of functioning, disability and health: ICF. Geneva: World Health Organization; 2001.
- [17] World Health Organization. ICD-10: international statistical classification of diseases and related health problems. Geneva: World Health Organization; 2016.
- [18] Rauch A, Cieza A, Stucki G. How to apply the international classification of functioning, disability and health (ICF) for rehabilitation management in clinical practice. *Eur J Phys Rehabil Med* 2008;44:329–42.
- [19] Heerkens Y, van der Brug Y, Napel HT, van Ravensberg D. Past and future use of the ICF (former ICDH) by nursing and allied health professionals. *Disabil Rehabil* 2003;25:620–7.
- [20] Stucki G, Cieza A, Ewert T, Kostanjsek N, Chatterji S, Ustun TB. Application of the international classification of functioning, disability and health (ICF) in clinical practice. *Disabil Rehabil* 2002;24:281–2.
- [21] Stucki G, Ewert T, Cieza A. Value and application of the ICF in rehabilitation medicine. *Disabil Rehabil* 2002;24:932–8.
- [22] Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. *Phys Ther* 2002;82:1098–107.
- [23] Stucki G, Cieza A, Geyh S, Battistella L, Lloyd J, Symmons D, et al. ICF core sets for rheumatoid arthritis. *J Rehabil Med* 2004;44:87–93.
- [24] Ruof J, Cieza A, Wolff B, Angst F, Ergeletzis D, Omar Z, et al. ICF core sets for diabetes mellitus. *J Rehabil Med* 2004:100–6.
- [25] Coenen M, Cieza A, Stamm T, Amann E, Kollerits B, Stucki G. Validation of the international classification of functioning, disability and health (ICF) core set for rheumatoid arthritis from the patient perspective using focus groups. *Arthritis Res Ther* 2006;8:R84.
- [26] Stamm TA, Cieza A, Coenen M, Machold KP, Nell VP, Smolen JS, et al. Validating the international classification of functioning, disability and health comprehensive core set for rheumatoid arthritis from the patient perspective: a qualitative study. *Arthritis Rheum* 2005;53:431–9.
- [27] Stucki G, Cieza A. The international classification of functioning, disability and health (ICF) core sets for rheumatoid arthritis: a way to specify functioning. *Ann Rheum Dis* 2004;63:ii40–5.
- [28] Stucki A, Daansen P, Fuessl M, Cieza A, Huber E, Atkinson R, et al. ICF Core sets for obesity. *J Rehabil Med* 2004:107–13.
- [29] Cieza A, Stucki G. Understanding functioning, disability, and health in rheumatoid arthritis: the basis for rehabilitation care. *Curr Opin Rheumatol* 2005;17:183–9.
- [30] Coenen M, Kus S, Rudolf K-D, Müller G, Berno S, Dereskewitz C, et al. Do patient-reported outcome measures capture functioning aspects and environmental factors important to individuals with injuries or disorders of the hand? *J Hand Ther* 2013;26:332–42. quiz 42.
- [31] Stamm TA, Bauernfeind B, Coenen M, Feierl E, Mathis M, Stucki G, et al. Concepts important to persons with systemic lupus erythematosus and their coverage by standard measures of disease activity and health status. *Arthritis Rheum* 2007;57:1287–95.
- [32] Stamm TA, Cieza A, Machold KP, Smolen JS, Stucki G. Content comparison of occupation-based instruments in adult rheumatology and musculoskeletal rehabilitation based on the International Classification of Functioning, Disability and Health. *Arthritis Rheum* 2004;51:917–24.
- [33] Stucki A, Borchers M, Stucki G, Cieza A, Amann E, Ruof J. Content comparison of health status measures for obesity based on the international classification of functioning, disability and health. *Int J Obes* 2006;30:1791–9.
- [34] Cieza A, Brockow T, Ewert T, Amman E, Kollerits B, Chatterji S, et al. Linking health-status measurements to the international classification of functioning, disability and health. *J Rehabil Med* 2002;34:205–10.
- [35] Cieza A, Geyh S, Chatterji S, Kostanjsek N, Üstün B, Stucki G. ICF linking rules: an update based on lessons learned. *J Rehabil Med* 2005;37:212–8.
- [36] Stamm TA, Mattsson M, Mihai C, Stöcker J, Binder A, Bauernfeind B, et al. Concepts of functioning and health important to people with systemic sclerosis: a qualitative study in four European countries. *Ann Rheum Dis* 2011;70:1074–9.
- [37] Coenen M, Cabello M, Umlauf S, Ayuso-Mateos JL, Anczewska M, Tourunen J, et al. Psychosocial difficulties from the perspective of persons with neuropsychiatric disorders. *Disabil Rehabil* 2016;38:1134–45.
- [38] Florin J, Ehrenberg A, Ehnfors M, Björvell C. A comparison between the VIPS model and the ICF for expressing nursing content in the health care record. *Int J Med Inform* 2013;82:108–17.
- [39] Kim TY, Coenen A. Toward harmonising WHO international classifications: a nursing perspective. *Inform Health Soc Care* 2011;36:35–49.
- [40] ISO TC 37/SC 1. ISO 860:2007 terminology work – harmonization of concepts and terms. 3rd ed. International Organization for Standardization (ISO); 2007.
- [41] Gäbler G, Bolleurs C. Austria & Netherlands. Cross-border terminology: where are we?. September ed. EFAD European Federation of the Association of Dietitians; 2017.
- [42] Carroll C, Booth A, Cooper K. A worked example of “best fit” framework synthesis: a systematic review of views concerning the taking of some potential chemopreventive agents. *BMC Med Res Methodol* 2011;11:29.
- [43] Booth A, Carroll C. How to build up the actionable knowledge base: the role of “best fit” framework synthesis for studies of improvement in healthcare. *BMJ Qual Saf* 2015;24:700–8.
- [44] Carroll C, Booth A, Leaviss J, Rick J. “Best fit” framework synthesis: refining the method. *BMC Med Res Methodol* 2013;13:37.
- [45] Hofbauer A, Karner G, Pail E, Purtscher AE, Scherer C, Tammegger M. Der diätetologische Prozess als Instrument der Qualitätssicherung. *J Ernährungsmed* 2014;13:18–9.
- [46] Austrian Dietetic Association. ICF-Dietetics German draft α version translation of the Dutch dietetic association and Dutch Institute of allied health care (NPI). English translation of the Dutch ICF-Dietetics Draft α version 2016 [unpublished data]. 2016.
- [47] Cohen J. A coefficient of agreement for nominal scales. *Educ Psychol Meas* 1960;20:37–46.
- [48] Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977;33:159–74.
- [49] Stamm TA, Nell V, Mathis M, Coenen M, Aletaha D, Cieza A, et al. Concepts important to people with psoriatic arthritis are not adequately covered by standard measures of functioning. *Arthritis Rheum* 2007;57:487–94.