

# To kill two birds with one stone: how to automatically combine standard terminologies and nomenclatures with ICF Environmental Factors in epidemiological studies

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**Abstract** The distribution of expanded ICF-EF terms was analyzed in a sample of 213 outpatients from Region Friuli Venezia Giulia, Italy. Outpatients were selected according to the main healthcare service involved. Almost 200 expanded ICF-EF terms were found (corresponding to 17 ICF-EF items). The distribution of expanded ICF-EF terms in the three groups was different, suggesting a different pattern of the "functioning/disability balance" in these groups. Expanded ICF-EF terms may be useful for epidemiological and statistical purposes.

## Introduction

The ICF provides a functioning descriptive model useful to describe the interactions between an individual with a health condition and his/her contextual factors. A great novelty is its Environmental Factors (EF) component. Unfortunately, the poor granularity of the EF component of ICF compared to other standard terminologies may discourage its use by those who look for more accuracy or, on the contrary, may facilitate its use by those who need less accuracy. However, standard terminologies do not cover all factors classified by the ICF. Aims: (1) to build expanded ICF-EF terms; (2) to study the distribution of expanded ICF-EF terms in a selected outpatient sample; (3) to suggest the use of expanded ICF-EF terms in epidemiological studies.

Table 1: Distribution of the main uncoded Environmental Factors (EF) defining subjects that provide support, assistance and relationships to the patients, in different groups (G), according to the electronic ICF-based individual record. Data are presented as number of items coded and percentages (%) on the total number of ICF items.

Uncoded "Support and Relationships" EF	Expanded ICF-EF				ICF codes				
	G1	G2	G3	Tot	G1	G2	G3	Tot	
Spouse %	2	0	11	13	e310 Spouse				
Partner %	0.6	2.5	3.1	6.2	e310 Partner				
Father and/or mother %	25.6	9.2	28.4	63.2	e310 Father and/or mother				
Sibling %	3	35	35	65	e310 Sibling				
Children %	1.4	7.0	9.7	18.1	e310 Children				
Foster/adoptive parent %	0	1	1	2	e310 Foster/adoptive parent				
Grandparent %	13	0	5	18	e310 Grandparent				
Medical Doctor %	22.6	0	22.6	45.2	e355 Medical Doctor				
Psychologist %	0	3	0	3	e355 Psychologist				
Speech therapist %	1	0	1	2	e355 Speech therapist				
Occupational therapist %	3.2	16.1	19.4	38.7	e355 Occupational therapist				
Nurse %	41.9	3.7	45.6	81.2	e355 Nurse	117	89	173	359
Lawyer %	0	2	1	3	e360 Lawyer				
Social worker %	16.4	4	20	38.9	e360 Social worker	0	16	6	22
Trustee %	8	10	18	36	e330 Trustee				
Employer %	28.6	25.7	64.3	118.6	e330 Employer				
Supervisor %	3	1	4	8	e330 Supervisor				
Personal care provider %	0	4	4	8	e340 Personal care provider				
Personal assistant %	11	5	16	32	e340 Personal assistant				
Etiology %	1	0	1	2	e315 Etiology				
Cousin %	0	4	0	4	e315 Cousin				
Nephew/niece %	21.1	2	23.1	44.2	e315 Nephew/niece				
Brother-in-law %	5.3	10.3	15.6	31	e315 Brother-in-law				
Aunt/uncle %	15.8	21.1	36.9	73	e315 Aunt/uncle				
Friend %	66.7	13.4	80.1	160.2	e320 Friend	0	8	4	12
Acquaintance %	16.7	16.7	33.4	66.8	e325 Acquaintance				
Colleague %	0	1	0	1	e325 Colleague				
Neighbour %	16.7	0	16.7	33.4	e325 Neighbour				
Community member %	0	1	0	1	e325 Community member				
<b>Total</b>						120	157	220	497

\*χ² test for the difference in the distribution of ICF codes = 133.4 P < 0.001

## Methods & Materials

Specific standard terms concerning care and living environment were collected using international and national nomenclatures and standards (ISO-9999, Italian Essential Levels of Health Care (ELHC), Italian Social Care Services nomenclature) and automatically mapped to ICF. Then, expanded ICF-EF terms were obtained that had the ICF code in first coding position and the standard nomenclature term in second coding position. The expanded ICF-EF terms were then used to collect data on a sample of 213 outpatients selected according to the main healthcare service involved (Child and Adolescent Neuropsychiatry Services, No. = 53; Mental Health Departments, No. = 51; and Healthcare Districts, No. = 109).

Table 2: Distribution ISO-9999 codes and ICF fitted items, in different groups (G), according to the electronic ICF-based individual record. Data are presented as number of items coded and percentages (%) on the total number of ICF codes.

Codes	Description	ISO-9999 codes				Expanded ICF-EF	ICF codes			
		G1	G2	G3	Tot		G1	G2	G3	Tot
03.03	Assistive products for respiratory therapy	5	0	4	9	e115 03.03				
03.18	Assistive products for administering medicines	2	2	0	4	e115 03.18				
03.24	Physical, physiological and technical test equipment and materials	0	0	1	1	e115 03.24				
03.33	Assistive products for pressure-sore prevention (cushion/chairs)	2	0	28	30	e115 03.33				
03.39	Assistive products for visual training	1	0	0	1	e115 03.39				
03.48	Equipment for movement, strength and balance training	7	0	7	14	e115 03.48				
06.03	Spinal orthoses	3	1	2	6	e115 06.03				
06.12	Lower limb prosthetic systems	15	0	10	25	e115 06.12				
06.24	Lower limb prosthetic systems	0	0	1	1	e115 06.24				
06.30	Prostheses other than limb prostheses	1	2	1	4	e115 06.30				
06.31	Orthopaedic footwear	10	0	18	28	e115 06.31				
06.03	Shoes and shoes	1	0	1	2	e115 09.03				
09.06	Assistive products for protecting the body (body-armor)	0	0	6	6	e115 09.06				
09.12	Assistive products for walking	0	0	8	8	e115 09.12				
09.15	Assistive products for toiletry	1	0	1	2	e115 09.15				
09.18	Assistive products for ostomy care	1	0	2	3	e115 09.18				
09.21	Products for skin protection and skin cleaning	0	1	1	2	e115 09.21				
09.22	Urinal devices	1	0	2	3	e115 09.22				
09.27	Urinal collectors	0	0	3	3	e115 09.27				
09.30	Assistive products for absorbing urine and faeces	8	0	20	28	e115 09.30				
09.33	Assistive products for washing, bathing and showering	1	0	12	13	e115 09.33				
15.03	Assistive products for preparing food and drink	1	0	0	1	e115 15.03				
15.09	Assistive products for eating and drinking	1	0	4	5	e115 15.09				
18.03	Fabrics	2	0	1	3	e115 18.03				
18.09	Sitting furniture	12	0	8	20	e115 18.09				
18.36	Furniture for storage	0	0	1	1	e115 18.36				
24.09	Assistive products for operating and/or controlling devices	0	0	2	2	e115 24.09				
24.27	Assistive products for fixation	0	0	1	1	e115 24.27				
27.06	Measuring instruments	1	0	1	2	e115 27.06				
30.06	Games	1	0	0	1	e115 30.06				
12.03	Assistive products for walking, manipulated by one care	1	1	5	7	e120 12.03				
12.06	Assistive products for walking, manipulated by both care	10	0	8	18	e120 12.06				
12.07	Accessories for assistive products for walking	0	0	2	2	e120 12.07				
12.12	Car adaptations	3	2	0	5	e120 12.12				
12.18	Cycles	3	0	1	4	e120 12.18				
12.21	Wheelchairs	17	0	42	59	e120 12.21				
12.24	Wheelchair accessories	1	0	6	7	e120 12.24				
12.27	Vehicles	3	0	1	4	e120 12.27				
12.30	Assistive products for transfer and turning	0	0	7	7	e120 12.30				
12.36	Assistive products for lifting	2	0	12	14	e120 12.36				
12.03	Assistive products for walking, manipulated by one care	1	0	2	3	e120 14.03				
12.03	Assistive products for walking, manipulated by one care	10	4	24	38	e125 21.03				
21.09	Input and output devices for computer, calculator and calculators	1	0	3	4	e125 21.09				
21.12	Computers	0	0	7	7	e125 21.12				
21.15	Software and word processing software	0	0	1	1	e125 21.15				
21.18	Assistive products for calculation	0	0	1	1	e125 21.18				
21.24	Assistive products for drawing and writing	0	0	1	1	e125 21.24				
21.36	Assistive products for telephony	0	1	0	1	e125 21.36				
21.42	Assistive products for face-to-face communication	2	0	0	2	e125 21.42				
21.45	Assistive products for hearing	2	0	1	3	e125 21.45				
03.43	Assistive products for training in alternative and augmentative communication	0	0	3	3	e303 03.43				
27.09	Work furniture	0	0	1	1	e135 27.09				
30.09	Assistive products for exercise and sports	0	0	1	1	e140 30.09				
30.12	Medical instruments	1	0	0	1	e140 30.12				
30.15	Assistive products for producing photos	0	0	1	1	e140 30.15				
18.30	Assistive products for vertical accessibility	1	0	4	5	e150 18.30				
<b>Total</b>							137	12	299	448

\*χ² test for the difference in the distribution of ICF codes = 12.6 P = 0.39

## Results

Expanded ICF-EF terms related to outpatients sample were almost 200 compared to 17 ICF-EF items.

Twenty-nine ICF-uncoded family members, health and social professionals, trustees, friends and colleagues were found (corresponding to 8 ICF items in e3)[Table 1]. Fifty-six ICF-ISO-9999 codes were found (corresponding to 7 ICF-EF e1 categories)[Table 2].

Twenty-five different ICF-ELHC terms were found (corresponding to ICF code e580)[Table 3]. Eighty ICF-Italian Social Care Services terms were found (corresponding to ICF code e575)[Table 4].

Table 3: Distribution of Essential Levels of Health Care (ELHC) terms and ICF fitted items, in different groups (G), according to the electronic ICF-based individual record. Data are presented as number of items coded and percentages (%) on the total number of ICF e580 code.

Codes*	Description	ELHC terms				Expanded ICF-EF	ICF code			
		G1	G2	G3	Tot		G1	G2	G3	Tot
1.A-1.F	Services targeted to the population at large and the working community	5	3	3	11	e580 1.				
2.	District health care services	0.7	0.4	0.4	1.6					
2.A	Basic health care services	24	28	51	103	e580 2.A				
2.B	Local emergency response	3	2	2	7	e580 2.B				
2.C	Pharmaceutical services provided through licensed local pharmacies	13	21	45	79	e580 2.C				
2.D	Supplementary health care support	4	1	6	11	e580 2.D				
2.E	Specialist day-hospital services	36	24	35	95	e580 2.E				
2.F	Provision of prostheses	17	0	23	40	e580 2.F				
2.G	Local day-hospital and home-based services	36	63	58	157	e580 2.G				
2.H	Local health care services provided in residential and semi-residential support facilities	12	56	52	120	e580 2.H				
3.A-3.I	Hospital services	21	7	8	36	e580 3.				
4.	Services targeted to care and rehabilitation of non-sufficient persons	2	4	3	9	e580 4.				
<b>Total</b>		173	209	286	668					

\*Code 23 (Spa water services) was excluded, due to the lack of codes in this category  
\*χ² test for the difference in the distribution of ICF codes = 24.43 P < 0.001

The distribution of expanded ICF-EF codes was statistically different among groups (χ² test for the difference in the distribution of ICF codes P < 0.001), except in Table 2 (χ² test for the difference in the distribution of ICF codes P = 0.39). Outpatients in G2, however, represented only the 2.7% of the total ICF codes in Table 2.

## Conclusions

The expanded granularity of ICF-EF items will allow a more detailed description of the EF underlying an individual functioning profile. The fact that almost 200 expanded ICF-EF codes, out of only 17 ICF-EF items, were used, shows the usefulness to expand the ICF.

The different distribution of expanded ICF-EF terms in the three groups suggests a different pattern of the "functioning/disability balance" in these groups. Expanded ICF-EF terms may be useful for epidemiological and statistical purposes.

Table 4: Distribution of Regional Social Services Information System terms and ICF fitted items, in different groups (G), according to the electronic ICF-based individual record. Data are presented as number of items coded and percentages (%) on the total number of times ICF e575 code is used.

Description	Expanded ICF-EF				ICF code	ICF code			
	G1	G2	G3	Tot		G1	G2	G3	Tot
Interventions for access to Social Service *	7	0	2	9	e575 Interventions for access to Social Service				
%	6.1	1.8	7.9	15.8					
Social work %	10	4	9	23	e575 Social work				
%	8.8	3.5	7.9	20.2					
Economical support interventions *	8	16	11	35	e575 Economical support interventions				
%	7.0	14.0	9.6	30.7					
Residential services *	11	6	7	24	e575 Residential services				
%	9.6	5.3	6.1	21.1					
Semi-residential and social skill interventions *	5	3	12	20	e575 Semi-residential and social skill interventions				
%	4.4	2.6	10.5	17.5					
Family care and institutional care †	1	1	1	3	e575 Family care and institutional care				
%	0.9								