

# Which Information is Commonly Used for Patients with Stroke at Rehabilitation Settings?

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**Purpose:** To explore the functioning information in the current medical records for patients with stroke using the comprehensive International Classification of Functioning, Disability and Health (ICF) coreset for Stroke.

**Methods:** Physical therapists, who have more than 3 years of clinical experience in neurologic therapeutic area, filled out the coreset for Stroke based on their patients' medical records, and an interview was conducted for them. Each of the categories in the coreset was analyzed using frequency and percentage analysis.

**Results:** A total of ninety patients with stroke were evaluated. Five categories of neuromusculoskeletal and movement functions in the body function domain were rated as having problems in over 90% of the patients. Four categories of the body structure domain were found as having a problem in over 73% of patients. In the domain of activity and participation, eight categories related to function of domestic lives, areas of major life and mobility were identified as having a problem for more than 90% of those patients. In the environmental factors, a category of health professionals was documented as facilitator in 87% of patients whilst nine categories, including products and technology, physical geography, services, systems and policies, were rated as barriers by more than 10% of patients.

**Conclusion:** The current medical records of patients with stroke contain functioning information. Information regarding body function, and activity and participation was mainly focused on rehabilitation services. It is suggested that environmental factors should be included to understand patients' life situation which may have impact on patients' functioning.

**Keywords:** ICF, Stroke, Medical recordings

## INTRODUCTION

WHO has proposed a biopsychosocial approach to health, functioning, and disability as new model of human functioning and disability. The new International Classification of Functioning, Disability and Health (ICF) model was developed to reflect the interactive relationship between health conditions and contextual factors.<sup>1</sup> The ICF model represents current world views of health and disability, and it is already being used in many countries for multiple purposes including a framework for social policy, research, education and clinical practice.<sup>2</sup>

ICF consists of four domains: body functions, body structure, activities and participation, and environmental factors. Body functions are defined as the physiological function of body systems, and

body structures refer to the anatomical parts of the body. Abnormalities of body function and structure are referred to as impairments. Activity is the execution of a task or action by an individual which represents the individual perspective of functioning. Participation refers to the involvement of an individual in a life situation which represents the social perspective of functioning.<sup>3</sup> Difficulties at the activity level are referred to as activity limitation. Problems an individual may experience in his or her involvement in life situations are included as participation restriction. Environmental factors consist of the physical, social and attitudinal environments in which people live and conduct their lives. These factors are external to individuals and can have a positive or negative influence, which may be indicated as a facilitator or a barrier respectively for the individual.<sup>4</sup>

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In the clinical practice, medical records of patients are used for communication between professionals, clinical decision makings, and creation of legal records. They can also estimate expenses for provided health services. Medical records may include examination, evaluation, diagnosis, prognosis, intervention, and outcomes relevant to individuals' health status in a standardised manner. In rehabilitation, health-status measures are used for the assessment of patients' problems, intervention management and outcome evaluation.<sup>2</sup> Stroke is the number one cause of the neurologic disability worldwide, and is characterized by both cognitive and motor impairments, which contribute to functional dependence and reduced quality of life.<sup>5</sup> Muscle power, range of motion, fine hand function, spasticity, respiratory function, walking, grasping or carrying, self-care are commonly recorded in current rehabilitation settings in Korea to understand stroke patients' conditions.<sup>6-10</sup> Restrictions in working, recreation and leisure, and interpersonal relationship including family and friends are also important aspect to patients with stroke.

ICF has the worldwide standard for reporting on functioning and disability and potential value to establish treatment plans for patients, which is applied as a useful framework for measuring the disability and functions in stroke-related clinical research. Recently, a series of ICF core sets have been developed to characterize the specific problems and/or patient population. The comprehensive ICF coresets for a specific condition is a list of ICF categories that depict the typical spectrum of problems in functioning of patients with that condition including stroke.<sup>11</sup> Each ICF core set is purpose-oriented and concise, and can be used in daily clinical practice.<sup>12</sup>

Many instruments are commonly used to measure individuals' level of function and also information of individuals' disability and functioning capacity are collected in the clinical settings. Those information could be linked into ICF so that a clearer understanding of the affecting patients' functioning to help clinician's decision making for clinical practice. However, there is no data available whether functioning information is actually recorded in the current medical recordings to understand individuals' health status. Therefore, the purpose of the study was to investigate functioning information in the current medical recordings for patients with stroke and link them into ICF to understand what kind information is commonly used for patients with stroke at rehabilitation settings.

## METHODS

### 1. Subjects and study periods

Data was collected from twelve rehabilitation hospitals and centers in Busan, Daegu, Daejeon, Gwangju, Ulsan, Jeju and Changwon. Fifteen therapists from 12 institutes participated to collect data. To achieve quality of data for the study, therapists who had an ICF education workshop and understood ICF were invited. Data collection was performed from June to September, 2015. Patients, diagnosed with stroke by medical doctors based on clinical and investigation features, and had undergone rehabilitation services, were also invited to the study.

### 2. Study contents and design

The study was a multicenter cross-sectional study. The coresets was applied by physical therapists. The data of core set was collected based on information gathered from patient's medical recordings including case history, patient-reported outcome, and clinical examination. When patients were asked about their problems, they wished to discuss regarding their functioning. Informed consent was obtained from the participating subjects prior to data collection.

### 3. Measurement and Methods

Fifteen physical therapists, who have minimum of 3 year clinical experience in neurologic therapeutic area, filled out the core set for stroke based on their patients' medical records and an interview. In the interview, difficulty of daily activities, eg modified Bathel index, were asked. The coresets is composed of 130 categories from four domains: body function (41 categories), body structures (5 categories), activity and participation (51 categories), and environmental factors (33 categories). The qualifier scale has five response options designed to assess categories of body function, body structure and activity & participation domains. Scores of 0, 1, 2, 3, and 4 indicate no, mild, moderate, severe and complete impairment, or limitation/restriction respectively. Whereas the qualifier scale of environmental factors has nine response options ranging from 4 to +4, a score of 1 to 4 refers to a barrier to environmental factors, while a score of +1 to +4 represents a facilitator to environmental factors. A score of 0 may be regarded as no influence in a patient's life. In addition, there are response options of '8' and '9' indicating 'not specified' and 'not applicable' respectively.

#### 4. Statistical Analysis

Collected data was evaluated using the frequency and percentage of patients who had a problem for each category in body function, body structure and activity and participation. For the categories of environmental factors, the frequency of reported categories as a barrier or a facilitator was calculated. The qualifiers '8 (not specified)' and '9 (not applicable)' were treated as missing value based on the assumption that if a determined ICF category is not specified or not applicable to a patient, it is not known whether it is problem for the patient or not. For the component of environmental factors, response options from 1 to 4 were recorded as from -1 to -4 respectively for a barrier, while scores from +1 to +4 were recorded as from 1 to 4 for a facilitator respectively. Descriptive data analysis was performed using SPSS version 22 (SPSS Inc., Chicago, IL, USA).

#### RESULTS

Ninety patients with stroke, mean age of 54.5 (SD = ± 12.3) years, were included in the study. All participants suffered from stroke longer than 3 months and 56 of them were male. Forty-three out of 90 participants had intra-cerebral hemorrhage, 47 of whom had cerebral infarction. Forty-two of them had stroke with left symptoms. Each code was presented in Figure 1 with mean of qualifier.

Frequency of response rate in each chapter of functioning domains is presented in the Table 1. The Body function domain was the most responded by participants whereas the body structure domain had least response rate across domains. In the body function domain, functions related to voice and speech and those of the digestive, metabolic and endocrine systems were documented in most chapters with 100% (n = 90) of patients. While chapters of the car-

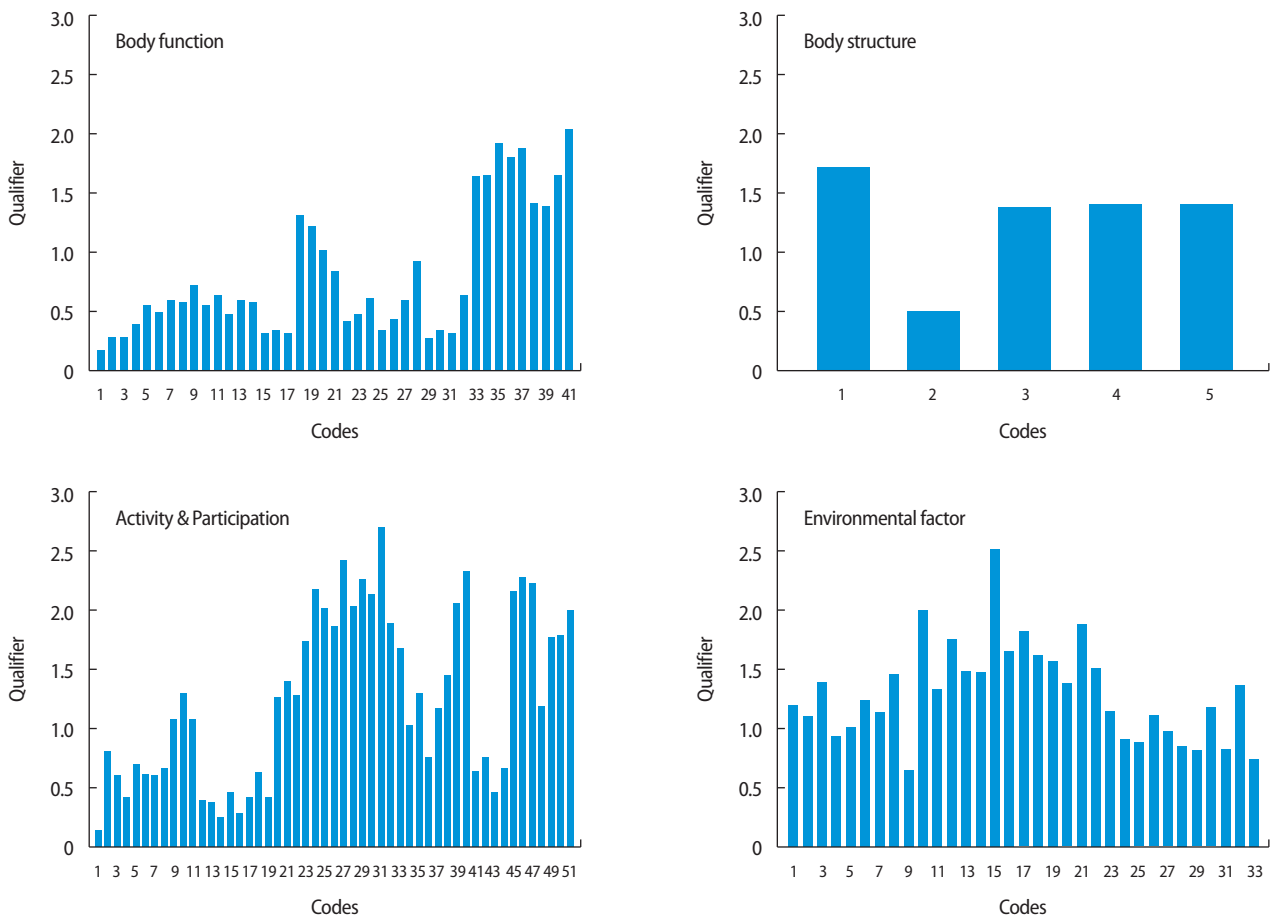


Figure 1. Distribution of each domain and each code. Code labels in each graph represent ICF codes in the core set. Each corresponding code is described in the appendix.

**Table 1.** Percentage of impairment in body function and structures, limitation and restriction of activity and participation components. Each chapter refers to body function, body structure and activity & participation (Unit: %)

Domain	Chapter	Qualifier*					
		0	1	2	3	4	Missing
Body function	b1: Mental functions	62.6	29.8	6.1	1.0	0.3	0.1
	b2: Sensory functions and pain	48.5	28.9	15.2	5.4	1.9	0.2
	b3: Voice and speech functions	35.4	8.0	3.7	3.0	0.0	0.0
	b4: Functions of the cardiovascular, haematological, immunological and respiratory systems	53.1	34.7	5.6	2.8	0.0	3.9
	b5: Functions of the digestive, metabolic and endocrine systems	79.4	15.0	2.8	2.8	0.0	0.0
	b6: Genitourinary and reproductive functions	65.6	22.2	4.4	3.3	0.6	3.9
	b7: Neuromusculoskeletal and movement-related functions	7.4	33.5	41.6	15.7	1.6	0.2
Body structure	s1: Structures of the nervous system	3.3	26.7	53.3	6.7	0.0	10.0
	s4: Structures of the cardiovascular, immunological and respiratory systems	45.6	11.1	8.9	1.1	0.0	33.3
	s7: Structures related to movement	18.1	31.5	33.3	7.8	1.9	7.4
Activity & participation	d1: Learning and applying knowledge	58.9	30.6	8.1	2.2	0.2	0.0
	d2: General tasks and demands	35.0	35.3	21.1	7.5	0.3	0.8
	d3: Communication	74.0	18.1	4.3	3.2	0.0	0.4
	d4: Mobility	11.4	27.2	27.4	20.1	10.8	3.1
	d5: Self-care	26.9	37.2	19.6	10.7	4.8	0.7
	d6: Domestic life	10.7	27.0	21.1	16.7	12.2	12.2
	d7: Interpersonal interactions and relationships	51.4	35.8	6.9	2.8	0.6	2.5
	d8: Major life areas	17.8	17.3	14.7	17.3	12.4	20.4
	d9: Community, social and civic life	13.3	21.7	23.9	16.7	10.6	13.9

\*Qualifier scales of 0, 1, 2, 3, 4 stand for no, mild, moderate, severe and complete impairment, or limitation/restriction respectively.

diovascular, hematological, immunological and respiratory systems functions and genitourinary and reproductive functions were found to be least responded chapters, about 4% of participants had reported missing categories. In the domain of body structure, one third of participants (33.3%) were not identified in the category related to structures of the cardiovascular, immunological and respiratory systems. In the chapter on learning and applying knowledge in the activity and participation domain, all participants (100%, n = 90) were documented as having some level of limitation/restriction including no problem and/or normal, whereas more than 20% of participants were identified as those whose functions of major life area were unknown. In the domain of environmental factors, no single chapters were documented for 100% of participants, and more than 70% of participants were identified as those whose categories in the chapter of support and relationships were positively affected.

Over 90% (n = 81) of participants were identified in five ICF categories about the neuromusculoskeletal and movement related functions (b715, b760, b735, b770, b730) as having a problem, while five categories (b110, b215, b510, b525, and b620) were coded as '0' which is qualified as 'no problem' or 'normal' for more than 75% of partici-

pants (n = 68).

In the domain of body structure, a category related to structure of brain (s110) was reported as having some level of problems by 86.7% (n = 78) of participants. In activity and participation domain, more than 90% of participants were documented in eight categories related to domestic life (d630, d640), while major life areas (d855) and mobility (440, d450, d455, and d465) were documented as having some level of limitations or restriction. Fifteen ICF categories were reported as having a problem by over 10% (n = 10) but less than 50% of the participants. Those are functions related to learning and applying knowledge (d166, d160, d170, d172, and d175), general tasks and demands (d210), communication (d325, d335, d350, d315, d330, d310, d360, d345), and interpersonal interaction and relationships (d760, d770, d710).

In the Environmental factor, nine categories were documented as a barrier by more than 10% (n = 10) and less than 50% (n = 45) of patients. These categories involved products and technology (e115, e120, e150 and e155), physical geography (e210), services, and systems and policies (e525, e540, e575, and e590). All categories were reported as a facilitator in more than 36% of participants. However, no single category was documented as a facilitator in more than

**Table 2.** Frequency of barrier/ facilitator in environmental factors. Each chapter refers to environmental factor components (Unit: %)

Chapter	Qualifier*									
	4	3	2	1	0	+1	+2	+3	+4	Missing
e1: Products and technology	0.7	1.0	3.6	5.6	22.8	20.3	18.3	7.6	11.8	8.3
e2: Natural environment and human-made changes to environment	2.2	0.0	4.4	5.6	40.0	13.3	12.2	2.2	8.9	11.1
e3: Support and relationships	1.0	1.0	0.6	2.1	19.2	15.9	22.9	14.4	17.6	5.4
e4: Attitudes	0.2	0.5	1.7	3.5	22.2	18.1	19.7	17.3	12.1	4.8
e5: Services, systems and policies	0.9	1.8	2.7	5.9	27.8	23.3	12.8	6.4	9.9	8.6

\*The qualifier scale from 1 to 4 refers as a barrier, whereas from +1 to +4 represents a facilitator to environmental factors. '0' regarded as no influence in a patient's life.

90% of participants. Five categories related to support and relationships (e310, e320, and e355) and attitudes (e410 and e450) were identified as facilitators in more than 75% of the patients but less than 90% of participants (Table 2).

## DISCUSSION

The purpose of this study was to investigate functioning information in the current medical records for ninety patients, who had suffered stroke longer than 3 months and undergone inpatient rehabilitation services, using the ICF comprehensive ICF core set for stroke. It was found that the current medical records of patients with stroke may have functioning information. They were closely related to body function and activity & participation which are common focus of rehabilitation services.

The most common problems found in the study were neuromusculoskeletal and movement impairments, which are the most common problems in patients with stroke, and impact heavily on patients' daily living and quality of life.<sup>13</sup> Therefore, a purpose of rehabilitation services is improving patients' neuromusculoskeletal and movement functions. In this study, over 90% (n = 81) of participants had problems of stability in joint, muscle power and tone, control of voluntary movement, and gait pattern. Similar results have been reported in previous studies.<sup>10,14,15</sup> It was found that consciousness was identified as 'no problem' or 'normal' in more than 81.6% of participants. This was due to the inclusion criteria of the current study, in which participants should have minimum score of 24 in the mini mental states examination.

In the body structure domain, brain structure (s110) was documented as having a problem in 86.7% (n = 78) of participants, which is consistent with the previous study.<sup>14</sup> In the current study, the structure of cardiovascular system was rated as 'missing value' in

33.3% (n = 30) of participants since the available information was not sufficient enough to make a judgement. Furthermore, no single category of body structure in ICF core set was rated 100%. Information regarding anatomical structure was not frequently documented for patients' functioning status, and was not highly applied as outcome measures of whether an individual's level of functioning was improved or decreased over time.

In the domain of activity and participation, 4 categories were documented as a limitation or restriction in more than 90% (n = 81) of participants. These categories are 'fine hand use', 'walking', 'moving around' and 'moving around in different locations', which had been previously observed in post-stroke populations and frequently reported as being limited and restricted.<sup>8</sup> It was found listening function (d115) was identified as having no problem in 91.1% (n = 82) of patients. Interpersonal relationships were not reported as being limited or restricted in more than 50% (n = 45) of participants though informal social relationships (d750) were reported as having problems with 41% (n = 37) of patients. It was found that 21% (n = 19) of the patients did not drive before they had a stroke. Categories of work and employment (d845-d855) were not also found to be suitable to use because the retired elderly comprised the proportion of patients (more than 25%, n = 23) in the current study.

In the environmental factors, five categories were regarded as primary facilitators in more than 75% (n = 79) of patients in the study. The support and assistance of immediate family, friends and health professionals could impact on patients' functioning status. Whereas nine categories were regarded as barriers in more than 10% (n = 9) of patients, barrier factors like products and technology, geography, relevant services, systems and policies should be paid attention by government, policy decision-makers as well as relevant bodies in order to change existing environmental barriers.

Standardisation of health information should be an important

role of assessment and management in the clinical settings. ICF is the international classification for functioning status and commonly referred as a standard tool. Functioning information in the current medical recordings of ninety patients with stroke was investigated using the ICF core set for stroke. It was found that the current medical records of patients with stroke contain functioning information. The results of the study were consistent with the general characteristics following stroke which appear in the form of neurological dysfunctions, eg. mobility and limited ability to perform activities of daily living. Environmental factors should be included to in order to understand patients' life situation which may influence patients' functioning.

Further study may be needed to establish standardisation of functioning information for patient with stroke, information should be collected from various institutes and/or organs like university hospitals, rehabilitation hospitals, specialized clinics and community based rehabilitation centres.

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**Appendix.** The ICF core set code list with corresponding code labels of the graph

Domain	Graph label	ICF code	Title	Graph label	ICF code	Title
Body function	1	b110	Consciousness functions	22	b310	Voice functions
	2	b114	Orientation functions	23	b320	Articulation functions
	3	b117	Intellectual functions	24	b330	Fluency and rhythm of speech functions
	4	b126	Temperament and personality functions	25	b410	Heart functions
	5	b130	Energy and drive functions	26	b415	Blood vessel functions
	6	b134	Sleep functions	27	b420	Blood pressure functions
	7	b140	Attention functions	28	b455	Exercise tolerance functions
	8	b144	Memory functions	29	b510	Ingestion functions
	9	b152	Emotional functions	30	b525	Defecation functions
	10	b156	Perceptual functions	31	b620	Urination functions
	11	b164	Higher-level cognitive functions	32	b640	Sexual functions
	12	b167	Mental functions of language	33	b710	Mobility of joint functions
	13	b172	Calculation functions	34	b715	Stability of joint functions
	14	b176	Mental function of sequencing complex movements	35	b730	Muscle power functions
	15	b180	Experience of self and time functions	36	b735	Muscle tone functions
	16	b210	Seeing functions	37	b740	Muscle endurance functions
	17	b215	Functions of structures adjoining the eye	38	b750	Motor reflex functions
	18	b260	Proprioceptive function	39	b755	Involuntary movement reaction functions
	19	b265	Touch function	40	b760	Control of voluntary movement functions
	20	b270	Sensory functions related to temperature and other stimuli	41	b770	Gait pattern functions
	21	b280	Sensation of pain			
Body structure	1	s110	Structure of brain	4	s730	Structure of upper extremity
	2	s410	Structure of cardiovascular system	5	s750	Structure of lower extremity
	3	s720	Structure of shoulder region			
Activity & Participation	1	d115	Listening	27	d455	Moving around
	2	d155	Acquiring skills	28	d460	Moving around in different locations
	3	d160	Focusing attention	29	d465	Moving around using equipment
	4	d166	Reading	30	d470	Using transportation
	5	d170	Writing	31	d475	Driving
	6	d172	Calculating	32	d510	Washing oneself
	7	d175	Solving problems	33	d520	Caring for body parts
	8	d210	Undertaking a single task	34	d530	Toileting
	9	d220	Undertaking multiple tasks	35	d540	Dressing
	10	d230	Carrying out daily routine	36	d550	Eating
	11	d240	Handling stress and other psychological demands	37	d570	Looking after one's health
	12	d310	Communicating with - receiving - spoken messages	38	d620	Acquisition of goods and services
	13	d315	Communicating with - receiving - nonverbal messages	39	d630	Preparing meals
	14	d325	Communicating with - receiving - written messages	40	d640	Doing housework
	15	d330	Speaking	41	d710	Basic interpersonal interactions
	16	d335	Producing nonverbal messages	42	d750	Informal social relationships
	17	d345	Writing messages	43	d760	Family relationships
	18	d350	Conversation	44	d770	Intimate relationships

(Continued to the next page)



Appendix. Continued

Domain	Graph label	ICF code	Title	Graph label	ICF code	Title
	19	d360	Using communication devices and techniques	45	d845	Acquiring, keeping and terminating a job
	20	d410	Changing basic body position	46	d850	Remunerative employment
	21	d415	Maintaining a body position	47	d855	Non-remunerative employment
	22	d420	Transferring oneself	48	d860	Basic economic transactions
	23	d430	Lifting and carrying objects	49	d870	Economic self-sufficiency
	24	d440	Fine hand use	50	d910	Community life
	25	d445	Hand and arm use	51	d920	Recreation and leisure
	26	d450	Walking			
Environ- mental factor	1	e110	Products or substances for personal consumption	18	e420	Individual attitudes of friends
	2	e115	Products and technology for personal use in daily living	19	e425	Individual attitudes of acquaintances, peers colleagues, neighbours and community members
	3	e120	Products and technology for personal indoor and outdoor mobility and transportation	20	e440	Individual attitudes of personal care providers and personal assistants
	4	e125	Products and technology for communication	21	e450	Individual attitudes of health professionals
	5	e135	Products and technology for employment	22	e455	Individual attitudes of health-related professionals
	6	e150	Design, construction and building products and technology of buildings for public use	23	e460	Societal attitudes
	7	e155	Design, construction and building products and technology of buildings for private use	24	e515	Architecture and construction services, systems and policies
	8	e165	Assets	25	e525	Housing services, systems and policies
	9	e210	Physical geography	26	e535	Communication services, systems and policies
	10	e310	Immediate family	27	e540	Transportation services, systems and policies
	11	e315	Extended family	28	e550	Legal services, systems and policies
	12	e320	Friends	29	e555	Associations and organizational services, systems and policies
	13	e325	Acquaintances, peers colleagues, neighbours and community members	30	e570	Social security services, systems and policies
	14	e340	Personal care providers and personal assistants	31	e575	General social support services, systems and policies
	15	e355	Health professionals	32	e580	Health services, systems and policies
	16	e360	Health-related professionals	33	e590	Labour and employment services, systems and policies
	17	e410	Individual attitudes of immediate family members			