

Content Comparison of Long-Term Care Instruments Based On The International Classification of Functioning, Disability And Health (ICF)

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Abstract

Background: Aging crisis is proposing a huge challenge to the whole Chinese social welfare system, however a national Long-term Care (LTC) Instrument has not established yet. The objective of this study was to analyze and compare the content of six selected LTCs based on the linkage of the International Classification of Functioning, Disability and Health (ICF), so as to provide insights for the development of Chinese national LTC instrument in the future.

Methods: Two trained health professionals performed the linkage according to the refined ICF linking rules. The main concepts included in the items of three international LTC instruments, namely Minimum Data Set 3.0 (MDS 3.0), Initial Assessment Instrument (IAI), and New Assessment Tool for Determining Dependency on Nursing Care (NBA), as well as three Chinese instruments, namely Disability Assessment of Long-Term Care (DA-LTC), Specification for Elderly Care Unified Need Assessment in Shanghai Version 2.0 (SEC-UNA 2.0), and pictorial-based Longshi Scale (LS) were selected and linked to the ICF categories. The six selected LTC instruments were analyzed and compared at the levels of ICF components, chapters, and categories.

Results: The main concepts of 340 valid items of the six LTC instruments were linked to 112 different ICF categories. Within the ICF framework, the "*Activities and Participation*" component was most frequently addressed in the LTC instruments followed by the "*Body functions*" component, and the percentages were 0.52 and 0.38, respectively. At the ICF chapters level, "*b1 mental functions*," "*d4 mobility*," and "*d5 self-care*" were the core of the LTC instruments. In addition, the contents of the six selected LTC instruments differed greatly.

Conclusions: The ICF provides a useful external reference for the analysis and comparison of different LTC instruments. The findings suggest that key elements to determine eligibility for LTC in China need to be further identified. It is anticipated that this study will provide new insights for the development of Chinese national LTC instruments.

Background

Over the past two decades, the aging population (those 65 years and older) in China has almost doubled, reaching 176.3 million (12.6%) in 2019 [1]. Given the current trend, this proportion is predicted to sharply increase to 27.9% in 2050 [2]. As the country with the largest population in the world, this aging crisis proposes a huge challenge to the whole Chinese social welfare system. In particular, this means that there is a great need for effective long-term care (LTC).

Providing LTC for the aging population is also becoming a major global challenge as longer life expectancies and low birth rates are becoming common [3]. Based on the experience of developed countries with well-coordinated and cost-effective LTC systems, one of the key steps is to develop eligibility criteria for LTC benefits and services. Such criteria determine the baseline expenditure needed to run the systems, and they play a critical role in objectively and fairly deciding the benefits for individuals

[4–5]. Countries that have successfully implemented national LTC services possess standard and structured assessment tools, such as the Initial Assessment Instrument (IAI) in Japan [6], the New Assessment Tool for Determining Dependency on Nursing Care (NBA) in Germany [5], and the Minimum Data Set (MDS) of the International Resident Assessment Instrument-Minimum in the US [7]. However, a nationally uniform assessment tool to determine the aging population's eligibility for LTC services in China has not yet been established.

According to the World Health Organization (WHO), LTC services allow individuals in need of LTC to "*maintain dignity and an independent daily life routine according to each person's own level of ability*" [8]. While developing operational eligibility criteria for LTC, one of the important issues was to identify the key factors that influence the aging population to function independently. The methods to develop LTC eligibility criteria usually include expert consultation, literature review, and clinical observation [5–6]. However, within the biopsychosocial model, the key factors should be discussed in a more comprehensive and systematic way.

"Functioning" as the operational concept of "health" in the International Classification of Functioning, Disability and Health (ICF) framework is not a stable attribute, but a fluid and continuous interaction between body functions and structures, activity and participation, as well as contextual factors (Figure 1) [9]. In the last two decades, functioning and its domains have been widely applied in the collection of national and international health information [10–11], as well as in the evaluation of policy content [12]. A major public health goal of the WHO is to help individuals, including the aging population, attain a high level of functioning. Hence, it is worth considering the key factors of LTC from the perspective of function.

As an international classification system, the ICF has systematic infrastructure and universal taxonomy to document people's functional information. It was conceived as a common language for different disciplines that can be applied in different settings. Using the proposed transparent linking rules [13–14], the ICF has been accepted as a reference to enable the comparison of variation in the content of collected health information from different perspectives and using various modes, such as technical or clinical examinations, health assessment instruments, and healthcare interventions. The ICF can help health practitioners, researchers, social workers, and even policymakers clearly understand a wide range of health information regarding functioning.

Therefore, the aim of this study was to analyze and compare the content of LTC assessment instruments based on the linkage of the ICF in order to provide a reference for the development of Chinese national LTC instruments. The specific aims were (i) to analyze the content of LTC assessments from a functional perspective by the linkage of the ICF framework and (ii) to compare the similarities and differences in the contents of LTC instruments.

Methods

The present study selected six LTC instruments—three of which were international LTC instruments, while the other three were newly published or widely applied Chinese instruments. The international

instruments were the MDS 3.0 [7], IAI [6], and NBA [5], while the Chinese instruments were the Chinese Disability Assessment of Long-Term Care (DA-LTC) [15], Chinese Specification for Elderly Care Unified Need Assessment in Shanghai Version 2.0 (SEC-UNA 2.0) [16], and the pictorial-based Longshi Scale (LS) [17].

The established and refined ICF linking rules developed by the ICF Research Branch were used to link the items in the instruments to the most precise ICF categories [13-14]. Two of the authors (Gao and Zhao) performed the linkage separately. Both were familiar with the concepts, definitions, and structure of the ICF and had prior linkage experience. Any differences between the two linkers were resolved through discussion. Where agreement could not be reached, the third author made an informed decision. The online ICF Browser (<https://apps.who.int/classifications/icfbrowser/>) is applied as a resource for linkage [18].

Linkage of items to the ICF

The ICF is a hierarchical coding system divided into two parts: functioning and disability, as well as contextual factors. Functioning and disability refer to the components of body function (*b*), body structure (*s*), activities and participation (*d*). Contextual factors were divided into the components of environment (*e*) and an unclassified set of personal factors (*pf*). As the basic unit of ICF, each category starts with a component letter, followed by the chapter number or first level (one digit), the second level (two digits), the third level (one digit), and the fourth level (one digit). An example of component *b* is presented in the following code:

b2 sensory functions and pain (first- or chapter level)

b280 sensation of pain (second-level)

b2801 pain in body part (third-level)

b28010 pain in head and neck (fourth-level)

To ensure that the linkage process was conducted in a meaningful and transparent way, the linking process was guided by the ICF linking decision tree [14].

Instruments

The number of domains/sections, the items, the published country/region, and the mode of administration of these instruments are presented in **Table 1**.

MDS 3.0 is a systematized and standardized multi-dimensional assessment that addresses the problems of LTC facility residents and their potential needs [7]. The data collected from residents can be aggregated to help in the planning of their care and to improve their quality of care. The MDS 3.0 has 21 sections in total. This study excludes the identification information and four summary sections

(participation in assessment and goal setting, care area assessment summary, correction request, and assessment administration). Therefore, 96 items were included for the linkage.

The IAI has two subscales, physical and mental status, as well as the use of medical procedures [6]. Trained local government officials completed this form through home visits. Based on standard evaluation scores, the assessors estimate the time needed for the nine categories of care (grooming/bathing, eating, toileting, transferring, assistance with instrumental activities of daily living (ADL), behavioral problems, rehabilitation, and medical services) per day, and assign a care-needs level to applicants according to the total estimated care minutes: not eligible (≤ 25 minutes), need support (< 30 minutes), level 1 (< 50 minutes), level 2 (< 70 minutes), level 3 (< 90 minutes), level 4 (< 110 minutes), and level 5 (≥ 110 minutes).

NBA has eight modules [5]. Six of them (mobility, cognition and behavior, self-care, management of illness-related demands, everyday life, and social contacts) were included in the scoring system. The scores of the six modules were weighted and integrated into an overall score between 0 and 100. Five degrees of dependency were identified according to the threshold scores: 1st degree of dependency (15-29), 2nd degree (30-49), 3rd degree (50-69), 4th degree (70-89), and 5th degree of dependency (either 90+, or 90+ and additional specific need constellation).

The DA-LTC was newly published by the National Healthcare Security Administration and the Ministry of Civil Affairs of the People's Republic of China in 2021 [15]. It has 27 items and is divided into three domains: activities of daily living (ADL), cognitive ability, and perceptive and communitive ability. It classifies applicants into six levels: no impairment, slightly impairment, moderate impairment, and severe impairment I, severe impairment II, and severe impairment .

The SEC-UNA version 2.0 has 83 items and is divided into two subscales, applicants' self-care ability and disease severity [16]. The SEC-UNA classifies applicants into seven degrees (from 0 to 6) depending on the threshold scores of each subscale, with 0 corresponding to totally independent and 6 corresponding to totally dependent. This study excluded the items on identification information (items 1 to 26).

The LS is a pictorial-based self-care assessment tool that has been widely applied in Chinese communities and nursing homes [17]. The LS has nine items that evaluate self-care ability in ADLs. It classifies applicants into six grades, with 1 corresponding to totally dependent and 6 corresponding to totally independent.

Data analysis

The reliability of the linking process between the two researchers was evaluated using the statistic and nonparametric bootstrapped 95% confidence intervals. The values were categorized as follows: value of 0.00-0.20 = slight agreement, 0.21-0.40 = fair, 0.41-0.60 = moderate, 0.61-0.80 = substantial, and 0.81-1.00 = almost perfect [19].

Content analysis and comparison of selected LTC instruments were based on linked ICF categories. The number of linked ICF categories was calculated and grouped by the ICF components.

Results

Linkage process

The main concepts of 340 valid items of the six LTC instruments were linked to 112 different ICF categories based on published linking rules [13-14]. The results of the statistic for the agreement between the two researchers were 0.73, and the 95% bootstrapped confidence intervals were 0.52 and 0.91, respectively, which have been presented as substantial reliability.

In these ICF categories, two categories belonged to the "s" component, 42 categories to the "b" component, 58 categories to the "d" component, five categories to the "e" component, and five categories to the unclassified "pf" component. In addition, 30 concepts such as "hallucinations", "delusions", "depression" and "anxiety" were identified as "not defined-mental health (*nd-mh*)", 48 concepts of disease diagnoses were assigned to "*health conditions (nc-hc)*", and six concepts like "bedfast", "functional rehabilitation potential", and "fall history on admission" were assigned to "*not covered*".

Linkage results

Table 2 presents the frequency of items, concepts, and ICF categories for each LTC assessment. It can be seen that within the ICF framework, the MDS 3.0 contains all the ICF components; however, none of the other five LTC instruments contains the "s" and "pf" components. The MDS 3.0 focused more on the "b" component, while the other five LTC instruments stressed more on the "d" component as percentages were more than 50% and even reached up to 89.5% in the pictorial-based LS scale.

Table 3 presents the content comparison of the selected LTC instruments using the ICF categories as a reference grouped by the components. Within the ICF framework, the "d" component was the most frequently addressed in the LTC instruments, followed by the "b" component. The "s", "e", and "pf" components were scarcely addressed with a total of 12 linked ICF categories containing 11% of all those linked.

In the ICF chapter level, the MDS 3.0 contained 15 chapters and five other LTC instruments linked to seven to 13 chapters. All the six LTC instruments contained the chapters "*d4 mobility*", and "*d5 self-care*", as well as the chapter "*b1 mental functions*" was the most frequent addressed one. In addition, the distribution of the six LTC instruments showed considerable differences. For example, for the "b" component, the MDS 3.0 covered all the chapters except "*b8 functions of the skin and related structures*". However, the NBA only contained "*b1 mental functions*". For the "d" component, the NBA covered all the nine chapters, whereas, the MDS 3.0 contained four chapters—less than four out of the five instruments.

In the ICF category level, only the following three categories and their subcategories (including third-level ICF categories): "*d520 caring for body parts*", "*d530 toileting*", and "*d550 eating*" were covered by all the

six selected LTC instruments. Other important categories contained in five out of the six LTC instruments were "*b110 consciousness functions*", "*b144 memory functions*", "*b525 defecation functions*", "*b620 urination functions*", "*d410 changing basic body position*", "*d510 washing oneself*", and "*d540 dressing*". Additionally, **Table 3** shows the frequencies of the ICF categories linked to the selected LTC instruments. A high number may indicate that the concept of ICF was broad or complex; therefore, several concepts of items from an LTC instrument had to be linked to the same ICF category. For example, the ICF category "*e5800 health services*" was linked to 31 concepts of the MDS 3.0, 12 concepts of the IAI, and 15 concepts of the NBA.

Discussion

This study compared and analyzed the contents of six selected LTC instruments using the ICF as an external reference system. Within the ICF framework, the MDS 3.0 has been proven to be a comprehensive LTC assessment that contains all the ICF components to describe functioning. Previous studies have shown that the linkages of different instruments and questionnaires to ICF categories contain only a few components of the ICF framework [20–21]. At the ICF chapters level, "*b1 mental functions*", "*d4 mobility*", and "*d5 self-care*" were found to be the core of LTC instruments. In addition, the study found that the contents of the six selected LTC instruments differed greatly.

Theoretically, the content of LTC instruments should be in accordance with national LTC policies and reflect the conceptual basis that is intended to be measured. Based on the linkage of ICF categories, the similarities and differences between the LTC instruments could clearly be explained. For example, this study found that the NBA comprehensively covered all the chapters of *the "d"* component, but only covered one chapter ("*mental functions*") in the "*b*" component. This could be explained by the NBA policy focused on the older adult population who had "*dependency on nursing care*" and who were "*particular in terms of including people with cognitive impairments*". By comparison, the IAI covered more chapters in the "*b*" component and contained less chapters in the "*d*" component. These might be attributed to the aims of IAI, which were "*to promote seniors' functional independence, rather than excessive dependency on institutions and the government*". However, although the Ministry of Human Resources and Social Security of the People's Republic of China published the guidelines of the LTC policy (Trial) [22], the targeted population comprised individuals "*who were severely disabled in basic requirements of life and medical care*", this study revealed that the content of the three selected Chinese LTC instruments varied. The SEC-UNA was the most comprehensive, and it covered five chapters in the "*b*" component as well as seven chapters in the "*d*" component. By comparison, in the newly developed DA-LTC lacked "*participation*" items which is defined as "*encompassing involvement in a life situation*", and the pictorial-based LS scale did not evaluate older people's "*mental function*."

This study revealed that all LTC instruments focused on the physical needs of older adults. Of all the linked ICF categories, more than 80% were about "*activities*" which is conceived as "*the execution of specific tasks or actions by an individual*" and "*body functions*" categories. However, from the biopsychosocial medical model perspective, the psychological needs and social participation

requirements of older adults should not be ignored [23–26]. Two large prospective studies conducted in Japan proved that social participation among older adults might decrease the need for LTC and, consequently, reduce future LTC costs [24–25]. Quail and colleagues' research showed that unmet psychological distress in older adults, may accelerate the decline of health and functional status, and can increase the use of emergency health services [26].

This study revealed that some important issues for older adults were not addressed in the majority of LTC instruments. For example, five out of six LTC instruments did not cover the category "*b280 pain*" even though more than 60% community-dwelling older adults and up to 80% of the older population living in LTC facilities suffer from chronic pain [27–28]. Chronic geriatric pain could lead to impaired ADLs, anxiety, disturbed appetite and weight loss, cognitive disorders, and an increased burden on the healthcare system [29–30]. Therefore, given the high prevalence of pain and its influence on older adults, it is an undeniably important issue in LTC. In addition, the three LTC instruments did not cover the category "*b134 sleep function*." Sleep is an essential element for health promotion in older adults. However, sleep disturbances, such as insomnia, have a reported prevalence ranging from 30–48% in the older adult population. The negative health consequences of sleep disturbances include decreased quality of life, increased risk of falls, psychological and physical difficulties, and healthcare system costs [31].

Additionally, as a national LTC instrument, the length of time required for administration is a critical factor that significantly influences the utility of LTC instruments, especially for China, which has a large aging population. In the Chinese context, a time-consuming LTC instrument will be less useful, even with good psychometric properties. Currently, LTC evaluation services are usually conducted by trained health professionals. However, it is not feasible to have such a large number of health professionals ready for service utilization in China. This study presented 52 and 17 ICF categories linked to the MDS 3.0 and the pictorial-based LS scale, respectively. However, the average time to complete the MDS 3.0 and the LS scale were around 61.5 and 1.5 minutes, respectively [7, 32]. From this perspective, the pictorial-based LS scale might be more feasible as a screening LTC instrument in China; however, it lacked items to evaluate applicants' mental function, which cannot be an ignored domain of LTC.

The present study has two main limitations. First, the linkage of NBA and IAI was performed using the candidate items from the public articles instead of the linkage from the original instruments, which could have led to the bias. Another important limitation is that although applying the ICF linking process can be used to collect different types of health information, it is not always possible to link all of them to the ICF classification system for comparison. For example, some behavioral items were not covered in the ICF system, but they were important characteristics of cognitive disorders.

Conclusions

To our knowledge, this is the first study to analyze and compare LTC instruments using ICF as an external reference. The linkage of the six selected LTC instruments revealed that "*b1 mental function*", "*d4 mobility*

", and "*d5 self-care*" were the most frequently addressed areas. In addition, the content of the LTC instruments differed. This study suggests that in China, key elements to determinate applicants' eligibility to be considered as "severely disabled" need to be further identified. Moreover, considering the large population basis and limited health resources, feasibility is a crucial issue that must be carefully considered. This being said, these findings are expected to provide useful information for future studies.

Abbreviations

LTC: Long-term care; IAI: Initial Assessment Instrument; NBA: New Assessment Tool for Determining Dependency on Nursing Care; MDS: Minimum Data Set; DA-LTC: Disability Assessment of Long-Term Care; SEC-UNA: Specification for Elderly Care Unified Need Assessment; LS: Longshi Scale; ADL: Activities of daily living.

Declarations

Ethics approval and consent to participate

As this is a content comparison and analysis of instruments, the Ethics Committee of the First Affiliated Hospital of Shenzhen University decided that no ethical approval is needed for this study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author (Yulong Wang) on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

YLW and YG contributed to the study concept and design. YG, JPZ, and XHX contributed to acquisition of data. YG, JPZ, and XXL contributed to analysis and interpretation of data. YG and JPZ contributed to draft the manuscript. All of the authors have read and approved the final version of the manuscript.

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Tables

Due to technical limitations, tables 1-3 are only available as a download in the Supplemental Files section.

Figures

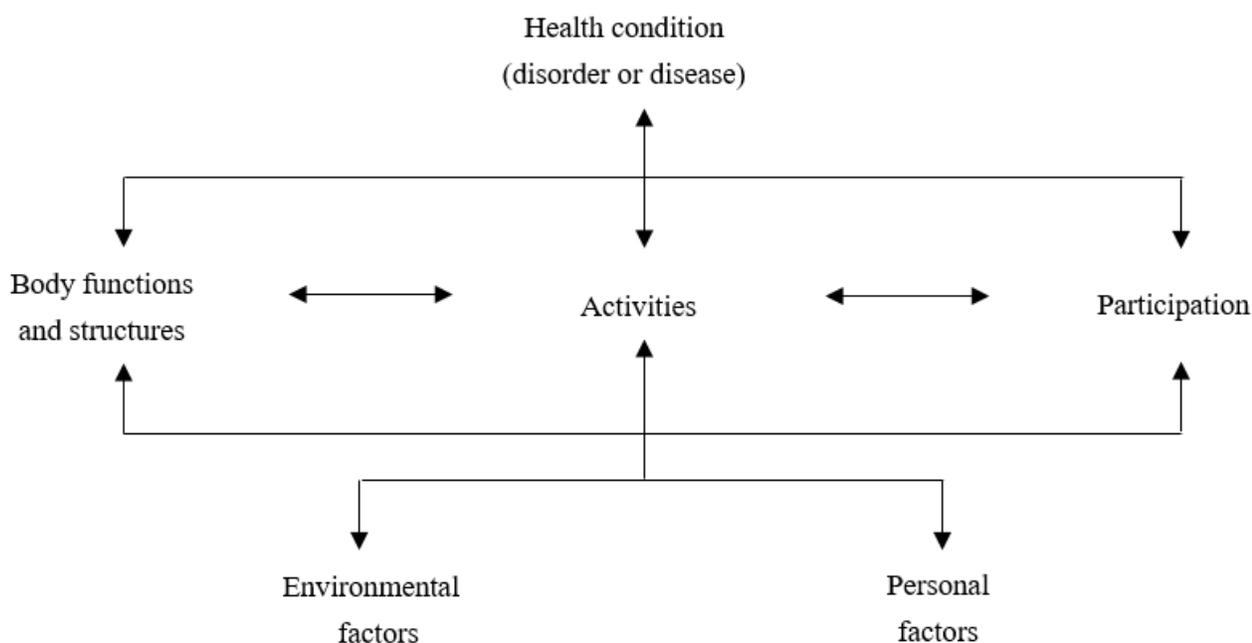


Figure 1

The framework of the ICF

Supplementary Files

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