



## Original article

## The Care Dependency Scale: psychometric testing of the Chinese version

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## ARTICLE INFO

## Article history:

Received 17 January 2016

Received in revised form

27 February 2016

Accepted 19 March 2016

Available online 16 June 2016

## Keywords:

Elderly

Geriatric care environment

Geriatrics

Nursing home

Nursing dependency

## ABSTRACT

**Objective:** To determine the validity and reliability of the Chinese version of the Care Dependency Scale (CDS) for proxy assessments by nurses in Chinese nursing homes. The CDS is an excellent tool for measuring care dependency in many countries. The Chinese version of the CDS contributes additional data regarding the scale's use.

**Methods:** This was a cross-sectional study of 184 older adults; 128 were re-evaluated after 2 weeks. Cronbach's alpha, the mean inter-item correlation, the inter-rater reliability and the test-retest reliability were used to analyze the reliability of the CDS. A factor analysis was carried out to find common dimensions between the CDS versions.

**Results:** The alpha coefficient of the CDS was 0.95. The subsequent inter-rater and test-retest reliabilities were analyzed in terms of the Kappa values, which were between 0.84 and 0.89; 0.83 and 0.92, respectively. Three factors were identified in the factor analysis.

**Conclusions:** The CDS is a suitable tool for assessing care dependency among elderly Chinese residents in nursing homes.

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## 1. Introduction

According to the Chinese National Bureau of Statistics, the number of people aged 60 years or older grew to 1.93 million in 2012, which accounts for 14.3% of the total population of China and is 0.59% more than in 2011.<sup>1</sup> As demographics change to include an increase in chronically ill adults, there is a simultaneous increase in care dependency, with many people suffering from urinary incontinence, dementia and mild cognitive impairment.<sup>2,3</sup>

Due to the rapid economic development and 'one child' policies in China, the traditional way of caring for the elderly at home has changed.<sup>4,5</sup> Nursing homes are now considered an important place for the elderly who need consistent care because of their illnesses and/or disabilities, and lack of family care. However, nursing home care is relatively new for the elderly and nurses in China and is still evolving. In China, people need nursing homes because they are completely dependent on help with their activities of daily living

(ADL), and their adult children cannot provide care. The majority of nursing homes focus on daily living activities. Most of the daily living care is typically provided by nurse assistants. Medical care is provided by a limited number of physicians and registered nurses.<sup>6</sup>

In China, most nursing homes are owned by the government and Street or Residents' Committees. Sports and recreational activities are less frequently taken in nursing homes because of a shortage of funds and lack of appropriate sites. Whereas in the Netherlands, for example, people who are in need of long-term care often live in residential homes or nursing homes with 24-h supervision and a protected living environment.<sup>7</sup>

## 1.1. Background

The assessment of a patient's needs is an essential part of nursing practice and a significant amount of nursing research is conducted to improve assessment methods, such as the development of measurement instruments.<sup>8</sup>

Some assessment instruments, such as the Barthel Index,<sup>9</sup> were developed to assess patients' ADL. Nevertheless, nurses' views were not taken into account and patients' psychological and sociological

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Peer review under responsibility of Shanxi Medical Periodical Press.

needs were not considered.<sup>10,11</sup> The (ADL) are usually used to measure the dependency level of older adults in China.<sup>11</sup>

### 1.2. The Care Dependency Scale

The Care Dependency Scale (CDS), which is based on Henderson's 14 human needs, aims to confirm patients' nursing care dependency as part of the assessment. The CDS was originally developed in the Netherlands in 1994 and has been translated into more than 16 languages.<sup>12–14</sup>

The scale consists of 15 items, including: eating and drinking; continence; body posture; mobility; day and night patterns; getting dressed and undressed; body temperature; hygiene; danger avoidance; communication; contact with others; sense of rules and values; daily activities; recreational activities, and learning abilities, which are all separately assessed. Each item has a brief description, and five care dependency criteria. A 5-point Likert scale assesses a patient's reliance, from completely dependent to completely independent. Therefore, the CDS total values are between 15 and 75 points. The lower the value, the more the patient depends on others for care.<sup>15–17</sup>

Development and psychometric testing of the Dutch CDS is described in several studies. In the first study, the concept of care dependency was operationalized<sup>16</sup> and 44 experts in a Delphi survey established the content validity of the initial scale.<sup>18</sup> Reliability of the scale was determined as an inter-rater reliability (Kappa) of 0.40–0.64; test-retest reliability (Kappa) was 0.55–0.80, and Cronbach's alpha was 0.97.<sup>19</sup> Utility tests revealed that the CDS is easy to use and quick to complete, normally taking less than 5 min.<sup>19</sup> A factor analysis was carried out and resulted in a unifactorial solution (Eigenvalue 10.721). In addition, the Mokken scale analysis for the whole scale demonstrated a high H-coefficient of 0.75.<sup>16,20</sup> Indications for the construct-related validity were found by comparing the CDS to three reasonably reliable and valid instruments.<sup>20</sup>

The instrument was first used to assess demented and mentally handicapped patients.<sup>18</sup> Patients' care dependency was also assessed in the geriatric, surgical and pediatric wards of hospitals in Germany.<sup>21</sup> A modified Arabic CDS for the self-assessment of older people in Egypt was used to measure nursing home residents, home care recipients and non-care recipients, and the results showed that the assessment of care dependency is useful among care recipients.<sup>22</sup> A modified CDS for rehabilitation was tested in Austria, and had a Cronbach's alpha of 0.97.<sup>23</sup> A modified CDS for pediatrics was tested in Germany and Egypt, and both had a strong internal consistency: Cronbach's alpha was 0.91 and 0.85 for the German and Arabic versions, respectively.<sup>24–26</sup>

The importance of the present study lies in further determining whether it is appropriate to compare the care dependency status of older patients in different settings and cultures using the same instrument. The aim of this study was to identify the psychometric properties of the CDS by analyzing data that was collected in China.

## 2. Methods

### 2.1. Translation procedures

The translated text of the English version into the Chinese version was examined to see whether the text was understood and considered valid by a nursing specialist in the original language, and whether it included items that were common and suitable for use across cultures.<sup>27</sup> Back translation is very common, and highly recommended for verifying the translation of an instrument.<sup>28</sup>

The initial forward translation and backward translation for the English version were performed by the language center of the Chinese Second Military Medical University. First, the instrument

was translated from English to Chinese. Then, the Chinese version of the scale was translated back from Chinese to English. A native English-speaking person compared the original and backward translated English versions of the instrument, and changes to the item descriptions and criteria were made. A Chinese language expert checked the grammar and structure of the items. Finally, a group of Chinese nurses evaluated whether the items were relevant to the Chinese health care system.

### 2.2. Participants and settings

CDS data were obtained from a sample of 184 older adults from one nursing home in Shanghai. In July 2013, the final sample consisted of 103 women and 81 men. The patients involved in the study were aged 60 years and over, and their mean age was 81. Most of them suffered from a chronic illness (e.g., cancer, chronic kidney disease, stroke, diabetes, dementia, or skeletal and circulatory system diseases).

### 2.3. Procedures

The nurses most involved in the daily care of the patients rated their CDS status. All raters ( $n = 15$ ) were trained to administer CDS, and the aim of the study was explained. Because the nurses were to assess the scores independently, the principles of the assessment and instructions for the use of the CDS were elaborately stated.

### 2.4. Ethical considerations

The study was conducted with the cooperation of the nurses and their head nurses in the nursing home. The Bio-Ethical Committee at Changhai Hospital of Shanghai gave us permission to do this research in 2013. The patients were verbally informed about the purpose of the study. They were told that a questionnaire about their dependency status would be completed by the nurse most involved in their daily care and that this investigation was voluntary. Those who agreed to participate in the investigation and returned the informed consent were included in the final sample.

### 2.5. Reliability

Reliability is the degree of consistency or dependability with which an instrument is analyzed.<sup>29</sup> In this study, an item analysis (mean and SD) and Cronbach's alpha were used to assess the internal consistency of the Chinese version of the CDS.<sup>30,31</sup>

Repeated measurements involving the same raters and patients in identical circumstances were performed to determine the reliability of the measurement. The measurements were repeated in two different ways: first, inter-rater reliability (IRR) was determined by two raters. Two raters independently completed the questionnaire for the same patient at the same time (T1) for a total sample of 184; second, one of the raters completed the CDS for the same patient twice, with a 2-week time interval (T2), which includes only 128 patients due to loss from nursing home discharges or deaths. This method was based on two assumptions: that the health of the patient had not changed dramatically within the time period and that no learning effects had occurred in the observer in the period between the first and second measurement.<sup>29</sup> Cohen's Kappa was used to calculate inter-rater reliability and test-retest reliability (TRR),<sup>32</sup> as described by Landis and Koch. The verbal descriptions for the different ranges of the Kappa statistics are slight (<0.20), fair (0.21–0.40), moderate (0.41–0.60), substantial (0.61–0.80) and almost perfect (>0.80).<sup>33</sup>

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