Validity and Reliability Resource Utilization
in Dementia 3.2 Thai for Assessing Cost of Dementia Care

Nalinee N. Chuakhamfoo[a*], Supasit Pannarunothai[b]

Pudtan Phantunane[c], Anders Wimo[d,e], Linus Jönsson[d,e] and Sirintorn Chansirikan[f]

[a]Department of Community Medicine, Faculty of Medicine, Naresuan University, Phitsanulok 65000, Thailand

[b]Centre for Health Equity Monitoring Foundation, Phitsanulok 65000, Thailand

[c]Department of Economics, Faculty of Business, Economics and Communications, Naresuan University, Phitsanulok 65000, Thailand

[d]Aging Research Centre, Department of Neurobiology, Care Sciences and Society (NVS), Karolinska Institute, Stockholm, Sweden

[e]Division of Neurogeriatrics, Department of Neurobiology, Care Sciences and Society (NVS)

Karolinska Institute, Huddinge, Stockholm, Sweden

[f]Department of Medicine, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand

[*]Corresponding author. E-Mail address: nalinee.research@gmail.com

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Abstract

Background

Assessing the cost of dementia is a complex process, but no assessment instrument in Thai has existed. Cost estimates are needed in Thailand, especially for family caregivers. The objective was to translate the widely used tool Resource Utilization in Dementia 3.2 (RUD) into Thai and to evaluate the validity and reliability. The RUD 3.2 was first translated from English into Thai, and the back-translation was then carried out for purposes of linguistic and technical accuracy. The completed Thai RUD 3.2 was tested for intra-rater reliability among 30 dementia caregivers in the Lamsonthi District, Lopburi Province. Reliability was analyzed by means of the Kappa coefficient and intra-class correlation coefficient (ICC). It was found that the lengthy, the methodical process of translating and the back-translation resulted in an approval of validity. Intra-rater testing on reliability showed varied results: such as caregiver's characteristics (kappa 0.55, 1.00); caregiver time (kappa 0.76, 0.96); caregiver work status (kappa 0.00, 1.00); caregiver health care resource utilization (kappa 0.94, 1.00); patient living accommodation (kappa 1.00); and patient health care resource utilization (kappa 0.52, 1.00). Here, the RUD 3.2 Thai version was utilized to conduct a thorough examination of the validity of the contents and its reliability. The RUD 3.2 Thai was accordingly suggested as a reasonable instrument for the assessment of caregiving time and resource utilization among Thai dementia caregivers.

Keywords: Resource Utilization in Dementia, Dementia, Thai, Reliability, Back-Translation, Assessing Cost

Introduction

Caring for dementia has become a significant concern for health care providers all over the world. As it often develops into full-time care for dementia patients, the time committed is really considerable; it has thus a critical impact on informal caregivers. Illustrating such a heavy and wrecking burden on such an incurable disorder can be found in a new case every 3 seconds. The costs of it on a global basis is a trillion US dollars per annually (Patterson, 2018).

An effective way to minimize the harmful effects of dementia care is to assess the service time from the caregivers as these data can greatly assist the policymakers to make proper decisions on the coverage, costs, and supervisions for both the patients and the caregivers (Prince, Comas-Herrera, Knapp, Guerchet, & Karagiannidou, 2016). The Resource Utilisation in Dementia (RUD) was first developed in 1998 by Wimo, Jönsson, Karlsson, & Winblad (1998). Its main intention was to determine the caregivers' time spent on dementia care and widely used for resource use data collection. The RUD was also a main tool used to tabulate costs for dementia care in many countries.

Gradually, the RUD is used to assess the informal care time for dementia patients. The RUD is also tested for validity and reliability and it has been discovered to be an excellent assessment of the informal dementia care time in communal-style living (Wimo et al., 2013; Wimo, Jonsson, & Zbrozek, 2010). This very effective and useful instrument has already been translated into 31 languages in 57 countries and has proved to be effective in comparing and determining the costs of dementia care in all these countries (Wimo & Prince, 2010).

However, the status quo in Thailand is there is no accepted or national yardstick of measurement on the translated standard time and resources used in the assessment of dementia care instrument. As such, the number of more than 200,000 dementia patients diagnosed in 2005 is projected to "grow" five times to 1 million on 2050 (Access Economics Pty Limited, 2006). As researchers attempt to establish a policy and services framework to improve efficiency in care delivery, information of the service time provided is the main focal point. This study presents the translation process from the English language to the Thai language, as well as the process of overcoming the discrepancies and determining the reliability of the Thai version of the RUD 3.2.

Materials and Methods

With permission from copyright holders, the researchers (NNC) set out to develop the "RUD 3.2 Thai" by employing the back-translation process (Kobayashi et al., 1998) to avoid the misunderstanding of the meaning or wording in each item due to cultural bias. Key personnel included 3 experts (Thai persons) as 2 translators and 1 terminologist. The 2 bilinguals translated the original RUD 3.2 from English to the Thai version with 1 terminologist. Also, 2 Americans linguistics Major graduates working as English teachers in Thai high school, were the persons who compared the translated English version (target version) with the original English version (source version). In case of disagreement of the source and target versions, the experts corrected the Thai version until it was congruent with the original meaning.

To begin with, two Thai translators independently translated the original English version of RUD 3.2 into Thai. The 2 versions of the translated Thai instrument were merged into 1 document by the terminologist. Then, the first translator translated the merged Thai document back into English. Some discrepancies were found when the original English RUD 3.2 was compared with the back-translated English documents by English-speaking personnel. The revised process involved a terminologist and 2 Thai translators; the result of this process was a second Thai document and the second back-translated English document. The English-speaking personnel compared the second back-translated English document with the original English RUD 3.2 and approved that all individual items in both documents had good congruence. The second Thai document was finally proofread until free of errors and was called "The RUD 3.2 Thai" as shown in Table 1. This RUD 3.2 Thai was used for reliability testing.

Table 1 Steps of Back-Translation for RUD 3.2 Thai

Step	Action	Brief Description
1	Forward translation	Original English of RUD 3.2 was translated into Thai (from source language to target language).
2	Reconciliation	Comparing and merging 2 versions of target language documents into the 1st target language document
3	Back-translation	Translating the 1st target language document back to the source language, the new source language document was called the back-translated document.

Table 1   (Cont.)

Step	Action	Brief Description
4	Back translation review	Comparing the source language with the back translation document, focusing on discrepancies
5	Harmonization	Revising the items in the 1st target language document with discrepancies to achieve the coherence with the meaning and understanding of the items in the source language – The result of this process was the 2nd target language document.
6	Proofreading	Reviewing the 2nd target document's typography, grammars, and other errors – The 2nd target document is the RUD 3.2 Thai

The reliability testing was compiled through the intra-rater (test-retest) method. The instrument testing of RUD 3.2 Thai will be used in the setting of home care for dementia in Lamsonthi district, Lopburi province of Thailand with Thai-speaking primary caregivers. The participants for the reliability testing were 30 dementia caregivers selected from 30 dementia households These 30 caregivers performed the test-retest reliability trials of RUD 3.2 Thai tool. The second trial was done 30 days after the first trial.

After gathering the data between June and August 2017. The RUD 3.2 Thai's reliability was analyzed in seven modules: caregiver's characteristics, caregiver time, caregiver work status, caregiver health care resource utilization, patient living accommodation, and patient health care resource utilization. The data analysis was performed using STATA 12. The Kappa coefficients were computed for the discrete data; the intra-class correlation coefficient (ICC) was computed for the continuous scale intra-rater testing reliability. For the reliability between the items in the scale, the Cronbach's alpha was analyzed. The detailed analyses were shown in Table 2

Table 2   Type of Data and Reliability Test

Module (Item)	Data Characteristics	Intra-Rater or Test-Retest
Caregiver's characteristics (Q1)	Continuous data	ICC (3,1)*
Caregiver's characteristics (Q2-Q7)	Discrete data	Kappa
Caregiver time (Q8-Q11, Q13)	Continuous data	ICC (3,1)*
Caregiver time (Q12, Q14)	Discrete data	Kappa
Caregiver work status (Q15-Q21)	Discrete data	Kappa
Caregiver health care resource utilization (Q22-Q25)	Discrete data	Kappa
Caregiver health care resource utilization (Q26)	Continuous data	ICC (3,1)*
Patient living accommodation (Q27-Q29)	Discrete data	Kappa
Patient health care resource utilization (Q30-Q33)	Discrete data	Kappa
Patient health care resource utilization (Q34)	Continuous data	ICC (3,1)*
All	Internal consistency	Cronbach's alpha

Note * ICC (3,1) was two-way mixed effects, consistency, single rater/measurement

Results

The Original English of RUD 3.2 had 85 parts including the titles and items. All parts were translated into Thai by two independent translators. The two translated Thai language instruments had 43 items that had different wordings. The terminologist and two independent translators merged two translated documents into 1 document through the reconciliation meeting. Then, another independent translator translated the merged Thai document back to the English version called the back-translated English document. The English-speaking personnel compared the

original English RUD 3.2 with the back-translated English document, and found 30 incongruence with the original version. Terminologist and three Thai translators revised the second Thai document. The English-speaking personnel reviewed the second Back-translated English document and the original English RUD 3.2 and found all items of both documents were congruent, hence the second Thai document was acceptable. The terminologist and translators had found six discrepancies between the second Thai document and the original RUD 3.2. The terminologist and the two translators checked the interpretation with the source language and approved six amendments of the second target document. An example of the amendment was that sibling in Thai might interchangeably be addressed as a cousin in the in overall speaking context (sibling (พี่-น้อง (Phǐ-Nxng)) versus cousin (ญาติพี่น้อง (Yāti- Phǐ-Nxng)). The terminologist reconfirmed that sibling was not cousin in the common use. For the proofreading, the two translators reviewed the second target document's typography, grammars, and other errors and the terminologist finally approved it. The result of the second target document was the RUD 3.2 Thai (see Figure 1).

The characteristics of 30 participating dementia caregivers were presented in Table 3.

The RUD instrument comprised six modules. The overall internal consistency by the Cronbach's alpha gave the scale reliability coefficient of 0.78. The test-retest agreements of each question were presented in Table 4. The perfect and almost perfect level of reliability, the value was range from 0.81 to 1.00 (Landis & Koch, 1977), was found in 29 items (or 85 percent of all items in the instrument), the moderate level of reliability was 4 items, and it found no result for the reliability test as the data from the caregivers responses was not enough to analyzed in question number 20. For the first module on caregiver's characteristics had the reliability value as 1.00 for the first five questions, the first question asking about the age of the caregivers, the result of ICC (3,1) of this question shown as 1.00 and the other following four questions had kappa coefficients value as 1.00. The Kappa coefficients in question 6 and 7 was 0.55 and 0.57 respectively. Focusing on the caregiver time's module, the ICC ranged from 0.85 to 0.96. For the caregiver work status's module, the Kappa coefficients ranged from 0.48 to 1.00. It found no result for the reliability test in question number 20 as mentioned earlier. When considering the module of caregiver health care resource utilization, the Kappa coefficients in questions 22 to 25 ranged from 0.98 to 1.00 and the ICC in question 26 gave value as 1.00. The reliability of patient living accommodation by the Kappa ranged from 0.94 to 1.00. The patient health care resource utilization, Kappa coefficients in question 30 to 32 was 1.00, and in question 33 was 0.52. The ICC value in question 34 was 0.98.
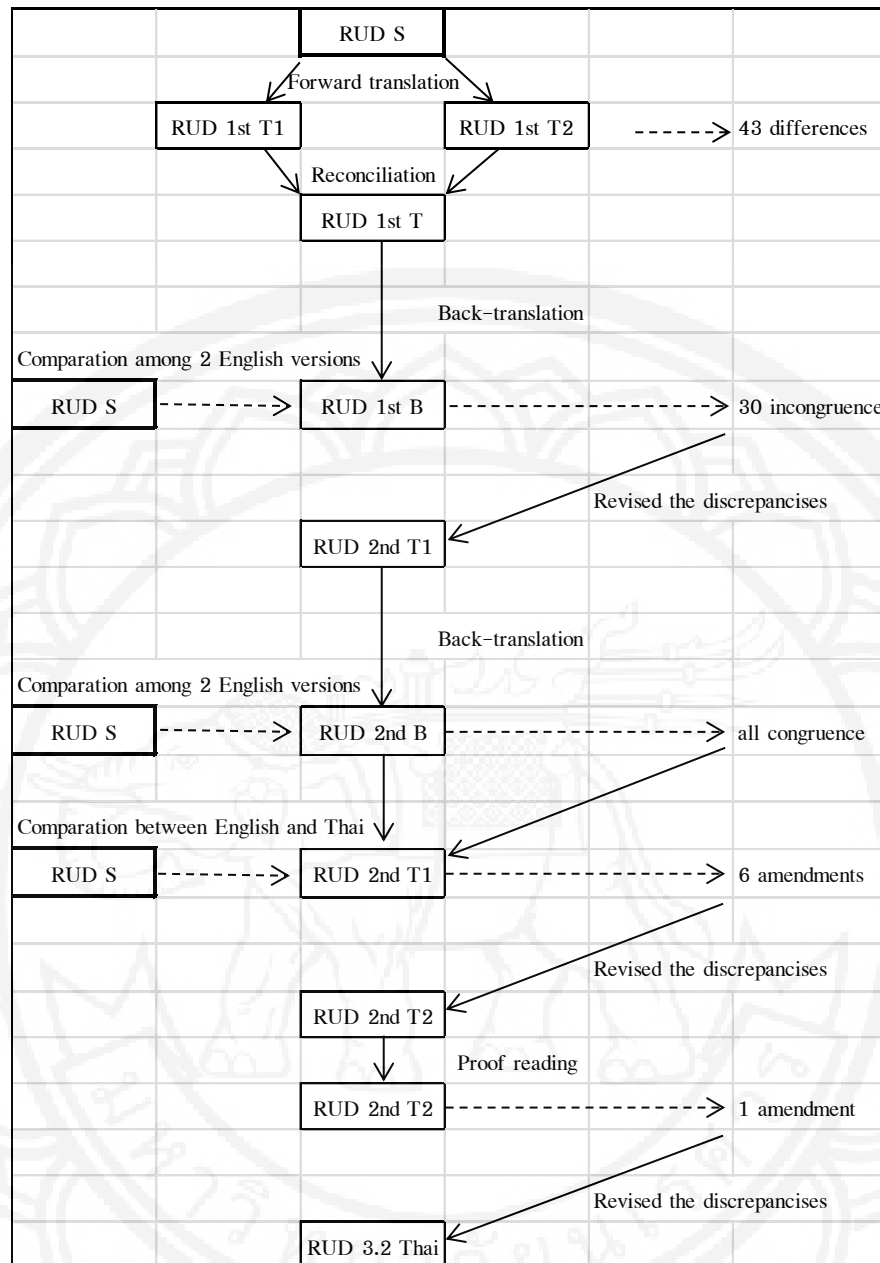
```
                              ┌─────────┐
                              │  RUD S  │
                              └─────────┘
                            Forward translation
              ┌──────────────┐              ┌──────────────┐
              │ RUD 1st T1   │              │ RUD 1st T2   │ - - - - - -> 43 differences
              └──────────────┘              └──────────────┘
                            Reconciliation
                              ┌───────────┐
                              │ RUD 1st T │
                              └───────────┘

                             Back-translation

Comparation among 2 English versions
┌─────────┐                   ┌───────────┐
│  RUD S  │ - - - - - - ->    │ RUD 1st B │ - - - - - - - - - - - - -> 30 incongruence
└─────────┘                   └───────────┘
                                                  Revised the discrepancises
                              ┌────────────┐
                              │ RUD 2nd T1 │
                              └────────────┘

                             Back-translation

Comparation among 2 English versions
┌─────────┐                   ┌───────────┐
│  RUD S  │ - - - - - - ->    │ RUD 2nd B │ - - - - - - - - - - - - -> all congruence
└─────────┘                   └───────────┘

Comparation between English and Thai
┌─────────┐                   ┌────────────┐
│  RUD S  │ - - - - - - ->    │ RUD 2nd T1 │ - - - - - - - - - - - - -> 6 amendments
└─────────┘                   └────────────┘
                                                  Revised the discrepancises
                              ┌────────────┐
                              │ RUD 2nd T2 │
                              └────────────┘
                                       Proof reading
                              ┌────────────┐
                              │ RUD 2nd T2 │ - - - - - - - - - - - -> 1 amendment
                              └────────────┘
                                                  Revised the discrepancises
                              ┌──────────────┐
                              │ RUD 3.2 Thai │
                              └──────────────┘
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Figure 1 Diagram of the Thai RUD 3.2 Linguistic Validation

Table 3 Characteristics of Participants (n = 30)

Characteristics	
Gender	
Female *n* (%)	26 (86.7)
Male *n* (%)	4 (13.3)
Age	
Mean	48.1
SD	12.2
95%CI	43.6 – 56.6
Relationship to Patient	
Child *n* (%)	17 (56.7)
Spouse *n* (%)	8 (26.7)
Others *n* (%)	5 (16.7)
Caregivers living with the patient *n* (%)	23 (76.7)
Caregivers not living with the patient *n* (%)	7 (23.3)
Number of Caregivers who Took Care of the Patient	
Mean (SD)	0.1 (0.8)
Min–Max	0 – 3
The Level of Care Contribution	
41–60% of the care *n* (%)	5 (16.7)
61–80% of the care *n* (%)	6 (20.0)
81–100% of the care *n* (%)	19 (63.3)

Table 4 Intra-Rater Reliability of Each Item

Module and Question		Kappa	ICC	p-value
Caregiver's Characteristics				
Q1	Age		1.00	0.00*
Q2	Sex	1.00		0.00*
Q3	Relationship to patient	1.00		0.00*
Q4	Number of children currently living with caregiver	1.00		0.00*
Q5	Living with the patient	1.00		0.00*
Q6	Number of caregivers involved	.55		0.00*
Q7	Level of care contribution?	.57		0.00*
Caregiver Time				
Q8	Sleep time per day and night		.95	0.00*
Q9	Time per day assisting the patient in toilet visits, eating, dressing, grooming, walking and bathing		.94	0.00*
Q10	Days providing the above services (according to Q9) to the patient		.90	0.00*
Q11	Time per day assisting the patient in shopping, food preparation, housekeeping, laundry, transportation, taking medication and managing financial matters		.96	0.00*
Q12	Days providing the above services (according to Q11) to the patient		.97	
Q13	Time per day assisting the patient in supervising		.85	0.00*
Q14	Days providing these services (according to Q13) to the patient?		.91	0.00*

Table 4 (Cont.)

Module and Question	Kappa	ICC	p-value
Caregiver Work Status			
Q15 Work for pay	.93		0.00*
Q16 Stop or reduce working	.88		0.00*
Q17 Hours work in total for pay per week	.96		0.00*
Q18 Hours per week paid due to care for the patient	1.00		0.00*
Q19 Hours of work cut down because of caregiver responsibilities	.48		0.01*
Q20 Number of times missed a whole day of work because of caregiver responsibilities	N/A***		N/A***
Q21 Number of times missed part of a day of work because of caregiver responsibilities	1.00		0.00*
Caregiver Health Care Resource Utilization			
Q22 Number of times admitted to a hospital	1.00		0.00*
Q23 Total number of nights admitted to hospital	1.00		0.00*
Q24 Number of times received care in a hospital emergency room	1.00		0.00*
Q25 Number of times visited a doctor, physiotherapist, psychologist or other health care professional	.98		0.00*
Q26 Number of drug uses by caregivers		1.00	0.00*
Patient Living Accommodation			
Q27 Patient's current living accommodation	.94		0.00*
Q28 Who does the patient live with?	1.00		0.00*
Q29 Number of nights spent in temporary living accommodation	1.00		0.00*
Patient Health Care Resource Utilization			
Q30 Number of times the patient admitted to a hospital	1.00		0.00*
Q31 Total number of nights admitted to hospital	1.00		0.00*
Q32 Number of times the patient received care in a hospital emergency room	1.00		0.00*
Q33 Number of times the patient visited a doctor, physiotherapist, psychologist or other health care professional	.52		0.00*
Q34 Average number of hours per visit by a doctor, physiotherapist, psychologist or other health care professional	.98		0.00*

Note: * sig < 0.05

** ICC was two-way mixed effects, consistency, single rater/measurement

*** not enough information to calculate kappa coefficient for caregiver work status (Q20)

Discussion

The dominant language in Thailand is the "central" Thai language (Alexander & McCargo, 2014), most Thai people speak Thai (Juelsgaard, 2013). Even university graduates, who had studied English for a minimum of 15 years, are still confused about the use of English (Hayes, 2016). Thus, the original English RUD 3.2 may not be the preferred language. Moreover, language barriers might affect the real validity and reliability of the instrument (Fitzpatrick, Davey, Buxton, & Jones, 1998). In order to figure out and compare the cost of dementia care of diverse populations, the English RUD 3.2 must be translated into Thai as Thai language is the most commonly used language in Thailand. The process for translating the source language into the target language was standardized, direct translation alone may trigger misunderstanding because of the cultural bias (Toury, 2000), the back translation was consequently employed.

In the present reliability study, the caregivers participated in this study were the caregivers who had been taking care of dementia patients in the patient's household. The participants who have four years of elementary education well understood and responded to the instrument without asking for more explanations, confirmed the easy use of RUD instrument as has been widely translated and used in many countries (Bökberg, Ahlström, & Karlsson, 2018; Bremer et al., 2017; Hurd, Martorell, Delavande, Mullen, & Langa, 2013; Jones et al., 2015; Prince et al., 2016; Seong, Kim, Kim, Kim, & Kim, 2017).

The people in each region of Thailand have their own distinctive accent or vernacular. However, this study just began with the area located in the central part of Thailand and the participants familiar with the central Thai language. Further studies for the instrumental development might attempt to recruit participants from the other parts of the country to increase sensitivity to the cultural bias of the vernacular or the homophone for each area of Thailand.

For the intra-rater or test-retest reliability, most of the items had found the perfect or almost perfect level of reliability because the situations of both caregivers and patients had not changed or not much had changed such as characteristics of the caregivers or need of dementia patients. There was an item related to caregiver work status which had not enough data to calculate the significant value of reliability testing. The item in question was about the day the dementia caregiver was absent for working to take care of the patient as the whole work day missing because there were a few caregivers responded to this question. The caregivers concerned said it was purely accidental and it hardly to take place again. As such this incident had not enough data for testing the reliability of this situation among 2 times of testing.

This present study developed RUD 3.2 Thai for academical purpose. However, the up-to-date RUD 4.0 has been developed to be a more accurate tool and more complex such as collecting data from more than one caregiver (Wimo et al., 2013). Further study should investigate on the up-to-date version.

Conclusions

The process of linguistic validation through the back translation method was a series of useful steps in a clear and precise execution of the original RUD in Thailand. All of the items in the RUD 3.2 Thai had been confirmed by key personnel in the process that it was precisely developed based on the meaning of the original English RUD 3.2.

Acknowledgments

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