

Reliability and internal consistency of Thai activity card sort for stroke survivors in Occupational Therapy Units

Peeradech Thichanpiang¹ Anuchart Kaunnil¹ Veerawat Sansri¹ Surachart Thongchoomsin¹
Kannika Permpoonputtana^{2*}

¹Division of Occupational Therapy, Faculty of Physical Therapy, Mahidol University, Thailand.

²National Institute for Child and Family Development, Mahidol University, Thailand.

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ABSTRACT

Background: In Thailand, it is estimated that there are 250,000 new cases of stroke each year. About 50,000 patients lose their lives and around 30% of patients become paralyzed. Occupational Therapy (OT) has a key role in rehabilitation for stroke. In particular, it enables survivors to reengage in their occupations. The Activity Card Sort (ACS) is a useful tool for assisting clients to select therapeutic activities and occupations that are relevant to their needs and contexts.

Objectives: This study aims to create, test of reliability and internal consistency of Thai-ACS for stroke survivors in occupational therapy units.

Materials and methods: The development of the Thai-ACS for stroke rehabilitation was based on a survey of stroke survivors and occupational therapists (OTs) from OT clinics in 6 regions of Thailand. Cluster analyses were used to identify group and patterns of activities.

Results: The survey was completed by 120 clients and 60 OTs who then engaged with ACS in therapy. Thai-ACS was comprised of 100 activity items obtained from OTs and stroke survivors' input. Three clusters emerged for domain areas, consisting of Basic rehabilitation skills and ADL (18 items); IADL, household and education (60 items); and Leisure and socio-cultural participation (22 items). All activities were created by the need of stroke survivors and related to their occupations. This final Thai-ACS also showed a Cronbach alpha coefficient of 0.832, which reflected high reliability and inter-correlations among test activity items.

Conclusion: Thai-ACS for stroke clients is a comprehensive instrument to engage collaboratively with stroke survivors in activities based on their cultural lifestyle. It will facilitate rigorous clinical and population-based research and will direct appropriate therapeutic engagement relevant to the client's needs and contexts.

Introduction

A stroke is a brain injury that results from bleeding or a blockage in the brain. It is a leading cause of death and disability in older adults. Long-term health conditions create

ongoing needs for the individual and has implications for rehabilitation that is needed after a stroke. The onset of disability after stroke can severely affect participation in meaningful occupations and life satisfaction.¹ In Thailand, there are more than 250,000 new stroke cases each year. Consequently, stroke survivors create burdens on patients and their families.²

The American Occupational Therapy Association defines the main focus of occupational therapy (OT) as "Achieving health, well-being, and participation in life through engagement in occupation".³ Throughout OT processes, occupational therapists

* Corresponding author.

Author's Address: National Institute for Child and Family Development, Mahidol University, Thailand.

E-mail address: kannika.per@mahidol.ac.th

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are mainly concerned with the individual's ability to participate in different contexts. Therefore, the assessment or evaluation of participation in all areas of function can be a primary aspect for implementing intervention plans and can affect outcomes for clients receiving OT services, including stroke survivors with disabilities and their families in developing countries such as Thailand.

OTs considered the activities and occupations that the stroke survivors needed to participate. Participation is defined as "engagement in work, play, or activities of daily living that are the part of one's socio-cultural context and which are necessary to individual's well-being".⁴ The meaningful and purposeful activities also demonstrate a positive effect on stroke survivor's health and quality of life. The ACS is a useful tool of OT. The purpose of the assessment is to assist clients in select therapeutic activities that are relevant to their occupations.⁵⁻⁷ The ACS provides therapists with valuable information to plan meaningful, client-centered interventions. A key principle involves determining the activity domains in order to generate an area of performing activities while considering the appropriate frequency of participation. Previous ACS were developed by the use of questionnaires or primary sources and subsequently are collected from target participants based on cultural considerations of everyday activities.⁸⁻¹⁰ There are many different kinds of activities, such as engaging in instrumental activities, leisure activities, and social activities.⁷ These domains could be adopted to measure participation in occupation while providing different therapeutic media for stroke survivors specific to their needs.

This occupation-focused measure is one of the few standardized and psychometrical instruments available for use with older people. In Thailand, there is a dearth of standardized assessment tools that are culturally valid and can be used for clinical and research purposes with the Thailand population. The limited number of assessment tools has a major effect on evaluation, intervention planning and intervention among occupational therapists, and is a major professional concern. Therefore, the purpose of this study is to create, test of reliability and internal consistency of Thai-ACS for stroke rehabilitation in occupational therapy units based on the opinions of stroke survivors and OTs. Therefore, the recognition of the importance of cultural relevance to enhance the integrity of the tool guided the development of the Thai-ACS for stroke clients

Materials and methods

Development of Thai-ACS for stroke survivors in occupational therapy units occurred in three stages: item generation, item reduction by Delphi procedure, and item determination. Figure 1 shows the developmental process of Thai-ACS for Stroke survivors. Ethical approval was granted from the Mahidol University Institutional Review Board (COA No. MU-IRB 2010/278.0710) and Document No. 53050 from the Institutional Review Board/Independent Ethics Committee, Department of Medical Services, Ministry of Public Health, Thailand.

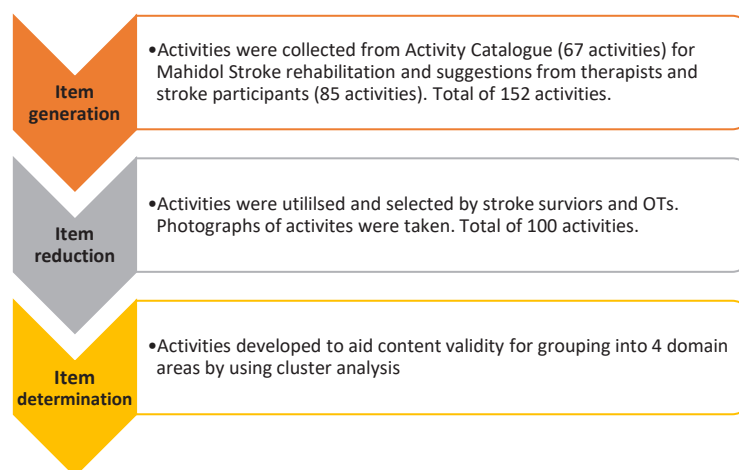


Figure 1. The developmental process of activity card sort (ACS).

Participants

One hundred and eighty participants were comprised of 60 occupational therapists who had experience in rehabilitation and 120 stroke survivors. OT practitioners were selected from each region (10 participants) across six different regions of Thailand (n=60) by purposeful sampling based on the following criteria 1) possessed occupational therapy national license; 2) worked full-time in public or private hospitals;

3) had more than two years' experience in occupational therapy for stroke rehabilitation; and 4) demonstrated good communication skills.

Stroke participants were also selected by purposive sampling from each region (20 participants) across six different regions of Thailand (n=120), which were eligible for inclusion in the study if they met the following criteria:

Thai citizens or residents and stroke survivors that can understand the study procedures. Individuals who had a severe vision or cognitive impairments which would impact their ability to sort photos were also excluded. Participants

were recruited using purposive sampling through personal and professional networks. Each participant was required to read and sign a written consent form before participating in the study. The demographic data are shown in Table 1.

Table 1 Demographic Data of stroke survivors and OTs.

Variable	
Out-patient department (OPD) stroke survivors	n = 120
	Mean (SD)
Age,	57.45 (14.74)
Gender	n (%)
Male	82 (68.33)
Female	38 (31.67)
Thailand region of residence	n (%)
Central	20 (16.67)
Eastern	20 (16.67)
Northern	20 (16.67)
North-Eastern	20 (16.67)
Southern	20 (16.67)
Western	20 (16.67)
Ethnicity	n (%)
Thai	120 (100)
Affected side	n (%)
Right side	34 (28.33)
Left side	84 (70)
Neither/Bilateral	2 (1.67)
Occupational therapists (OTs)	n = 60
Gender	n (%)
Male	14 (23.33)
Female	46 (76.67)
Years of experience	
≤2 years	3 (5.00)
3-5 years	8 (13.33)
6-10 years	14 (23.33)
10-15 years	18 (30.00)
16-20 years	9 (15.00)
>20 years	8 (13.33)
Region and Types of Hospital	
Central region (Medical Institute and University hospital)	36 (60.00)
Northern region (Provincial hospital)	5 (8.33)
North-east region (University hospital)	5 (8.33)
Eastern region (Regional hospital)	4 (6.67)
Western region (Regional Hospital)	5 (8.33)
Southern region (Regional hospital)	5 (8.33)

Procedure

Stage one – Item generation

This process included 3 sources of data to generate potential activity and occupation items for the measurement of participation. The activity and occupation items were drawn from the Activity Catalogue from Mahidol Stroke Rehabilitation, the suggestions of OTs who had experience in stroke rehabilitation and stroke participants.

Stage two – Item reduction

This process reduced the number of initial items. The most common activities and occupations of the occupational therapy session were chosen based on the suggestions from OTs and stroke survivors in six regions of Thailand. The various kinds of activities and occupations were chosen by stroke participants and formed the representative classification of activity participation. Activities and occupations were divided into four domain areas comprising of 1) Basic rehabilitation skills and ADL; 2) Instrumental activities of daily living (IADL) and household activities; 3) Socio-cultural/educational activities; and 4) Leisure activities.¹¹ This process was used to ask participants to rate 6 Likert scales in terms of importance (0=No accepted, 1=Very low, 2=Low, 3=Moderate, 4=High, and 5=Very high). The items were selected by stroke survivors using a mean score of 2.00 to be used as the cut-off point for inclusion.¹²

To increase generalization, the Delphi method was used by doing face-to-face therapeutic interventions/interactions, questionnaires, and interviews.¹³ The survey was designed not only to gain the perspective of therapists and stroke participants, but also to focus on the potential relationships between functional performance and activity items.

Stage three – Item determination

To establish the content validity of the Thai-ACS for stroke survivors in occupational therapy units, then activity and occupation items were entered into a hierarchical cluster analysis. The classification was identified as the fundamental basis for examining the domain area in Thai stroke rehabilitation.

Data Analysis

All data were entered into and managed via the Statistical Package for the Social Sciences, PASW software for Windows version 18 (SPSS Inc., Chicago, IL., USA). For reliability, Cronbach's alpha coefficient was used to analyze

internal consistency within each domain area. The final process was analyzed using a hierarchical cluster analysis¹⁴ which grouped different activities (Determination of Domains) representing the classification of activity and participation from both therapists and users.

Results

Item generation

For this stage, 152 activity and occupation items from the Activity Catalogue (67 activities) and suggestions of OTs who had experience in stroke rehabilitation and stroke survivors (85 activities) were used. Therefore, this phase collected multiple activity items based on experience, culture, lifestyle, and local materials and resources across six different regions throughout Thailand.

Item reduction

This process reduced the number of initial items. All activities were divided into four domain areas comprising of 1) Basic rehabilitation skills and ADL; 2) Instrumental activities of daily living (IADL) and household activities; 3) Socio-cultural/educational activities; and 4) Leisure activities. The most common activities of the stroke survivors in six regions were designed based on suggestions from many OTs and stroke survivors. To increase generalization, the Delphi method was used. The survey was designed not only to gain perspective of therapists and stroke survivors, but also to focus on potential relationships between functional performance and activity items. Item reduction was undertaken by the use of the activity catalogue and various new activity items from six regions of Thailand. There were in total of 152 activities that allowed a choice in choosing appropriate therapeutic media for stroke survivors. A total of OTs and stroke survivors were asked to rate the commonalities of each activity to be done during OT sessions. However, 100 activity items were selected by stroke survivors using a mean score of 2.00¹² to be used as the cut-off point for inclusion in the final Thai-ACS for stroke survivors as shown in Table 2. Based on the activity selected these were calculated and activities were ranked from most to least in terms of utilization. Using a mean score of <2.0 eliminated some, leaving 100 out of the 152 therapeutic items. These items were then chosen for potential inclusion in an ACS for Thai stroke survivors in occupational therapy units.

Table 2 Ranking, mean score and standard deviation in the level of activity approach for 100 of 125 activities, from most utilization to least utilization.

Activities by ranking numbers	Mean±SD	Activities by ranking numbers	Mean±SD	Activities by ranking numbers	Mean±SD
1. Button skill	4.00±0.00	35. Mouse and key board skills	3.63±0.49	69. Hand cycling exercise	3.10±0.30
2. Pressing toothpaste	4.00±0.00	36. Stapler skill	3.58±0.051	70. Flipping coins/ cards	3.09±0.29
3. Driving car or motor bike	4.00±0.00	37. Using scissors	3.58±0.57	71. Ball throwing at target with a bounce	3.07±0.26
4. Washing hands	4.00±0.00	38. Tearing paper	3.57±0.50	72. Golf skills	3.07±0.26
5. Weight bearing	4.00±0.00	39. Drawing skill	3.56±0.51	73. Incline board	3.06±0.42
6. Bathing with bucket and bowl	4.00±0.00	40. Drying clothes by clothes rack/ clothesline	3.55±0.52	74. Using spoon/fork to remove bead	3.04±0.58
7. Using remote control (TV)	4.00±0.00	41. Tennis ball pick and place	3.54±0.53	75. Trunk control/bilateral arm movement	3.03±0.16
8. Opening and closing the door	3.98±0.13	42. Folding fabric	3.54±0.51	76. Climbing board	3.02±0.14
9. Grooming	3.96±0.18	43. Lashing rope	3.52±0.51	77. Looping curve skill	3.02±0.22
10. Taking shower	3.96±0.20	44. Writing skill	3.52±0.54	78. Abacus skill	3.00±0.00
11. Dressing with top (shirt/blouse)	3.94±0.23	45. Basketry	3.50±0.57	79. Handle a ball for wrist exercise	3.00±0.00
12. Wearing a belt	3.93±0.25	46. Folding banana leaves to carry food	3.50±0.57	80. Bowling skill	3.00±0.00
13. Watering plants	3.93±0.26	47. Using a soup ladle	3.50±0.57	81. Kick ball	3.00±0.00
14. Wearing trousers	3.93±0.26	48. Washing cloth skill	3.50±0.51	82. Playing table tennis	3.00±0.00
15. Holding and drinking water from bottle	3.92±0.27	49. Pinching peas (grain, seed)	3.50±0.51	83. Dart	3.00±0.00
16. Zipper	3.92±0.28	50. Scrubbing and sweeping the house	3.43±0.50	84. Forceps pick and place with ping pong	3.00±0.00
17. Spray nozzle for butt wiping	3.91±0.30	51. Using pencil sharpener (device)	3.40±0.54	85. Bimanual putting pin in a bead	3.00±0.00
18. Pump action of lotion bottle (shampoo)	3.90±0.30	52. Going to temple/ church/ mosque	3.40±0.49	86. Key grip skill (turning)	3.00±0.00
19. Key skill (lock-unlock)	3.83±0.37	53. Phoning skill	3.39±0.49	87. Big peg board	3.00±0.21
20. Holding and rotating bottle (control object)	3.83±0.38	54. Thai Chess game	3.22±0.044	88. Bimanual holding of cone and place	2.98±0.13
21. Meal preparation and cooking meal	3.80±0.42	55. Calculation skill	3.22±0.041	89. Stacking cones or rod	2.98±0.14
22. Sorting stones and crystal marbles	3.75±0.46	56. Piano and keyboard (musical instrument)	3.20±0.63	90. Putty activities	2.98±0.27
23. Knife skill (under closely supervision)	3.75±0.50	57. Hammer/Axe skill (plastic)	3.20±0.44	91. Shape matching skill	2.98±0.15
24. Using cash machine	3.75±0.50	58. Gardening & growing plants	3.18±0.40	92. Pinch grip (pinching clothespin)	2.97±0.17
25. Opening/ closing a book	3.75±0.57	59. Pick and place ball in small cone	3.17±0.38	93. Throwing rings (quoits) at target	2.94±0.24
26. Stereognosis skill	3.73±0.46	60. Flowering arranging	3.17±0.40	94. Playing jigsaw puzzles	2.94±0.57
27. Reading the Tripitaka/ Koran/ Bible	3.71±0.48	61. Playing card	3.16±0.37	95. Picture mosaic skill	2.93±0.26
28. Scoop and pour liquid into bottle	3.71±0.45	62. Folding paper boat or Sarus crane bird	3.14±0.37	96. Small peg board	2.92±0.33
29. Wiping the table	3.71±0.52	63. Pronation & supination task	3.14±0.35	97. Constructing chain from plastic link	2.88±0.33
30. Sorting tiddlywinks with spoon	3.69±0.46	64. Plier skill	3.13±0.034	98. Placing beads on pins	2.86±0.35
31. Pinch off veggie	3.67±0.51	65. Bolt-screwing (into board)	3.12±0.41	99. Coins dropping into piggy bank	2.86±0.53
32. Picking and sorting small bead (rice, bean)	3.67±0.47	66. Fruit pole	3.11±0.32	100. Organising medicine	2.25±0.50
33. Lettering and enveloping skills	3.67±0.57	67. Sliding board	3.11±0.47		
34. Using chopstick	3.65±0.48	68. Throwing and receiving ball	3.11±0.31		

Item determination

The final Thai-ACS for stroke survivors in occupational therapy units after domain area determination using cluster analysis is described herein. When clustering therapeutic activities, cluster analysis categorized 100 activity items into three groups (clusters) by placing the same items in the same

cluster. Therefore, there are three domain areas of the final Thai-ACS which comprised of Basic rehabilitation skills and ADL (18 items); IADL, household and education (60 items); and Leisure and socio-cultural participation (22 items) as shown in Table 3.

Table 3 Final Activity Card Sort for Thai Stroke Rehabilitation after item determination.

Classification of Activities Into 3 Domain Areas (100 items)		
CLUSTER 1 Basic rehabilitation skills and ADL (18 items)	CLUSTER 2 IADL, household and education (60 items)	CLUSTER 3 Leisure and socio-cultural participation (22 items)
- Looping curve skill	- Abacus skills	- Using chopstick
- Key grip skill	- Reading the Tripitaka/Bible/ Koran	- Use of spoon and fork (bimanual) to remove bead from putty
- Pronation and supination task	- Lashing rope	- Writing skills
- Bimanual holding of cone and place	- Flower arranging	- Picking and sorting small bead (like cleaning rice, bean)
- Dressing with top (shirt/blouse)	- Kick ball	- Sorting tiddlywinks with spoon
- Peg board	- Bowling skills	- Calculation skill
- Stacking cones or rod	- Folding banana or coconut leaves to carry food	- Fruit pole
- Pick and place ball in small cone	- Basketry	- Washing cloth skill
- Tennis ball pick and place	- Watering plants	- Scrubbing and sweeping the house
- Trunk control/bilateral arm movement	- Using cash machine	- Phoning skill
- Sliding board	- Driving car or driving simulation	- Hammer/Axe skill (plastic)
- Pinch grip (Pinching)	- Spray nozzle for butt wiping	- Scoop and pour liquid into bottle
- Putty activity	- Bathing with bucket and bowl	- Opening and closing door
- Bimanual putting pin in a bead	- Using a soup ladle	- Pump action of lotion bottle
- Forceps pick and place with ping pong ball	- Using remote control	- Bolt-screwing (into board)
- Incline board	- Organising medicine	- Mouse and key board skill
- Constructing chain from plastic (small) link	- Knife skills	- Shape matching skills
- Placing beads on pins	- Pinch off veggie	- Picture mosaic skills
	- Pressing toothpaste	- Dart
	- Button skills	- Piano and musical instrument
	- Wearing a belt	- Throwing rings (quoits) at target
	- Stereognosis skills	- Ball throwing at target with a bounce
	- Handle a ball for wrist exercise	
	- Pinching peas	
	- Washing hand	
	- Pliers Skills	
	- Taking shower	
	- Grooming	
	- Zipper	
	- Wearing trousers	
	- Tearing paper	
	- Weight bearing	

Table 3 Final Activity Card Sort for Thai Stroke Rehabilitation after item determination. (continues)

Classification of Activities Into 3 Domain Areas (100 items)		
CLUSTER 1 Basic rehabilitation skills and ADL (18 items)	CLUSTER 2 IADL, household and education (60 items)	CLUSTER 3 Leisure and socio-cultural participation (22 items)
	<ul style="list-style-type: none"> - Holding and rotating the bottle - Climbing board - Hand cycling exercise - Big peg board - Flipping coin/ card - Drying clothes with clothesline - Lettering and enveloping skills - Meal preparation and cooking - Playing table tennis - Folding fabric - Using pencil sharpener - Coins dropping into piggy bank - Sorting stone and crystal marbles - Key skills - Using scissors - Opening/Closing a book - Stapler skills - Wiping the table - Holding and drinking water from bottle or cup - Folding paper boats - Thai chess game - Gardening and growing plants - Drawing skills - Golf skills - Playing jigsaw puzzles - Playing card - Throwing and receiving ball - Going to temple 	

Cronbach's alpha coefficient was used to analyze internal consistency within each domain area. Internal consistency statistics were alpha 0.866 for Basic rehabilitation skills and ADL; alpha 0.948 for IADL, household and education; and alpha 0.934 for Leisure and socio-cultural participation. When all activities for 3 domain areas were integrated as the final Thai-ACS. Moreover, this final Thai-ACS was scrutinized

by using Cronbach's Alpha for a coefficient of reliability after a psychometric test score that involved questioning participants. This final Thai-ACS presented a Cronbach alpha coefficient of 0.832, which indicated high reliability in practice,¹⁵ or a good level of internal consistency, thereby reflecting high reliability and inter-correlations among test activity items as shown in Table 4.

Table 4 The reliability of Activity Card Sort for Thai Stroke Rehabilitation.

Domain area	Cronbach's Alpha coefficient	Number of Item
Basic rehabilitation skills and ADL	0.866	18
IADL, household and education	0.948	60
Leisure and socio-cultural participation	0.934	22
Thai ACS for Stroke Clients	0.832	100

Discussion

The purpose of this study was to develop a version of Thai-ACS that may provide therapeutic activities and occupations for stroke survivors in occupational therapy units. A total of 100 items were included in the final Thai-ACS. Three categories were finalized for the tool; however, this was a difficult part of the tool development with the sorting of activities into the categories. The classification of activities was changed and modified by the cluster analysis from four to three domain areas (Basic rehabilitation and ADL; I-ADL, household and education; and Leisure and socio-cultural participation). According to Katz et al.¹⁶ there were 88 activity items placed in four domain areas (IADL; low-physical leisure activities; high-physical leisure activities, and social-cultural activities) of ACS for adult Israeli people. Packer et al.¹¹ surveyed elderly Australian people in Brisbane and Adelaide when creating their Australian version of the ACS. They also determined four domains (social, leisure, work, and household activities) before the data collection. During the data collection, there were more than one hundred activities in the phase of item generation, and then the outcome of ACS showed 82 pictorial activities which were arranged into three domains of household activities; social/educational activities; and leisure activities. In the ACS Japanese version, there are seventy-two activity items that were finally included and were classified into four domains as instrumental activities of daily living, low-demand leisure activities, high-demand leisure activities, and social/cultural activities.⁵

To be consistent with universal terms and standards, the activities of daily living (ADL) are normally divided into two positions: personal ADL (P-ADL), and instrumental ADL (I-ADL).¹⁷ However, another term generally used is self-care which represents the basic activities for caring for oneself in daily life.¹⁸ This study used ADL and I-ADL in the domains to clarify the characteristics and forms of activities accommodated by OTs and stroke participants in their selection and performance. As revealed in the findings, we provided the stroke survivors with opportunities for meaningful and purposeful therapeutic activities based on their own needs and lifestyles. Moreover, the development of the ACS opened a new arena in which to embrace novel relevant activities for stakeholders to practice in rehabilitation sessions and apply them elsewhere. Consistent with Wottrich et al.¹⁹ the rehabilitation team found that the key activities were unique to each client, such as shopping in a favorite deli store or convenient mall. These opportunities increased the wide range of activities meeting the patients' needs creatively linking them to trends in the

societal environment. New dimensions to tackle new problems were created which bridged gaps between the desired and achievable goals of individual patients.

In this research, the Thai-ACS provided various therapeutic media, where activities and occupations were classified into domains corresponding to functional performance and the needs of stroke survivors. According to Guidetti and Tham²⁰, if the aim of therapeutic intervention was unclearly managed by the occupational therapists, stroke survivors found that it was hard to understand the goals and directions of treatment. In the same way, Kielhofner²¹ argued that the therapeutic strategy must be coupled with a client's doing, feeling, perspective, and thoughts in ways which would influence the attainment of the desired goals. According to a systematic review of randomized trials, stroke survivors who received occupational therapy intervention focusing on the improvement of personal activities of daily living can improve skill performance and minimize the risk of deterioration in functional abilities than those who received usual care.²²

Nevertheless, the ACS does not indicate specific techniques, but instead indicates modalities to be used in specific situations for an individual's needs. The occupational therapist positions him/herself as a supporter or facilitator. The therapists' teaching should not implement specific intervention techniques without therapeutic activities being a key element in the initiation of, and support to stroke survivors who must find ways to perform activities. They will draw on their own past experiences in similar situations. Consistent with the previous work reported that therapists should be aware and recognize what techniques individual clients experience as the most useful and powerful. Then they can encourage the clients to perform that technique and use it in both specific and diverse situations.²³

Conclusion

The set of therapeutic occupations or activities in Thai-ACS suitable for Thai patients has been formulated. The history and evidence related to the importance of activities and frequency of participation related to various health conditions have been considered. The development of culturally appropriate ACS for stroke survivors in Thailand began with item generation; item reduction; and the item determination. The new Thai-ACS for stroke survivors contains three domain areas; Basic rehabilitation skills and ADL; IADL, household activities and education; and Leisure and socio-cultural participation. Hence, Thai-ACS is a comprehensive instrument used to collaboratively engage with stroke survivors and

their families when performing activities and facilitates the rehabilitation effectively based on local, regional, and cultural lifestyle considerations.

Limitations

These results should be considered within the context of the study's limitations. At the development phase, the stroke participants were predominantly drawn from purposive sampling which may limit to explore the activity participation and engagement in participants with various diversity, individuals experiencing health conditions, and a representative gender distribution. Additionally, the recovery stage or functional status of stroke participants should be considered during the development of ACS. For each region, the most of OTs were recruited from the same settings that may affect to activity selection. In clinical practice, the occupational therapy practitioner should consider the context and individualized stroke clients before providing activity and occupation-based intervention. Hence, a measurement tool with reliability and validity is necessary. Therefore, this Thai-ACS was only generalized at clinical based setting. Further research may also need to develop ACS that are suitable for home or community-based participation and engagement for stroke survivors and the qualitative studies from the OTs would be interpreted for the using of activity card sort in stroke rehabilitation.

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Conflict of interest

The authors state that there are no conflicts of interest.

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