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Original Article

Validity and Reliability of Thai Version of Questionnaire Measuring Self-efficacy for Appropriate Medication Use Scale among Thai with post-myocardial infarction

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Abstract

The purpose of this study was to translate the self-efficacy for appropriate medication use scale into Thai, and then examine the validity and reliability of this version of the questionnaire. Responses to the 13-item Thai version of the self-efficacy for appropriate medication use scale (SEAMS) were collected from 100 Thai with post-MI. None of the 13 items violated any assumption for factor analysis. Hypothetical exampling and factor analysis were performed. Factor analysis revealed three components for determining the self-efficacy for medication adherence: the patient's self-confidence (six items), complexity of medication (four items), and daily life change (three items). The instrument used showed acceptable validity and reliability. In conclusion, the SEAMS may be used in the clinic to measure self-efficacy for appropriate medication use scale among Thais with post-MI.

Keywords: instrument, medication self-efficacy, post myocardial infarction, Thai

1. Introduction

Poor medication adherence remains an important obstruction to achieving improved medication adherence in persons with myocardial infarction (MI) (Albert, 2008; Choudhry *et al.*, 2008; Polack *et al.*, 2008). After undergoing acute treatment, post-MI patients must adhere to specific medication regimens that play a crucial role in maintaining their health. Adherence to a post-MI medication regimen reduces cardiac events, morbidity, mortality, re-hospitalization and healthcare costs, and enhances well-being among patients (Choudhry *et al.*, 2008; Corrao *et al.*, 2010; Dragomir *et al.*, 2010; Jackevicius *et al.*, 2008; Perreault *et al.*, 2009; Timmins *et al.*, 2005).

Despite the fact that medication adherence is a positive treatment for persons with MI, prior studies have found that as few as 8% take their medication exactly as prescribed (Albert, 2008; Choudhry *et al.*, 2008; Jackevicius *et al.*, 2008; Polack *et al.*, 2008). The literature shows significantly low rates of medication adherence in persons with post-MI in the first three months after hospital discharge because clinical symptoms have improved (Butler *et al.*, 2002; Kramer *et al.*, 2006).

The literature shows self-efficacy is a significant predictor of medication adherence and the greatest single effect on medication regimen in coronary artery disease patients. (Chiou *et al.*, 2009; Kang *et al.*, 2010; Schoenthaler *et al.*, 2009). Self-efficacy is the key construct in social cogni-

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tive theory by Bandura (1997) and refers to an individual's belief in his or her ability to categorize and perform vital actions to achieve certain outcomes (Bandura, 1997; Armstrong, 2010). In terms of health, self-efficacy is conceptualized as an individual's confidence in his or her ability to change health behaviors to control and prevent the progression of disease. In this study, self-efficacy is defined as the confidence of Thai with post-MI in their ability to take their medications appropriately (Risser *et al.*, 2007).

The instruments to measure medication self-efficacy have been developed and few are broadly applicable across a range of chronic illness including limited testing and literacy skills (Risser *et al.*, 2007). The Self-Efficacy for Appropriate Medication Use Scale (SEAMS) was developed based on Bandura's social cognitive theory. This tool reviewed the medication and nursing literature to identify scales pertaining to medication self-efficacy. The instrument component items with simple wording that would be appropriate for use across various levels of patient literacy and a variety of chronic illness (Risser *et al.*, 2007).

This specific tool is needed for the assessment of self-efficacy for medication adherence. The assessment tool should be logical and easy to comprehend in order to aid participants when answering the questionnaire. To evaluate the self-efficacy for medication adherence in MI, a specific instrument is needed that has high validity and is reliable with an appropriate number of questions and format. To date, no such instrument has been developed to measure self-efficacy for medication adherence among Thai with post-MI. In particular, the SEAMS was previously developed and validated in Western populations. Thus, translation into Thai language was needed before it could be uses among the Thai populations. To assess whether this tool would be valid in a new population, the reliability and validity of a Thai version of the SEAMS were tested in Thai with post-MI.

2. Methods

2.1 Study sample

This study involved the test reliability and validity of an instrument for assessing medication adherence among Thai with post-MI. Simple random sampling was used to approach the participants, and the study took place at the cardiology outpatient department with permission from the Police General Hospital's ethics committee. One-hundred participants were included in the analysis, which is the minimum of subjects for suitable statistical power for factor analysis (Hair *et al.*, 2010). Subjects were recruited according to the following inclusion criteria: 1) recently discharged and undergoing follow-up in the first 3 months after hospital discharge from the cardiology clinics; 2) age $\geq$ 20 years; 3) understanding Thai language; 4) no cognitive impairment or disease complications; and 5) willingness to participate in the study. The purpose of the study, benefits, risks, and length of time needed to complete the interview were explained to all patients, each of whom signed a consent form. All information from the subjects was coded to ensure anonymity.

2.2 Instrument

In this study, self-efficacy is defined as the confidence of Thai with post-MI in their ability to take their medication appropriately. The SEAMS was developed based on Bandura's social cognitive theory. This instrument was developed by Risser *et al.* (2007) for lower-literacy patients with a chronic disease. A multidisciplinary team with expertise in medication adherence and health literacy developed this instrument and tested its validity and reliability in 436 patients with CAD and additional comorbidities. Patients were asked about how confident they were that they could take their medications accurately (unconfident = 1, fairly confident = 2, and extremely confident = 3). The lowest possible score of the 13-item questionnaire was 13, and the highest possible score was 39; the high score indicated that the participants were highly confident about taking medication. Internal consistency was tested with Cronbach's alpha (0.89), and the test-retest showed correlations ranging from 0.7 to 0.9. Validity was evaluated by factor analysis. A two-factor solution was found, explaining 52.3%. Criterion-related validity was strongly correlated with medication adherence as assessed by the Morisky scale (Spearman ρ=0.51, p=.0001). The instrument was used with chronic illness patients such as those with DM, HT and coronary artery disease (Risser *et al.*, 2007).

2.3 Translation process

1) This tool was translated from English into Thai by two instructors who have expertise in the English language at the Language Institute of Chulalongkorn University and an independent translator who is a nurse instructor with expertise in cardiovascular nursing who had studied abroad for more than 5 years. 2) The Thai version of the instruments was evaluated by two Thai/English bilingual people. 3) The questionnaire was translated back into English by two Thai-English independent translators who each had taught English to graduate students for more than 10 years and a nurse instructor with expertise in cardiovascular nursing who had studied abroad for more than 5 years. 4) Then, the investigators compared both versions in the original language, conducted checks with the translators and advisors, discussed the differences, and produced a final consensus version. 5) The final Thai version was tested for content validity by five experts, two cardiologists and three nursing instructors, to ensure that it was acceptable and that the meaning of each item was correctly reflected. Then, a pilot study was performed with Thai post MI for the finally of Thai version of the instrument.

2.4 Reliability and validity of study

1) Content validity

Content validity was determined by five experts: two cardiologists and three nursing instructors. The experts were asked to rate the level of relevancy between the items and the definition of the concepts as represented. A four-point Likert-type scale ranging from 4 (strongly relevant) to 1 (strongly irrelevant) was used to rate each item. The Content Validity Index (CVI) was calculated for SEAMS.

2) Reliability

The reliability of the SEAMS tool was tested. For internal consistency, a Cronbach's alpha coefficient > .70 was considered satisfactory. The homogeneity of the SEAMS was tested by item-total and inter-item correlation coefficients. An item-total correlation coefficient > .30 was considered acceptable. For inter-item correlations, coefficients between .30 and .70 were considered acceptable; a coefficient < .30 indicated that items were not present in the tool, whereas a coefficient >.70 indicated repetition (Hair *et al.*, 2010).

3) Construct validity

Principal component analysis (PCA) extraction and rotation by varimax method were applied for extracted factors. For extraction and conceptual consideration, the criteria determined factors extraction which was Eigen values > 1, a scree plot, and all of the cumulative percent of variance extracted. Factor loadings $\geq$ 0.4 were defined as sufficient to determine a factor (Hair *et al.*, 2010).

2.5 Data collection

After receiving permission to access the subjects, the investigator conducted the study at a cardiology clinic. The researcher presented the benefits/risks of the intervention and the protection of human rights in nontechnical terms, to obtain approval from the patients to participate in the study. If the patient met the inclusion criteria and agreed to participate, then he or she was asked to sign a consent form. The interview process took approximately 30-45 minutes to complete. Participants were then asked to complete the SEAMS questionnaire. During data collection, participants were able to refuse or leave without any consequence. Data collection took place from September, 2011, to January, 2012.

2.6 Data analysis

Statistical analysis was performed with the SPSS software package, version 11.5. The level of statistical significance was set at a *p*-value of 0.05. Descriptive statistics and factor analysis were obtained for the SEAMS.

3. Results

3.1 Characteristics of sample

The characteristics of the 100 Thai post-MI who met the inclusion criteria of the study are shown in Table 1. The participants were aged 30 to 83 years, male (77%), and married (84%). Twenty nine percent of participants had a Bachelor's degree education, followed by primary school (20%) and high school (17%). The participants had monthly of 15,001-20,000 Baht (54%). The Cardiac Canadian Society Class was used to categorize the symptom severity of participants. The participants had class I (81%), class II (12%), class IV (4%), and class III (3%) symptom severities.

3.2 Reliability and validity

1) The degree of relevance and content validity

The average degree of relevance for the questionnaire items used in this study was 90%, which indicates that the Thai version of SEAMS was an accurate reflection of the English version. The content validity index (CVI) was found to be 1.0, which indicates a good level of content validity for the Thai version.

2) Reliability

The Cronbach's alpha of SEAMS Thai version was .90. Item-total and inter-item correlation coefficients were

Table 1. Demographic and clinical characteristics of patients with post-MI (N =100).

Characteristics	Range (mean ± SD) or No. (%)
Age (mean ± SD)	30-83 (56 ± 10.83)
Sex	
Male	77 (77%)
Female	23 (23%)
Marital status	
Single	6 (6%)
Married	84 (84%)
Widowed	9 (9%)
Divorced	1 (1%)
Education level	
No education	4 (4%)
Primary school	20 (20%)
Secondary school	10 (10%)
High school	17 (17%)
Diploma	12 (12%)
Bachelor degree	29 (29%)
Master degree	8 (8%)

Note. SD= Standard deviation.

also tested (r =.54 to .73, r = .13 to .81, respectively), that was very good discrimination (> .3) (Hair *et al.*, 2010). The appropriateness of data for factor analysis was tested before principal component analysis was performed. The correlation coefficient was > .3. The sampling was adequate for factor analysis (Kaiser-Meyer-Oklin value = .67). Bartlett's Test of Sphericity indicated a sufficient correlation matrix among the variables ($\chi^2 = 273.016$, df = 78, $p = 0.00$).

Principal component analysis extraction method was used for extract factors. The SEAMS was orthogonally rotated by varimax rotation (see Table 2). Three factors explaining 72.53% of the total variance were identified. Communalities in each factor ranged from .59 to .88. Factors 1 to 3 explained 29.51%, 21.67%, and 21.35% of the variance, respectively (Table 2). Overall, the appearance of the factor structure was reasonable and explainable. Factor 1 had six items reflecting the patient's self-confidence. Factor 2 had four items that captured the complexity of the medication. Factor 3 explained the dimension of daily life change. This factor had three items with high factor loadings (> .60). Nevertheless, this factor explaining only 21.35% but it was a clear-cut indicator of variable and relatively good described (Table 3). Additionally, items 5-7 exerted a co-loading effect on factor 3.

4. Discussion

In the current study, reliability and validity of the SEAMS are acceptable to assess the self-efficacy for medication adherence among Thai with post-MI. The internal con-

Table 2. Total variance explained and communalities (N = 100).

Component	Initial Eigenvalues			Rotation Sum of Squares Loadings			Communalities
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
SE1	6.411	49.313	49.313	3.836	29.505	29.505	.628
SE2	1.873	14.411	63.724	2.817	21.667	51.173	.614
SE3	1.144	8.800	72.525	2.776	21.352	72.525	.661
SE4	.988	7.603	80.127				.601
SE5	.720	5.542	85.669				.774
SE6	.479	3.682	89.351				.781
SE7	.373	2.865	92.216				.716
SE8	.308	2.367	94.584				.620
SE9	.261	2.007	96.591				.857
SE10	.179	1.378	97.969				.879
SE11	.152	1.171	99.140				.748
SE12	.075	.575	99.715				.589
SE13	.037	.285	100.000				.730

Table 2. (Cont.)

Characteristics	Number (%)
Financial status (Bath)	
Non salary	18 (18%)
Less than 2,000	1 (1%)
2,001-5,000	3 (3%)
5,001-10,000	8 (8%)
10,001-15,000	7 (7%)
15,001- 20,000	54 (54%)
More than 20,000	9 (9%)
Cardiac Canadian Society Class	
Class 1	81(81%)
Class 2	12 (12%)
Class 3	3 (3%)
Class 4	4 (4%)

Note. SD= Standard deviation.

Table 3. Factor analysis with varimax rotation of the Self-efficacy for Appropriate Medication Use Scale (N = 100).

Items	Dimensions		
	1	2	3
1. When you take several different medicines each day.		.700	
2. When you take medicines more than once a day.	.810		
3. When you are away from home.			.670
4. When you have a busy day planned.			.878
5. When they cause some side effects.		.589	.517
6. When no one reminds you to take the medicine.	.599		.586
7. When the schedule to take the medicine is not convenient.	.622		.487
8. When your normal routine gets messed up.			.599
9. When you are not sure how to take the medicine.		.904	
10. When you are not sure what time of day to take your medicine.		.866	
11. When you are feeling sick (you know, like having a cold or the flu).	.741		
12. When you get a refill of your old medicines and some of the pills look different than usual.	.842		
13. When a doctor changes your medicines.	.850		

Note. Factor loading > .40 are in boldface.

sistency was satisfactory (Cronbach's alpha = .90), and the overall ranges of the item-total and inter-item correlation coefficients were appropriate (r =.54 to .73, r = .13 to .81, respectively), and is consistent with the original version. A factor analysis of the Thai version of the SEAMS revealed three components of the self-efficacy for medication adherence: the patient's self-confidence, complexity of medication, and daily life change. The Thai version was found to be inconsistent with the original version, which included two dimensions: taking medication under difficult circumstances and taking medication under uncertain or changing circumstances. Because of the great differences in culture and language between Thailand and western countries, it is important to reflect this in the items discussing a patient's self-confidence and daily life change from taking medication under difficult circumstances and taking medication under uncertain or changing circumstances. Some items showed co-loading effects between patient's self-confidence and the daily life change of Thai version such as when no one reminds to take medication or when the schedule to take medication is inconvenient. The all items in two domains of the Thai version were all items of the first domain of the original version, which was taking medication under difficult circumstances. However, all items reflected self–efficacy for taking medication, and the confidence of patients in their ability to take their medication appropriately. Furthermore, both the Thai and original version testing was based on Bandura's social cognitive theory. Thus, for Thai with post-MI, the Thai version of SEAMS was found to be a reliable and valid measure of self-efficacy.

Regarding the limitation of this study, all participants had been diagnosed with acute myocardial infarction and were being followed-up within the first 3 months after discharge, which is a specific group. As a result, the findings cannot be generalized to others such as those with heart failure, acute coronary syndrome, or cardiac surgery. Further studies are required to assess the use of SEAMS among other groups of patient with heart disease and in different regions of Thailand. A sample size of 300 is would give a higher power of the factor analysis (Brown and Onsman, 2010).

5. Conclusions

The reliability and validity of the Thai version of the SEAMS was appropriate for measuring self-efficacy for medication adherence among Thais with post-MI. Nevertheless, information about the reliability and validity of the instrument should be confirmed in larger populations. Although the components of factor analysis were different between the Thai and original version, the items of the Thai version of the SEAMS were the same as those in the original version and based on Bandura's social cognitive theory. This tool and the knowledge contained in this paper may be used by nurses and others to assess self-efficacy for medication adherence among Thais with post-MI.

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References

Albert, N. M. 2008. Improving medication adherence in chronic cardiovascular disease. Critical Care Nurse. 28, 54-64.

Armstrong, K. A. 2010. The relationship of personal characteristics, behavioral capability, environmental factors, and hypertension medication adherence in African American adults with metabolic syndrome. Unpublished Ph.D dissertation, school of nursing in the college of health and science, Georgia State University.

Bosworth, H. B., Oddone, E. Z., and Weinberger, M. 2006. Patient treatment adherence concept, intervention, and measurement. Lawrence Erlbaum Associates, New Jersey.

Boulet, L. 1998. Perception of the roe and potential side effects of inhaled corticosteroids among asthmatic patients. Chest. 113, 587-592.

Chiou, A-F., Wang, H-L., Chan, P., Ding Y-A., Hsu, K-L., and Kao, H-L. 2009. Factors associated with behavior modification for cardiovascular risk factor in patients with coronary artery disease in Northern Taiwan. Journal of Nursing Research. 17(3), 221- 229.

Choudhry, N. K., Patrick, A. R., Antman, E. M., Avorn, J., and Shrank, W. H. 2008. Cost-effectiveness of providing full drug coverage to increase medication adherence in post-myocardial infarction Medicare beneficiaries. Circulation. 117, 1261- 1268.

Corrao, G., Conti, V., Merlino, L., Catapano, A. L., and Mancia, G. 2010. Result of a retrospective database analysis of adherence to statins therapy and risk of nonfatal ischemic heart disease in daily clinical practice in Italy. Clinical Therapeutics. 32 (2), 300- 310.

Dragomir, A., Cote, R., White, M., Lalonde, L., Blais, L., and Berard, A. *et al.* 2010. Relationship between adherence level to statins, clinical issues, and health-care costs in real-life clinical setting. Value in Health. 13, 87- 94.

Gehi, A. K., Ali, S., Na, B., and Whooley, M. A. 2007. Self-report medication adherence and cardiovascular events in patients with stable coronary heart disease. Achieve International Medicine. 167(16), 1798- 1803.

Hair, J. F., Black, W. C., Babin, B. J., and Anderson, R. E. 2010. Multivariate data analysis (7th ed). Pearson Education, Inc. Upper Saddle River, New Jersy

Ho, P. M., Magid, D. J., Shetterly, S. M., Olson, K. L., Maddox, T. M., and Peterson, P. N. et al. 2008. Medication nonadherence is associated with a broad range of adverse outcomes in patients with coronary artery disease. American Heart Journal. 155, 772-779.

Jackevicius, C. A., Li, P., and Tu, J. V. 2008. Prevalence, predictors, and outcomes of primary nonadherence after acute myocardial infarction. Circulation. 117, 1028-1036.

Kang, Y., Yang, I., and Kim, N. 2010. Correlates of health behaviors in patients with coronary artery disease. Asain Nursig Research. 4, 45- 55.

Kusuma, KH. 2006. Adherence to self-care requirements model; an empirical test among patients with coronary artery disease. Unpublished Ph.D dissertation, Graduate Studies, Phylosophy (Nursing), Graduate Studies, Mahidol University.

Maddox, T. M., and Ho, P. M. 2009. Medication adherence and the patient with coronary artery disease: challenges for the practitioner. Current Opinion in Cardiology. 24, 468- 472.

Ngamvitroj, A., and Kang, D. 2007. Effect of self-efficacy, social support, and knowledge on adherence PEFR self-monitoring among adults with asthma: A prospective repeated measures study. International Journal of Nursing Studies. 44, 882-892.

Perreault, S., Dragomir, A., Roy, L., White, M., Blais, L., and Lalonde, L. et al. 2009. Adherence level of antihypertensive agents in coronary artery disease. British Journal of Clinical Pharmacology. 69, 74- 84.

Polack, J., Jorgenson, D., and Robertson, P. 2008. Evaluation of different methods of providing medication-related education to patients following myocardial infarction. Canadian pharmacology Journal. 141(4), 241-247.

Public Health Statistic. 2009. Health Information Division, Bureau of Health Policy and Plan. Number of deaths and death rates per 100,000 population by leading causes of death, 2009 [online]. Available at: http://epid.moph.go.th (November 7, 2011)

Risser, J., Jacobson, T. A., and Kripalani, S. 2007. Development and psychometric evaluation of the Self-efficacy for Appropriate Medication Use Scale (SEAMS) in Low-Literacy patients with chronic disease. Journal of Nursing Measurement. 15(3), 203- 219.

Schoenthaler, A., Ogedegbe, G., and Allegrante, J, P. 2009. Self-efficacy mediates the relationship between depressive symptoms and medication adherence among hypertensive African Americans. Health Education & Behavior. 36, 127-137.

Shah, N. D., Dunlay, S. M., Ting, H. H., Montori, V. M., Thomas, R. J., and Wagie, A. E. *et al.* 2009. Long-term medication adherence after myocardial infarction: experience of a community. The American Journal of Medicine. 122, 961.e7-961.e12.

Smith, D. H., Kramer, J. M., Perrin, N., Platt, R., Roblin, D. W., and Lane, *et al.* 2008. A randomized trial of direct-to-patient communication to enhance adherence to β-Blocker Therapy Following Myocardial Infarction. Achieve International Medicine. 168(5), 477- 483.

Timmin, F. 2005. A review of the information needs of patient with acute coronary syndromes. Nursing in Critical Care. 10(4), 174-181.

Van der Elst, M. E., Bouvy, M., Blaey, C. J., and de Boer, A. 2007. Effect of drug combinations on admission for recurrent myocardial infarction. Heart. 93, 1226-1230.

Vlasnik, J. J., Aliotta, S. L., and DeLor, B. 2005. Medication adherence: Factors inuencing compliance with prescribed medication plans. Traditional Chinese Medicine (TCM). 47-51.

Williams, B., Brown, T., & Onsman, A. 2010. Exploratory factor analysis: A five-step guide for Novices. Journal of Emergency Primary Health Care. 8(3), 1-12.

Willich, S. N., Muller-Nordhorn, J., Kulig, M., Binting, S., Gohlke, H., and Hahmann, H. *et al.* 2001. Cardiac risk factors, medication, and recureent clinical events after coronary artery disease. European Heart Journal. 22, 307- 313.

Wolf, M. S., Davis, T. C., Osborn, C. Y., Skripkauskas, S., Bennett, C. L., and Makoul, G. 2007. Literacy, self-efficacy, and HIV medication adherence. Patient Education and Counseling. 65, 253-260.

World Health Organization (WHO). 2003. Adherence to long term therapies: evidence for Action. [online] Available at: http:// www. WHO. Com / WHO Library Cataloguing in-Publication Data. (April 7, 2011)

World Health Organization (WHO). 2011. Global status report on noncommunicable diseases 2010: Burden: mortality, morbidity and risk factors. [online] Available at: http:// www. WHO. Com/ data and statistic. (April 7, 2011)

Wu, JR., Moser, D. K., Lennie, T. A., and Burkhart, P. V. 2008. Medication adherence in patients who have heart failure: a review of the literature. Clinics of North America. 43, 133- 153.

Wu, JR., Moser, D. K., Lennie, T. A., Peden, A. R., Chen, Yu-C., and Heo, S. 2008. Factors influencing medication adherence in patients with heart failure. Heart Lung. 37, 8- 16.

Zhao, D. (2000). Self- efficacy and compliance with medical regimen among hypertensive patients. Unpublished master's thesis, Nursing Science (Adult Nursing), Graduate Studies, Chiang Mai University.