Test-retest reliability of the Mandarin versions of the Hypertension Self-Care Profile instrument

Soh Heng Agnes Ngoh, MN, BHS(N)^{a,*}, Hazel Wai Ling Lim, MPH, BHS(N)^b, Yi Ling Eileen Koh, BSc^a, Ngia Chuan Tan, FCFPS, FAMS^{a,c}

Abstract

Self-efficacy in essential hypertension can be measured using scales, such as the “Hypertension Self-Care Profile” (HTN-SCP) questionnaire. It assesses “Behavior”, “Motivation”, and “Self-efficacy” in 3 domains, respectively. This study aimed to validate the Mandarin version of HTN-SCP instrument (HTN-SCP-Mn) targeted at patients of Chinese ethnicity with hypertension.

Our study recruited Chinese patients, aged 40 years and older, with essential hypertension from a public primary healthcare clinic in Singapore. The 60-item HTN-SCP-Mn questionnaire was completed online using a tablet or smartphone on enrolment. A retest was conducted 2 weeks after the initial test. Reliability was assessed by internal consistency and test-retest reliability using Cronbach alpha and intraclass correlation coefficients (ICC). Differences between the overall HTN-SCP-Mn scores of the patients and their self-reported self-management activities were also determined using independent *t* test.

Of the 153 patients who completed the HTN-SCP-Mn during the initial test, 79 responded to the test-retest evaluation. Reliability of the 3 domains “Behavior”, “Motivation”, and “Self-efficacy” obtained high internal consistency (Cronbach alpha = 0.838, 0.929, and 0.927, respectively). The item total correlation ranged from 0.058 to 0.677 for Behavior, 0.374 to 0.798 for Motivation, and 0.326 to 0.767 for self-efficacy. The ICC indicated fair to good test-retest reliability with scores of 0.643, 0.579, and 0.710 for the respective domains.

The results showed face validity of the HTN-SCP-Mn instrument, indicating its potential application in mandarin-proficient patients. Further study is needed to correlate its scores with objective demonstration of self-efficacy.

Abbreviations: HTN-SCP = Hypertension Self-Care Profile, HTN-SCP-Mn = Mandarin version of HTN-SCP instrument, ICC = intraclass correlation coefficients.

Keywords: hypertension, instrument, mandarin, self-care

1. Introduction

Hypertension is a significant modifiable risk factor for cardiovascular mortality and morbidity globally.^[1] Its prevalence is expected to increase significantly in economically developing and developed Asian countries in the next 2 decades, including China and other Asian nations. Lewington et al^[2] reported that one-third of Chinese adults in a national cohort population had hypertension, with lower control levels than in Western

population and were associated with significant excess mortality. A report from World Health Organization revealed that 266 million Chinese suffer from hypertension, affecting 24% of the population aged 15 years and above.^[1] Even for the small island nation of Singapore with its multiethnic Asian population comprising largely Han Chinese and minority Malay and Indian ethnic groups, 23.5% of them have hypertension.^[3]

Hypertension is a life-long disease, which is largely managed by the affected patients themselves. Aside from episodic consultations with healthcare professionals, patients with hypertension need to manage multiple aspects of their daily lives in order to control their blood pressure to mitigate their vascular complications. They include recommended measures such as salt and fat restriction in their diet, adherence to adequate, regular physical activities, medication regimens, and scheduled reviews by their physicians.^[4] A proportion of patients extend beyond these activities to include self-monitoring of their home blood pressures, weight, and physical exercises. What distinguishes this proactive subset of the population with hypertension may be related to their self-efficacy. Perceived self-efficacy is defined by Albert Bandura as one's belief in their abilities to organize and succeed in accomplishing an intended task.^[5] Such belief plays an important role in determining the approaches toward attaining one's goals, tasks, and overcoming the challenges. Self-efficacy has been shown to result in better chronic disease self-management.^[6,7] Patients with stronger self-efficacy beliefs are more likely to initiate and maintain recommended health behaviors.^[5] Williams et al^[8] had reported that lower levels of self-efficacy were associated with elevated blood pressure, which increased their cardiovascular risks of stroke and coronary heart diseases.

Editor: Massimo Tusconi.

The study concept was conceived by NCT. SHAN and HWLL coordinated with the Nursing students from Ngee Ann Polytechnic to conduct the test-retest segments of the study. YLEK analyzed the data. SHAN, YLEK, and NCT interpreted the results. SHAN and YLEK drafted the manuscript, collated feedbacks, and revised the manuscript, which was finalized by NCT before submission to journal.

The authors have no funding and conflicts of interest to disclose.

^a Department of Research, SingHealth Polyclinics, ^b School of Health Science, Ngee Ann Polytechnic, ^c Duke NUS Medical School, Singapore.

* Correspondence: Soh Heng Agnes Ngoh, SingHealth Polyclinics, C/o 167, Jalan Bukit Merah, Connection One, Tower 5, #15-10, 150167, Singapore. (e-mail: agnes.ngoh.s.h@singhealth.com.sg).

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Medicine (2017) 96:45(e8568)

Received: 12 March 2017 / Received in final form: 13 October 2017 / Accepted: 18 October 2017

<http://dx.doi.org/10.1097/MD.00000000000008568>

Assessing an individual's perceived self-efficacy will be relevant in determining the behavior change of patients and the impact on their health outcomes in chronic disease management. Such assessment will require the evaluation of the multiple facets of self-efficacy and can be challenging. In order to evaluate the self-efficacy among patients with hypertension in any local population, an instrument has to be identified and validated. Currently, there are many instruments available to assess self-efficacy. However, most of these instruments are either not contextualized to the local population, or assessed only a component of self-efficacy or not self-efficacy and not specific to hypertension.^[9]

The "Hypertension Self-Care Profile" (HTN-SCP) instrument is a 60-item questionnaire that assesses behavior, motivation, and self-efficacy in patients with hypertension. The self-efficacy domain covers medication adherence and lifestyle modifications, which are key measures in hypertension management.^[10]

The HTN-SCP has previously been validated in a Korean American population with Asian values living in a western community.^[10] An earlier face validation study of the English version of the instrument in Singapore reported satisfactory internal consistency and test-retest reliability.^[11] Despite English being the common language in Singapore, some of the citizens of various ethnic groups may not be conversant in the language. Hence, the use of the HTN-SCP will be restricted if only the English version of the instrument is available to assess patients with hypertension. There is a need to develop the Mandarin version of HTN-SCP (HTN-SCP-Mn) to cater to the local predominantly Chinese population. We postulated that the HTN-SCP-Mn would be understood by the Mandarin-literate users and that it would show satisfactory internal consistency and test-retest reliability.

2. Objective of study

The study aimed to evaluate the internal consistency and test-retest reliability of the HTN-SCP-Mn instrument.

3. Materials and methods

3.1. Study design

A within-subject test-retest study design was conducted on 2 separate occasions (14–21 days apart) to assess the reliability of the translated instrument. Ethics approval was approved by the Centralized Institution Review Board with reference number (2016/2332).

3.2. Subjects

3.2.1. Inclusion criteria.

1. The study population included adult citizens or permanent residents, aged 40 to 79 years, of Chinese ethnic origin and proficient (able to read and understand) in Mandarin language.
2. They had clinical diagnosis of essential hypertension based on disease coding by the International Classification of Diseases (version 10) and were currently managed at the designated polyclinic for at least 1 year. Their diagnosis was affirmed with reference to their electronic health records at the study site.
3. They indicated willingness to access the Internet via any form of devices (smartphone or tablet or laptop or desktop) to administer the web-based questionnaire twice on 2 separate occasions 2 weeks apart.

3.2.2. Exclusion criteria. Patients, who were not proficient in Mandarin, did not have access to Internet, were not Internet savvy or had known cognitive, visual and auditory impairment from their medical records, were excluded.

3.2.3. Study site. The study was carried out at a typical public primary care clinic (polyclinic) at Queenstown from April to August 2016. The study site is located in the southern-west region of Singapore, serving a population of 98,730 Asian residents in the region in 2014.^[12] The average workload per day is approximately 500 patients, of which 15% is related to hypertension (highest among all chronic diseases).

3.3. Sample size calculation

A study population comprising 50 to 99 study subjects is considered a good sample based on the COSMIN recommendation for the conduct of the test-retest reliability assessment.^[13] An earlier validation study using a web-based approach by the investigators showed significant dropout rate. The target recruitment size was therefore increased to 150 subjects to cater to attrition.^[14]

3.4. Instrument

Permission was granted for the use of the original HTN-SCP instrument by A/Prof HR Han of John Hopkins Hospital.^[10] The translation of the HTN-SCP instrument into the Chinese and Malay versions was carried out by qualified bilingual translators from a specialized linguistic agency. Backward translation was also conducted and discrepancies were reviewed and discussed until a final agreement was reached. The questionnaire also included patients' demographic variables and questions pertaining to their self-management activities.

3.5. Data collection

Patients were screened for eligibility based on the inclusion and exclusion criteria by the site investigator or polyclinic staff at the nurse counseling room or were referred by the family physician after their consultation. Potential subjects were led into a private room where they were given information on the study intent and procedure on the participant information sheets. Time was provided for their consideration, clarification, and understanding before obtaining their informed consent. Enrolled patients were assigned study identification number to allow cross-linkage between the test and retest procedure and to ensure anonymity.

In order to verify the test-retest reliability, participants were required to complete the HTN-SCP-Mn instrument on 2 separate occasions. On recruitment at the study site, patients filled up a web-based version of the HTN-SCP-Mn on a free web-based platform via Qualtrics.^[15] Two weeks later, they accessed the web-based version of the HTN-SCP-Mn instrument again. Instructions to carry out the retest were provided to them in hard copy on enrolment.

For the patients who failed to administer the questionnaire 2 weeks after the test, phone calls or emails were sent out to remind them to carry out the retest, allowing an additional week for them to complete the study. Those who failed to administer the retest, despite such measure, were regarded as dropouts. For the latter, the data in the initial test were included in the analysis to correlate with their self-management measures but were excluded from the validation analysis.

Table 1**Demographic characteristics of study participants of Chinese ethnicity.**

Demographics	N (%)
Gender	
Males	84 (54.9)
Females	69 (45.1)
Age, median (IQR)	59 (52.0–65.5)
Highest level of education	
Primary	34 (22.2)
Secondary	50 (32.7)
JC/polytechnic/ITE	33 (21.6)
University	36 (23.5)
Other comorbidities	
Hypertension only	50 (32.7)
Diabetes	53 (34.6)
Dyslipidemia	91 (59.5)
Kidney disease	4 (2.6)
Heart disease	10 (6.5)
Stroke	5 (3.3)
Others	6 (3.9)
Median number of BP lowering medication (IQR)	1 (1–2)

BP = blood pressure, IQR = interquartile range, ITE = Institute of Technical Education, JC = junior college.

3.6. Data analysis

Descriptive statistics were reported for the demographics of participants. Independent *t* test was used to evaluate the difference between the overall HTN-SCP-Mn scores and recommended self-management activities. A *P* value of <.05 was considered as statistically significant. Data analysis was performed using the IBM SPSS Statistics for Windows, Version 23.0, IBM Corp (Armonk, NY), released 2015.

The floor or ceiling effects were considered to be present when there are more than 15% of the participants reported the lowest or the highest possible score for each of the 3 domains of the HTN-SCP-Mn: “Behavior”, “Motivation”, and “Self-efficacy”.^[16] We assessed the internal consistency of the HTN-SCP using Cronbach alpha statistic, whereby a value of 0.7 was considered acceptable. For good to excellent internal consistency, the range should be above 0.8 to 0.9.^[17]

The test-retest reliability can be determined by the intraclass correlation coefficients (ICC) in which ICC ≥ 0.75 indicates excellent reliability, ICC between 0.4 and 0.75 indicates fair to good reliability, and ICC < 0.4 indicates poor reliability.^[18]

To determine if any item in the scale was inconsistent with the averaged behavior of the other items, the item total correlation

Table 3**Comparison of differences in patients' characteristics for study population and dropout.**

	Dropout	Study population	<i>P</i>
Total, n	74 (48.4)	79 (51.6)	
Gender			.84
Males	40 (47.6)	44 (52.4)	
Females	34 (49.3)	35 (50.7)	
Age, median (IQR)	59 (51.8–66)	59 (53–65)	.30
Highest level of education			.55
Primary	20 (58.8)	14 (41.2)	
Secondary	23 (46)	27 (54)	
JC/polytechnic/ITE	14 (42.4)	19 (57.6)	
University	17 (47.2)	19 (52.8)	

IQR = interquartile range, ITE = Institute of Technical Education, JC = junior college.

was tested. A mean item total correlation of 0.15 to 0.20 was desirable for scales that measure broad characteristics, while values of 0.40 to 0.50 were required for scales which had narrower characteristics.^[19]

4. Results**4.1. Demographic data**

A total of 153 patients with hypertension were analyzed for the first test, while the re-test included 79 patients.

Table 1 shows the characteristics of the 153 patients, of which 54.9% were male, and the median age of 59 years old. More than half (54.9%) had at least secondary education. There were 32.7% who had hypertension only, while 59.5% of all hypertension patients also had dyslipidemia. More than half of the patients measured their blood pressure at home (54.2%) and measured their weight regularly (51.6%) (Table 2).

Due to the dropout of 74 subjects leading to an attrition rate of 48%, the demographic characteristics of the study population and the defaulter group were compared. However, no differences in terms of their median age (interquartile range), gender, and level of education (Table 3) were detected.

In Table 2, those who recorded their blood pressure readings regularly had higher HTN-SCP-Mn score than those who did not document their measurements regularly.

The Motivation domain had the highest average score of 62.1, compared with Self-efficacy (59.9) and Behavior (46.4) (Table 4). No subject presented with minimal score for all 3 domains; however, “Motivation” and “Self-efficacy” domains had minimal ceiling of <4%.

Table 2**Relationship between self-reported self-care activities and treatment pattern and the Hypertension Self-Care Profile scores.**

	N (%)	Overall mean HTN-SCP score (SD)		<i>P</i>
		Yes	No	
Do you measure your blood pressure at home?	83 (54.2)	175.8 (23.9)	169.1 (28.7)	.12
Do you record your blood pressure readings regularly?	60 (39.2)	181.1 (20.9)	167.4 (28.1)	<.01*
Do you keep a food diary?	10 (6.5)	176.5 (24.7)	172.5 (26.5)	.65
Do you measure your weight regularly?	79 (51.6)	174.0 (25.0)	171.5 (27.8)	.57
Do you record your weight regularly?	39 (25.5)	175.7 (23.0)	171.8 (27.4)	.42
Do you use any mobile apps to monitor your health or medical condition?	19 (12.4)	174.1 (25.5)	172.6 (26.5)	.82
Has your doctor ever reduced your HBP medications?†	38 (24.8)	173.7 (29.9)	172.5 (25.2)	.81

HBP = high blood pressure, HTN-SCP = Hypertension Self-Care Profile, SD = standard deviation.

* A *P* value of <.05 was considered as statistically significant.

† This is generally considered a surrogate marker for maintenance of optimal blood pressure control.

Table 4**Internal consistency reliability of scales and test–retest reliability of stability.**

Domains	No. of items	Mean (SD)	Ceiling effect proportion (%)	Item-Total Correlation Range	Cronbach Alpha	ICC	ICC, 95% CI
Behavior	20	46.4 (10.4)	0	(0.058–0.677)	0.838	0.643	(0.493–0.756)
Motivation	20	62.1 (9.9)	6 (3.9)	(0.374–0.798)	0.929	0.579	(0.411–0.709)
Self-efficacy	20	59.9 (10.5)	5 (3.3)	(0.326–0.767)	0.927	0.710	(0.578–0.805)

CI = confidence interval, ICC = intraclass correlation coefficients, SD = standard deviation.

4.2. Reliability of instrument

Cronbach alpha test of internal consistency was 0.838, 0.929, and 0.927, respectively, for the Behavior, Motivation, and Self-efficacy domains. This indicates excellent internal consistency for all 3 domains.^[12] For item to total correlation coefficient, “Behavior” domain ranged from 0.058 to 0.677 (Table 4), of which the lower end indicates that some items might correlate well with the rest of the items. The ranges for other 2 domains are quite similar, and they indicate good correlation.

The test–retest reliability of the HTN-SCP-Mn indicates fair to good reliability and stability of the instrument with ICC ranging from 0.571 to 0.710.

5. Discussion

Overall, the HTN-SCP-Mn instrument showed satisfactory internal consistency, reliability, and stability in local patients who were proficient in mandarin. The low ceiling effect indicates better discrimination when it is administered to a heterogeneous group of patients with hypertension. What is required next is to validate and correlate the scores of the instrument with objective assessment of self-care measures by the patients.

Nonetheless, the administration of the 60-question HTN-SCP-Mn may be tedious in its application in routine clinical practice. It seems that the regular self-monitoring of home blood pressure alone is a good indicator of self-care, based on the higher correlation between this self-reported measure and the HTN-SCP-Mn scores. This finding suggests that the instrument can potentially be trimmed down but the abridged version will require further validation study.

5.1. Strength and limitations

The use of a web-based approach in administering the retest portion of the study was intended to provide convenience to subjects but it also resulted in higher level of dropouts despite reminders. Reimbursements to compensate subjects of their efforts may potentially reduce the dropout rate.

A proportion of the local Chinese population, especially the more senior patients, can only communicate in dialects and are not proficient in Mandarin. This will restrict the use of the HTN-SCP-Mn across the entire Chinese community.

Examples of local food options were added to exemplify selected items in the instrument, such as the equivalence of food choices containing 5 g of fat. While this measure contextualized the content of the instrument to the local habits, it may alienate and restrict its usage in other countries with significant Chinese population. One measure to reduce this limitation is to add specific examples relevant to the local context in country-specific instrument, but this should be evaluated with further study.

6. Conclusion

The results showed good test–retest reliability and internal consistency of the HTN-SCP-mandarin tool. It can potentially be used to assess self-efficacy among patients with hypertension who are proficient in Mandarin. Further study is needed to correlate its scores with actual demonstration of self-efficacy by patients.

Acknowledgments

The developer of the original instrument, A/P Hae-Ra Han of the School of Nursing in the John Hopkins University, had kindly allowed the research team to validate the HTN-SCP instrument for the Singapore study. The investigators are also grateful to the nursing students from Ngee Ann Polytechnic who assisted in carrying out the study.

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