Reliability and Validity of the Thai Version of the Health of the Nation Outcome Scales (HoNOS)

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Background: *Measurement in psychiatric services is important for the development of a psychiatric tool for budget allocation.*
Objective: *To translate the Health of the Nation Outcome Scales (HoNOS) into Thai and to assess its psychometric properties.*
Material and Method: *The HoNOS was translated into Thai, by using the standard of "forward-backward" translation procedure. Two psychiatric nurses interviewed subjects together but independently rated their scores. The subjects were 23 acute inpatients and 23 sub-acute inpatients. The reliability and validity was assessed.*
Results: *The Cronbach's alpha coefficient of the Thai HoNOS was 0.68. It had a high correlation ($r > 0.80$) with the Brief Psychiatric Rating Scale (BPRS), the Global Assessment of Functioning (GAF) and the Clinical Global Impression (CGI). It suggested high concurrent validity. It had a satisfactory power ($p < 0.05$) in discriminating overall clinical outcomes between acute and sub-acute psychiatric inpatients.*
Conclusion: *The Thai HoNOS fulfils the requirements of a psychiatric outcome scale for routine use in inpatient service.*

Keywords: *Health of the Nation Outcome Scales (HoNOS), Psychiatric patient, Measurement, Thailand*

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Psychiatric measurements play an important role in mental health care and research, especially outcome measurements. Measurement usage enhances the quality of psychiatric service, increases service efficiency, controls service costs, introduces innovation, and demonstrates accountability[1].

There are three ways to develop a new measurement. (1) Self development: by this method, the measurement will be developed to meet the developer's objectives but needs more budget and time and, very importantly, high caliber developer's skills. (2) Use foreign standard measurement without adjustment: this method needs a lower budget compared to (1) but needs an awareness of translation validity and differences in content and culture between Thai and the original country. (3) Use foreign standard measurement with adjustment: after selecting the measurement, it is translated by following through the standard process, and finally, its psychiatric qualities and characteristics are tested. Similar to (2), this method is also comparatively cheap[2-4].

In Thailand, there are several measurements currently used in the psychiatric field. For example, Global Assessment of Functioning (GAF)[1,5], Clinical

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Global Impression Scale (CGI)[1], Brief Psychiatric Rating Scale (BPRS)[1,6], General Health Questionnaires[7], Hospital Anxiety and Depression Scale[8], and Behavior and Symptom Identification Scale (BASIS-32)[9] have been translated into Thai. Furthermore, the Mental Health Department has developed a Thai version assessment form to identify capability of psychiatric patients.

Despite many measurements in various domains of mental health, there is no single measurement appropriate for every aspect in this field[1]. Moreover, there is no Thai outcome measurement that can comprehensively assess the overall clinical picture of a psychiatric patient for budget allocation. Outcome measurements widely used for budget allocation in many countries are GAF[1,10] and the Health of the Nation Outcome Scales (HoNOS)[1,11-13].

The present study selected HoNOS because the HoNOS is suitable for routine use by nurses and psychiatrists due to its simplicity, broad clinical and social coverage and adequate psychometric properties[11,12]. The HoNOS provides a more comprehensive picture of mental health outcomes than any other brief measurement[14]. HoNOS was first translated into Thai and its psychometric properties tested.

Material and Method

Health of the Nation Outcome Scales (HoNOS)

The HoNOS was designed to be a brief general assessment of functioning for psychiatric patient[1,11-19]. It was intentionally designed for routine work of mental health staff and therefore easy to fill in. It was expected to be adopted in everyday clinical work. This 12-item measurement covers clinical problems and social functioning. Each scale has a score from 0 (no problem) up to 4 (severe to very severe problem). The score can be completed in a few minutes by clinicians in routine assessment. The 12 items cover four problem areas, including behavioral problems, impairment, symptomatic problems, and social problems. The tool is designed to be used with secondary mental healthcare services. It covers clinical and social areas relevant to adult mental illness, provides a brief numerical record of the clinical assessment, and has a variety of uses for clinicians, administrators and researchers. The HoNOS needs to be employed at the beginning and the end of care (admission and discharge). In an acute patient setting, the domestic situation is often unknown to the staff, so items 11 (accommodation) and 12 (occupational problem) are not rated. Additionally, the patient should be rated every 3 to 6 months but not longer than 12 months. When compared with the Brief Psychiatric Rating Scale (BPRS), the HoNOS is simpler and relatively easier to use. Up to now, the HoNOS has identified five outstanding characteristics as follows: short enough for routine use, coverage of common clinical problems and social functioning, sensitive to change, reliable, and highly correlated with established scales. The HoNOS score shows a strong association with service utilization, and, therefore, is likely to play a major role in casemix systems. In Australia, HoNOS was used for developing the mental health casemix classification and service costs (MH-CASC).

Translation process

After being granted official permission to translate the HoNOS into Thai by the Royal College of Psychiatrists' Research Unit, London, the authors applied the translation procedures as recommended by Greco et al[3,4] and the Medical Outcomes Trust[20].

Two bilingual mental health experts, Thai native speakers living in the UK or the US for more than five years translated the original HoNOS into Thai. Then the two bilingual non-mental health specialists back-translated the Thai HoNOS draft into English. One back-translator was an English native speaker who was fluent in Thai and had lived in Thailand for more than 5 years. The other back-translator was a Thai native speaker who was fluent in English and had lived in the UK for more than 5 years. The first draft of the Thai HoNOS was pre-tested by six psychiatric nurses to identify any statements difficult to understand. The opinions of field testing nurses were presented to an expert panel comprising researchers, translators, back-translators, psychiatric experts, language experts, and representative nurses. The panel was requested to comment on all aspects of the Thai HoNOS draft. Comments from the experts were reasonably positive. Their suggestions and concerns were similar to those previously presented in the study of Orrell et al[14].

Subject

Patient subjects were selected from Suan Prung Psychiatric Hospital, the 700-bed psychiatric hospital under the Mental Health Department, responsible for 12 provinces in Northern Thailand. The hospital focuses on adult patient service, drug addicts, and research. Twenty-three acute patients were selected as group 1, and another 23 sub-acute patients (discharged patients awaiting transportation arrangement)

selected as group 2. The inclusion criteria were patients aged 18-80 years and diagnosed as psychiatric diseases and disorders of substance use.

Even though all 12 items of the HoNOS were translated, items 11 and 12 were excluded from reliability, validity and factor studies. As suggested by Wing et al[11,12], these items cannot be evaluated reliably in hospitalized patients. In addition, low sensitivity may be due to the short re-rating interval, minimal changes in clients, or the characteristics of the scale itself[19].

Ethics approval

The Human Research Ethics Committee of Naresuan University approved the present study. Written consent was received from all participants after the full study details were explained. The patients were assured that the present study was anonymous and confidential. The study was carried out in September 2004.

Other measurements

To test the criterion validity of the Thai HoNOS, other measures were simultaneously assessed in the selected acute and sub-acute patients.

Global assessment of functioning (GAF) is a general rating scale for evaluating the overall functioning on a continuum from psychological or psychiatric sickness to health with a scale ranging from 10 to 100, with anchor points for each 10-point band of psychiatric patients. GAF is relatively simple, reliable, valid and useful in a wide variety of clinical and research settings[1,5]. Clinical Global Impression scale (CGI) assesses the overall clinical state of psychiatric patients[1]. Brief Psychiatric Rating Scale (BPRS) is an interviewer-rated psychiatric scale covering a range of mental state phenomena[1,6]. Concurrent validity of the HoNOS and BPRS equal 0.56[14].

Raters and rating

Two raters were psychiatric nurses at the Suan Prung Psychiatric Hospital having over 10 years experience with psychiatric patients. Prior to the field-testing, the authors and the raters carefully studied the HoNOS trainer guide introduced by the Royal College of Psychiatrists of UK[15]; and made themselves familiar with the scoring system. Rating was made according to the HoNOS trainer guide.

Group 1 and Group 2 subjects were assessed and scored under the Thai HoNOS, GAF, CGI, and BPRS. The ratings mainly relied on direct observation and interview with patients and information obtained from their medical records. Before assessing, both raters independently reviewed the subjects' medical records, relevant information including diagnostic category, mental health disorder status, date of birth, and marital and employment status, etc. After that, they directly observed and performed joint interviews but independently rated the scores.

Data analysis

Mean, standard deviation (SD), correlation coefficient (r) and multiple correlation coefficient were (r) used to describe the results.

Validity tests

The validity tests included concurrent, criterion and discrimination validity. Criterion validity was assessed by comparing the Thai HoNOS scores with GAF, CGI, and BPRS scores.

The difference between Thai HoNOS scores of Group 1 (acute inpatients who were hospitalized for less than 48 hours) and those of Group 2 (non-acute, discharged inpatients who were waiting for transportation arrangement) were examined to evaluate the discrimination validity. The 2-tail significant difference of the scores was examined using Wilcoxon Rank Sum Test. A p-value of less than 0.05 indicated a significant correlation or difference[22].

Reliability tests

A Cronbach's alpha test for internal consistency of Thai HoNOS was assessed. The scale was considered internally consistent and reliable if the Cronbach's alpha was equal to 0.70 or higher[21]. The correlation was assessed by using Spearman rank correlation coefficient (r).

Intraclass correlation coefficients (ICCs) for inter-rater reliability of Thai HoNOS scores assessed by rater 1 (Group 1 and Group 2) and rater 2 (Group 1 and Group 2).

Factor analysis

The authors performed a factor analysis to examine its structural components.

Results

Patients participating in the present study were admitted to the hospital from August to October 2004. The subjects comprised 29 males and 17 females. The mean age was 37.7 years with standard deviation (SD) of 13.6 (range 18-60 years). Subjects had an

Table 1. Number of 46 patients and the Thai HoNOS scale mean scores by patient groups

Thai HoNOS	Number of cases with score > 0	% of total scores	Mean scores (SD)	
			Group 1 (23) (acute)	Group 2 (23) (non-acute)
item 1: aggression	15 (10%)	14	1.52 (1.50)	0.00 (0.00)
item 2: self-harm	5 (3%)	5	0.78 (1.54)	0.04 (0.21)
item 3: alcohol and drug abuse	10 (7%)	8	0.61 (1.12)	0.04 (0.21)
item 4: cognitive problems	11 (7%)	6	0.52 (0.95)	0.26 (0.75)
item 5: physical illness/ handicap	9 (6%)	4	0.26 (0.69)	0.13 (0.46)
item 6: hallucinations/delusions	24 (16%)	22	2.43 (1.47)	0.39 (0.90)
item 7: depression	12 (8%)	6	0.83 (1.19)	0.30 (0.64)
item 8: other symptoms	32 (21%)	18	1.74 (1.10)	0.70 (0.70)
item 9: relationship problems	20 (13%)	10	0.83 (0.83)	0.22 (0.52)
item 10: activities of daily living	13 (9%)	8	0.52 (0.85)	0.00 (0.00)
item 1-10 (range 0-22)		100	10.04 (4.15)	2.09 (2.17)

average illness duration of 7.9 years (SD = 7.2), and average length of stay of 37.1 days (SD = 28.8).

Subjects were diagnosed by International Statistical Classification of Diseases (ICD). The predominant diagnosis was schizophrenia, paranoid, and acute psychotic disorders (F1X.5, F1X.7, F20-29) (28 patients, 60.9%), 14 patients (30.4%) had alcohol-related disorders (F10.0-F10.9), three patients (6.5%) had mood disorders (F30-F39), and one (2.2%) had mental retardation (F70-79).

On average, the raters spent 10.7 minutes (SD = 5.8) to complete the interview. Actual time consumed depended on complexity of the inpatient's problems.

Table 1 demonstrates the profile (mean scores) of the individual Thai HoNOS items for the two patient groups (acute and non-acute). The maximum Thai HoNOS score (item 1-10) was 22 with a mean score of 6.07. The mean HoNOS score (SD) of group 1 (acute patients) was 10.04 (4.15) whereas, those of group 2 (non-acute patients) was 2.09 (2.17). In group 1 the highest score was seen in item 6 (hallucinations/ delusions), followed by item 8 (other symptoms), and item 1 (aggression), respectively. The lowest score was seen in item 5 (physical illness/handicap), followed by item 10 and 4 (activities of daily living and cognitive problem), and item 3 (alcohol and drug use), respectively. In group 1 (acute inpatient), only the mean scores of items 1,6 and 8 were higher than 1 (mild to very severe problem), especially item 6 was higher than 2 indicating the existence of hallucination and delusion problem. In group 2 (non-acute inpatient), no mean score of items were higher than 1.0.

Reliability

A Cronbach's alpha of the Thai HoNOS was 0.68. It was lower than 0.70 satisfactory internally consistent reliability.

Table 2 indicates that the ICCs of the Thai HoNOS were excellent at total scale score 0.96. The interrater reliability was satisfactory to excellent, between 0.75 and 0.98. For the Thai HoNOS item 8

Table 2. Intraclass reliability coefficients (ICCs) of the Thai HoNOS

	Intraclass reliability coefficients (ICCs)
item 1: aggression	0.93*
item 2: self-harm	0.96*
item 3: alcohol and drug abuse	0.92*
item 4: cognitive problems	0.94*
item 5: physical illness/ handicap	0.91*
item 6: hallucinations/delusions	0.98*
item 7: depression	0.92*
item 8: other symptoms	0.75*
item 9: relationship problems	0.88*
item 10: activities daily living	0.88*
item 1-3: Behaviour total	0.94*
item 4-5: Impairment total	0.94*
item 6-8: Symptom total	0.95*
item 9-10: Social total	0.95*
item 1-10: total	0.96*

* $p < 0.001$

(other symptom), the reliability was satisfactory at 0.75, while others had a good to very good level of ICCs at 0.88 or better.

Validity

The total scores of the Thai HoNOS (item 1-10) were significantly correlated with other standard popular outcome measures. The total scores of the Thai HoNOS were highly correlated with BPRS ($r = 0.915$, $p < 0.001$), followed by GAF ($r = -0.896$, $p < 0.001$), and CGI ($r = 0.880$, $p < 0.001$), respectively.

The discrimination analysis found that mean scores of group 1 and group 2 were different (Wilcoxon $W = 293$, $Z = -5.458$, $p < 0.001$). It indicated that the Thai HoNOS score of acute patients (group 1) was significantly higher than non-acute patients' (group 2).

Factor analysis

Table 3 shows Varimax rotation of the principle component analysis yielded a four-factor model of the Thai HoNOS. The first factor (21.59% of the variance) comprised item 7 depression, item 2 self-harm, and item 5 physical illness/handicap. The second factor (21.09% of the variance) consisted of item 10 activities of daily living, item 4 cognitive problems, item 9 relationship problems, and item 8 other symptoms. The third factor (16.08% of the variance) comprised item 3 alcohol/drug use and item 6 hallucination/delusions. The fourth factor (13.96% of the variance) consisted of only item 1 aggression. The Cronbach's alphas of the first, second, and third factors were 0.70,0.64 and 0.49 respectively.

Discussion

The results indicate that the Thai HoNOS generally fulfills the requirements of a clinically acceptable outcome scale for routine use in mental health services.

In comparison to general measurements, Cronbach's alpha coefficient of the Thai HoNOS ($r = 0.68$) is in line with the previous study of Orrell et al (Cronbach's alpha = 0.65)[14]. It is satisfactory for a measurement with a small number of items[15].

Similar to previous studies[18,23], the present study has examined the validity of Thai HoNOS and has reported a good correlation ($r > 0.80$) with other standard measurements. Examination of the validity showed that the Thai HoNOS had the highest correlation with BPRS, followed by GAF and CGI. The Thai HoNOS/GAF and Thai HoNOS/BPRS correlations were higher than the McClelland's study where the correlation of the HoNOS with BPRS was 0.72 ($p < .001$, $n = 93$) and with GAF was 0.71 ($p < .001$, $n = 149$)[23].

The difference in mean total Thai HoNOS score between acute patients and sub-acute patients was significant, concluding that the Thai HoNOS had a satisfactory power ($p < 0.05$) in discriminating the overall clinical outcomes between acute and sub-acute psychiatric inpatients. This discriminating validity for overall clinical outcomes is in line with Victorian field trial's study[14].

The time to complete the Thai HoNOS (mean 10.72 minutes, SD = 5.76) was consistent with the previous study. In McClelland's study, time to complete the original HoNOS was 5-15 minutes, depending on

Table 3. Factor analysis of Thai HoNOS (weight > 0.40 shown)

	Factor 1	Factor 2	Factor 3	Factor 4
item 1: aggression	0.89			
item 2: self-harm	0.83			
item 3: alcohol and drug abuse	0.59			
item 4: cognitive problems		0.77		
item 5: physical illness/ handicap		0.76		
item 6: hallucinations/delusions		0.57		
item 7: depression		0.55		
item 8: other symptoms			0.89	
item 9: relationship problems			0.67	
item 10: activities daily living				0.93
Eigen value	2.16	2.11	1.61	1.40
Percentage of variance[a]	21.60	21.09	16.08	13.96

[a] Total = 72.724

the experience of the rater and the complexity of the patient's problem[23]. In Orrell's study, the HoNOS used 5 minutes or less to complete when the full clinical data were available[14].

However, there are a number of methodological limitations in the present study. First, subjects in the present study were limited to psychiatric inpatients. Further study should include other groups e.g. outpatients, patients in the community. Second, the raters of the present study were nurses only. It would be interesting to test whether a nurse is a good representative for other mental health professionals, e.g., psychiatrists, psychologists. Lastly, the sample size in the present study is relatively small compared with the number suggested by experts (> 5 subjects per variable or > 100 subjects per study)[24].

For an inpatient setting with mental health problems, the Thai HoNOS was a brief and easy to use scale. Reliability and validity generally provided good to excellent results. In line with other previous studies, this measurement can be applicable in inpatient routine care of psychiatric hospitals[25].

In conclusion, with reliability and validity established, the authors suggest that the next logical step in the development of the Thai HoNOS scale is to establish how compatible the Thai HoNOS is when implemented with other psychiatric population (e.g., outpatients), and what the result would be if the Thai HoNOS is used by other mental health professionals. In particular, follow-up studies need to be done to show how good the Thai HoNOS functions as a measure to predict longitudinal outcome rather than a cross-sectional view.

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ความเที่ยงและความตรงของแบบประเมินสุขภาพจิตฉบับภาษาไทย

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***ภูมิหลัง**: แบบประเมินสุขภาพจิตสำหรับผู้ป่วยจิตเวชฉบับภาษาไทยมีความสำคัญต่อการพัฒนาระบบกลุ่มโรคร่วมเพื่อการจัดสรรงบประมาณบริการจิตเวช*

***วัตถุประสงค์**: เพื่อแปลเครื่องวัด HoNOS ให้เป็นภาษาไทยและทดสอบคุณสมบัติทาง psychometric*

***วัสดุและวิธีการ**: แปลเครื่องวัด HoNOS ให้เป็นภาษาไทยโดยใช้วิธีแปลและแปลกลับ พยาบาลจิตเวชสองคนจะเข้าวัดด้วยการสัมภาษณ์พร้อมกันแต่แยกกันลงทะเบียนในกลุ่มผู้ป่วยเฉียบพลันและกึ่งเฉียบพลันจำนวนกลุ่มละ 23 คน จากนั้นทดสอบความเที่ยงและความตรงของเครื่องวัด*

***ผลการศึกษา**: เครื่องวัดมีค่าความเที่ยงเท่ากับ 0.68 มีความสัมพันธ์กับเครื่องวัด CGI และ BPRS สูงกว่า 0.8 แสดงให้เห็นว่ามีค่าความตรงในระดับสูง นอกจากนั้นเครื่องวัดนี้มีอำนาจในการจำแนกกลุ่มผู้ป่วยในแบบเฉียบพลันและแบบกึ่งเฉียบพลัน*

***สรุป**: เครื่องวัด HoNOS ฉบับภาษาไทยมีคุณสมบัติที่จำเป็นครบถ้วนที่จะนำไปใช้ในงานบริการผู้ป่วยในจิตเวช*