ORIGINAL ARTICLE

Evaluation of a Hong Kong Chinese version of a self-administered questionnaire for assessing symptom severity and functional status of carpal tunnel syndrome: cross-cultural adaptation and reliability

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Objectives To evaluate the application of a translated version of an established self-administered questionnaire for carpal tunnel syndrome on Chinese patients in Hong Kong.

Design Evaluation of an instrument tool.

Setting Department of Orthopaedics and Traumatology, Queen Mary Hospital, Hong Kong; Holistic Medical Centre, Aberdeen, Hong Kong.

Participants Patients with carpal tunnel syndrome, translators.

Main outcome measures The adaptation was based on forward-backward translation from English to Chinese (Hong Kong) and vice versa. Meetings with translators, investigators, and patients were organised to generate an acceptable version of the questionnaire. A pilot study was carried out on 20 patients and subsequently minor adjustments were added. Fifty patients were recruited to validate the reliability and internal consistency of the questionnaire.

Results The ordinality of response agreed with the original instrument. Test-retest reproducibility showed no significant difference between tests. The Pearson correlation coefficient ranged from 0.83 to 0.93. Internal consistency was good, at 0.85.

Conclusion Through the validation of the Hong Kong Chinese version of the questionnaire, we are able to produce an assessment tool for the local patients. Furthermore, we are able to create a platform for: (i) a cross-national and cross-cultural epidemiological comparison as well as a means of (ii) evaluating different types of treatments.

Introduction

Carpal tunnel syndrome (CTS) is a prevalent disease resulting in upper extremity disability. It affects 0.1% of the general population and up to 5% of those in certain occupations.[1,2] Carpal tunnel release is one of the most commonly performed operations on the hand, accounting for approximately 200 000 procedures per year in the United States.[3] Despite the high prevalence of this disorder and the frequency of release procedures, there is no consensus on how to document CTS severity and the success of surgery.[3] Clinicians generally evaluate its severity by reference to associated neuromuscular impairment and other physical findings. Nonetheless, patients are more concerned with symptoms and functional outcomes,[4] for which there was no standardised, validated, reproducible, and sensitive instrument, until the development of a self-administered questionnaire by Levine et al in 1993.[3] Apart from affording an opportunity for clinicians to appreciate and address patients' perspectives, this questionnaire also provides quantitative measurements.

The questionnaire comprises two parts, namely the Symptom Severity Scale (SSS) and the Functional Status Scale (FSS). In the SSS, there were 11 questions; responses could be scored one point (mildest) to five points (most severe). The overall result was the calculated mean of all 11 scores. In the FSS, there were eight questions assessing the difficulty in performing selected activities. Again, the overall outcome was the mean of all the scores in this section.

By validating this questionnaire in the Chinese (HK) version, we would be able to

Key words
Carpal tunnel syndrome; Questionnaires; Reproducibility of results

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introduce a suitable local outcome assessment tool. We therefore set out to create a platform for the evaluation of different types of treatment and enable cross-national and cross-cultural comparisons.[3]

評估由患者自我評鑑腕管綜合徵的症狀嚴重程度和功能的香港中文問卷：因應文化的修訂及可靠性

目的 評估一份已得到行內確認而由患者自我完成有關腕管綜合徵的問卷，其中文版在香港華裔病人中的應用。

設計 問卷工具的評估。

安排 香港瑪麗醫院矯形及創傷外科，以及香港仔康力醫療中心。

參與者 腕管綜合徵患者和翻譯人員。

主要結果測量 香港中文版問卷是經過英中、中英多次互譯，並與翻譯人員、調查人員和病人會面商討後修訂而成的，之後由20位患者試用問卷，研究分析後再對問卷作輕微改動。最後由50位病者試做問卷，以確定問卷的可靠程度和內在的統一程度。

結果 回應的順序與原本問卷保持一致，測試之間的重測重複性並無顯著差異。皮爾森相關係數在0.83至0.93之間，內在統一程度高，達0.85。

結論 這次就香港中文版問卷的確認，不但為本地患者提供了一個評估工具，同時為國家之間以及文化族群之間流行情況的比較提供了平台，也為不同治療措施提供了一個評估的方法。

Methods

Adaptation methods

The Brigham and Woman's Hospital CTS questionnaire was used. The Chinese (HK) adaptation followed a protocol similar to the one used in both the International Quality of Life Assessment (IQOLA) project and the validated Spanish version of the same questionnaire.[5] The IQOLA was developed to obtain different language versions of the 36-item short-form health surveys (SF-36).[6]

In this study, the methodological process was forward and backward translation. Two bilingual translators with ample clinical experience translated the original questionnaire into the Chinese (HK) version. Their native language was Cantonese (a dialect used in Southern China, including Hong Kong). Each translator prepared a separate translation and the difficulty in obtaining conceptually equivalent expressions in Chinese (HK) [written form of Cantonese] was assessed. Both versions were discussed between the translators and the investigators in order to arrive at a consensus. Two other translators assessed the conceptual equivalence and clarity of each individual phrase and the choice of response. Subsequently, the investigators and the four translators had a meeting to produce the first adapted version.

To assess the conceptual equivalence, this adapted version was translated back into English by two bilingual translators living in Hong Kong, whose native language was English. Their back translations were compared with the original version in order to identify items or words that were not precisely equivalent.

A pilot study was carried out to gather opinions from 20 randomly selected patients to assess comprehension of the translated questionnaire. Based on the results and consensus from the investigators and translators, the second version was then developed. The second version then underwent ordinality as well as reliability analysis, before the final version could become established (Appendix 1).

Ordinality analysis

Subjective descriptions like "mild", "moderate", and "severe" can be translated into different words. However, interpretation of these descriptive terms can be affected by the cultural background of the respondents. Therefore, ordinality analysis is required to validate the agreement between the different language versions. The choice of response to each item of the CTS questionnaire was organised into categories of: (1) no difficulty, mild difficulty, moderate difficulty, severe difficulty, and unable to respond at all; and (2) none, moderate, severe, and very severe. The ordinality study was based on the Thurstone scaling exercise.[6] Participants were required to mark on a 10-cm line (visual scale) the relative position of every choice in relation to the end extreme choices for each category. For example, for the category of "no difficulty, slight/mild, moderate, severe, unable to respond at all", every participant was shown a horizontal 10-cm line with the respective extreme responses being (in Hong Kong Chinese): "沒有困難(no difficulty)" on the left end (0 cm) and "根本做唔到(inability to perform)" on the right end (10 cm). Likewise participants were required to mark on the line their responses for the remaining questions. It was expected that the response option "severe(非常/十分)" would be placed near the extreme "inability to perform"; "頗/中度" would be placed in the middle and the option "slight/mild(少少)" near "no difficulty" (Appendix 2).

To carry out these exercises, standardised instructions were given and an example was shown. The different questions and their corresponding visual scales were presented in separate pages and in a randomised manner. A randomly sampled population of 20 subjects was included in the empirical study.

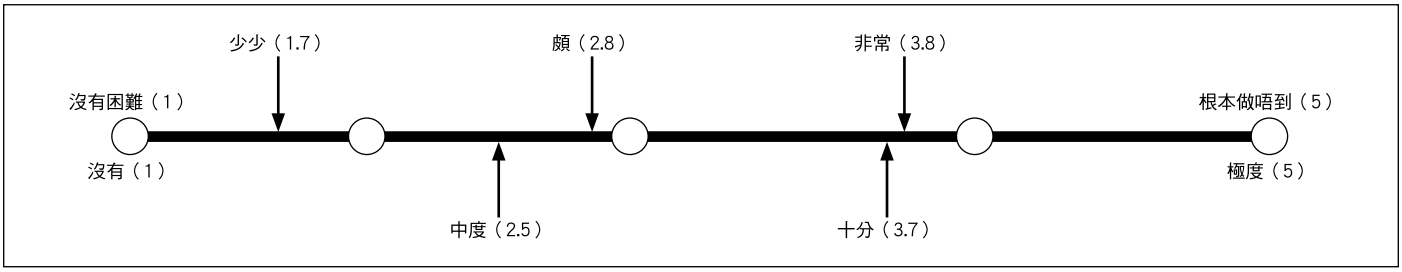

FIG. Representation of results of the ordinality analysis of response options by the visual analogue scale (Thurstone scaling exercise)
The objective is to identify if respondents across countries placed the translated response options in the same order as the scores assigned in the original questionnaire. "沒有" and "沒有困難" were placed as an anchor over the left end of the scale, also known as score "1". "極度" and "根本做唔到" were placed over the right end of the scale as anchor, also known as score "5". Bracketed numbers refer to the mean score of the respective response options

TABLE. Results of the reliability analyses

Carpal tunnel syndrome questionnaire	Test-retest reproducibility					Internal consistency
	Mean (SD) score for the first test	Mean (SD) score for the second test	Mean (SD) score difference	Paired *t* test probability	Pearson correlation coefficient	Cronbach alpha coefficient
Symptom severity	2.5220 (0.394)	2.5675 (0.356)	0.0455 (0.375)	0.576	0.83	0.83
Functional status	2.2831 (0.223)	2.3456 (0.277)	0.0625 (0.250)	0.333	0.93	0.87

This population group comprised patients with hand numbness and attended the orthopaedic specialist clinic of Queen Mary Hospital or a private general practitioner clinic in Aberdeen, in equal proportion.

Reliability and internal consistency analysis

The second Chinese (HK) version questionnaire was self-administered by 50 patients who suffered from CTS (confirmed by electrophysiological study) but had not been operated on. None of them had had symptoms for less than 6 months, and all could read and speak Chinese (HK) fluently. The questionnaire was first completed just before the patient consulted the orthopaedic specialist, and again 1 hour later. Both sets of questionnaires had the questions printed on separate pieces of paper and in a randomised order.

Internal consistency (the degree of agreement of different questions in measuring a single concept) was assessed by the Cronbach alpha coefficient, which reflected the correlation of each item with the whole scale.[6,7] It ranged from 0 to 1; a coefficient greater than 0.7 indicated a satisfactory reliability of the scale when it was used for group comparison. A Cronbach alpha of 0.8 was considered good and a value of 0.9 as excellent.[8]

Instrument reproducibility was assessed by comparing the means from the two administrations with the paired Student *t* test and the Pearson correlation coefficient.[3,6,7,9]

Results

The order of mean scores in choices of response agreed with the order established in the original questionnaire (Fig). This was useful in deciding the choices of response to be included in the Chinese (HK) version. For example, "非常(3.8±0.9)" was used instead of "十分(3.7±0.8)" and "頗(2.8±0.7)" was used instead of "中度(2.5±1.1)". These choices of response were selected for use in the questionnaire, as the respective mean score was closer to the original version.

Among the 50 patients recruited into the study for the reliability and internal consistency analysis, 42 (84%) were female and 12 (24%) had bilateral involvement. Their ages ranged from 32 to 81 years with a mean of 66 years. Internal consistency analyses are shown in the Table. The Cronbach alpha was higher than 0.7 for all scales (range, 0.83-0.87). Mean scores of the two administrations were similar, and no statistically significant difference was observed. The Pearson correlation coefficients ranged from 0.83 to 0.93. A post-hoc analysis revealed no association between the scores and demographic characteristics.

Discussion

Patient self-reporting health measurement is not a new concept.[10] Nonetheless, the general public is seldom exposed to this kind of exercise.[11] Hesitancy

in utilising the instrument was clearly expressed while we performed this study. Although all the subjects were able to read Chinese (HK), most required either some form of assistance or the presence of a companion when filling the form.

In the era of critical assessment and accountability, patients' perspectives and concerns become more important.[12] Generic health-related quality of life assessment like the SF-36 questionnaire and less specific assessment tools like Disability of the Arm, Shoulder, and Hand (DASH) questionnaire are neither specific nor sensitive enough for CTS alone. Lack of specificity is self-explanatory. In this context, a mere change in CTS severity was not likely to have a significant impact on global well-being. Hence, these global assessment tools are not sufficiently sensitive when the severity of CTS is the only concern. The need to developing a disease-specific instrument was evident.

The current questionnaire focused on CTS and was revolutionary in that it targeted patient perspectives. Despite Levine et al[3] publishing the questionnaire in a leading journal, it did not receive much attention till 10 years later. With the recognition of its impressive reliability and sensitivity in documenting the impact of treatment, it became a standard outcome assessment tool, either alone or as a complementary measure.[13-18]

An important concept relevant to self-reporting health instruments is to recognise that the measures taken are of 'patient-perceived health'. This depends on a complex interplay of social and cultural factors.[5] For example, osteoarthritis of the hand was reported as a significant disability in the elderly in the United States, where subjects usually lack family support. The same disease is not perceived to be a major issue in Spain, where patients usually live with their extended families.[5]

For countries with different languages and cultures, the instrument concerned requires both translation and adaptation,[6,19-21] as mere linguistic translation is inadequate.[7,19,22] For countries or regions with the same or similar languages but different cultures, the instrument still needs adaptation even if translation is not deemed necessary.[5] For instance, the Spanish versions of the DASH and the CTS instruments can be used in Mexico or any Spanish-speaking country, but still needed to be modified because of cultural differences.[5] Similar scenarios occur in the Greater China region, where Taiwan, Hong Kong, Macau, and Mainland China all utilise the same Chinese characters as their written language but have their own unique culture.

The Medical Outcomes Trust of the United States has recommendations in such situations. When adapting instruments for use in other countries, prior research is necessary to show equivalence.[6,20] Medical professionals in Hong Kong have been accustomed to this type of validation procedure.[23,24] Surprisingly, such guidelines are not observed in Europe; many tools, including the DASH and the CTS questionnaires used cross-nationally, have been applied without reliability data and adaptation having been reported.[5,25,26]

Cross-cultural adaptation of an instrument renders studies for cross-cultural comparison feasible,[21] and has fuelled a surge in research and literature on the methods of translation and adaptation of health measures used in various countries. Among different approaches toward translation and adaptation, the method proposed in this manuscript can be classified as a sequential model.[19] Our model follows the guidelines proposed by Guillemin et al,[21] which are among the most commonly used. Adaptations of instruments such as the SF-36,[6] DASH,[27] and the Sickness Impact Profile,[28] also utilise this model. The same sequential model was also used to develop the Swedish[29] and Spanish versions[5] of the CTS questionnaire. Its standard set of procedures includes forward-backward translation, the use of focus groups for quality control, and a quantitative assessment of the equivalence between the original questionnaire and the translated version.

The present study produces a Chinese (HK) version of the CTS questionnaire. Ordinality analysis provides evidence of the complete concordance between the order of the response options of the translated version and those of the original, thus reflecting the conceptual equivalence of the translation. For response options with more than one translation, such an analysis can facilitate choosing the option closest to the theoretical score in the original,[5,6] although it might not be the most appropriate translated expression. For example, intervals on a visual analogue scale for responses like "mild/moderate/severe" may not be placed equidistant. Thus, adopting a gold standard score based on a literal translation rather than linguistic equivalence may not always be the most suitable.

The high internal consistency of both scales of the CTS questionnaires means that items of both seem to target unitary concepts.[7] Good reproducibility[8] fulfils the prerequisite for a reliable measuring tool. Furthermore, the insignificant difference in test-retest mean scores suggested that the questionnaire was appropriate for group comparison. Similar results for internal consistency and reproducibility have been reported for the Swedish,[29] Spanish,[5] and original versions[3] of the CTS questionnaire.

Despite keen enthusiasm on instrument adaptation, there remains a controversy on the need to account for reliability, validity, and responsiveness in cross-cultural adaptation.[5] It can be argued

that the adaptation process produces a modified instrument that presents an unknown reliability, validity, and responsiveness in the second culture. Because this issue is unclear, some researchers do not embrace this methodology in cross-cultural adaptation studies.[19,21] The cross-cultural adaptation process of any instrument can be extensive, and we include only the reliability analysis, which was previously shown to have good internal consistency and reproducibility. We nevertheless believe that complete equivalence between the Chinese (HK) version and its respective original cannot be established without further studies of validity and responsiveness. Furthermore, controlled trials using different treatment modalities, and even sham procedures, might provide better appreciation on the effectiveness of this questionnaire in documenting treatment outcome. A longer-term longitudinal cohort might also shed light on its stability in reference to time.

Conclusion

The Chinese (HK) version of the CTS questionnaire is a highly reproducible assessment tool with good internal consistency and conceptual equivalence. By validating the Chinese (HK) version of the instrument, we are able to produce an outcome-assessment tool for CTS. As a result, we have created a platform on which a cross-national and cross-cultural epidemiological comparison is feasible and the success of different types of treatments can be assessed.

Appendix

Additional material related to this article can be found on the HKMJ website. Please go to <http://www.hkmj.org>, search for the appropriate article, and click on Full Article in PDF following the title.

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APPENDIX 1. The final Hong Kong Chinese version of the Brigham and Woman's Hospital CTS questionnaire

表格一

以下題目所指的病徵，是指過去兩個星期內的一個平常日子中，閣下所感受到的病徵的嚴重程度。請於每一個問題中，只圈出一個最合適的答案。
請問你的手或手腕的痛楚於晚上有多嚴重？ 1. 我在晚上根本沒有手或手腕的痛楚 2. 少少痛 3. 頗痛 4. 非常痛 5. 極度痛
在過去兩個星期來的一個平常晚上，你的手或手腕痛會令你在睡眠中痛醒多少次？ 1. 從來都未試過 2. 一次 3. 兩至三次 4. 四至五次 5. 多過五次
你在日間通常有沒有手或手腕痛？ 1. 我從未在日間感到痛楚 2. 我在日間只感到少少痛 3. 我在日間感到頗痛 4. 我在日間感到非常痛 5. 我在日間感到極度痛
你在日間感到手或手腕痛有多頻密？ 1. 我從未在日間感到痛楚 2. 每日一至兩次 3. 每日三至五次 4. 每日多過五次 5. 不停的痛
平均來說，在日間的痛楚每次維持多久？ 1. 我從未在日間感到痛楚 2. 少於十分鐘 3. 十至六十分鐘 4. 多過六十分鐘 5. 不停的痛
你的手有沒有痲（沒有感覺）？ 1. 沒有 2. 我只感到少少痲 3. 我感到頗痲 4. 我感到非常痲 5. 我感到極度痲
你會不會感到手或手腕無力？ 1. 沒有 2. 少少無力 3. 頗無力 4. 非常無力 5. 極度無力
你的手有沒有痺（針拮感覺）？ 1. 沒有 2. 我只感到少少痺 3. 我感到頗痺 4. 我感到非常痺 5. 我感到極度痺
你的手在晚上有沒有痲（沒有感覺）或痺（針拮感覺)？ 1. 我的手在晚上沒有痲或痺 2. 少少痲痺 3. 頗痲痺 4. 非常痲痺 5. 極度痲痺
在過去兩星期的一個平凡晚上，你的手或手腕的痲痺令你一晚醒多少次？ 1. 從來都未試過 2. 一次 3. 兩至三次 4. 四至五次 5. 多過五次
你在拿捏或使用細小的物件（如鎖匙或筆）時，有沒有感到困難？ 1. 沒有困難 2. 少少困難 3. 頗困難 4. 非常困難 5. 極度困難

表格二

在過去兩個星期內的一個平常日子中，閣下會否因為手或手腕的病徵而令以下的活動有困難？請於每一個描述的活動中，圈出一個最合適的答案形容你所感受到的困難。

活動	沒有困難	少少困難	頗困難	非常困難	根本做唔到
寫字	1	2	3	4	5
扣衫鈕	1	2	3	4	5
拿起一本書或雜誌睇	1	2	3	4	5
提起電話的聽筒	1	2	3	4	5
扭開一個樽蓋	1	2	3	4	5
一般家庭雜務	1	2	3	4	5
提起一袋超市的雜物	1	2	3	4	5
沐浴更衣	1	2	3	4	5

APPENDIX 2. Example of questions used in establishing the ordinality by referring the categorical choice to the visual analogue scale. Questions and the corresponding visual scales were printed on separate pages and in random order

過去兩個星期內的一個平常日子中，你的手或手腕的痛楚於晚上有多嚴重？請圈出一個最合適的答案。
1. 根本沒有痛楚
2. 少少痛
3. 頗痛
4. 非常痛
5. 極度痛

過去兩個星期內的一個平常日子中，你的手或手腕的痛楚於晚上有多嚴重？請於線上劃出你的困難程度。

根本沒有痛楚 ——————————————— 極度痛

在過去兩個星期內的一個平常日子中，閣下會否因為手或手腕的病徵而令寫字有困難？請圈出一個最合適的答案形容你所感受到的困難。
1. 沒有困難
2. 少少困難
3. 中度困難
4. 十分困難
5. 根本做唔到

在過去兩個星期內的一個平常日子中，閣下會否因為手或手腕的病徵而令寫字有困難？請於線上劃出你的困難程度。

沒有困難 ——————————————— 根本做唔到