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Cross-cultural validation of the educational needs assessment tool into Chinese for use in severe knee osteoarthritis

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Background: Patient education is an integral part of the management of osteoarthritis. The educational needs assessment tool (ENAT) was developed in the UK to help direct needs-based patient education in rheumatic diseases.

Aim: The aim of the study was to adapt and validate the ENAT into Chinese, for use in severe knee osteoarthritis (KOA).

Methods: This cross-cultural validation study took two phases: 1) adaptation of the ENAT into Chinese (CENAT) and 2) validation of the CENAT. The Construct validity was determined using factor analysis and criterion-related validity by comparing data from CENAT with data from different self-efficacy scales: patient–physician interactions scale (PEPPI-10), self-efficacy for rehabilitation outcome scale (SER), and the self-efficacy for exercise scale (SEE).

Results: The sample comprised 196 patients, with mean age 63.6±8.7 years, disease duration was 11.5 years, and 57.1% were female. The CENAT was found to have high internal consistency. The CENAT had weak correlations with the Chinese versions of PEPPI (r=0.40), SER (r=0.40), and SEE (r=0.39). There were no correlations with age r=-0.03 or disease duration r=-0.11.

Conclusion: The ENAT translated well into Chinese and has evidence of validity in KOA. Future studies will further inform its usefulness in clinics, community, and online settings.

Keywords: assessment, educational needs, knee osteoarthritis, instrument validation

Introduction
Knee osteoarthritis (KOA) is a common disease of the knee joint, which leads to long-term joint pain, limited movement, and poor quality of life in the affected patients.1 In the US, >27 million adults suffer from KOA.2 It is estimated that 10% of people older than 55 years have disabling knee symptoms due to KOA in the UK.3 In China, the incidence of KOA is 13.2% in 40–70-year age group.4

Patient education is an important aspect of the management of osteoarthritis. The management guidelines for patients with osteoarthritis point out that “patients should receive patient education on their first consultation with health providers”.5–7 The purpose of patient education is to help patients manage their diseases and improve their life quality.6–8 However, research findings have shown that routine patient education struggles to achieve long-term impact on patients;9 therefore, individualized, needs-based educational programs that put the patient at the center are advocated.10

Understanding the patients’ needs for education is a prerequisite in the development of an effective patient-centered education, and some studies have proposed the development of individualized self-management programs for people with osteoarthritis to improve their health status.11,12 The European League Against Rheumatism has...
developed evidence-based recommendations, which provide guidance on the delivery of nonpharmacologic interventions of people with hip or KOA. These include individualized treatment and patient education regarding lifestyle changes, exercise, and other aspects of disease management.

Research on patients’ educational needs in patients with arthritis is lacking in China. In the UK, the educational needs assessment tool (ENAT) was developed over 10 years ago and has been validated in various disease groups. The ENAT has been shown to help nurses’ direct needs-based patient education for people with rheumatoid arthritis (RA). The ENAT is a simple 39-item questionnaire used to assess educational needs of people with arthritis. It consists of seven domains: pain management (six items), activity (five items), feeling (four items), arthritis course (seven items), treatment (seven items), self-care measure (six items), and support system (four items). Each item has a five-point Likert scale, scored as 0 = not important, 1 = a little important, 2 = fairly important, 3 = very important, and 4 = extremely important, thus directly reflecting the patients’ educational needs.

In the Netherlands, the Dutch version ENAT has been used to determine educational needs of patients with RA, systemic lupus erythematosus, and systemic scleroderma (SSc). In Poland, the Polish version of the tool was validated and used to summarize the educational needs of patients with RA and SSc. The ENAT has been validated for use in osteoarthritis in Austria, the Netherlands, Norway, Portugal, and the UK.

Nurses spend a lot of time in patient education, and providing needs-based patient education ensures that this important activity is effective. The ENAT is the tool with which this can be achieved. In China, research on educational needs of patients with arthritis is at an infancy stage and no tools are available for assessment of patients’ educational needs. The aim of this study was to adapt the ENAT into Chinese (CENAT) and validate it for use in KOA.

Methods

Study design

This was a cross-sectional study that involved two phases: 1) adaptation of the original (English) ENAT into Chinese by researchers from two hospitals in Beijing and Tianjin, between January and February 2016; and 2) testing the validity of the CENAT in patients with KOA.

In Phase II, we included patients who were hospitalized for KOA of Kellgren–Lawrence grade IV by X-ray and had the ability to complete the questionnaire independently. We excluded patients who were not able to complete the questionnaire, such as those who were unconscious, with severe mental disorders, cognitive dysfunction, or other serious illnesses. Two family doctors oversaw the integrity of the study and three orthopedic surgeons supervised patient recruitment.

The adaptation of the ENAT into Chinese

The ENAT was translated into Chinese according to an established cross-cultural adaptation methodology described by Beaton et al, which consists of five stages: initial translation, synthesis of these translations, back-translation, expert committee assessment, and field testing. First, the ENAT was first translated into Chinese by two senior translators, one is a professional bilingual translator and the other is a bilingual translator with medical educational background. Each translator worked out a report (T1 and T2). Second, two translators with medical educational background joined the team to discuss T1 and T2, and then they revised, edited, and summarized the third translation report (T3). Third, translation report (T3) was back-translated by two translators who lived and studied in America for a long time generating two back-translated versions, respectively (BT1 and BT2). Fourth, the expert committee comprising all translators, clinicians, and a methodologist met for discussion and reached a consensus on all translated items. Following this meeting, five patients with severe KOA were recruited to help in a preliminary test to determine the readability and feasibility of the CENAT. The patients evaluated the specific contents of the scale, and in discussion with the staff, they produced a draft CENAT ready for psychometric testing (Table S1).

Validation of the CENAT

Following the cross-cultural adaptation, the CENAT was given to patients with KOA, and the data were used to test for different types of validity: 1) construct validity using factor analysis; 2) internal consistency; and 3) concurrent validity, assessed by comparing the CENAT data with self-efficacy data (the self-efficacy for exercise, the self-efficacy for rehabilitation, and perceived efficacy in patient–physician interactions [PEPRI]).

While the CENAT data were used for testing its construct validity (using factor analysis) and internal consistency, the concurrent validity testing involved data from other questionnaires, namely the self-efficacy for exercise scale (SEE), the self-efficacy for rehabilitation outcome scale (SER), and the PEPPI scale (PEPPPI-10). Patients who consented were given the CENAT and the other questionnaires to complete independently and return to the investigators.
The SEE is used to measure self-efficacy for exercise. The English version has a high internal consistency (Cronbach’s \( \alpha \) coefficient=0.92). The Chinese version SEE is validated and used in clinical studies. The Cronbach’s \( \alpha \) coefficient of the Chinese version SEE is 0.75. The SER is validated for measuring the patients’ confidence in functional exercise after hip and knee replacement surgery. The Chinese version SER is validated and used in clinical research. The tool consists of 12 items, and the Cronbach’s \( \alpha \) coefficient of the Chinese version SER is 0.94. The 10-item PEPPi-10 is used to test patients’ confidence level in patient–physician interactions. The Chinese version of the PEPPi-10 is validated and has been shown to have Cronbach’s \( \alpha \) coefficient of 0.91. The ENAT has been validated in seven rheumatic diseases including osteoarthritis and this study validated its Chinese version (CENAT).

Once returned, the data from the questionnaires were anonymized and entered into a spreadsheet for data cleaning and analysis. The senior author (WL) who was not involved in the data collection undertook the statistical analysis. The statistical tests are detailed in the next section.

Statistical analysis
In this study, factor analysis was used to validate the Chinese version of ENAT, that is, to find representative factors of the scale. Kaiser–Meyer–Olkin test assesses the adequacy of the sample for factor analysis, and a value between 0.8 and 1 suggests that the sample is adequate. Principal component analysis and maximum variance method were adopted in this study to extract the main factors that met the requirements (Eigen value component matrix was rotated by maximum variance method, and the rotated matrix variable score was >0.60, which was within the factor’s range). Cronbach’s \( \alpha \) coefficient was used to evaluate the internal consistency of the Chinese ENAT. Cronbach’s \( \alpha \) coefficient of >0.7 indicates that the measured scale has good internal consistency.

The correlations between the CENAT and SER, SEE, and PEPPi were also measured to assess the criterion-related validity of the CENAT. If the data had been normally distributed, the correlations of the three variables were determined by Pearson’s correlation coefficient; otherwise, the Spearman’s correlation coefficient was used with values of 0.20–0.39, 0.40–0.59, 0.60–0.79, and 0.80–1.0 representing weak, moderate, strong, and very strong correlations, respectively. In RA population, needs-based patient education had an effect on self-efficacy; therefore, it is plausible to expect that the educational needs would be correlated with self-efficacy (convergent validity) and not correlated with age or disease duration (divergent validity).

Statistical analyses were performed using SPSS 19.0, IBM Corporation, Armonk, NY, USA; 2010. Structural validity was assessed using confirmatory factor analysis with LISREL 8.7, Scientific Software International, Lincolnwood, IL, USA.

Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All patients signed an informed consent form and the study was approved by Tianjin Hospital ethics committee.

Results
Patient characteristics
Overall, 200 participants were recruited and four were excluded from the analysis because of missing responses to items in the CENAT. The evaluable population comprised 196 patients with mean age 63.6±8.7 years, mean disease duration was 11.5 years, and 57.1% were women. Other patient characteristics are summarized in Table 1.

Results of the adaptation phase
During the adaptation process of the ENAT, the researchers encountered unclear concepts, grammar, and idioms that
were influenced by an English cultural background. Through discussion, the members of the expert committee reached a consensus on the most appropriate terminology to help Chinese participants understand the items. Table S1 presents the results of the back-translation, issues, and agreements for each ENAT item. These results demonstrate that different cultural backgrounds, national conditions, and social systems were taken into account in the adaptation to enable patients’ understanding of the items (Figure 1). The Expert Committee believes that the aim of developing an accurate Chinese version of the ENAT has been achieved.

Internal consistency
The study results showed that the Cronbach’s $\alpha$ coefficient of the CENAT was 0.74. Kaiser–Meyer–Olkin measure was 0.9, suggesting that this dataset was adequate for factor analysis. Common factors with the characteristic value $\geq 1$ were extracted by using principal component analysis and maximum variance rotation method. The results showed that the characteristic values of factor 1, factor 2, factor 3, factor 4, and factor 5 were $\geq 1$, and the contribution rate was 67.9%, including all 39 items (Table 2). The confirmatory factor analysis showed good-fit indices for a five-factor model of the CENAT ($df=692$, $p$-value $<0.01$, root mean square error of approximation $=0.08$). The correlation coefficient between the five factors ranged between 0.65 and 0.91 (Figure 2).

Criterion-related validity
Table 3 presents the Spearman’s correlations between the CENAT and other measures. The results showed that the CENAT had weak but significant correlations with the measures of self-efficacy (PEPP $r=0.40$, $p<0.001$; SER $r=0.40$, $p<0.001$).
Table 2  Factor analysis of the CENAT rotating element matrix

| Item          | Factor | 1   | 2   | 3   | 4   | 5   |
|---------------|--------|-----|-----|-----|-----|-----|
| Pain1         |        | 0.343| 0.242| 0.101| 0.225| 0.742|
| Pain2         |        | 0.369| 0.094| 0.195| 0.634| 0.267|
| Pain3         |        | 0.144| 0.286| 0.138| 0.789| -0.010|
| Pain4         |        | 0.155| 0.236| 0.281| 0.766| 0.029|
| Pain5         |        | 0.030| 0.213| 0.110| 0.751| 0.205|
| Pain6         |        | 0.155| 0.010| 0.222| 0.668| 0.348|
| Movement7     |        | 0.374| 0.412| 0.390| 0.234| 0.275|
| Movement8     |        | 0.166| 0.275| 0.424| 0.189| 0.477|
| Movement9     |        | 0.182| 0.516| 0.227| 0.225| 0.441|
| Movement10    |        | 0.469| 0.254| 0.226| 0.389| 0.346|
| Movement11    |        | 0.305| 0.724| 0.180| 0.282| 0.089|
| Feeling12     |        | 0.184| 0.322| 0.587| 0.399| 0.223|
| Feeling13     |        | 0.398| 0.168| 0.614| 0.435| -0.019|
| Feeling14     |        | 0.416| 0.016| 0.191| 0.363| 0.434|
| Feeling15     |        | 0.336| 0.071| 0.601| 0.413| 0.135|
| Disease16     |        | 0.187| 0.505| 0.199| 0.188| 0.582|
| Disease17     |        | 0.463| 0.446| 0.377| 0.249| 0.255|
| Disease18     |        | 0.284| 0.562| 0.391| 0.233| 0.078|
| Disease19     |        | 0.526| 0.581| 0.131| 0.225| 0.150|
| Disease20     |        | 0.373| 0.328| 0.331| 0.258| 0.315|
| Disease21     |        | 0.377| 0.454| 0.241| 0.341| 0.174|
| Disease22     |        | 0.533| 0.505| 0.091| 0.084| 0.257|
| Treatment23   |        | 0.452| 0.264| 0.346| 0.126| 0.628|
| Treatment24   |        | 0.681| 0.296| 0.359| 0.169| 0.219|
| Treatment25   |        | 0.650| 0.399| 0.144| 0.091| 0.259|
| Treatment26   |        | 0.662| 0.259| 0.377| 0.219| 0.113|
| Treatment27   |        | 0.688| 0.245| 0.332| 0.134| 0.257|
| Treatment28   |        | 0.609| 0.478| 0.148| 0.131| 0.333|
| Treatment29   |        | 0.624| 0.127| 0.311| 0.447| 0.092|
| Selfhelp30    |        | 0.211| 0.311| 0.675| 0.247| 0.331|
| Selfhelp31    |        | 0.340| 0.318| 0.513| 0.316| 0.209|
| Selfhelp32    |        | 0.213| 0.603| 0.377| 0.097| 0.266|
| Selfhelp33    |        | 0.337| 0.668| 0.216| 0.246| 0.206|
| Selfhelp34    |        | 0.279| 0.741| 0.212| 0.118| 0.215|
| Selfhelp35    |        | 0.651| 0.512| 0.193| 0.139| 0.007|
| Support36     |        | 0.272| 0.333| 0.673| 0.155| 0.269|
| Support37     |        | 0.664| 0.240| 0.289| 0.229| 0.224|
| Support38     |        | 0.307| 0.517| 0.554| 0.112| 0.080|
| Support39     |        | 0.685| 0.343| 0.136| 0.118| 0.269|

Notes: Extraction method: principal component. Rotation method: orthogonal rotation method with Kaiser standardization. Rotation converges after the eighth iteration.

Abbreviation: CENAT, Chinese version of the educational needs assessment tool.

$p<0.001$; and $r=0.39; p<0.001$). There were no correlations between the CENAT and age ($r=-0.03, p=0.69$) nor disease duration ($r=-0.11, p=0.11$).

Discussion

In the present study, a standard adaptation method was used to adapt the ENAT into Chinese, and this process was useful in ensuring the conceptual equivalence between the original (English) ENAT and the Chinese version. Simplistic translation of a questionnaire into another language without cross-cultural adaptation and validation is inadequate. Due to different cultural background, national conditions, and other factors, some items of the Chinese ENAT could not be directly translated into Chinese; therefore, the adaptation process took account of culture to ensure that the concepts contained in the items were meaningful to Chinese patients.

As our purpose was to adapt the ENAT into Chinese and test its validity, the results have confirmed that the CENAT is a valid tool for assessing the educational needs of patients with severe KOA in China. Factor analysis and results of the internal consistency have demonstrated that the CENAT has retained its construct validity after being adapted into Chinese. In chronic disease, self-efficacy has been shown to mediate the effect of patient education. The presence of correlation between the CENAT and measures of self-efficacy implies a degree of convergent validity, although these were only weak correlations. Care needs to be taken in interpreting these results as the CENAT assesses patient educational need, and this was a noninterventional cross-sectional study, and the level of patients’ need does not necessarily correspond to self-efficacy. Conversely, the lack of significant correlation with age and disease duration implies a divergent validity, both of which provide further evidence of the validity of the CENAT in KOA.

The ENAT was designed to assess educational needs of patients with arthritis, and in this study, we have now demonstrated its validity in Chinese population of patients with KOA. The CENAT can, therefore, be used to direct needs-based education and to develop the health educational programs in patients with KOA in China.

The limitations of this study are that 1) as the sample was selected from hospitalized patients, the risk of selection bias cannot be excluded; 2) we could not undertake more powerful analyses such as item-response theory or exploration of differential item functioning. While those analyses can be carried out in the future, we believe that the current analysis provides preliminary evidence of the validity of the CENAT; 3) being a noninterventional cross-sectional study, the evidence of criterion-related validity was limited and sensitivity to change was not assessed; 4) the CENAT was used in hard copy (paper) form and as the technology of questionnaire moved into electronic forms, its response in online and app forms will need to be assessed; 5) this study validates the CENAT in KOA; therefore, further evidence will be required before the tool is used in other types of osteoarthritis. Despite the abovementioned limitations,
we believe that our conclusions are well supportive of the validity of the CENAT in this patient population.

**Conclusion**

This is the first study to adapt and validate the ENAT into Chinese for use in severe KOA. We systematically investigated the validity of the Chinese version ENAT, showing that the Chinese version ENAT has a good construct validity, internal consistency, and satisfactory criterion-related validity. Therefore, this tool can help nurses to assess the educational needs of patients with severe KOA and provide effective needs-based patient education. Although
Table 3 Spearman’s correlations between the CENAT and other measures

| CENAT | ENAT | PEPP | SER | SEE | Disease duration | Age |
|-------|------|------|-----|-----|------------------|-----|
|       |      |      |     |     |                  |     |
| Spearman’s correlations | I | 0.40** | 0.40** | 0.39** | −0.11 | −0.03 |
| P     | 0.000 | 0.000 | 0.000 | 0.114 | 0.690 |
| N     | 196 | 196 | 196 | 196 | 196 | 196 |
| Bootstrapp | | | | | | |
| Deviation | 0 | −0.003 | −0.002 | −0.000 | 0.005 | 0.000 |
| Standard error | 0 | 0.069 | 0.067 | 0.069 | 0.067 | 0.074 |
| 95% CI | | | | | | |
| Floor | 1 | 0.251 | 0.264 | 0.249 | −0.239 | −0.178 |
| Ceiling | 1 | 0.426 | 0.514 | 0.521 | 0.025 | 0.111 |

Notes: *Unless otherwise noted, bootstrap results are based on 1,000 bootstrap samples. **p<0.01.

Abbreviations: CENAT, Chinese version of ENAT; ENAT, educational needs assessment tool; PEPP, perceived efficacy in patient–physician interactions; SER, self-efficacy for exercise scale; SEE, self-efficacy for rehabilitation.

the scale has demonstrated validity in this study, further research will be required to provide the evidence for other psychometric properties including sensitivity to change.

Disclosure
The authors report no conflicts of interest in this work.

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## Supplementary material

### Table S1 Back-translation, issues, and agreements for each educational needs assessment tool item

| Original | Back-translation 1 (BT1) | Back-translation 2 (BT2) | Issues | Agreement |
|----------|-------------------------|-------------------------|--------|-----------|
| Arthritis educational needs assessment tool | Assessment tool for educational needs in patients with arthritis | The tool for assessing needs for education in patients with arthritis related | Chinese language has multiple meanings for the word "arthritis" | 关节炎教育需求评估工具 “Arthritis” is the most adequate translation |
| How long have you had your arthritis for? | How long have you been diagnosed with arthritis? | How long have you suffered from arthritis? | Uncertainty whether word “diagnosed” or “suffer” should be used in the Chinese version | “您因为关节炎病了多久?” The Chinese translation is correct in terms of style |
| Please state your age in years: | Please state your age | Please state your age in years: | Discussion on whether phrase “in years” is needed. | The phrase “in years” has been omitted “您的年龄是” |
| How old were you when you left school? | How old were you when you graduated from school? | How old were you when you graduated from school | Education in the Chinese system does not require age information | The most appropriate Chinese phrase was chosen “您的学历是” |
| At this time, do you want education about anything to help you deal with your arthritis? | Do you want to get information which will help you manage arthritis? | Do you want to help yourself to cope with arthritis by any obtaining education? | Uncertainty how to translate into Chinese “manage” or “cope with” | Chinese translation is correct in terms of style “如果是，您想知道什么” |
| If yes, what? | If yes, what information would you like to get? | If yes, what would you like to know? | Uncertainty how to translate into Chinese “get” or “know” | The Chinese version is correct in terms of style “通常，您想了解多少关节炎的知识?” |
| In general, how much information do you want about your arthritis? | In general, how much information would you like to know about your arthritis? | In general, how much information would you like to get about your arthritis! | Discussion concerning the phrase “Please mark the appropriate column with n ‘√’” | The word “information” was added “下列问题您想了解多少？请在适当的列表下打勾” |
| How much do you need to know now about each of the following things? Please tick in the column that shows best how you feel: | How much do you need to know now about each of the following issues? Please tick in the column that shows best how you feel: | How much would you already know about the following issues? Please mark the appropriate column with an ‘√’ | Discussion concerning the phrase “Please mark the appropriate column with n ‘√’” | The Chinese version is correct in terms of style |
| Using heat or cold on painful joints | Treatment of painful joint by cold or heat | Reduce the pain of joints by cold or heat | Uncertainty how to translate into Chinese “treatment” or “reduce” | “用冷热疗法处理关节疼痛” The most correct Chinese phrase has been chosen “疼痛管理相关部分” |
| This section relates to managing pain | Section on managing pain | Section on dealing with pain | Discussion on whether to choose a more formal way of introducing section of questions | A more formal way of introducing a new section was chosen “知道以下更多的信息对您来说有多重要” |
| How important is it for you to know more about the following | How important is it for you to know more about the following issues for you? | How important is it for you would know more about the following issues? | Discussion on a formal way of asking a question | An informal way of asking a question has been chosen “运动疗法” |
| Using exercise | Physical exercise | Functional exercise | Uncertainty whether “physical” and “functional” can be used synonymous | The most correct Chinese phrase was chosen “活动相关部分” |
| The section relates to movement | Section on issues related to movement | Section on issues related to mobility | Discussion on word choice between “movement” and “mobility” | The most adequate Chinese version was chosen |

(Continued)
| Original                                                                 | Back-translation 1 (BT1)                      | Back-translation 2 (BT2)                      | Issues                                                                 | Agreement                                                                 |
|-------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Ways of doing things which wear my joints less                          | Methods of reducing wear of joints            | Ways of relieving joints                      | “Wear my joints less” was repeated in the Chinese phrase              | “缓解关节磨损的方法”                                                        |
| Ways to deal with moods or depression                                   | Ways to alleviate moods or depressive states  | Ways to cope with moods or depressive states  | Discussion on word choice between “alleviate” and “cope with”. Ambiguous meaning of the term “moods” | “应对负性情绪或抑郁状态的方法”                                                                                                                                 |
| Why I am feeling down or depressed                                      | Why do I feel moody or depressed              | Why do I feel disappointed or depressed?      | Ambiguous meaning of the phrase “feeling down”                        | “为什么我会感到情绪低落或沮丧?”                                                                                           |
| What type of arthritis do I have                                        | What type of arthritis do I have              | What type of arthritis do I have              | Lack of knowledge of arthritis in Chinese patients                     | Chinese version is correct in terms of style                             |
| How might arthritis affect my children or relatives                      | What is the effect of the disease on my children and family? | Can the disease affect the lives of my children and family? | Multiple meaning of word “affect”                                    | “关节炎对我的孩子和家人会产生什么影响”                                                                                   |
| Ways my arthritis can be treated                                        | Therapies for arthritis                       | The treatment of arthritis                    | Uncertain whether to use the word “therapies” or “treatment” in the Chinese version | The most adequate Chinese translation was chosen                         |
| Ways my arthritis is affecting me                                       | Ways arthritis is affecting me                | The way of my arthritis is affecting me       | Multiple meaning of word “affect”                                    | “关节炎对我造成影响的方式”                                                                                              |
| What might happen in the future                                         | What will happen to me in the future          | How will my condition change in the future    | The question is open ended                                            | “在未来，我的状态将如何改变”                                                                                              |
| This section is about treatments you may be receiving from health professionals. | Section on treatments that you can receive from medical professionals. | Section contains treatments that the patient can receive from nurses and other health professionals | Lack of a Chinese equivalent of a term “health professionals” | The chosen phrase describes the meaning of “health professionals”                                                             |
| How operation might help me                                             | Can surgery help me                           | Can surgery help me                           | Uncertainty how to translate “operation” into Chinese                | The most adequate Chinese term was chosen                                |
| What are the side effects of my medicines                               | What are the side effects of my drugs         | Are there any side effects to the drugs       |                                                                                       | “药物的副作用是什么”                                                                                                  |
| How aid might help me (splints, adaptations, collars)                   | What aid may help me (orthopedics orthotics, splints, fixators) | What aids can help me (orthopedics orthotics, splints, fixators) | Difficulty with translating term “adaptations” and “collars”         | Chinese version is correct in terms of style                             |
| Alternative treatments or herbal remedies                                | Conservative treatment or Chinese traditional treatment | Conservative treatment or Chinese traditional treatment | Multiple meanings of the phrase “alternative treatments” and “herbal remedies” | The most adequate Chinese term has been chosen                           |
Table S1 (Continued)

| Original | Back-translation 1 (BT1) | Back-translation 2 (BT2) | Issues | Agreement |
|----------|--------------------------|--------------------------|--------|-----------|
| Foods or vitamins that might help | Diet or vitamins that may help | Foods or vitamins which might help | More formal version of question in Chinese should be given | "食物或维生素能带来的帮助" Chinese version is correct in terms of style "推荐的运动" The most adequate Chinese translation was chosen "运动量" |
| Exercises I should be doing | Recommended exercises | Recommended exercises | Uncertainty whether the word "recommended" should be used | "运动" Chinese term was chosen "在什么情况下，我应该看医生?" Chinese translation is correct in terms of style |
| How much exercise should I be doing | Amount of exercise | Amount of exercise | Uncertainty whether the word "amount" should be used | "运动量" Chinese term was chosen "在什么情况下，我应该看医生?" Chinese translation is correct in terms of style |
| Times when I should call the doctor or nurse | Times when I should contact a doctor | Situations when I should consult a doctor | Uncertainty whether the word "situations" is adequate, and lack of a Chinese equivalent of the sentence "Registered nursing don’t provide consultative services regarding issues relevant to the practice of nursing for outpatients" | "在什么情况下，我应该看医生?" Chinese translation is correct in terms of style |
| Organizations I can get in touch with about arthritis | Departments which can help patients with arthritis | Departments that can help patients with arthritis | Lack of a Chinese equivalent of a term "Arthritis Organizations". Uncertainty whether "departments" is the correct translation of the term "organizations" | "哪些部门可以提供关节炎患者" Chinese phrase describing contacting an organism was chosen |
| Who I can ask for financial help | Who can I ask for financial help | Who can I ask for financial help | Lack of cultural equivalence (it is possible to ask for financial help in case of suffering from arthritis) | "我可以向哪里寻求经济帮助" Chinese version is correct in terms of style |
| Where I can find groups who will help me to cope with arthritis | Where can I find support groups for arthritis | Where can I find support groups for people with arthritis | Lack of cultural equivalence (it is possible to ask for help outside the health care system) | "我在哪里可以得到病友的帮助?" |
| How I can get the most out of seeing the doctor or nurse | How to make more effective contacts with the doctor or nurse | How can I improve communication with the doctor or nurse to maximize effectiveness | Idiomatic meaning of the "get the most out of" can be translated in various ways in Chinese | "如何提高与医生或护士的交流效果" Chinese version is correct in terms of grammar |

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