

# Japanese Orthopaedic Association Hip Disease Evaluation Questionnaire (JHEQ): a patient-based evaluation tool for hip-joint disease. The Subcommittee on Hip Disease Evaluation of the Clinical Outcome Committee of the Japanese Orthopaedic Association

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## Abstract

**Background** The Japanese Orthopaedic Association Hip Score is widely used in Japan, but this tool is designed to reflect the viewpoint of health-care providers rather than that of patients. In gauging the effect of medical therapies in addition to clinical results, it is necessary to assess quality of life (QOL) from the viewpoint of patients. However, there is no tool evaluating QOL for Japanese patients with hip-joint disease.

**Methods** With the aim of more accurately classifying QOL for Japanese patients with hip-joint disease, we prepared a questionnaire with 58 items for the survey derived from 464 opinions obtained from approximately 100 Japanese patients with hip-joint disease and previously devised evaluation criteria. In the survey, we collected information on 501 cases, and 402 were subjected to factor analysis. From this, we formulated three categories—movement, mental, and pain—each comprising 7 items, for

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a total of 21 items to be used as evaluation criteria for hip-joint function.

**Results** The Cronbach's  $\alpha$  coefficients for the three categories were 0.93, 0.93, and 0.95, respectively, indicating the high reliability of the evaluation criteria. The 21 items included some related to the Asian lifestyle, such as use of a Japanese-style toilet and rising from the floor, which are not included in other evaluation tools.

**Conclusions** This self-administered questionnaire may become a useful tool in the evaluation of not only Japanese patients, but also of members of other ethnic groups who engage in deep flexion of the hip joint during daily activities.

## Introduction

There are numerous medical evaluation tools for a variety of diseases, but in most cases, such tools are designed to reflect the viewpoint of health-care providers rather than that of patients. Evaluations focusing on hip-joint disease, such as the Harris Hip Score [1] and Merle d' Aubigné and Postel score [2], are commonly used. In Japan, the criteria for hip-joint function proposed by the Japanese Orthopaedic Association (JOA Hip Score) [3] are also widely used. However, it has been reported that the JOA Hip Score is a reliable system only for patients with osteoarthritis of the hip that is treated conservatively [4]. Moreover, such evaluations by health-care providers can be biased and affected by intra-observer and interobserver differences, producing disease-state assessment results that differ significantly from

patients' perceived severity of their disease. In gauging the effect of medical therapies in addition to clinical results, it is necessary to assess patients' quality of life (QOL). Thus, in recent years, evaluation criteria that can serve as patient-focused outcome indices have been attracting increasing attention. Health-related QOL criteria represent patient-based outcome index criteria. The Medical Outcomes Study Short-Form 36-Item Health Survey (SF-36) [5] offers comprehensive criteria, and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) [6] and Oxford Hip Score (OHS) [7] offer criteria specific to hip-joint disease. However, because these tools' criteria do not take into account movements specific to the Asian lifestyle [8, 9], such as rising from the floor or squatting to use a Japanese-style toilet, they cannot be said to accurately evaluate the QOL of all patients [10–13].

In recent years, the Japanese Orthopaedic Association has been working on a plan to establish patient-based, multi-faceted, and science-based evaluation criteria for a variety of diseases. As a part of that effort, the Japanese Hip Society has been asked to prepare criteria specific to hip-joint disease that also incorporate movements common in Japanese daily life. In response to this request, the Japanese Hip Society established the Subcommittee on Hip Disease Evaluation of the Clinical Outcome Committee of the Japanese Orthopaedic Association to draw up patient-based criteria specific to hip-joint disease with this consideration in mind. In this article, we describe the process of criteria creation, and consider the reliability and appropriateness of these final evaluation criteria. The complete hip-disease evaluation

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questionnaire and guide for mental-health-care providers are shown in the two appendixes to this article.

## Materials and methods

To prepare these patient-based evaluation criteria, we first interviewed patients during office visits occurring between July and September 2006 about any difficulties related to their hips. This interview was conducted by physicians or nurses with open question methods at eight university hospitals and six municipal hospitals in the whole of Japan. We analyzed and pooled patients' comments for use in preparing a questionnaire. Furthermore, we considered some preexisting QOL criteria and some evaluation criteria, such as those from the SF-36, and included some items from such sources in the questionnaire item pool. We then compiled a self-administered questionnaire for the purpose of preparing criteria and used it in a survey conducted at 12 university hospitals and 5 municipal hospitals throughout Japan from December 2007 to August 2008. Permission to conduct the survey was obtained from the ethics committee of each institution, and all patients consented to participate after being given complete information about this survey.

In order to select questionnaire question items and prepare evaluation criteria, the obtained data were subjected to factor analysis. In the factor analysis, we first identified the number of factors by principal component analysis [14], and then conducted rotation with obtained number using the Quartimin method [15]. To verify the reliability of the completed questionnaire, we calculated the Cronbach's  $\alpha$  [16] for each factor using the items applied. Statistical analysis was performed using SAS (version 9.1; SAS Institute Inc., Cary, NC, USA).

## Results

A total of 464 comments were obtained from about 100 patients during oral questioning from the interview. Overlapping opinions and those with similar content were grouped together, and a pool of 84 items was finalized. In addition, we added items based on previously devised evaluation criteria.

We then created a questionnaire comprising 58 items for the survey (Table 1). Excluding the category of "pain," which was an unnumbered item, five response categories were adopted ("strongly agree," "agree," "uncertain," "disagree," "strongly disagree") for each item on the answer sheet. For some of the items, the questions were asked twice, one time for the left hip joint and another time for the right hip joint. To assess pain, a visual analog scale was also adopted. In this survey, we collected information

**Table 1** Questions used in a survey

Item no.	Question
Pain	How severe is your hip-joint pain? <sup>a</sup>
1	Even when I am at rest, my hip is painful
2	My hip is painful when I sit in a chair
3	My hip is painful when I sit down on a sofa or other low place
4	My hip is painful when I stand still
5	I feel pain in my hip when I start to move
6	I feel pain when I move my hips
7	Because of pain in my hip joint, it is difficult for me to move
8	Because of pain in my hip joint, I can't do things energetically
9	I sometimes feel decreased muscle strength in my legs
10	I sometimes find it a burden to walk the usual distance that I need to cover
11	When I walk, I need one cane
12	When I walk, I need two canes
13	It is difficult for me to walk up a slope
14	It is difficult for me to walk down a slope
15	It is difficult to walk in places where there is a difference in levels
16	It is difficult for me to climb up stairs
17	It is difficult for me to climb down stairs
18	When I am walking, it is difficult to nimbly avoid obstacles
19	It is difficult to walk straight
20	It is sometimes difficult to walk without swaying my shoulders
21	I feel a difference in the length between my left and right legs
22	Standing is onerous
23	It is difficult for me to sit in a chair
24	It is difficult for me to sit in or rise from a chair
25	It is difficult for me to get up from the floor and tatami
26	It is difficult for me to sit seiza style (with legs bent under me)
27	It is difficult for me to squat
28	It is difficult for me to use a Japanese-style toilet
29	It is difficult to use a Western-style toilet
30	It is difficult to get in and out of a bathtub
31	It is difficult to change my trousers and underpants
32	It is difficult to cut my toenails
33	It is difficult to put on my socks
34	Because of hip-joint disease, it is difficult to select suitable shoes and clothes
35	It is difficult to work standing up
36	It is difficult to work with heavy loads [using a vacuum cleaner, lifting/putting down a futon (heavy quilt)]
37	It is difficult to accomplish daily tasks
38	Because of hip-joint pain, I occasionally can't sleep
39	It is difficult to do simple shopping for daily items

**Table 1** continued

Item no.	Question
40	It is difficult for me to get in and out of cars
41	Because of hip-joint disease, it is difficult to use previously used means of transportation
42	Because of hip-joint disease, it is difficult for me to take advantage of public transportation such as buses and trains
43	Because of hip-joint disease, it is difficult for me to continue with hobbies and work previously engaged in
44	Because of hip-joint pain, it has become difficult for me to go out
45	Because of hip-joint disease, I have become self-conscious about my manner of walking
46	Because of hip-joint disease, I sometimes feel that things don't go as well as they should
47	Because of hip-joint disease, I sometimes get irritated or feel nervous
48	Because of hip-joint disease, I feel dispirited and avoid going out
49	Because of hip-joint disease, I feel anxiety about my livelihood/daily life
50	Because of hip-joint disease, I sometimes feel that life is inconvenient
51	Because of hip-joint disease, I feel dissatisfied with my health
52	My hip-joint condition deeply affects my well-being
53	Because of hip-joint disease, I sometimes feel down
54	Because of hip-joint disease, it is difficult to actively undertake various things
55	Because of hip-joint disease, I notice how others look at me
56	Because of hip-joint pain, sometimes participation in local events and neighborhood relationships does not go smoothly for me
57	Because of hip-joint disease, I sometimes quarrel with people

<sup>a</sup> Visual analog scale

for 501 cases. Regarding the replies to the questions concerning laterality of hip-joint involvement, we proposed a solution that was based on the following criteria:

- Criterion 1: The more problematic hip joint is counted.
- Criterion 2: When problems are present bilaterally in the hips, the more painful hip joint is counted.
- Criterion 3: In cases in which no decision can be made on the basis of criteria 1 and 2, the more severely affected side is counted for each item.

Patients who were diagnosed “no problem” with respect to the bilateral joint in criterion 1 were excluded from the analysis.

With the exception of the visual analog scale for pain, each item was given 0–4 points in increasing order, starting from “strongly agree.” With regard to the visual analog scale for pain, the length from the left side of the scale

recorded by the respondent was divided into five stages and given 0–4 points for increasing levels of pain, so as to be consistent with the form of the replies to the other questions.

The scores obtained for these 58 items that could be rounded off were considered items for analysis, and the persons who replied to all of these items were considered targets for analysis. These amounted to 402 cases (Table 2).

To investigate the number of categories, we performed principal component analysis. There were six principal components with eigenvalues exceeding 1, and the cumulative percentage of the six principal components was 72.2% (Table 3). A screeplot was prepared from these results, and the number of categories was decided to be three (Fig. 1).

Factor analysis was conducted using the Quartimin method with three categories. Although a few items with low commonality were seen in the prior communality estimates (minimum value, 0.404), we performed the analysis using all of the items, and Table 4 shows the factor pattern and the factor structure of main items that strongly associated with each item.

In view of the results of analysis of these categories, we selected question items, in consultation with clinicians, regarding each factor and considered the naming of the categories. In this way, as shown in Table 5, items were adopted for each category, and category names of “movement,” “mental,” and “pain” were selected. The final communality estimates of the applied items showed a maximum value of 0.825 and minimum value of 0.584. Using the items applied to the respective categories, Cronbach's  $\alpha$  values were calculated (Table 6). In addition, the correlation coefficient between the categories of “movement” and “mental” was calculated to be 0.66; that between “movement” and “pain,” 0.57; and that between “mental” and “pain,” 0.69.

## Discussion

When preparing evaluation criteria, an important first step is the creation of an item pool that will form the basis of questions from which the criteria will be decided on. Because in the present criteria, a patient-based evaluation was the main element, we questioned patients face-to-face, focusing on their own hip joint and related difficulties in daily life and then creating an item pool from patients' opinions.

Because all of the participants in our study are Japanese, we collected numerous opinions related to deep flexion and rotation of the hip joint associated with motions common in daily Japanese life, such as rising from the floor and using a Japanese-style toilet, and these were reflected in the final evaluation criteria. These items represent areas that could not be assessed in the WOMAC [10, 11, 13] and OHS [12], and thus have the important feature of including Asian

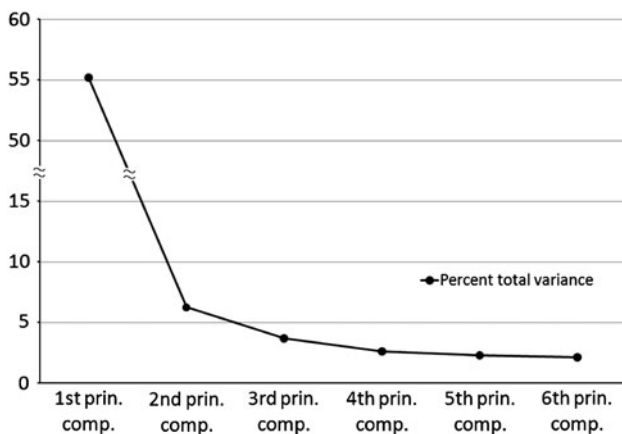
**Table 2** Summary demographic data for questionnaire respondents

	No. of targeted cases	No. of excluded cases	Total no.
Age (years)	56.1 ± 14.0	64.4 ± 12.2	57.7 ± 14.1
Sex (%)			
Men	78 (20.3)	12 (12.5)	90 (18.8)
Women	306 (79.7)	84 (87.5)	390 (81.3)
Not noted	18	3	21
Condition (%)			
Degenerative osteoarthritis of the hip	300 (75.2)	73 (74.5)	373 (75.1)
Osteonecrosis of the femoral head	61 (15.3)	8 (8.2)	69 (13.9)
No problem	0 (0.0)	5 (5.1)	5 (1.0)
Other conditions	38 (9.5)	12 (12.2)	50 (10.1)
Not noted	3	1	4
Total	402	99	501

The values of age were mean ± standard deviation. The values of sex and condition were number and percentage. The excluded patients were those who did not completely answer the questionnaire for the survey

**Table 3** Results of principal component analysis

Principal component	1st	2nd	3rd	4th	5th	6th
Eigenvalue	32.03	3.62	2.14	1.52	1.33	1.23
Percent total variance	55.22	6.25	3.69	2.62	2.29	2.13
Cumulative percent	55.22	61.47	65.17	67.79	70.08	72.20

**Fig. 1** Screplot. *Prin comp* principal component

lifestyle patterns. Notably, almost all of the questions finally adopted in the criteria were obtained by the initial oral questioning. From the viewpoint of patient-centered evaluation, the completed criteria can thus be considered to be fully appropriate.

The questionnaire used for the survey for the preparation of criteria consisted of 58 questions. Actually, we would have preferred to have used all of the items in the item pool as questions, but taking information bias into account, we decided that some of the items should not

be adopted in the survey. When adopting items for this purpose, we placed special weight on the frequency with which items were raised during oral questioning, with items raised by multiple patients adopted whenever possible.

In the survey, we collected information for 501 cases, with the target participants amounting to 402 of these. Almost all of the 99 dropouts had inadequate replies; this occurred most frequently in persons of advancing age. In preparing the questionnaire, we used the large type character for easy reading and illustrated the sample replies, in addition to the number of questions, in order to take into consideration information bias. However, the burden of completing the survey might have been considerable in the elderly. The completed questionnaire was thus shortened to only 21 items and should be employed with care with elderly patients. The “seiza” is one of the common postures in Japan. However, this item was not included in the final 21 items. In the factor analysis results, seiza was not strongly associated as compared to other items. Squatting for a Japanese-style toilet requires more range of motion of the hip joint than “seiza” [8, 9, 13]. Therefore, the items of getting up from the floor and using a Japanese-style toilet will be available for including the seiza item.

In the factor analysis, the number of categories adopted was three, but we similarly investigated the scenario of adopting four or five categories. In each of these scenarios, the categories used here were expressed, whereas in the case of the remaining categories, we could not supply an appropriate interpretation and so decided against their adoption. In the selection of questions to make up the evaluation criteria, items 16 and 17 in the “movement” category were consolidated. For this reason, when calculating the Cronbach’s  $\alpha$  coefficients and the correlation

**Table 4** Results of category analysis

Factors	Items	Factor pattern	Factor structure
First category	13	0.628	0.825
	14	0.618	0.790
	15	0.669	0.856
	16	0.659	0.848
	17	0.685	0.821
	18	0.636	0.841
	25	0.778	0.858
	27	0.900	0.821
	28	0.871	0.765
	30	0.725	0.794
	31	0.684	0.805
	32	0.828	0.772
	33	0.756	0.788
	36	0.640	0.828
Second category	45	0.610	0.753
	46	0.592	0.818
	47	0.770	0.809
	48	0.737	0.842
	49	0.794	0.824
	50	0.624	0.847
	51	0.811	0.851
	52	0.709	0.761
	53	0.651	0.787
	54	0.795	0.833
Third category	01	0.935	0.875
	02	0.933	0.854
	03	0.798	0.818
	04	0.752	0.821
	05	0.771	0.870
	06	0.824	0.887
	07	0.833	0.904
	08	0.748	0.878
	38	0.725	0.786
	Pain	0.791	0.846

coefficients between each pair of categories, we adopted the lower of the scores for items 16 and 17.

Cronbach's  $\alpha$  coefficients reflect the reliability of the evaluation criteria according to the adopted questions, and a Cronbach's  $\alpha \geq 0.70$  was considered to indicate that a scale had internal-consistency reliability [17, 18]. In each case, the Cronbach's  $\alpha$  values were high, confirming sufficient reliability for these criteria. A self-administered patient-based questionnaire for hip-joint disease, the Japanese Hip-Disease Evaluation Questionnaire (JHEQ),

**Table 5** Items adopted as evaluation criteria

Categories and items for each	Content
<b>Movement</b>	
16 + 17	It is difficult for me to climb up and down stairs
25	It is difficult for me to get up from the floor and tatami
27	It is difficult for me to squat
28	It is difficult for me to use a Japanese-style toilet
30	It is difficult to get in and out of a bathtub
32	It is difficult to cut my toenails
33	It is difficult to put on my socks
<b>Mental</b>	
47	Because of hip-joint disease, I sometimes get irritated or feel nervous
48	Because of hip-joint disease, I feel dispirited and avoid going out
49	Because of hip-joint disease, I feel anxiety about my livelihood/daily life
51	Because of hip-joint disease, I feel dissatisfied with my health
52	My hip-joint condition deeply affects my well-being
54	Because of hip-joint disease, it is difficult for me to actively undertake various things
56	Because of hip-joint pain, sometimes participation in local events and neighborhood relationships does not go smoothly for me
<b>Pain</b>	
1	Even when I am at rest, my hip is painful
2	My hip is painful when I sit in a chair
5	I feel pain in my hip when I start to move
7	Because of pain in my hip joint, it is difficult for me to move
8	Because of pain in my hip joint, I can't do things energetically
38	Because of hip-joint pain, I occasionally can't sleep
Pain	How severe is your hip-joint pain? (visual analog scale)

**Table 6** Reliability of each category

Categories	Cronbach's $\alpha$ coefficients
Movement	0.93
Mental	0.93
Pain	0.95

was established through this process (Appendix 1). A guide for mental-health-care providers using the JHEQ was also developed (Appendix 2).

Because the JHEQ takes into account facets of the Asian lifestyle, it may help improve the assessment of QOL for Asian patients. At the same time, the JHEQ can also be useful in Western populations for evaluating patients who frequently engage in deep flexion of the hip joint. The JHEQ also makes possible preoperative and postoperative evaluation of factors that formerly were not be assessed. For example, after total hip arthroplasty it will now be possible to assess mental aspects such as anxiety associated with clinical events such as dislocation and reimplantation. Similarly, these criteria may facilitate investigations into differences in patient-based evaluations in those undergoing joint-preserving surgery with osteotomy and arthroscopy as compared with total hip arthroplasty. Issues still to be resolved include the fact that no comparison has yet been performed with evaluation criteria already in use. Additional studies are required to compare the JHEQ with the JOA Hip Score, the Harris Hip Score, the SF-36, and the WOMAC.

The Japanese Orthopedic Association Hip Disease Evaluation Questionnaire and guidelines, which are provided in the Appendix, were written originally in Japanese. After translation into English by qualified specialists, they

were then back-translated into Japanese to confirm the accuracy of the English translation.

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**Conflict of interest** No conflict of interest related to this research has been declared by the authors.

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## Appendix 1

### Japanese Orthopedic Association Hip Disease Evaluation Questionnaire

The following questionnaire asks you to describe your hip-joint condition, including difficulties you may encounter in daily life. Your honest appraisals will help us improve treatment for patients in the future. Thank you for taking the time to fill out this questionnaire.

#### Guidelines

- ① Please make sure that your answers to the questions pertain to your hip-joint condition within the past 3 months.
- ② Please refer to the examples below in answering the questions.
- ③ Please try answer all questions. However, if you find some questions difficult to answer, you may skip them.
- ④ In this questionnaire, there are two types of questions:
  - I. The first type asks you to place an X on a line to indicate your answer.
  - II. The second type asks you place a check mark in the box that applies to you.

### Type I Question Example.

#### < Important Point >

Place an X on the line that corresponds to your answer.

**Good Examples**

No pain at all		Maximum pain
✕	-----	
No pain at all		Maximum pain
	-----  ✕	

In this case the X is not on the line, but beside or above it.

**Bad Examples**

No pain at all		Maximum pain
✕	-----	
No pain at all		Maximum pain
	-----  ✕	

### Type II Question Example

#### < Important Point >

Please check ONE box that most applies to you.

<p><b>Good example:</b> 1 box is checked.</p> <p><b>Bad example:</b> 2 boxes are checked.</p>		<b>Strongly Agree</b>	<b>Agree</b>	<b>Uncertain</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Good example</b>	Even when I am at rest, my hip is painful.		<input checked="" type="checkbox"/>			
<b>Bad example</b>	Even when I am at rest, my hip is painful.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			



**The Questionnaire Begins Here**

\*Please respond regarding your current (within the last 3 months) hip condition.

1. In general, rate your current level of satisfaction as it pertains to your hip condition.

Place an X on the continuum, where the left side represents complete satisfaction and the right represents complete dissatisfaction.

**Complete Satisfaction**

**Complete Dissatisfaction**



2. How severe is your hip pain?

Place an X on the continuum of pain, where the left side represents no pain at all and the right side represents maximum pain.

**< Right Side Hip >**

**No Pain  
at all**

**Maximum  
Pain**



**< Left Side Hip >**

**No Pain  
at all**

**Maximum  
Pain**



Please place a check mark in the box for each question that applies to you.

		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. Even when I am at rest, my hip is painful.	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. My hip is painful when I sit in a chair.	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I feel pain in my hip when I start to move.	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I cannot move my hip joint freely because of the pain.	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The pain in my hip joint prevents me from moving with strength.	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Because of hip-joint pain, I occasionally cannot sleep well.	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. It is difficult for me to climb up and down stairs.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. It is difficult for me to get up from the floor and tatami.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. It is difficult for me to squat.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. It is difficult for me to use a Japanese-style toilet.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
11. It is difficult to get in and out of a bathtub.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. It is difficult to cut my toenails.	<b>Right</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Left</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. It is difficult to put on my socks.	<b>Right</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Left</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Because of hip-joint disease, I sometimes get irritated or feel nervous.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Because of hip-joint disease, I feel dispirited and avoid going out.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Because of hip-joint disease, I feel anxiety about my livelihood/daily life.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Because of hip-joint disease, I feel dissatisfied with my health.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. My hip-joint condition deeply affects my well-being.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Because of hip joint disease, it is difficult for me to actively undertake various things.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Because of hip-joint pain, sometimes participation in local events and neighborhood relationships does not go smoothly for me.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Thank you for completing this questionnaire.**

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## Appendix 2

### Japanese Orthopaedic Association Hip-Disease Evaluation Questionnaire (JHEQ) Guide for Mental-Health-Care Providers

The JHEQ was created by the Subcommittee on Hip Disease Evaluation of the Clinical Outcome Committee of the Japanese Orthopaedic Association. The title, methods for completion, and scoring methods of the JHEQ described below have been prescribed by the subcommittee. The change of the JHEQ without permission is prohibited.

#### I. Title

The official English name of this questionnaire is the Japanese Orthopaedic Association Hip-Disease Evaluation Questionnaire (JHEQ).

#### II. Completing the JHEQ

1. JHEQ completion is based on patients' self-reports or those of guardians caring for patients. It is not desirable for health-care providers to assist patients in completing this questionnaire except in circumstances where
  - 1) Patients require clarification regarding the contents of the question
  - 2) Patients possess a physical disability that impairs their ability to perform the questionnaire independently
  - 3) Patients mistakenly enter incorrect data (e.g., visual analog scale [VAS], double-answering)
  - 4) A health-care provider determines that additional assistance is required
2. Health-care providers should not reveal questionnaire category names or scores to patients who complete the JHEQ.

#### III. JHEQ Items

1. Items in the JHEQ consist of factors relating to the patients' hip joints, hip-joint condition (using the VAS), pain, movement, and mental status.
  - 1) Concerning the first question, "In general, rate your current level of satisfaction as it pertains to your hip condition":
    - On the scoring sheet, this question is labeled "HIP-JOINT CONDITION." In assessing the patient's hip-joint condition, a 100-mm VAS is used. It is a numeric value measured and reported in millimeters (round up). This assessment is an independent factor and is not to be part of the JHEQ score.
  - 2) Concerning the second question, "How severe is your hip-joint pain?"
    - On the scoring sheet, this question is labeled "VAS," under the Pain category. A 100-mm VAS was adapted for this score, which is part of the Pain category. The patient's right side and left side are to be assessed separately. Measuring from the left side of the VAS index, millimeters are converted to points as follows:
      - Up to 20 mm = 4 points
      - Between 21 mm and 40 mm = 3 points
      - Between 41 mm and 60 mm = 2 points
      - Between 61 mm and 80 mm = 1 point
      - More than 80 mm = 0 points

- 3) In addition to the VAS for pain, questions 1 to 6 comprise the Pain category, questions 7 to 13 comprise the Movement category, and questions 14 to 20 comprise the Mental category.
2. Scoring procedures for Pain, Movement, and Mental categories
- 1) Patients' answers—strongly agree, agree, uncertain, disagree, and strongly disagree—are scored as 0, 1, 2, 3, and 4 points, respectively.
  - 2) The total score in each category is defined as a score of each category. Possible scores range from 0 to 28 points. A total score of the VAS for pain and questions 1 to 20 is defined as the JHEQ score. The JHEQ score ranges from 0 to 84 points.
  - 3) The scoring obeys the following criteria.
    - Criterion 1: The JHEQ score is adopted the score in the side of the hip joint with problems.
    - Criterion 2: When a patient has problems on her/his both hip joints, the JHEQ score is adopted for the side of the hip joint with the greater pain.
    - Criterion 3: When the side of the hip joint is not decided by criteria 1 and 2, the lower point in each questionnaire is adopted.
  - 4) Health-care providers can use the Japanese Orthopaedic Association Hip Disease Evaluation Questionnaire (JHEQ) Index Score Sheet as a tool for scoring each category and the JHEQ.

**Japanese Orthopaedic Association Hip-Disease Evaluation Questionnaire (JHEQ)  
Index Score Sheet**

**HIP-JOINT CONDITION**                      VAS  mm

**PAIN**  + **MOVEMENT**  + **MENTAL**  =  /84

**PAIN (0–28)**

VAS	0	1	2	3	4	
Q 1	0	1	2	3	4	
Q 2	0	1	2	3	4	
Q 3	0	1	2	3	4	
Q 4	0	1	2	3	4	
Q 5	0	1	2	3	4	
Q 6	0	1	2	3	4	<input type="text"/> / 28

**MOVEMENT (0–28)**

Q 7	0	1	2	3	4	
Q 8	0	1	2	3	4	
Q 9	0	1	2	3	4	
Q 10	0	1	2	3	4	
Q 11	0	1	2	3	4	
Q 12	0	1	2	3	4	
Q 13	0	1	2	3	4	<input type="text"/> / 28

**MENTAL (0–28)**

Q 14	0	1	2	3	4	
Q 15	0	1	2	3	4	
Q 16	0	1	2	3	4	
Q 17	0	1	2	3	4	
Q 18	0	1	2	3	4	
Q 19	0	1	2	3	4	
Q 20	0	1	2	3	4	<input type="text"/> / 28

## References

1. Harris WH. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end-result study using a new method of result evaluation. *J Bone Joint Surg Am.* 1969;51:737–55.
2. D'Aubigné RM, Postel M. Functional results of hip arthroplasty with acrylic prosthesis. *J Bone Joint Surg Am.* 1954;36:451–75.
3. Imura S. The Japanese Orthopaedic Association: evaluation chart of hip joint functions. *J Jpn Orthop Assoc.* 1995;69:864–7.
4. Kuribayashi M, Takahashi KA, Fujioka M, Ueshima K, Inoue S, Kubo T. Reliability and validity of the Japanese Orthopaedic Association hip score. *J Orthop Sci.* 2010;15:452–8.
5. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care.* 1992;30:473–81.
6. Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. Validation study of WOMAC: a health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. *J Rheumatol.* 1988;15:1833–40.
7. Dawson J, Fitzpatrick R, Carr A, Murray D. Questionnaire on the perceptions of patients about total hip replacement. *J Bone Joint Surg Br.* 1996;78:185–90.
8. Mulholland SJ, Wyss UP. Activities of daily living in non-Western cultures: range of motion requirements for hip and knee joint implants. *Int J Rehabil Res.* 2001;24:191–8.
9. Hemmerich A, Brown H, Smith S, Marthandam SS, Wyss UP. Hip, knee, and ankle kinematics of high range of motion activities of daily living. *J Orthop Res.* 2006;24:770–81.
10. Bae SC, Lee HS, Yun HR, Kim TH, Yoo DH, Kim SY. Cross-cultural adaptation and validation of Korean Western Ontario and McMaster Universities (WOMAC) and Lequesne osteoarthritis indices for clinical research. *Osteoarthritis Cartilage.* 2001;9:746–50.
11. Thumboo J, Chew LH, Soh CH. Validation of the Western Ontario and McMaster University osteoarthritis index in Asians with osteoarthritis in Singapore. *Osteoarthritis Cartilage.* 2001;9:440–6.
12. Uesugi Y, Makimoto K, Fujita K, Nishii T, Sakai T, Sugano N. Validity and responsiveness of the Oxford hip score in a prospective study with Japanese total hip arthroplasty patients. *J Orthop Sci.* 2009;14:35–9.
13. Fujita K, Makimoto K, Higo T, Shigematsu M, Hotokebuchi T. Changes in the WOMAC, EuroQol and Japanese lifestyle measurements among patients undergoing total hip arthroplasty. *Osteoarthritis Cartilage.* 2009;17:848–55.
14. Pearson K. On lines and planes of closest fit to systems of points in space. *Philos Mag.* 1901;2:559–72.
15. Carroll JB. An analytic solution for approximating simple structure in factor analysis. *Psychometrika.* 1953;18:23–8.
16. Cronbach LJ, Warrington WG. Time-limit test: estimating their reliability and degree of speeding. *Psychometrika.* 1951;16:167–88.
17. Helmstadter GC. Principles of psychological measurement. Upper Saddle River: Prentice Hall; 1964.
18. Nunnally J, Bernstein I. Psychometric theory. 2nd ed. New York: McGraw Hill; 1979. p. 279–80.