Development and Validation of a Symptom Scale to Evaluate Postoperative Patients with Esophagogastric Cancer

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BACKGROUND: Postgastrectomy or esophagectomy symptoms can be a significant burden for patients. However, no standard scale for evaluating these symptoms has been established. We recently developed a postoperative symptom-specific scale.

STUDY DESIGN: After a draft scale was prepared based on a pilot study, psychometric methods were used to assess its reliability and validity. This study involved specialized and multifaceted discussions by a team consisting of gastrointestinal surgeons, gastroenterologists, psychologists, and epidemiologic researchers. The draft questionnaire included 40 questions and 3 domains. A factor analysis was carried out to refine the items and subscale design. To assess the reliability, Cronbach’s alpha and score distributions were estimated. To assess the criterion-related validity, the correlations with the Short Form (SF)-12, Gastrointestinal Symptom Rating Scale (GSRS), endoscopic findings, and nutritional indicators were analyzed.

RESULTS: A total of 344 patients were enrolled in this study. In an exploratory factor analysis (principal factor method), the eigenvalue attenuation data showed 4 domains. The final scale, named the Esophagus and Stomach Surgery Symptom Scale (ES4), included 23 items and 4 domains; 7 items for cervico-thoracic symptoms, 6 for abdominal hypersensitivity symptoms, 4 for abdominal distention symptoms, and 6 items for systemic symptoms. Cronbach’s alphas for these domains were 0.82, 0.81, 0.79, and 0.74, respectively. The scale scores were normally distributed, and there were significant associations with the endoscopic findings, nutritional indicators, the summary score of the SF-12, and the GSRS.

CONCLUSIONS: The ES4 scale has high psychometric validity and can evaluate the profiles and severity of postoperative symptoms. This scale is applicable as an outcomes measure for various interventional studies on esophagogastric surgery aimed at alleviating postoperative symptoms. (J Am Coll Surg 2014;219:895–903. © 2014 by the American College of Surgeons)
primarily related to intense reflux, a small stomach, or dumping syndrome.3,6 These symptoms can cause a significant burden for the patients. Preventing these postoperative disorders is an important issue, and various attempts have been made to modify the procedure used for reconstruction or to perform less invasive surgery.7,13

However, a major problem in evaluating the effectiveness of these interventions is the lack of an established and validated scale applicable to these symptoms. As scales of quality of life (QOL), the gastric cancer module STO-22,14,15 esophageal cancer module OES-18 of the European Organization for Research and Treatment of Cancer (GIQLI),19 or the Gastrointestinal Symptom Rating Scale (GSRS)20 have previously been used in published articles. However, they are focused on QOL, and the evaluation of surgery-specific and detailed symptoms, such as those related to a small stomach or dumping symptoms, were not included. A postoperative scale named the DAUGS (dysfunction after upper gastrointestinal surgery) has been developed in Japan.3,21 This focused on the postoperative dysfunction, including QOL, and the concept that these scales attempted to measure was unclear for gastrointestinal surgeons. The QOL should be distinguished from the symptom scale3,22,23; the QOL is associated with the daily burden caused by symptoms, but the severity of postoperative symptoms cannot be evaluated using these tools. None of these scales can be considered to provide adequate validity for the evaluation of postoperative symptoms. Because upper gastrointestinal surgery can cause specific gastrointestinal or systemic symptoms depending on the surgical technique and procedure, there is a particularly strong need for a scale that is appropriate for the assessment of these postoperative symptoms.

Gastrointestinal surgeons need a scale that would enable evaluation of the advantages and shortcomings of individual surgical procedures. The desirable features of such a scale would include the ability to clarify the profile and severity of symptoms appearing after the operation, and the possibility for use as a comparable outcomes measure in the development of new surgical procedures, or in clinical studies aimed at evaluating the efficacy of such interventions.

This study was undertaken to develop a new scale (the Esophagus and Stomach Surgery Symptom Scale; ES4), which enables the psychometrically appropriate evaluation of patients after upper gastrointestinal surgery, with a focus on physical symptoms.

### METHODS

The study team consisted of 6 members (2 gastrointestinal surgeons, 1 gastroenterologist, 1 psychometrician, and 2 clinical epidemiologists). The study was carried out at 6 hospitals during the period from November 2011 to January 2013, after approval was obtained from the Institutional Review Board. The ES4 was developed in accordance with established psychometric procedures for the development of a psychological scale, and the outline of this study is shown in Figure 1. A draft scale was first prepared from the results of qualitative research and a pilot survey. Next, the reliability and validity of the scale was investigated in a larger number of patients.

### Preparation of draft questionnaire

The questions considered for inclusion in the scale for the evaluation of the postoperative upper gastrointestinal disorders were identified during discussions by experts and by referring to published articles, to yield a pool of items. The study team prepared 48 items that were assumed to fall into 3 domains for the questionnaire; thoracic, abdominal, and systemic symptoms. Then, to confirm the content validity of the item pool, a qualitative survey was carried out in clinical cases. The qualitative survey covered 12 patients (7 men and 5 women, aged 34 to 71 years, including 4 patients who underwent esophagectomy, 5 who underwent total gastrectomy, and 3 who underwent distal gastrectomy). Two members of the study team conducted semi-structured interviews of the patients and investigated their physical symptoms. The findings from the interviews were discussed again by the study team in order to make any appropriate additions and corrections to the items. The pooled items were corrected and supplemented on the basis of the results. Finally, a new item pool (prototype scale), composed of 52 items, was made.

Thereafter, a pilot survey was carried out involving 22 patients (7 after esophagectomy, 5 after total gastrectomy, and 10 after distal gastrectomy). Patients were asked to
answer the questions contained in the prototype symptom scale in order to evaluate whether or not the contents and language of the questions were easy to understand and appropriate. The items were also examined by descriptive statistics (means and standard deviations) and Item-Total correlations. On the basis of the results of the pilot survey, inappropriate questions were deleted, the language was modified, and the format and expression of alternatives were adjusted, yielding a draft version of the questionnaire. Finally, 40 questions were selected as the draft scale.

For each symptom, the patients were first asked to answer whether the symptom was absent (0) or present (1). The patients selecting “1 (present)” were then asked to describe the severity of the symptom on a 4-grade scale: 1 (minimal and negligible), 2 (mild), 3 (moderate), and 4 (severe).

Assessment of the reliability and validity

Subjects and methods

The survey was conducted in a large number of patients, using the draft questionnaire, for the psychometric assessment of its reliability and validity. Patients were considered eligible if they had undergone an operation for malignant disease of the esophagus or stomach. All patients were at least 20 years old, and the time after operation ranged from 6 months to 5 years. Patients were required to have an Eastern Cooperative Oncology Group performance status of 0 or 1. Exclusion criteria included the following: patients currently having or within 3 months of having had chemotherapy or radiotherapy; patients with recurrence or other malignant disease; patients who were pregnant; and patients currently taking antipsychotic, antidepressant, or antianxiety medication.

External variables

To assess the criterion-related validity, the subjects were asked to answer the SF-12 (a comprehensive QOL scale) and Gastrointestinal Symptom Rating Scale (GSRS; disease-specific QOL scale) survey form, in addition to the draft questionnaire. To assess the known-groups validity, the scores were compared with findings from upper gastrointestinal endoscopy and nutritional indicators, including the meal quantity and body weight loss at the time of the survey. Endoscopists were not aware of the patients’ answers to the questionnaire.

Figure 1. The outline of the scale development process. The draft questionnaire was prepared from the results of the item pool, qualitative research, and a pilot study. In the next stage, an investigation was conducted in a large number of patients for psychometric evaluation of the scale’s reliability and validity.
The proportion of body weight loss (%) was calculated by using following equation: “the present body weight”/“body weight before the operation” × 100. The meal quantity (%) was defined as the percentage of the quantity of food ingested daily at the time of the survey relative to the quantity before surgery (self-reported by individual patients).

**Psychometric assessment for the scale**

To assess the psychometric reliability and validity, the following analyses were performed. Evaluation of the descriptive statistics of each item of the draft scale; the mean and standard deviation of all items were confirmed. An analysis of the factor structure: an exploratory factor analysis (principal factor method with Promax rotation) was conducted to determine the subscale design and items. The Cronbach’s alpha was calculated to estimate the reliability coefficients. The distribution of the subscale scores were confirmed; the subscale scores were the average of all items that were included in each subscale, and these were then converted to fall within the range of 0 to 100 (multiplied by 25). The correlations of the scale score with the endoscopic findings or nutritional indicators (the proportion of body weight loss, meal quantity) were analyzed to determine the criterion-related validity. Furthermore, the correlations with the upper and lower gastrointestinal score of the GSRS and the summary score of the SF-12 were analyzed. The summary score included 3 components; a physical component score (PCS), mental component score (MCS), and social role/function component score (RCS).

**RESULTS**

A total of 359 patients were enrolled in the study (Table 1). Answers were obtained from 344 patients (95.8%).

**Analysis of the factor structure**

In the exploratory factor analysis (principal factor method) of 40 items, the eigenvalue attenuation showed a structure of 5 factors. Some of the items that had large factor loading for plural factors were deleted. Following this, 23 items and 4 domains were set (cervico-thoracic symptoms [CTS], abdominal hypersensitivity symptoms [AHS], abdominal distension symptoms [ADS], and diet-induced systemic symptoms [DIS]). The number of missing data (nonresponses) was 4 (1.2%) in 4 items and less than 1% in remaining items.

**Reliability**

The values of Cronbach’s alpha, a coefficient estimating reliability, for each subscale were 0.822 for CTS, 0.810 for AHS, 0.792 for ADS, and 0.743 for DIS.

**Score distribution**

The scores of each subscale were then converted to fall within the range of 0 to 100. Figure 2 illustrates the distribution of each scale score. The mean scores (SD) for the CTS, AHS, ADS, and DIS were 24.1 (21.1), 33.9 (21.0), 37.4 (16.7), and 15.7 (16.7), respectively. The scores for AHS and ADS followed an ideal normal distribution. Although it seemed that the score distribution of the CTS and DIS were weighted, it was not a floor effect. In this scale, the patient is first asked about the presence or absence of the symptom. The score is 0 for patients answering “Absent” for all items included in each subscale; therefore asymptomatic patients were relatively frequent for CTS and DIS. The score distribution in symptom-positive patients did follow a normal distribution, suggesting the absence of any significant problems with these subscales.
Criterion-related validity

**Association with the Gastrointestinal Symptom Rating Scale**

The correlation coefficients were 0.588 between the CTS and the upper gastrointestinal score of the GSRS and 0.571 between the AHS and the lower gastrointestinal score. The correlation between the DIS and GSRS score was relatively low (Table 3).

**Concurrent validity with the Short Form-12**

The correlation coefficients between the subscale score of ES§ and SF-12 3-component summary score are shown in Table 3. Furthermore, from the viewpoint of clinicians, the equivalent of the SF-12 summary scores for the subscale scores (divided into 3 groups by cut-off levels of the mean ± 1/2SD) are shown in Figure 3. A 1-way ANOVA was performed, with ES§ scores serving as independent variables and the SF-12 summary score serving as a dependent variable. In each subscale, the PCS, MCS, and RCS tended to decrease as the symptom severity increased, confirming the validity of the scale. Main effects were noted in all summary scores for the subscale below. The PCS, MCS and RCS for the CTS were $F(2,306) = 3.51 \ (p = 0.031)$, $F(2,306) = 7.96 \ (p = 0.000)$ and $F(2,306) = 12.0 \ (p = 0.000)$. The MCS for the AHS was $F = 8.15 \ (p = 0.000)$. The MCS and RCS for the AHS were $F(2,306) = 6.67 \ (p = 0.001)$ and $F(2,306) = 5.54 \ (p = 0.004)$. The MCS and RCS for the DIS were $F(2,306) = 4.43 \ (p = 0.013)$ and $F(2,306) = 8.38 \ (p = 0.000)$.

**Association with reflux esophagitis**

In patients for whom endoscopy findings were available, the score was compared with the presence/absence of endoscopic evidence of gastroesophageal reflux disease (GERD) (Table 4). The scores of reflux and CTS were significantly higher in GERD-positive patients than in GERD-free patients.

**Association with nutritional indicators**

Each of the subscale scores of individual patients were divided into 3 categories by a cut-off level of the mean ± 1/2SD, and were analyzed in relation to the proportion of body weight loss and meal quantity (Fig. 4). The body weight loss tended to be higher, and the meal quantity tended to be lower, as scores became higher in all subscales, and this tendency was statistically significant.

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**Table 2. Factor Analysis**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Question</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cervico-thoracic symptoms (CTS)</td>
<td>Have you had difficulty swallowing your food?</td>
<td>0.850</td>
<td>0.004</td>
<td>−0.116</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>Have you felt discomfort in your throat?</td>
<td>0.657</td>
<td>0.112</td>
<td>−0.198</td>
<td>0.089</td>
</tr>
<tr>
<td></td>
<td>Have you felt solid food getting stuck in your chest?</td>
<td>0.653</td>
<td>0.031</td>
<td>0.057</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>Have you had difficulty swallowing?</td>
<td>0.622</td>
<td>0.019</td>
<td>−0.064</td>
<td>0.069</td>
</tr>
<tr>
<td></td>
<td>Have you had nausea?</td>
<td>0.602</td>
<td>−0.083</td>
<td>0.185</td>
<td>−0.089</td>
</tr>
<tr>
<td></td>
<td>Have you had food come back up into your mouth?</td>
<td>0.485</td>
<td>−0.091</td>
<td>0.229</td>
<td>−0.089</td>
</tr>
<tr>
<td></td>
<td>Have you had nausea or vomiting immediately after eating?</td>
<td>0.460</td>
<td>−0.004</td>
<td>0.164</td>
<td>0.001</td>
</tr>
<tr>
<td>2 Abdominal hypersensitivity symptoms (AHS)</td>
<td>Have you had loose stools?</td>
<td>−0.014</td>
<td>0.791</td>
<td>0.081</td>
<td>−0.067</td>
</tr>
<tr>
<td></td>
<td>Have you had diarrhea?</td>
<td>0.052</td>
<td>0.768</td>
<td>−0.031</td>
<td>−0.116</td>
</tr>
<tr>
<td></td>
<td>Did you have diarrhea immediately after eating?</td>
<td>−0.055</td>
<td>0.726</td>
<td>−0.066</td>
<td>0.102</td>
</tr>
<tr>
<td></td>
<td>Have you felt a sudden, urgent need to have a bowel movement?</td>
<td>−0.043</td>
<td>0.677</td>
<td>0.066</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>Have you heard gurgling noises from your abdomen after eating?</td>
<td>0.033</td>
<td>0.455</td>
<td>0.075</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>Have you had any accidental leakage of stool?</td>
<td>0.051</td>
<td>0.408</td>
<td>−0.012</td>
<td>0.000</td>
</tr>
<tr>
<td>3 Abdominal distention symptoms (ADS)</td>
<td>Have you had a heavy feeling in your stomach area after eating?</td>
<td>0.007</td>
<td>0.001</td>
<td>0.800</td>
<td>−0.060</td>
</tr>
<tr>
<td></td>
<td>Have you had bloating in the lower part of your abdomen?</td>
<td>−0.053</td>
<td>0.036</td>
<td>0.683</td>
<td>0.041</td>
</tr>
<tr>
<td></td>
<td>Have you had pain in the upper part of your abdomen after eating?</td>
<td>−0.010</td>
<td>−0.002</td>
<td>0.672</td>
<td>0.071</td>
</tr>
<tr>
<td></td>
<td>Have you felt full after eating only a small amount?</td>
<td>0.104</td>
<td>0.082</td>
<td>0.545</td>
<td>0.033</td>
</tr>
<tr>
<td>4 Diet-induced systemic symptoms (DIS)</td>
<td>Have you felt listless or fatigued after eating?</td>
<td>−0.024</td>
<td>−0.036</td>
<td>0.058</td>
<td>0.814</td>
</tr>
<tr>
<td></td>
<td>Have you felt weak in the body after eating?</td>
<td>−0.009</td>
<td>0.003</td>
<td>−0.024</td>
<td>0.754</td>
</tr>
<tr>
<td></td>
<td>Have you fainted, or felt like you were going to faint, after eating?</td>
<td>0.027</td>
<td>0.006</td>
<td>−0.102</td>
<td>0.566</td>
</tr>
<tr>
<td></td>
<td>Have you felt extreme sleepiness after eating?</td>
<td>−0.023</td>
<td>0.005</td>
<td>0.044</td>
<td>0.489</td>
</tr>
<tr>
<td></td>
<td>Have you felt dizziness after eating?</td>
<td>0.051</td>
<td>0.033</td>
<td>0.032</td>
<td>0.474</td>
</tr>
<tr>
<td></td>
<td>Have you felt your heart throbbing after eating?</td>
<td>0.050</td>
<td>−0.045</td>
<td>0.191</td>
<td>0.388</td>
</tr>
</tbody>
</table>

Interfactor correlation, 1 to 2, 0.209; 1 to 3, 0.370; 1 to 4, 0.485; 2 to 3, 0.332; 2 to 4, 0.251; 3 to 4, 0.353.
DISCUSSION

In accordance with scientifically and psychometrically accurate procedures to develop a disease-specific symptom scale, we established the Esophagus and Stomach Surgery Symptom Scale (ES4). This study involved specialized and multifaceted discussions by a team consisting not only of gastrointestinal surgeons and gastroenterologists, but also of psychologists experienced in the development of psychological scales, as well as epidemiologic researchers. This scale comprehensively covered the symptoms of patients surveyed, and its validity was high. The scale can be viewed as having high generalizability because the validity-confirming study was conducted in outpatients at nationwide institutes (university hospitals, specialist cancer hospitals, and regional core hospitals). The construct of this scale was examined repeatedly by the study team and adapted to the needs of gastrointestinal surgeons. As a result, the ES4 is able to evaluate the postoperative symptoms after surgery for esophagogastric cancer. We believe that postoperative symptoms can now be used as one of the endpoints when planning clinical studies aimed at evaluating the efficacy of function-preserving or minimally invasive surgery.23,27

This new scale is made up of 4 domains: CTS (cervico-thoracic symptoms), AHS (abdominal hypersensitivity symptoms), ADS (abdominal distention symptoms), DIS, diet-induced systemic symptoms; AHS, abdominal hypersensitivity symptoms; ADS, abdominal distention symptoms; DIS, diet-induced systemic symptoms; ES4, Esophagus and Stomach Surgery Symptom Scale; G1, gastrointestinal; GSRS, Gastrointestinal Symptom Rating Scale; MCS, mental component score; PCS, physical component score; RCS, role/function component score.

### Table 3. Correlation of Gastrointestinal Symptom Rating Scale Score and SF-12

<table>
<thead>
<tr>
<th>Scale</th>
<th>Symptoms</th>
<th>Upper GI Coefficient [95% CI]</th>
<th>Lower GI Coefficient [95% CI]</th>
<th>PCS Coefficient [95% CI]</th>
<th>MCS Coefficient [95% CI]</th>
<th>RCS Coefficient [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES4</td>
<td>CTS</td>
<td>0.578 [0.546–0.773]</td>
<td>0.240 [0.134–0.356]</td>
<td>−0.241 [−0.358]</td>
<td>−0.254 [−0.372]</td>
<td>−0.286 [−0.406]</td>
</tr>
<tr>
<td></td>
<td>AHS</td>
<td>0.243 [0.135–0.361]</td>
<td>0.571 [0.353–0.760]</td>
<td>−0.055 [−0.167]</td>
<td>−0.206 [−0.321]</td>
<td>−0.126 [−0.239]</td>
</tr>
<tr>
<td></td>
<td>ADS</td>
<td>0.516 [0.257–0.483]</td>
<td>0.379 [0.281–0.503]</td>
<td>−0.113 [−0.226]</td>
<td>−0.257 [−0.375]</td>
<td>−0.210 [−0.329]</td>
</tr>
<tr>
<td></td>
<td>DIS</td>
<td>0.354 [0.458–0.684]</td>
<td>0.373 [0.288–0.510]</td>
<td>−0.147 [−0.260]</td>
<td>−0.203 [−0.318]</td>
<td>−0.271 [−0.390]</td>
</tr>
</tbody>
</table>

ADS, abdominal distention symptoms; AHS, abdominal hypersensitivity symptoms; CTS, cervico-thoracic symptoms; DIS, diet-induced systemic symptoms; ES4, Esophagus and Stomach Surgery Symptom Scale; G1, gastrointestinal; GSRS, Gastrointestinal Symptom Rating Scale; MCS, mental component score; PCS, physical component score; RCS, role/function component score.
and DIS (diet-induced systemic symptoms). From the psychometric view, all factors gave sufficient loads to individual items, and the validity of subscales was shown to be sufficient. The coefficients of reliability of these scales were also sufficient to suggest that they are applicable.

To evaluate the symptoms after upper gastrointestinal surgery, the systemic symptoms after a meal, such as the DIS, were a very specific and important domain. However, these items were not included in the other common scales used for assessments, for example, the GSRS, GIQLI, EORTC QLQ C30 or FACT-G with their modules.

The DIS might correspond to a group of symptoms conventionally called “dumping syndrome.” Dumping syndrome refers to symptoms arising from excessive secretion of gastrointestinal hormones and cytokines (due to rapid transfer of food to the small bowel) and sudden changes in blood glucose levels. For a diagnosis of dumping syndrome, a scoring method based on an induction test was reported by Sigstad in 1970. This method is not generally used at present, and a standard definition of the term dumping syndrome has not been established. For this reason, we used the term DIS rather than dumping syndrome in this study.

An analysis of criterion-related validity demonstrated satisfactory validity for 2 established QOL scales, endoscopic findings and nutritional indicators. As a result of the association with the GSRS, the correlation was clinically interpretable; sufficient correlations were evident between “CTS and the upper gastrointestinal score of the GSRS” and “ADS and the lower gastrointestinal score of the GSRS.” On the other hand, the DIS had a weak correlation with the GSRS. Furthermore, in the study of the association with the SF-12, postoperative symptoms were shown to have a strong impact on the summary score of

Table 4. Association of Each Score and Gastroesophageal Reflux Disease Diagnosed by Endoscopy

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>GERD (−)</th>
<th>GERD (+)</th>
<th>t</th>
<th>df</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTS</td>
<td>23.6</td>
<td>19.8</td>
<td>44.6</td>
<td>22.3</td>
<td>4.28</td>
</tr>
<tr>
<td>AHS</td>
<td>33.2</td>
<td>20.3</td>
<td>37.3</td>
<td>15.7</td>
<td>0.81</td>
</tr>
<tr>
<td>ADS</td>
<td>16.1</td>
<td>16.6</td>
<td>16.6</td>
<td>13.0</td>
<td>0.14</td>
</tr>
<tr>
<td>DIS</td>
<td>38.0</td>
<td>24.5</td>
<td>41.7</td>
<td>28.0</td>
<td>0.59</td>
</tr>
</tbody>
</table>

ADS, abdominal distention symptoms; AHS, abdominal hypersensitivity symptoms; CTS, cervico-thoracic symptoms; DIS, diet-induced systemic symptoms; GERD, gastroesophageal reflux disease; t, t value; df, degree of freedom.
the comprehensive QOL scale including the physical, mental, and social role/function QOL. The ES4 includes many items designed to rate factors having important influences on these aspects of QOL; therefore, the scale can comprehensively cover clinically important symptoms. With regard to the known-groups validity, there were sufficient correlations between each subscale score and the changes of body weight and meal quantity that would have a strong influence on the patient’s daily burden. Each of these findings endorses the validity of the scale.

Because the number of items included in this survey was very large, it was impossible to assess the criterion-related validity in comparison to previously published disease-specific QOL scales for gastric and esophageal cancer, such as the EORTC QLQ C-30 and FACT-G. Further studies need to be conducted in new subjects to assess this limitation.

CONCLUSIONS

In conclusion, the ES4 developed in this study has a high psychometric validity and is capable of evaluating the profiles and severity of symptoms caused by upper gastrointestinal surgery. This scale is applicable as an outcomes measure for various interventional studies on gastrointestinal surgery aimed at alleviating postoperative symptoms. Furthermore, we plan to accumulate data on the use of this scale in clinical studies to improve its interpretability.

Author Contributions

Study conception and design: Honda, Fukuhara
Acquisition of data: Nunobe, Hiki, Miura, Nishigori, Kusanagi, Yamamoto, Kobayashi
Analysis and interpretation of data: Honda, Wakita, Onishi, Boddy
Drafting of manuscript: Honda, Boddy
Critical revision: Onishi, Hiki, Miura, Fukuhara

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REFERENCES