ABSTRACT

Introduction: The postoperative quality of recovery-40 (QoR-40) is one of the most frequently used tools to assess the quality of recovery after surgery. The aim of the current study was to translate, culturally adapt, and validate the QoR-40 questionnaire in Arabic.

Methods: A systematic translation process was used to translate the original English QoR-40 into Arabic. After the pilot study, the translated version was validated among patients who underwent different types of surgeries. The reliability (using internal consistency) and validity of our translated Arabic version was examined. To investigate the responsiveness of the translated QoR-40, the questionnaire was administered five times among the same group of patients (once before surgery as baseline measure, and four times after surgery, up to 1 week after surgery).

Results: A total of 182 participants (7 men, 175 women) were included in the study. The QoR-40 total scale and all subscales showed excellent internal consistencies over time, with the exception of the QoR-40 pain subscale at postoperative day 1. The QoR-40 total and subscale scores were inversely associated with patients’ self-report pain scores but positively correlated with patients’ self-report recovery scores. Patients’ QoR-40 total, comfort, emotions, and physical subscale scores increased over time after surgery, indicating a general trend of recovery over time. Patients’ scores in the QoR-40 pain and support subscales remained stable over time, suggesting no substantial changes were reported in these two domains. Quality of recovery was also found to be related to patients’ ages, American Society of Anesthesiologists Physical Status, and the extent of surgery (major vs. minor). Most patients found the Arabic QoR-40 questions to be clear and easy to understand and thought the questionnaire items covered all their problem areas regarding their quality of recovery.

Conclusion: Our translated version of QoR-40 was reliable and valid for use among Arabic-speaking patients. In addition, the QoR-40 was able to assess the quality of recovery in several domains among patients who underwent surgical procedures.

Key words: Anesthesia; Arabic; quality of recovery; quality of recovery-40; reliability; validity

Development and validation of Arabic version of the postoperative quality of recovery-40 questionnaire

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**Introduction**

In recent years, postoperative quality of recovery has become an important measure that reflects on the performance of the surgeon, the anesthesiologist, and the institution at which the surgery was performed. The quality of postoperative recovery has become an important endpoint in many clinical trials. A recent study suggested that the use of a single outcome (e.g., pain scores) to indicate the quality of recovery might not necessarily reflect other important outcomes (e.g., length of hospital stay or patient satisfaction). Thus, a more comprehensive scale has been suggested to assess the quality of postoperative recovery.\(^3\) In fact, postoperative quality of recovery was found to be strongly correlated with patient satisfaction.\(^2\)

Multiple scales have been developed to assess the quality of postoperative recovery in the last few years. The postoperative quality of recovery-40 (QoR-40), developed and validated by Myles et al. in 2000,\(^3\) is one of the most commonly used instruments to assess postoperative quality of recovery in clinical practice. The 40 QoR-40 items were selected from an initial pool of 50 items. The average time to complete the questionnaire was reported to be 6.3 min (standard deviation [SD] = 4.9).

A recent systematic review included 17 studies evaluated the overall psychometric properties of the QoR-40 questionnaire.\(^4\) The QoR-40 was found to have good internal consistency (pooled \(\alpha = 0.91\), 95% confidence interval [CI]: 0.88–0.93), test-retest reliability (pooled \(r = 0.90\), 95% CI: 0.86–0.92), and inter-rater reliability (intraclass correlation = 0.86). Validity of the QoR-40 was established by having moderate correlations with unidimensional visual analog scale (pooled \(r = 0.58\), 95% CI: 0.51–0.65) and negative correlation with hospital length of stay (pooled \(r = −0.24\), [−0.31–−0.16]). The clinical utility of the QoR-40 instrument was supported by high patient recruitment rate into evaluation studies (97%) and an excellent completion and return rate (97%). On average, it took about 5.1 min (95% CI: 4.4–5.7) for patients to complete the QoR-40.

The QoR-40 questionnaire has never been translated into the Arabic language. The aim of this study is to translate, culturally adapt, and validate the QoR-40 into Arabic language.

**Methods**

A repeated measures study was conducted between April 2015 and December 2016 in two tertiary hospitals; King Fahad Medical City (Institutional Review Board [IRB] approval No. 14-107), Riyadh – Saudi Arabia and Corniche Hospital, Abu Dhabi, United Arab Emirates (IRB approval No. Ch10041501). Electronic data capturing template was made to standardize data collection and maintain quality.

**Translation and cultural adaptation**

**Initial translation (forward translation)**

Five bilingual translators, from five Arabic countries (Syria, Saudi Arabia, Yemen, Sudan, and Egypt) with different dialects, were assigned. All translators spoke Arabic as their mother language. Two of them were naive translators with no prior knowledge of the concepts being quantified, and they were not from the medical field. Each translator produced a written report of the translation that they completed, after which all the translators met to discuss the translation and came to a consensus of the translated version of the instrument.

**Backward translation**

Two translators who were totally blind to the original (English) questionnaire were assigned to translate the final Arabic version back into the English language. This is a process of validity check to make sure that the translated version reflects the same item content as the original version. English (the source language) was the mother tongue for these two translators, and they were not aware of the concepts being explored.

**An expert committee**

An expert committee was composed of a methodologist, health professionals, and language professionals. The expert committee’s role was to consolidate all the versions of the questionnaire and develop the prefinal version of the questionnaire for field-testing. The committee eventually reviewed all the translations and reached consensus on any discrepancy.

**Measures**

**Postoperative quality of recovery-40**

The QoR-40 consists of 40 checklist items assessing the quality of postoperative recovery (1 = none of the time, 2 = some of the time, 3 = usually, 4 = most of the time, and 5 = all of the time). The QoR-40 items measure five general domains: Comfort (12 items), emotions (9 items), physical independence (5 items), patient support (7 items), and pain (7 items). The minimal score is 40 and the highest score is 200, higher scores indicate better the quality of recovery. Each patient completed the same questionnaire at five times; the day before surgery (baseline), before discharge from the postanesthesia care unit (PACU), in the morning of postoperative day 1 (POD1), in the morning of POD3, and in the morning of POD7.
Self-reported quality of recovery

Every time the patients were completing the questionnaire, they were asked to score their recovery in a scale from 0 to 100, where 0 not recovered at all and 100 completely recovered.

Numerical rating scale

Numerical rating scale is 11-point (0–10) pain intensity score that assesses the current overall pain intensity (from 0 = “no pain” to 10 = “pain as bad as you can imagine”).

Study protocol

An Arabic version of the QoR-40 questionnaire was administered five times to patients undergoing predetermined variable surgical procedures as follow: Patients were administered the questionnaires preoperation (baseline), before discharge from PACU, POD1, POD3, and POD7. Eligible patients were any patient who is between 17 and 80 years old undergoing any one of the procedures listed in Table 1. Exclusion criteria were patients with psychosis, significant visual impairment, physical disability, or patient’s refusal to participate in the study. Baseline and PACU questionnaires always completed by face-to-face interview while POD1, POD3, and POD7 were either completed by face-to-face interview (if the patient is in the hospital) or as a telephone interview if the patient was discharged home (e.g., day care surgery).

Pilot study

The prefinal version was pilot tested on a group of 31 patients (all female). This data is not shown for space consideration. No specific constructive feedback was received. The committee met at this point and approved the prefinal version as final [the final Arabic version presented in Appendix 1]. No changes were implemented to the prefinal version.

Table 1: Frequencies of surgery types among patients in the current study

| Surgery type                        | Number | Frequency |
|-------------------------------------|--------|-----------|
| Lower segment cesarean section      | 105    | 57.69     |
| D and C                             | 32     | 17.58     |
| Major gynecological laparotomy      | 12     | 6.59      |
| Major breast cancer surgery (i.e., mastectomy) | 7      | 3.85      |
| Laparoscopic cholecystectomy         | 6      | 3.3       |
| Total knee replacement               | 6      | 3.3       |
| Complex spine surgery               | 5      | 2.75      |
| Herniotomy                          | 4      | 2.2       |
| Major laparotomy                    | 2      | 1.1       |
| Knee arthroscopy                    | 1      | 0.55      |
| Microdiscectomy                     | 1      | 0.55      |
| Minor breast benign surgery (i.e., lumpectomy) | 1      | 0.55      |

D and C: Dilatation and curettage

Assessing face validity

After completing the QoR-40 questionnaire for the first time, patients responded to five statements regarding the QoR-40 items on a 5-point Likert-type scale: 1 = totally disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree. The five statements were: (1) Questions were clear and easy; (2) questions covered all your problem areas with your recovery after surgery; (3) you would like the use of this questionnaire for future assessments; (4) the questionnaire lacks important questions regarding your recovery; and (5) any of the questions violates your privacy.

Statistical analysis

All data analyses were performed in R version 3.3.2 (2016-10-31). Descriptive statistics (mean, SD) were presented for the QoR-40 subscale and total scores.

Reliability

The internal consistency of the QoR-40 was examined using Cronbach’s $\alpha$. Cronbach’s $\alpha$ ranges from 0 (no internal consistency; none of the items are correlated with each other) to 1 (perfect internal consistency; all of the items are perfectly correlated with each other). Cronbach’s $\alpha$ was computed for the total pain scores (all 40 items) as well as the five dimensions. An instrument with $\alpha \geq 0.70$ is typically considered to have adequate internal consistency. As $\alpha$ is a function of the questionnaire’s length, $\alpha$ is expected to be lower for the subscales than for the total scale.

Validity

Construct validity

Construct validity of the QoR-40 was examined by investigating the association between the QoR-40 subscale and total scores and patients’ self-report pain and recovery scores. Pearson’s correlation coefficient ($r$) was used to evaluate the strength of the associations; $r < 0.3$ was considered to be weak, moderate if $0.3 \leq r < 0.5$, and strong if $r \geq 0.5$.

Responsiveness

Responsiveness was assessed by the repeated administrations of the QoR-40 at PACU, POD1, POD3, and POD7. Considering the repeated nature of the multiple assessments, linear mixed-effects models (LMMs) are used to take into account the correlated observations within patients. The changes of the individuals’ responses were estimated using LMMs, with time of administration (in days) as fixed effects and patients as the random effect.

To further examine the extent to which patients’ characteristics (e.g., age and American Society of Anesthesiologists [ASA] classification) and surgical information (e.g., type of surgery, surgery duration, and PACU duration) were associated with
QoR-40 scores, these variables are included as fixed effects in the subsequent LMMs as well. Results from these LMMs provide information with respect to whether patients’ overall QoR-40 scores (averaged across time) are associated with patients’ characteristics and surgical information.

**Results**

A total of 182 patients (7 males, 175 females) participated in the validation study of the QoR-40 questionnaire. The average age was 37.7 (SD = 11.6), with average body mass index of 32.5 (SD = 12.6). Most patients had university-level education (65%), with smaller proportions having received some high school (22.8%), less than high school (7.8%), or no education (4.4%). The majority of these patients were married (96.7%), whereas 3.3% were single. Of the enrolled patients, 28.2% were rated as ASA 1, 62.1% were rated as ASA 2, and 9.6% were rated as ASA 3 on the ASA classification score. One hundred and thirty-nine (75.82%) patients were from Corniche Hospital and 44 (24.18%) from King Fahad Medical City.

One hundred and forty-six (80.22%) patients were inpatient admission, and 36 (19.78%) were day care admission. One hundred and thirty-four (73.63%) patients underwent major surgery, and 48 (26.37%) underwent minor surgery [Table 1]. Out of the 182 patients, 2 (1.1%) developed complications during the postoperative hospital stay. The average surgical time was 81.16 min (SD = 71.23, range = 15–600). The average PACU stay was 41.15 min (SD = 25.84, range = 15–139). The average duration of hospital stay was 81.51 hours (SD = 60.73, range = 4 - 444.5).

The completion rates were 100%, 95.6%, 100%, 98.35%, and 79.67% before surgery, PACU discharge, POD1, POD3, and POD7, respectively. Of the eight patients who did not complete the QoR-40 at PACU discharge, 5 (62.5%) refused to participate, reflecting the challenge to complete the questionnaire when patients are being in PACU. On the other hand, of the 38 missing patients at POD7, our research team was unable to reach 36 (94.7%) of them (e.g., did not answer multiple call attempts), 1 (2.6%) was readmitted for respiratory complications, and only 1 (2.6%) refused to participate.

At POD1, the questionnaires were primarily completed through face-to-face interview (78.2%) and 21.8% was conducted through telephone interview, as day care surgery patients were discharged the same day. In contrast, the majority (91.4%) of the questionnaires was completed by telephone interview, whereas only 8.6% was completed by face-to-face interview (for the remaining inpatients) at POD7.

The extents to which the QoR-40 subscale and total scores are responsive to change across time were examined using the low internal consistency of the pain dimension on the 1st day after surgery.

**Reliability**

Cronbach’s α for the QoR-40 is shown in Table 3. Results showed excellent internal consistency for QoR-40 across different time points. The internal consistencies for most subscales were acceptable to excellent. The exception was the low internal consistency of the pain dimension on the 1st day after surgery.

**Validity**

**Construct validity**

The construct validity of the QoR-40 was assessed by examining the correlations between patients’ self-report pain and recovery scores at each assessment after surgery (PACU to POD7). As the results were similar for all measurement time points, only results for POD1 are presented here [Table 4], and the rest are presented in Appendices 2-4. Consistent with expectations, patients’ self-report pain scores were negatively associated with the QoR-40 dimension and total scores, whereas self-report recovery scores were positively correlated with the QoR-40 dimension and total scores.

**Face validity**

Patients’ responses to the five questions assessing the face validity of the QoR-40 are presented in Table 5. The majority of the patients endorsed agree or strongly agree for the first three questions assessing face validity. Results showed that most patients found the QoR-40 questions to be clear and easy to understand, the questionnaire items covered all their problem areas regarding their quality of recovery, and that most would like to use the QoR-40 for their long-term follow-up assessment. Most patients disagreed that the QoR-40 lacks important questions regarding their quality of recovery, suggesting that the QoR-40 addressed most, if not all, of the important issues associated with their quality of recovery. Finally, most patients felt that the QoR-40 questions did not violate their privacy.

**Responsiveness**

The average changes in QoR-40 scores, patient’s self-report recovery, and pain scores from baseline (preoperatively) to POD7 are plotted in Figures 1-3. The QoR-40 subscale and total scores increased over time, suggesting that patients reported better recovery as they recover from their surgeries [Figures 1 and 2, dashed line]. A similar pattern is observed for the patients’ self-report recovery score [Figure 2, solid line]. On the other hand, patients’ self-report pain scores increased from PACU to POD1 postoperative and decreased subsequently [Figure 3].

The descriptive statistics of the QoR-40 subscales and total scores are presented in Table 2.
LMMs. Time (in days) was modeled as the fixed effect (from PACU to POD7), with patients modeled as the random effect. With the exception of the pain and support subscales, the QoR-40 comfort, emotions, and physical subscales as well as the QoR-40 total scores were responsive to change over time. Patients reported increased comfort, emotions, and physical independence from PACU discharge to POD7. Overall, the quality of recovery assessed with the QoR-40 increased over time, with consistent findings for patients’ self-report recovery scores. On the other hand, pain and support assessed with the QoR-40 subscales remained stable over time.

As illustrated in Figure 3, patients’ self-reported pain scores showed a quadratic change from PACU to POD7 (Est\_time\(^2\) = 0.79, standard error [SE] = 0.13, \(P < 0.001\); Est\_time\(^2\) = −0.12, SE = 0.02, \(P < 0.001\)). Self-reported pain scores increased from PACU to POD1, then subsequently decreased until POD7. When only POD1 to POD7 pain scores were included in the model, patients’ self-report pain scores showed a statistically significant decrease over time (Est\_time\(^2\) = −0.19, SE = 0.03, \(P < 0.001\)).

To further investigate the extent to which the average QoR-40 subscale, total scores, as well as patients’ self-report pain and recovery scores were different across different groups of patient, patients’ age, ASA classification, and type of surgery (major vs. minor) were included into the second set of LMMs as fixed effects. Results from these LMMs provided information regarding the effect of age, ASA, physical status and surgery type on the average QoR-40 subscale, total, self-report pain and recovery scores, controlling for the changes in corresponding scores over time and taking into account the within-patient correlations [Table 6]. A positive coefficient indicates a positive association between the variable of interest (e.g., age) and the average (across patients and over time) outcome variable (e.g., QoR-40 total scores), whereas a negative coefficient reflects a negative correlation between the two.

Patients’ age was positively associated with QoR-40 comfort and emotions subscale scores; older patients were more likely to report overall higher scores on these two domains of recovery than younger patients. Similar results were found for the total QoR-40 scores and patients’ self-report recovery scores, in which older patients were more likely to report higher recovery scores than younger patients. ASA physical status was negatively correlated with QoR-40 comfort scores but positively associated with QoR-40 support scores. Patients with higher ASA physical status reported overall less comfort but more support than those with lower ASA physical status.
ASA physical status also had an inverse relation with recovery scores. Results indicated that patients with higher ASA physical status had worse recovery than those with lower ASA physical status.

Surgery type (minor surgery) was positively associated with all QoR-40 subscales and total scores, with the exception of the pain subscale. Patients who underwent minor surgery were, on average, more likely to report higher scores on comfort, emotions, physical independence, support, and overall quality of recovery, than those who underwent major surgery. Similar positive correlation was found between surgery type (minor surgery) and patients’ self-report recovery score. Compared to patients who underwent major surgery, patients who underwent minor surgery reported better recovery on average. On the other hand, the association between surgery type and patients’ self-report pain scores was negative. Results indicated that patients who underwent minor surgery were, on average, more likely to report less pain on the QoR-40 than those who underwent major surgery.

Discussion

In this study, we translated and validated the QoR-40 questionnaire among patients who underwent a variety of surgeries at two major medical centers in two countries. We strived to develop a questionnaire that can be easily administered to Arabic-speaking patients speaking different
Translation of a preexisting questionnaire into a different language is important for cross-cultural studies. Subsequent validation of the translated instrument is essential to ensure that the translated instrument retains the psychometric properties of the original measure, allowing comparisons to be made among patients from different countries. The QoR-40 was previously translated and validated in multiple languages, including Turkish, Japanese, Persian, and Brazilian. As with the original QoR-40 \((\alpha = 0.93)^{[3]}\), our Arabic version of the QoR-40 showed excellent overall internal consistency across different measurement time points \((all \alpha_s \geq 0.90)\). The reliability of the QoR-40 remained consistent across time, regardless of whether the questionnaire was administered by face-to-face or telephone interview. Similarly, the extents to which the QoR-40 dimensions and total scores were associated with patients’ self-report pain and recovery were consistent over time. These findings showed that the Arabic version of QoR-40 had consistent reliability and validity across time among patients in this study.

Of note, although pain assessed with the QoR-40 remained relatively stable after surgery, patients’ self-reported pain severity showed a sharp increase in POD1 and subsequently decreased. One plausible explanation for the increase in self-report pain scores in POD1 is that patients’ pain was managed with anesthetic and intraoperative pain medication at PACU, but as the effects of the pain medication subsided, the severity of pain increased. Such results suggested that more aggressive and scheduled pain management might be required for patients at POD1. In contrast to the patients’ self-reported pain score that described the surgical site pain only, the pain domain in the QoR-40 has a broader assessment, and it consistent of surgical site pain, headache, back pain, muscle pain, sore throat, and sore mouth. This might explain why the total score of this domain did not have statistically significant change over time.

Factors that affected the quality of recovery were age, ASA Physical Status, and the extent of the surgery (major vs. minor). Compared to younger patients, older patients were more likely to report better recovery on emotional and comfort scales. Patients who had higher ASA Physical Status or major surgeries were more likely to have poorer quality of recovery than those who had lower ASA Physical Status or minor surgeries.

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**Table 6: Fixed effects from linear mixed-effects models estimating the change in quality of recovery-40, pain, and recovery scores from postanesthesia care unit discharge to postoperative day 7, controlling for patients’ age, American Society of Anesthesiologist, and surgery type**

|                      | Estimate | SE  | t    | P     |
|----------------------|----------|-----|------|-------|
| **Comfort**          |          |     |      |       |
| Intercept            | 48.09    | 1.63| 29.54| <0.001|
| Time (days)          | 1.00     | 0.09| 11.37| <0.001|
| Age                  | 0.11     | 0.03| 3.24 | 0.001 |
| ASA                  | -1.83    | 0.70| -2.61| 0.01  |
| Surgery (minor)      | 3.51     | 0.90| 3.92 | <0.001|
| **Emotions**         |          |     |      |       |
| Intercept            | 34.84    | 1.52| 22.92| <0.001|
| Time (days)          | 0.61     | 0.06| 10.06| <0.001|
| Age                  | 0.10     | 0.03| 3.26 | 0.001 |
| ASA                  | -0.97    | 0.66| -1.48| 0.142 |
| Surgery (minor)      | 2.81     | 0.84| 3.35 | 0.001 |
| **Physical**         |          |     |      |       |
| Intercept            | 17.22    | 1.09| 15.81| <0.001|
| Time (days)          | 1.05     | 0.06| 16.91| <0.001|
| Age                  | -0.03    | 0.02| -1.39| 0.166 |
| ASA                  | -0.06    | 0.47| -0.12| 0.906 |
| Surgery (minor)      | 3.53     | 0.60| 5.89 | <0.001|
| **Support**          |          |     |      |       |
| Intercept            | 28.96    | 1.03| 28.15| <0.001|
| Time (days)          | -0.10    | 0.06| -1.69| 0.092 |
| Age                  | 0.04     | 0.02| 1.82 | 0.07  |
| ASA                  | 0.89     | 0.44| 2.02 | 0.045 |
| Surgery (minor)      | 2.68     | 0.57| 4.72 | <0.001|
| **Pain**             |          |     |      |       |
| Intercept            | 33.07    | 0.71| 46.28| <0.001|
| Time (days)          | 0.06     | 0.04| 1.58 | 0.114 |
| Age                  | 0.00     | 0.01| 0.23 | 0.815 |
| ASA                  | -0.49    | 0.31| -1.59| 0.115 |
| Surgery (minor)      | -0.44    | 0.39| -1.13| 0.261 |
| **Total**            |          |     |      |       |
| Intercept            | 162.14   | 4.63| 35.03| <0.001|
| Time (days)          | 2.61     | 0.20| 13.04| <0.001|
| Age                  | 0.23     | 0.10| 2.40 | 0.018 |
| ASA                  | -2.62    | 1.99| -1.31| 0.191 |
| Surgery (minor)      | 12.06    | 2.56| 4.72 | <0.001|
| **Pain score**       |          |     |      |       |
| Intercept            | 3.88     | 0.60| 6.44 | <0.001|
| Time (days)          | -0.18    | 0.03| -5.48| <0.001|
| Age                  | 0.02     | 0.01| 1.70 | 0.091 |
| ASA                  | -0.59    | 0.25| -2.36| 0.02  |
| Surgery (minor)      | -1.58    | 0.32| -4.95| <0.001|
| **Self-reported recovery score** | | | | |
| Intercept            | 36.20    | 5.64| 6.42 | <0.001|
| Time (days)          | 6.36     | 0.43| 14.92| <0.001|
| Age                  | 0.63     | 0.10| 6.00 | <0.001|
| ASA                  | -8.89    | 2.37| -3.76| <0.001|
| Surgery (minor)      | 19.59    | 2.95| 6.65 | <0.001|

*Only POD1 to POD7 were modeled for patients’ self-report pain score as there was a sharp increase in pain scores from PACU to day 1. SE: Standard error; PACU: Postanesthesia care unit; POD: Postoperative day; ASA: American Society of Anesthesiologist physical status
We had an attrition rate of 20% in our study at POD7, primarily due to our inability to get in touch with the patients after multiple attempts. With the current data, we were unable to determine the reasons for their nonresponse. Future studies should investigate whether the quality of recovery is associated with the likelihood of remaining in longitudinal studies that track postsurgical recovery over time. Our study also highlights the need to take into account attrition rates when estimating the sample size needed for longitudinal studies.

**Conclusion**

Our study is the first cross-cultural validation of the QoR-40 among Arabic-speaking patients. By translating and validating the QoR-40 in Arabic language, we provided physicians with a new tool with which to evaluate the recovery of patients after surgery in the Arab communities.

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**Conflicts of interest**

There are no conflicts of interest.

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Appendix

**QoR - 40 (Arabic Version)**

**المستقبل الطبي:**

**الجزء الأول**

كيف كان شعورك خلال الـ 24 ساعة الماضية؟

(قم بشرح من 1 إلى 5، حيث أن: 1 = سيء جداً و 5 = ممتاز)

على سبيل المثال: إذا كنت تستطيع التنفس بسهولة في كل الأوقات، يجب أن تشير على الرقم 5 برسم دائرة حوله، كما هو موضح أدناه:

| القدرة على التنفس بسهولة |
|---------------------------|
| دائمًا | في معظم الأوقات | غالبًا | في بعض الأوقات | لا إطلاقا |
| 5 | 4 | 3 | 2 | 1 |

**المشاعر**

| الرضا |
|--------|
| دائمًا | في معظم الأوقات | غالبًا | في بعض الأوقات | لا إطلاقا |
| 5 | 4 | 3 | 2 | 1 |

| المشاعر |
|---------|
| دائمًا | في معظم الأوقات | غالبًا | في بعض الأوقات | لا إطلاقا |
| 5 | 4 | 3 | 2 | 1 |

**Appendix 1a: Arabic version of the quality of recovery-40**
كيف كان شعورك خلال الـ 24 ساعة الماضية؟

(قيم شعورك من 1 إلى 5، حيث أن: 1 = سيء جداً و 5 = ممتاز)

|         | دائمًا | في معظم الأوقات | غالباً | في بعض الأوقات | لا اطلاقاً |
|---------|-------|----------------|-------|-----------------|-----------|
| الاعتماد على النفس | 5 | 4 | 3 | 2 | 1 |
| لدى القدرة على التكلم طبيعياً | 5 | 4 | 3 | 2 | 1 |
| لدى القدرة على الاستحمام، تفريش أسنان، أو الحلاقة | 5 | 4 | 3 | 2 | 1 |
| لدى القدرة على الاعتناء بمرضي الشخصي | 5 | 4 | 3 | 2 | 1 |
| لدى القدرة على الكتابة | 5 | 4 | 3 | 2 | 1 |
| استطيع العودة للعمل أو أن أمارس النشاطات المنزلية الاعتيادية | 5 | 4 | 3 | 2 | 1 |

|         | دائمًا | في معظم الأوقات | غالباً | في بعض الأوقات | لا اطلاقاً |
|---------|-------|----------------|-------|-----------------|-----------|
| مساعدة المريض | 5 | 4 | 3 | 2 | 1 |
| لدى القدرة على التواصل مع العاملين في المستشفى | 5 | 4 | 3 | 2 | 1 |
| في حال وجودك في المستشفى | 5 | 4 | 3 | 2 | 1 |
| استطيع التواصل مع الأهل والأصدقاء | 5 | 4 | 3 | 2 | 1 |
| أحصل على الدعم من أطباء المستشفى | 5 | 4 | 3 | 2 | 1 |
| في حال وجودك في المستشفى | 5 | 4 | 3 | 2 | 1 |
| أحصل على الدعم من ممرضات المستشفى | 5 | 4 | 3 | 2 | 1 |
| في حال وجودك في المستشفى | 5 | 4 | 3 | 2 | 1 |
| أحصل على الدعم من أهل والأصدقاء | 5 | 4 | 3 | 2 | 1 |
| استطيع فهم التعليمات والنصائح | 5 | 4 | 3 | 2 | 1 |
Appendix 1c: Arabic version of the quality of recovery-40

|          | 1 | 2 | 3 | 4 | 5 |
|----------|---|---|---|---|---|
| الراحة   |   |   |   |   |   |
| الغثيان | 1 | 2 | 3 | 4 | 5 |
| النقيو أو الاستفراغ | 1 | 2 | 3 | 4 | 5 |
| الهنوع | 1 | 2 | 3 | 4 | 5 |
| (محاولة التقيؤ ولكن عدم القدرة) | 1 | 2 | 3 | 4 | 5 |
| الشعور بعدم الراحة | 1 | 2 | 3 | 4 | 5 |
| الارتجاف أو الارتعاش | 1 | 2 | 3 | 4 | 5 |
| الانفاض(تفاخه) | 1 | 2 | 3 | 4 | 5 |
| الشعور بالبرودة الشديدة | 1 | 2 | 3 | 4 | 5 |
| الشعور بالدوخة | 1 | 2 | 3 | 4 | 5 |
| المشاعر  |   |   |   |   |   |
| ارى أحلاماً مزعجة | 1 | 2 | 3 | 4 | 5 |
| أشعر بالقلق | 1 | 2 | 3 | 4 | 5 |
| أشعر بالغضب | 1 | 2 | 3 | 4 | 5 |
| أشعر بالاكتئاب | 1 | 2 | 3 | 4 | 5 |
| أشعر بالوحدة | 1 | 2 | 3 | 4 | 5 |
| أجد صعوبة في أن أنام | 1 | 2 | 3 | 4 | 5 |
Appendix 1b: Arabic version of the quality of recovery-40

| Question | Arabic Version |
|----------|----------------|
| How was your mood during the last 24 hours? | (Rate your mood from 1 to 5, where 1 = bad, 5 = excellent) |

| Scale   | Always | Most of the time | Sometimes | Rarely | Never |
|---------|--------|------------------|-----------|--------|--------|
| Support | 1      | 2                | 3         | 4      | 5      |
| Pain    | 1      | 2                | 3         | 4      | 5      |
| Headache| 1      | 2                | 3         | 4      | 5      |
| Muscle pain| 1      | 2                | 3         | 4      | 5      |

Thank you for your cooperation.

Please complete the questionnaire by clicking here...

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Appendix 2: Pearson’s correlation coefficients between quality of recovery-40 subscales, total scores, and patients’ pain and recovery scores at postanesthesia care unit discharge

| Pain score | Recovery score | Comfort | Emotions | Physical | Support | Pain |
|------------|----------------|---------|----------|----------|---------|------|
| Recovery Score | 0.36***        |         |          |          |         |      |
| Comfort | 0.14           | 0.48*** |          |          |         |      |
| Emotions | 0.11           | 0.44*** | 0.62***  |          |         |      |
| Physical | −0.09          | 0.25**  | 0.53***  | 0.43***  |         |      |
| Support | −0.18*         | 0.09    | 0.29***  | 0.46***  | 0.43*** |      |
| Pain | −0.24**        | −0.25** | −0.01    | 0.10     | −0.09   | 0.10 |
| Total | 0.00           | 0.40*** | 0.84***  | 0.82***  | 0.74*** | 0.64*** |

*P<0.05; **P<0.01; ***P<0.001

Appendix 3: Pearson’s correlation coefficients between quality of recovery-40 subscales, total scores, and patients’ pain and recovery scores at postoperative day 3

| Pain score | Recovery score | Comfort | Emotions | Physical | Support | Pain |
|------------|----------------|---------|----------|----------|---------|------|
| Recovery Score | −0.44***       |         |          |          |         |      |
| Comfort | −0.18*         | 0.36*** |          |          |         |      |
| Emotions | −0.23**        | 0.40*** | 0.67***  |          |         |      |
| Physical | −0.41***       | 0.21**  | 0.31***  | 0.28***  |         |      |
| Support | −0.34***       | 0.24**  | 0.08     | 0.25***  | 0.17*   |      |
| Pain | −0.12          | 0.28*** | 0.45***  | 0.55***  | 0.07    | 0.07 |
| Total | −0.34***       | 0.46*** | 0.81***  | 0.87***  | 0.52*** | 0.41*** |

*P<0.05; **P<0.01; ***P<0.001

Appendix 4: Pearson’s correlation coefficients between quality of recovery-40 subscales, total scores, and patients’ pain and recovery scores at postoperative day 7

| Pain score | Recovery score | Comfort | Emotions | Physical | Support | Pain |
|------------|----------------|---------|----------|----------|---------|------|
| Recovery score | −0.39***   |         |          |          |         |      |
| Comfort | −0.35***      | 0.49*** |          |          |         |      |
| Emotions | −0.36***      | 0.36*** | 0.83***  |          |         |      |
| Physical | −0.34***      | 0.19*   | 0.50***  | 0.42***  |         |      |
| Support | −0.36***      | 0.16    | 0.28***  | 0.28***  | 0.10    |      |
| Pain | −0.35***      | 0.35*** | 0.68***  | 0.68***  | 0.29*** | 0.18* |
| Total | −0.50***      | 0.46*** | 0.90***  | 0.88***  | 0.57*** | 0.57*** |

*P<0.05; **P<0.01; ***P<0.001