JA SYMPOSIUM

Use of quality of recovery score (QoR40) in the assessment of postoperative recovery and evaluation of enhanced recovery after surgery protocols

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Quality of recovery and its relationship with quality of perioperative care

Surgery has become less invasive with technological advances in surgical instruments and imaging. In addition, safer anesthesia has been achieved with the use of airway management tools including the video laryngoscope and supraglottic airway device, perioperative assessment by

D. Shida Division Colorectal Surgery, National Cancer Hospital, Tokyo, Japan transesophageal echocardiography during noncardiac and cardiac surgery, and new anesthetic agents and muscle relaxants such as remifentanil and rocuronium bromide. Nowadays, there is an emphasis on the quality of postoperative recovery [1]. Quality of recovery, an important postoperative outcome, is classified into two categories [2]: doctor-reported outcome (DRO) and patient-reported outcome (PRO). DRO includes survival, adverse events, and length of hospital stay; PRO includes quality of life (QoL), quality of recovery, and patient satisfaction. The Food and Drug Administration defines PRO as "any report on the status of a patient's health condition that comes directly from the patient, without interpretation of the patient's response by a clinician or anyone else" [2]. Litwin et al. [3] showed that physician ratings of patient symptoms do not correlate well with patient self-assessment of health-related OoL, suggesting that both DRO and PRO are important.

Donabedian's classical model of quality of care consists of three components: structure, process, and outcomes [4]. The Donabedian model is applicable to perioperative medicine (Fig. 1). Monitoring and evaluation of both DRO and PRO are essential for improving quality of care.

What is the QoR-40?

The quality of recovery score (QoR-40) is a recoveryspecific and patient-rated questionnaire that contains 40 items and comprises five subscales relating to comfort, emotion, patient support, physical independence, and pain. QoR-40 was developed and validated in Australia [5]: it is an assessment of PRO including QoL. The 40 questions were extracted from a list of 61 items related to recovery from anesthesia and surgery. These items had been identified as important by patients or their relatives or friends,

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Fig. 1 The Donabedian model for evaluating quality of care. Donabedian's classical model of quality of care has three essential components: structure, process, and outcomes



anesthesiologists or experienced trainees, nursing staff working in recovery or postoperative wards, and surgeons or experienced trainees [2]. The total score and subscales of the QoR-40 are measured using a 5-point Likert scale and individual scores are then summed. The minimum score is 40 points and the maximum score is 200 points. The initial study showed that the correlation between postoperative QoR-40 and visual analogue scale was good (r = 0.68, P < 0.001) and that a negative correlation between QoR-40 and duration of hospital stay was observed ($\rho = -0.24$, P < 0.001). Also, reliability was good, as demonstrated by test-retest reliability (intraclass r = 0.92, P < 0.001), Chronbach's $\alpha = 0.91$, and splithalf coefficient (r = 0.83, P < 0.001). The completion time was less than 6.7 (SD 4.2) min. These psychometric results showed that the OoR-40 has good validity, reliability, and feasibility in perioperative settings [5].

The Japanese version of QoR-40 has been tested for its validity, reliability, and feasibility in clinical settings in Japan. The Japanese version of QoR-40 was validated according to standard methods of cultural adaptation and psychometric analysis [6] (Fig. 2). It is recognized that the use of measures such as the OoR-40 across cultures requires accurate translation of the items and cultural adaptation of the instrument to maintain the content validity at a conceptual level across different cultures [7]. There are seven steps to this cultural adaptation process. The first stage is forward translation. At least two forward translations of the instrument should be made, thereby allowing comparison of the two translations. This step may reveal discrepancies in the translation process and highlights unclear wording in the original document. The second stage is synthesis. The two translators and a recording observer together synthesize the results of the translations. The third stage is back translation. Two translators who were not involved in the forward translation then translate the synthesized questionnaire back into the original language. This is a process of validation that ensures that the forward-translated version accurately reflects the original document. The fourth stage is a check by an expert committee. In this stage, the methodologist, health professionals, language professionals, and translators (forward and back translators) review all the translations and reach a consensus on any discrepancies between the translated and original versions. The fifth stage is the pretest. The prefinal version of the new questionnaire is tested on subjects or patients in the target setting. Ideally, 30–40 people should be tested. Stage six is submission and appraisal. This step involves a full assessment of the score-level attributes including construct validity, reliability, and responsiveness (Fig. 3) [7]. In the QoR-40J, one item of physical independence was changed to another item because the original item could not be understood by Japanese patients. QoR-40J has good validity, reliability, and feasibility in the Japanese clinical setting.

Clinical studies have been conducted using the OoR-40 including selection of anesthesia methods, effects on QoL, interventions for enhancing postoperative quality of recovery, and detection of factors that lead to poor recovery. In a study on new anesthetic methods for cardiac surgery, Lena et al. concluded the fast-track anesthesia combined with morphine-clonidine spinal analgesia controlled postoperative pain better and resulted in better quality of recovery than conventional analgesia [8]. Myles et al. examined the relationship between quality of recovery and postoperative QoL using QoR-40 and the Short Form 36 Health Survey (SF-36), which is the de facto standard of measurement of QoL. It was found that QoR-40 was a better measurement of early postoperative recovery, and that early postoperative poor recovery was predictive of poor QoL at 3 months after surgery. This information may allow implementation of earlier and more effective support strategies (e.g., counseling, home assistance) for hospitalized patients to achieve better OoL [9]. Murphy et al. [10] conducted a randomized controlled trial to examine the effect of preoperative dexamethasone on postoperative quality of recovery of patients undergoing outpatient laparoscopic cholecystectomy surgery. They concluded that the use of preoperative dexamethasone enhanced post-discharge quality of recovery and reduced

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nausea, pain, and fatigue in the early postoperative period [10]. Buchanan et al. noted that patient gender was an independent factor influencing the response to anesthesia and recovery after surgery [11]. Women emerged more quickly from general anesthesia but their overall quality of recovery was poorer than that of men. Female sex hormones, particularly progesterone, might be involved in this phenomenon, with premenopausal women experiencing faster recovery times but poor overall recovery [11]. Herrera et al. and Kluivers et al. conducted systematic reviews on postoperative recovery-specific instruments [12, 13]. They concluded that the QoR-40 is an ideal recoveryspecific questionnaire and recommended its use. Recently, a meta-analysis and systematic review on the QoR-40 was published that confirmed the validity, reliability, and feasibility of QoR-40 in eight different countries, suggesting that the QoR-40 is a valid and reliable instrument in many countries including Japan regardless of cultural differences between countries [14].

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Enhanced recovery after surgery protocols and the QoR-40J

Enhanced recovery after surgery (ERAS) represents a fundamental shift in perioperative care compared with traditional perioperative care. ERAS protocols reduce surgical stress, maintain postoperative physiological function, and enhance mobilization after surgery. These improvements have resulted in reduced morbidity rates, faster recovery, and shorter hospital stays [15]. The QoR-40J is used as a measure of early postoperative recovery from the patients' perspective. In Japan, the ERAS protocol has been used in clinical settings. A Japanese hospital introduced ERAS protocols and implemented the protocols in daily practice [16]. After introducing ERAS protocols for colorectal surgery, the postoperative stay was reduced from 10 days to 7 days without worsening the incidence of postoperative complications. However, PRO was not examined in this study. Therefore, the quality of recovery and QoL were quantified using QoR-40J and SF-36v2J (Japanese version of SF-36v2) by the same investigators in a separate study. In this study, 27 colorectal cancer patients undergoing surgery and "BOKUTOH ERAS" protocol management were asked to answer both QoR-40J and SF-36v2J questionnaires preand postoperatively. Compared with the preoperative score (183.5), the scores of QoR-40J differed significantly on postoperative days 1 and 3 [150.9 (SD 15.7) and 168.1 (SD 17.5) points, respectively]. However, both QoR40J and SF-36v2J scores at discharge (postoperative day 6) and at 1 month postoperatively were similar to preoperative scores [17]. These findings suggest that hospital



Fig. 3 Process of cross-cultural adaptation

discharge by postoperative day 7 was appropriate from the perspectives of both doctors and patients.

Conclusion

Postoperative quality of recovery measured by QoR-40 is an assessment of PRO. The QoR-40J was useful for assessing the perioperative outcomes after adaptation of ERAS protocols in Japan, encompassing both DRO and PRO.

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