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Validation and reliability of the Abbreviated World Health Organization Quality of Life Instrument (WHOQOL-BREF) in the hospitalized trauma population

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ABSTRACT

Introduction: While the number of trauma patients surviving their injury increase, it is important to measure Quality of Life (QoL). The Abbreviated World Health Organization Quality of Life (WHOQOL-BREF) questionnaire can be used to assess QoL. However, its psychometric properties in trauma patients are unknown and therefore, we aimed to investigate the validity and reliability of the WHOQOL-BREF for the hospitalized trauma population.

Methods: Data were derived from the Brabant Injury Outcome Surveillance. Floor and ceiling effects and missing values of the WHOQOL-BREF were examined. Confirmatory factor analysis (CFA) was performed to examine the underlying 4 dimensions (i.e. physical, psychological, social and environmental) of the questionnaire. Cronbach's alpha (CA) was calculated to determine internal consistency. In total, 42 hypotheses were formulated to determine construct validity and 6 hypotheses were created to determine discriminant validity. To determine construct validity, Spearman's correlations were calculated between the WHOQOL-BREF and the EuroQol-five-dimension-3-level questionnaire, the Health Utility Index Mark 2 and 3, the Hospital Anxiety and Depression Scale and the Impact of Event Scale. Discriminant validity between patients with minor injuries (i.e. Injury Severity Score (ISS)$\leq$8) and moderate/severe injuries (i.e. ISS $\geq$ 9) was examined by conducting Mann-Whitney-U-tests.

Results: In total, 202 patients (median 63y) participated in this study with a median of 32 days (interquartile range 29–37) post-trauma. The WHOQOL-BREF showed no problematic floor and ceiling effects. The CFA revealed a moderate model fit. The domains showed good internal consistency, with the exception of the social domain. All individual items and domain scores of the WHOQOL-BREF showed nearly symmetrical distributions since mean scores were close to median scores, except of the *'general health'* item. The highest percentage of missing values was found on the *'sexual activity'* item (i.e. 19.3%). The WHOQOL-BREF showed moderate construct and discriminant validity since in both cases, 67% of the hypotheses were confirmed.

Conclusion: The present study provides support for using the WHOQOL-BREF for the hospitalized trauma population since the questionnaire appears to be valid and reliable. The WHOQOL-BREF can be used to assess QoL in a heterogeneous group of hospitalized trauma patients accurately.

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Introduction

According to the World Health Organization (WHO), trauma is a major and worldwide problem [1]. It is increasingly important to focus on patient-centered outcomes in order to improve non-fatal outcome. Quality of Life (QoL) is a multidimensional concept

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including both positive and negative aspects of life and it incorporates a person's physical health, psychological state, level of independence, social relationships, personal beliefs and relationship to salient features of the environment [2]. QoL measures patient's evaluation of functioning in line with their expectations.

The World Health Organization Quality of Life questionnaire (WHOQOL) provides a detailed assessment of each individual facet that is related to QoL. Currently, the WHOQOL is an internationally applicable, cross-culturally comparable and generic instrument for the assessment of QoL [3]. The original WHOQOL was created by the WHOQOL Group in 1995 and consists of 100 items [3]. Following the development of the WHOQOL-100, the WHOQOL Group developed an abbreviated form, i.e. the Abbreviated World Health Organization Quality of Life (WHOQOL-BREF) [2]. The WHOQOL-BREF consists of 26 questions; one item for each of the 24 facets contained in the original WHOQOL-100 and two items concerning the 'overall QoL' and 'general health' [2,4]. The WHOQOL-BREF is very popular since its brevity reduces participant response burden and thus facilitates its use in conjunction with other measures [2].

In the general population, the WHOQOL-BREF is a valid and reliable measure for the assessment of QoL [2,4]. Several studies have validated the WHOQOL-BREF in specific subgroups of the population [5–11]. In addition, the WHOQOL-BREF has also been validated in various patient groups [12–18].

The WHOQOL-BREF has been used to determine QoL for the trauma population [19–23]; however, its methodological qualities in this population are unknown. Several studies have investigated the psychometric properties of the WHOQOL-BREF in specific subgroups of trauma patients [19–21]. A previous study evaluated and defined reference values of the WHOQOL-BREF for patients with acetabular fractures [24]. Although the WHOQOL-BREF was not validated in this study, the authors concluded that the WHOQOL-BREF can be used to assess QoL. Furthermore, the WHOQOL-BREF has been found to be an appropriate and valid measure for the assessment of QoL in patients with traumatic brain injury (TBI) [25] and in patients with spinal cord injury (SCI) [26]. In the study amongst SCI-patients, a comparison between outcomes of SCI-patients and non-SCI participants (i.e. participants free of any acute or chronic medical condition) was made in order to validate the WHOQOL-BREF; however, construct validity was not determined [26].

Hence, a complete picture of the validity and reliability of WHOQOL-BREF in the heterogeneous hospitalized trauma population is not available yet. The aim of this study was to investigate the validity and reliability of the WHOQOL-BREF for use in hospitalized trauma patients.

Methods

Design and setting

This cross-sectional validation study was approved by the Ethics Committee Brabant (project number NL50258.028.14) and was conducted in a level 1 and level 2 trauma centre. The study was performed in compliance with the Declaration of Helsinki. This study was part of the Brabant Injury Outcome Surveillance (BIOS) which is a large prospective cohort study focusing on the prevalence, recovery patterns and risk factors of non-fatal outcome and costs after trauma [27].

Participants

The WHOQOL-BREF was examined in a random sample of trauma patients who were included in the BIOS. In the BIOS, adult trauma patients who were seen at the Emergency Department (ED), were admitted to a ward or an Intensive Care unit (ICU) and survived to hospital discharge were eligible for inclusion. In the BIOS, both intentional and unintentional injuries and all types and severity of injuries were included. Patients for this validation study were recruited between April 2016 and November 2016 and were invited to participate at one month post-trauma. Patients with a pathological fracture, insufficient knowledge of the Dutch language or with no permanent address of residence were excluded. For this validation study, proxy informants were excluded as QoL-measures cannot reliably be obtained by proxy informants [28,29].

Data collection

Demographic characteristics were extracted from the self-reported questionnaires and included age and gender. Injury related characteristics including the Abbreviated Injury Scale (AIS) [30] and the Injury Severity Score (ISS) [31] were extracted from the Brabant Trauma Registry Database.

WHOQOL-BREF

The WHOQOL-BREF was included in the patient questionnaire of the BIOS. The WHOQOL-BREF produces a QoL-profile which consists of four domain scores including the physical (7 items), psychological (6 items), social (3 items), and environmental (8 items) domain. Additionally, there are two general items that are examined separately: item 1 asks about individuals 'overall perception of QoL' and item 2 asks about individuals 'overall perception of general health' [32]. All items are rated on a 5-point scale. The mean score of items within each domain is used to calculate the domain scores. Mean scores are multiplied by four in order to make domain scores and subsequently, scores for each domain range from 4 to 20. For the two general items the range of single scores also vary from 4 to 20. In order to make the interpretation of the domains and the individual items more easy, all scores were converted to 0–100 [32]. According to the WHOQOL-guideline, the assessment is discarded when <20% of the data is missing. Where an item is missing, the mean of other items in the domain was substituted. When $\geq$2 items are missing from the domain, the domain score cannot be calculated, with the exception of domain 3, where the domain score should only be calculated if $\leq$1 item is missing [32]. Almost all items and domain scores are scaled in a positive direction (i.e. higher scores denote higher QoL), except for the items 'pain and discomfort', 'negative feelings' and 'dependence on medication or treatments' which are negatively framed. However, when domain scores are calculated, these negatively framed questions are transformed in positively framed questions.

Questionnaires for the validation of the WHOQOL-BREF

To determine the construct and discriminant validity of the WHOQOL-BREF, the random sample of patients completed the set of questionnaires after their written informed consent was obtained. The set of questionnaires to determine construct validity included the Impact of Event Scale (IES) [33] to measure symptoms of post-traumatic stress disorder (PTSD), the Hospital Anxiety and Depression Scale (HADS) [34] to screen for anxiety and depression, and the EuroQol-five-dimension-3-level (EQ-5D-3 L) [35] and the Health Utility Index Mark 2 and 3 (HUI2 and HUI3) [36] to measure HRQoL. See the protocol paper of the BIOS [27] for an overview of methodologic qualities of the measurements.

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