Development and preliminary validation of a novel chest wall specific quality of life instrument-C-QoL

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Introduction

Quality of Life (QoL) is a core metric for patients with chest wall injury (CWI). No thoracic specific QoL instruments exist and granularity to assess impact of interventions on patients with chest wall injury is lacking. We hypothesized we could develop a valid and reliable CWI specific quality of life (C-QoL) questionnaire.

Methods

A systematic review of QoL instruments used in chest wall injury literature was performed and an international group of CWI experts assembled a panel of questions for inclusion. A three-round modified Delphi consensus process was performed using a 70% consensus threshold. A clinical validation study enrolling adults with ≥1 rib fractures(s) was performed. Participants completed the C-QoL and the SF-36 twice, with a week intervening each response. Reliability, construct validity, floor and ceiling effects of the C-QoL (sub)scales were determined using the Consensus-based Standards for the selection of health Measurement Instruments group guidelines.

Patient Recruitment

The clinical validation of the C-QoL instrument took place in three participating hospitals, Denver Health (DH), Saint Francis Hospital and Medical Center (SF), and Stanford Health Care (SH). Patients aged 18 years or older were eligible for enrollment if they sustained at least one rib fracture in the last year. Patients with insufficient comprehension of the English language were excluded. Patients were approached for participation in the study during their index hospitalization, when visiting the outpatient clinic, or after hospitalization for rib fractures (by telephone or e-mail) from January 2022 until December 2024.

Results

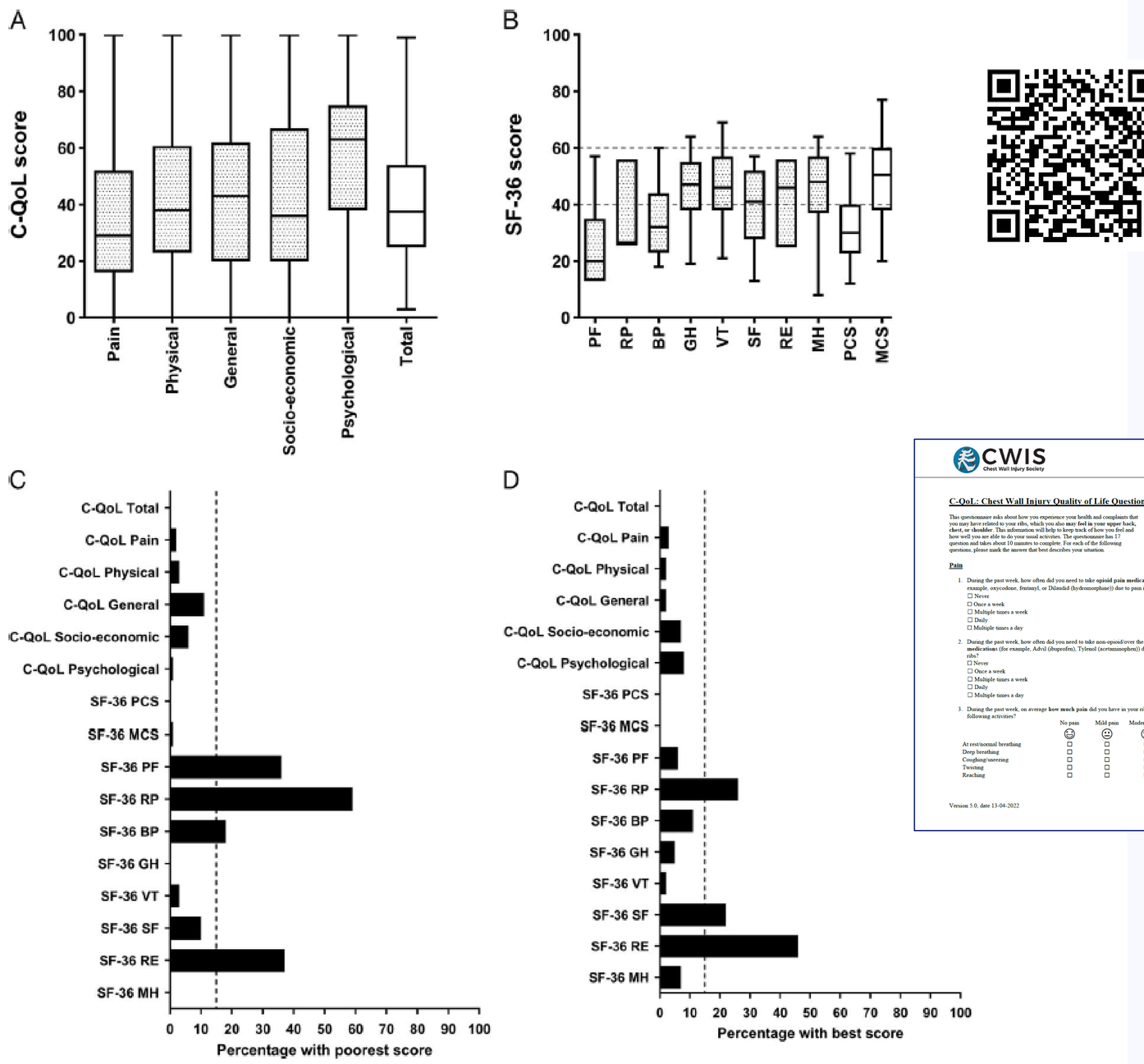


Figure 1. Boxes show median (P_{50}) with P_{25} and P_{75}, whiskers show minimum and maximum values.C-QoL ranges 0–100, with higher scores representing better chest-related QoL.SF-36 is normalized to 50 (SD, 10; dashed line indicates 40–60 range), with higher scores representing better QoL.The dashed line indicates the 15% threshold for a floor effect or ceiling effect. BP, Bodily Pain; d, days; RE, Role limitations due to Emotional problems; RP, Role limitations due to Physical health; SF, Social Functioning.

Twenty-two CWI experts participated in the Delphi process resulting in creation of the C-QoL instrument with five domains: pain, physical functioning, general health, socio-economic functioning, and psychological health. Scores ranges from 0 to 100.Median QoL score for the first 154 participants was 34 (P25–P75 25–50). Subscale scores ranged from 29 (P25–P75 14–48) for pain to 55 (P25–P75 37–75) for psychological health. All (sub)scales showed an inverse correlation with injury severity and had adequate reliability (Cronbach alpha between 0.70 and 0.95), construct validity (>75% or correlations with SF-36 (sub)scales are predicted correctly) and had no floor or ceiling effect.

Questionnaires and Data Collection

Patients who consented to study participation were asked to fill out the C-QoL questionnaire and the Short Form 36 (SF-36), an existing QoL measurement instrument, utilized to assess the construct validity of the C-QoL instrument. The participants were requested to fill out these questionnaires twice, with a one-week interval between applying the questionnaires. The questionnaire responses and clinical data were collected in a secure online database. The clinical data were retrieved from the electronical medical records.

Conclusion

The C-QoL instrument is reliable and valid for measuring CWI specific QoL in patients. A prospective study is needed to externally validate the instrument, and to determine the responsiveness, measurement error, and minimal important change.

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