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Original Research

The EORTC CAT Core—The computer adaptive version of the EORTC QLQ-C30 questionnaire

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Abstract ***Background:*** To optimise measurement precision, relevance to patients and flexibility, patient-reported outcome measures (PROMs) should ideally be adapted to the individual patient/study while retaining direct comparability of scores across patients/studies. This is achievable using item banks and computerised adaptive tests (CATs). The European Organisation for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire Core 30 (QLQ-C30) is one of the most widely used PROMs in cancer research and clinical practice. Here we provide an overview of the research program to develop CAT versions of the QLQ-C30's 14 functional and symptom domains.
Methods: The EORTC Quality of Life Group's strategy for developing CAT item banks consists of: literature search to identify potential candidate items; formulation of new items compatible with the QLQ-C30 item style; expert evaluations and patient interviews; field-testing and psychometric analyses, including factor analysis, item response theory calibration and simulation of measurement properties. In addition, software for setting up, running and scoring CAT has been developed.
Results: Across eight rounds of data collections, 9782 patients were recruited from 12 countries for the field-testing. The four phases of development resulted in a total of 260 unique items across the 14 domains. Each item bank consists of 7–34 items. Psychometric evaluations indicated higher measurement precision and increased statistical power of the CAT measures compared to the QLQ-C30 scales. Using CAT, sample size requirements may be reduced by approximately 20–35% on average without loss of power.
Conclusions: The EORTC CAT Core represents a more precise, powerful and flexible measurement system than the QLQ-C30. It is currently being validated in a large independent, international sample of cancer patients.

1. Introduction

Patient-reported outcomes (PROs) are the primary source of information about patients' health-related quality of life (HRQOL). PRO measures (PROMs) are typically static, standardised questionnaires i.e. all patients are asked the same set of items yielding scores that are comparable across patients. To achieve precise measurements for patients at different levels of HRQOL, traditional PROMs often require a substantial number of items; more than may be feasible and/or reasonable to ask patients to complete. Therefore, such PROMs typically represent a compromise between the need to minimise patient burden, while achieving adequate measurement precision.

Item response theory (IRT) provides a family of statistical models to describe the psychometric characteristics of items in multi-item scales [1]. In recent years, there has been an increasing interest in the use of IRT when developing new PRO/HRQOL measures and for enhancing existing ones. A simple search in PubMed® using search terms 'item response theory' AND ('quality of life' OR 'patient reported outcome') resulted in 5 hits for 2000, 21 for 2005 and 69 for 2015 [2]. One of the