



Health-related quality of life among incident colorectal cancer patients

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INTRODUCTION

Colorectal cancer is one of the most common diagnosed cancer in Western countries and its evolution can have strong impact on health-related quality of life (HRQoL) of the patients.

Disease and treatment-related adverse effects often result in a reduced overall quality of life.

When we assess change in patients' perceived health and quality of life during the course of their illness, the measurement of true change may be hampered by the occurrence of response shift (RS). RS is described as "a change in the meaning of one's self-evaluation of a target construct as a result of: (a) a change in the respondent's internal standards of measurement (recalibration); (b) a change in the respondent's values (reprioritization); (c) a redefinition of the target construct (reconceptualization) [Sprangers & Schwartz, 1999].

AIMS

The objective is to apply the Multifactorial structure of HRQOL construct on the EORTC QLQ-C30 [Boehmer, 2006] and to detect reconceptualization, reprioritization and recalibration response shifts in colorectal cancer patients.

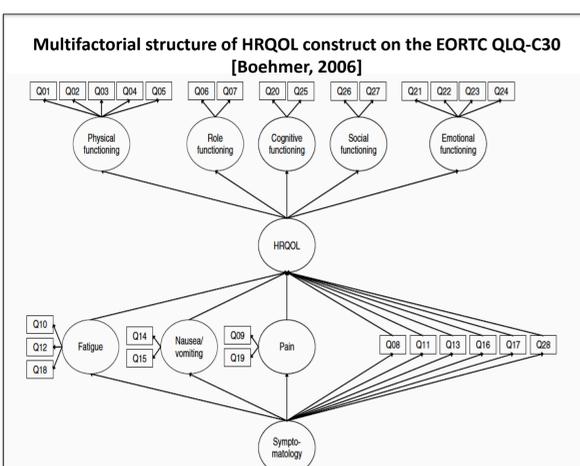
MATERIALS AND METHODS

A sample of colorectal cancer patients was recruited after diagnosis. The QLQ-C30 and Hospital Anxiety and Depression Scale (HADS) were assessed at baseline and six months later. The patients recruitment finished in April 2016. Boehmer model (2005) was used to assess HRQoL. Functional, social and emotional scales were used as indicator variables, as they reflect information about the level of HRQoL, while physical symptoms were established as causal variables as their occurrence can impact on HRQoL. Structural equation modeling (SEM) was used to detect RS effects according to the Oort's Procedure proposed in 2005. It relies on an operationalization of the different forms of RS as changes in the value of SEM parameters between two times of measurement.

RS detection and true change assessment is done in four step:

- (1) establishment of an appropriate measurement model;
- (2) fitting a model of no RS;
- (3) detection of RS;
- (4) assessment of true change.

The chi-square difference test was used to compare the fit of the models.



Types of change and associated invariance hypotheses Frans J. Oort, Quality of Life Research (2005) 14: 587-598

matrix	Parameter	Type of change	Invariance hypothesis
Patt(Γ)	Common factor loadings	Response shift	Patt(Γ_1) = Patt(Γ_2)
Γ	Common factor loadings	Reconceptualization	$\Gamma_1 = \Gamma_2$
τ	Intercepts	Reprioritization	$\tau_1 = \tau_2$
Diag(Ω)	Residual factor variances	Recalibration (uniform)	Diag(Ω_{11}) = Diag(Ω_{22})
		Recalibration (non-uniform)	
α	Common factor means	True change	$\alpha_1 = \alpha_2$
		True change (in the means)	
Diag(Φ)	Common factor variances	Other types of change	Diag(Φ_{11}) = Diag(Φ_{22})
Φ^*	Common factor correlations	True change in the variances	$\Phi_{11}^* = \Phi_{22}^*$
		Higher level reconceptualization or reprioritization	
Ω^*	Residual factor correlations	Lower level reconceptualization or reprioritization	$\Omega_{11}^* = \Omega_{22}^*$

Notes: Patt(Γ) is the pattern of zero and non-zero in the Γ matrix; Diag(Γ) designates the diagonal elements of the matrix concerned.

RESULTS

Figure 1. Parameter estimates in the final model (Factor loading)

Factor loadings (Γ)	BASELINE		FOLLOW-UP	
	HRQOL	Symptomatology	HRQOL	Symptomatology
Physical Functioning	0.203		0.250	
Role Functioning	0.327		0.304	
Emotional Functioning	0.152		0.327	
Cognitive Functioning	0.136		0.152	
Social Functioning	0.213		0.136	
Fatigue		0.990		0.990
Nausea / Vomiting		0.249		0.249
Pain		0.698		0.698
Dyspnoea		0.605		0.605
Insomnia		0.707		0.707
Appetite loss		0.593		0.593
Constipation		0.355		0.355
Diarhoea		0.249		0.249

REPRIORITIZATION

Patt(Γ_1) = Patt(Γ_2) NO RECONCEPTUALIZATION

Figure 2. Parameter estimates in the final model (Intercepts)

Intercepts (τ)	BASELINE	FOLLOW-UP
Physical Functioning	4.874	4.874
Role Functioning	4.980	4.980
Emotional Functioning	4.637	4.637
Cognitive Functioning	5.034	4.795
Social Functioning	5.058	5.058
Fatigue	1.544	1.544
Nausea / Vomiting	0.202	0.395
Pain	0.837	0.837
Dyspnoea	0.529	0.741
Insomnia	1.139	1.139
Appetite loss	0.660	0.660
Constipation	0.669	0.669
Diarhoea	0.598	0.598

UNIFORM RECALIBRATION

UNIFORM RECALIBRATION

UNIFORM RECALIBRATION

Figure 3. Parameter estimates in the final model (Residual variances)

Residual variances Diag(Ω)	BASELINE	FOLLOW-UP
Physical Functioning	0.312	0.312
Role Functioning	0.785	0.785
Emotional Functioning	0.529	0.529
Cognitive Functioning	0.455	0.455
Social Functioning	0.639	0.639
Fatigue	0.378	0.378
Nausea / Vomiting	0.357	0.550
Pain	0.649	0.649
Dyspnoea	0.669	0.669
Insomnia	1.252	1.252
Appetite loss	0.879	0.879
Constipation	1.119	1.119
Diarhoea	0.995	0.995

NONUNIFORM RECALIBRATION

RESULTS

Between October 2014 and April 2016, 289 patients were assessed (mean age=67.9yrs, sd=10.5, 54.7% male), 69.9% had colon and 30.1% a rectum cancer. Chemotherapy was prescribed in 51.4% of sample.

HADS Anxiety score was 4.9 (sd=3.5, 24.3% had score>8); mean HADS Depression score was 3.9 (sd=3.9, 17.9% had score>8).

Data of 252 patients who have completed the follow-up were used to detect RS effects and true change.

Mean functional QLQ-C30 subscales range from 69.6 (global QoL) to 89.2 (cognitive functioning), fatigue was the most frequent symptom present in 85.3% of patients (70.6% at follow-up).

The model of Boehmer was the basis of a structural equation model for measurements at two occasion without any across occasion constrains (CFI=0.93, RMSEA=0.8).

In model 2 all across invariance constrains on factor loading, intercepts and residual variances were imposed. The fit of model 2 was significantly worse than the fit of Model 1, indicating the presence of RS (χ^2 difference test: CHISQ(33)=99.5 p<0.0001).

Inspection of modification indices indicated which of the equality constrains were not tenable and showed five cases of RS (figure 1, 2, 3); the fit of model 3 was significantly better than the fit of Model 2 (χ^2 difference test: CHISQ(3)=50.7 p<0.0001).

Modification of Model 3 investigated change in the means, variances and correlations of the common factors.

Symptomatology means and variances changed across occasions ($\alpha_1 = 0$, $\alpha_2 = -0.285$; Diag(Φ_{11})=1, Diag(Φ_{22})=1.104); HRQOL means and variances didn't change across occasions.

The fit of the four model was showed in table 1.

Table 1. Goodness of overall fit of models in the four-step response shift detection procedure

Model	Description	RMSEA	CFI	SRMR
Model 1	Measurement model (no across occasion constraints)	0.08	0.93	0.05
Model 2	No response shift model	0.08	0.90	0.08
Model 3	Response shift model	0.07	0.92	0.07
Model 4	Final model (all tenable constraints imposed)	0.07	0.92	0.07

CONCLUSION

This study highlight the presence of RS in colorectal cancer patients.

Integrating RS into HRQOL researchs would allow a better understanding of how quality of life is affected by changes in health status and would provide valid measures for assessing changes in HRQOL.

The sample was heterogeneous in terms of the disease and kind of treatment patients received after diagnosis.

A further analysis will investigate change in patients' HRQoL for different diagnoses and kinds of treatment groups.