

# Assessing risk factors of evolutive health-related quality-of-life and mortality: a joint modelling approach

*Urko Aguirre<sup>1,2,3</sup>, Adrian Lopez<sup>4</sup>, Marta Jiménez Toscano<sup>4</sup>, Jose María Quintana<sup>1,2,3</sup> Maximino Redondo<sup>3,5</sup>, for the REDISSEC-CARESS/CCR group*

<sup>1</sup>urko.aguirrelarracochea@osakidetza.eus, Research Unit, Osakidetza Basque Health Service, Barrialde-Galdakao Integrated Health Organization, Galdakao-Usansolo Hospital Galdakao, Spain

<sup>2</sup>Kronikune Institute for Health Services Research, Baracaldo, Spain

<sup>3</sup>Network for Research on Chronicity, Primary Care, and Health Promotion (RICAPPS)

<sup>4</sup>Department of Surgery, Hospital del Mar, 08003 Barcelona, Spain.

<sup>5</sup>Unidad de Investigación, Hospital Costa del Sol, Malaga, Spain. CIBER Epidemiología y Salud Pública (CIBERESP), Madrid, Spain

**Introduction and Objective(s):** Nowadays, colorectal cancer (CRC) is a major socio-health problem, being one of the most frequent causes of death in the general population. Although the incidence of CRC has increased slightly in recent years, patient survival has stabilised, mainly due to advances in both diagnosis and treatment. However, few clinical care guidelines exist to adequately address deficits in the Health-Related Quality of Life (HRQoL) of these patients. In longitudinal studies, information on HRQoL is observed in different measurements until the event of interest (e.g. mortality) occurs. The aim of this work is to study how changes in HRQoL vary over time and influence mortality in patients with CRC, simultaneously assessing the association between both outcome variables. Furthermore, it is in our best interest to identify which patient sociodemographic and clinical features are related to this mechanism.

**Method(s) and Results:** The subjects of the present study are patients with colorectal cancer and belonging to the CARESS-CCR cohort (22 hospitals, 5 Autonomous Communities). Information was collected on sociodemographic and clinical data. Regarding HRQoL, these patients completed the EORTC QLQC30 questionnaire, in 6 different measurements, at baseline point and at follow-up up to 5 years (1 month, 1-2-3 and 5 years). Joint models were developed in two steps: first, generalized mixed models were applied to predict the evolution of the summary component of the EORTC QLQC-30, as well as survival models for mortality. Finally, the association between the two modelling approaches was assessed. Results of the joint model showed that the Charlson comorbidity index was associated with worse HRQoL outcomes and higher mortality risk. An improved HRQoL outcome was associated with a lower 5-year mortality risk ( $p < 0.001$ ).

**Conclusions:** Joint models are a useful statistical method to characterize HRQoL trajectories in the first 5-years post-surgery in CRC. A better evolution of HRQoL is associated with a less risk of mortality at 5 years post-surgery.

**Keywords:** HRQoL, joint modelling, mortality, colon cancer.