**Background**

- Health-related quality of life (HRQoL) is commonly assessed using disease-specific patient-reported outcomes such as the St George’s Respiratory Questionnaire (SGRQ).
- Disease-specific measures, such as the SGRQ, are more responsive to changes in HRQoL than generic measures, such as EQ-5D. However, utility values derived from patient assessments are required to generate quality-adjusted life years (QALYs), a widely used measure for cost-effectiveness analysis.
- Mapping algorithms can be employed to generate EQ-5D utility scores from SGRQ scores, thereby allowing existing SGRQ data from clinical trials to be employed in cost-effectiveness analyses.
- Mapping between SGRQ and EQ-5D has been achieved in a population of patients with chronic obstructive pulmonary disease (COPD) and idiopathic pulmonary fibrosis.

**Objective**

- To develop a mapping function between the disease-specific SGRQ and the generic five-level EQ-5D (EQ-5D-SL) HRQoL measures in a population with severe asthma.

**Methods**

**Study design**

- This mapping analysis (GSK ID HO-15-16182) used data from the IDEAL study (GSK ID 201722, NCT02293265), an observational cohort study in patients ≥12 years of age with severe asthma (as defined by the European Respiratory Society/American Thoracic Society Guidelines for Severe Asthma), conducted in six countries. All assessments, including SGRQ and EQ-5D, were performed at the study’s single clinical visit.
- The study population was split 3:1 into an estimation sample and a validation sample. Models were developed using data from the estimation sample using regression analysis, then assessed in the validation sample.

**Psychometric analyses**

- Prior to mapping, psychometric analysis assessed the relationships between EQ-5D utility scores or dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) and SGRQ scores (total and domain scores: symptoms, activity, and impact) by calculating correlations between measures (convergent validity).
- Pawson’s correlation (r) was used for continuous variables, such as EQ-5D utility scores, and Spearman’s correlation (ρ) was used for all other correlations.

**Mapping**

- Different regression methods were used to map SGRQ total (domains, and individual items) onto the EQ-5D-5L utility score using the estimation sample:
  - Ordinary least squares (OLS) regression – this used a simple linear model to explore relationships.
  - Tobit regression – this used a linear model adjusted to take into account the upper and lower limits of the utility values, so that predictions do not exceed the credible range of values.
- Two-part model (TPM) regression – this analyzed the probability of a patient being in perfect health separately from analysing utility values of patients not in perfect health, then combined the two sets of results.

**Results**

**Population characteristics**

- Of the 748 patients enrolled in IDEAL, 658 (88%) had complete data for SGRQ and EQ-5D-SL. 492 (75%) patients were included in the estimation sample, and 166 (25%) patients in the validation sample. Patients in the estimation sample had a mean (standard deviation) (SD) age of 50.4 (15.1) years, EQ-5D-SL score of 0.80 (0.21) and a SGRQ total score of 42.1 (20.4). The distribution of EQ-5D-SL scores was negatively skewed as 9.5% of patients had scores < 0.5.
- There were no statistically significant differences in patient characteristics including age, EQ-5D-SL score or SGRQ score between the estimation and validation samples.

**Psychometric analysis**

- Strong correlations (r ≥ 0.5) were observed between EQ-5D-SL utility score and SGRQ total score, and SGRQ activity and impact domains (Figure 1).
- Strong correlations were also found between EQ-5D-SL mobility or usual activities and SGRQ activity and impacts domains.
- Moderate correlations (0.3 ≤ r < 0.5) were observed between EQ-5D-SL utility scores and SGRQ symptom domain scores.

**Conclusions**

- Psychometric analysis showed strong correlations between several aspects of the SGRQ and EQ-5D-SL scores.
- No model consistently performed best across the five criteria used to assess models. However, the Tobit SGRQ item model was preferred as SGRQ item scores had the lowest overall MAEs.
- EQ-5D-SL scores predicted from SGRQ underestimated the difference in means in groups with and without asthma control compared with observed EQ-5D-SL scores indicating that mapping may underestimate potential health gains.
- The models developed performed better than the existing mapping algorithm between SGRQ and EQ-5D previously developed for COPD, indicating improved precision in utility mapping for a population with severe asthma.
- A limitation of this analysis was the small sample size, particularly at the lower end (<0.5) of the EQ-5D distribution, increasing uncertainty and reducing model fit.

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**References**