**BACKGROUND**

The prevalence of comorbidities increases with age but preference-based utilities are generally obtained from cohorts who have a single condition. This can cause problems when populating health states in economic models which represent more than one condition. Analysts use the mean utilities from the cohorts with the single conditions to estimate the mean utility for a cohort with comorbidities. There is currently no consensus on which is the most appropriate method to combine these data and the different techniques can produce very different results.

**OBJECTIVE**

To compare the accuracy of different methods (minimum, multiplicative, additive, a linear regression) used to estimate health state utility values for comorbidity health conditions.

**METHOD**

Data collected during five rounds of the Welsh Health Survey (n=64,437) were used to generate mean SF-6D scores for cohorts with specific health conditions. These data were then used to estimate mean SF-6D scores for cohorts with comorbid health conditions (n= 32) using the following methods:

- The additive method assumes a constant absolute decrement relative to the baseline:
  \[ \dot{U}_{\text{add}} = U_{\text{baseline}} - U_{\text{condition A}} - U_{\text{condition B}} \]

- The multiplicative method assumes a constant proportional decrement relative to the baseline:
  \[ \dot{U}_{\text{mult}} = U_{\text{baseline}} \cdot (1 - x_{\text{condition A}}) \cdot (1 - x_{\text{condition B}}) \]

- The minimum method assumes the effect on HRQoL is equivalent to the most severe of the single health conditions:
  \[ \dot{U}_{\text{min}} = \min(U_{\text{condition A}}, U_{\text{condition B}}) \]

A simple linear model obtained using an OLS regression, incorporating a combination of the above methods:

\[ \dot{U}_{\text{linear}} = \beta_0 + \beta_1 \cdot \min(U_{\text{condition A}}, U_{\text{condition B}}) + \beta_2 \cdot \max(U_{\text{condition A}}, U_{\text{condition B}}) + \epsilon \]

**RESULTS**

- The actual mean SF-6D scores for the sub-groups with comorbidities range from 0.465 to 0.607.
- The additive method tends to underestimate the scores (ME: -0.121, MAE: 0.121).
- The multiplicative method tends to underestimate the scores (ME: -0.075, MAE: 0.075).
- The minimum method tends to overestimate the scores (ME: 0.055, MAE: 0.056).
- The linear model performs well in the central area but tends to under-predict scores at the top of the range and over-predict scores at the bottom of the range.
- The linear model performs best in terms of errors and the proportion of estimated scores within the SF-6D MID (0.041) when sub-grouped by actual SF-6D category.

**CONCLUSIONS**

While the linear model gave the most accurate results in these data, additional research is required to validate these findings.

**REFERENCES**


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