Core obesity model to assess the cost-effectiveness of weight management interventions

Maria De Francesco 1, Sandra Lopes 1, Henrik Meinecke 1, Gabriela Vega-Hernandez 1, Mark Lamotte 1, Michael J E Lean 1

1IQVIA, HEOR/HTA, Zaventem, Belgium; 2Novo Nordisk AS, Seborg, Denmark; 3Human Nutrition, University of Glasgow, Glasgow, UK

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Background

- Elevated body mass index (BMI) increases morbidity and mortality from chronic diseases (including type 2 diabetes (T2D), cardiovascular disease (CVD), musculoskeletal disorders, hypertension, gait problems and some cancers) 1-3.
- The objective of this study was to develop a ‘core obesity model’ to assess long-term complications and costs and effects of different interventions.

Objectives

- The objective of this study was to develop a ‘core obesity model’ to assess long-term complications and costs and effects of different interventions.
- This poster explores the model structure, its inputs and its clinical outcomes, using an illustrative example.

Methods

- A Markov model was developed (Microsoft Excel™ 2013, Redmond, WA, USA) to estimate the costs and effects of a cohort with obesity over a lifetime time horizon.
- The model cycle length is 3 months for the first year, allowing for a treatment ‘stopping rule’ at 12 weeks, and annually thereafter.
- The model is able to compute results for time horizons ranging from 1 to 40 years.

Health states

- Health states are additive and reflective of complications that:
  - are highly related to obesity according to the World Health Organization (Figure 1);
  - have substantial effects on costs, quality of life (QoL) and/or life expectancy.
- A graphical representation of the model structure is presented in Figure 1.

Mortality

- General population age and gender-specific all-cause mortality is included in the model, based on country-specific life-tables.
- Both long-term and short-term mortality are considered.

Transitions

- Transitions describe the progression of the cohort between health states.
- A systematic review of the literature in 2017 identified risk equations, which can inform the transition probabilities between health states (Table 1).

Clinical and economic outcomes

- The clinical outcomes of the model include:
  - cumulative incidence of obesity-related complications;
  - QoL;
  - life expectancy;
  - quality-adjusted life expectancy.
- The economic outcomes of the model include:
  - treatment ‘stopping rule’ at 12 weeks, and annually thereafter.
- Baseline characteristics of the model starting cohort (European NGT population) were defined at model entry (Table 2).

Results

- Over a 10-year time horizon, the model predicted 5.0% mortality, 5.8% acute coronary syndrome (ACS) and 2.1% stroke (Figure 3).
- Knee replacement occurred in 6.3% of the cohort and the proportion alive with T2D was 5.0%.

References:

18. Incidence of knee replacement was reduced to 4.4% and the proportion alive with T2D was 3.8%.
19. TKR, total knee replacement.

Discussion/Limitations

- Prediabetes is defined based on baseline; however, no risk equation for developing prediabetes were identified.
- Although its management costs are low, this potentially underestimates future prevalence.
- Some risk equations, for example UKPDS28, do not include BMI as an independent risk factor predicting the risk of CVD.
- Other risk equations include BMI only up to certain BMI levels.
- Finally, this study is limited by lack of prospective long-term data on hard outcomes after intentional weight changes.

Conclusion

- The presented Core Obesity Model is novel in assessing the long-term effects of weight management interventions on such a comprehensive set of obesity medical complications.
- This model could therefore be used to inform cost-effectiveness analyses on treatments for adult patients with obesity.