Economic Plan

This document identifies the priorities for economic analysis and the proposed methods for addressing these questions as described in section 7 of the Guidelines Manual (2012).

1 Guideline

Full title of guideline: Weight Management Suite

2 Process for agreement

The economic plan was prepared by the guideline health economist in consultation with the rest of the internal Guideline Updates Team (GUT) and Guideline Committee (GC). It was discussed and agreed on X by the following people[a]:

For the GUT and GC:

GUT economist:	Miaoqing Yang, Kusal Lokuge, Jeremy Dietz, Alfredo Mariani
GUT representative(s)[b]:	Shreya Shukla
GC representative(s)[c]:	Whole committee

For NICE (completed by NICE):

CCP lead:

Commissioning manager:

Economic lead:

Costing lead:

Proposals for any changes to the agreed priorities will be circulated by email to this group. If substantive revisions are agreed, they will require to be recorded as addenda to this document (section 7) or as an updated version of the document[d].

[a] This may be done by face-to-face meeting, teleconference, or email as convenient.

[b] This may be the project manager, a systematic reviewer or research fellow and/or the centre director or manager, as appropriate for the NCC and guideline.

[c] This may be GC chair, clinical lead and/or other members as appropriate.

[d] In case clinical questions are changed, for example, section 3 requires updating as well as other sections if modelling priorities are affected.

3 Topic priorities identified in the Scope

This section contains all topics, or clinical review questions as covered by the scope. These topics usually reflect selected clinical issues. Please indicate if an area is relevant for economic consideration and if modelling is deemed appropriate to address it.

Area[e]	**Relevant?**[f]	**Appropriate for modelling?**[g]
RQ1.1 What are the most accurate and suitable anthropometric methods and thresholds, for different ethnicities, to assess the health risk associated with overweight and obesity in children and young people, particularly those in black, Asian and minority ethnic groups?	No	Low priority, as the clinical evidence is centred around looking at the accuracy and suitability of indicators such as BMI and waist to hip ratio where no substantial costs other than measuring equipment are involved. The clinical review has been completed and presented to the committee. The committee agreed that the topic is unlikely to have substantial economic implication due to potential changes in practice driven by related recommendations.
RQ1.2 What are the most accurate and suitable anthropometric methods and thresholds, for different ethnicities, to assess the health risk associated with overweight and obesity in adults, particularly those in black, Asian and minority ethnic groups?	No	Low priority, as the clinical evidence is centred around looking at the accuracy and suitability of indicators such as BMI and waist to hip ratio where no substantial costs other than measuring equipment are involved. The clinical review has been completed and presented to the committee. The committee agreed that the topic is unlikely to have substantial economic implication due to potential changes in practice driven by related recommendations.

[e] This corresponds to the "Key clinical issues that will be covered " section in the scope, or if available, clinical review questions

[f] Please state if this area is deemed relevant for considering opportunity costs and likely disinvestments. Areas might pose a decision problem directly or implicitly inform the choice between options. Categories should include information on relevance and if of high or low priority for health economic work (see below).

[g] Health economic work comprises of literature reviews, qualitative consideration of expected costs and effects and/or formal decision modelling. Decision modelling is particularly useful where it can reduce uncertainty over cost effectiveness and/or where a recommendation is likely to result in considerable changes in health and/or costs. For further details please see section 7.1 of the Guidelines Manual (2012). It may not be feasible or efficient to address every relevant decision problem by de novo work. There rationale for choosing areas for cost effectiveness modelling should be discussed in detail in Sections 3 and 4.

Area[e]	Relevant?[f]	Appropriate for modelling?[g]
RQ1.3 What are the most effective and cost-effective approaches for identifying overweight and obesity in children and young people, particularly those in black, Asian and minority ethnic groups, and increasing their uptake of weight management services?	Yes	Low priority. The clinical review is still ongoing and part of the results have been presented to the committee. The committee anticipated that measures to identify people with overweight and obesity and increase uptake of weight management services would be cost effective for the NHS if more people could benefit from weight management services. The cost increase would be outweighed by the reduction in obesity-related complications in the long term.
RQ1.4 What are the most effective and cost-effective approaches for identifying overweight and obesity in adults, particularly those in black, Asian and minority ethnic groups, and increasing their uptake of weight management services?	Yes	Low priority. The clinical review is still ongoing and part of the results have been presented to the committee. The committee anticipated that measures to identify people with overweight and obesity and increase uptake of weight management services would be cost effective for the NHS if more people could benefit from weight management services. The cost increase would be outweighed by the reduction in obesity-related complications in the long term.
RQ2.1: What is the effectiveness and cost effectiveness of total or partial diet replacements, intermittent fasting, plant-based and low carbohydrate diets in achieving and maintaining weight loss in adults living with overweight or obesity?	Yes	High priority. The clinical review is still ongoing, and we expect that the recommendations are likely to have a significant economic impact given the potentially large population who will be affected and the wide variation in practice across England. Furthermore, no directly applicable economic evidence has been identified in the literature review. Hence, it is likely that this question will be addressed by economic modelling if robust clinical evidence is found.
RQ2.2: What referral criteria for bariatric surgery are most effective to achieve weight loss and maintain a healthier weight in adults living with obesity?	Yes	Low priority. The clinical and economic reviews have been completed and presented to the committee. The committee agreed that there is sufficient evidence from existing literature supporting the recommended referral criteria, and therefore the RQ is not prioritised for new economic modelling.

Area[e]	Relevant?[f]	Appropriate for modelling?[g]
RQ2.3: What multicomponent interventions and approaches are effective, cost effective and acceptable in helping children and young people living with overweight or obesity to grow and develop into a healthier weight as part of a weight management programme?	Yes	High priority. The clinical review is still ongoing, and we expect that the recommendations are likely to have a significant economic impact depending on the costs of the multicomponent interventions and approaches, the population to which they are recommended to, and the potential benefits as informed by the clinical review. Hence, it is likely that this question will be addressed by economic modelling if robust clinical evidence is found.
RQ2.4: What is the effectiveness and cost effectiveness of healthy living programmes for preventing overweight or obesity in children and young people?	Yes	High priority. The clinical review is still ongoing, and we expect that the recommendations are likely to have a significant economic impact depending on the costs of the healthy living programmes, the population to which they are recommended to, and the potential benefits as informed by the clinical review. Hence, it is likely that this question will be addressed by economic modelling if robust clinical evidence is found.
RQ2.5: What is the effectiveness, cost effectiveness and acceptability of psychological approaches to address the counterproductive effect of weight stigma in achieving or maintaining weight loss, or negating the adverse impact of stigma, in children, young people and adults?	Yes	Moderate priority. The clinical review is still ongoing. Dependent on what outcomes of interest are identified and potential cost implications of the recommendations, we will discuss with the committee to see whether an economic evaluation can add value to the recommendation.

4 Planned modelling

This section will specify modelling work prioritised by the GC. It will provide details on how cost effectiveness will be considered for relevant, prioritised clinical areas/decision problems. Proposed modelling work should be listed in chronological order. For each decision model, please state the proposed analytical methods, relevant references and any comments and justifications on, for example, possible diversions from the reference case.

Area[h] (clinical question(s) [i])	*Outline proposed analysis*
RQ1.1, RQ1.2	No modelling work proposed
RQ1.3, RQ1.4	No modelling work proposed
RQ2.1	**Population:** People aged 18 years and over who are overweight (BMI 25 kg/m2 to 29.9 kg/m2) or living with obesity (BMI ⩾ 30 kg/m2). Exclusion criteria include pregnant women and people of healthy weight gain. **Interventions:** **Energy restricted diets:** • Low energy (total or partial replacement) diets including low energy liquid diets (defined as diet containing 800-1200 calories per day) • Very low (total or partial replacement) energy diets (defined as diets containing less than 800 calories per day) **Macronutrient diets:** • Low carbohydrate diet (defined as under 130g of carbohydrates) • Very low carbohydrate (defined as under 50g of carbohydrates) **Plant based diets with a calorie deficit.** (Plant based diets defined as diets excluding meat and fish e.g., vegetarian, and vegan diets). **Intermittent energy restriction (patient led fasting)** • Time restricted eating: • Intermittent fasting (e.g., 16/8 intermittent fasting) • Alternate day fasting

[h] This should be the key areas relevant for considering opportunity costs and high priority for de novo modelling, as identified in section 3.

[i] Two or more questions may be addressed by a single analysis if appropriate.

- Fasting for two days (e.g. 5:2 diet)

Evaluation type: Cost–utility analysis (health benefits expressed in terms of QALYs)

Perspective: NHS and personal social services.

Time horizon: 100 years

Discounting: 3.5% for both costs and QALYs

Model structure: An adaptation of the PRIMEtime model will be used to carry out the economic evaluation. The PRIMEtime refers to a series of population-based proportional multi-state lifetable models designed to link behavioural risk factors with population NCD mortality[1]. The full model contains twelve behavioural risk factors, covering the domains of diet, physical inactivity, alcohol consumption, and tobacco consumption, and twenty-four health outcomes, including cardiovascular diseases, cancers and others. We will adapt the PRIMEtime model to the topic of obesity and map changes in BMI to changes in total mortality and morbidity of a range of obesity-related non-communicable diseases for each treatment arm (Figure 1).

The model is designed to minimise the risk of double counting of effect size, by including epidemiologic parameters that have been appropriately adjusted for other behavioural risk factors[1]. For example, body mass index (BMI) is a risk factor for both diabetes and CHD/stroke, so that we will avoid double-counting by reducing the relative risks of CHD and stroke from BMI. We will update the data inputs of baseline characteristics using the most recent data sources and obtain treatment effects of interventions from the clinical review.

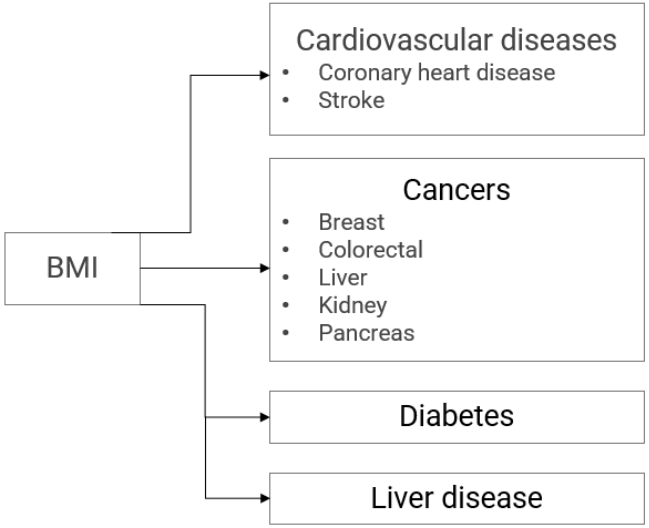

Figure 1: Schematic diagram of the PRIMEtime model adapted to RQ2.1

Baseline population: Data on population numbers and mortality rates will be obtained from the Human Mortality Database[2]. For each disease type, data on age-sex specific disease incidence, prevalence and case fatality will be derived using the 'disbayes' R package (github.com/chjackson/disbayes) and Global Burden of Disease data[3] for England. BMI distributions in sex and age in 5-year bands will be obtained from Health Survey for England (HSE)[4] data.

Treatment effect inputs: Data on the relative effectiveness of diet interventions will be taken from the clinical review. Clinical difference in BMI will be modelled.

Cost and resource use inputs:

Cost of interventions: To be obtained from sources identified in the economic evidence review and standard UK sources for health care and social care costs (e.g. PSSRU). If unavailable, we will also ask committee for suggestions and explore the feasibility of using micro-costing approach.

Cost of long-term complications: Health care and social care cost related with long-term complications will be sourced from existing literature or the latest version of Programme Budgetting Returns (PBR).

Utility data:

Impact on QALY due to long-term complications: The impact on QALYs due to long-term complications will be obtained by looking at the input parameters used in economic models in NICE guidelines relating to these complications. In the event that this information was not available in previously published guidelines, a combination of de novo literature reviews and expert opinions are to be used.

Subgroup analysis:

If possible, the same subgroups will be looked at as are of interest in the clinical review. Specifically:

- People at a higher risk of CV events
- People with type 2 diabetes or prediabetes
- Ethnicity
- Sex
- Severity of obesity
- People with learning and physical disabilities
- People with serious mental illness
- People from different demographic/socioeconomic/geographic groups

If there is no evidence on differences in relative effectiveness between different treatment options, we might only be able to model the change in baseline population for some of the subgroup analyses above. In addition, standard deterministic and probabilistic sensitivity analyses will be conducted, to assess the impact of parameter uncertainty.

RQ2.2	We have completed the literature review of both clinical and economic evidence. Given the popularity of economic evaluations relating to bariatric surgery as an area of research, identified studies were limited to those applicable to the UK. There were 5 UK studies identified that showed consistent evidence that bariatric surgery was cost-effective under the current referral criteria. The committee agreed that existing evidence is sufficient to support the recommendation to keep the current referral criteria, so that no new economic modelling was deemed necessary.
RQ 2.3, RQ 2.4	Given that there is insufficient evidence mapping BMI levels to long-term complications in children, an adaptation of the PRIMtime model as explained for RQ 2.1 is to be used, where the effectiveness of interventions are to be obtained via changes in BMI from the clinical review and incorporated to the model. With the PRIMEtime model is at present limited to adults, a separate analysis is to be done to project the QoL of children following the interventions, until the age of 18 (using a combination of data from the clinical review and an analysis of HSE data). This would then be plugged into the PRIMEtime model as a starting baseline population.
RQ 2.5	The clinical review is still ongoing. Dependent on what outcomes of interest are identified and potential cost implications of the recommendations, we will discuss with the committee to see whether an economic evaluation can add value to the recommendation.

5 Clinical Guidelines technical support unit[j]

Not applicable.

6 References

1. Scarborough P, Harrington RA, Mizdrak A, Zhou LM, Doherty A. The Preventable Risk Integrated ModEl and Its Use to Estimate the Health Impact of Public Health Policy Scenarios. Scientifica (Cairo). 2014;2014:748750. doi: 10.1155/2014/748750. Epub 2014 Sep 25. PMID: 25328757; PMCID: PMC4195430.
2. University of California Berkeley (USA), Max Planck Institute for Demographic Research (Germany). Human Mortality Database [Available from: www.mortality.org.]
3. Global Burden of Disease Study. GBD Results Tool: Institute for Health Metrics and Evaluation, University of Washington [Available from: http://ghdx.healthdata.org/gbd-results-tool]
4. Health Survey for England: NHS Digital; [Available from: https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england]

7 Addenda to economic plan

Please state any changes that have been made to the above agreed plan, together with date. If clinical questions have changed since the economic plan was signed off, include a new list with all clinical questions as part of the addenda, together with a comment where questions were inserted, deleted or altered and an explanation.

Scope area[k] (clinical question(s) [l])	*Proposed changes*	*Date agreed*

[j] The clinical guidelines technical support unit provides academic support to guideline developers at any point in guideline development: conduct, or support the NCC/ICG team in the development of, advanced evidence synthesis, support complex economic analyses, conduct validation of or amendments to, existing evidence syntheses used in guideline models and address concerns from stakeholder (via consultation). Please contact the senior technical adviser for further details.

[k] This should be the key areas relevant for considering opportunity costs and high priority for de novo modelling, as identified in section 3.

[l] Two or more questions may be addressed by a single analysis if appropriate.