Mount Hood 2026 - Reference Simulation

(Type 2 Diabetes & Prediabetes)

Mt Hood Reference Simulation

The modelling groups are asked to repeat the reference simulations for the representative patient in the Mt Hood Reference case (as reported in the Mt Hood model registry and specified below). This will enable model simulations to be compared across time—incorporating model upgrades for those that have completed these previously—and these values will be used to update the model registry: https://www.mthooddiabeteschallenge.com/registry.

Model inputs for Challenge – Reference Simulation

Patient Baseline Characteristics

To allow for consistent comparisons across all models, baseline patient characteristics should follow the values as listed in Table 1. Any other baseline patient characteristics which your model *requires* to run effectively can be sourced from publicly available literature. Please document any additional assumed parameters and their sources in "Baseline Characteristics" tab in the accompanying Excel spreadsheet

Table 1: Patient Baseline Characteristics

Patient Characteristics	**Type 2 diabetes[a]**		**Prediabetes[b]**	
	Men	**Women**	**Men**	**Women**
Current age (years)	66	66	51	51
Duration of diabetes (years)	8	8	-	-
Current/former smoker	N	N	N	N
Ethnicity	White	White	White	White
HbA1c. %	7.5	7.5	5.9	5.9
FPG. mmol/L	8.5	8.5	5.9	5.9
Systolic Blood Pressure, mmHg	145	145	124	124
Diastolic Blood Pressure, mmHg	80	80	78	78
Total Cholesterol, mmol/l	5.2	5.2	5.3	5.3
HDL Cholesterol, mmol/l	1.3	1.3	1.2	1.2
LDL Cholesterol, mmol/l	3.0	3.0	3.2	3.2
Triglycerides, mmol/L	2.0	2.0	1.8	1.8
BMI (kg/m^2)	28	28	34	34
Albumin: creatinine ratio (mg/g)	14.2	14.2	13.6	13.6
PVD	N	N	N	N

Micro or macro albuminuria (albuminuria >50)	N	N	N	N
Atrial fibrillation	N	N	N	N
eGFR (ml/min/1.73 m2)	70	70	95	95
WBC (x10^9/l)	7	7	-	-
Heart rate (bpm)	79	79	-	-
Haemoglobin (g/dl)	14	14	14	14
Prior history of macrovascular disease	N	N	N	N
Prior history of microvascular disease	N	N	N	N

Sources:

[a]ADVANCE—Action in Diabetes and Vascular Disease: patient recruitment and characteristics of the study population at baseline

[b]The Diabetes Prevention Program: Baseline characteristics of the randomized cohort

Utility Values

The reference simulation uses the health utility values for type 2 diabetes from the 2018 Mt Hood Quality of life Challenge, and newly added health utility values for prediabetes and normal glucose tolerance (NGT) health states. If presenting a type 2 diabetes model and your model is capable of incorporating movement between differing glycaemic states, please submit two separate results files: 1) with distinct prediabetes and NGT utility values as set out below **and** 2) with prediabetes and NGT utilities set to a single common utility value with type 2 diabetes of 0.785 (95%CI 0.681-0.889) to maintain comparability with previous years' reference simulations. For all utility parameters, it will be adequate to use point estimates rather than making additional use of parameter uncertainty estimates reported in Table 2 as required.

If your model *requires* parameterisation of additional utility weights for health states not listed, please set these to zero where possible, and failing this – utilise and document the value and source for the additional utility parameterisation as a last resort. Please document your sources and assumptions in the "Utility values" tab in the accompanying Excel spreadsheet.

Restating the above for further clarity – this challenge requires participants to only apply disutility values for complication events described in the instructions wherever possible.

If this is not possible and your model *requires* you to apply additional disutilities for certain health states (e.g. a raised BMI health state which is independent of BMI's effect on complication events) - please report the additional disutility value used.

Please keep baseline utilities constant across all ages. Do not allow baseline utilities to change as participants age unless this feature is absolutely essential for the functioning of your model. If your model requires this feature for adequate functioning – please report the utility changes applied from baseline in the Excel sheet.

Please ensure to avoid confusion with utility/disutility terminology in loading the models and in reporting results. The "Utility/Disutility Values" column in Table 1 reports "utility" only for diabetes without complication (which is positive). The remaining items (all negative) are disutility and are incremental (and applied additively where possible if multiple events occur in a given model cycle or year, i.e. the total utility decrement is the sum of disutlity values of events occurring in a given cycle, see below).

Based on the 2018 Mt. Hood challenge conference call on September 5, 2018, two suggestions were made for the Quality of Life challenge, including:

1) The additive quality-of-life (QoL) model is recommended when populating the health utility values into the simulation model. As shown in Table 2 below, if a subject has experienced two different complications belonging to two different categories of disease (e.g., stroke [in the category of cerebrovascular disease] and myocardial infarction [in the category of coronary heart disease]), the health utility value will be reduced by 0.219 which is the sum of individual decrement for these two complications (i.e., 0.164+0.055). However, if a subject has experienced two or more complications within the same category of disease (e.g., myocardial infarction [in the category of coronary heart disease] and congestive heart failure [in the category of coronary heart disease]), the health utility value will be reduced by 0.108 (the decrement for heart failure) which is the largest decrement of these two complications. If the additive QoL model is not feasible in your model, please document your assumptions how the health utility values are populated in your model.
2) The utility decrement and its 95% confidence interval for renal transplant was assumed to be half of those for hemodialysis.

Table 2. Utility values by categories of diseases/complications

Disease category	Utility value for use in Mt. Hood QoL challenge [a]	Utility/Disutility Values	Lower 95% CI	Upper 95% CI
Baseline utility value	Normoglycaemia [b]	0.900	0.882	0.918
	Pre-T2D [b]	0.860	0.851	0.869
	Diabetes without complications	0.785	0.681	0.889
Acute metabolic disorder	Minor hypoglycemia event	-0.014	-0.004	-0.004
	Major hypoglycemia event	-0.047	-0.012	-0.012
Comorbidity	Excess BMI (each unit above 25 kg/m^2)	-0.006	-0.008	-0.004
Retinopathy	Cataract	-0.016	-0.031	-0.001
	Moderate non-proliferative background diabetic retinopathy	-0.040	-0.066	-0.014
	Moderate macular edema	-0.040	-0.066	-0.014
	Vision-threatening diabetic retinopathy	-0.070	-0.099	-0.041
	Severe vision loss	-0.074	-0.124	-0.025
Nephropathy	Proteinuria	-0.048	-0.091	-0.005
	Renal transplant[c]	-0.082	-0.137	-0.027
	Hemodialysis	-0.164	-0.274	-0.054
	Peritoneal dialysis	-0.204	-0.342	-0.066
Neuropathy	Peripheral vascular disease	-0.061	-0.090	-0.032
	Neuropathy	-0.084	-0.111	-0.057
	Active ulcer	-0.170	-0.207	-0.133

	Amputation event	-0.280	-0.389	-0.170
Cerebrovascular disease	Stroke	-0.164	-0.222	-0.105
Coronary heart disease	Myocardial infarction	-0.055	-0.067	-0.042
	Ischemic heart disease	-0.090	-0.126	-0.054
	Heart failure	-0.108	-0.169	-0.048

Source:

[a] All values from Beaudet et al. 2014, except those otherwise highlighted. [b] Leal et al. 2022 [c] The utility decrement and its 95% confidence interval for renal transplant was assumed to be the half of those for haemodialysis. Abbreviations: QoL, quality of life; CI, confidence interval; BMI, body mass index.

Reference Simulation - Instructions

Step 1: Run a simulation using the patient baseline risk factors from Table 1 held constant over a 40-year period, separately for males and for females

Commented [JA1]: Match instructions with 2022 excel sheet for results

This simulation should match both the 2018 Mt Hood challenge and the reference case simulations which are on the Mt Hood website: (https://www.mthooddiabeteschallenge.com/refsim).

Ensure QALYs are **not discounted** for this challenge.

Extract the results and enter input values in a transparent manner in the accompanying Excel workbook in tab labelled "Time paths & Outcomes" (modify the workbook to fit your outcomes if necessary, but please try to preserve the basic structure). Do not forget to include traces of risk factor time paths for input values of all risk factors utilised by the model; event rates (or counts) of all major health states predicted by the model (e.g. MI; stroke; renal failure, etc.), and life-expectancy.

For microsimulation models, please ensure that the number of replications is sufficient to generate stable results. Report how many replications were used.

Step 2: Reference simulation of common treatment effects, holding risk factors constant

Re-run the 40-year simulation with each of the four individual interventions separately, and then all interventions combined, separately for males and females. These interventions represent a permanent reduction to ongoing risk factor trajectories, and are to be applied immediately after baseline. Intervention effects should be simulated in all post-baseline cycles, with baseline values remaining unchanged.

Please simulate each of:

(i) 0.5%-point reduction in HbA1c;
(ii) 10mm Hg reduction in Systolic Blood Pressure;
(iii) 0.5 mmol/l (19.33 mg/dl) reduction in LDL Cholesterol
(iv) 1-unit reduction in BMI (kg/m2)
(v) All 4 of the interventions above applied in combination simultaneously

Extract the results and add to the accompanying Excel workbook (in tab labelled "Time paths & Outcomes". Report outcomes and inputs in a transparent manner. Do not forget to include traces (numerical preferable, failing this curves) for input values of all model utilised risk factors; cumulative rates (or counts) of all major health states in the model (e.g. MI; stroke; renal failure, etc.) and life expectancy.

Step 3: Estimate incremental QALYs holding risk factors constant, separately for males and females

Using the "Utility/disutility" values in Table 2 run the baseline simulation and estimate expected QALYs over 40 years, assuming that decrements apply to the year of the of the event and are similarly applied to each subsequent year. However, if temporary events/states such as hypoglycaemia are modelled, it is likely that these decrements only apply to the year of the event. If so, please document this.

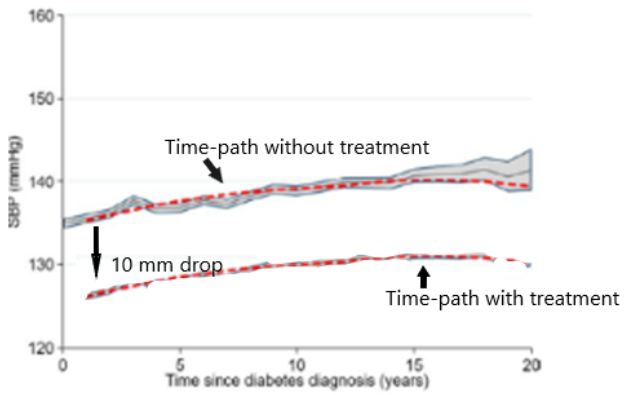
Run each of the four interventions listed in Step 2 to estimate the expected QALYs and calculate the incremental QALYs compared to the baseline (control). Extract the results and add to the accompanying Excel workbook (in tab labelled "Time paths & Outcomes").

Be sure to report incremental QALYs so that a negative value indicates worse QALYs (not inverting to account for a positive value indicating more disutility)

Step 4: Reference simulation of common treatment effects over 40 years, when risk-factor time-paths are NOT held constant

The simulations in step 1-3 does not capture the drift that can occur in many risk factors over time eg. the gradual increase in HbA1c. To understand what impact change in risk factors may have on incremental benefits the second component of this challenge is to redo the four simulations outlined in step 2 using the actual risk factor time paths or assumptions regularly used in your model. Please assume that treatment effects to be assumed still represent permanent vertical displacements from the trajectories without intervention time-paths.

As an example, consider the blood pressure treatment simulation – the treatment will permanently reduce SBP 10 mm Hg below the projected trajectory of SPB without treatment. Similarly, please allow all risk factors that are normally projected in your model to vary. So, when simulating the blood pressure lowering intervention allow HbA1c, LDL, BMI and other risk factors to follow the time-path predicted by your model without any treatment effect.



Extract the results and add to the accompanying Excel workbook (in tab labelled "Time paths & Outcomes". Report outcomes and inputs in a transparent manner. Do not forget to include traces (numerical or curves) for input values of all the above risk factors; cumulative rates (or counts) of all major health states in the model (e.g. MI; stroke; renal failure, etc.), QALYs and life expectancy.

Submission:

Prior to the meeting, please submit the Excel spreadsheet ("MH Padua Reference Simulation_GROUP") to Mount Hood at: mthood2016@gmail.com **by 18 September 2026.** Please replace GROUP with your modelling group name before submission, and note in the email text whether you are submitting to the prediabetes or type 2 diabetes reference simulation.

Commented [JA2]: Deadline?