The Cost-Effectiveness of the PDM-ProValue Diabetes Management Program in Germany

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Background and Aims

The PDM-ProValue study program examined the effectiveness of a structured, IT-supported and personalised outpatient care process (integrated personalized diabetes management, iPDM) in insulin-treated people with type 2 diabetes. It reported an improved outcome, e.g. glycaemic control (-0.5% in HbA1c in the intervention group) and of other medical and process parameters. To generate further insight on the health economic impact, a model-based cost-effectiveness study was performed with the PDM-ProValue study results.

Methods

The validated Markov models (see Figure 1) of the PROSIT Disease Modelling Community were parameterised with the PDM-ProValue patient characteristics at study start (n = 907, see Table 1). Next, a cohort simulation was conducted. All calculations were performed with this cohort considering different study outcomes. The comparative scenarios were the effects seen in the intervention group (iPDM) against the assumption of no iPDM/ study effect (Baseline), and secondly against the effects of the ProValue study control group (Control) respectively.

The cost data from the German Cost-of-Diabetes-Mellitus trial (CoDiM) were inflated to the reference year 2016 according to the sector specific federal expenditure statistics. Program costs were not considered. For additional analyses, discount rates of 3%, and 5% were applied according to German guidelines.

The models simulated in annual cycles the long-term effect of the included scenarios on macrovascular events, life expectancy as well as quality-adjusted life-years (QALYs) for the remaining lifetime. Incremental cost-effectiveness ratios (ICER) were calculated for cost per life-year gained and for cost per QALY gained.

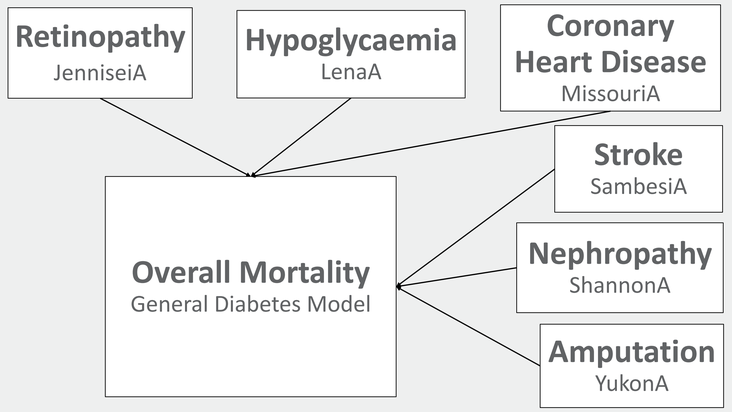

Fig. 1: Interactive Markov Models (with names)

Patient Characteristics	
Age	64.7 y
Duration of diabetes	14.3 y
Hypertension	89.9%
Coronary heart disease	26.0%
Atrial fibrillation	7.7%
Heart attack	10.0%
Stroke	5.8%
Nephropathy	27.1%
Glomular filtration rate <45mL/min/1.73sqm	12.2%
Retinopathy/ Maculopathy	15.0%
Neuropathy	44.7%
Diabetic foot	15.7%

Tab. 1: Descriptive parameters of the ProValue cohort

Results

The diabetes models estimate the loss of life expectancy (Baseline) at 6.39 years per person with type 2 diabetes vs German standard mortality table (Figure 2 for comparison between Baseline and iPDM); 17.2% of the ProValue patients with no prior acute myocardial infarction (AMI) are expected to suffer from a first AMI over the remaining life-time. iPDM could avoid 8.7% (absolute difference 1.5%) of these AMIs (NNT = 64.9, Control 0.9% avoided AMIs against Baseline). iPDM gains 0.52 years of life per patient (NNT = 12.3, 0.287 QALYs) vs Baseline and 0.05 years (0.025 QALYs) per patient versus Control. Against Baseline, iPDM avoids 8% of all hypoglycaemic events (3% against Control), see Figure 3.

The ICER of iPDM against Control amounted to -2212.86 € per nominal life-year gained and -2839.92 € per nominal QALY gained respectively. The ICER against Baseline amounted to +811.39 € per nominal life-year gained and +1194.64 € per QALY gained respectively, see Figure 4. Discounting did not change the overall evaluation. Cost savings started immediately and were highest in the first treatment year.

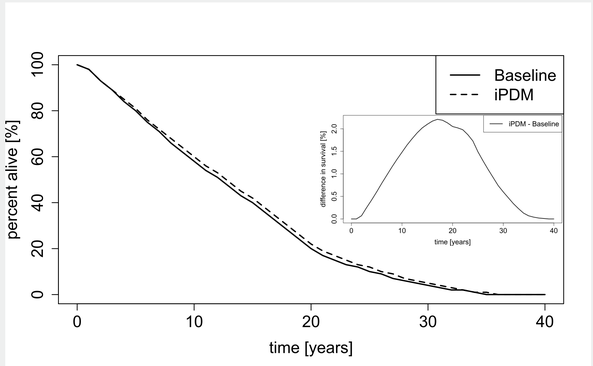

Fig. 2: simulated comparison of survival

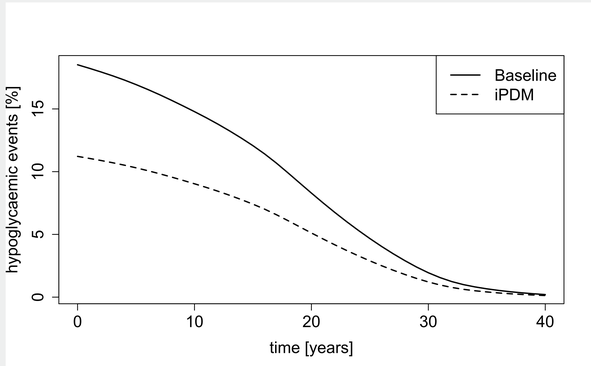

Fig. 3: proportion of individuals in the model with simulated hypoglycaemic events

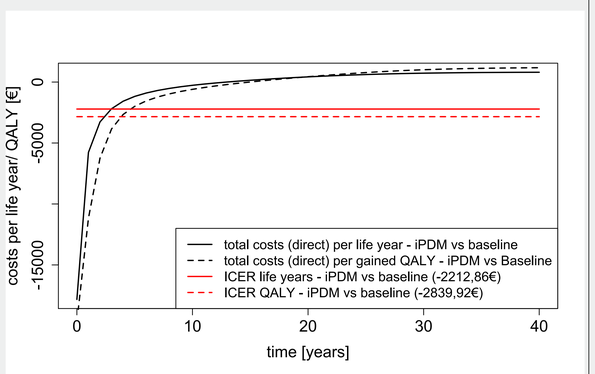

Fig. 4: health economic results of the simulation

Conclusion

The simulation confirms and quantifies the loss of life expectancy due to type 2 diabetes mellitus. From the patient's point of view, despite existing medical complications, iPDM reduces mortality and heart attack rate. It improves quality-of-life. iPDM offers low cost savings as the associated higher life expectancy consumes earlier monetary benefits. The negative costs for an additional year of life or QALY achieved in comparison to the ProValue control group indicate a good value for the money invested in all examined scenarios.

To explore the potential impact of iPDM on younger or healthier populations, further cost-effectiveness analyses should be conducted.

The authors of the GECKO Institute, are currently carrying out an accompanying health economic evaluation of the PDM-ProValue study program on behalf of Roche Diabetes Care Germany GmbH. AM is a former and JW an active employee of Roche Diabetes Care Germany GmbH.