A Monte Carlo Simulation Model for Evaluating the Effectiveness of Interventions along the ‘Diabesity’ Pathway

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Almost 40,000 people have been diagnosed with diabetes in ABUHB

160,000 people are at increased risk of acquiring type II diabetes
<table>
<thead>
<tr>
<th>Patient Information</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>F</td>
</tr>
<tr>
<td>Age</td>
<td>48 years</td>
</tr>
<tr>
<td>Starting weight</td>
<td>121.03 kg</td>
</tr>
<tr>
<td>Height</td>
<td>1.66 m</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Other</td>
</tr>
<tr>
<td>Current smoker</td>
<td>N</td>
</tr>
<tr>
<td>HbA1c</td>
<td>6.42%</td>
</tr>
<tr>
<td>SBP</td>
<td>137 mmHg</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>5.65 mmol/l</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>1.11 mmol/l</td>
</tr>
<tr>
<td>Atrial fibrillation detected</td>
<td>N</td>
</tr>
<tr>
<td>Pre-existing type II diabetes</td>
<td>N</td>
</tr>
</tbody>
</table>
$t = 0$

Age
Sex
Health state:
BMI ...

- Normal glucose regulation
- Pre-diabetes
- Type II diabetes
Model of diabesity progression

- CHD
- Stroke
- Normal glucose regulation
  - Pre-diabetes
  - Type II diabetes
  - CHD Stroke
  - death
- Diabetes related comorbidities
  - death
- Diabetic retinopathy
- Diabetic nephropathy
- Diabetic peripheral neuropathy
- CHD (diabetes related)
- Stroke (diabetes related)
At time $t = 0$:
- Age
- Sex
- Health state: BMI...
- Draw random numbers

At time $t = 1$:
- New Age = Age +1
- Sex
- New health state: BMI...
- Draw random numbers
At time $t = 0$,

- Age
- Sex
- Health state: BMI

... draw random numbers

At time $t = 1$,

- New Age = Age + 1
- Sex
- New health state: BMI

... draw random numbers

At time $t = 2$,

- New Age = Age + 2
- Sex
- New health state: BMI

... draw random numbers
**Assumed weight progression**
for average female patient enrolled to S4L and 3 Level MDT:
48 years, BMI 44

Diagram showing weight progression over 10 years:
- Starting weight: 121 kg
- End weight: 131 kg
- Intervention points:
  - 121 kg
  - No intervention

Legend:
- S4L 3Level MDT
- Phase of moderate relapse
After 10 years
our average patient (female, now: 58 years, BMI 44)
has already experienced

10 kg less than without intervention
= a loss of body mass of 8%

a reduction in the risk of acquiring diabetes type II by 59%

a raise in the probability of surviving year 10 by 33%
Cost progression for an average female patient: 48 years, BMI 44
Intervention costs are recouped in 5-12 years for AWMS patients at high risk of type II diabetes while long-term healthcare cost savings for diabetes patients are not significant.
Thank you!