Incidence Rate of Prediabetes: An Analysis of New Zealand Primary Care Data

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Diabetes Mellitus (DM) epidemic

- DM, affecting 9% of adult population worldwide, is a leading cause of premature death & disability.
- NZ DM prevalence: 5.8%, with higher rates in Pacific (12.5%) and Māori (7.3%).

NZ guideline on DM management

**Target HbA1c 50-55 mmol/mol or as individually agreed**

**Lifestyle modification**
- Food, physical activity and behavioural strategies

- If measured HbA1c does not meet or closely approach agreed target within 3 months, or if patient is symptomatic, drug therapy should be considered

**First line drug therapy**
- **Metformin**
  - Gastrointestinal tolerance may be improved by gradual introduction
  - Stop if eGFR <30 ml/min/1.73 m²

- **Sulphonylurea**
  - Educate the person on the possibility of hypoglycaemia
  - Acarbose therapy (note 1)

- Review medication adherence and dose optimisation

**Second line drug therapy**
- **Add sulphonylurea**

- If metformin and sulphonylurea not tolerated or contraindicated or if an alternative to insulin is required

**Third line drug therapy**
- **Insulin**
  - See Figure 6 on initiation of insulin in primary care (note 4)

- If no congestive heart failure
- If at significant risk of hypoglycaemia
- Consider the increased risk of fracture in women (notes 2 & 3)
What is already known about PreDM

- People with impaired glucose tolerance (IGT or PreDM) are at high risk of Type 2 DM.
- Lifestyle modification interventions are effective in preventing or delaying Type 2 DM development.

<table>
<thead>
<tr>
<th>Result</th>
<th>Action</th>
<th>Why</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptomatic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c ≥50 mmol/mol and, if measured</td>
<td>No further tests required</td>
<td>Diabetes is confirmed</td>
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<tr>
<td>Fasting plasma glucose ≥7.0 mmol/L</td>
<td></td>
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<tr>
<td>Or</td>
<td></td>
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<tr>
<td>Random plasma glucose ≥11.1 mmol/L</td>
<td></td>
<td></td>
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<tr>
<td><strong>Asymptomatic</strong></td>
<td></td>
<td></td>
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<tr>
<td>HbA1c ≥50 mmol/mol and, if measured</td>
<td>Repeat HbA1c or a fasting plasma glucose</td>
<td>Two results above the diagnostic cut-offs, on separate occasions are required for the diagnosis of diabetes*</td>
</tr>
<tr>
<td>Fasting plasma glucose ≥7.0 mmol/L</td>
<td></td>
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<tr>
<td>Or</td>
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<tr>
<td>Random plasma glucose ≥11.1 mmol/L</td>
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<tr>
<td>HbA1c 41–49 mmol/mol and, if measured</td>
<td>Advise on diet and lifestyle modification. If over 35 years, a full cardiovascular risk assessment and appropriate management is indicated</td>
<td>Results indicate ‘prediabetes’ or impaired fasting glucose*</td>
</tr>
<tr>
<td>Fasting plasma glucose 6.1–6.9 mmol/L</td>
<td></td>
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</tr>
<tr>
<td>HbA1c ≤40 mmol/mol and, if measured</td>
<td>Retest at the next cardiovascular risk reassessment interval</td>
<td>This result is normal</td>
</tr>
<tr>
<td>Fasting plasma glucose ≤6.0 mmol/L</td>
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</tbody>
</table>
Study aim and design

• To understand prediabetes incidence rate and HbA1c control status in the general adult population.

• EMR data from 14 New Zealand general practices on enrolled patients (age≥20) were analysed to identify prediabetes by:
  – Having an initial HbA1c of 41-49 mmol/mol
  – Having had not been diagnosed (by READ or Rx) with DM by the first HbA1c of 41-49 time point.
Study sample

- A total of 28,192 adults were included in the analysis
- 14,963 women (53%).

- Māori (median age = 44, IQR: 32-54)
- Pacific people (median age = 43, IQR: 32-55)
- non-Māori/non-Pacific people (median age = 50, IQR: 39-63)
Findings – PreDM incidence rates

<table>
<thead>
<tr>
<th></th>
<th>Total # patients</th>
<th>Patients who had diabetes before 2011 # (%)</th>
<th>Patients who had prediabetes identified in 2011 # (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Māori</td>
<td>3543</td>
<td>371 (10%)</td>
<td>140 (4%)</td>
</tr>
<tr>
<td>Pacific</td>
<td>4052</td>
<td>685 (17%)</td>
<td>234 (6%)</td>
</tr>
<tr>
<td>Non-Māori/ non-Pacific</td>
<td>20597</td>
<td>1615 (8%)</td>
<td>902 (4%)</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>28192</strong></td>
<td><strong>2671 (9%)</strong></td>
<td><strong>1276 (5%)</strong></td>
</tr>
</tbody>
</table>

- RR for preDM was increased for the Māori and Pacific groups versus non-Māori/ non-Pacific people, with RR of 1.96 in the younger age groups (<50 years) and RR of 1.33 in the 50+ group.
Findings – HbA1c control

- RR for having uncontrolled HbA1c (highest HbA1c in 2011 ≥65 mmol/mol) increased for the Māori and Pacific groups versus non-Māori/non-Pacific people (RR = 3.35 among those <50 years, RR = 4.35 in the 50+ group).
Study implications

- Given the high rates of DM & PreDM, opportunities exist for promoting public health interventions at the primary care setting in terms of:
  - Identification and monitoring
  - More holistic risk assessment (e.g. CVR based on modified Framingham)
  - Followed by evidence-based management, e.g., Green Prescription (GRx)
Green Prescription (GRx)

Study limitations

- EMR data from primary care only,
- The participating general practices had large case load of high-needs population,
- We did not examine other physiological measures, other risk factors such as lifestyle or long-term outcomes.
- Future EMR analysis could explore potential predictors and confounders, e.g., BMI or waist-to-hip ratio.
So what about BMI?

• Yes, BMI is higher in ‘expected’ directions…

HOWEVER
Recording of BMI is not universal

- More likely for BMI to be recorded with diabetes
  - But even then not universal
  - Recording is probably biased by other factors
Not a clean causal network

• Factors will interact

Deprivation → Lifestyle (e.g. diet) → Diabetes

Ethnicity → Lifestyle (e.g. diet) → BMI

• Most important message is the need to create preventative interventions that fit lifestyle and beliefs (as influenced by a range of socio-demographic factors)
  – Also a warrant for more studies with unbiased inclusion for measurement
EMR data identified an alarming incidence rate of prediabetes, especially among Māori and Pacific groups. Given the already high prevalence of diabetes in Māori and Pacific groups, this highlights the need to better prevent and manage the disease progressing.
Acknowledgement

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