Why Diabetes Matters

Rob Andrews

1. Diabetes is common and on the increase
2. Diabetes can be prevented
3. Diabetes has unpleasant complications
4. Complications are largely preventable

Secular trends in incidence rates, age 0-14 yrs.

For every known case of diabetes, there is another that is undiagnosed
Factors Influencing Prevalence of type 2 diabetes

- Age
- Ethnicity
- Obesity
- Family history
- Birth weight
- Lifestyle

Ethnicity:
- Special populations (Pima Indians, Nauru)

Diabetes in Nauru

- Traditional lifestyle based on agriculture and fishing
- 1906: guano discovered
- 1925: first case of diabetes
- 1934: second case of diabetes
- 1968: per capita royalties $22,500

Factors Influencing Prevalence of type 2 diabetes

Ethnicity:
- Indian Subcontinent
- Indo-Americans
- Black African descent
- European descent

Factors Influencing Prevalence of type 2 diabetes

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Prevalence of diabetes

- 1/3 over age 20
- 2/3 over age 55
- 77% over age 70
Relative risk of progression to diabetes by BMI at age 18 in women aged 30-55 yrs

**[US Nurses' Study]**

The shape of things to come?

**Prentice 1997**

Age-adjusted Percentage US Adults Obese or Diagnosed Diabetes

Factors Influencing Prevalence of type 2 diabetes

- Age
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- Family history
- Birth weight
- Lifestyle

Genetics and wt gain

No family history

Offspring of patients with Type 2 diabetes
Factors Influencing Prevalence of type 2 diabetes

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- Obesity
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Birth wt and IR

Factors Influencing Prevalence of type 2 diabetes

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Exercise and risk of Diabetes

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Prevention of Type 2 diabetes

Intervention in both studies

Aims
- Reduce weight by 5% or more
- Reduce total fat < 30%
- Reduce intake of sat fat < 10%
- Increase fibre to > 15g/1000 Kcal
- Moderate exercise for 30 min per day

Finnish prevention trial

American prevention trial

Prevention IGT ➔ Diabetes

2 major studies

- Finnish prevention trial (522)
  - Normal vs Lifestyle intervention

- American prevention trial (3234)
  - Normal vs Lifestyle intervention vs metformin
Summary prevention trials

Summary
- Diet and exercise (D+E) reduces progression to diabetes by 58%
- Metformin reduces risk but not as much as D+E
- The more changes in D+E made the greater the effect
- 22 patients with IGT need to be treated with D+E for 1 year to prevent one person getting diabetes

Bariatric surgery

Lap RYGB = Roux en Y Gastric Bypass

Adjustable gastric band

Longer term data

![Graph showing weight loss over time for gastric band and RYGB procedures.]

What happens if you don’t operate

<table>
<thead>
<tr>
<th>Operation</th>
<th>No operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of dying</td>
<td>1% 6%</td>
</tr>
<tr>
<td>New cancer diagnosis</td>
<td>2% 8%</td>
</tr>
<tr>
<td>Heart problems</td>
<td>5% 27%</td>
</tr>
<tr>
<td>New onset diabetes</td>
<td>0% 27%</td>
</tr>
<tr>
<td>Significant infections</td>
<td>9% 37%</td>
</tr>
<tr>
<td>Arthritis</td>
<td>5% 12%</td>
</tr>
<tr>
<td>Respiratory problems</td>
<td>3% 11%</td>
</tr>
<tr>
<td>Time in hospital</td>
<td>21 days 36 days</td>
</tr>
</tbody>
</table>

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Complications of Diabetes

- Acute
- Chronic
Acute complications of diabetes

- Hyperglycaemic
  - Ketotic and non-ketotic
- Hypoglycaemia (complication of treatment)
  - Insulin and sulfonylureas
- Infections
  - Atypical or fulminant
- Acute intercurrent illness
  - e.g. Myocardial infarction

Chronic complications of diabetes

- Microvascular
  - Retinopathy, nephropathy
- Macrovascular
  - Heart disease, stroke, peripheral vascular disease
- "Metabolic"
  - Neuropathy, cataracts

Microvascular Complications

- Small vessels become thicker and more leaky

Macrovascular Complications

- Coronary risk X 2-3
- Stroke X 2-3
- Amputation X 5-10

Diabetes is the commonest cause of blindness in people of working age.
Diabetes is the commonest cause of referral for renal transplantation.
Coronary Mortality, Men in the UK

CHD 26%  
Other  
Non-diabetic

CHD 66%  
Other  
Diabetes

Risk factors are additive

The risk of a first coronary in someone with diabetes is equivalent to the risk in a non-diabetic who has already had a coronary

Coronary Mortality is Falling in the Population as a Whole

Lawlor et al, BMJ, 2001

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**Microvascular complications**

- **HbA1c Dependent**
  - Not in IGT
  - Type 2 at diagnosis
  - Type 1 5-15 years after diagnosis

**Neuropathy**

- Increase with time
- 70-100% get

**Retinopathy**

- 100% type 1 patient get

**Nephropathy**

- 30-40% in type 2 diabetes

**Microalbuminuria** (25-250mg/d)

**Macroalbuminuria** (>250mg/d)

**CRF**

**Macrovascular complications**

- **HbA1c independent**
  - Present in IGT
  - Metformin seems to reduce risk

**Hypertension**

- **IHD**
- **CVA**
- **PVD**

**Blood pressure**

- Aim for 135/80

**Insulin concentration**

- Role insulin sensitizers

**Weight**

**cholesterol**

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**Complications are Largely Preventable**

- The prognosis of type 1 diabetes continues to improve dramatically, when modern techniques of management are applied.