Complications of Diabetes: Screening and Prevention

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Diabetes Staff Education Course
Feb 17

Diabetic Complications

Microvascular:
- Retinopathy
- Nephropathy
- Neuropathy

Macrovascular:
- Coronary heart disease (CHD)
- Cerebrovascular disease (CVD)
- Peripheral vascular disease (PVD)

Type 2 diabetes is NOT a mild disease
Macrovascular disease at diagnosis in Type 2 diabetes

- Cerebrovascular disease: 1%
- Abnormal ECG: 18%
- Hypertension: 35%
- Absent foot pulses: 13%
- Intermittent claudication: 3%

75% of all deaths in people with Type 2 diabetes are due to cardiovascular disease

Retinopathy

- Specific for diabetes
- Type 1 and Type 2 diabetes
- Related to duration of diabetes and control
- Individual risk factors (?genetic)
- Most common cause of preventable blindness <65 year old

Other Diabetic Eye Diseases

- Cataracts
- Glaucoma

Normal Retina
**Vitreous Haemorrhage**

**Cataract**

**Retinopathy - Prevention**

- Good diabetes control
  - Type 1 diabetes (DCCT, 1993)
  - Type 2 diabetes (UKPDS, 1998)
- ACE inhibitors
  - Type 1 diabetes (Lewis et al, 1993)
  - Type 2 diabetes (HOPE, 2000)
- Good BP control
- **STOP SMOKING**
- Regular attendance at Retinal Screening
  - Referral to ophthalmologist when appropriate
**Nephropathy**

- Specific for diabetes
- Type 1 and Type 2 diabetes
- Related to duration of diabetes and control
- Associated with retinopathy
- Commonest cause of ESRD
- Progressive

Microalbuminuria (30-300mg/24hr, albustix -ve)
Albuminuria (>300mg/24hr, albustix +ve)
Renal impairment (eGFR <60mL/min)
Dialysis
(Transplantation)
Nephropathy - Prevention

Good diabetes control
Type 1 diabetes (DCCT, 1993)
Type 2 diabetes (UKPDS, 1998)

Good blood pressure control (esp. ACEI)
Type 1 diabetes (Lewis et al, 1993)
Type 2 diabetes (HOPE, 2000)

Target BP <140/80
(<130/70 if presence of microalbuminuria)

CKD Guidelines - referral

DCCT - New Microalbuminuria

Percentage of Patients

Year of Study
Neuropathy

Clinical Syndromes

• Chronic sensory neuropathy
• Acute painful neuropathy
• Proximal motor neuropathy (amyotrophy)
• Diffuse motor neuropathy
• Focal neuropathy
• Autonomic neuropathy

Neuropathy - Prevention

Good diabetes control (DCCT, UKPDS)

Neuropathy - Treatment

Improve diabetes control
Anti-depressants (amitriptyline, duloxetine)
Anti-epileptics (gabapentin, pregabalin)
Axain cream
Acupuncture

Macrovascular Disease

Coronary Heart Disease (CHD)
• Angina
• Myocardial infarction
• PTCA
• CABG
• Heart failure

Cerebrovascular Disease (CVD)
• Stroke
• TIA

Peripheral Vascular Disease (PVD)
• Intermittent claudication
• Ulceration
• Gangrene
• Amputation
Cardiovascular Disease

The Framingham Study Kannel and McGee Circulation 1979

Annual Incidence of CVD (per 1000)

Males Females

The Framingham Study Kannel and McGee Circulation 1979

Cardiovascular Disease

Glycaemic Control

UKPDS

3867 patients with type 2 DM randomised

Conventional control
Target: FPG <7.5 mmol/l n=1138
Achieved: HbA1c 7.9%

Intensive control
Target: FPG <6 mmol/l
Achieved: HbA1c 7.0%

Sulphonylurea: n=1234
Insulin: n=1156

UKPDS

Total deaths: 702 (18%)
Cardiovascular deaths: 402 (57%)
Cancer deaths: 170 (24%)
Diabetes deaths: 12 (2%)
Accidental deaths: 7 (1%)
Other deaths: 111 (16%)


UKPDS - Glycaemic Control

<table>
<thead>
<tr>
<th>Aggregate Endpoint</th>
<th>Log-rank p</th>
<th>Favours Intensive 0.1</th>
<th>Favours Conventional 10</th>
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</thead>
<tbody>
<tr>
<td>Any diabetes-related endpoint</td>
<td>0.009</td>
<td></td>
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<tr>
<td>Diabetes-related deaths</td>
<td>0.34</td>
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<td>All-cause mortality</td>
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<td>Myocardial infarction</td>
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<td>Stroke</td>
<td>0.52</td>
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<td>Amputation or death from PVD</td>
<td>0.15</td>
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<td>Microvascular</td>
<td>0.609</td>
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<thead>
<tr>
<th>Single Endpoints</th>
<th>Log-rank p</th>
<th>Favours Intensive 0.1</th>
<th>Favours Conventional 10</th>
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<tbody>
<tr>
<td>Fatal myocardial infarction</td>
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<tr>
<td>Non-fatal myocardial infarction</td>
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Blood Pressure Control
UKPDS (HDS)

1148 hypertensive patients with type 2 DM
Tight control (<150/85)

Less tight control (<180/105)


Achieved blood pressure:

Tight control 144/82
Less tight control 154/87

Clinical end point

Any diabetes related end point

Deaths related to diabetes

All cause mortality

Myocardial infarction

Stroke

Peripheral vascular disease

Microvascular disease

P value

0.0046

0.019

0.17

0.13

0.013

0.17

0.0092

Favours tight control

Favours less tight control


Hypertension Optimal Treatment (HOT) Trial

18,790 Patients ≥50 y.o. (8% DM = 1,501)

- Felodipine at baseline
- Adding ACEI, β-Blocker, Diuretic

Blood Pressure | Target DBP | Achieved
<table>
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<tr>
<td>&lt;90mmHg</td>
<td>144/85</td>
<td></td>
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<tr>
<td>&lt;85mmHg</td>
<td>141/83</td>
<td></td>
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<tr>
<td>&lt;80mmHg</td>
<td>139/81</td>
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Aspirin 75mg v placebo

Hypertension Optimal Treatment (HOT) Trial Subgroup with Diabetes Mellitus


Antiplatelet Therapy

A meta-analysis of six RCTs (10,117 patients) found no statistically significant reduction in the risk of major cardiovascular events or all-cause mortality when aspirin was compared to placebo or no aspirin in people with diabetes and no pre-existing cardiovascular disease. Aspirin significantly reduced the risk of myocardial infarction in men (RR 0.57, 95% CI 0.34 to 0.91) but not in women (RR 1.08, 95% CI 0.67 to 1.71; p for interaction = 0.03). Evidence relating to harm was inconsistent ***.

Low-dose aspirin is not recommended for primary prevention of vascular disease in patients with diabetes.

Lipid Control
Lipid control in type 2 DM

European Task Force (July 1998): Chol>5.0mmol/l; 10yr CHD risk >20%
Joint British Societies (Dec 1998): Chol>5.0mmol/l; 10yr CHD risk >30%
BHS (Sept 1999): Chol>5.0mmol/l; 10yr CHD risk >30%
SIGN (Jan 2000): Chol>5.0mmol/l; 10yr CHD risk >30%
SIGN (Nov 2001): Chol>5.0mmol/l; 10yr CHD risk >30%
N.B. 10yr CHD risk >15% when affordable
SIGN (March 2010): Age >40; Simva 40mg or Atorva 10mg

The Diabetic Foot

Feet are at risk from microvascular (neuropathy) and/or macrovascular disease (PVD)

Remember loss of protective sensation

Foot screening – assessment of risk (SCI Diabetes)
- Skin condition (infection, ulceration, callus)
- Deformity (claw toes, Charcot joint)
- Peripheral pulses (dorsalis pedis, posterior tibial)
- Fine touch (10g monofilament)
- (Vibration -tuning fork, neurothesiometer)
- (Ankle reflexes)
- Footwear
Foot ulcers

Screening for complications (1)

- Retinal screening  Digital camera
  Grading system
  Automatic call and recall
  Varying locations
  Optician
  Ophthalmology clinic

- Foot screening  Suitably trained HCP
  Pulses and sensation using 10g monofilament

- HbA1c  Aiming for <58mmol/mol
  Likely to need escalating medication over time
Screening for complications (2)

- BP control
- Urine for ACR/PCR – U&E /eGFR
- Smoking cessation advice
- Cardiovascular risk assessment - statins
- Lifestyle factors – exercise, diet, weight loss (GWMS referral)

Summary

- Prevention always better than treatment
- Importance of tackling lifestyle factors from beginning and throughout
- Recognition of the natural progression of the condition and need for escalation of therapies
- Importance of attending screening opportunities
- Empowering patient to make choices about the things they can control
- Enabling patients to access information and data