European Perspective on Paediatric Diabetes Care

Practical Ways to Achieve Targets in Diabetes Care

Keystone, Colorado, July 2013

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UNIVERSITY OF CAMBRIDGE
Financial Disclosures

There are No relevant financial relationships with any commercial interests to disclose.
• Type 1 diabetes
  Incidence
  Management
  Outcomes

• Type 2 diabetes
Type 1 diabetes in Europe

- EURODIAB registers
- 23 centres
- 19 countries

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Age-standardised annual incidence rate (per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland (two regions)</td>
<td>40</td>
</tr>
<tr>
<td>Italy (Sardinia)</td>
<td>35</td>
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<tr>
<td>Sweden (Stockholm county)</td>
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<tr>
<td>United Kingdom (N. Ireland)</td>
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<tr>
<td>Norway (eight counties)</td>
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<tr>
<td>United Kingdom (Oxford)</td>
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<tr>
<td>United Kingdom (Leeds)</td>
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<tr>
<td>Denmark (four counties)</td>
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<tr>
<td>Portugal (Algarve)</td>
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<tr>
<td>Iceland (whole nation)</td>
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<td>Germany (Düsseldorf)</td>
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<td>Belgium (Antwerp)</td>
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<td>Estonia (whole nation)</td>
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<td>Bulgaria (Western)</td>
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<td>Czech Republic (whole nation)</td>
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<td>Greece (Attica)</td>
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<td>Austria (whole nation)</td>
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<tr>
<td>Hungary (18 counties)</td>
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<td>Latvia (whole nation)</td>
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<td>Poland (three cities)</td>
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<td>Portugal (Madeira)</td>
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<td>Croatia (Zagreb)</td>
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<td>Poland (Gliwice)</td>
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<td>Greece (five northern regions)</td>
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<td>Romania (Bucharest)</td>
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<tr>
<td>FYR of Macedonia (whole nation)</td>
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</tr>
</tbody>
</table>

Estimated (2005) and predicted cases of newly diagnosed type 1 diabetes

Patterson et al. Lancet. 2009 Jun 13;373(9680):2027-33
Inverse association between rate of incidence increase and average incidence

Spearman rank correlation coefficient
\( r_s = -0.52; p = 0.02 \)
Variations in care and outcomes across Europe: The Hvidoere Study Group

Professor Henrik B. Mortensen
Study design

Multicenter cross-sectional investigation with 22 participating paediatric departments from 18 countries in Europe, Japan and North America.

The HbA$_{1c}$ concentration was determined once and analyzed both locally and centrally at The Steno Diabetes Center, Denmark.

Age, sex, duration of diabetes, height, bodyweight, insulin regimen and number of severe hypoglycaemic events were recorded.
International survey of childhood diabetes

Number of children (per cent of total) vs. HbA$_{1c}$ (per cent)

- Males
- Females
International survey of childhood diabetes

Center mean (SE)

HbA1c (per cent)

8.0 8.5 9.0 9.5 10.0 10.5 11.0

- Below
- Similar to 8.6% (the grand mean for HbA1c)
- Above

Centers
International survey of childhood diabetes
Age related distribution of number of daily insulin injections in 2857 children and adolescents

Number of children (per cent of total)

Age (years)
Injection frequency

HbA$_{1c}$ in 1995 (grand mean): 8.7% (1.6%)

HbA$_{1c}$ in 1998 (grand mean): 8.9% (1.6%)

Number of injections
- 2
- 3+

% of patients

<table>
<thead>
<tr>
<th>Year</th>
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<th>1998</th>
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HbA$_{1c}$ by centre for ‘95 and ‘98

The 1995 baseline level, and the three year change for HbA$_{1c}$ for the 21 centres.
Summary/Hvidoere

- No significant change in HbA$_{1c}$ for the 3 year period despite the use of three or more daily insulin injection increased from 42 to 70%.
- HbA$_{1c}$ varied significantly among centres.
- Only 2 centres improved their metabolic control significantly in the 3 year period.
- Fewer severe hypoglycaemic events in centres with a HbA$_{1c}$ significantly below the grand mean.
Hvidoere Study Group on Childhood Diabetes

Exploring Center Differences 2005

Carine de Beaufort Luxembourg
Better glycaemic outcome in individuals

- Not so much about insulin regimen, but management/adjustment
- More compliance with both diabetes-specific and general activities of adolescence
- Targeting and visit frequency
- Cultural differences
• Hvidoere
• Clinic based surveys
• Ascertainment
• Generalisability
• International and
• National Audits
Dr Justin Warner
England 22,947 CYP aged 0-17yrs, 1ST Jan 2009
Wales 1,345 CYP aged 0-17yrs, 1ST Jan 2009
Total = 24,292
% achieving HbA1c targets 2010-11

- England
- Wales
- England and Wales

- <7.5
- >=7.5 and <=9.5
- >9.5
Summary / UK Audit

• In England and Wales the National Paediatric Diabetes Audit:
  – >90% coverage of patient with diabetes
  – Care processes poorly performed or not submitted to the audit
  – Overall HbA1c remains high nationally but number of patients with values <7.5% is improving
  – HbA1c >9.5% remains high
  – DKA rates appear to be increasing.
Improving Quality

• Networks
  – Uniform standards and guidelines
  – Peer review
• Best practice tariff
• RCPCH delivering the National Paediatric Diabetes Audit

Most scientists regarded the new streamlined peer-review process as ‘quite an improvement.’
Reinhard Holl
DPV
software for standardized
longitudinal documentation,
Electronic health record

QS-DPV
quality improvement
through external
comparison
(benchmarking)

DPV-Wiss
epidemiologic /
scientific analysis of
cumulative
data-base
Completeness pediatric patients about 91% in Germany about 75% in Austria

contacts: 2,388,039
  outpatient: 2,031,401
  inpatient: 304,808

patients: 292,036
  type-1-DM: 83,115
  type-2-DM: 187,614
  type-3-DM: 10,863
  gest.-DM: 10,444

DM-onset
  < 20 y.: 68,911
  > 20 y.: 223,125

centers: 382
Outcome: HbA1c

Improvement persistent after adjustment for age, gender, DM-duration, migration background, BMI, type of insulin therapy, insulin dose, center size
Rosenbauer et al, Diabetes Care 2012, 35
Time-Trend: Nephropathy Screening

Blue: all centers  black: individual center

Longitudinal changes during last 17 years

Benchmarking: Nephropathy Screening

Treatment Center (Median: 77.6 %)
The rest of Europe
Pump usage
19% < 18 years in the UK
26% < 20 years in Germany
38% paediatrics patients in Norway
18% paediatrics patients in France
20% paediatrics patients in Sweden
30-40% in the USA
• Type 1 diabetes

• Type 2 diabetes
  Incidence
  Management
  Outcomes
Type 2 Diabetes Incidence

Prevalence per 100,000 population (log10 scale)
Type-2-Diabetes in Pediatrics

age at diagnosis
11 - 18 years

Year of Diagnosis

percentage of all patients

1995 97 99 01 03 05 07 09 2011
TYPE 2 DIABETES IN CHILDHOOD: BUILDING A PLATFORM FOR INTERVENTIONS TO PREVENT THE PROGRESSION TO CARDIOVASCULAR DISEASE

Gray Z¹, Ilsley E², Cotter C¹, Ford A³, Turner K⁴, Heywood J⁴, Barnett A², Dunger D⁴, Hamilton-Shield J⁵, Wales J⁶, Barrett T².

¹Birmingham Children’s Hospital NHS Foundation Trust, ²University of Birmingham, ³Sheffield Children’s Hospital NHS Foundation Trust, ⁴University of Cambridge, ⁵University of Bristol, ⁶University of Sheffield
Introduction

• Type 2 diabetes reported in children since 1979
• First UK reports 2000
• USA SEARCH, TODAY studies

• Little phenotypic data on UK patients
• UK ethnic minority population from Pakistan, India, Bangladesh, West Indies

RCPCCH/DUK ‘snapshot’ 2009
328 ‘paediatrician diagnoses’

Vs ~23,000 Type 1 diabetes
Conclusions

• T2DM still ~1% of childhood diabetes in UK

• White UK children older at diagnosis than non-white children, more obese

• Trend to ethnic differences in fasting C-peptide, BMI-SDS at diagnosis.

• African-Caribbean UK children have poorer metabolic control, signs of cardiovascular dysfunction compared to White UK and South Asian children.
The European Union

- Eurodiab registers
- European framework
- FP7 2012
- IL-2 newly diagnosed
- IMI
- SUMMIT
- SWEET consortium
The European Network of Paediatric Research at the European Medicines Agency (Enpr-EMA)

Diabetes and Endocrinology European Research Network

• Meetings at the ESPE annual meeting and at the EMA
• Full support from the European Society for Paediatric Endocrinology and the International Society for Paediatric and Adolescent Diabetes

• Workshop at the EMA
  25th February 2013  Paediatric investigation plans in type 2 diabetes mellitus
• EfPIA proposal for an IMI call around Epidemiology, Innovative trial designs, working with industry and the PDCO to develop drugs for patients with type 1 diabetes, type 2 diabetes and endocrine disorders.

• Presentations at:
  ESPE, Milan, September 2013
  ISPAD, Gothenburg, October 2013
• Paediatric Diabetes
• Registers
• National networks and databases
• Comparative studies
• Support from the EU for a research network
END
Type 2 diabetes/Current numbers

Treatment:

- Diet / lifestyle only 8%
- Metformin only 55%
- Metformin and insulin 32%

- UK practice to add insulin:
  - At diagnosis if osmotic symptoms, then wean off
  - if HbA1c persistently greater than 7.5% despite maximal tolerated dose metformin

- Other agents: small numbers only
Insulin pump provision in various countries (2009)

The approximate usage of insulin pump therapy in various countries during 2007–9 (local country estimates)

# Type 2 diabetes in Europe

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Exploring centre differences study 2005
A multi-centre, cross-sectional study
Involving
21 paediatric departments
17 countries in
Europe, Japan, Australia and North America
March and October 2005.
Learning Objectives of Presentation

• Variation in incidence of type 1 and type 2 diabetes in Europe

• Management strategies and outcomes
• Microalbuminurial
• Prediction and prevention
• AdDIT Intervention
Insulin pump provision in various countries (2009)

The approximate usage of insulin pump therapy in various countries during 2007–9 (local country estimates)

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