

Young Onset Type 2 Diabetes

Myuri Moorthy

Introduction

- Young Onset T2 DM
 - Diagnosed < 40 years of age
- Increasing number of cases
- Review of population data
- Best practice

Barts Paediatric Diabetes

- Data extraction from Twinkle

2020 - 2021

Diabetic Type	0-4 yr	5-9 yr	10-14 yr	15-19 yr	Total
Type 1	0	30	0	0	30
Type 2	0	0	0	0	0
MODY	0	0	0	0	0
Permanent Neonatal	0	2	0	0	2
Transient Neonatal	3	1	0	0	4
Secondary	0	0	0	0	0
Not confirmed	0	0	0	0	0
CF related IGT	0	0	0	0	0
CFRD	0	4	5	9	18
Total	12	57	113	149	331

34% increase in number of young people with T2DM in Barts Health

	5-9 yr	10-14 yr	15-19 yr	Total
Type 1	41	89	89	229
Type 2	0	9	23	32
MODY	0	3	2	5
Permanent Neonatal	1	0	0	2
Transient Neonatal	1	1	0	5
Secondary	0	0	1	1
Not confirmed	0	0	1	1
CFRD	1	7	8	18
Total	15	116	127	303

NPDA- England & Wales

T2DM Age <19 years in Paediatric Diabetes Units

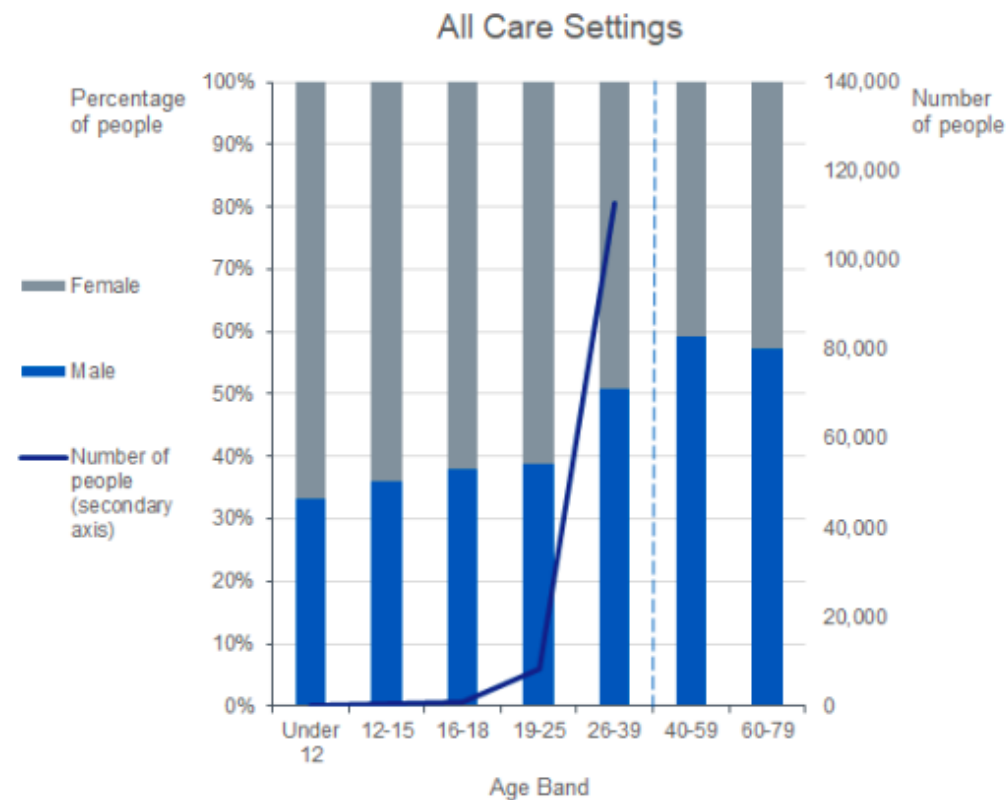
Year	N
2019/2020	810
2018/2019	790
2013/2014	340

Only 1/3 of YP with T2DM are seen in secondary care

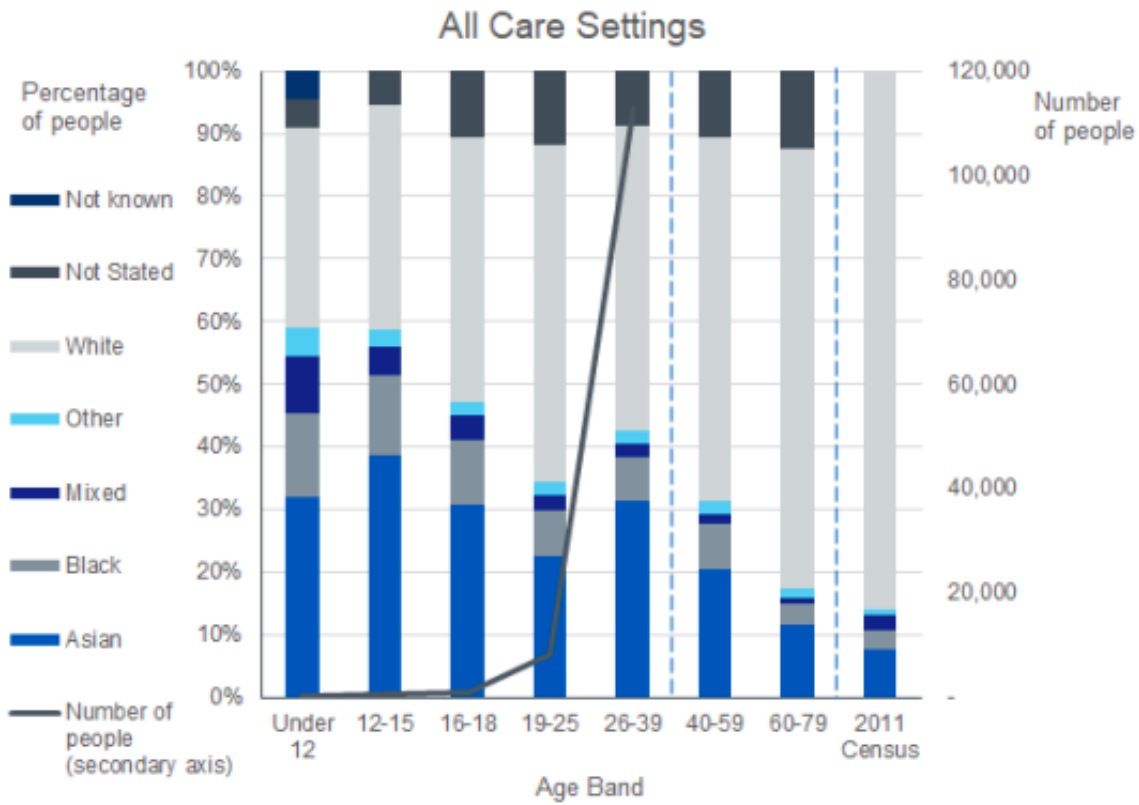
NDA Young People with T2DM in England

Table 1: Cohort - the number of young people with type 2 diabetes in England, by age group, 2019-20

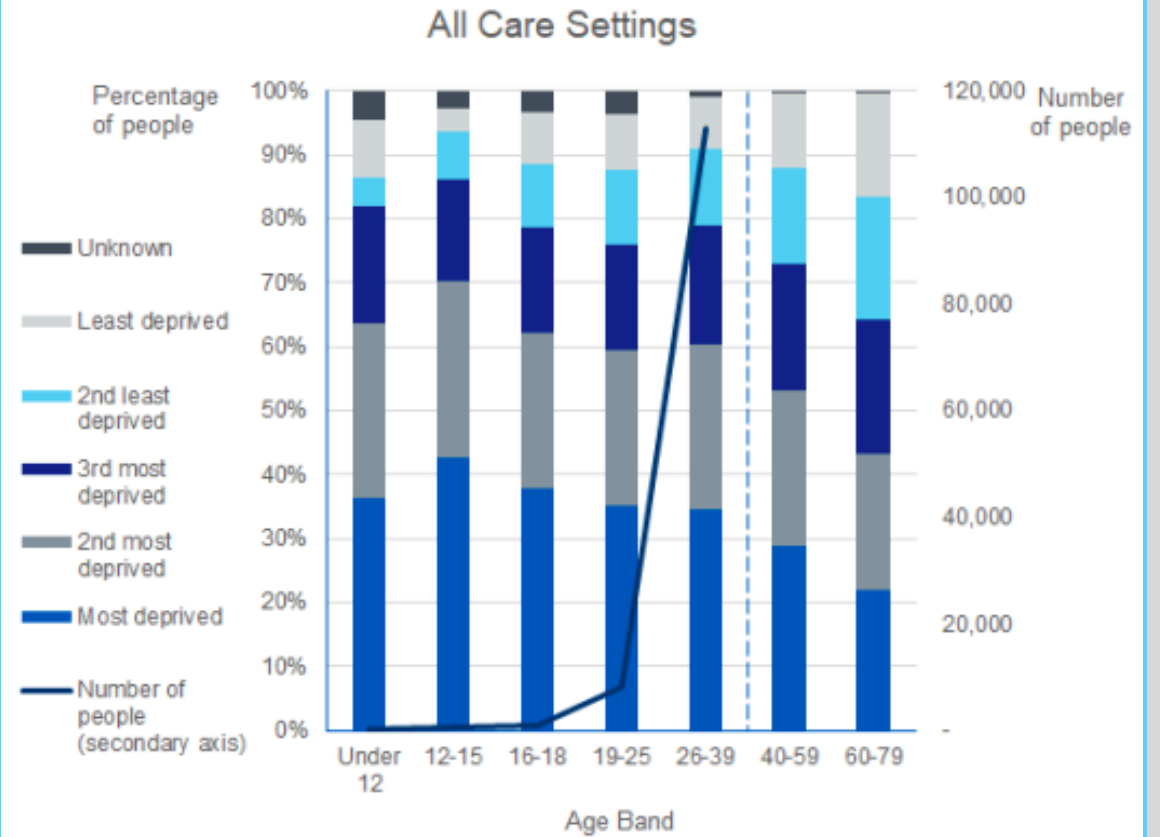
Age group	Number of people
Under 12 years	105
12-15 years	545
16-18 years	910
19-25 years	8,245
26-39 years	112,980
Total	122,780



Ethnicity



Deprivation

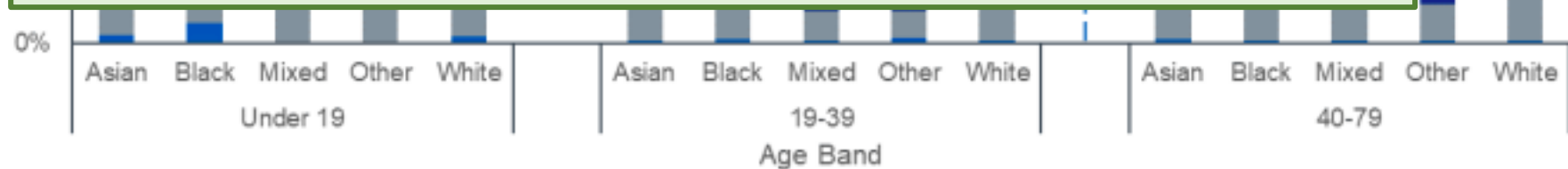


BMI

Percentage of people

■ Unknown
■ Obese
■ Overweight
■ Healthy Weight
■ Underweight

- Increasing numbers of YP with T2DM
- Strong association with obesity
- Female predominance
- Over-representation of ethnic minority groups
- Higher prevalence in most deprived areas



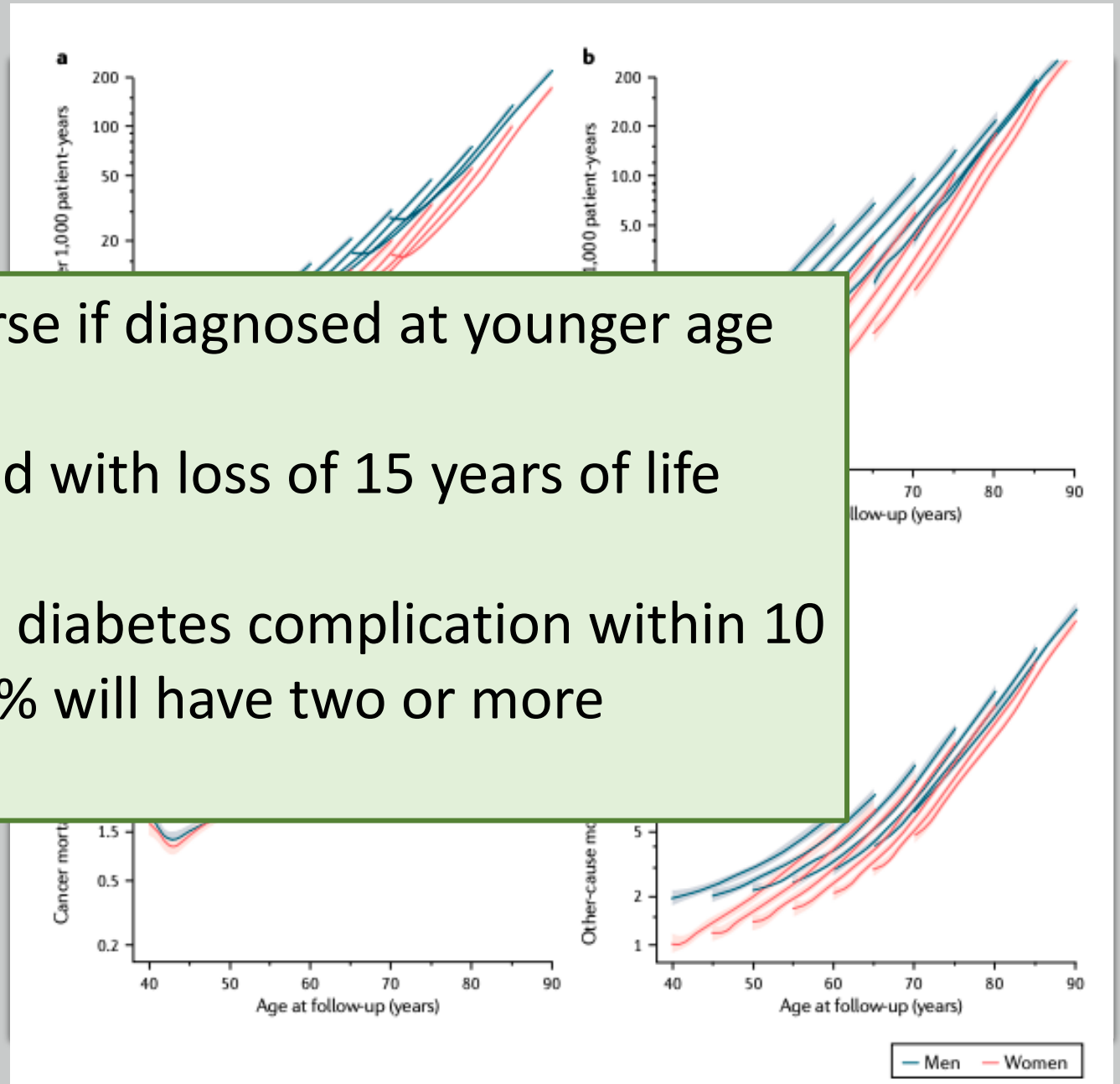
Relationship Between Age of Onset T2DM and mortality

For any given age, mortality is higher with a younger age at diagnosis.

Prognosis is worse if diagnosed at younger age

It is associated with loss of 15 years of life

60% will have one diabetes complication within 10 years, 28% will have two or more



Pathogenesis

- Greater beta-cell decline
- Stronger genetic component:
 - Polygenic risk – impact from multiple disease-associated gene variants

Subtypes of T2DM

Finer et al.
East London Primary Care Database.
Age >18

Cluster analysis to identify T2DM subgroups, using clinical features at diagnosis:

- Age-related Diabetes 82%
- Obesity-related Diabetes 10%
- Severe Hyperglycaemic Diabetes 8%- younger people

Any Macrovascular Disease

Subgroup
and Study

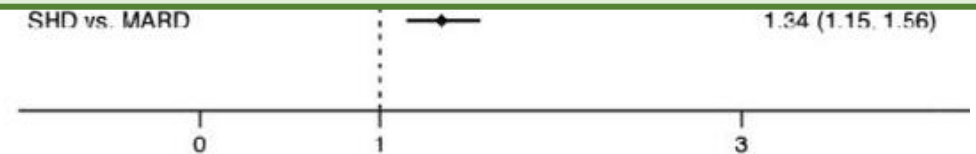
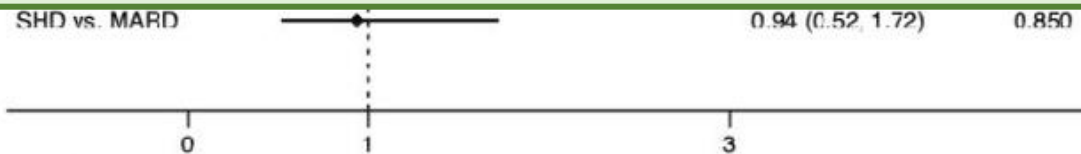
Hazard Ratio
(95% CI)

Any Microvascular Disease

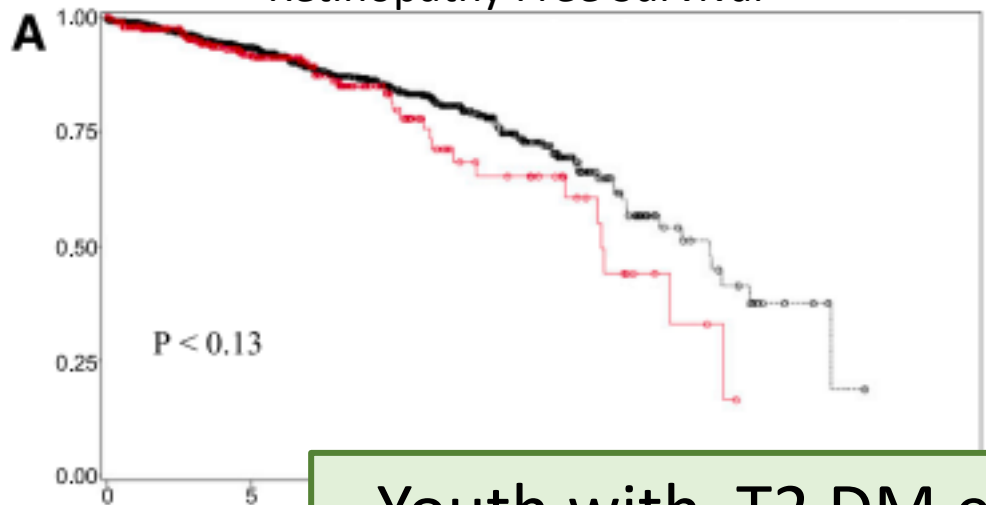
Subgroup
and Study

Hazard Ratio
(95% CI)

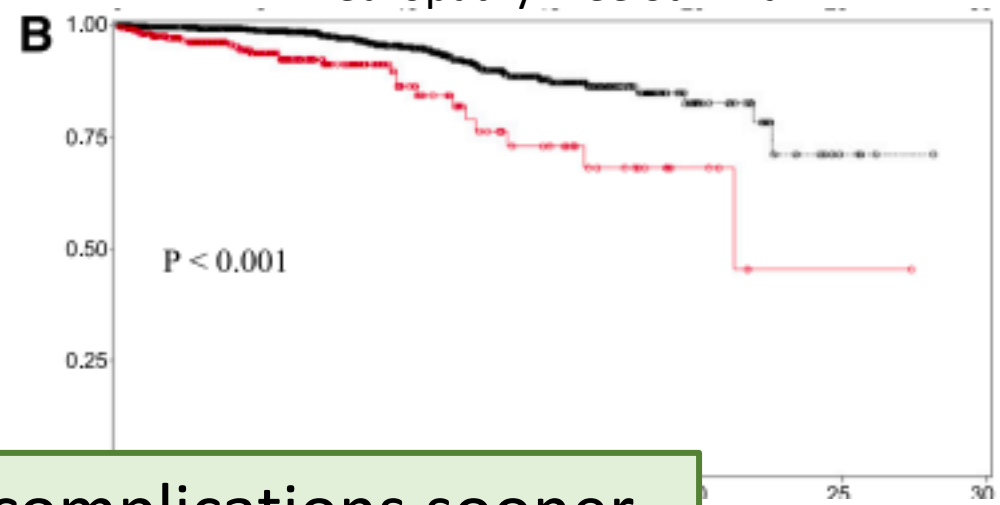
- Age-related T2D – milder course
- Obesity-related T2D – linked to macrovascular complications
- Severe hyperglycaemic T2D – 40% greater chance of microvascular complications



Retinopathy Free Survival

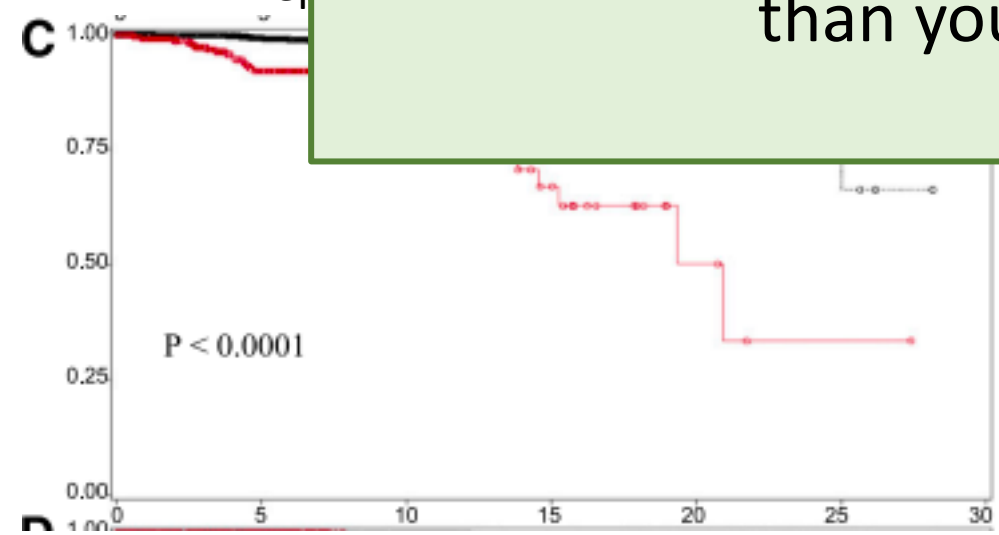


Neuropathy Free Survival

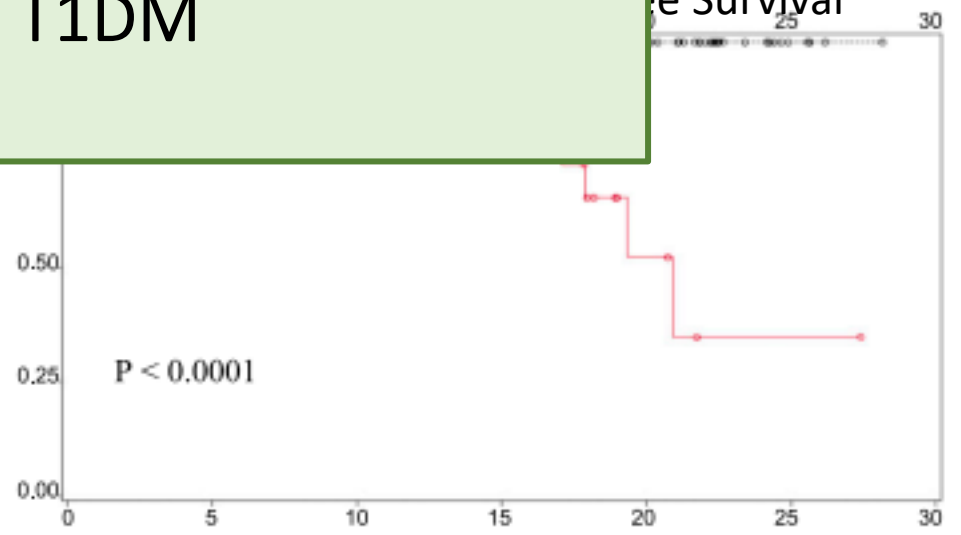


Youth with T2 DM exhibit complications sooner than youth with T1DM

Nep

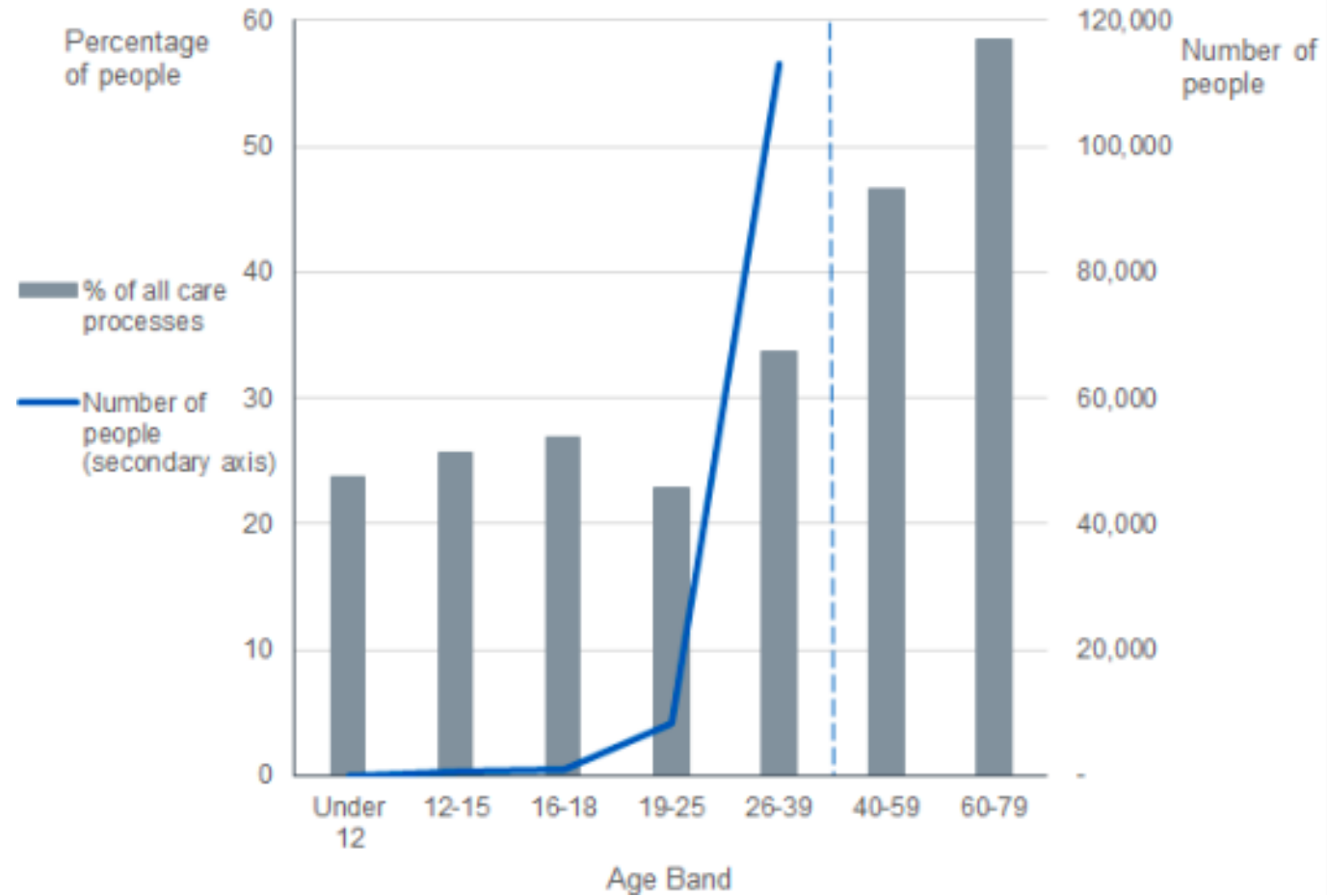


Survival

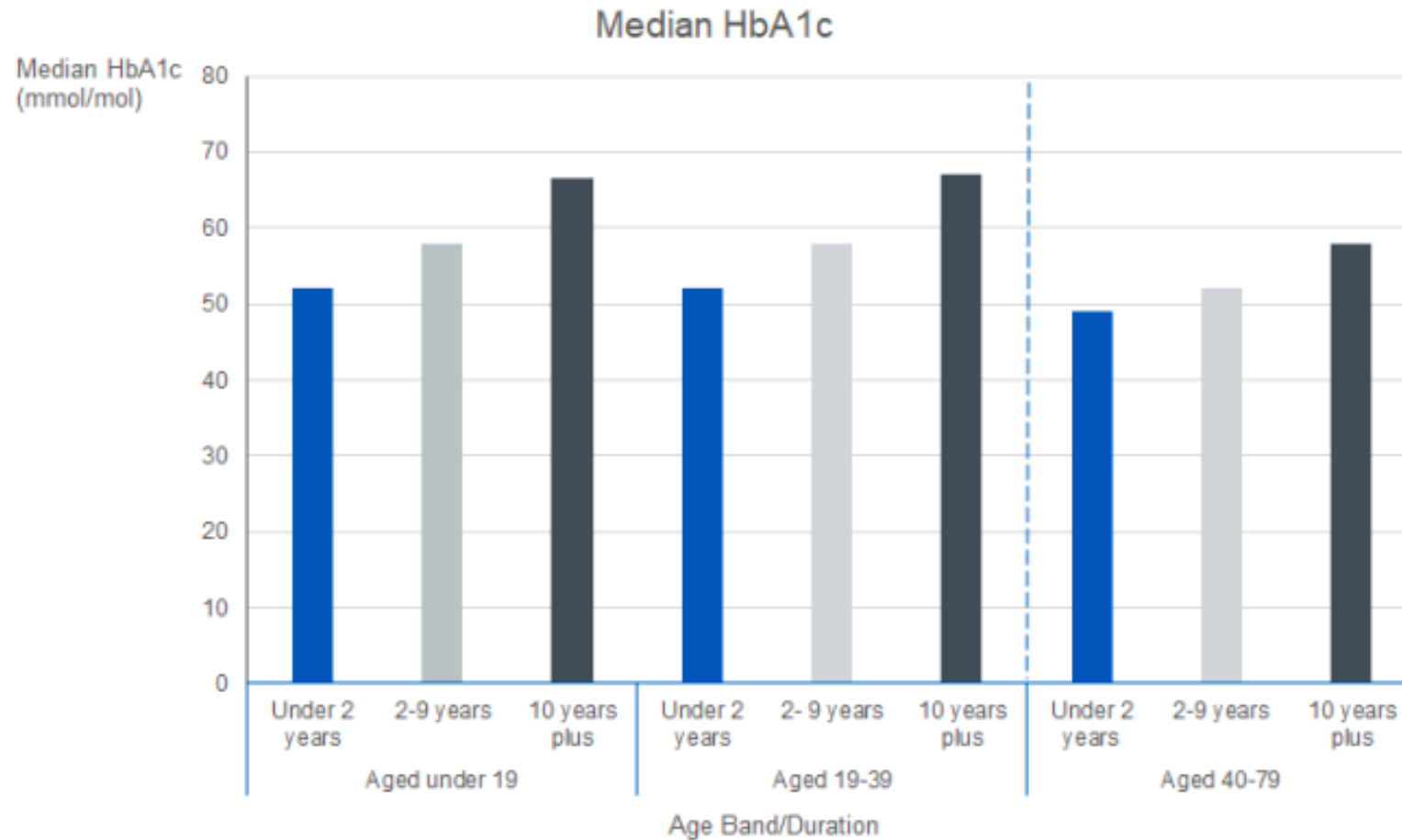


Patients at risk	0	5	10	15	20	25	30
T1DM	1,011	608	365	152	37	4	
T2DM	342	153	56	25	6	1	

Follow up: Care Processes



Follow up: HbA1c



What does this mean on
a practical level?

Patient Presentation

Chandler et al 2018
British paediatric Surveillance
Unit
Age < 17

- 1/2 osmotic symptoms
- 1/3 asymptomatic
- Recurrent infections, especially affecting genitalia

Who should we be screening for T2DM

- Overweight (BMI $\geq 85\%$) or obesity (BMI $\geq 95\%$)
 - after onset of puberty or ≥ 10 years of age
 - have one or more additional risk factors for diabetes

- If normal, repeat 3-year intervals

Table 2.4—Risk-based screening for type 2 diabetes or prediabetes in asymptomatic children and adolescents in a clinical setting (202)

Testing should be considered in youth* who have overweight (≥ 85 th percentile) or obesity (≥ 95 th percentile) **A** and who have one or more additional risk factors based on the strength of their association with diabetes:

- Maternal history of diabetes or GDM during the child's gestation **A**
- Family history of type 2 diabetes in first- or second-degree relative **A**
- Race/ethnicity (Native American, African American, Latino, Asian American, Pacific Islander) **A**
- Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, or small-for-gestational-age birth weight) **B**

Diagnostic tests for Diabetes

Table 2.2—Criteria for the diagnosis of diabetes

FPG \geq 126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*

OR

2-h PG \geq 200 mg/dL (11.1 mmol/L) during OGTT. The test should be performed as described by WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

OR

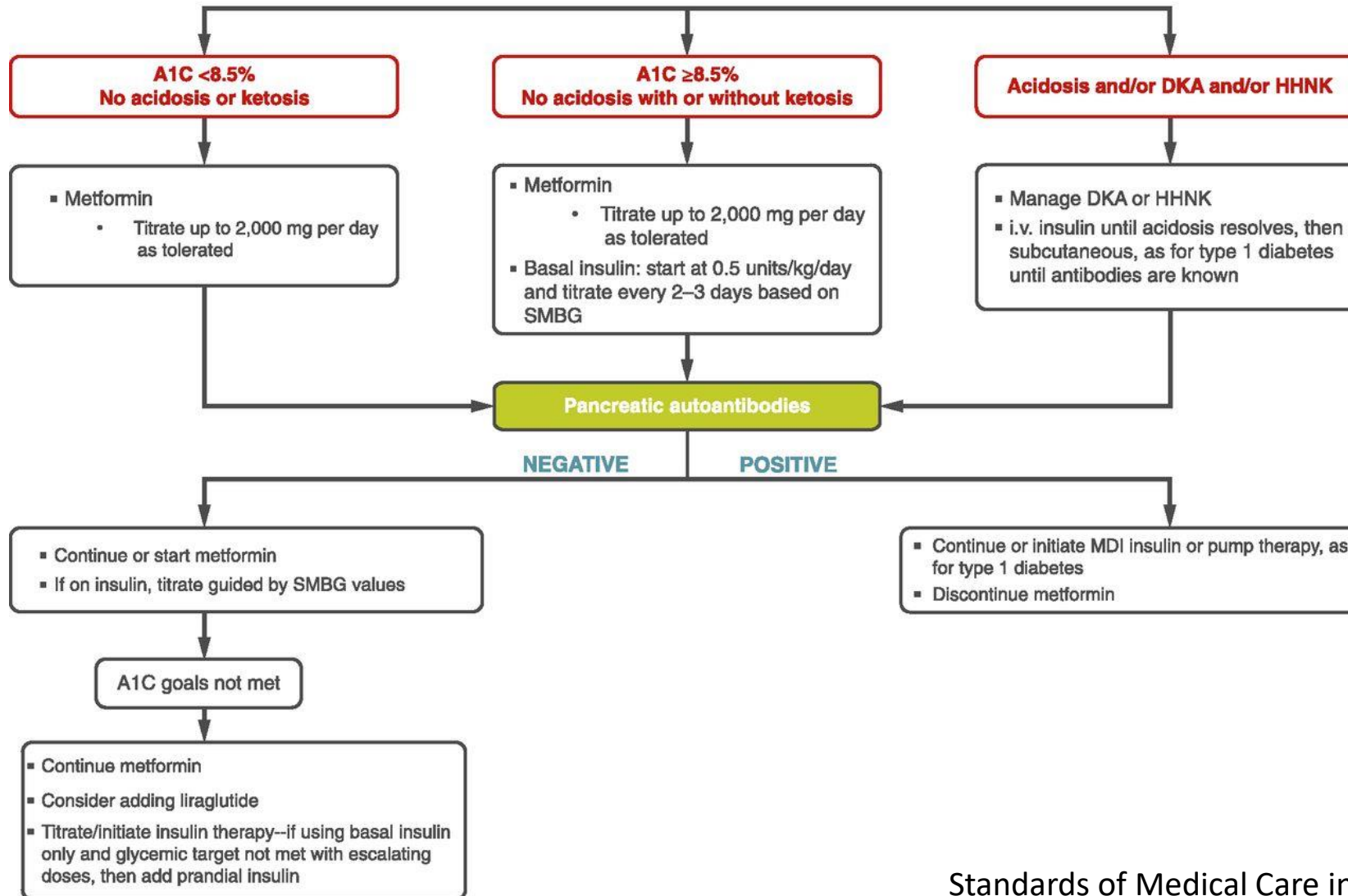
A1C \geq 6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*

OR

In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose \geq 200 mg/dL (11.1 mmol/L).

DCCT, Diabetes Control and Complications Trial; FPG, fasting plasma glucose; OGTT, oral glucose tolerance test; WHO, World Health Organization; 2-h PG, 2-h plasma glucose. *In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal test results from the same sample or in two separate test samples.

New-Onset Diabetes in Youth With Overweight or Obesity With Clinical Suspicion of Type 2 Diabetes
Initiate lifestyle management and diabetes education



Management- NICE

- Education- young people and their families
- Dietary management- seen by a dietitian. Encouraging weight loss
- Metformin- from diagnosis
- HbA1c every 3 months- individualised targets (aim < 48mmol/mol)
- Psychological and Social- offer psychological support

Screening- NICE & ADA

Yearly monitoring for

- Hypertension
- Dyslipidaemia
- Albuminuria
- Retinopathy
- Neuropathy

- PCOS
- Sleep apnoea
- Liver function

Comorbidities at diagnosis- 37% NAFLD and 21% hypertension

Treatments licensed for treatment

Metformin

Insulin

GLP1- Victoza from age 10

SGLT2i- over age 18

Bariatric surgery: BMI >35 kg/m² with comorbidities or BMI >40 kg/m² with or without comorbidities

Engagement

- Mental health team
- Youth workers
- Group sessions
- Education
- Easy access to healthcare

Who would we like to see in secondary care?

Diabetes Young Adult Service

- All T2DM age 16-25 years
- Pre-diabetes with BMI < 30kg/m²

Obesity Service

- Pre-diabetes with BMI >30kg/m²
- Age 18-25 years

Conclusion- Young Onset T2DM

- Increasingly common
- Seems to be a more severe disease
- Associated with poorer outcomes compared to older T2DM and aged matched T1DM
- Still a lot to learn!
- Actively screen in children >10 years if high risk
- Promote engagement
- Very close follow up
- Refer <25 years to diabetes team