# PRE-DIABETES

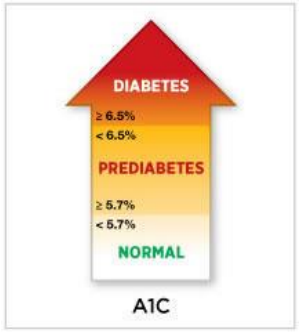
# Why worry?

- ADA estimates that by 2050, 1 in 3 Americans will have diabetes
- WHO projects 100m diabetics in India by 2030, and 150m in China by 2040
- In the UK +- 3.2m people have T2DM, and by 2025 it is predicted that this will increase to 5m
- 5m have pre-diabetes in England

- Those with a history of GDM have the highest rates of progression to diabetes
  - with a 7x increased risk after the first diagnosis and a 70% cumulative incidence at 10 years

# How to diagnose pre-diabetes

- ADA criteria
  - fasting plasma glucose of 5.6-6.9 mmol/L or $HbA_{1c}$ of 39-47 mmol/mol (5.7-6.4%)




- WHO and the International Expert Committee
  - fasting plasma glucose of 6.0-6.9 mmol/L and $HbA_{1c}$ of 42-47 mmol/mol (6.0-6.4%)

# Are we any good at it?

**Efficacy and effectiveness of screen and treat policies in prevention of type 2 diabetes: systematic review and meta-analysis of screening tests and interventions**

*BMJ* 2017; 356 (Published 04 January 2017)

*Trisha Greenhalgh et al*

- First systematic review to assess both the diagnostic accuracy of screening tests for pre-diabetes and the efficacy of interventions in those detected by screening
  - 148 papers (covering 138 studies) reviewed in full

- Our ability to predict diabetes with blood tests alone, and do so accurately in people with borderline elevated blood sugars, is questionable
- $HbA_{1c}$ is neither sensitive nor specific
- Fasting glucose is specific but not sensitive
  - Low sensitivity results in a high number of people with false negative results, resulting in a large number being falsely reassured.
- There is no existing blood test that can predict imminent diabetes with 100 percent accuracy.

- Pre-diabetes may overburden a health system and divert focus from those who actually do have diabetes
- Those with pre-diabetes may face significant costs, stigmatization, as well as employment and insurance consequences

- A screen and treat policy will be effective only if a test exists that correctly identifies those at high risk (sensitivity) while also excluding those at low risk (specificity); and an intervention exists that is acceptable to, and also efficacious in, those at high risk.

# How to manage ‘Pre-diabetes’: what to tell your patient

- “You might get type 2 diabetes soon or sometime in the future”

- “You are more likely to get heart disease or have a stroke”

# How to manage ‘pre-diabetes’

- Individually targeted
  - lifestyle interventions and
  - metformin

    have some efficacy in preventing or delaying the onset of type 2 diabetes, though the protective effect of the former is greatest in longer interventions (three to six years) and attenuates with time from intervention.

# Prevention of T2D: Selected Lifestyle Modification Trials

| Study | Country | N | Baseline BMI ($kg/m^2$) | Intervention period (years) | RRR (%) | NNT |
|---|---|---|---|---|---|---|
| Diabetes Prevention Program | USA | 3234 | 34.0 | 2.8 | 58 | 21 |
| Diabetes Prevention Study | Finland | 523 | 31 | 4 | 39 | 22 |
| Da Qing | China | 577 | 25.8 | 6 | 51 | 30 |

NNT, number needed to treat; RRR, relative risk reduction; T2D, type 2 diabetes.

DPP Research Group. *N Engl J Med*. 2002;346:393-403. Eriksson J, et al. *Diabetologia*. 1999;42:793-801.
Li G, et al. *Lancet*. 2008;371:1783-1789. Lindstrom J, et al. *Lancet*. 2006;368:1673-1679.

# Evidence-based National Diabetes Prevention Program (National DPP)*

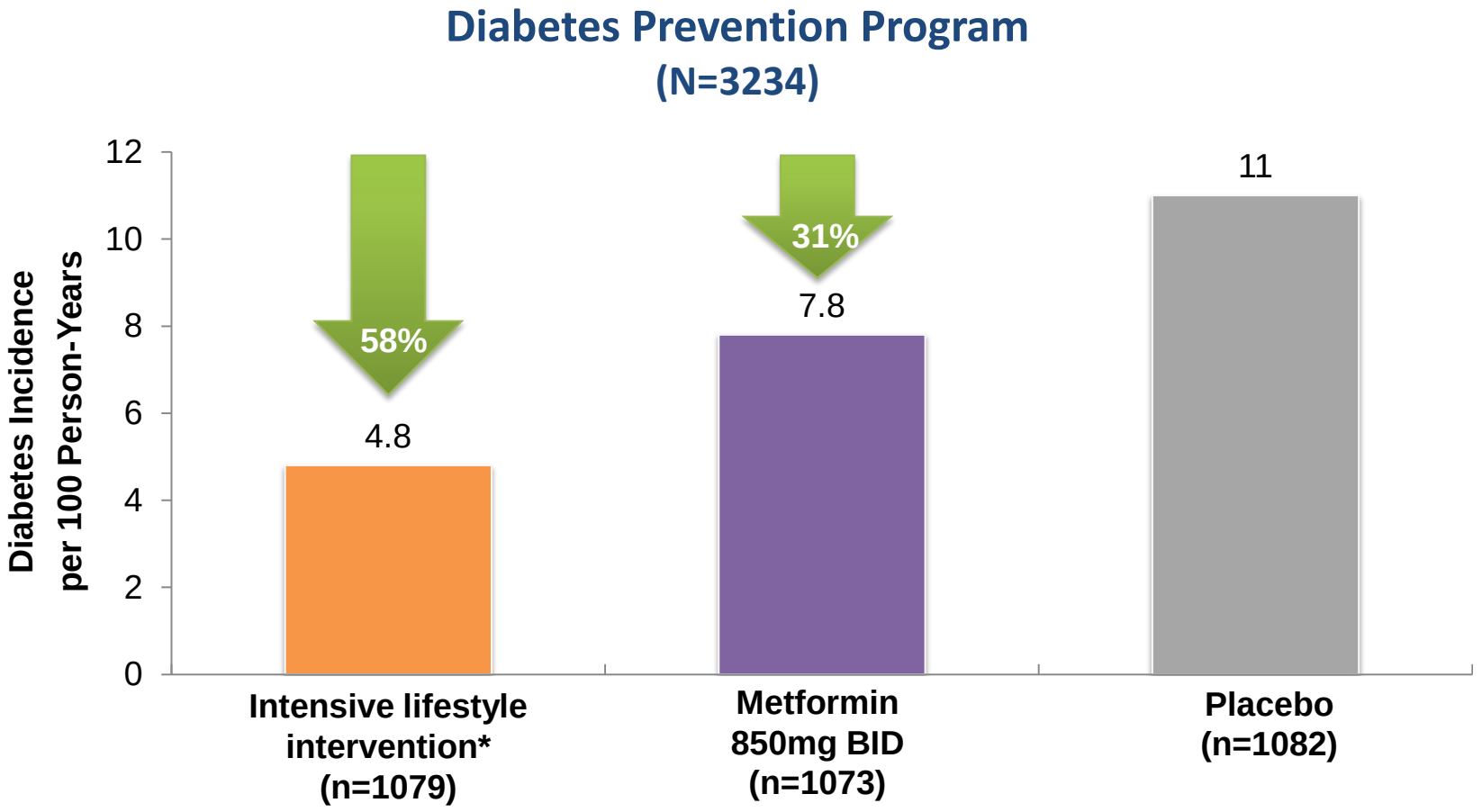
| National Institute of Health (NIH)-funded 3-arm Randomized Control Trial | | |
|---|---|---|
| Placebo | Metformin | Intensive lifestyle coaching |

5-7% body weight loss reduced the risk of developing Type 2 diabetes by 58% in those with prediabetes (over 3 years)

- 71% in those over age 60

*Knowler WC, Barrett-Connor E, Fowler SE, et al. Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002;346(6):393-403.

# Intensive Lifestyle Intervention Effectively Prevents Progression From IGT to T2D



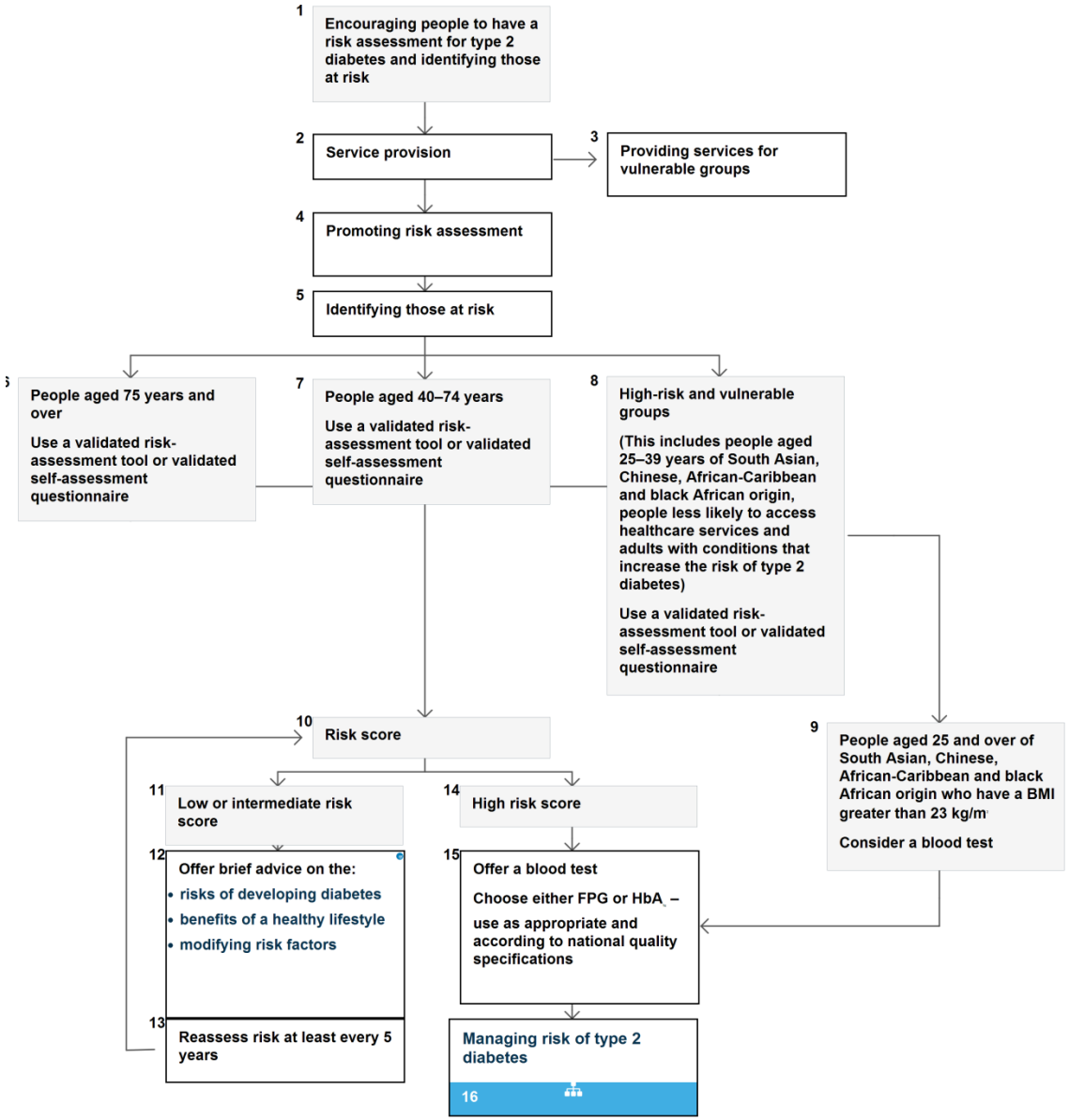

*Goal: 7% reduction in baseline body weight through low-calorie, low-fat diet and ≥150 min/week moderate intensity exercise .

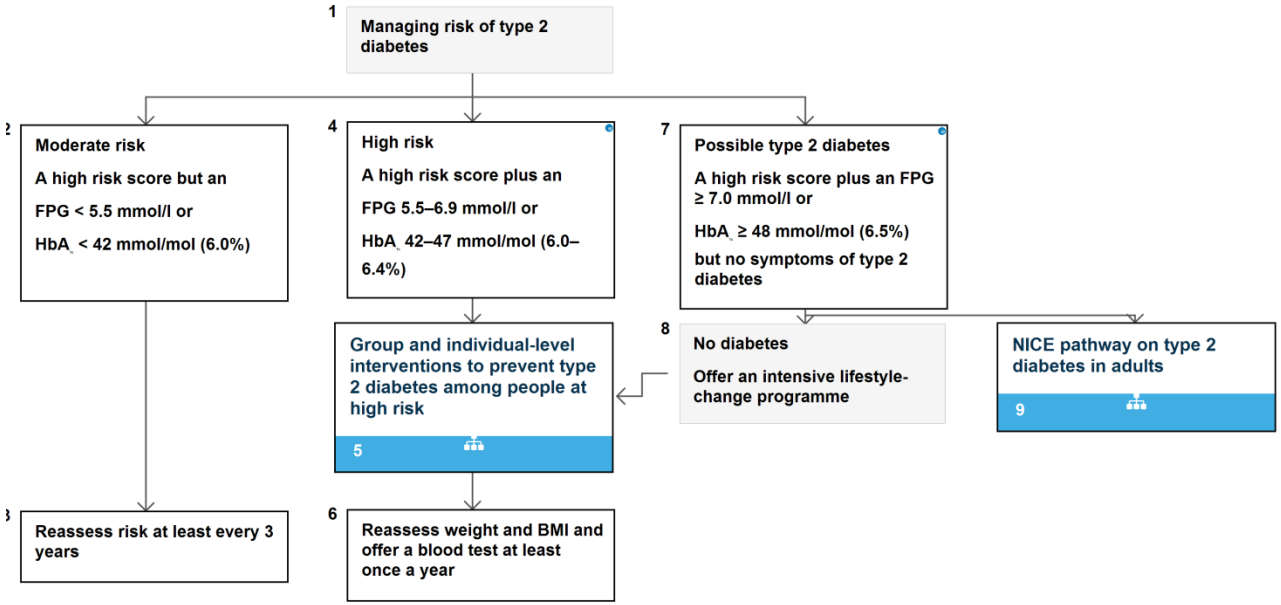
IGT, impaired glucose tolerance; T2D, type 2 diabetes.

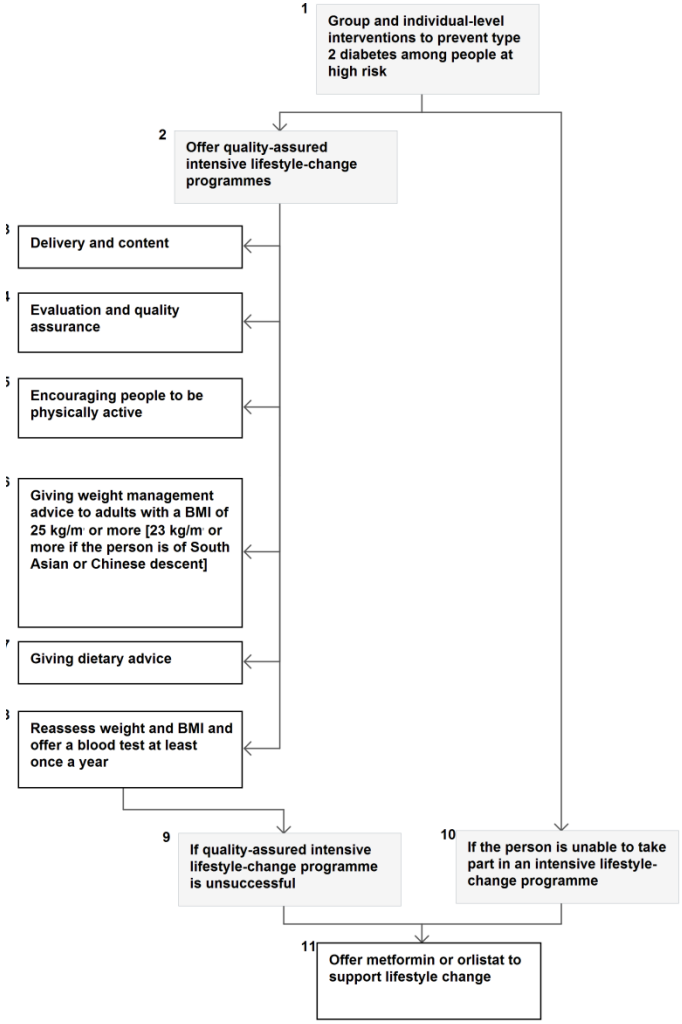
DPP Research Group. *N Engl J Med*. 2002;346:393-403.

# NICE Pathways

riskscore.diabetes.org.uk




1
Managing risk of type 2 diabetes
2
Moderate risk
A high risk score but an
FPG < 5.5 mmol/l or
HbA1c < 42 mmol/mol (6.0%)
3
Reassess risk at least every 3 years
4
High risk
A high risk score plus an
FPG 5.5–6.9 mmol/l or
HbA1c 42–47 mmol/mol (6.0–6.4%)
5
Group and individual-level interventions to prevent type 2 diabetes among people at high risk
6
Reassess weight and BMI and offer a blood test at least once a year
7
Possible type 2 diabetes
A high risk score plus an FPG ≥ 7.0 mmol/l or
HbA1c ≥ 48 mmol/mol (6.5%)
but no symptoms of type 2 diabetes
8
No diabetes
Offer an intensive lifestyle-change programme
NICE pathway on type 2 diabetes in adults
9


1
Group and individual-level interventions to prevent type 2 diabetes among people at high risk
2
Offer quality-assured intensive lifestyle-change programmes
3
Delivery and content
4
Evaluation and quality assurance
5
Encouraging people to be physically active
6
Giving weight management advice to adults with a BMI of 25 kg/m or more [23 kg/m or more if the person is of South Asian or Chinese descent]
7
Giving dietary advice
8
Reassess weight and BMI and offer a blood test at least once a year
9
If quality-assured intensive lifestyle-change programme is unsuccessful
10
If the person is unable to take part in an intensive lifestyle-change programme
11
Offer metformin or orlistat to support lifestyle change

Thank you