

Use of haemoglobin A1c (HbA1c) in the diagnosis of diabetes mellitus. The implementation of World Health Organisation (WHO) guidance 2011

An expert group* have discussed the WHO report. The group agree that the WHO requirements are met in the UK. HbA_{1c} is not suitable for use in everyone. Do not use HbA_{1c} to diagnose diabetes in pregnancy.

The test

Analysis of venous HbA_{1c} in UK laboratories participating in national quality assurance schemes currently fulfils WHO requirements. HbA_{1c} should usually be measured on a laboratory venous blood sample. Point-of-care HbA_{1c} should not be used for diagnosis unless the health care staff have been appropriately trained and the HbA_{1c} method used can demonstrate an internal quality control and external quality assessment performance that matches that of a laboratory method. Confirm a point-of-care diabetes diagnosis with laboratory venous HbA_{1c}.

Most patients

HbA_{1c} \geq 48mmol/mol can be used to diagnose diabetes in most situations. In patients without diabetes symptoms repeat venous HbA_{1c} in the same lab within 2 weeks. If the second sample is $<$ 48mmol/mol (6.5%) treat as high risk of diabetes and repeat the test in 6 months or sooner if diabetes symptoms develop. In symptomatic adults with relatively slow onset of symptoms a single result \geq 48mmol/mol will suffice.

Situations where HbA_{1c} must not be used as the sole test to diagnose diabetes

HbA_{1c} reflects glycaemia over the preceding 2–3 months so may not be raised if blood glucose levels have risen rapidly. Examples:

- ALL symptomatic children and young people.
- Symptoms suggesting type 1 diabetes (any age).
- Short duration diabetes symptoms.
- Patients at high risk of diabetes who are acutely ill.
- Taking medication that may cause rapid glucose rise, e.g. corticosteroids, antipsychotics.
- Acute pancreatic damage/pancreatic surgery.

Do an immediate quality-assured finger-prick capillary glucose test. Check blood/urine ketones if available. If glucose is $>$ 11.0mmol/L seek same-day specialist diabetes advice. For children and teenagers phone the specialist paediatric diabetes team same day. Send same day laboratory venous glucose, adding HbA_{1c} to exclude stress hyperglycaemia and/or for baseline, but *do not delay* seeking advice whilst awaiting the result.

Presence of factors that influence HbA_{1c} and its measurement

See Annex 1 from WHO report. Discuss the patient with your local laboratory or specialist diabetes team or use

WHO Recommendation 2011¹

HbA_{1c} can be used as a diagnostic test for diabetes providing that stringent quality assurance tests are in place and assays are standardised to criteria aligned to the international reference values, and there are no conditions present which preclude its accurate measurement.

An HbA_{1c} of **48mmol/mol (6.5%)** is recommended as the cut point for diagnosing diabetes. A value of less than 48mmol/mol (6.5%) does not exclude diabetes diagnosed using glucose tests.

glucose testing. Factors include abnormal haemoglobins, anaemia, altered red blood cell lifespan.

Patients whose HbA_{1c} is $<$ 48mmol/mol (6.5%)

These patients may still fulfil WHO glucose criteria for the diagnosis of diabetes which can be used in patients with symptoms of diabetes or clinically at high risk of diabetes. Glucose tests are not recommended routinely in this situation.

WHO did not provide specific guidance on HbA_{1c} criteria for people at high risk of diabetes. Clinicians should consider the individual patient's personal risk of diabetes and provide advice and monitoring accordingly. Pending NICE² guidance (see consultation) the expert group suggested using HbA_{1c} values below.

- **High risk of diabetes HbA_{1c} 42–47mmol/mol (6.0–6.4%).** Provide intensive lifestyle advice. Warn patients to report symptoms of diabetes. Monitor HbA_{1c} annually.
- **HbA_{1c} $<$ 42mmol/mol (6.0%).** Some of these patients may still be at risk of diabetes. If clinically at high risk manage as above.

A detailed report will be available shortly. This guidance is supported by: the Association for Clinical Biochemistry; Association of British Clinical Diabetologists; Community Diabetes Consultants; Diabetes UK; NHS Diabetes; Primary Care Diabetes Society; TREND-UK (Training, Research, and Education for Nurses in Diabetes UK).

Professor W Garry John, Clinical Biochemist, Norfolk and Norwich Hospital

Dr Rowan Hillson MBE, National Clinical Director for Diabetes

Professor Sir George Alberti, Chair, Diabetes UK and expert group*

References

1. http://www.who.int/diabetes/publications/report-hba1c_2011.pdf.
2. <http://guidance.nice.org.uk/PHG/Wave19/62>.

*The full list is available online at www.practicaldiabetes.com.

Consensus statement

Use of haemoglobin A_{1c} in the diagnosis of diabetes mellitus. The implementation of WHO guidance 2011

*Members of the expert group

George Alberti, WHO committee on HbA_{1c}, Chair
Diabetes UK

Barbara Bain, Professor of Diagnostic Haematology,
Imperial College

Ian Barnes, National Clinical Director Pathology,
Department of Health

Julian Barth, President Association for Clinical Biochemistry

Felix Burden, Commissioning Director, Heart of
Birmingham PCT

Fiona Campbell, Paediatric Lead, NHS Diabetes

Marie Cummins, Regional Programme Manager/NHS
Health Checks, NHS Diabetes

Melanie Davies, Professor of Diabetes Medicine, University
of Leicester

Alison Daykin, Policy Manager, NHS Health Checks,
Department of Health

Jane French, National External Quality Assurance Scheme,
glycated haemoglobin

Roger Gadsby, Associate Clinical Professor, University of
Warwick, NHS Evidence Diabetes

Geoff Gill, Chair Joint Specialty Committee for
Endocrinology & Diabetes, RCP

Martin Hadley Brown, Chair Primary Care Diabetes Society

Rowan Hillson, National Clinical Director for Diabetes
England, Department of Health (Chair)

Richard Holt, Professor in Diabetes and Endocrinology,
University of Southampton

June James, Training, Research & Education for Nurses in
Diabetes

Garry John, Consultant Clinical Biochemist, Norfolk and
Norwich University Hospital; Professor of Clinical
Biochemistry, University of East Anglia

Brian Karet, past Diabetes Lead RCGP. Primary Care Lead
Diabetes UK, Primary Care Diabetes Society

Kamlesh Khunti, Professor of Diabetes, Head of Division
of General Practice and Primary Health Care, University
of Leicester

Eric Kilpatrick, Professor of Clinical Biochemistry, Hull
Royal Infirmary

Elizabeth Lynam, Branch Head, Vascular programme,
Department of Health

Sally Marshall, Professor of Diabetes, University of
Newcastle

John McKnight, Consultant Diabetologist, Scotland

Nathan Moore, Diabetes Policy Lead, Department of
Health

Anna Morton, Director NHS Diabetes

Maurice O'Kane, Consultant Chemical Pathologist,
Altnagelvin Area Hospital, and University of Ulster,
Northern Ireland

Simon O'Neill, Director of Care, Information and
Advocacy, Diabetes UK

Naveed Sattar, Professor of Metabolic Medicine, University
of Glasgow, Scotland

Robert Sheriff, Consultant in Public Health Medicine, UK
National Screening Committee

Nicola Strother-Smith, Director NHS Diabetes & Kidney
Care, NHS Health Checks

Annette Thomas, Welsh External Quality Assurance
Scheme, Wales

Chris Walton, Chair, Association of British Clinical
Diabetologists

Nick Wareham, WHO committee on HbA_{1c}, Chair
Prevention prediabetes to diabetes NICE, Director MRC
Epidemiology Unit

Heather White, Deputy Branch Head, Vascular
programme, NHS Health Checks, Department of Health

Peter Winocour, past Chair, Association of British Clinical
Diabetologists