HbA_{1c} reporting: Change for change's sake?

Debbie Hicks

Debbie Hicks is a Nurse Consultant – Diabetes, Enfield PCT.

The way in which HbA_{1c} results are reported in the UK is changing in June 2009. Read on to find out what difference this will make to our discussions with people with diabetes regarding their glycaemic control and risks of long-term complications.

What is HbA_{1c}?

Glucose in the blood has an affinity to a specific part of haemoglobin in red blood cells, and forms glycosylated haemoglobin – more commonly known as HbA_{1c}. The higher the circulating glucose, the higher the level of HbA_{1c}. HbA_{1c} circulates for the lifespan of the red blood cell (around 90 days), so reflecting the blood glucose levels over the preceding 2–3 months. HbA_{1c} is influenced greatly by the glucose levels in the month prior to measuring (Monnier et al, 2003).

What does the HbA_{1c} tell us?

The DCCT (Diabetes Control and Complications Trial; 1993) in type 1 diabetes and the UKPDS (UK Prospective Diabetes Study; 1998) in type 2 diabetes both showed that the risks of both microvascular and macrovascular complications of diabetes increase as HbA_{1c} levels increase. HbA_{1c} can, therefore, give a measure of an individual's potential risk of long-term complications of the condition.

Why measure HbA_{1c}?

Serial measurements of HbA_{1c} show how an individual's glycaemic control, and, thus, risk of complications, changes in response to alterations in diabetes management. HbA_{1c} should be measured every 2–6 months, although some laboratories will not measure levels for an individual any more often than 3-monthly. Up until the beginning of June, we in the UK have used the method from the DCCT to predict an individual's risk of long-term complications.

For most people with diabetes, the optimal HbA_{1c} target is 6.5%, although this can vary from person to person depending on the type of diabetes and an individual's specific circumstances, including risk of hypoglycaemia, pregnancy, cardiovascular status and comorbidities.

As you may know, there are some limitations to the HbA_{1c} test – both the existing DCCT assay and the new IFCC (International Federation of Clinical Chemistry and Laboratory Medicine) reference method – when used with people who have haemoglobinopathies such as sickle cell anaemia, thassalaemia, and spherocytosis. At best, in these individuals, HbA_{1c} levels can only be used to detect trends, and home blood glucose monitoring becomes extremely important in these cases. Some areas of the country may have access to the serum fructosamine test, which is a much shorter-duration measurement (approximately 2 weeks) and there is no direct comparison to the HbA_{1c} value.

What are the new units?

HbA_{1c} results traceable to the IFCC reference method will be expressed as millimoles of HbA_{1c} per mole of haemoglobin (mmol/mol). A guide to the new values expressed as mmol/mol is shown in *Box 1*. These are just examples, and every result will be converted, for example an HbA_{1c} of 7.2% will equal 55mmol/mol. See Eric Kilpatrick's comment on the IMPROVE™ Control page for more information on calculating the new values from the old (page 199).

Just because the way we are measuring the HbA_{1c} is changing, the general targets in the UK will stay the same. Bizarrely, there has been no recommended global target for HbA_{1c} following the decision to standardise the measurement, which is confusing – why can we not have the same target throughout the world?

Why change?

In the 1990s, a small group of international chemical pathologists, on behalf of the IFCC, began work on a new reference method for measuring HbA_{1c} levels; this method was approved in 2002 (Jeppsson et al, 2002). This meant that any laboratory measuring HbA_{1c} in the future would have to be able to report in the new IFCC-standardised values as well as the DCCT-aligned values (Nordin et al, 2007).

In theory, the new values should allow global comparison of HbA_{1c} values, which would be

Box 1. HbA$_{1c}$ values expressed both as the DCCT-aligned value and the IFCC-standardised value.

DCCT HbA$_{1c}$ (%)	IFCC HbA$_{1c}$ (mmol/mol)
6.0	42
6.5	48
7.0	53
7.5	59
8.0	64
9.0	75

DCCT=Diabetes Control and Complications Trial; IFCC=International Federation of Clinical Chemistry and Laboratory Medicine

If you would like to put forward your thoughts on how you will implement the change in HbA$_{1c}$ reporting and how it is affecting your practice, then please contact the editorial team at: jdn@sbcommunications group.com

useful in such cases as clinical studies, and the UK will be the first to adopt these new values. However, there is some controversy as to whether the US will ever make the change, and at last year's EASD (European Association for the Study of Diabetes) Conference in Rome there was also some discussion as to whether some countries in Europe will adopt the new values.

I'm left wondering whether – if the US have decided to continue with the old DCCT assay and some European countries may also decide not to change – we will be any further forward, as there will be two differing assays that will not be comparable – which was the initial reason for the change!

First impressions

When I first heard about this change I did wonder if it was "change for change's sake", as is often the case in the NHS. However, I do think there is the possibility it will make our lives easier once we assimilate the new information. You may ask, how?

Well, how many times have you been explaining the HbA$_{1c}$ result to a person with diabetes, and they think their level of 9% is okay? That is because they are relating the value to their home monitoring result in mmol/L. How often have you had to explain the 9% does not equate to 9mmol/L in their monitoring diaries? In fact, 9% probably equates to a blood glucose level of >10mmol/L. The new units are very different to the old, so I believe there will be less confusion for people with diabetes – but we'll have to wait and see.

In a recent study (Patiño-Fernández et al, 2009), it was confirmed that, generally, people do not understand their HbA$_{1c}$ result. The purpose of the study was to examine young people with diabetes' knowledge of the HbA$_{1c}$ test and glycaemic control. Seventy individuals aged between 11 and 16 years old with type 1 diabetes were interviewed about their knowledge of the HbA$_{1c}$ test, the health risks associated with particular HbA$_{1c}$ levels, and their own glycaemic targets. The results revealed that only 13% of the study population accurately described the HbA$_{1c}$ test, and fewer correctly identified the HbA$_{1c}$ ranges for good, fair and poor glycaemic control. The majority of young people with diabetes did not know which blood glucose values correspond to specific HbA$_{1c}$ results, and only a small number of them correctly estimated the short- and long-term risks associated with maintenance of an HbA$_{1c}$ of 7% or 12%.

In this sample of youths with type 1 diabetes, mostly from black and minority ethnic backgrounds with low income, there was a significant lack of knowledge concerning the meaning and implications of the HbA$_{1c}$ test. The findings suggest that interventions for this population should use the HbA$_{1c}$ test results to help young people with diabetes to better understand and set goals for their glycaemic control. I believe that the results would be similar regardless of the group being studied.

If we are to help people with diabetes reduce their risk of complications, then we need better information to explain the significance of all their results. If the study above is anything to go by, we are not conveying the right messages to people with diabetes.

When is the changeover to new units?

From 1 June 2009, results will be provided in the UK as both IFCC-standardised units (mmol/mol) and DCCT-aligned units (%). This will give everyone time to become familiar with the new units and how they relate to DCCT numbers, and to the risk of complications. From 1 June 2011, results will be reported only in the new IFCC units. This journal will begin dual reporting in the next issue.

In an attempt to make the transition period as pain-free as possible, NHS Diabetes have produced information leaflets for people with diabetes and healthcare professionals. These can be downloaded from www.diabetes.nhs.uk, or hard copies can be ordered from the website.

How do you intend conveying this new information in your area? Tell us what you think about the change – contact us at the journal. ■

Diabetes Control and Complications Trial Research Group (1993) The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* **329**: 977–86

Jeppsson JO, Kobold U, Barr J et al (2002) Approved IFCC reference method for the measurement of HbA1c in human blood. *Clin Chem Lab Med* **40**: 78–89

Monnier L, Lapinski H, Colette C (2003) Contributions of fasting and postprandial plasma glucose increments to the overall diurnal hyperglycemia of type 2 diabetic patients: variations with increasing levels of HbA(1c). *Diabetes Care* **26**: 881–5

Nordin G, Dybkaer R (2007) Recommendation for term and measurement unit for "HbA1c". *Clin Chem Lab Med* **45**: 1081–2

Patiño-Fernández AM, Eidson M, Sanchez J, Delamater AM (2009) What do youth with type 1 diabetes know about the HbA$_{1c}$ test? *Children's Health Care* **38**: 157–67

UK Prospective Diabetes Study Group (1998) Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes. *Lancet* **352**:837–53