The role of confirmatory HbA_{1c} testing in diagnosing type 2 diabetes

Dear Editor,

A small, but I think important point, regarding the diagnosis of type 2 diabetes as per the BPJ monograph [article] *from February, 2012, "The new role of HbA_{1c} in diagnosing type 2 diabetes"* [BPJ 42, Feb, 2012]. *My issue is with Table 2 and explanatory text; I assume this is referenced to Table 3 from the New Zealand Guidelines Group (NZGG) publication "Management of Type 2 Diabetes".*

Table 2 in the BPJ article states that for persons without symptoms but with an HbA_{1c} ≥ 50mmol/mol (or fasting plasma glucose ≥ 7.0 mmol/L), the test should be repeated in not less than 3 months. That is NOT what the NZGG document states, it simply says to do a repeat measurement (no time frame stated); NZGG gives a 3-6 month time-frame for repeat testing ONLY where HbA_{1c} and fasting blood glucose results are discordant.

I recently had a non-symptomatic patient with an HbA_{1c} of 63 mmol/mol. He clearly has diabetes and waiting 3 months to do another test is to waste valuable time getting him assessed and treated, but that is what following the BPJ guideline would recommend.

The NZGG guideline for this patient would be to simply repeat the test forthwith, or do a fasting blood glucose (though at a level of 63, this would be a formality).

By and large I find the BPJ stuff extremely helpful, and congratulate your team on the quality, and especially the relevance to New Zealand practice.

***Dr Phil Dashfield**, General Practitioner*
Wellington

Response from bpac^{nz} editorial team:

The short answer, as Dr Dashfield points out, is that there is unlikely to be any benefit in waiting three months to confirm a diagnosis of type 2 diabetes for this patient. The recommendation to wait three months before performing a confirmatory HbA_{1c} test was intended as guidance for clinicians managing patients with glycaemic levels closer to the diagnostic threshold.

The NZGG guidelines and the NZSDD position statement both recommend repeat HbA_{1c} testing for asymptomatic patients with an HbA_{1c} ≥ 50 mmol/mol. Confirmatory testing for asymptomatic patients is recommended because an inaccurate diagnosis of type 2 diabetes could result in a patient receiving unnecessary treatment, potentially reducing their quality of life. Neither the NZGG nor NZSDD documents specify a timeframe within which confirmatory HbA_{1c} testing should be performed.

The article in BPJ recommended three months between HbA_{1c} tests in asymptomatic patients to allow the effects of any lifestyle changes the patient may make to be apparent on retesting. While it was not specifically stated, this advice was intended to apply to patients with a borderline HbA_{1c} result for the diagnosis of type 2 diabetes. Waiting three months for a confirmatory test was recommended because HbA_{1c} testing quantifies the number of haemoglobin molecules in erythrocytes with glucose attached to the N-terminal of the haemoglobin beta chain.[3] The lifespan of an erythrocyte is approximately 120 days.[4] The HbA_{1c} value therefore represents the mean level of glucose in the blood that erythrocytes have been exposed to in the past two to three months.[3] Lifestyle change is the foundation of all treatments for type 2 diabetes and motivated patients with borderline HbA_{1c} results may be able to achieve sufficient glycaemic control before undergoing a confirmatory test to avoid a diagnosis of type 2 diabetes; although they would remain at high risk of developing diabetes. As metformin is initiated at, or soon after, diagnosis the period of time between these two tests is an opportunity to assess the effects of lifestyle on glycaemic control in patients with borderline results before a diagnosis is confirmed.

There are also a number of reasons, other than diabetes, why a patient's HbA_{1c} levels may be elevated. A three-month timeframe between testing does not exclude all of these, although it does reduce the likelihood of a false-positive test result. A patient's HbA_{1c} levels may be elevated due to:[5, 6]

- Reduced erythropoiesis, caused by iron deficiency anaemia or vitamin B12 deficiency
- Excessive alcohol consumption or chronic kidney disease which can increase the intracellular acidity of erythrocytes
- Splenectomy, which may increase red blood cell lifespan
- Haemoglobinopathies, which can cause HbA_{1c} results to overestimate blood glucose levels
- Large doses of aspirin or long-term opioid use

Best Practice Journal aims to provide practical guidance for New Zealand health professionals working in primary care, rather than rigid guidelines. Guidance published in BPJ should not override clinical judgement and individual patients may need to be managed differently, depending on the clinical context. Dr Dashfield is correct in that in the case he provides for us, there is good reason to perform the confirmatory HbA_{1c} test immediately with a view to initiating pharmacological treatment as soon as the diagnosis is confirmed.

For further information see:

www.bpac.org.nz/BPJ/2012/February/hbA1c.aspx

www.nzgg.org.nz/guidelines/0036/ACF4758.pdf

www.nzssd.org.nz (click "Position Statements" in the menu bar, select "NZSSD position statement on the diagnosis of, and screening for, type 2 diabetes")

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The difficulties of accessing echocardiography in patients with heart failure

Dear Editor,

The practicalities of this are challenging – getting an echo is nigh on impossible for me through the public system. It seems the difference in management between HF-REF and HF-PEF is the use of diltiazem and verapamil – bad in HF-REF and good in HF-PEF. This is interesting but for me difficult in practice because the diagnosis is not easy in the absence of an echo. Comments please.

General Practitioner

Online comment

This question was recently posted online in response to an article "Identifying patients with heart failure in primary care", BPJ 50 (Feb, 2013). This article was also accompanied in the same journal by "Managing patients with heart failure in primary care".

Response from bpac^{nz} editorial team:

Accessing echocardiography can be difficult due to resource limitations, and criteria for publically funded echocardiography vary throughout the country. It is difficult to clinically distinguish between heart failure with reduced ejection fraction (HF-REF) and heart failure with preserved ejection fraction (HF-PEF) in the absence of an echocardiogram. There appear to have been no clear clinical diagnostic criteria developed to diagnose HF-PEF since the bpac^{nz} heart failure articles were published in Best Practice Journal (BPJ) in 2011.[1]

The BPJ article "Identifying patients with heart failure in primary care", included information on the utility of a number of primary care investigations for patients with heart failure; none of these, however, can accurately differentiate between HF-REF and HF-PEF. A clinical decision rule developed to help guide decisions about the need for echocardiography was also included in the article, although it does not necessarily help to predict HF-PEF. Clinical features that are known to be associated with a higher risk of HF-PEF include older age, female gender, atrial fibrillation, hypertension, a higher BMI and a lower incidence of coronary artery or valvular disease.[2]

Initially the management of both types of heart failure is similar – using diuretics to reduce fluid overload and therefore to relieve the patient's symptoms. However, further management is now often determined by the specific type of heart failure and, as the correspondent correctly points out, there are differing roles for rate-limiting calcium channel blockers such as diltiazem and verapamil.

The steps for managing a patient with HF-REF are:

1. Start with a diuretic
2. Add an ACE inhibitor and beta-blocker
3. Add spironolactone if still symptomatic – monitor renal function and electrolytes
4. Add an angiotensin-II receptor blocker (ARB), digoxin and anticoagulants as appropriate. Continue to closely monitor renal function and electrolytes
5. Avoid rate-limiting calcium channel blockers such as diltiazem and verapamil as they can impair left ventricular function

The steps for managing a patient with HF-PEF are similar but patients may be more "brittle" and fluid balance control can be more challenging:

1. Start with a diuretic
2. Add a beta-blocker
3. Add an ACE inhibitor if blood pressure control is required
4. Add digoxin if the patient is in atrial fibrillation
5. Consider the use of a rate-limiting calcium channel blocker, e.g. diltiazem or verapamil instead of a beta-blocker as there is some evidence these medicines may improve the condition of patients with HF-PEF

Best Practice Journal aims to provide "best practice" guidance based on current evidence and expert opinion. We appreciate there are times when this is not achievable given resource limitations and a more pragmatic solution has to be sought. The majority of patients with suspected heart failure, who do not need acute care, can have their initial treatment initiated in primary care. Their need for echocardiography or a cardiology assessment can then be determined by the likely underlying cause of the heart failure, their range of co-morbidities and their response to treatment.

For further information, see: "Identifying patients with heart failure in primary care" and "Managing patients with heart failure in primary care", BPJ 50 (Feb, 2013), available from: **www.bpac.org.nz**

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Best practice for the administration of intramuscular injections: is drawing back necessary or not?

Dear Editor,

I am doing some research into best practice for administration of intramuscular (IM) injections. When administering childhood vaccines we are told not to draw back, which is different from the advice I received when I trained as a nurse. After asking colleagues who have worked in different clinical settings I have received a number of conflicting replies regarding the need to draw back during IM injections. Can you advise best practice for this?

Practice Nurse
Dunedin

Response from bpac^{nz} editorial team

The practice of drawing or pulling back on the plunger of a syringe (also known as aspirating) while performing an intramuscular (IM) injection is used to avoid accidental intravenous (IV) injection. The risk to a patient of accidental IV administration varies according to the substance being injected.

A useful rule of thumb is that drawing back is:

- Not necessary for vaccinations,
- Necessary for passive immunisation with immunoglobulins
- Likely to improve patient safety for IM injections of medicines.

For the IM administration of vaccines drawing back is usually not necessary.[1] The Immunisation Handbook (New Zealand), Centres for Disease Control (United States), Department of Health (United Kingdom) and World Health Organisation all recommend that IM vaccinations should be made into the deltoid or vastus lateralis muscles.[1–4] As large blood vessels are not located near the recommended injection sites, drawing back before the injections of most vaccines is not needed, as long as the correct site and needle is used.[2, 3]

For the IM administration of immunoglobulins used for passive immunisation, drawing back is recommended as anaphylactic reactions, which although rare, are more likely to occur following IV administration.[1] These products include immunoglobulins derived from donated blood, such as Rh(D) immunoglobulin, hepatitis B immunoglobulin, tetanus immunoglobulin, zoster immunoglobulin and human normal immunoglobulin for IM administration.[1]

For the IM administration of medicines, clinical judgement should be used when deciding whether to draw back, taking into account:

- The risk to the patient if the medicine were to be accidentally administered IV
- The site of injection, which will influence the chance of injecting into a blood vessel

For medicines administered by IM injection where IV administration may cause significant adverse effects drawing back should reduce the risk of harm and improve patient safety. Examples of medicines used in primary care which could cause serious adverse effects if an IM injection is delivered IV

include preparations with oily liquids or suspended particles, such as long-acting antipsychotic or steroid depot injections. Oil-based injections may cause pulmonary oil embolism when injected intravenously, with symptoms such as acute onset cough and respiratory distress.[5, 6] Accidental IV administration of a depot IM olanzapine injection may cause post-injection delirium/sedation syndrome due to acute exposure to high doses.[7]

The potential for injection into a major blood vessel is higher with an intended IM injection in the dorsogluteal area. The risk of sciatic nerve damage or accidental subcutaneous injection in this area is also increased. Between 2005 and 2008, eight claims for sciatic nerve injury following a dorsogluteal IM injection were made to ACC, six of which occurred in a general practice setting.[8] Even with correct injection technique many IM injections into the dorsogluteal region result in subcutaneous administration due to variable subcutaneous tissue thickness between people.[3, 9] This can result in delayed uptake of the medicine, tissue irritation or the development of granulomas.[10]

The ventrogluteal injection site (also known as gluteal triangle) is an alternative site suitable for injections of up to 3 mL in adults. It is associated with less risk of accidental IV injection, avoids the sciatic nerve and there is also a more consistent depth of subcutaneous tissue between individuals than the dorsogluteal site, resulting in a safer, more consistent IM administration.[8, 11]

Other key practice points for performing an IM injection include:

- Injections should be given at a 90° angle with the surrounding skin stretched, either between fingers or using the Z-track technique, described below[2]
- If drawing back is performed, a five to ten second wait time is recommended to check for blood entry into the syringe[9]
- The Z-track injection technique helps prevent seepage of the injected fluid out through the injection track:[12]
  - Use a free hand to pull the skin sideways two to three centimetres prior to injecting
  - Perform the injection and withdraw the needle
  - Release the skin so that the needle track through the skin is offset away from the track through the underlying tissue

Guides to identifying the ventrogluteal IM injection site and using the Z-track injection technique are available from:

http://thenursepath.com/2014/04/23/the-ventrogluteal-im-injection-site/

https://vimeo.com/73862611

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