Classification of diabetes for primary care: A practical approach

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Article points

1. Central to the management and treatment of individuals with diabetes is maintaining accurate and updated records of their current diagnosis; incorrect coding and misdiagnosis can affect appropriate diabetes management.
2. A taskforce was set up to assess the coding and miscoding of diabetes within primary care (NHS Diabetes, 2011).
3. The review found sufficient misdiagnosis, misclassification and miscoding errors to develop an algorithm to support the accurate classification and diagnosis of diabetes in primary care.

Key words

- Audit tool
- Classification algorithm
- Correct diabetes diagnosis
- Practical guidelines
- Primary care

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A report was commissioned by NHS Diabetes and the Royal College of General Practitioners in conjunction with the Department of Health to review the coding, classification and diagnosis of diabetes in primary care in England (NHS Diabetes, 2011). It identified errors in misdiagnosis, misclassification and miscoding, which would result in inappropriate management and poor outcomes. A classification algorithm and audit tool were developed to assist with the practical classification of diabetes to enable practitioners to follow clinical-based advice when coding diabetes in the future.

Diabetes is increasingly being recognised as one of the biggest threats to health within England. Current prevalence models, set by the recent Association of Public Health Observatories, estimate that there are 3.1 million people with diabetes in England (Holman et al, 2011); this represents a significant rise of 25% since the previous estimate provided by Diabetes UK (2010), with a further 800 000 people estimated as being undiagnosed (NICE, 2004). This coupled with an aging population and rising obesity levels (Gregg et al, 2004) equates to a considerable projected increase in diabetes within 20 years. By 2020 an estimated 3.8 million adults, or 8.5% of the adult population, will have diabetes, and by 2030 this is estimated to rise to 4.6 million, or 9.5% of the adult population (Holman et al, 2011); approximately half of this increase will be a result of the changing age and ethnic group structure of the population, and half will be because of higher levels of obesity.

Central to the management and treatment of individuals with diabetes is maintaining accurate and updated records of their current diagnosis. However, a 2004 *National Diabetes Audit* report identified shortcomings in medical records (The Information Centre, 2006); it found that in 43% of identified cases the type of diabetes was not specified. Furthermore, the 2006 Quality and Outcomes Framework (QOF) changes, which required diabetes to be specified as type 1 or type 2, saw a 22% reduction in the number of people on the diabetes register (Hippisley-Cox and O'Hanlon, 2006).

As a result, a taskforce was set up to spearhead the assessment of coding and miscoding of diabetes within primary care.

Coding, diagnosis and classification of diabetes

NHS Diabetes and the Royal College of General Practitioners in conjunction with the Department of Health (DH) reviewed the coding, classification and diagnosis of diabetes in primary care in England (NHS Diabetes, 2011). The aim of the report was to provide frontline staff with an easy-to-use classification algorithm to help make accurate diagnosis. Contained within the report was a four-point analysis of diabetes coding, including:

- A systematic review of current evidence on miscoding.
- An analysis of diagnostic databases.
- Audit tools to improve diagnosis, classification and coding in clinical practice, and the results of a pilot using them.
- Classification guidelines.

The first aim of the report was to identify and define types of coding errors most commonly encountered – three types of coding errors were identified:

- Misdiagnosis, when someone is diagnosed with any form of diabetes when they do not have the condition.
- Misclassification, when someone is incorrectly classified as having a type of diabetes that they do not have.
- Miscoding, when the wrong computer Read code is used, meaning that it is not possible to determine the type of diabetes precisely.

Coding errors occur for a number of reasons. Some are simple errors involving mistakes on data entry of clinical records, but as the clinician and person with diabetes are aware of the correct diagnosis and management, such mistakes are unlikely to have a great impact on the management of the condition. However, others are more serious errors resulting from a lack of information or understanding from the healthcare professional; these mistakes invariably have considerable impact on the management of disease.

As part of a systematic literature review, the authors of the report examined the frequency of errors and omissions within 17 identified published literature papers. The search examined both qualitative and quantitative data describing implications for individuals with diabetes and healthcare professionals. The authors felt that the current

Case study 1. Example of misdiagnosis.

Mr S, aged 86, was admitted to hospital in May 2003 with a myocardial infarction and newly diagnosed type 2 diabetes. For his diabetes he was commenced on twice-daily human Mixtard, 4 units and 2 units. Mr S was discharged and his injection technique checked in primary care. His plasma glucose on home testing was never greater than 9 mmol/L.

Following left ventricular failure, Mr S was readmitted to hospital (October 2003). As his HbA_{1c} was 48 mmol/mol (6.5%) and his plasma glucose was 6.5 mmol/L, his insulin was stopped and he was discharged; Mr S's original diabetes diagnosis had been based on a single plasma glucose reading of 14.0 mmol/L during his initial admission in May 2003.

Mr S was classified as having "Diabetes controlled by diet", and was followed up in the community in a practice diabetes clinic (July 2003); all his HbA_{1c} levels were between 39 and 46 mmol/mol (5.7 and 6.4%). His plasma glucose readings were between 4.7 and 5.5 mmol/L, with only two higher readings of 6.3 mmol/L and 6.5 mmol/L during this 6-month period.

Mr S was later discharged from the practice diabetes clinic following identification of the misdiagnosis in the audit as he did not have diabetes.

complex classification of diabetes and its subtypes, combined with similarities in presentation of disease, frequently led to difficulties distinguishing an accurate or precise diagnosis (Stone et al, 2010). Furthermore, miscoding has implications on therapeutic management in terms of patient compliance, depending on acceptance of the correct labelling of the condition (Tai et al, 2007). Additionally, poor management of hyperglycaemia can lead to inappropriate use of insulin (Leslie and Pozzilli, 1994), and some people with diabetes may not be referred to appropriate education programmes (DAFNE Study Group, 2002; Trento et al, 2004; Davies et al, 2008).

The review found errors and omissions occurring with sufficient frequency to consider the problem important. Poor outcomes were related to delayed management of disease, inappropriately prescribed treatment, people not being prescribed treatment (Stone et al, 2010) and psychological difficulties, such as anxiety regarding stopping insulin and feelings of annoyance about previous inappropriate management (Shepherd and Hattersley, 2004). *Case studies 1* and *2* highlight examples of inappropriate management.

Analysis of routine primary care data

Having examined current published literature, the report set out to determine the prevalence and extent of misclassification and coding errors within primary care. With much of primary care data computerised, it has become increasingly common to routinely collect data for audit, quality improvement and research (de Lusignan et al, 2006; de Lusignan and van Weel, 2006).

Little evidence was available regarding the quality of underlying data entry. By examining primary care data from Gray et al's (2003) and de Lusignan et al's (2009) studies, analysis of the records of nearly one million patients was possible. Using Read codes, prescription data, BMI and blood results, errors were identified in 14.5% of all diagnosed cases of diabetes (de Lusignan et al, 2010). The least frequent error was related to misclassification, and in particular the misclassification of type 1 diabetes; the most common errors related to miscoding, and in particular the use of vague disease codes, which on occasion incorrectly specified the type of diabetes or contradicted other coding on record. In total, 85–90% of the data on diabetes were suitable, but recommendations for further improvement can be made.

Practical guidelines for the classification of diabetes

A simple algorithm was developed to support the accurate classification and diagnosis (*Figure 1*), and all practices are encouraged to adopt it. It is primarily based on age of diagnosis and timing of treatment; it also takes into account other

Case study 2. Example of type 2 diabetes being misclassified as type 1.

Ms I, aged 38, was first diagnosed with "insulin dependent" diabetes in May 1999; this classification was later changed to type 1 diabetes in 2004. Her initial treatment consisted of metformin, which was changed to glibenclamide in 1995. In 1999 the first trial of insulin was started, in combination with gliclazide. By 2004 Ms I had started on insulin permanently; her BMI was >30 kg/m^2. As a result of the diabetes audit she was reclassified from having type 1 diabetes to having type 2 diabetes; the diagnostic codes were "unified" as type 2 diabetes, and her date of diagnosis adjusted to 1995.

clinical factors, such as obesity. The availability of practical guidelines will assist professionals on accurate coding for the future.

Audit tool pilots

The report also examined the use of audit tools to enable practitioners to check for miscoding, misclassification and misdiagnosis of diabetes. Six MIQUEST (Morbidity Information and Export Syntax, a DH-sponsored computer data extraction tool) queries were developed to look for evidence of misdiagnosis or misclassification (Stone et al, 2010), such as people diagnosed with type 1 diabetes but no record of insulin being prescribed. These searches were run in five practices in south-east England with a combined list size of approximately 45 000 (de Lusignan et al, 2012). The search tool was able to identify 83 errors out of approximately 1600 people with diabetes; this equates to about 5% having errors, with 2.2% being misdiagnosed, 2.1% being misclassified and 0.9% being miscoded. The search tool can be downloaded free of charge from http://www.clininf.eu/cod.

Conclusion

The NHS Diabetes (2011) report provided a comprehensive assessment of the impact of incorrect coding of diabetes in primary care. It explored the impact this has on the psychological well-being of people with diabetes, as well as giving a practical assessment of appropriate medical management in primary care. The algorithm developed to support the accurate classification and diagnosis (*Figure 1*) will enable practitioners to follow clinical-based advice when coding diabetes in the future.

As a result of the 2006 QOF changes, the proportion of people included in the diabetes register has been altered; the search tool can help identify the groups missed out and validate cases. For example, when a requirement to differentiate type 1 diabetes from type 2 diabetes was introduced, the classification of diabetes fell by 22%; this was probably because many people with diabetes did not have a specific type 1 or type 2 code (Hippisley-Cox and O'Hanlon, 2006). The search tool may be useful for healthcare professionals looking to meet the new QOF requirement for diabetes added for 2012–13 (The Information Centre, 2012), which invites confirmation of the diagnosis of the type of diabetes for people aged over 17 years.

The use of computerised search tools has demonstrated itself as a powerful

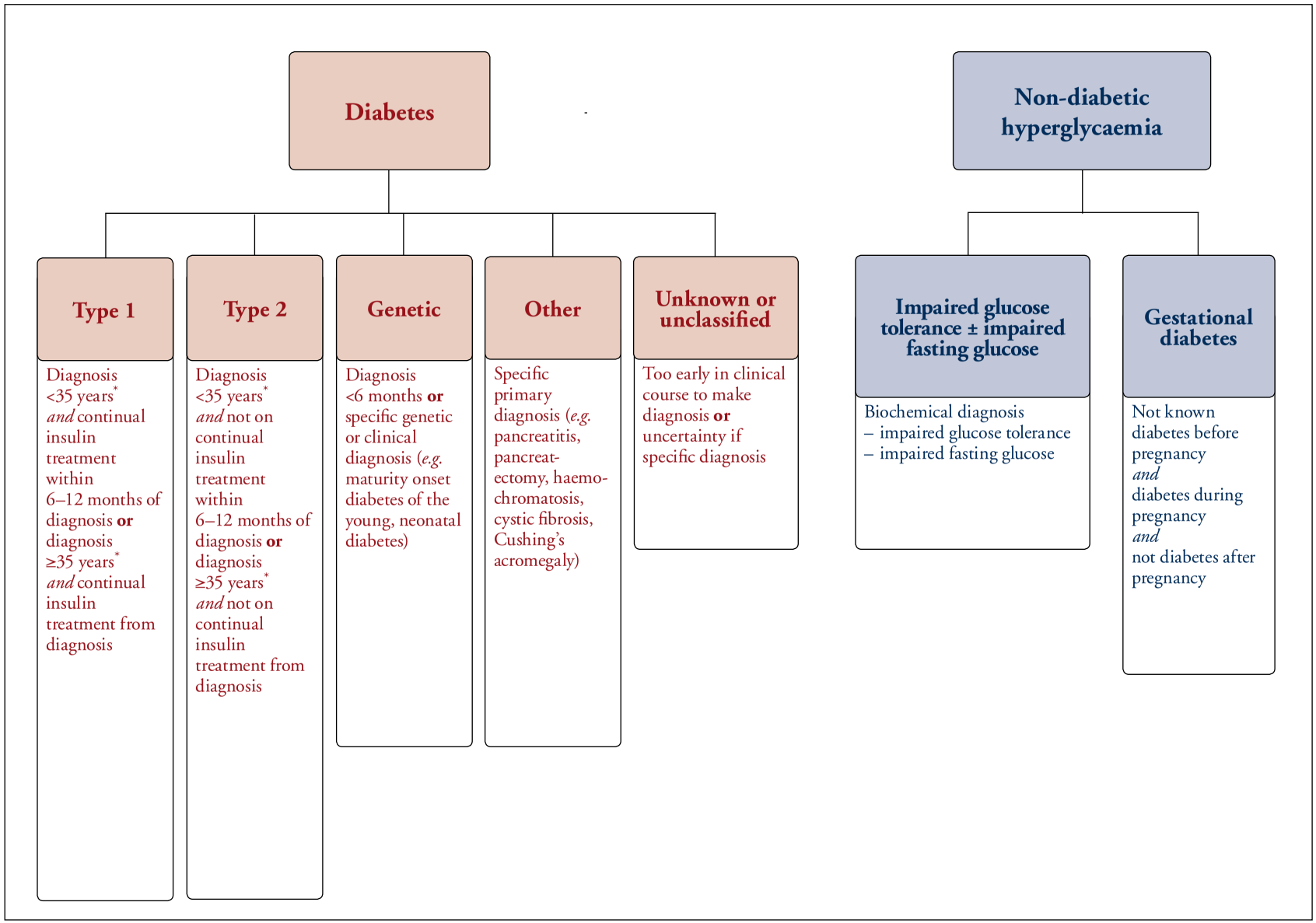

*Figure 1. Practical classification guideline for the diagnosis of diabetes. *=In high-risk racial groups, a cut-off of 30 years should be used.*

ally in identifying errors, and in the future may be used to revise back-dated data entry. The publication of this report and the awareness produced regarding coding errors will be of great benefit to clinicians and individuals with diabetes when tackling this increasingly complex condition. ■

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