Case finding of Non Insulin Dependent Diabetes Mellitus in a group practice and development of procedure for maintenance of a disease register.

Dr Hanan Marafi, DNE VTS. Bedford Medical Centre, Navan

Introduction

There are 190,000 people in Ireland with Diabetes, T2DM or Non Insulin Dependent Diabetes Mellitus (NIDDM) accounts for 90% of the cases. NIDDM incidence is rising, it is estimated that by 2020 there will an increase of 62% in the number of cases. (*Guide to Integrated Care for Type 2 Diabetes*, ICGP ,2016)

With the advent of the Diabetes Mellitus Cycle of Care programme (DMCoC) it has become increasingly important for practices to maintain an accurate diabetes register. This is to enable registration, call and recall of patients.

In a group practice, there are inevitably lapses in the quality of recording of new diagnoses of chronic disease. It is difficult to ensure that a large number of clinicians will reliably and consistently enter the new diagnosis, in this case of NIDDM, correctly in the Basic Medical Information page of the *Health.one* record.

This project set out to create an automated case-finding process and to test whether it could be relied upon to accurately update the disease register of patients with NIDDM or whether a manual checking system is required to ensure the accurate process of Diabetic disease register .

Diabetes diagnosis involves the presence of symptoms such as polyuria, polydipsia and unexplained weight loss) in addition to one of the following laboratory criteria:

1. a random venous plasma glucose concentration >= 11.1 mmol/l
2. OR a fasting plasma glucose concentration >= 7.0 mmol/l (whole blood >= 6.1 mmol/l)
3. OR 2 hour plasma glucose concentration >= 11.1 mmol/l 2 hours after 75g anhydrous glucose in an oral glucose tolerance test (OGTT)
   (GPnotebook)

A single elevate glucose test shouldn't be used in the diagnosis of Diabetes in the absence of symptoms. A repeat glucose test on a different day is required. The oral glucose tolerance test (OGTT) can be used if random or fasting glucose are not diagnostic.

Aims

To document the number of unregistered cases of NIDDM in a group practice setting
To develop an automated analysis function within the electronic medical record (eMR)
To determine the accuracy of this process for identifying cases.
To design a procedure for the identification of new cases and maintenance of the disease register based on our findings.

Method

Setting:
A large urban group practice with 19,076 active patients , of whom 8280 are GMS eligible and 10796 are private patients.

Total number of patients with NIDDM is 610 (3.2%) , of whom 435 are GMS eligible and 175 are private patients.

Extant register of NIDDM was established in Oct 2015 for the initiation of the DM CoC. This comprised 369 patients, who had GMS eligibility and a diagnosis of NIDDM.

Procedure for case finding and coding NIDDM:
We designed a concatenated analysis to identify possible cases of NIDDM diagnosed but not coded.

The analyses were restricted to cases without a prior diagnosis of NIDDM or Polycystic Ovary Syndrome. We did not use a date limit in our analysis script as this precludes using item exclusion criteria to exclude historical data such as past medical history recorded in the BMI outside of the date range specified.

We created a series of nested analyses using the Database analysis (Query plus) function to identify the following cohorts:
a) patients treatment with Metformin and Gliclazide by ATC code
b) patients w R glucose > 11
c) patients with HbA1c > 48

The resulting master analysis was designed using the 'advanced' options to update a new disease flag called "diabetes status' such that we could easily identify the resulting cohort and manually assess the accuracy of the diagnostic label.

A chart review was conducted using the data extraction tool to tabulate relevant items from the eMR for each patient in this cohort. This allowed the author to determine how many of the patients reported by the analysis met the diagnostic criteria for NIDDM. These cases had the ICPC2 diagnostic code T-90 applied to the medical record. Additional review of the chart was required for some patients to establish the indication for drug prescription or the record of NIDDM diagnosis in correspondence.

Finally a schedule was designed using the scheduler function to automate the case finding and disease flagging of patients for 'diabetes status', equating to possible cases of uncoded NIDDM

A prompt was created using the alert function in the Health.one configuration tool to encourage opportunistic review of these cases.

The disease flag ' diabetes status' provides a continually refreshed pool of potentially uncoded patients for whom manual review *en bloc* could be delegated or as a substrate for the opportunistic patient alert.

Results

Review of the current state of the medical records revealed that there were 435 registered GMS eligible patients with coded NIDDM among 610 total patients with coded NIDDM. This represents a 3.2% prevalence in our patient population.

The case finding database analysis among patients without coded NIDDM identified:
Four patients with glucose > 11 mmol/L at least once.
188 patients with either Hgba1c or HgbA1c[IFCC] > 48 mmol/mol.
385 patients who were currently using gliclazide or metformin.

There were 127 patients with a recorded diagnosis of PCOS.

Combining the searches for patients with Glucose > 11 AND/OR HgbA1c > 48 AND/OR drug prescription for Metformin or Gliclazide , while excluding patients with recorded NIDDM AND/OR PCOS, yielded 113 patients (GMS and others) who may have had unrecorded (uncoded) NIDDM.

Of these 77 (68%) were found on review of the data extraction table to meet the criteria for diagnosis of NIDDM.

Discussion

A master case finding analysis in our practice, which has previously established a register for NIDDM yielded 113 possibly uncoded patients. For 68% of this number the diagnosis was confirmed.

The 36 (32%) whose diagnosis was not confirmed or could not be established from the eMR precludes using an automated scheduled analysis to create a disease flag for diabetes or to insert a coded item in the basic medical information.

Therefore the procedure for case finding and coding missing cases must involve manual review, either in batches or opportunistically . The former is greatly facilitated by the *Health.one* data extraction tool, which can be configured to display in tabular form all required *Health.one* items pertinent to the exclusion or inclusion of a case as NIDDM. The later method is aided by the attribution of an alert to fire in individual patient records who are given the interim disease flage of 'diabetes status', which it is safe to delegate to the scheduler function.

The 77 patients newly coded as a result of our case finding project represent an additional 13% (77/610) of cases of NIDDM. Half of these patients (39/77) were GMS eligible and therefore entitled to the DMCoC programme for which funding of up to € 5070 would be available in the year of their registration and €3900 in each subsequent year.

Some points of technical learning arose in the course of this project:

1)Application of date limits to database analyses when attempting to exclude known cases of NIDDM.

Where it is desired to limit a database analysis to a date interval, the analysis logic prevents the inclusion or exclusion of an extant disease code or label using the analysis criteria. This is because the disease code will often have been created in the eMR before the start of the time interval and yet the item exclusion or inclusion criteria will be subject to this date limit. Thankfully, the scheduler function by its very nature operates on a timed basis and overcomes this difficulty.

2) Content of laboratory items.

Previously, Healthlink laboratory data were mapped to items specifically either fasting or non-fasting/random. More recently the characterisation of the sample is provided in a separate item in the Healthlink report, usually 'comments'. When the database analysis searched for a glucose value and for a comment content to indicate, for example, a fasting specimen, the report will yield all patients with a value for glucose and for the item 'comments' whether or not the two are related.

As a result and due to the absence of an item specifying whether or not the glucose was random or fasting, and given that we cannot combine these criteria, we could only case find patients with a glucose > 11 mmol/L as all of these patients were more likely to be diabetic. We were unable to include patients with glucose > 7mmol/L for this reason.

On the other hand, the inclusion of a column to display content of the item 'comments' beside the value of the item 'glucose' in the data extraction table, at least allowed for efficient review of patients without recourse to individual chart and transaction searches.

Nevertheless, the inability to delegate searches for fasting or random values in an automated , scheduled search is a limitation of the analytical capacity of *Health.one* which could be overcome if Healthlink lab items were specifically and uniquely 'random' or 'fasting' as they were in the past.

Conclusion

Health.one provides a suite of powerful tools to assist GPs maintain disease registers. Our study suggests that, at least in a practice such as ours, it is unsafe to fully automate the attribution of disease codes or disease flags through case finding searches.

The procedure that we have adopted is to automate a scheduled search and attribution of an interim disease flag indicating a 2/3rds likelihood that a patient has NIDDM and to use the data extraction tool as well as individual patient alerts to continually work on maintenance of the vitally important disease register.