A Computer Based, Automated Analysis of Process and Outcomes of Diabetic Care in 23 GP Practices

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Abstract
The predicted prevalence of diabetes in Ireland by 2015 is 190,000. Structured diabetes care in general practice has outcomes equivalent to secondary care and good diabetes care has been shown to be associated with the use of Electronic Healthcare Records (EHRs). This automated analysis of EHRs in 23 practices took 10 minutes per practice compared with 15 hours per practice for manual searches. Data was extracted for 1901 Type II diabetics. There was valid data for 1809 (96%) of the 9 key indicators in the previous year. 543 (34%) had a Hba1c >7.5%, 142(9%) had a Total Cholesterol >6mmol/l, 83(6%) had an LDL cholesterol >4mmol/l, 367(22%) had Triglycerides >2.2mmol/l and 162(10%) had Blood Pressure >160/100mmHg. Data quality and key indicators of care compare well with manual audits in Ireland and the UK. Electronic Healthcare Records and automated audits should be a feature of all chronic disease management programs.

Introduction
In the UK most type 2 diabetes is successfully managed in primary care and there is good evidence that structured care for diabetics in general practice has as good outcomes as secondary care. The Institute of Public Health estimates the prevalence of diabetes in Ireland by 2015 at 190,000. Integrated care across primary and secondary healthcare sectors for all diabetics is the goal of the Irish Diabetes expert advisory group. The increasing diabetes prevalence, lack of resources in secondary care and proven successful management in general practice mean that the majority of care will continue to occur in general practice for the foreseeable future.

The American Diabetes Association in January 2010 commented that there are several factors associated with practices which provide quality diabetes care including an electronic healthcare record (EHR) (Audit '09) and compares these to results of other primary care audits. Hba1c control is similar to DIG and a little better than the older Midlands and UK data (Table 2). For total and LDL cholesterol the DIG audit is better while for Triglycerides the HIUG group is marginally better (Table 3). Blood pressure control is very similar to the DIG data. For surrogate outcomes each indicator was broken down into low, medium and high risk groups in accordance with the ICGP national guidelines 2003 and compared with other primary care diabetes audits, two conducted in Ireland and a nationwide audit conducted in the UK. The Diabetes Interest Group (DIG) in Cork commenced in 2001 and has a full time Diabetes Nurse Facilitator since 2007. The Midlands Structured Diabetes Care Scheme commenced in 1998 and has 2 Diabetes Nurse Specialists and funding for 4 diabetic visits with the practice nurse each year. The England and Wales audit is a nationwide audit of practice performance where practices are reimbursed for reaching certain targets both in process and outcomes (QOF - Quality Outcome Framework) for chronic disease care.

Methods
Interested practices were sent an analysis which they imported to their software. This extracted the most recent result and date of recording for each of the key indicators of diabetes and cardiovascular care for all type 2 diabetics. The indicators extracted were Hba1c, Total cholesterol, LDL cholesterol, Triglycerides, creatinine, Body Mass Index (BMI), systolic and diastolic blood pressure and current smoking status. The indicators chosen to reflect process and surrogate outcomes of care were those which we felt were most clinically relevant to the diabetes consultation and which in the experience of the user group were historically most likely to be recorded in a consistent manner across multiple practices. Running this extract and emailing the resultant anonymised excel file to the research co-ordinator took only 10 minutes for each practice. A similar manual process for the Diabetes Interest Group in Cork takes more than 10 minutes per patient (equalling to 15 hours for the average practice in this study).

This data was then both manually and electronically scrutinised to remove results which were outlying and/or recorded in the incorrect format. Further work is being undertaken to design systems to prevent their occurrence in future audits. Data was then analysed using SPSS statistical software. For process of care the percentage of patients with a valid reading for each indicator in the past 12 months was assessed. For surrogate outcomes each indicator was broken down into low, medium and high risk groups in accordance with the ICGP national guidelines 2003 and compared with other primary care diabetes audits, two conducted in Ireland and a nationwide audit conducted in the UK. The Diabetes Interest Group (DIG) in Cork commenced in 2001 and has a full time Diabetes Nurse Facilitator since 2007. The Midlands Structured Diabetes Care Scheme commenced in 1998 and has 2 Diabetes Nurse Specialists and funding for 4 diabetic visits with the practice nurse each year. The England and Wales audit is a nationwide audit of practice performance where practices are reimbursed for reaching certain targets both in process and outcomes (QOF - Quality Outcome Framework) for chronic disease care.

Results
The quality of the data extracted was very high. Less than 2% required removal of data which were outlying and/or recorded in the incorrect format. The majority of these issues will be resolved by implementing the new diabetes clinical review protocol which we have now integrated to the EHR.

Process of care
The percentage of valid values recorded (Table 1) compares well with other audits and shows that the HIUG practices check and record these variables in a very consistent manner and that the analyses which we have designed are capable of extracting this data.

Key Indicators of care
The following tables show the average level of control achieved for the main diabetic care indicators in this audit (Table 1) and compares these to results of other primary care audits. Hba1c control is similar to DIG and a little better than the older Midlands and UK data (Table 2). For total and LDL cholesterol the DIG audit is better while for Triglycerides the HIUG group is marginally better (Table 3). Blood pressure control is very similar to the DIG data (Table 4). In terms of key indicators for diabetes the audit data compare well with the recent DIG audit and are significantly better than the older Midlands and UK data. This is remarkable given that this groups common interest is in using information technology to improve practice management and patient care rather than a specific interest in diabetes. This group as a whole receive no specific incentives or support to improve diabetic care.
Inter-practice Variation

Inter-practice variation is much more marked for both process and key indicators of care than the variation seen between the four audits compared above. To some degree this is predictable as the populations are smaller at practice level. However statistical probability is unlikely to be the only factor explaining the marked variations. For process of care we found variation in valid HbA1c data recorded from 44% to 96% and valid smoking data recorded from 9% to 96%. In relation to the key indicators of care, well controlled HbA1c (<6.5%) varied from 5% to 55%; well controlled Total Cholesterol (<5mmol/l) varied from 57% to 85%; well controlled LDL Cholesterol (<3mmol/l) varied from 47% to 88%; well controlled systolic BP (<130mmHg) varied from 7% to 52% and well controlled diastolic BP(<80mmHg) varied from 15% to 66%.

Discussion

Chronic disease care and the shift to primary care will be the major developments in healthcare in Ireland within the next decade. Supporting the co-ordinated development of these services and their ongoing assessment will require a new vision of the role of information technology. This study confirms that automated audit of diabetes care is possible for this self-selected group of practices with minimal workload for the practices when compared with similar manual audits. Likewise it confirms that the data quality is comparable to manual data searches in other Irish and UK diabetes audits in primary care. The data quality was obtained despite the lack of a pre-defined dataset or data entry method.

The 23 practices were a self selected group with an interest in utilising Information Technology for patient care and may thus not be representative of all practices. However the majority of general practitioners are highly computerised as evidenced by the NDRP survey 2009 and the General practice in Ireland Survey 2010 which found that >90% of GPs were computerised and of these >80% used computers for all their clinical records including consultation records. The potential of EHRs in general practice is immense but to be best utilised it requires agreed structures for chronic disease care, improved IT in other clinical care areas and improved structured communications. Diabetes care standards in the 23 HIUG practices studied compare well with standards achieved by other primary care groups both in Ireland and the UK. We have identified those areas where data is deficient as well as the areas where the clinical targets recommended in the national guidelines are not being achieved. To date we have addressed these deficiencies by providing all practices with individualised practice feedback reports and by providing a new disease management module for diabetes which is integrated to the patients EHR. Inter-practice variation was marked in this audit and we have commenced another project which will review the practice factors likely to affect process and key indicators of care (questionnaires already returned by all 23 practices). We will be looking closely at the practice factors revealed in the practice questionnaires to see if there are any consistent reasons for such marked variation as well as asking the practices to feedback to us their beliefs as to why their own practice varies from the average in different areas.

We have recently developed a disease management module for diabetes which is integrated to the patients EHR. This automatically creates an electronic diabetic flow sheet within the patient file. This interface facilitates data input as well as data review and creates a structured diabetic consult with built in reminders for overdue items. It also includes structured data on feet, eyes, renal function and other diabetic complications (based on the proposed national minimum diabetes dataset) which will enable audit of diabetic care outcomes. We will be undertaking another audit to determine if the new chronic disease interface will improve the data quality and diabetic care further. The burden of chronic disease care in an ageing society cannot be carried by the current system of healthcare. New systems of healthcare which recognise the roles of both primary care and information technology are essential if we are to provide the care which our patients deserve.

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References


