Increased length of inpatient stay and poor clinical coding: audit of patients with diabetes

Harriet Daultrey[1] • Catherine Gooday[2] • Ketan Dhatariya[2]

[1]Norwich Medical School, University of East Anglia, Norwich, Norfolk, UK
[2]Diabetic Foot Clinic, Elsie Bertram Diabetes Centre, Norfolk and Norwich University Hospitals NHS Foundation Trust, Norwich NR4 7UY, UK
Correspondence to: Ketan Dhatariya. Email: ketan.dhatariya@nnuh.nhs.uk

Abstract

Objectives   People with diabetes stay in hospital for longer than those without diabetes for similar conditions. Clinical coding is poor across all specialties. Inpatients with diabetes often have unrecognized foot problems. We wanted to look at the relationships between these factors.

Design   A single day audit, looking at the prevalence of diabetes in all adult inpatients. Also looking at their feet to find out how many were high-risk or had existing problems.

Setting   A 998-bed university teaching hospital.

Participants   All adult inpatients.

Main outcome measures   (a) To see if patients with diabetes and foot problems were in hospital for longer than the national average length of stay compared with national data; (b) to see if there were people in hospital with acute foot problems who were not known to the specialist diabetic foot team; and (c) to assess the accuracy of clinical coding.

Results   We identified 110 people with diabetes. However, discharge coding data for inpatients on that day showed 119 people with diabetes. Length of stay (LOS) was substantially higher for those with diabetes compared to those without ($\pm$ SD) at 22.39 (22.26) days, vs. 11.68 (6.46) ($P < 0.001$). Finally, clinical coding was poor with some people who had been identified as having diabetes on the audit, who were not coded as such on discharge.

Conclusion   Clinical coding – which is dependent on discharge summaries – poorly reflects diagnoses. Additionally, length of stay is significantly longer than previous estimates. The discrepancy between coding and diagnosis needs addressing by increasing the levels of awareness and education of coders and physicians. We suggest that our data be used by healthcare planners when deciding on future tariffs.

Introduction

In 2010 the global prevalence of diabetes was estimated to be 6.6% with this figure estimated to increase to 7.8% by 2030.[1] The latest data available for the UK Quality and Outcomes Framework show that in 2010, the prevalence of diabetes in England and Wales was 5.4%.[2] With respect to the catchment population of our hospital in Norfolk in the same year, the prevalence of diabetes was estimated at 7.7%.[3] The recent National Diabetes Inpatient Audit found that as many as one in six hospital inpatients had a diagnosis of diabetes.[4] In 2004, the prevalence of inpatients with diabetes in our hospital was estimated at 9.7%.[5] Anecdotally, the introduction of consultant led inpatient general and podiatry ward rounds at our hospital suggested to us that these numbers may have increased.

People with diabetes are twice as likely to be admitted to hospital compared with people without diabetes.[5,6] Patients with diabetes have reported they are dissatisfied with their inpatient care, with one in six patients describing their hospital experience as being negative.[7] The UK National Service Framework has stressed the importance of improving care for patients with diabetes in an attempt to provide patients with a more positive hospital experience.[8]

Length of stay has proved to be a useful tool in assessing inpatient care – it has been shown that patients with diabetes remain in hospital for longer than patients without diabetes.[9] The reasons for this have been described as multifactorial. Reasons for this include the increased incidence of unstable blood glucose levels, multiple co-morbidities including microvascular and macrovascular complications, complex polypharmacy, including misuse of insulin, inappropriate use of intravenous insulin infusion, management errors when converting from the intravenous insulin infusion to usual medication, and higher complication rates postoperatively.[10] These issues can be summarized by saying that diabetes is a complex disease and there is lack of experience of inpatient management for patients with diabetes.[11] NHS Diabetes reports that this increased length in stay is estimated to result in 80,000 excess bed-days per year across England.[12]

Foot disease is a recognized sequela of the vascular and neuropathic complications of diabetes.

In the UK up to 100 people per week have a limb amputated as a result of diabetes.[13] These patients present an extra challenge for medical staff especially if they are uncertain regarding diabetes management.[11]

The importance of auditing patients with diabetes has been stressed as helping to improve the standards of care of patients with diabetes.[4,14–16] Clinical coding, if accurate, is a useful resource for retrospective clinical data. If clinical coding is of high quality and consistent it allows comparisons to be made across time, as well as between sources.[17] Previous research has used clinical coding as a basis for comparing length of stay of patients with diabetes,[18] however limitations in the reliability of this method of data collection have been described.[9,11,19,20]

The Hospital Episode Statistics (HES) have been used as a source of national data to act as a comparison to hospital data.[9] 'HES is the national statistical data warehouse for England of the care provided by NHS hospitals.'[21] The HES publishes more than 13 million records and covers a range of topics including diagnoses. The data used for HES and hospital clinical coding are taken from hospital discharge summaries.[22] The HES database uses Healthcare Resource Group (HRG) codes which are assigned automatically by a national computer database using the data from clinical coding.[23] An HRG code is a group of conditions consisting of patient events that have been judged to consume a similar level of resource. Every patient at the hospital is allocated an HRG code and the Trust is paid according to these.

The aim of this work was to establish if patients with diabetes and foot problems were in hospital for longer than the national average length of stay, as stated by the HES database. Another aim was to identify the accuracy of clinical coding within the Norfolk and Norwich University Hospital (NNUH), establishing its reliability for future research. This was the first such piece of work at the NNUH looking at patients with diabetes and foot problems.

Methods

The data were collected by the four podiatrists who work in the foot clinic at NNUH on 9 March 2009 at the NNUH. The nursing staff on

all adult wards, excluding the maternity wards, were asked to provide a list of the patients on their ward who had a diagnosis of type 1 or type 2 diabetes. All the lead nurses of the wards had been previously contacted via email and informed about this point prevalence study. Patients' reason for admission was assessed, their feet were examined, and their hospital number was noted. All inpatients, regardless of whether they have diabetes or not, have their pressure areas examined daily as part of good general and nursing care, with the feet, sacrum, back, and other pressure areas of patients being evaluated using the Waterlow score.[24] These examinations are usually done by the nursing staff, but on this day, the feet were examined by the podiatrists. All data were kept anonymous. Ethical approval was not required because this work was undertaken as part of service evaluation and improvement within the diabetes department.

One year later the clinical coding department at NNUH was contacted to provide a list of patient numbers and their length of stays, for the inpatients who had a diagnosis of diabetes on their discharge summaries who had been hospital in patients on 9 March 2009.

Clinical coding provided ICD10 codes and HRG codes which were matched to the HES database. The length of stay could then be compared to national mean length of stay, based on the HRG clinical coding. Coding errors were noted when the hospital numbers provided by clinical coding did not match the hospital numbers of the patients identified by the podiatrists.

Statistical analysis was done using paired t-tests comparing HRG code lengths of stay with actual length of stay. Statistical significance was taken at a $P < 0.05$.

Results

Length of stay

In total there were 810 adult inpatients on the day the audit was conducted. One hundred and 10 patients with diabetes were identified by the podiatrists. This was different to the data provided by the clinical coding department one year later, who identified 119 patients as having diabetes who were inpatients on that day. Only one of these patients had been diagnosed as having

diabetes during that admission, the others had a pre-existing diagnosis of diabetes.

Of these 119, 83 (69%) were in hospital for longer than the HES database stated. Actual mean LOS (days $\pm$ SD) was 22.39 (22.26) vs. 11.68 (6.46) ($P < 0.001$). Mean LOS for those people with foot problems ($n = 40$) was significantly different, 20.3 (18.3) vs. 9.79 (5.45) ($P < 0.001$).

Forty inpatients had current foot problems or were deemed to be at high risk. The high-risk foot is one that either had the current presence of, or a history of, neuropathy, peripheral arterial disease, foot deformity, infections, ulcers or gangrene.[25] However, all of the patients with active foot ulceration were known to the specialist foot clinic, having previously attended the clinic. On the day of the audit, there were no patients in hospital specifically because of their foot disease.

Coding

The clinical coding department identified 119 patients with a diagnosis of diabetes who were inpatients on 9 March 2009. However, analysis showed that there were 30 patients identified by the podiatrists which the clinical coding did not identify. There were 47 patients identified by clinical coding which the nursing staff did not identify.

Analysing the data to establish length of stays of the inpatients with diabetes proved challenging. Hospital coding initially provided was in the ICD10 form, the coding department was then contacted again to translate the hospital codes into HRG codes, the coding used by HES database. There may have been a chance of error here, where the translation of codes was not accurate, therefore meaning a false comparison.

Discussion

Length of stay

Our data demonstrate that patients with diabetes at the NNUH have a longer length of stay than the national average, 22.39 (22.26) vs. 11.68 (6.46) days; this highlights an area for improvement at our hospital. Previous work has suggested this increased length of stay occurs as a result of the complications of managing the patients by non-specialists and the potential delays in awaiting expert help.[11] Previous work has also looked into

methods of reducing the length of stay of patients with diabetes, with the introduction of diabetes inpatient specialist nurses making a big impact.[5,11] However, despite this growing body of evidence, a recent national survey involving 262 hospitals identified 'substantial gaps' in inpatient care of patients with diabetes in the UK.[26] Those authors also suggested that a series of guidelines about different aspects of inpatient diabetes care could be of clinical value.

One of the ways in which the importance of identifying diabetes is the use of resources such as those used by the NHS Institute of Innovation and Improvement 'ThinkGlucose' campaign.[27] This uses labels, posters, magnets, and so forth in clinical areas.

There were some individual patients who were in hospital for a significant amount of time longer than the HES database suggested. One patient (coded as 'complex elderly with a nervous system primary diagnosis') was in for 55 days longer than national average. This increase may have been unavoidable and skewed the mean length of stay data, where the complications were independent of diabetes care and therefore not a true reflection on diabetes management.

We appreciate that there were 30 patients the nursing staff identified which the coding department did not, we do not, therefore, know their length of stay. This limits the value of our data. However, given that the data collected by the podiatrist identified 30 people not identified by clinical coding is also a concern.

Further limitations included that the focus of this study was to look at the prevalence of foot disease in our cohort. Other diabetes-related factors, such as the presence of macrovascular disease (stroke and myocardial infarction) or other microvascular disease (nephropathy and retinopathy) were not recorded. However, even ignoring these factors, LOS was substantially prolonged in those with foot disease. It may have been the case that those with foot disease also had other co-morbidities that lead to their increased LOS, however, given the numbers we feel this is unlikely to be the case in most patients. In addition, the diagnosis of diabetes among the nursing staff may have been overlooked, especially if they were diet-controlled. This could have been overcome by looking at the admission notes of all 810 inpatients. However, our institution has only paper records, and as such we were unable to go through each set of notes individually.

Finally, another source of potential error was from the coders themselves. Clinical coding is done by specialist personnel who are trained to extract specific data from hospital notes. They extract a list of diagnoses from several sources – but mainly from the discharge summary, the written entries in the hospital records and the filed correspondence. They then convert these diagnoses into the correct codes that are used to bill the primary care trust for work done. The extraction of data or the conversion of the diagnoses into the correct code is a possible source of error.

Foot problems

Our data showed that more than one-third of the inpatients identified by the podiatrists with diabetes had high-risk foot problems, 40 out of the 110 patients. These additional co-morbidities had significant resource implications.[16,20]

Rayman's audit, consisting of greater than 14,000 patients identified that 'Less than a third of the patients recalled a foot examination, yet one in 30 acquired a foot lesion while in hospital'[4], highlights an area where care can be improved for patients with foot problems.[27] The 2008/2009 Payment by Results tariff for a lower limb amputation was £11,031 (€12,481).[28] As mentioned, in the UK it is estimated that 100 people every week have a limb amputated,[12] this equates to £1,103,100 (€1,248,100) cost to the NHS per week for leg amputations alone. The estimated cost for healing a foot ulcer is £5200 (€5882)[29]. Cost is not the only aspect to consider with patients and foot problems, a more holistic approach is necessary to identify patients who may also experience a reduction in social, emotional and physical functioning.[16]

Coding

Our data agreed with previous work that also identified errors in clinical coding.[15,19] The coding department identified 119 inpatients with a diagnosis of diabetes on the date the data were collected, while the lead nurses on each ward informed the podiatrists of only 110 patients.

Reliable clinical coding depends on accurate discharge summaries of patients. At our institution, this important task is often delegated to the most junior members of the medical team, and this may be the cause for this discrepancy. Thirty patients with diabetes were identified by the podiatrists, but not by the coding department. In addition, clinical coding identified 46 patients who had diabetes which the nursing staff did not. On further investigation 45 of the 46 patients had previously been diagnosed with diabetes.

This work highlights the fact that junior medical staff need to be made aware of the importance of writing accurate discharge summaries. There are multiple reasons as to why errors in coding may occur.[15] In our institution, a discharge summary should be written no more than 72 hours after a patient has been discharged, transferred to another hospital or died. The discharge summary is then sent to clinical coding. A primary diagnosis is allocated – this is unlikely to be diabetes, then secondary co-existing conditions such as diabetes are coded. High-cost drugs, procedures and interventions are also coded. If the discharge summary is not completed, the coders will locate the patient's notes and form a diagnostic code based on what they find written in the notes, another potential situation where errors may likely. Discharge summaries that use abbreviations, lack specific detail or do not form a clear diagnosis, are ones which are more likely to produce a miscoding.

The clinical coding team at our institution code on average 15,500 discharges each month, all of which must be completed by the fifth working day of the following month. This puts pressure on the coding staff and making the occurrence of coding errors more likely.

An error in clinical coding has cost implications for the diabetes department, 'Coded clinical data is grouped to meet the reporting structure of Payment by Results to ensure the trusts are paid accurately for activity'.[30] The economic burden of diabetes may increase by 40–50% over the next 30 years.[20] In the market-driven forces within the NHS and commissioning becoming more important, correct coding will be important to maintain appropriate levels of income for the care provided by trusts.

Coding errors have been reported in previous research.[5,11,19,20] Interestingly one study found that 'one-quarter of elderly inpatients with diabetes are not recorded as having diabetes'.[5] Other recent data suggested that people with diabetes occupy 17% of hospital beds, however this could be partially due to a problem with clinical coding.[11]

Prevalence

This point prevalence survey identified that 13.6% of inpatients at the NNUH had diabetes, whether as a primary diagnosis or as a co-morbidity to a separate condition. Relying on the population figures in our data has its limitations; identifying the patients relied on the nursing staff on the wards with errors occurring where patients may have been wrongly excluded. This could mean the population of inpatients with diabetes may have been greater than what was actually found. This is shown by the discrepancy between nurse identification and coding.

Conclusion

Our data have highlighted areas for improvement in the care of hospital inpatients with diabetes. Reducing length of stay of patients with diabetes needs to be addressed in attempt to meet the national average as well as concentrating on patients with foot problems in attempt to reduce costs. Since this survey was conducted a regular specialty ward round for people with diabetic foot problems has been introduced. Clinical coding is being addressed, with the importance of correct being emphasized as part of the mandatory training packing at junior medical staff induction. Junior doctors are being made aware of the implications of poor discharge summaries in attempt to improve quality of coding.

References

1 International Diabetes Federation. The global burden of diabetes. See http://www.diabetesatlas.org/content/global-burden

2 Diabetes UK. Diabetes prevalence 2010: Quality and Outcomes Framework. See http://www.diabetes.org.uk/Professionals/Publications-reports-and-resources/Reports-statistics-and-case-studies/Reports/Diabetes-prevalence-2010/

3 Alabady K, Kendrick-Jones S, Ochiba G, Williams J. Diabetes predictive modelling for Norfolk. Association of

Public Health Observatories diabetes model (APHO) June 2010, applied to Norfolk. See http://norfolkinsight.org.uk/resource/view?resourceId=328

4   Rayman G. Inpatient audit. Diabetes Update. See http://www.diabetes.org.uk/upload/Professionals/publications/Comment_Inpatient%20audit_new

5   Sampson MJ, Crowle T, Dhatariya K, *et al.* Trends in bed occupancy for inpatients with diabetes before and after the introduction of a diabetes inpatient specialist nurse service. *Diabetic Med* 2006;**23**:1008–15

6   Clement S, Braithwaite SS, Magee MF, *et al.* Management of diabetes and hyperglycemia in hospitals. *Diabetes Care* 2004;**27**:553–97

7   Sampson MJ, Singh H, Dhatariya KK, *et al.* Psychometric validation and use of a novel diabetes in-patient treatment satisfaction questionnaire. *Diabetic Med* 2009;**26**:729–35

8   Department of Health. *National Service Framework for Diabetes: Standards*. London: Department of Health, 2001

9   Sampson MJ, Dozio N, Ferguson B, Dhatariya K. Total and excess bed occupancy by age, speciality and insulin use for nearly one million diabetes patients discharged from all English Acute Hospitals. *Diabetes Res Clin Pract* 2007;**77**:92–8

10   Frisch A, Chandra P, Smiley D, *et al.* Prevalence and clinical outcome of hyperglycemia in the perioperative period in noncardiac surgery. *Diabetes Care* 2010;**33**:1783–8

11   Flanagan D, Ellis J, Baggot A, Grimsehl K, English P. Diabetes management of elective hospital admissions. *Diabetic Med* 2010;**27**:1289–94

12   NHS Diabetes. Inpatient care. See http://www.diabetes.nhs.uk/our_work_areas/inpatient_care/

13   NHS Diabetes, Diabetes UK. Putting feet first. Commissioning specialist services for the management and prevention of diabetic foot disease in hospitals. See http://www.diabetes.org.uk/Documents/Reports/Putting_Feet_First_010709

14   Hammersley MS. Care of hospital inpatients with diabetes: are we prepared for the epidemic? *Pract Diab Int* 2007;**24**:181–3

15   Royal College of General Practitioners, NHS Diabetes. Coding, classification and diagnosis of diabetes. A review of the coding, classification and diagnosis of diabetes in primary care in England with recommendations for improvement. London: RCGP, 2011. See http://www.diabetes.nhs.uk/publications_and_resources/reports_and_guidance/

16   Chadwick P, Stuart L, Fox M, *et al.* An audit to improve the care of the diabetic foot. *Wounds UK* 2007;**3**:73–7

17   NHS Connecting for Health. Standards and audit. See http://www.connectingforhealth.nhs.uk/systemsandservices/data/clinicalcoding/codingstandards

18   Department of Health. Six years on. Delivering the diabetes National Service Framework . See http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_112511

19   Stone MA, Camosso-Stefinovic J, Wilkinson J, *et al.* Incorrect and incomplete coding and classification of diabetes: a systematic review. *Diabetic Med* 2010;**27**:491–7

20   Kristensen T, Laudicella M, Ejersted C, Street A. Cost variation in diabetes care delivered in English hospitals. *Diabetic Med* 2010;**27**:949–57

21   Hospital Episode Statistics. Welcome to HES online. See http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937

22   Department of Health. Hospital Episode Statistics. See http://www.dh.gov.uk/en/publicationsandstatistics/statistics/hospitalepisodestatistics/index.htm

23   NHS Information Centre. What are Healthcare Resource Groups (HRGs)? See http://www.ic.nhs.uk/services/the-casemix-service/new-to-this-service/what-are-healthcare-resource-groups-hrgs

24   Edwards M. The levels of reliability and validity of the Waterlow Pressure Sore Risk Calculator. *J Wound Care* 1995;**4**:373–8

25   National Institute for Clinical and Healthcare Excellence. Diabetic foot problems. Inpatient management of diabetic foot problems. London: NICE, 2011. See http://www.nice.org.uk/nicemedia/live/13416/53556/53556

26   Sampson MJ, Brennan C, Dhatariya K, Jones C, Walden E. A national survey of in-patient diabetes services in the United Kingdom. *Diabetic Med* 2007;**24**:643–9

27   NHS Institute for Innovation and Improvement. Think glucose. Inpatient care for people with diabetes. See http://www.institute.nhs.uk/quality_and_value/think_glucose/welcome_to_the_website_for_thinkglucose.htm

28   Department of Health. Tariff information: confirmation of Payment by Results (PbR) arrangements for 2008/09. See http://www.dh.gov.uk/en/Managingyourorganisation/Financeandplanning/NHSFinancialReforms/DH_081226

29   Ramsey SD, Newton K, Blough D, *et al.* Incidence, outcomes, and cost of foot ulcers in patients with diabetes. *Diabetes Care* 1999;**22**:382–87

30   NHS Connecting for health. Coding for non-coders. See http://www.connectingforhealth.nhs.uk/systemsandservices/data/clinicalcoding/noncoders