Praise and brickbats: the latest results of National Diabetes Audits for England and Wales

The National Diabetes Audit has now published two more key reports: the latest assessment of inpatient care and a second audit of NHS diabetic foot services.

Steve Chaplin examines the results of both audits and their implications for the current quality of diabetes care.

Inpatient care audit results, 2016
The National Diabetes Inpatient Audit is again a mixture of praise and brickbats. Praise for the hospital teams who, despite no increase in manpower, have yet again managed an increase in patient numbers and improved some aspects of practice; brickbats for persistent shortcomings that leave ‘considerable scope for further improvements’.

Participation, prevalence and staffing
The 2016 audit included 209 sites and data on 15,774 inpatients. About 18% of hospital beds are occupied by someone with diabetes (7% of the population have diabetes) but the average conceals marked variation, from a minimum of 2.4% to a maximum of 41%. Although the proportion of inpatients with diabetes has increased by 0.5% since 2015, there has been no increase in staff numbers. Worse, 28% of participating hospital sites have no diabetes inpatient specialist nurses (DISNs), 73% no specialist dietetic provision and 28% no inpatient podiatry.

Providing care
Adoption of technology is progressing slowly. The use of electronic patient records (fully implemented in 34% of sites), electronic prescribing (28%) and remote blood glucose monitoring (47%) is increasing. The proportion of sites holding diabetes morbidity and mortality meetings fell from 56% in 2015 to 53%. About half of sites say they use NHS Diabetes e-learning on safe insulin use but the report admits that data on such initiatives are unreliable. The proportion of people with diabetes appropriately seen by the diabetes team continues to increase and is now 69%. This figure is higher (73%) in centres that provide seven-day DISN cover, for patients with type 1 diabetes (T1D) (82%) and for those with type 2 diabetes (T2D) who use insulin (72% vs 62% of non-users).

Blood glucose monitoring and insulin infusions
A ‘good diabetes day’ is defined as a day on which the frequency of blood glucose monitoring was appropriate (criteria depended on treatment), with no more than one measurement of >11mmol/L and none of <4mmol/L. The number of such days in the previous week was 2.6 for T1D and 3.4 for T2D, suggesting that fewer than half of hospital stays have appropriate non-emergency monitoring.

The use of insulin infusions is improving, with the proportion of patients having an infusion now down to 8%. Of these, 8% lasted longer than seven days, 6% were considered to have been too long and in 14% the switch to subcutaneous administration was mismanaged. Blood glucose was monitored every 1–2 hours in 54% of patients on infusions but 2.3% were monitored less than three times a day (and some not at all).

Medication errors
Errors in prescribing and management (e.g. adjusting the dose according to blood glucose level) of medicines occurring in the seven days before the audit were still common in 2016 but, overall, there was a small trend for the slow rate of
decline of previous years to continue (Figure 1). This improvement was, however, confined to prescription errors – medication management errors were slightly more frequent than previously.

A medication error was recorded for 38% of patients, evenly divided between a prescription error (21%), a medicines management error (24%) and an error associated with insulin (23%). The most frequent prescription errors were the drug not recorded as administered (about 5% for insulin or oral agents) and the dose not adjusted when appropriate for insulin (12%) or an oral agent (9%). Prescription and management errors were more common among patients with T1D and those with T2D who were using insulin – overall, almost half of insulin users had a medication error. All errors except those associated with insulin were significantly more common on surgical than medical wards (41% vs 37%; p<0.05). Prescription and management errors were less likely when electronic patient records were used, but electronic prescribing reduced only prescription errors.

**Hypoglycaemic episodes**
The trend to fewer hypoglycaemic episodes during a hospital stay continues: 20% of patients experienced an episode within seven days of the audit. Minor episodes were far more common (19%) but major episodes (blood glucose <4.0mmol/L) occurred in 8% of patients. Not surprisingly, insulin users more often had a severe episode (27% of those with T1D, 14% with T2D) but 4% of patients using oral agents were also affected. Injectable treatment was required by 1.7% of patients.

Hypoglycaemia was significantly more likely among patients who self-monitored their blood glucose (15% vs 8% of those who didn’t; p<0.05); there was no difference according to self-administration of insulin or self-adjustment of insulin dose. Thirty percent of severe episodes occurred between 5am and 9am, with smaller peaks in the morning (16%) and after 9pm (18%). This points to a problem with nocturnal hypoglycaemia.

**DKA, HHS and foot care**
The frequency of diabetic ketoacidosis (DKA) during a hospital stay was 4.4%; for hyperosmolar hyperglycaemic state (HHS), it was 0.2%. Both figures were slightly higher than previously but the difference was not statistically significant.

Active foot disease was present in 9% of patients on admission and was the reason for admission in 4%. A specific diabetic foot risk examination for ulceration was carried out within 24 hours of admission in 30% of patients and later in 7%. Hospitals that have management guidance in place are more likely to offer timely examination and an assessment by the specialist foot service, but this does not reduce the incidence of new foot lesions during the hospital stay. It is possible this is confounded by better ulcer identification and reporting at these sites.

**Patient experience**
The audit suggests that the quality of the hospital meals service is deteriorating. Meal choice and timing were rated always/almost always suitable by 54% of patients (vs 65% in 2012) and 63% (vs 73% in 2012), respectively. Despite this, the proportion of patients who say they are satisfied with their hospital experience overall remained, at 84%, close to the level reported since 2011. No areas for improvement were identified by 46% of patients, but 26% said staff knowledge about diabetes should be improved and 17% said the same about the food. Positive views about involvement in treatment planning were reported by 45% of patients and about the ability to take control of their diabetes by 60%. There was wide variation between sites in all these figures.

**National Diabetes Foot Care Audit, 2014–16**
The first National Diabetes Foot Care Audit (N DFA) was published in 2016. It found that outcomes were compromised in services that do not have appropriate processes in place to ensure prompt referral and assessment, although its conclusions were limited by a participation rate of only 60%. The second N DFA has fared little better: only 54% of 216 commissioners in England and Wales participated and shortcomings in service provision and outcomes remained.”

**Conduct of the audit**
The audit assesses three aspects of care. Are the structures recommended by NICE in place? Does treatment follow its guidance? Are outcomes as good as they can be? The standard is NICE’s 2015 guideline Diabetic foot problems: prevention and management, against which data at the level of clinical network, commissioner, NHS trust, local health board and specialist foot care service are measured. This includes all ulcer episodes recorded since the audit began in 2014 – 11 073 patients with 13,034 ulcer episodes – and outcomes up to 24 weeks. N DFA estimates a case ascertainment rate of about 10%.

Half of providers in England were unable to say whether they had a specialist diabetes foot care service. The proportion of commissioners with appropriate structures in place was 62% for training for routine diabetic foot examinations, 83% for a foot protection service pathway, and 74% for a pathway for assessment within 24 hours. But only 43% of responders confirmed that all three structures were in place and 14% had only one.

**Patients and ulcer outcomes**
The patients included in the audit mostly had T2D (87%) and were white (92%), male (70%) and older (mean 67 years); a quarter were from the most deprived fifth of the population. The average duration of diabetes was 15 years and 43% had met the NICE target for glycaemic control (HbA1c ≤58 mmol/mol) before their first ulcer.

Almost half of ulcer episodes were graded severe (SINBAD score ≥3) at the first expert assessment. The prevalence of SINBAD elements was hindfoot location 18%, ischaemia 35%, neuropathy 82%, bacterial infection 43%, area ≥1cm2 48%, and depth to tendon/bone 18%. There was no difference between T1D and T2D in the distribution of these elements. Of all new ulcers, 3% were associated with active/possibly active Charcot foot disease and 4% were associated with previous, inactive Charcot foot disease.

Time to assessment is a risk factor for ulcer severity. Ulcer episodes...
that are self-referred are less likely to be severe and those with an interval of ≥ two months to expert assessment are more likely to be severe (Figure 2). About half of patients still have an ulcer at 12 weeks and one-quarter at 24 weeks; every SINBAD element and Charcot foot disease were associated with reduced healing. Ulcer severity correlates strongly with outcomes at 12 and 24 weeks. Overall mortality was 2.5% at 12 weeks and 4.4% at 24 weeks. For cases where the outcome is known, less severe ulcers are associated with almost twice the odds of being alive and ulcer-free at 12 weeks (60% vs 35% with severe ulcer), though the gap narrows by 24 weeks (74% vs 56%). Healing rates are similar for ulcers expertly assessed within two days and three to 13 days; expert assessment within two weeks of first presentation is associated with significantly greater odds of survival and being ulcer-free (67% vs 64% within two days to two months and vs 54% after two months). The lessons to be learned from these findings are that health professionals should create simple and rapid referral pathways and commissioners should ensure that local services have an easily accessible diabetes specialist foot care team.

There is wide variation between NHS trusts and local health boards in reported 12- and 24-week outcomes but interpretation of this finding is complicated by the low ascertainment rate, differences in data quality, and the lack of adjustment for patient profiles. The NDFA expects this to improve as the volume of data increases but it notes that these methodological problems are unlikely to explain all the variation, implying that the remainder is due to shortcomings in services.

**Outcome predictors**

The factors predicting being alive and ulcer-free at 12 weeks were: being female, having T1D, being of black or Asian ethnicity, diabetes duration <10 years, and self-referral to the specialist foot care service. By 24 weeks, only being female, black or Asian ethnicity and diabetes duration less than five years remained predictors, and residence in a less deprived area of the country now improved the outlook.

Worse ulcer healing at 12 weeks was predicted by having mixed or ‘other’ ethnicity, currently smoking, Charcot foot disease, any SINBAD elements, a wait of more than two months for expert assessment, and not having received all eight of the NICE recommended care processes. Of these, only smoking and bacterial infection were not still predictors for 24-week outcomes.

**Summary**

The inpatient and foot care audits shine a harsh light on NHS diabetes services at this most difficult of times. Both audits reveal variation in performance – a bane in many aspects of the NHS. Some centres are delivering a high standard of care as measured against national guidance, others are struggling. Better outcomes are being achieved here and there but, perhaps inevitably, the gains are modest and progress is slow. Problems with inpatient care and foot care services persist and it is clear that underperformance is affecting patient outcomes. The NDFA is planning a second report focusing on admissions for foot disease, major and minor amputation and revascularisation. The woefully inadequate involvement of commissioners in this audit must end.

**Steve Chaplin, BPharm, MSc, Medical Correspondent**

**References**