The DICE project: Diabetes inpatient care evaluation

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Article points

1. High quality diabetes care prevents or delays the onset of complications.
2. The Alphabet Strategy is a simple but effective template to structure the elements of diabetes care.
3. The application of this strategy can help improve the quality of care of inpatients.

Key words

- Alphabet Strategy
- Quality assessment and indicators

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The Alphabet Strategy is a simple template used to ensure that the simple but important aspects of diabetes care are carried out regularly (Jaiveer et al, 2002; Lee et al, 2004). The authors evaluated the application of this template to the care of inpatients with diabetes in the Diabetes Inpatient Care Evaluation (DICE) project. The case notes of 100 inpatients with diabetes were assessed retrospectively for documentation of the quality of diabetes care received by the patient, based on a check list derived from the new General Medical Services contract (DoH, 2003). A sticker to prompt staff to apply the Alphabet Strategy was placed in the notes of a further 100 people with type 2 diabetes. The differences in the monitoring of care between these two groups is discussed in this article.

Diabetes is epidemic both nationally and internationally and the economic burden on organisations providing health care is immense (American Diabetes Association, 1998; Bagust et al, 2002). However, evidence demonstrates that the complications of diabetes can be prevented or delayed by effective management. In particular, the Steno-2 study showed that intensive, target-driven, multifactorial intervention resulted in a 50% reduction in microvascular and macrovascular complications (Gaede et al, 1999). The challenge for health care providers is to deliver a comprehensive, patient-centred service that not only encompasses all facets of diabetes care but would also be cost effective and of excellent quality. Because the provision of good quality diabetes care needs to be established at every point where the person with diabetes interacts with the health care system, inpatient stays could provide the opportunity to assess the quality of the services being delivered to the person with diabetes.

The National Service Framework for coronary heart disease states that: 'Excellence requires that important, simple things are done right all the time' (DoH, 2000). However, studies have disclosed major deficiencies in the delivery of diabetes care, especially the documentation

standards for essential aspects of care such as recording HbA_{1c} levels, lipid profiles and the degree of proteinuria on an annual basis (The Audit Commission, 2000; Graham et al, 2002). Robust systems are therefore needed to ensure that management is systematic, consistent and timely.

Inpatient diabetes care frequently aims to merely maintain reasonable glycaemic control and to avoid acute metabolic complications. However, using a hospital stay as an opportunity to undertake a full diabetes assessment can yield health benefits such as optimising the parameters of diabetes care and creating the opportunity for the individual to be seen by the multidisciplinary diabetes care team. Previously undiagnosed complications can be detected and omissions in management rectified. Admission to hospital may increase the person's willingness to discuss his or her diabetes and to renegotiate their management plan.

Previously, improvements in diabetes management have been reported following the implementation of the Alphabet Strategy (Jaiveer et al, 2002; Lee et al, 2004). The Alphabet Strategy is a mnemonic approach to diabetes care comprised of seven elements linked to the first seven letters of the alphabet (Patel and Morrissey, 2002).

- Advice
- Blood pressure lowering
- Cholesterol and creatinine management
- Diabetes control
- Eye examination
- Foot examination
- Guardian drugs.

Whereas previous studies focused on the outpatient clinic, this study evaluates the impact of the Alphabet Strategy on the management of people with diabetes admitted to the wards.

The seven criteria of the Alphabet Strategy are among those that the new General Medical Services (GMS) contract financially rewards primary care teams for achieving (DoH, 2003). Most are process indicators used to report whether various examinations or investigations have been performed in the previous 15 months. Four of these are outcome indicators: two for HbA_{1c} and one each for target levels of blood pressure, and total cholesterol. Ninety-nine points were available for diabetes care at the time this study was performed. Now diabetes has 93 available. The new GMS contract comprised 1000 points that covered several conditions and practice management. However, the new GMS contract is focussed on parameters of comprehensive diabetes care rather than the personal needs of the person with diabetes (and thus may not take into account confounding factors that may affect the care during the period as an inpatient), the authors have previously found this to be a useful tool for auditing the delivery of care in the diabetes outpatient clinic.

The aim of this study was to assess the value of an approach based on the Alphabet Strategy on inpatient diabetes care. However, we concentrated more on the changes in the process indicators than on the outcome variables in the two studied patient groups. For example, we compared the number of times BMI was recorded before and after implementation of the strategy rather than whether any improvements in BMI occurred due to strategy use.

Materials and methods

The case notes of 100 randomly selected people with type 2 diabetes diagnosed over one year ago admitted to the George Eliot NHS Trust between January and March 2004 were analysed retrospectively. Hospital admission could be for any reason and the participants were evenly distributed across the medical and surgical wards.

A check list based on the 18 diabetes quality indicators of the original new GMS contract arranged in Alphabet Strategy format were used as an audit tool. Case notes were reviewed for documentation of the following.

- Advice: BMI; smoking status; giving cessation advice if relevant; and history of flu vaccination.
- Blood pressure: the blood pressure at discharge was taken as the value for comparison.
- Cholesterol and creatinine.
- Diabetes control: HbA_{1c}.
- Eye and foot examination within the last 15 months.
- Guardian drugs: documentation of any treatment with ACE inhibitors, ARBs, statins or aspirin.

Following the retrospective analysis a prospective audit was conducted in October and November

Page points

1. The opportunity to undertake a full diabetes assessment can result in health benefits.
2. The Alphabet Strategy template for diabetes care comprises of: advice, blood pressure lowering, cholesterol and creatinine management, diabetes control, eye examination, foot examination and use of guardian drugs.
3. A check-list based on the General Medical Services (GMS) contract for diabetes quality indicators was used.

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1. Following the retrospective analysis, Alphabet Strategy prompts were inserted into case notes.
2. A prospective audit was conducted on the case notes of a further 100 inpatients using the same audit tool used previously.
3. After the application of the Alphabet Strategy, the new GMS contract score improved.

2004. A simple sticker based on the Alphabet Strategy (*Figure 1*) was placed on the notes of the first 100 people with type 2 diabetes admitted to hospital for any reason. Reminders on ward notice boards prompted staff to complete the template and they were encouraged to seek the help of the diabetes care team if necessary. When the diabetes team became aware that the sticker had been completed, or after the individual had been discharged, the case notes were reviewed using the same 18 GMS criteria used previously.

Results were analysed by Student's *t*-test and statistical significance assessed. The new GMS contract score was also calculated.

Results

After the application of the Alphabet Strategy the recording of BMI improved from 0% to 78% ($P<0.0001$) and record of 'flu vaccination from 75% to 88% ($P<0.01$). Recording of smoking status improved significantly from 94% to 98% ($P<0.0001$) and smoking cessation advice from 35% to 67% of smokers ($P<0.0001$). See *Figure 2A*. Blood pressure was recorded 100% of the time in both groups.

Recording of cholesterol levels rose from 73% to 90% ($P<0.05$) and of proteinuria from 0% to 38% ($P<0.0001$). Creatinine was measured in 100% of cases in both audits, see *Figure 2B*. Measurement and documentation of HbA_{1c} increased from 70% to 94% ($P<0.0001$). Examination of eyes for diabetic retinopathy dropped from 44% to 34% (P=not significant) whereas checking feet for pulses and neuropathy rose from 43% to 76% ($P<0.0001$), see *Figure 2C*. The calculated new GMS contract score improved from 62 to 85.7 out of a maximum possible 99 ($P<0.0001$).

In the initial retrospective audit 85% of patients had a BP below 145/85 mmHg, compared to 76% after the Alphabet Strategy was implemented. In the initial audit, 62% of the patients had an HbA_{1c} below 10% and 37% below 7.4%; after the reaudit the figures were 90% and 64%, respectively.

Discussion

The retrospective audit revealed that, at the time, diabetes care was not recorded adequately, thus

Advice	Wt	Ht	BMI	Exercise	Smoker	Cess advice	Flu jab last yr					
	kg	m	kg/m^2		Y / N	Y / N / NA	Y / N					
Blood pressure	BP average											
Cholesterol and creatinine	TC	LDL	HDL	TGL	Sr creatinine	Urine protien						
Diabetes control	HbA_{1c}	Average glucose level	Hypos									
	%		Y / N									
Eye care	Fundus examination	Grade of DR	Right	Left								
	done already / done now											
Feet	R	PT	DP	PN	Ulcer	L	PT	DP	PN	Ulcer		
Guardian drugs	Aspirin	ACEi	ARB	Statins								

Figure 1. The DICE project sticker. Abbreviations used: ACEi, angiotensin-converting enzyme inhibitors; ARB, angiotensin II receptor blockers; Cess, cessation; DR, diabetic retinopathy; DP, dorsalis pedis; HDL, high-density lipoprotein cholesterol; Ht, height; Hypos, hypoglycaemic episodes; L, left; LDL, low-density lipoprotein cholesterol; PN, peripheral neuropathy; R, right; TC, total cholesterol; TGL, triglycerides; Sr, serum; PT, posterior tibial; Wt, weight; Yr, year.

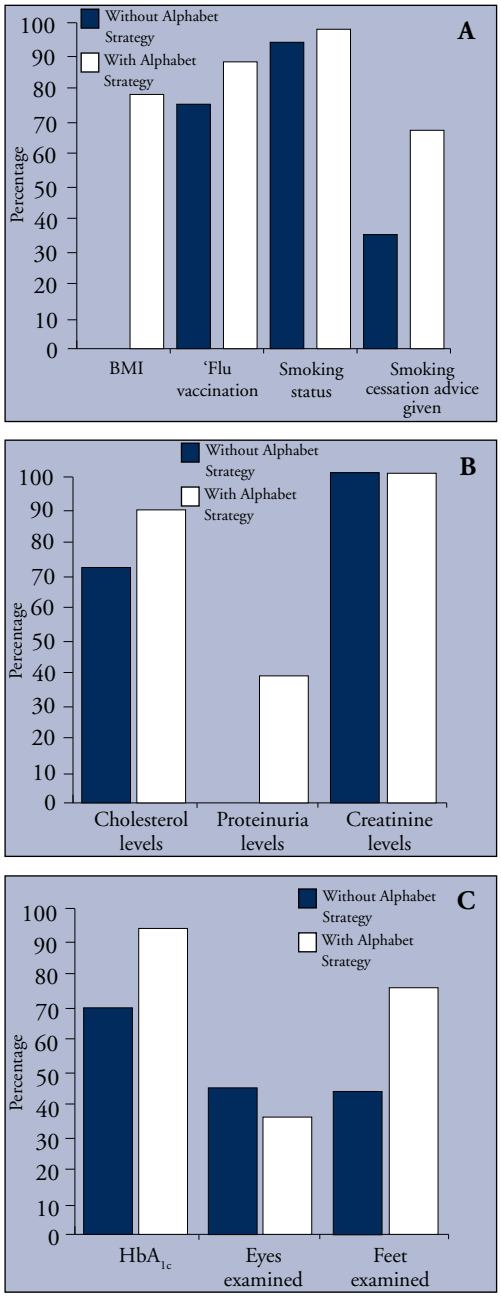
implying that the care itself could be inadequate as there would be information missing from any decision-making process. The simple but important aspects of care were not carried out or monitored regularly enough. Introduction of a simple prompt based on the Alphabet Strategy significantly improved the frequency that quality indicators were measured.

Examination of the individual elements of care revealed shortcomings in certain vital areas. For example, although weight was measured in many individuals, this information was not then used to calculate BMI. It was interesting to note that people with diabetes were often only weighed when this was needed for drug dose calculation.

Smoking is a major risk factor for diabetic retinopathy, coronary heart disease and peripheral vascular disease (Leng et al, 1995; Muhlhauser et al, 1996; Cullen et al, 1998). Inquiry about smoking forms part of the standard history taken from most individuals on admission to hospital, but cessation advice was often either not given or not documented in the case notes. Similarly, measuring blood pressure is routine practice for all nurses. It was surprising to find that the percentage of individuals in the group assessed using the Alphabet Strategy who reached the blood pressure targets set out in the GMS contract fell by 9%, which would seem to indicate a lower level of diabetes care. However, this decrease was not statistically significant and probably reflects random variation between the two study groups.

Recording cholesterol levels improved significantly after the application of the Alphabet Strategy. Some wards, in particular the coronary care unit carried this out for every admission. In the initial audit scores were very poor for microalbuminuria screening as this test was not routinely available from the laboratory. It was then decided that proteinuria measurements, which were available, would replace this indicator. The score then improved significantly for the group assessed by the Alphabet Strategy. Microalbuminuria testing became available at the George Eliot Hospital from October 2005. Although urine dipstick examination was carried out in many of the people with diabetes, it was found that staff often did not document the results until the template prompted them to do so.

For diabetes control, documentation of HbA_{1c} measurement significantly improved from 70% to 94% after introduction of the template. It is possible that HbA_{1c} was previously being checked but not recorded, but this is still, in the author's opinion, a failure of care. The sticker prompted



Figures 2A, B and C. Graphs showing changes in recording frequencies for different care indicators following prompting to use the Alphabet Strategy.

Page points

1. The retrospective audit revealed that the assessment of comprehensiveness of a patient's diabetes care during their inpatient stay in the hospital was inadequate.
2. Some of the people in the study were only weighed when this was needed for drug dose calculation, instead of part of routine care and BMI calculation.
3. Recordings of cholesterol levels, proteinuria and HbA_{1c} were significantly more frequent after implementing the alphabet strategy.

Page points

1. The frequency of eye examinations did not increase but that of feet did.
2. Most of the quality indicators in the new GMS contract are achievable by asking a few more questions and ensuring adequate documentation.
3. The Alphabet Strategy is a simple but effective tool in improving the delivery of diabetes inpatient care.

The Warwick Medical School runs a one-day workshop on the Alphabet Strategy for healthcare professionals involved in diabetes care. For more information, visit: http://www2.warwick.ac.uk/fac/med/study/cpd/subject_index/diabetes/workshops/abc/ (accessed 21.02.2007)

doctors to check if HbA_{1c} had been calculated for the person with diabetes and request it if missing. Interestingly, only 37% of patients in the initial audit had HbA_{1c} below the new GMS contract target of 7.4%: this was significantly higher, 64%, in the prospective group, once the Alphabet Strategy was implemented. Again, this could be explained by variation between the two groups.

In the first audit, foot and eye examinations were carried out and recorded (or results from previous 15 months recorded) in approximately 40% of cases. The frequency of eye examinations did not increase but that of feet did. This demonstrates a need for improvement in inpatient care with regard to screening for diabetes complications. Interestingly, foot examination was carried out more regularly on surgical wards, especially on individuals under the care of vascular surgeons.

Areas in which inpatient care scored well were the recording of smoking status, blood pressure and serum creatinine levels. These high scores are predictable as these measurement form part of any routine inpatient care package. Areas in need of improvement include smoking cessation advice, control of blood pressure, cholesterol measurement and, most importantly, checking HbA_{1c}.

The contribution of inpatient management to the person with diabetes' care is clearly limited and could be further hampered by inadequate recording of information regarding various biomedical markers. However, most of the quality indicators in the new GMS contract are achievable simply by asking a few more questions relevant to risk factors and complications and ensuring adequate documentation of the same. This would therefore be the best low-cost approach with additional tests added to further improve the documentation if necessary. Also, the inpatient stay provides a valuable opportunity for the service provider to ensure that important parameters of diabetes care have been checked appropriately. Routine and thorough assessment of an individual's diabetes care history would be an opportunity to involve the person with diabetes in the service framework and empower them with the knowledge of the ideal care plan.

The use of the Alphabet Strategy would therefore provide healthcare professionals with a structured approach to managing diabetes and also ensure multifaceted and effective service delivery. It can also help the patient to understand the various facets of comprehensive diabetes care.

Conclusion

The Alphabet Strategy is a simple but effective tool in improving the delivery of diabetes inpatient care and ensures that simple things are done regularly to achieve excellence in diabetes care. The new GMS contract serves well as an audit tool for comparing the quality of diabetes care. The Alphabet Strategy not only has the potential to prompt comprehensive service delivery for diabetes, but could also prove a useful tool for diabetes nurses and the multidiscipinary team in effectively managing an individual's diabetes during their inpatient stay. ■

American Diabetes Association (1998) Economic consequences of diabetes mellitus in the U.S. in 1997. *Diabetes Care* **21**: 296–309

Audit Commission, The (2000) *Testing times: A review of diabetes service in England and Wales.* Audit commission, London

Bagust A et al (2002) The projected health care burden of Type 2 diabetes in the UK from 2000 to 2060. *Diabetic Medicine* **19**(suppl 4): 1–5

Cullen P et al (1998) Smoking, lipoproteins and coronary heart disease risk. Data from the Munster Heart Study (PROCAM). *European Heart Journal* **19**: 1632–41

DoH (2000) *Coronary heart disease: national service framework for coronary heart disease - modern standards and service models.* DoH, London

DoH (2003) Investing in General Practice. The New General Medical Services Contract. DoH, London

Gaede P et al (1999) Intensified multifactorial intervention in patients with Type 2 Diabetes mellitus and microalbuminuria: The Steno type 2 randomized study: *Lancet* **353**: 617–22

Graham JP et al (2002) Assessment of standard medical care in patients with type 2 diabetes. *Diabetes* **51**(suppl. 2): A-274

Jaiveer P, Jaiveer S, Lee JD et al (2002) The Alphabet Strategy – a tool to achieve clinical trial standards in routine practice. *British Journal of Diabetes and Vascular Disease* **3**: 410–3

Lee JD et al (2004) Recalculation of cardiovascular risk score as a surrogate marker of change in clinical care of diabetes patients: the Alphabet POEM project (Practice Of Evidence-based Medicine). *Current Medical Research and Opinion* **20**: 765–72

Leng GC et al (1995) The relationship between cigarette smoking and cardiovascular risk factors in peripheral arterial disease compared with ischaemic heart disease. The Edinburgh Artery Study. *European Heart Journal* **16**: 1542–8

Muhlhauser I et al (1996) Cigarette smoking and progression of retinopathy and nephropathy in type 1 diabetes. *Diabetic Medicine* **13**: 536–43

Patel V, Morrissey J (2002) The Alphabet Strategy: The ABC of reducing Diabetes Complications. *British Journal of Diabetes Vascular Disease* **2**: 58–9