

Trends in the prescription and cost of diabetic medications and monitoring equipment in England 1991–2004

Hitesh Patel¹, Janakan Srishanmuganathan², Josip Car³, Azeem Majeed³

¹Charing Cross Hospital, London W6 8RF, UK

²Chelsea and Westminster Hospital, London SW10 9NH, UK

³Department of Primary Care and Social Medicine, Imperial College, St Dunstan's Road, London W6 8RF, UK

Address correspondence to Josip Car, E-mail: josip.car@imperial.ac.uk

ABSTRACT

Background To report the trend in prescriptions and cost of antidiabetic drugs and glucose monitoring equipment in England from 1991 to 2004.

Methods We analysed data on all community antidiabetic drug prescriptions in England collated from the Prescription Cost Analysis system.

Results The total number of diabetes prescriptions (medicines and monitoring) rose from 7 613 000 (1991) to 24 325 640 (2004) (>300% increase). Meanwhile, total costs increased by 650%. Insulins are the biggest contributor to cost followed by monitoring equipment and then oral medications. Three times as many items of oral tablets are prescribed than insulins. Metformin accounts for 40% of all diabetic drug dispensations but only 7% of the costs. More is spent on glitazones now than on either metformin or sulphonylureas.

Conclusions There has been a substantial increase in the cost of managing diabetes in the community. Costs are likely to continue to rise in the future, as the prevalence of diabetes increases and through more aggressive identification and management of patients with diabetes in the hope of reducing the even more costly complications. The cost implications of glucose monitoring merits further study.

Keywords costs and cost analysis, diabetes mellitus, drug costs, economics, pharmaceutical preparations

Introduction

Diabetes is increasing in prevalence and currently affects more than 170 million people worldwide.¹ About 90% of sufferers have type 2 diabetes.² Both type 1 and type 2 diabetes are chronic conditions and have devastating complications, mostly due to accelerated macrovascular and microvascular diseases. People with diabetes, when compared with the general population, suffer up to five times as many myocardial infarcts,³ twice as many strokes⁴ and have 15 times the risk of requiring limb amputation.⁵ In the UK, the condition is the leading cause of end-stage renal failure⁶ and blindness in the people aged <65 years.⁷ Unsurprisingly, it also represents a considerable economic burden for the National Health Service (NHS) and its sufferers.¹

Two landmark trials have demonstrated that tight control of blood glucose levels minimizes the complications of diabetes. The Diabetes Control and Complications Trial Research Group revealed a reduced risk of retinopathy by 76%, neuropathy by 60% and nephropathy by 39%, in people with type 1 diabetes.⁸ The United Kingdom Prospective Diabetes study (UKPDS) showed that better control of blood glucose in people with type 2 diabetes reduced the risk

of myocardial infarct by 39%, early kidney damage by a third and the need for laser eye therapy by a quarter.⁹ Hence, the National Service Framework outlines that all people with diabetes should receive high-quality care to control their blood glucose,¹ which should minimize the progression and complications of diabetes.

In 2004, drugs made up 12.7% of NHS costs (£9.506 billion out of £74.343 billion); this compares with 8.9% of NHS costs 15 years earlier.¹⁰ There are six main classes of antihyperglycaemic drugs: insulins and five types of oral medication—metformin, sulphonylureas, glitazones, meglitinides and acarbose. Insulins are used in the treatment of type 1 diabetes. Additionally, ~25% of people with type 2 diabetes will also eventually need insulin after they lose glycaemic control on oral medications.¹¹ We examined the trend in the

Hitesh Patel, Foundation year 2 doctor

Janakan Srishanmuganathan, Foundation year 2 doctor

Josip Car, Clinical Lecturer in Primary Care

Azeem Majeed, Professor of Primary Care

amount prescribed and cost of diabetic medications and monitoring equipment from 1991 to 2004 in England.

Methods

We obtained data on prescribing for diabetes for the period 1991–2004 from the Prescription Cost Analysis (PCA) system, which is part of prescription pricing and information systems managed by the Prescription Pricing Authority. They compile data for the Department of Health on all the community prescriptions dispensed in England. The PCA system does not include drugs dispensed in hospitals, mental health trusts or private prescriptions. However, the vast majority of prescribing for diabetes is carried out by NHS general practitioners, with relatively little done by hospital specialists.

In 1991, a new improved PCA system was introduced, which is based on all community prescriptions dispensed by community pharmacists, appliance contractors and dispensing doctors, and prescriptions submitted by doctors for items personally administered. Before this, statistics were based on a sample of prescriptions issued by community pharmacists and appliance contractors. We analysed data on all diabetic medicine classes 1991–2004. As glitazones and meglitinides are newer and more expensive therapies, we looked in more detail on the impact of these drugs on prescribing costs. The data cover a population of more than 50 000 000 people with the latest report that over 1 500 000 people have diabetes.

Results

The total number of diabetes prescriptions (medicines and monitoring) rose from 7 613 000 (1991) to 24 325 640 (2004) (>300% increase). Meanwhile, total costs increased by

650% (Table 1). Insulins are the biggest contributor to cost followed by monitoring equipment and then oral medications (Tables 1 and 2). This is despite there being at least three times as many items of oral tablets prescribed than insulins (Table 1).

Tables 1 and 2 summarize the substantial increase in costs and number of prescriptions since 1991. Insulins account for >60% of the cost of drugs despite making up only 23% of total prescriptions; 40% of all dispensed diabetic drugs are metformin, but it only makes up 7% of the total drugs bill. Since 1991, the proportion prescribed of metformin has doubled and of sulphonylureas has almost halved. More is spent now on glitazones than on either metformin or sulphonylureas. Over £130 million was spent on glucose monitoring in 2004. This is more than was spent on all the oral hypoglycaemic medications combined.

Of the oral medicines, sulphonylureas have traditionally cost the most, but since 2003 ‘other’ oral diabetic medicines have overtaken their cost. Rosiglitazone and pioglitazone cost £50.6 million in 2004, which accounts for 88% of the ‘other’ category (Fig. 1). The consumption of biguanides has soared since 1998, and it has become the most widely used oral antidiabetic drug since 2001. Despite the increasing usage of this drug, less money is spent per annum on it than on any other class.

Discussion

Main findings of this study

We found >6-fold increase in the cost of diabetes medications in the UK in the last 15 years. Insulins are the largest contributor to cost followed by monitoring equipment and finally oral medications.

This study brings to attention the changing face of diabetic pharmaco-economics for policy makers. Over the last

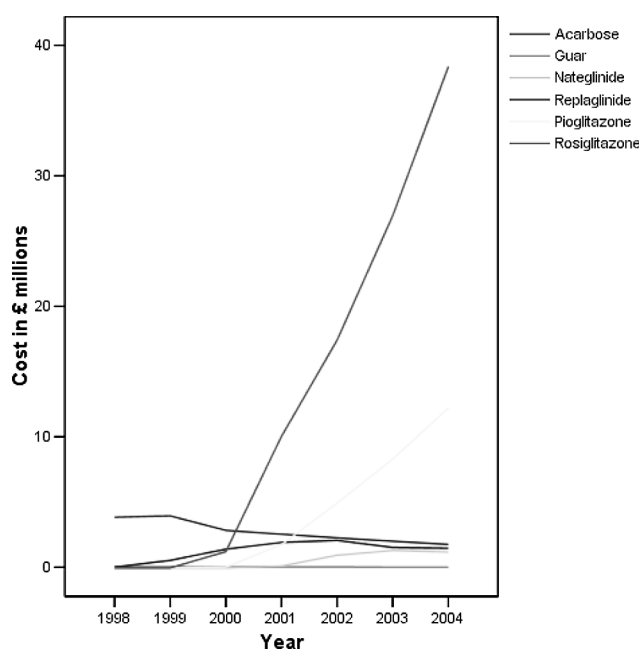
Table 1 Change in diabetic drug prescriptions 1991–2004

	Cost in £ millions (% of total antidiabetic drugs)		Prescriptions in millions (% of total antidiabetic drugs)	
	1991	2004	1991	2004
Biguanides	2.83 (5.6)	22.56 (7.1)	1.09 (20.5)	7.42 (40.3)
Sulphonylureas	11.21 (22.0)	40.07 (12.6)	2.84 (53.5)	5.38 (29.2)
Other oral agents*	0.12 (0.2)	57.64 (18.2)	0.01 (0.2)	1.42 (7.7)
Total oral agents	14.16 (27.8)	120.27 (38.0)	3.94 (74.2)	14.21 (77.1)
Insulins	36.83 (72.2)	196.82 (62.1)	1.36 (25.6)	4.21 (22.9)
Total antidiabetic drugs	50.99 (100)	317.09 (100)	5.31 (100)	18.42 (100)

*Acarbose was licensed in 1993, Repaglinide was licensed in 1998, Pioglitazone and Rosiglitazone were licensed in 2000, and Nateglinide was licensed in 2001.

Table 2 Change in glucose monitoring prescriptions 1991–2004

	Cost in £ millions (% of total antidiabetic drugs)		Prescriptions in millions (% of total antidiabetic drugs)	
	1991	2004	1991	2004
Blood glucose monitoring equipment	13.68	129.63	0.81	5.33
Urine glucose monitoring	3.82	1.81	1.50	0.57
Total glucose monitoring equipment	17.51	131.51	2.31	5.90

**Fig. 1** Cost of 'other' oral diabetic medicines: 1998–2004.

10 years, there has been a vast increase in costs of medicines, as well as the number of prescriptions dispensed. However, in the future, even more resources will need to be allocated to diabetes because the prevalence has increased by almost 100% since 1991. This trend will continue with the increasing life expectancy of patients with diabetes and an ageing population and because the UK has one of the fastest growing rates of obesity in the world.¹² There is now a trend to diagnose and treat diabetes earlier than in the past and treat patients with borderline glycaemia.¹³ New guidelines advocate ever more intensive blood glucose-lowering therapy, tighter monitoring and the appropriate usage of newer and more expensive drugs. Furthermore, identification of patients at high risk of diabetes in primary care is also likely to be given greater prominence, and this will inevitably

lead to the identification and treatment of more people with diabetes.

The cheaper biguanides have surpassed the sales of sulphonylureas in recent years. This is in line with the National Institute of Clinical Excellence (NICE) recommendation that metformin should be used as first line in overweight and normal body mass index hyperglycaemic patients who are not controlled on diet alone.¹⁴ Sulphonylureas can be added to an existing metformin regime or be used as first-line agents when metformin is contraindicated or not tolerated or when patients are not overweight.¹⁴

Rosiglitazone and pioglitazone are the two glitazones available in the UK since 2000. NICE has recommended their use in patients with type 2 diabetes who are unable to take metformin and sulphonylureas due to either intolerance or contraindications.¹⁵ They may have beneficial effects, apart from glycaemic control, on cardiovascular risk determinants and atherosclerosis.¹⁶ Their use has rocketed in recent years; however, more long-term research is still needed on their role in managing diabetes. On maximum doses, rosiglitazone costs about £14/month more than pioglitazone. The initial research was undertaken on rosiglitazone especially with regard to monotherapy and combination therapy, which could explain why it is more popular in the UK. There is no clear guidance from NICE about which one to use.

α -Glucosidase inhibitors such as acarbose reduce post-prandial glucose surge. A recent Cochrane review concluded that this class has an inferior glycaemic control and adverse effect profile when compared with sulphonylureas.¹⁷ This would explain the decline in its usage in the UK, especially as it costs about twice as much as brand named sulphonylureas. NICE states it has a role when people are unable to use other oral therapies, but this is rare.¹⁴

NICE and Diabetes UK advocate home monitoring in diabetics.¹⁵ This is not contentious when patients are on insulin as it guides dosage and alerts to hypoglycaemia but its value in patients treated with only oral medicines has been questioned. A meta-analysis showed no difference in glycated haemoglobin, episodes of hypoglycaemia and improvements in quality of life when patients with type 2 diabetes using monitoring and no monitoring were compared.¹⁸ Monitoring more than once a day may also lead to more distress, worries and depressive symptoms in people with diabetes who are not being treated with insulin.¹⁹ There is a need for glucose monitoring to be subject to rigorous investigation through randomized controlled trials and cost-effectiveness analyses.

What is already known about this topic

A cross-sectional survey of prescriptions in all diabetics in Finland in 1995 revealed that people with type 2 diabetes are

responsible for a greater proportion of the prescription bill than people with type 1 diabetes.²⁰ Sixty-two per cent and 39% of the total cost of medicines used by people with type 1 and type 2 diabetes, respectively, are accounted for antidiabetic medicines.²⁰ This study however did not offer any detail of changes in prescription costs over time, nor did it examine individual drug classes.

A longitudinal study of <160 Swedes with type 2 diabetes between 1995 and 2001 showed that the usage of sulphonylureas dropped from 54 to 41% and metformin increased from 34 to 48%.²¹ Our data, which include a much larger sample size and have a longer study period, showed more impressive changes in the usage of these two drugs (Table 1). Our study also includes glucose monitoring equipment and the newer classes of drugs.

A study of all oral antidiabetic drug prescriptions in the US (1990–2001) showed a 3.9-fold increase in prescriptions compared with 6-fold in our study for a similar period. Metformin was only given license in 1995 in the US (it has been used in the UK since the 1970s) after the overpowering evidence of the UKPDS, as there were concerns over biguanides and lactic acidosis. There was an equally significant change in favour of metformin over sulphonylureas. However, glitazones captured 17% of the market in 2001 in the US, whereas in the UK they have <7%.

The pharmaceutical cost of treating hyperglycaemia in the UK is not as high as that of cardiovascular, central nervous system or respiratory diseases.¹⁰ This does not account for people with diabetes requiring poly-pharmacy to an extent that their drug costs are about three times higher than a non-diabetic control population.²⁰ The UK spends less on hypoglycaemic medication per diabetic patient than many other European countries, even though it is much more expensive to treat the complications of long-term poor glycaemic control.²²

What this study adds

Our study provides a picture of national trends in costs of diabetes medication. It highlights a number of areas where trends in costs merit further study and clarification such as those with monitoring equipment. Costs are likely to continue to rise in the future, as the prevalence of diabetes increases and through more aggressive identification and management of patients with diabetes. However, these costs need to be set against the benefits from better management of diabetes, such as a reduced risk of vascular complications, and improvements in the quality of life of patient with diabetes.

Limitations

Our study is based on data from the well-established PCA system. It is comprehensive for all community prescriptions in England. However, our data do not reflect all drug prescriptions in England, as they do not include drugs dispensed in hospitals. Also, our data do not allow us to directly compare antihyperglycaemic prescriptions between people with type 1 and 2 diabetes. This is because PCA data are available only at aggregate level and not for individual patients.²³

Competing interests

Professor Azeem Majeed is an Associate Director (Primary Care) for the Diabetes Research Network.

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