

Diabetes: is patient knowledge the key to self-management?

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ABSTRACT

Type 2 diabetes is a chronic metabolic disorder and community-based management poses many challenges to both healthcare professionals and patients. This article explores the attitudes of two different diabetic patients towards their condition by means of informal interviews. The relationship between patient knowledge and compliance with treatment regimes is also investigated through the two case studies. Current strategies for managing Type 2 diabetes in the primary-care setting are also reviewed.

INTRODUCTION

According to the World Health Organisation the incidence of diabetes is increasing rapidly, potentially reaching an estimated 221 million by 2010, and placing a substantial strain on healthcare systems worldwide.¹ Type 2 diabetes is a chronic metabolic disorder associated with significant morbidity and mortality. In Ireland, approximately 2% of the population are affected by Type 2 diabetes with 65% of these patients receiving all their diabetes care from a General Practitioner (GP).² Early diagnosis, good glycaemic control and screening for complications are essential for effective management of Type 2 diabetes.³ Hyperglycaemia is the principle diagnostic feature of Type 2 diabetes. The classic diagnostic signs and symptoms include polydipsia, polyuria, lethargy, unexplained weight loss and blurred vision.¹ The increase in blood sugar levels occurs insidiously and often precedes clinical onset of the disease by many years. At diagnosis, 20-25% of patients have evidence of one or more microvascular complications of the disease (i.e. retinopathy, nephropathy, and neuropathy).⁴ Therefore, regular primary-care screening of high-risk groups is essential for early diagnosis of the disease. Risk factors for Type 2 diabetes include: family history of the disease, family history of cardiovascular disease, obesity (especially central), age (> 65 years), sedentary lifestyle, high fat diet, hypertension, impaired glucose tolerance, dyslipidaemia, and the use of certain medications, e.g. steroids.⁵ Diagnostic criteria are outlined in Table 1 below.

Fasting Glucose	2 Hour Glucose	Interpretation	Response
< 6.1 AND	< 7.8	Normal	Review as indicated
6.1 – 6.9 AND	< 7.8	Impaired fasting glucose	Manage CVD risk aggressively; control weight, increase exercise. Re-test annually
< 7.0 AND	7.8 – 11.0	Impaired glucose tolerance	
7.0 or above OR	>11.0	Diabetes	Treat

Table 1: Diagnostic Criteria for Type 2 diabetes²

STUDY APPROACH

Two patients with Type 2 diabetes were informally interviewed about their condition. The patients selected currently have differing disease status and were interviewed

individually outside the GP surgery setting. Both patients gave informed consent for the interview.

T.S., a 37 year-old female was diagnosed 2 years ago and rarely attends her GP.

P.F., a 55 year-old male, was diagnosed 5 years ago and attends regular GP appointments.

INTERVIEWS

What is diabetes?

T.S.: I don't know. It was probably explained to me, but I didn't understand.

Have you heard of blood glucose? No, I've never heard of it.

P.F.: It's a problem in the body where the pancreas doesn't produce enough insulin, therefore the blood glucose levels rise.

Why take your prescribed medication and what would happen if you didn't?

T.S.: I would be afraid of what would happen if I didn't take them; I might have a stroke or heart attack, but I don't really understand what they're for.

P.F.: Glucose levels in the blood would build up, affecting my vessels. Blood wouldn't circulate to my extremities and the functions of my vital organs would be affected; my heart, eyes, and kidneys. When I found out how serious this was I didn't want to take any risks. I don't want to face the ramifications of not looking after myself.

What medication do you take and what are they for?

T.S.: I don't know.

Glucophage 500mg: I've been on this for 2 years, for my diabetes.

Aldactone 25mg: Taking it for 2 years now, for my facial hair growth.

Aspirin 75mg: I was given this just yesterday; I think it stops heart disease.

Rosuvastatin: I was put on this yesterday, too. The doctor explained why, but my head was a million miles away and I didn't hear any of it.

P.F.: Amaryl 4mg once a day, I've been on this for 5 years. It increases my insulin production.

Metformin 850mg twice a day, I've been on this for 4 months. It increases the effectiveness of Amaryl.

Simvastatin 10mg, I've been on this for 8 months and it lowers cholesterol.

My cholesterol was 6.6 when they put me on it but I've since heard there's evidence of benefits for putting every diabetic on statins, not just if they're over 50 or have high cholesterol.

What else can you do to manage your diabetes?

T.S.: Don't eat any sugar and cut out junk food. I've done that, but I can't stop drinking Coke. I drink up to 2 litres a day. I couldn't go on a strict diet.

Do you exercise? No, but I was told I should. I'm not able to run or do sit-ups.

P.F.: Watch my diet, exercise, don't drink alcohol and keep my weight down.

How do you watch your diet? I can eat low GI foods, and slow releasing carbohydrates, like porridge and fruit - but not too much fruit. I was advised not to eat more than 5 grapes in one serving as they can make my blood sugars go high, so I don't buy them anymore. Who eats 5 grapes and stops?

I can't eat foods with high sugar content, excess carbohydrates, or too much cheese. I stopped drinking alcohol when I was diagnosed diabetic, but over the last year I've occasionally had the odd glass of red wine. I've recently heard that the best drink for a diabetic is gin and slimeline tonic.

How do you measure your diabetic control and what should you aim for?

T.S.: I'm supposed to prick my finger 3 times a day with a special pen, but if I do it twice a week that would be the most. My sugars should be between 4 and 7. I don't write the values down although I should. It goes above 7 a lot, it's usually 13 or 14. It also goes below 4 sometimes, and I get very tired and don't feel well.

P.F.: I do a pin-prick glucose test usually 3 times a day, and never less than twice. The range should be between 4 and 7. My values range from about 3.8 to around 7. It's usually below 7. I know if it goes as low as 3.8 as I get tired.

I keep a record of my readings, and the average over the past 14 days is 6.6, and over the past 30 days is 6.8.

Why do you think you have diabetes?

T.S.: I don't know why I have it.

Do you have any family history? I have a niece who went on insulin during her recent pregnancy.

P.F.: It's familial, 3 of my 5 siblings have also found out they have diabetes since my diagnosis.

Do you attend a diabetic clinic and why?

T.S.: No, I went once but didn't go back. I tried to eat the foods they told me to, but I ended up eating more than I normally would and put on weight. The foods were expensive too.

P.F.: Yes, I visit a diabetic nurse every 3 months and see the doctor every so often. It's very important to monitor my diabetes and keep it under control.

They check my blood pressure, glucose levels, HbA_{1c}, and my feet. I also get my eyes checked once a year by a hospital specialist.

At the beginning I went through a lot of tests; ECG, renal tests, blood pressure, and eye tests. They told me that we caught the disease early, but having to go for all the tests and waiting for results really hit home with me how serious this condition was.

Has having diabetes changed your lifestyle, and if so, in what way?

T.S.: Not really. I just take the tablets and try not to eat too much junk food.

P.F.: Yes. The biggest change is my diet. It was difficult but I had to do it. It affects my social life as I don't go to the pub for a drink any more. I have to monitor and keep on top of the blood sugars every day. But the changes I make to my life now are nothing compared to changes I'd have to make if I lost my eyesight.

What are your hopes for the future with regards to your diabetes?

T.S.: I want to lose the extra weight I have on, and I would be prepared to go on insulin injections to do this, even though I hate needles.

P.F.: To control my diabetes with diet and tablets alone. I don't want to progress to using insulin, as I don't want the hassle of using needles and I don't like them.

I realise this may be inevitable, but I want to avoid it for as long as possible.

DISCUSSION

Self-Management

These cases illustrate two patients with different attitudes towards diabetes. Ultimately, the diabetic patient is in control of their disease and the role of the healthcare professional is to help the individual make informed choices about self-management.⁶ Optimal management of diabetes requires significant lifestyle changes for many patients, which can be difficult to achieve and maintain.⁷ A number of factors are thought to influence patient compliance with treatment plans, such as education, gender, age, socio-economic status, family history of Type 2 diabetes, current lifestyle, and patient knowledge of their condition. Just as the two patients interviewed displayed different attitudes towards diabetes, it is important to realise that no two patients are alike. The initial diagnosis of a chronic disease such as diabetes can bring with it fear and denial. At this crucial time it is essential to listen to the patient and meet their needs, avoiding information overload and maximising patient cooperation. Cooperation between the patient and healthcare professional is fundamental to the successful long-term management of diabetes.²

Disease progression and complications

A common misconception of patients is that Type 2 diabetes is a "mild" disease.^{3,8} Research highlights the importance of in-depth exploration of patients' views during each consultation to identify service delivery failures and gaps in patient knowledge, such as a lack of awareness of macrovascular risk.⁷ The incidence of macrovascular (cardiovascular disease) and microvascular (retinopathy, nephropathy and neuropathy) complications are well documented. Alarming, the presence of diabetes as a cardiovascular disease risk factor is equivalent to having pre-existing coronary heart disease.^{2,9} Studies have shown that diabetes to now the most common single cause of end-stage renal disease¹⁰ and adult blindness⁹ in Europe and the United States. With the well-described nature of disease progression, patient awareness and cooperation with health care professionals is of paramount importance.

Lifestyle Modifications

The aims of Type 2 diabetes management are to relieve acute symptoms, improve quality of life and prevent long-term complications without precipitating hypoglycaemia.⁵ It is generally accepted that aggressive management of diabetes, including a self-care regime of tight glycaemic control, medication, diet control, and exercise promotes a better quality of life and fewer long-term complications.¹¹ The most common therapeutic error in Type 2 diabetes management is prescribing medication too soon. First-line therapy for diabetes, aimed at reducing insulin resistance, should be diet modification and weight loss.³ This aspect of treatment should not be underestimated, as greater than 90% of diabetics are obese at the time of diagnosis.¹² Moderate weight loss improves glycaemic control, reduces cardiovascular disease risk and can prevent the development of Type 2 diabetes in those with impaired glucose tolerance.¹³ Therefore, weight loss is an important therapeutic strategy in overweight patients who have Type 2 diabetes or are at risk of developing the disease.

All Type 2 diabetes patients should ideally be referred to a dietician.² Dietary guidelines are outlined in Table 2.^{2,10} It is recommended that consumption of refined sugars be restricted, and that intake of complex carbohydrates should comprise 60-70% of the daily total energy intake. Protein should contribute 10-20% of total energy intake and less than 10% where renal disease or albuminuria is present. Fat should account for less than 35% of the total energy intake, with less than 10% being saturated fat. The normal weekly alcohol allowances are permitted: 21 units for males, and 14 units for females.⁵ Regular physical exercise, tailored to the patient's medical condition, should be encouraged.⁸ Smoking cessation should also be advised, in an effort to further decrease cardiovascular disease risk. Adoption of these lifestyle changes will reduce insulin resistance, improve glycaemic control, and have positive effects on blood pressure and lipid profile, lowering the patient's cardiovascular disease risk.⁵

Risk Factor	Target Monitoring	Non-Pharmacological Action
Hyperglycaemia	Fasting glucose < 7.0mmol/l HbA1c < 6.5%	Set reasonable achievable targets Restrict refined sugar intake
Dyslipidaemia	Total cholesterol < 4.5mmol/l LDL cholesterol < 2.5mmol/l HDL cholesterol > 1.0 (male) > 1.3 (female) Triglyceride < 1.7mmol/l	Review dietary intake Total fat < 35% TE Saturated fat < 10%
Hypertension	< 130/85	Salt restriction < 6g/day Weight reduction
Obesity	BMI 20-25kg/m ²	Reduce dietary intake Carbohydrate 60-70% TE Protein 10-20% TE (not exceeding 1g/kg) Encourage fibre, vitamin & antioxidant intake

Sedentary lifestyle	Physical activity review	Increase aerobic activity
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Table 2: Management Targets for Type 2 diabetes^{2,10}

Pharmacological treatments

Where treatment goals are not achieved after an adequate trial of dietary and lifestyle changes, an oral hypoglycaemic agent should be prescribed. The UK Prospective Diabetes Study found that only 23% of patients attained fasting plasma glucose levels below 7.8mmol/L when managed by dietary modification alone.¹² Oral hypoglycaemics available include the sulphonylureas, metformin and acarbose.

Sulphonylureas are first-line agents, unless the patient is obese, where metformin is the drug of choice.³ Sulphonylureas augment endogenous insulin production by stimulating its release from pancreatic beta-cells. Many patients do not respond to the action of sulphonylureas (primary failure) and of those who respond a further 5-10% per year later become resistant (secondary failure).³ Weight gain and hypoglycaemia are common adverse effects of sulphonylureas. Hypoglycaemia can be severe and occasionally fatal. Patients must be counselled on the warning signs of hypoglycaemia and its management.⁵ Occasionally sulphonylureas can cause a disturbance in liver function, which rarely progresses to cholestatic jaundice, hepatitis and hepatic failure. Hypersensitivity reactions have also been reported.

Metformin increases insulin sensitivity by reducing hepatic glucose production and increasing peripheral glucose uptake. Insulin production is not affected, therefore hypoglycaemia does not occur as a side-effect.⁸ Metformin does not cause weight gain, and is the treatment of choice in obese patients; however, it is equally effective in the non-obese. Adverse effects mainly involve gastrointestinal upset: anorexia, nausea, vomiting and diarrhoea, which may persist, particularly if high doses are used. Rarely, metformin can cause lactic acidosis, a potentially fatal complication. It is associated with renal dysfunction and consequently, metformin is contra-indicated in renal disease.

The thiazolidinediones, pioglitazone and rosiglitazone reduce peripheral insulin resistance through activation of nuclear peroxisome proliferator activated receptor γ (PPAR γ), leading to a reduction of blood-glucose concentration.¹⁴ They can be used alone or in combination with metformin or with a sulphonylurea. As weight gain is a common side effect, they preferably should be combined with metformin, particularly for obese patients. Other side effects include nausea, vomiting, headache and rarely pulmonary oedema and angioedema. The original thiazolidinedione, troglitazone, was withdrawn from the market following reports of severe and unpredictable hepatotoxicity; consequently, liver function should be closely monitored in patients receiving thiazolidinedione therapy. They are contraindicated in patients with hepatic impairment, or if pre-treatment concentrations of alanine aminotransferase are raised more than 2.5 times the upper limit of normal. Cardiac failure of any degree is a further contraindication.

Nateglinide and repaglinide are oral insulin secretagogues with a rapid onset of action and short duration of activity. They are administered shortly before each main meal.

Repaglinide may be given as monotherapy for patients who are not overweight or for those in whom metformin is contra-indicated or not tolerated, or it may be given in combination with metformin. Nateglinide is licensed only for use with metformin. Adverse effects include abdominal pain, nausea, vomiting, hypoglycemia and rarely hypersensitivity reactions.

Acarbose may be used in patients who do not respond to diet alone, those who cannot tolerate conventional hypoglycaemics, or as an adjunct to other drugs.⁵ Taken at the beginning of a meal, acarbose reduces post-prandial hyperglycaemia by reducing polysaccharide digestion in the small intestine, therefore reducing glucose absorption. The major adverse effect is GI intolerance.

Combination therapy is indicated when patients become refractory to monotherapy.^{3,4} The most common combination used is metformin and a sulphonylurea. Up to 50% of patients uncontrolled with high dose sulphonylureas will achieve good glycaemic control with the addition of metformin.⁸

When both dietary and oral combination therapy fails, insulin is indicated, and the patient should be referred to a specialised service for initiation of therapy, education and monitoring. In Ireland it is estimated that 20% of Type 2 diabetes patients eventually require insulin therapy.²

Statins, a class of lipid-lowering drugs, have proven benefits in primary prevention of cardiovascular disease in Type 2 diabetes patients. The recent Collaborative Atorvastatin Diabetes Study (CARDS) demonstrated significant cardiovascular disease risk reduction in Type 2 diabetic patients irrespective of pre-treatment LDL-cholesterol levels.¹⁵ Therefore, all diabetic patients should be considered for statin therapy irrespective of their lipid level unless contraindicated.⁹ Evidence from the West of Scotland Coronary Prevention Study (WOSCOPS) suggest statins have a protective role in the primary prevention of Type 2 diabetes development.¹⁶

The American Diabetes Association recommends enteric-coated aspirin as primary prevention of cardiovascular disease in Type 2 diabetes patients aged over 30 years who are at high risk of vascular disease.⁹ This includes patients with hypertension, obesity, albuminuria, hyperlipidaemia, smokers, and those with a family history of cardiovascular disease. The risk of vascular complications in Type 2 diabetes are strongly associated with raised blood pressure, and any reduction in blood pressure is likely to reduce these risks.¹⁷ Aggressive blood pressure management is advised in these patients.

Reaching targets

For health care professionals there is increasing emphasis on the importance of achieving diabetes management targets. However, there is evidence to suggest that patients who default from follow-up may do so due to a perception that failure to achieve their diabetic targets will be met with a negative attitude on the part of the GP. The lifestyle changes necessary to improve the prognosis of Type 2 diabetes can be difficult for any patient to implement and maintain. Individualised personal targets must be agreed with each patient and reviewed at each follow-up visit. Patient education and motivation is vital for achieving treatment goals.⁴ A positive environment where patients are not criticised for difficulty in complying with

recommendations, but supported and encouraged, may help to ensure repeated return for regular review and monitoring.²

Conclusion

The future of diabetes care will see patients managed in an appropriately resourced primary care setting, with access to a dietician, podiatrist, ophthalmologist, and diabetic nurse on a regular basis with additional specialist referrals as necessary. Shared care initiatives should be developed between GPs and local hospital-based specialist medical teams to provide high quality care for diabetic patients. There is a need for health care professionals to explore the attitudes and beliefs of Type 2 diabetes patients in order to optimise patient management. Empowering a diabetic patient requires offering accurate and up-to-date information that meets the individual's needs.⁶ Providing the patient with sufficient knowledge to make informed choices gives them the independence and responsibility required for successful control of their disease.

P.F. summed up much of this in a final statement at the end of his interview. He provided an insightful analogy which may be worth remembering:

“I think learning to manage diabetes should be likened to learning to drive a car. Just as the driving instructor doesn't go into unnecessary detail on the mechanics of the car engine, but explains how to change gear and manoeuvre; I believe health carers shouldn't get too involved in explaining the detailed physiology of diabetes, but focus on teaching how to manage and control the condition, skilfully and with confidence.”

REFERENCES

1. Verma L, Prakash G, Tewari HK. Diabetic retinopathy: time for action. No complacency please! Bull World Health Organ. 2002;80:419
2. O'Sullivan T. Type 2 diabetes management. Forum distance learning programme, Module 83: July 2004
3. Guidelines for good practice in the diagnosis and treatment of non-insulin dependent diabetes mellitus. Report of a joint working party of the British Diabetic Association, the Research Unit of the Royal College of Physicians, and the Royal College of General Practitioners. J R Coll Physicians Lond. 1993;27:259-66
4. Colwell JA. Controlling type 2 diabetes: are the benefits worth the costs? JAMA 1997;278:1700
5. Management of Non-Insulin Dependent Diabetes Mellitus (NIDDM). National Medicines Information Centre Bulletins, Vol 3 No 6 1997

6. McDonnell B. To empower or to disempower? – that is the question. *Diabeteswise*, Volume 2 Issue 1 Spring 2005
7. Smith SM, O'Leary M, Bury G, Shannon, W, Tynan, A, Staines, A. and Thompson, C. A qualitative investigation of the views and health beliefs of patients with Type 2 diabetes following the introduction of a diabetes shared care service. *Diabet Med* 2003; 20:853-857
8. Williams G. Management of non-insulin-dependent diabetes mellitus. *Lancet* 1994;343:95-100
9. O'Connor R. Practice prevention of diabetes complications. Forum distance learning programme, March 2005.
10. Boyle-Thomas P. Diet and diabetic nephropathy. *Diabeteswise*, Volume 2 Issue 1 Spring 2005
11. Brooker L, O'Brien C, Acheson R. Modifiable risk factors affecting progression of diabetic retinopathy. *Diabeteswise*, Volume 1 Issue 4 Winter 2004
12. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood glucose-control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 1998;352:837-53
13. Klein S, Sheard NF, Pi-Sunyer X et al. Weight management through lifestyle modification for the prevention and management of type 2 diabetes: rationale and strategies. *Diabetes Care* 2004;27:2067-2073
14. Krentz AJ, Bailey CJ, Melander A. Thiazolidinediones for type 2 diabetes. New agents reduce insulin resistance but need long term clinical trials. *BMJ*. 2000;321:252-3.
15. Colhoun HM, Betteridge J, Durrington PN et al. Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS): multicentre randomised placebo-controlled trial. *Lancet* 2004;364:685-96

16. Freeman DJ, Norrie J, Sattar N et al. Pravastatin and the development of diabetes mellitus: evidence for a protective treatment effect in the West of Scotland Coronary Prevention Study (WOSCOPS). *Circulation* 2001;103:357-62

17. Adler AI, Stratton IM, Neil HA et al. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. *BMJ* 2000;321:412-9