PHARMACIST-LED DIABETIC PATIENT MONITORING

Jasmine Vella, Lilian M. Azzopardi
Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Msida.

Corresponding author: Jasmine Vella
E-mail: jasminevella@gmail.com

ABSTRACT

OBJECTIVE To assess pharmacist intervention in diabetic patients on patient compliance to medication and blood glucose self-monitoring and to evaluate patient therapeutic plans through monitoring of glycated haemoglobin (HbA1c) levels.

METHOD Thirty type 2 diabetic patients receiving their medication through the Pharmacy of Your Choice (POYC) scheme were assessed. Patient compliance to medication and to self-blood glucose monitoring was reported before (t=0) and following pharmacist intervention (t=1). The pharmacist intervention included an educational session and distribution of a 'Diabetes Patient Information Leaflet'. HbA1c testing was performed and patients with out-of-range values were referred.

KEY FINDINGS Patient compliance to medication improved following pharmacist intervention, with 24 patients claiming to 'rarely miss a dose' of medication prior to the intervention (t=0), decreasing to 8 patients at t=1. At t=0, 1 patient reported to 'never miss a dose' of medication which increased to 22 patients at t=1. Fifteen patients reported to monitor glucose levels less than once a month at t=0, while 23 patients claimed to monitor their glucose levels on a weekly basis at t=1. The mean value for HbA1c was 6.5%. Two patients obtained HbA1c values of 7.0 and 7.1% and were referred.

CONCLUSION Pharmacist-led medication reviews, through monitoring of blood glucose and HbA1c levels and suggesting optimal pharmacological treatment, can help diabetic patients use their medications more effectively to achieve maximal treatment benefits. Point-of-care HbA1c testing may be an accessible means of assessing glucose control and may motivate patients who seek to monitor glycaemia more closely.

KEYWORDS Pharmacist intervention, blood glucose monitoring, HbA1c testing, diabetes, medication compliance.

INTRODUCTION

Diabetes poses one of the most significant health problems in primary and secondary care sectors in each country.[1] Locally, diabetes affects around 10% of the general population.[2] Patients with diabetes commonly receive more than one type of medication daily. Complex therapeutic plans and possibly a lack of understanding of the patient's pharmacological therapy may lead to lack of compliance.

Patients registered with the POYC scheme may renew their prescriptions every two months at government clinics where a thorough patient assessment is not always undertaken due to time constraints and other factors. This situation may lead to over-prescribing. Some patients visit different doctors leading to a lack of continuity of treatment since their drug history may not always be readily available.

Another aspect of diabetes management is self-monitoring of blood glucose (SMBG). Although blood glucose levels should be monitored frequently, patients may find themselves monitoring glycaemia only when required or when advised to do so by a health care provider.

Glycated haemoglobin (HbA1c) testing is measured primarily to identify the average blood glucose concentration over a period of time (weeks or months). Values higher than the average HbA1c concentration indicate poor blood glucose level control. HbA1c monitoring may improve glycaemic control and thus treatment outcomes in patients with diabetes.[3]

Locally, HbA1c testing is only performed in one private clinic and is recently being carried out free-of-charge at Mater Dei hospital laboratory, against private general practitioners' referral. Introduction of point-of-care HbA1c testing in community pharmacies or clinics may lead to reduced hospital waiting times and support the pharmacist in monitoring drug therapy plans. Pharmacist intervention plays a key role in educating patients about the management of their condition. Close monitoring may lead to better control of the condition, both through lifestyle changes and pharmacological treatment adjustments if necessary. By monitoring blood glucose control in relation to patient medication and general patient health, pharmacists are in an ideal position to detect medication misuse or inappropriateness and discuss such issues with prescribers to improve treatment.

Method

Ethics approval was obtained from the University Research Ethics Committee. The study was undertaken at a local community pharmacy and 30 patients who were collecting their antidiabetic medications through the Pharmacy of Your Choice Scheme in the pharmacy were invited to participate. Participation in the study was entirely voluntary and informed consent was obtained from each patient prior the start of the study.

Three tools were used in this study; a previously validated 'Patient Questionnaire'[4], which was distributed to patients at baseline prior to pharmacist intervention (t=0) and after 2 months (t=1). This questionnaire, available both in English and Maltese language, consisted of multiple-choice close-ended questions and an open-ended question. In this questionnaire, compliance to medication and blood glucose self-monitoring was assessed by self-reporting. A 'Patient Profile Sheet', including demographic data and medications being received, was developed by the investigator (JV) and completed at baseline. A 'Diabetes Patient Information Leaflet', which was also developed by the investigator and distributed to patients at baseline, served as an adjunct to the pharmacist intervention. An educational session was held with the patient in the pharmacy at baseline.

HbA1c testing was carried out in the pharmacy at baseline on patients meeting the following inclusion criteria; receiving more than 2 medications, undergone recent hospital admissions or had treatment modification during the past year. Testing was undertaken using the Siemens/ Bayer DCA 2000+® analyser, which gave results within a few minutes. Results were discussed with the patients and any patients with out-of-range results were referred to a physician.

All data was entered into a spreadsheet and results were interpreted using SPSS® version 20.0. Statistical tests applied included the One-Way ANOVA, Pearson correlation test and the Chi-square test.

Results

Thirty patients participated in this study of which 17 were male and 13 were female, all were Maltese and the mean age was 67 years (range 57 to 83 years). Patients were taking an average of 6 medications, with each patient taking an average of 2 antihyperglyaecemic medications. The oral antidiabetic drug metformin was being taken by 20 patients.

Patient compliance to medication improved following pharmacist intervention, with 21 patients reporting that they rarely miss a dose of medication; this number decreased to 3 patients following pharmacist intervention. Post intervention patients claimed that they are compliant with treatment.

Frequency of glucose monitoring also improved following intervention; out of the 3 patients who claimed to check glucose levels daily at the end of the study, 2 patients reported to do so less than once a month at baseline. Eleven patients who checked their glucose levels on less than one occasion per month at t=0 reported to monitor their levels once a week at t=1. Patient compliance at time 0 was compared to frequency of self-blood glucose monitoring and there was a trend in less frequent self-monitoring with patients who had a higher risk of missing doses (Table 1).

Ten of the participating patients who met inclusion criteria were assessed for HbA1c levels. The mean HbA1c value obtained was 6.59%. HbA1c (range 5.8 to 7.1%). There was a trend in that patients taking a larger number of medications obtained higher values for HbA1c compared to those who took fewer medications (Figure 1). The two patients receiving the largest number of medications in this study (11 medications each) had HbA1c values of 6.8% and 7.1% respectively.

Participants who monitored glucose levels daily prior to pharmacist intervention were found to have HbA1c values of 6.5% or less; those who did so less frequently than once a week obtained HbA1c values of 6.65% or greater (Figure 2).

		Do you ever miss a dose of medication? (t=0)			
		No	Rarely	> once a month	Total
How often do you check your glucose level? (t=0)	Once a day	0	2	0	2
	Once a week	1	8	0	9
	Once a month	0	3	1	4
	<Once a month	0	11	4	15
Total		1	24	5	30

Table 1: Patient compliance to medication and frequency of glucose monitoring (n=30)
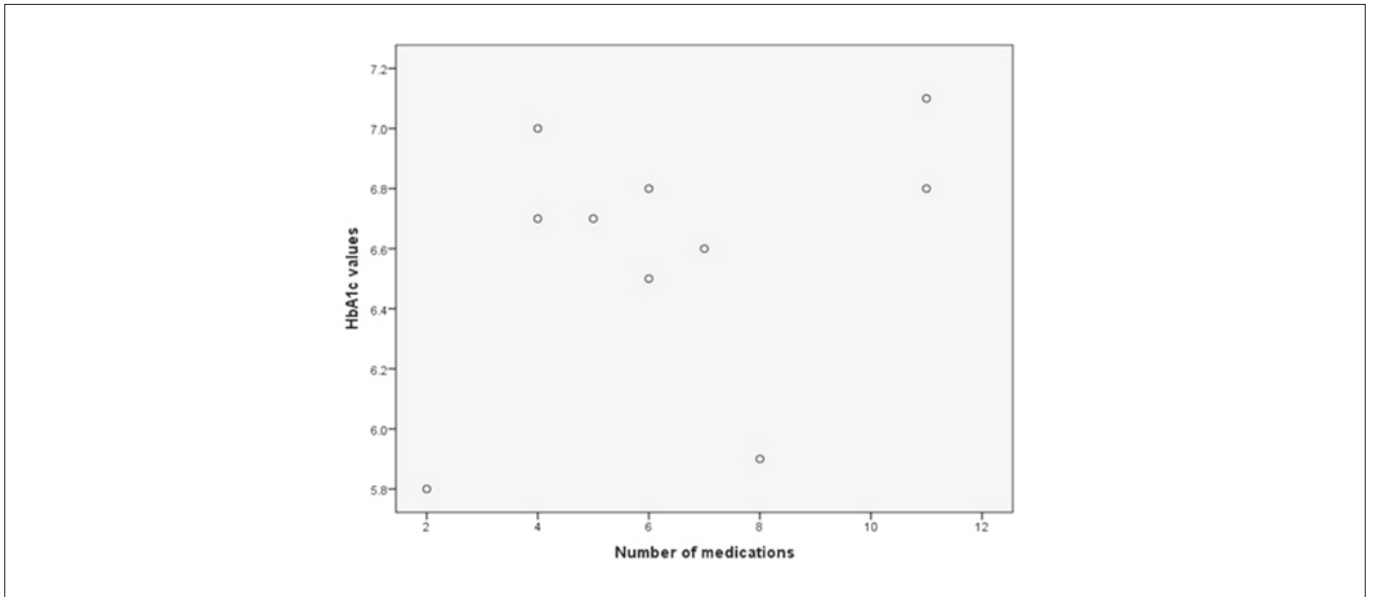
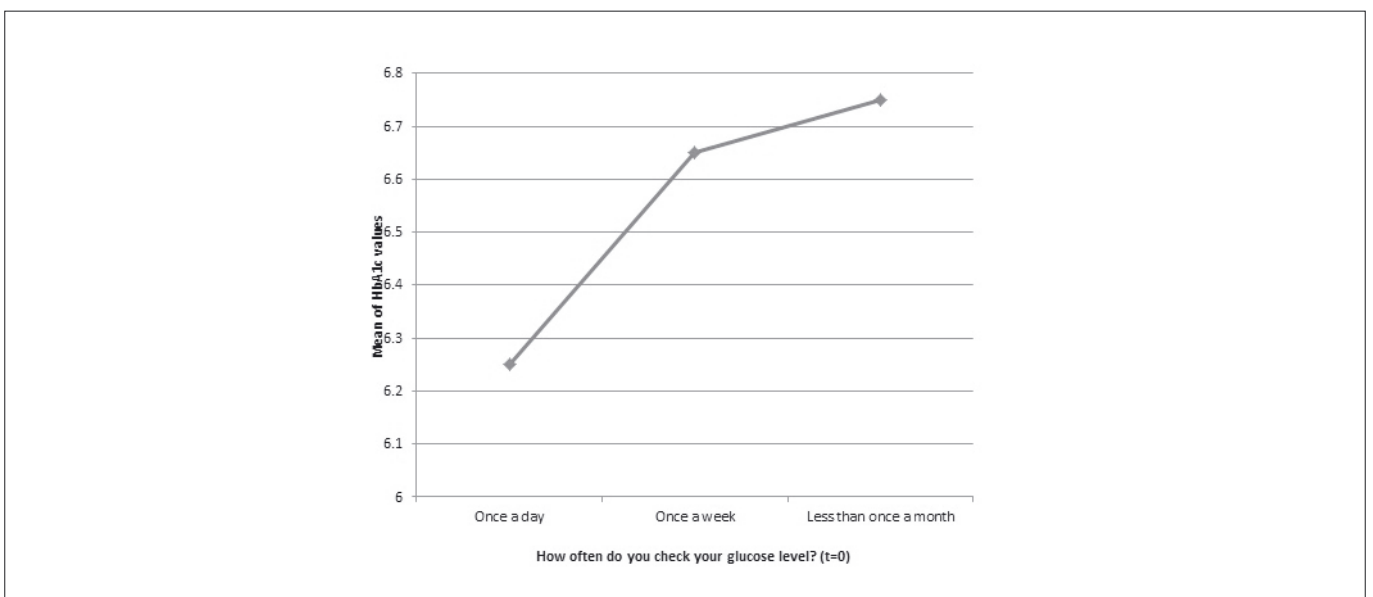**Figure 1:** Percentage HbA1c and number of medications (n=10)

Discussion

Patient compliance to medication prior to pharmacist intervention is considerably low. This result is not surprising given the fact that Type 2 diabetes often requires complex therapeutic plans, polypharmacy as well as medication administration at different times during the day. Some patients, may need to split tablets to administer the correct dose or eat directly after medication administration, which, when performed on a daily basis can be rather demanding. The main reason for most patients missing a dose of medication on one or more occasions was forgetfulness.

Pharmacists and other health care professionals should continuously educate patients on the importance of medication adherence, especially in patients with complex treatment regimens for conditions such as diabetes. Patients should be made aware of the risks and long-term complications that can arise from non-compliance.

Following pharmacist intervention, most patients reported failure to miss a dose of medication and compliance to medication improved in the majority of participants. Patients need to be educated not only about medication regimens but also about the disease itself. They should be knowledgeable about the disease symptoms, pharmacological management and the correct administration of drugs. Incorporating patients in treatment discussions is imperative for them to have a sound knowledge and understanding of the disease and thereby facilitate treatment implementation.

Complex conditions such as diabetes require multifactorial interventions consisting of continuous patient education and motivation, together with developing realistic targets to improve disease outcome and prevent both micro- and macrovascular complications.[5]

Figure 2: Percentage HbA1c and frequency of glucose monitoring (n=10)

Following pharmacist intervention, most patients reported failure to miss a dose of medication and compliance to medication improved in the majority of participants.

Frequency of glucose monitoring was also found to be unexpectedly low, with most participants admitting to checking their glucose levels less than once a month. Regular monitoring of glycaemia is indispensable in optimal diabetes management since this cannot be achieved simply by correct adherence to medication. Diabetic patients should be regularly reminded of the importance of close monitoring of glucose levels and advised on the availability of various glucose testing devices and their correct use.

Frequency of glucose monitoring increased following pharmacist intervention with most patients reporting weekly checking of their glucose levels. However, despite the educational session and pharmacist intervention, no patients reported checking their glucose levels daily. This reflects the tediousness such a task presents to these patients, who are additionally required to manage their disease daily in other ways. Patients who obtained lower values for HbA1c reported better compliance, both to medication administration and to glucose monitoring. Such results are comparable to those in a study conducted by Hansen *et al* (2009), which showed that lower HbA1c levels are associated with more frequent self-monitoring of blood glucose. Nonetheless, solely increasing the frequency of glucose monitoring does not automatically equate to improved HbA1c levels.[6]

Other factors need to be employed to ensure improvement and maintenance of glycaemia. These include dietary modifications, executing necessary lifestyle modifications, regular check-ups to assess treatment progression and continuous monitoring and adherence.

Conclusion

This study attempts to highlight the need of increased professional services such as pharmacist interventions, which are imperative in conditions such as diabetes. Patients who participated in the study showed an overall lack of compliance, which improved considerably following pharmacist intervention. This emphasises the need for improved patient education and closer monitoring to ensure improved treatment outcomes. Point-of-care HbA1c testing performed within the community pharmacy also proved to be important in identifying patients receiving sub-optimal treatment and consequently warranting referral. Such a service could be a beneficial means of monitoring patients' disease progression more closely, as the community pharmacist is one of the most accessible healthcare providers.

Increasing awareness of these care issues may improve patient perception of diabetes and instil motivation, such that patients gain confidence in managing their condition better. This will ultimately reflect on an improved disease outcome and quality of life of patients and carers.

References

1. Halpin HA, Morales-Suarez-Varela MM, Martin-Moreno JM. Chronic disease prevention and the new public health. Public Health Rep 2010;32(1):120-154.

2. Townsend Rocchiccioli J, O'Donoghue CR, Buttigieg S. Diabetes in Malta: Current findings and future trends. MMJ 2005;17(1):16-19.

3. Schwartz KL, Monsur J, Hammad A, Bartoces MG, Neale AV. Comparison of point of care and laboratory HbA1c analysis: A MetroNet Study. J Am Board Fam Med 2009;22(4):461-46.

4. Zammit L. Compliance issues in hypertensive care [project]. Msida (Malta): Department of Pharmacy, University of Malta; 2005.

5. Gaede P, Vedel P, Larsen N, Jensen GVH, Parving HH, Pedersen O. Multifactorial intervention and cardiovascular disease in patients with type 2 Diabetes. N Engl J Med 2003;348:383-393.

6. Hansen MV, Pedersen-Bjergaard U, Heller SR, Wallace TM, Rasmussen AK, Jorgensen HV, Pramming S, Thorsteinsson B. Frequency and motives of blood glucose self-monitoring in type 1 diabetes. Diabetes Res Clin Pr 2009;85(2):183-188.