ORIGINAL ARTICLE

Quality of care for patients with diabetes done by family medicine team during the period 2013-2016

Larisa Gavran[1], Salih Tandir[2], Suad Sivić[2,3], Fatima Topčić[1]

[1]Family Medicine Teaching Centre, Primary Health Care Zenica, [2]School of Medicine, University of Zenica, [3]Institute for Health and Food Safety Zenica; Zenica, Bosnia and Herzegovina

Corresponding author:

Larisa Gavran

Family Medicine Teaching Centre, Primary Health Care Zenica

Fra Ivana Jukuća 2, 72000 Zenica,

Bosnia and Herzegovina

Phone: +387 32 401 555;

Fax: +387 32 242 113;

E-mail address: gavranlarisa@yahoo.com

ORCID ID: http://www.orcid.org/0000-0001-6035-6496

ABSTRACT

Aim To assess whether the quality of diabetes care provided by a family medicine team changed over the course of four years and to identify potential gaps in our practice in order to improve it in the future.

Methods An audit was carried out for randomly selected 120 medical records (MC) from the Diabetes Registry of patients with type 1 or 2 diabetes mellitus treated by one family medicine team for four consecutive years, from 2013 to 2016. We examined demographic data (gender, age, diabetes type, family history), annual examinations (glycated haemoglobin, blood glucose, lipid profile, neurological examination, urinalysis, foot care, ocular fundus and body mass index), prescribed insulin or other drugs and patients' education.

Results Over the years females dominated with the maximum of 63% in 2013. In most years type 2 diabetes occurred in 93% of patients. The acceptable level of monitoring included examination of ocular fundus, lipid profile or total cholesterol, blood pressure, fasting and postprandial blood glucose with more than 80% annually. A low level of monitoring complications of diabetes was found on monofilament test, 26% in 2016, urinalysis, 20% in 2016 and examination of feet with the maximum of 46% in 2013. Outcome measurement showed satisfactory levels of glycated haemoglobin of 60% in 2014, blood pressure 76% in 2014, fast 56% and postprandial blood glucose of 73% in 2013.

Conclusion We still need to find effective interventions that will lead to improvement of care for patients with diabetes in family medicine.

Key words: quality of care, diabetes, family medicine team

INTRODUCTION

Diabetes mellitus is a chronic non-communicable disease. Huge, constant increase of economic and medical costs for diabetes mellitus type 2 requires timely prevention of this disease and energetic treatment of an already existing one (1). The increasing number of patients worldwide is taking pandemic proportions. According to the latest data from the International Diabetics Federation of 2016, there are around 415 million people with diabetes registered in the world (2), and the assumption is that 46% more are still unregistered. According to the same source, in Bosnia and Herzegovina (B&H) diabetes is registered in 363,600 adults (20-79 years), and it is estimated that 157,800 adults have undiagnosed diabetes. According to the data from 2015, diabetes mellitus in B&H is in the fifth place in Europe with the disease prevalence of 12.3% of the adult population aged 20-79 (2).

The role of the family medicine team in the care of patients with diabetes mellitus is very important and significant in prevention and early detection, treatment, as well as early detection and treatment of complications and assessment of the quality of health care (3).

Despite the usefulness and effectiveness of glycaemic control, blood pressure and hyperlipidemia control interventions, the implementation of comprehensive care standards for diabetes remains suboptimal (4,5). Although the role of family medicine in diabetics is particularly important, the utilization of clinical recommendations for diabetes is inadequate and insufficient at the primary health care level, therefore, an increasing number of patients with diabetes remains at high risk (3-5). No special organisational model has proved to be superior. A correct assessment of quality of care indicators should take into account the heterogeneity of type 2 diabetes mellitus as well as the socio-economic status and the ethnicity of the patient population (6). It can be achieved by structured systematic care of patients in general practice. This needs to be underpinned by information systems that assist with recall and audit, along with provider education, multidisciplinary team work, and shared care with specialist services (3). The addition of patient education to these interventions and the enhancement of the role of nurses in diabetes care led to improvements in patient outcomes and the process of care (4).

Clinical audit presents a practical approach to systematically evaluate the quality of patient care, and identify treatment gaps between current practice and target goals (7,8). Several clinical audits reported modest improvements in some key indicators (3-10).

The aim of this study was to assess whether the quality of diabetes care provided by one family medicine team in Primary Health Care Zenica was changed over the course of four consecutive years from 2013 to 2016, and to identify potential gaps in our practice in order to improve it in the future.

PATIENTS AND METHODS

Patients and study design

Medical audit as a method of assessment of care quality (7) using retrospective analysis of medical chart based on explicit criteria and standards was done. Data were collected retrospectively using chart review and it was done for the period of four consecutive years for the period 2013- 2016. An audit was carried out by randomly selected 30 medical records (MC) from diabetes registry of patients with type 1 or 2 diabetes mellitus treated by one family medicine team in Primary Health Care Zenica, Bosnia and Herzegovina. From a diabetes registry containing records of 118 patients with diabetes, every fourth patient medical record was taken to total 30 records annually, resulting in a total of 120 patient MCs in four years.

Methods

The questionnaire of the Agency for Quality and Accreditation in Health – AQAH in the Federation of Bosnia and Herzegovina addressing outcome and process of care measures for early detection of complications and long-term management of diabetes was used (6): regular measurement of body mass inex (BMI) and blood pressure on every visit to the family medicine team (yes/no), urine albumin and blood creatinin, fasting glucose or glycated haemoglobin (HbA1C), and lipid profile or total cholesterol (yes/no), feet and ocular fundus examination (yes/no), and neurological examination with monofilament test in the last 15 months of period.

Statistical analysis

Descriptive statistical methods to examine and describe the data were used. Results were pre-

sented in a table with the number and percentage of patients with diabetes and their parameters, as well as the levels of the required parameters.

RESULTS

Our study was based on the analysis of 120 medical records of patients with diabetes mellitus during the four-year period. During almost of all four years female patients were more represented than males, with the maximum of 63% in 2013. The largest number of patients had type 2 diabetes mellitus, 93%. Family history of diabetes was found in majority of patients, with the maximum of 83% in 2016. (Table 1).

Table 1. Demographic and clinical characteristics of 120 patients with type 2 diabetes in the period 2013-2016

	No (%) of patients during the year			
	2013	2014	2015	2016
Gender				
Females	19 (63)	18 (60)	18 (60)	15 (50)
Males	11 (36)	12 (40)	12 (40)	15 (50)
Type of diabetes mellitus				
Type 1	3 (10)	2 (6,6)	2 (6,6)	2 (6,6)
Type 2	27 (90)	28 (93)	28 (93)	28 (93)
Family history of diabetes				
Yes	14 (46)	18 (60)	18 (60)	25 (83)
No	16 (53)	12 (40)	12 (40)	5 (16)

Monitoring of the process of care and the occurrence of diabetes complications were followed by the number of patients' examinations conducted in the previous 15 months prior to each of the four consecutive years. The number of performed examinations of monofilament test and urinalysis was improved in 2016, eight (26%) and six (20%), respectively, comparing to 2013, where there were no registered examinations for both periods. Contrary to this, the number of feet examinations decreased from 14 (46%) in 2013 to 12 (40%) in 2016, as well as for ocular fundus from 24 (80%) in 2013 to 14 (46%) in 2016. The number of patients with recorded lipid profile decreased from 30 (100%) in 2013 to 26 (86%) in 2016, blood pressure measured decreased from 27 (90%) in 2013 to 25 (83%) in 2016, HbA1C measurement decreased from 29 (96%) in 2013 to 25 (83%) in 2016. Most patients were tested for fasting blood glucose and postprandial blood glucose in 2013, 29 (96%). The number of measurements of body weight (BW), body height (BH) and body mass index (BMI) decreased from 30 (100%) in 2013 to 20 (66%) in 2016 (Table 2).

Table 2. Clinical and laboratory investigations performed on 120 patients during the period 2013-2016

Parameter	No (%) of patients examined per year			
	2013	2014	2015	2016
Neurological (monofilament)	0 (0)	5 (16)	8 (26)	8 (26)
Urinalysis for albuminuria	0 (0)	1 (3)	1 (3)	6 (20)
Examination of feet	14 (46)	7 (23)	7 (23)	12 (40)
Examination of ocular fundus	24 (80)	28 (93)	28 (93)	14 (46)
Lipid profile or total cholesterol	30 (100)	28 (93)	28 (93)	26 (86)
Blood pressure	27 (90)	25 (83)	25 (83)	25(83)
Glycated haemoglobin	29 (96)	20 (66)	20 (66)	25 (83)
Fasting Blood glucose	29 (96)	28 (93)	28(93)	27(90)
Postprandial blood glucose	29 (96)	20 (66)	23 (76)	23 (76)
Measured BW, BH and BMI	30 (100)	13 (43)	13 (43)	20 (66)

BW, body weight; BH, body height; BMI, body mass index

The number of patients who received oral hypoglycaemic agents (OHA) and had insulin therapy prescribed increased from 15 (50%) and six (20%), respectively, in 2013 to 26 (86%) and 12 (40%), respectively, in 2016. Over the years, the number of patients who were prescribed OHA with insulin was almost equal, eight (26%) (Table 3).

Table 3. Management and treatment of 120 patients with diabetes included in the clinical audit performed in the period 2013-2016

Prescribed therapy	No (%) of patients per year			
	2013	2014	2015	2016
Oral hypoglycaemic agents (OHA)	15 (50)	16 (76)	15 (50)	26 (86)
Insulin only	6 (20)	7 (23)	7 (23)	12 (40)
OHA with insulin	8 (26)	7 (23)	7 (23)	8 (26)
Have a return appointment scheduled	30 (100)	27 (90)	13 (39)	13 (39)
Patients education about diabetes	30 (100)	30 (100)	30 (100)	23 (76)
Self-monitoring of blood glucose/3 months	29 (96)	17(56)	17 (56)	15 (50)

The number of patients with normal HbA1C (≤7%) decreased from 18 (60%) in 2014 to 14 (46%) in 2016, as well as number of those with normal fasting blood glucose (<7 mmol/L) and postprandial blood glucose decreased from 17 (56%) and 22 (73%), respectively, in 2013 to 16 (53%) and 18 (60%), respectively, in 2016. The number of patients with normal blood pressure (≤140/90 mmHg) increased from 13 (43%) in 2013 to 20 (66%) patients in 2016 (Table 4).

Table 4. Comparison of target parameters and clinical outcome of diabetes care performed on 120 patients during the period 2013-2016

Parameter	No (%) of patients with targeted values per year			
	2013	2014	2015	2016
HbA1C<7%	14 (46)	18 (60)	14 (46)	14 (46)
Fasting Blood glucose<7 mmol/L	17 (56)	13 (43)	12 (40)	16 (53)
Postprandial Blood glucose< 11.1mmol/L	22 (73)	20 (66)	20 (66)	18 (60)
Blood pressure≤140/90 mmHg	13 (43)	23 (76)	20 (66)	20 (66)

DISCUSSION

With this audit of diabetes care we, as a family medicine team, wanted to examine how we could manage our patients and achieve recommended goals of management and treatment of diabetes.

Our study has shown lack of monitoring of the process of care among patients with diabetes over the years. Actually, we had an increment for individual measurements, but unsatisfactory for monofilament test (26% in 2016), urinalysis (20% in 2016) and examination of feet (46% in 2013). Although the level of monitoring of complication of diabetes changed over the years, it was at an acceptable level for examination of ocular fundus, lipid profile, blood pressure, fasting blood glucose and HbA1C with more than 80% during most of the study period. Compared to a study conducted in Bosnia and Herzegovina (B&H) by monitoring parameters in 18 family medicine teams at 5 locations they had better results comparing to the results of this study for the examination of renal function 54.1% and 20%, respectively, feet examination 53.4% and 46% respectively, ocular fundus 53% and 46%, respectively, neurological examination 35% and 26%, respectively (6). Comparing to the previous one this study obtained better results for the following measurements: BMI 66% compared to 25%; HbA_1C 83% compared to 26%, lipid profile examined 80% compared with 75% and blood pressure measure 80% versus 67.2% in the B&H study (6). In a Canadian study, almost all patients had a documented blood pressure and lipid profile; more than half (60%) had a record of the weight and/or BMI (11). Another similar B&H study conducted in Zenica, analysed indicators of the control of people with type 2 diabetes - on the sample of 853 charts, insufficient percentage of records was shown for HbA1c (37.8%), fundus oculi (40.8%), foot examination (47.1%) and for urinalysis (56.3%) (12).

According to the Family Medicine Standards issued by the AQAH FB&H in 2014 (6,13), in the clinical audit of the management of diabetes mellitus, it is predicted that body mass index and waist circumference, examination of ocular funds and foot, testing of neuropathy with monofilament, urinoanalysis and registered HbA1c need to be done for the last 15 months. Each of the individual criteria for assessing the quality of care for people with diabetes was estimated by reviewing 20 medical records. In fact, in 16 out of 20 medical records of patients with diabetes, each of the suggested parameters of the Family Medicine Standards should be found (6,13).

Outcome measure showed that the normal level (less than or equal to 7.0) of HbA1C increased from 46% in 2013 to 60% in 2014 and decreased to 46% in 2015 and 2016. In Canada HbA_1C was within the target value (less than or equal to 7.0) in 76% of patients (11). In a B&H study normal HbA_1C was found in 40.9% in only one primary health centre (6). An American study showed that 40.5% of patients had values less than 7%. Normal fasting blood glucose decreased from 56% in 2013 to 53% in 2016, in the B&H study it was found in 54.5% of patients (6). Finally, normal blood pressure increased from 43% in 2013 to 76% in 2014 and decreased to 66% in 2015 and 2016. Similar results were also obtained in the B&H study (6). The American study showed that only 35.3% of patients had adequate blood pressure control (14).

The limitations of the study could be a relatively small number of the charts per year for one team of family medicine. Each year, we randomly selected data from 30 charts from Diabetes Registers without considering the duration of the disease. Consequently, the patients with a long-term illness and expected worsening of the disease were compared with newly diagnosed patients in whom we expected improved levels of glycaemia and less complications of diabetes; on average, all patients might have falsely better outcome of the disease. Also we did not make a difference in the management and treatment of the disease regarding age, gender and whether or not the patients had taken insulin only, oral therapy or a combination of medications.

Multilevel models showed that patient ethnicity, practice type, involvement of midlevel clinicians, and the treatment were all associated with HbA1c level (14). Actually, interventions for type 2 diabetes in primary care are better targeted at individuals with very poor glycaemic control (15). Elimination of clinical inertia, finding solutions for lack of guidelines about diabetes care in family medicine practice, reduced daily check-ups and administrative overload with increased financial

incentives for family medicine teams may contribute to improved services and better clinical outcomes (16-19).

Compared with other studies, these results highlight that we need better understanding of possible reasons of such fluctuations in diabetes care over the years, as well as the reasons for the lack of

causal relationship between the process of diabetes care and outcome of the measures (20).

TRANSPARENCY DECLARATIONS

Competing interests: none to declare.

REFERENCES

1. World Health Organization: Definition, diagnosis and classification of diabetes mellitus and its complications. Part diagnosis and classification of diabetes mellitus. Geneva, Department of noncommunicable disease surveillance, 1999. www.who.int/iris/handle/10665/66040 (20 November 2017)

2. International Diabetes Federation. IDF diabetes atlas-7th edition. www.diabetesatlas.org (20 November 2017)

3. Zachariadou T, Makri L, Stoffers HE, Philalithis A, Lionis C. The need for quality management in primary health care in Cyprus: results from a medical audit for patients with type 2 diabetes mellitus. Qual Manag Health Care 2006;15:58–65.

4. Georgiou A, Burns J, McKenzie S, Penn D, Flack J, Harris MF Monitoring ghange in diabetes care using diabetes registes. Experience from division of general practice. Aust Fam Physician 2006; 35:77-80.

5. Renders C, Valk G, Griffin S, Wagner E, Eijk Van J, Assendelft W. Interventions to improve the management of diabetes in primary care, outpatient and community settings: a systematic review. Diabetes Care 2001; 24:1821-33.

6. Novo A, Jokić I. Medical audit of diabetes mellitus in primary care setting in Bosnia and Herzegovina. Croat Med J 2008; 49:757–62.

7. Rutten GE. Care of patients with type 2 diabetes mellitus in primary care. Ned Tijdschr Geneeskd 2008; 152:2389-94.

8. Shehab A, Elnour A, Abdulle A. A clinical audit on diabetes care in patients with type 2 diabetes in Al-Ain, United Arab Emirates. Open Cardiovasc Med J 2012; 6:126–32.

9. Lee TW, Chan SC, Chua WT, Harbinder K, Khoo YL, Ow Yeang YL, Sethuraman K, Teoh LC. Audit of diabetes mellitus in general practice. Med J Malaysia 2004; 59:317-22.

10. Racic M, Kusmuk S, Mašić S, Ristić S, Ivković N, Djukanovic D Lj, Božović Dj. Quality of diabetes care in family medicine practices in eastern Bosnia and Herzegovina. Prim Care Diabetes 2015; 9:112-9.

11. Agarwal G, Kaczorowski J, Hanna S. Care for patients with type 2 diabetes in a random sample of community family practices in ontario, Canada. Int J Family Med 2012; 2012:734202.

12. Gavran L, Brkic S, Nuhbegovic S, Sivic S, Batic-Mujanovic O, Beganlic A. Improvement in monitoring of type 2 diabetes mellitus (DM) done by family medicine teams after implementation of DM flowcharts. Acta Inform Med 2009; 17:15-19.

13. Riđanović Z, Kerleta-Tuzović V, Novo A. Diabetes Mellitus. In: Standardi za timove porodične/obiteljske medicine. Sarajevo: Agencija za kvalitet i akreditaciju u zdravstvu u Federaciji Bosne i Hercegovine, 2014:57-61.

14. Spann SJ, Nutting PA, Galliher JM, Peterson KA, Pavlik VN, Dickinson LM, Volk RJ. Management of type 2 diabetes in the primary care setting: a practice-based research network study. Ann Fam Med 2006; 4:23-31.

15. Murphy ME, Byrne M, Galvin R, Boland F, Fahey T, Smith SM. Improving risk factor management for patients with poorly controlled type 2 diabetes: a systematic review of healthcare interventions in primary care and community settings. BMJ Open 2017; 4:7:e015135.

16. Harris BS. Clinical inertia in patients with T2DM requiring insulin in family practice. Can Fam Physician 2010; 56:418–24.

17. Bralić Lang V, Bergman Marković B, Kranjčević K. Family Physician clinical inertia in glycemic control among patients with type 2 diabetes. Med Sci Monit 2015; 21: 403–11.

18. Valk GD, Renders CM, Kriegsman DM, Newton KM, Twisk JW, Eijk JT, Wal G, Wagner EH. Quality of care for patients with type 2 diabetes mellitus in the Netherlands and the United States: a comparison of two quality improvement programs. Health Serv Res 2004; 39:709-25.

19. Gulliford MC, Ashworth M, Robotham D, Mohiddin A. Achievement of metabolic targets for diabetes by English primary care practices under a new system of incentives. Diabet Med 2007; 24:505–11.

20. Ohman-Strickland PA, Orzano AJ, Hudson VS, Solberg IL, Ciccio-Bloom Di B, O'Malley D, Tallia FA, Balasubramanian AB, Crabtree FB. Quality of diabetes care in family medicine practices: influence of nurse-practitioners and physician's sssistants. Ann Fam Med 2008; 6:14–22.