Medical Audit of Diabetes Mellitus in Primary Care Setting in Bosnia and Herzegovina

Ahmed Novo[1], Irena Jokić[2]

[1]School of Medicine, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

[2]Federal Institute for Public Health, Sarajevo, Bosnia and Herzegovina

> **Correspondence to:**
> Novo Ahmed
> Ferhadija 17
> Sarajevo, Bosnia and Herzegovina
> *ahnovo@gmail.com*

Aim To assess the quality of diabetes care provided by family medicine teams in primary health centers in Bosnia and Herzegovina (BH) through a medical audit, addressing the extent to which clinical practice complied with pre-determined explicit criteria of long-term management.

Method Retrospective analysis included randomly selected medical records of patients with type 1 or 2 diabetes mellitus treated by 18 family medicine teams at 5 locations in BH, included in the Canadian International Development Agency/World Health Organization project "Strengthening health care system in BH with focus on primary health care/family medicine model." Audit record form contained 24 questions on sex, age, diabetes type, body mass index (BMI), hypertension, family anamnesis, annual examinations (HbA$_1$C, BMI, lipid profile or total cholesterol, blood creatinin, neurological examination, urinanalysis for albuminuria, foot care, and examination of ocular fundus), smoking habits, alcohol consumption, patient education, prescribed insulin and other drugs, and patient's health care-seeking behavior. Standardized and record forms were returned anonymously with 99.3% response rate.

Results Records of 536 patients with diabetes were analyzed (64% women and 87% patients with diabetes mellitus type 2). Family medicine teams showed poor compliance with established criteria for diabetes control. Metabolic control (69.5%) was acceptable, but the level of monitoring complications of diabetes (foot and ocular fundus examined in 53.4% and 53% of patients, respectively) was low. There were also considerable variations in diabetes management between different centers as well as between the teams in the same center.

Conclusion The audit revealed deficiencies in the quality of diabetes care and variations in care provision between primary care teams. Clinical guidelines and continuing education about acceptable diabetes care should be developed and implemented in BH.

Diabetes mellitus is a chronic disease present in 2%-5% of adult population. There are 180 million people affected with the disease worldwide (1) and their number is expected to double by 2030 (2). Diabetes mellitus accounts for a large burden of morbidity and mortality, because of complications leading to kidney disease, visual loss, lower limb amputation, and coronary heart disease. This chronic disease is present in all age groups and both sexes, affects all aspects of life, and requires multidisciplinary care. Thus, the management of the disease at primary care level has a large clinical impact. It has been shown that primary care management of the disease can be as good as or better than hospital outpatient care (3). Many studies have been carried out to improve the management of diabetes in primary care (4). The care outcomes, based on the St. Vincent Declaration (1), are reduction of blindness, renal failure, amputation of limbs, and coronary heart disease. However, the interval between a therapeutic intervention and long-term outcome can be long, therefore, intermediate outcome measures should be used in quality assessments. Such measures are control of systolic blood pressure, glycosylated hemoglobin, and low-density lipoprotein-cholesterol (LDL). These can prevent or slow down progression of vascular changes closely linked to morbidity and mortality (5). Measures of process of care are also used, such as control of body mass index (BMI) and examination of feet, ocular fundus, and renal function, which detect complications at early stages and help in averting undesired outcomes. Both types of quality of care measures have been used to compare and improve diabetes care in different countries (3,6).

The population of Bosnia and Herzegovina (BH) is 3 843 000 (12% aged over 65) and consists of two entities: the Federation (FBH) and Republic Srpska and the District of Brčko. The data on diabetes prevalence or incidence, distribution by sex, age, and types of the disease in BH are not available. National, country-wide clinical performance guidelines for diabetes management have not been developed. Primary care practitioners who completed the Program of Additional Training in Family Medicine for Physicians and Nurses (PAT Program), developed by Queens University of Canada, use the Canadian guidelines (7).

Several studies in neighboring countries addressed the issue of diabetes mellitus management in primary care. A Slovenian study examined the relevance of albuminuria in primary care patients with diabetes for their cardiovascular prognosis (8). Four studies were conducted in Croatia. One investigated attitudes, thoughts, and fears that patients with diabetes might experience in connection with their disease and obstacles they might encounter while adhering to the therapeutic regimen (9). Another investigated the association of the disease duration with the onset of complications and the physician assessment of patient compliance (10). A short review paper discussed the use of quality of care indicators of diabetes in primary care (11), and a study investigating a possibility of diagnosing metabolic syndrome on the basis of clinical and laboratory data collected from primary care medical records found that general practitioners either did not implement some activities or did not document them (12). However, no audit or other method of quality assessment of diabetes management in primary care was reported in countries of former Yugoslavia. Such a study was conducted in Cyprus and assessed diabetes care provided by primary health centers as suboptimal (13). The aim of our study was to assess the quality of diabetes care in primary care settings of BH by conducting a medical audit.

Subjects and methods

Medical audit is a method of quality of care assessment using retrospective analysis of medical records based on explicit criteria and standards developed specifically for the subject studied and the setting where it takes place (14). Our audit was based on the standards developed through the PAT program (15), which addressed intermediate outcome and process of care measures for the early detection of complications and long-term management of diabetes. The audit was carried out during 10 work days in October 2007 by 18 teams of family medicine in primary health care centers at 5 locations in BH; 6 teams in Doboj (Republic of Srpska), 3 in Brčko (District of Brčko), 4 in Tuzla, 3 in Kladanj, and 2 in Orašje (Federation of Bosnia and Herzegovina). These were the teams that took part in the Canadian International Development Agency/World Health Organization (CIDA/WHO) Project "Strengthening Health Care Systems in BH with Focus on Primary Health Care/Family Medicine Model." The 18 family medicine teams treated 804 patients with diabetes mellitus.

A structured questionnaire (web extra material) had been developed consisting of questions relating to patient data, family history, and type of diabetes. The questions were also based on pre-determined standards of care. We asked whether BMI and blood pressure were measured on every visit to the family medicine team, whether urine albumin and blood creatinin, fasting glucose or HbA1C, and lipid profile or total cholesterol were tested in the last 12 months, whether feet and ocular fundus were examined, and whether neurological examination was carried out. There were also questions about treatment and whether patients who smoked were advised to stop. We also inquired whether the patient had received any form of educational program during the previous year. Each of the 18 family medicine teams was asked to retrieve the medical record of every fourth patient with type 1 or type 2 diabetes mellitus and gather a total of 30 records per team, which would result in a total of 540 patients (60% of patients with diabetes). The teams were asked to fill out the questionnaire by answering the questions for each patient. Filled-out questionnaires were then mailed anonymously to the WHO Country Office and the author (NA) identified them by code. In medical audits, analysis of records is usually done by a specially established audit team, not by practitioners whose practice is being assessed (14). However, due to lack of potential audit team with specific experience and knowledge and due to insufficient resources, the audit was performed by the authors.

Statistical analysis

We used descriptive statistical methods to summarize and describe the collection of data. Data collected from the field were entered into Microsoft Excel database. Proportions were compared using χ^2 test. We used Statistical Package for the Social Sciences for Windows, version 11.5 (SPSS Inc., Chicago, IL, USA). The level of statistical significance was set at <0.05.

Results

Our analysis included the records of 536 patients with diabetes mellitus (response rate of 99.3%), 63.2% of whom were women. The majority of patients (55.6%) were in the 61-75 age group and 88.6% had type 2 diabetes mellitus (Table 1). There were 138 patients with a family history of the disease. The duration of the disease in analyzed patients was not known. At each visit to the family medicine team, blood pressure was measured in 360 (67.2%) and BMI in 134 (25.0%) patients; during the previous year, 385 (71.8%)

Table 1. Demographic and clinical characteristics of 536 patients included in the clinical audit

Characteristics	No (%) of patients
Sex:	
female	339 (63.2)
male	197 (36.8)
Type of diabetes mellitus:	
type 1	61 (11.4)
type 2	475 (88.6)
Age groups (years):	
<30	6 (1.1)
30-45	23 (4.3)
46-60	163 (30.4)
61-75	298 (55.6)
>75	46 (8.6)

Table 2. Clinical and laboratory investigations performed during the previous 12 mo by 18 family medicine teams in five primary health centers in Tuzla, Doboj, Kladanj, Orašje, and Brčko

Investigation	No (%) of patients
Neurological	191 (35.6)
Urinalysis for albuminuria	258 (48.1)
Examination of feet	286 (53.4)
Examination of ocular fundus	288 (53.7)
Blood creatinin	329 (60.4)
Lipid profile or total cholesterol	391 (72.9)

Table 3. Management of 536 patients included in the clinical audit and their compliance with the treatment

Management	No (%) of patients
Oral medications for diabetes	362 (67.6)
Insulin	100 (18.6)
Dietary changes only	74 (13.8)
Showing-up regularly scheduled control visits	326 (60.8)
Considered to comply well	402 (75.0)
Have a return appointment scheduled	332 (61.9)

patients had their weight measured, but not their height. In the previous 3 months, normal HbA$_1$C was found in 142 (26.5%) and normal fasting blood glucose in 234 (43%) patients.

Various proportions of patients had the specified clinical and laboratory investigations performed in the previous 12 months, from 35.6% who performed neurological examination to 72.9% who had their lipid profile or total cholesterol checked (Table 2). There were 60 smokers and 49 of them (81.6%) were advised to stop; in 81 patients the smoking status was not recorded. Among 536 patients, 412 (76.9%) were known to have increased blood pressure. Records of 362 (67.5%) patients contained information that they received some sort of patient education related to the disease during the last year. The majority of pa-

tients (67.5%) received oral diabetic medications and 75% of patients were considered to comply well with the treatment (Table 3). In addition to diabetes-specific treatment, 490 patients (91%) were taking other prescription medications, 58% of them more than 3 medications at the same time.

Discussion

The audit disclosed acceptable metabolic control with low frequency of monitoring complications of diabetes. The quality of diabetes care was assessed by studying the performance of intermediate outcome and process of care measures. As to process measures, assessment of renal function was done in 54.1% of our patients, compared with 84% in Sweden (16) and 71.4% in England (17). Feet examination was performed in 53.4% of patients, compared with 63% in Israel (18) and 70.4% in England (17); ocular fundus was examined in 53% of patients, compared with 68.3% in Israel (18) and 64.6% in England (17); neurological examination was performed in 35% of patients. BMI was measured in 25% of patients, compared with 40% in Israel (18,19). With regard to intermediate outcome measures, only 26% of patients had their HbA$_1$C checked in the previous year, compared with 75% of patients in Israel (19); 69.5% of patients had satisfactory metabolic control, compared with 60% in Sweden (16), 67% in Finland (20), 42.9% in England in 2001 (17) and 59% in 2005 (21), and 40% in Germany (22). Seventy five per cent of patients had their lipid profile examined. Blood pressure was measured on each visit to the family medicine team in 67.2% of patients, compared with 83% in England (17), whereas 76.9% of patients were known to have elevated blood pressure. In Sweden, only 40% of patients did not have acceptable blood pressure levels (16). It is commendable that 81.6% of known smokers were advised

to stop smoking, but we do not know whether the advice was followed. Variations among primary health centers were observed. Normal fasting glucose was found in 54.5% of patients in one primary health center and in 26.7% in another. Normal HbA$_1$C was found in 40.9% of patients in one primary health center and in none in another. Variations between different centers were found in received diabetes education, scheduled appointments, and compliance with therapy. Variations were also noted in the frequency of annual investigations performed between different family medicine teams of the same primary health center. The audit revealed poor compliance with pre-determined standards in many primary health centers. It disclosed acceptable metabolic control but low frequency of monitoring target organ damage and detected significant variations among family medicine teams of different primary health centers, as well as among family medicine teams of the same primary health center.

The audit we performed had two main limitations. An important negative aspect of diabetes is the increased risk for developing coronary heart disease, but no information was obtained on this aspect in the studied population. Also, patients with diabetes have to deal with many behavioral changes in life style to adhere to the regimen (9), but the audit did not address patients' perspectives on care at this stage of the assessment of care in Bosnia and Herzegovina.

The audit accomplished its aim, since it assessed the quality of diabetes care by studying the extent to which clinical practice in the studied primary health centers complied with pre-determined criteria and standards. The quality was found to be inadequate in comparison with that provided in some other European countries.

To improve the quality, the findings of the audit were sent to all physicians and nurses in primary health centers who took part in the audit, with recommendations for improvements in their day-to-day work. Country-wide clinical performance guidelines for diabetes management in primary care should be developed and implemented and continuing education of diabetes management in primary care should be organized.

References

1   Diabetes care and research in Europe: an action programme for the implementation of St. Vincent Declaration for the improvement of diabetes care. Copenhagen: WHO Regional Office for Europe; 1991.

2   Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care. 2004;27:1047-53. Medline:15111519 doi:10.2337/diacare.27.5.1047

3   Renders CM, Valk GD, Griffin SJ, Wagner EH, Eijk Van JT, Assendelft WJ. Interventions to improve the management of diabetes in primary care, outpatient, and community settings: a systematic review. Diabetes Care. 2001;24:1821-33. Medline:11574449 doi:10.2337/diacare.24.10.1821

4   Griffin S. Diabetes care in general practice: meta-analysis of randomised control trials. BMJ. 1998;317:390-6. Medline:9694757

5   National Quality Forum. Available from: *http://www.qualityforum.org/*. Accessed: November 12, 2008.

6   Kerr EA, Gerzoff RB, Krein SL, Selby JV, Piette JD, Curb JD, et al. Diabetes care quality in the Veterans Affairs Health Care System and commercial managed care: the TRIAD study. Ann Intern Med. 2004;141:272-81. Medline:15313743

7   Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Canadian Diabetes Association 2003 clinical practice guidelines for the prevention and management of diabetes in Canada. Canadian Journal of Diabetes. 2003;27 Suppl 2:S1-152.

8   Mlacak B, Jaksic Z, Vuletic S. Albuminuria, cardiovascular morbidity and mortality in diabetic and non-diabetic subjects in a rural general practice. Fam Pract. 1999;16:580-5. Medline:10625130 doi:10.1093/fampra/16.6.580

9   Vinter-Repalust N, Petricek G, Katic M. Obstacles which patients with type 2 diabetes meet while adhering to the therapeutic regimen in everyday life: qualitative study. Croat Med J. 2004;45:630-6. Medline:15495293

10 Vinter-Repalust N, Jurkovic L, Katic M, Simunovic R,

Petric D. Disease duration, patient compliance and presence of complications in diabetic patients [in Croatian]. Acta Med Croatica. 2007;61:57-62. Medline:17593642

11   Vrca-Botica M, Zelic I. Quality indicators for diabetes care in primary care. Diabetol Croat. 2007;36:31-2.

12   Markovic BB, Kern J, Milakovic SB, Kranjcevic K, Matijasevic I, Repalust NW, et al. Metabolic syndrome in family medicine [in Croatian]. Acta Med Croatica. 2007;61:245-51. Medline:17629098

13   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. Medline:16456481

14   Eldar R. Quality of medical care [in Croatian]. Zagreb: Medicinska Naklada; 2003.

15   Hodgetts PG. Program of additional training, response to curriculum review and commentary. Available from: *http://post.queensu.ca/~geddesj/PATresponse.htm*. Accessed: June 15, 2008.

16   Farnkvist LM, Lundman BM. Outcomes of diabetes care: a population-based study. Int J Qual Health Care. 2003;15:301-7. Medline:12930045 doi:10.1093/intqhc/mzg047

17   Khunti K, Ganguli S, Baker R, Lowy A. Features of primary care associated with variations in process and outcome of care of people with diabetes. Br J Gen Pract. 2001;51:356-60. Medline:11360698

18   Goldfracht M, Porath A. Nationwide program for improving the care of diabetic patients in Israeli primary care centers. Diabetes Care. 2000;23:495-9. Medline:10857941 doi:10.2337/diacare.23.4.495

19   Vinker S, Nakar S, Ram R, Lustman A, Kitai E. Quality of diabetes care in the community: a cross-sectional study in central Israel. Isr Med Assoc J. 2005;7:643-7. Medline:16259344

20   Valle T, Koivisto VA, Reunanen A, Kangas T, Rissanen A. Glycemic control in patients with diabetes in Finland. Diabetes Care. 1999;22:575-9. Medline:10189534 doi:10.2337/diacare.22.4.575

21   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. Medline:17381507 doi:10.1111/j.1464-5491.2007.02090.x

22   Pittrow D, Stalla GK, Zeiher AM, Silber S, Marz W, Pieper L, et al. Prevalence, drug treatment and metabolic control of diabetes mellitus in primary care [in German]. Med Klin (Munich). 2006;101:635-44. Medline:16896570 doi:10.1007/s00063-006-1093-x