

# Measuring adherence rate to quality indicators for diabetes care identified by primary health care in Bahrain

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## ABSTRACT

**الأهداف:** لقياس جودة نوعية الرعاية للمرضى الذين يعانون من مرض البول السكري في العيادات الخارجية (12 عيادة) للطب العام (GPC) مقارنة بعيادة واحدة لرعاية السكري (DCC).

**الطريقة:** أجريت دراسة مقطعية مستعرضة في مركز الرازي الصحي، المنامة، البحرين حيث تمت مراجعة السجلات الصحية للمرضى، خلال الفترة من يناير إلى ديسمبر 2012م، وتم جمع معلومات عن مؤشرات بيان جودة علاج مرضى السكري وهي عبارة عن 8 مؤشرات لسير العملية و 4 مؤشرات للنتائج المتوسطة، ومن ثم مقارنتها بالأهداف المعيارية، من خلال دراسة سجلات 120 مريضاً من عيادات الطب العام و 80 مريضاً من عيادة السكري.

**النتائج:** المعدل المتوسط لفحص الشبكية للسكري وفحص الأقدام السكرية وإعادة فحص اختبار الزلال البولي وفحص اختبار التحكم في السكر هي 0%، 0%، 2%، 13% و 18% في عيادات الطب العام (على التوالي)، في حين أنها كانت 87%، 97%، 58% و 79% في عيادة السكري (على التوالي)، وكان هناك تباين كبير في معدلات قياس بيان الجودة بين عيادة السكري و عيادات الطب العام.

**الخاتمة:** اوجدت الدراسة تباين كبير في معدل مؤشرات سير العملية والنتائج المتوسطة في عيادات الطب العام، والتي تتطلب المزيد من التحسينات على اداؤها. أما عيادة السكري فهي تجاوزت الأهداف في 7 مؤشرات. وبينت الدراسة أيضاً أن الالتزام بمؤشرات سير العملية من عمل الفحوصات الدورية للسكري لم يترافق مع مؤشرات النتائج المتوسطة الجيدة.

**Objectives:** To measure the quality of care for patients with diabetes mellitus at the outpatient clinics from 12 general practitioners clinics (GPC) and one diabetes care clinic (DCC).

**Methods:** A cross-sectional study was conducted at the Al-Razi Health Center, Manama, Bahrain, and health records from January to December 2012 were reviewed. The study consisted of 120 patients from GPC, and

80 patients from DCC. Information regarding quality indicators on the management of diabetic care was gathered, which consisted of data on the adherence rate for each of the 8 processes and 4 intermediate outcomes indicators, and was then compared to the standard target.

**Results:** The average rate for the examination of measurement in GPC for diabetic retina was 0%, diabetic foot was 2%, second microalbuminuria retesting was 13%, and glycosylated hemoglobin test order (HbA1c) was 18%, and in the DCC, 87% (diabetic retina), 97% (diabetic foot), 58% (second microalbuminuria retesting), and 79% (HbA1c). The differences were statistically significant between DCC and GPC.

**Conclusion:** This study has found significant differences in the adherence rate of process and clinical outcome indicators across the GPC, an area that requires further improvements. The DCC, however, highly exceeded the target in 7 indicators, while it was relatively far from the target in the other 3 indicators. The study revealed that adherence to process indicators was not associated with good intermediate outcomes.

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Diabetes mellitus (DM) is one of the most widespread non-communicable diseases in many countries. According to the National Non-Communicable Diseases Risk Factors Survey (NCD Survey) report of 2007 in Bahrain, the prevalence of DM was 14.3% among Bahraini people.<sup>1</sup> In Bahrain, the prevalence of DM among 20-79 year-olds in 2013 was 17.3%, and the total cases of adults with diabetes was 168.66/1000.<sup>2</sup> Diabetes mellitus was reported in 10.6% of foreign workers, who were registered at the primary health care (PHC) services (7.3% of them were newly diagnosed). The rate of impaired fasting glucose tolerance among foreign workers was 6.3%, which was considered to be high in comparison with other parts of the world.<sup>3</sup> Diabetes imposes an increasing economic burden on the national health care systems worldwide.<sup>4</sup> The mean healthcare expenditure per person with diabetes in Bahrain was US\$9,056,<sup>2</sup> as a result the health care system needs immediate and proactive action to prevent further morbidities and mortalities, particularly from macrovascular and microvascular complications.<sup>4</sup> Accordingly, comprehensive and appropriate management of patients with DM should include early screening for diagnosis and complication prevention.<sup>5</sup> The Ministry of Health (MOH) in Bahrain exert efforts to reduce the morbidities of DM. The Diabetic Committee was established in 1997, as well as, introduced specialized diabetic care clinics (DCC) in some PHCs, as a pilot implementation.<sup>6</sup> In 2008, additional DCCs under the supervision of trained diabetic physicians and nurses were established. The Al-Razi Health Center (RHC) is one of the 27 health centers across Bahrain that was included in the pilot implementation of specialized DCC.<sup>6</sup> The RHC only treats expatriate workers, who are mostly male patients (accounting for more than 95% of the patients), and representing 1,227 companies across the country.<sup>7</sup> The DM clinical practice guidelines (CPG) published in 2008 consists of 11 quality indicators in order to better manage DM.<sup>8</sup> The indicators included the structure, process, and outcome. Structure refers to the environment of care, while process refers to how things are organized and carried out, and outcome refers to the impact of health services on the patients.<sup>5</sup> The aim of the study was to determine the quality of care of the management of patients with DM at the outpatient clinics in RHC in Bahrain. The study particularly focuses on the implementation of the DM CPG quality indicators.

**Methods.** This is a cross-sectional retrospective study. The medical files of patients visiting the outpatient clinics at RHC between January and December 2012 were reviewed. Approval for the study was obtained from the Quality Committee at the PHC.

**Study population and inclusion criteria.** The target group consisted of workers registered at RHC and diagnosed with DM. They were either attending the GPC or the DCC, and were on regular follow up visits for a minimum period of 12 months duration. Ten patients were selected from each of the 12 general practitioner clinics (GPC) (total of 120 patients), as well as one trained general practice physician and one trained diabetic nurse from the DCC. The overall population size was 1,000 in GPC in contrast to 400 in the DCC. The sample selection was random, and records were in paper file form; the samples were randomly collected by one trained diabetic nurse. Information on process indicators and intermediate outcomes was collected, and the adherence rate for each indicator was compared with GPC, DCC, and the standardized target.

**Study parameters and data collection.** Patients' records were reviewed. The following information was extracted: demographic data (age, gender, and ethnic group); type of clinics (GPC or DCC); process; and intermediate outcome indicators based on the MOH DM CPG of 2008 were circulated, likewise, all physicians and diabetic nurses were trained across the country before this study. The following are Bahrain's diabetic indicators:<sup>8</sup>

**a) Process indicators.** Seven process indicators were included (Table 1). A process indicator was considered as "achieved" if there were documentation in the medical records of any tests requested by the physician, or laboratory results during the past 12 months. Nephropathy was assessed either by 2 first morning samples for albumin to creatinine ratio (ACR), or by 24-hour timed urine protein (UP). Retinopathy was assessed either by fundoscopic examination carried out by the physician, or fundal photography assessed by the technician. Diabetic foot assessment was either documented by the physician, or by the diabetic nurse. The physician's adherence rate to each indicator is calculated using patients that satisfied the target indicators. The authors added another indicator, which was not included in the MOH DM CPG, as they considered it crucial for the quality assessment of DM management. This is the filling chronic disease flow sheet, which must be filled for each patient by either the attending physician, or clinical nurse; and

**b) Intermediate outcome indicators.** Four intermediate outcome indicators were included (Table

2). Test for glycemic control by recording the most recent glycosylated hemoglobin (HbA1c) level in the last year was considered "optimal" if HbA1c level  $\leq 5.3\%$ . Blood pressure (BP) control was considered "optimal" if systolic blood pressure (SBP) was  $\leq 130$  mm Hg, and diastolic blood pressure (DBP) was  $\leq 80$  mm Hg. Furthermore, dyslipidemia control was considered "optimal" if low-density lipoprotein cholesterol (LDL-chol) level was  $\leq 2.6$  mmol/L.

Data were analyzed using the Statistical Package for Social Sciences version 15 (SPSS Inc, Chicago, IL, USA). Significance testing of proportions was appropriate by using Wilcoxon matched pairs test, where  $p \leq 0.05$  was considered significant.

**Results. Demographic data.** A total of 200 patients were included in the study. The male to female ratio was 49:1 (with male accounting for 98% of the total patients). The age ranged between 26-75 years (mean; 48 years) in both GPC and DCC. The ethnic group's variations were comparable between the DCC and GPC, but DM was reported more among the Indian patients (65%) than other nationalities (75%) attending both clinics (Table 3).

**Process and intermediate outcome indicators.** The staff's adherence rate at the DCC of most quality guidelines was high, and exceeded expectations. The mean difference between the DCC and standardized target was statistically significant. In contrast, the staff's adherence rates at the GPC to quality guidelines were far beyond the standardized target for almost all the indicators. The mean difference between the GPC and standardized target was also statistically significant, and the mean difference between the DCC and GPC was also statistically significant.

**Table 1 -** Diabetes mellitus process indicators used in this study.

Process indicators	No. of measurements	Standardized target (%)
Glycosylated hemoglobin test	Twice annually	(90)
Blood pressure measurement	Thrice annually	(90)
Urine albumin testing or ACR or 24 urine total protein	First testing	(90)
Urine albumin re-testing or ACR	Second re-testing	(90)
Lipid profile	Once annually	(90)
Eye assessment	Once annually	(70)
Foot assessment	Once annually	(70)
Filling chronic disease flow sheet	Filling of chronic disease sheet in each visit	(90)
ACR - spot albumin to creatinine ratio		

**The HbA1c test and glycemic control.** The physician's adherence to order HbA1c twice per year was reported only in 18% in the GPC, and 79% in the DCC. The mean HbA1c level was 7.5% in GPC, and 6.9% among the patients in DCC. The "optimal" glycemic control was observed in 12% attending the GPC, and 16% of the patients in the DCC, which are considered as poor control for both clinic. The mean difference between the GPC and DCC was statistically significant for HbA1c screening test ( $p < 0.0005$ ) (Table 4).

**Blood pressure measurements and hypertension control.** Blood pressure should be measured at least thrice annually. This was achieved only in 70% of the patients in GPC compared with 100% of patients in the DCC. The mean SBP level was  $123 \pm 19$ , and the mean DBP was  $79 \pm 9$  mm Hg. The result was better in DCC. The optimal SBP control of  $\leq 130$  and DBP of  $\leq 80$  was reported in 52% of GPC, and 74% of DCC. The mean difference between the GPC and DCC were both statistically significant for BP measurement ( $p < 0.0005$ ) and control ( $p < 0.002$ ) (Table 4).

**Serum cholesterol level (LDL-chol) and hyperlipidemia control.** Despite the high physician's adherence rate to measure the lipid profile once annually in both clinics, but the achieved "optimal" lipid control of LDL-chol  $\leq 2.6$  mmol/l was below the standardized target. It was 28% in the GPC, and 24% in the DCC. The patients with LDL-chol  $> 2.6$  mmol/l were treated with anti-lipid agents (mainly statin therapy) at 67% in the GPC, and 87% in DCC. The mean difference between the GPC and DCC was statistically significant for both lipid level screening ( $p < 0.005$ ), and control on statin treatment ( $p < 0.001$ ) (Table 4).

**Microalbuminuria level.** A total of 51% of patients were initially screened for microalbuminuria in the

**Table 2 -** Diabetes mellitus intermediate outcome indicators used in this study.

Intermediate outcome indicators	Outcome level	Target (%)
Glycosylated hemoglobin levels	$\leq 5.3\%$	(30)
Blood pressure levels	Both systolic blood pressure $\leq 130$ mm Hg and diastolic blood pressure $\leq 80$ mm Hg	(70)
LDL-chol	With LDL-chol $\leq 2.6$ mmol/L	(50)
Percentage of patients, not on treatment	With LDL-chol $> 2.6$ mmol/L	(20)
LDL-chol - low-density lipoprotein cholesterol		

GPC, while it reached up to 100% in the DCC. This result became lower when we checked for the records of re-testing for microalbuminuria in both clinics. It was 13% in GPC, and 58% in the DCC. The mean difference between the GPC and DCC was statistically significant for both first and second microalbuminuria tests ( $p < 0.0005$ ) (Table 4)

**Documentation of eyes and foot examination.** The records for screening for diabetic retinopathy (0%) and foot examination (2%) were both very poor in the GPC. In contrast, it reached up to 87% (screening for diabetic retinopathy) and 97% (screening for foot examination) in the DCC. The mean difference between the GPC and DCC was statistically significant for both retinal and foot examination ( $p < 0.0005$ ) (Table 4).

**Filling the chronic disease flow sheet.** The results showed that only 33% of the flow sheet data were filled by the GPC, while it reached 79% by the DCC. The mean difference between the GPC and DCC was statistically significant ( $p < 0.0005$ ) (Table 4).

**Table 3 -** Diabetes mellitus among the different ethnic groups attending both regular and diabetic clinics included in this study (N=200).

Variables	n (%)	
	Regular	Diabetic
Clinics	120 (60.0)	80 (40.0)
<i>Nationality</i>		
Indian	90 (75.0)	52 (65.0)
Bangladesh	17 (14.2)	11 (13.7)
Pakistani	5 (4.2)	8 (10.0)
Nepalese	4 (3.3)	5 (6.2)
Others	4 (3.3)	4 (5.0)

**Discussion.** It is well-documented that there are considerable variations in DM care, and wide ranges of implementation of standards of care.<sup>9</sup> Tabrizi et al<sup>10</sup> reported a major gap between the recommended DM standard of care and the actual care that patients receive. The current study shows that the adherence rate to the standardized targets was relatively higher in DCC compared to the GPC. The adherence rate to the process indicators by physicians was relatively higher compared with intermediate outcome measures. In the DCC, the overall rates achieved showed minimum differences from the standardized targets, with mostly 7 out of 12 indicators achieved. Contradictorily, the GPC showed high divergence from all the standardized targets. The RHC could be reflective of the state of diabetes care for expatriate patients in Bahrain as it is the only health center caring for expatriates in Bahrain.

Weber et al<sup>11</sup> measured the performance of process and intermediate outcome indicators, they were fallen short of recommendations when assessed by records review. They showed that BP measurement was consistently high across all specialties (in 98.4%), while in our study it reached up to 70% (GPC) and 100% (DCC), this finding was observed in other studies as well.<sup>12</sup> Weber et al<sup>11</sup> also found that HbA1c and lipid profile tests were carried out in 75%, and 50% with “optimal” control of HbA1c, and lipid control was achieved in approximately 50% of the patients. This was compared with our findings, where HbA1c was carried out in 79% and lipid profile test in 100% at DCC, while it was considered as “suboptimal” for the control of HbA1c (16%) and lipid control (24%), and

**Table 4 -** Comparison between the standardized target of all the indicators and the mean achieved results among the regular and diabetic clinics.

Diabetes mellitus indicators	Standardized target	Regular clinics* (%)	Diabetic clinic*	P-value
Glycosylated hemoglobin (HbA1c) twice a year	(90.0)	(18.0)	(79.0)	0.0005
HbA1c $\leq 5.3\%$	(30.0)	(12.0)	(16.0)	0.542
Measured blood pressure at least 3 times a year	(90.0)	(70.0)	(100.0)	0.0005
Last systolic blood pressure $\leq 130$ mm Hg, and/or last DBP $\leq 80$ mm Hg	(70.0)	(52.0)	(74.0)	0.002
Lipid profile carried out at least once in the last year	(90.0)	(87.0)	(100.0)	0.005
LDL $> 2.6$ mmol/L on statin therapy	(80.0)	(67.0)	(87.0)	0.001
LDL $\leq 2.6$ mmol/L	(50.0)	(28.0)	(24.0)	0.629
Microalbuminuria testing record in the reporting year	(90.0)	(51.0)	(100.0)	0.0005
Microalbuminuria re-testing in the reporting year	(90.0)	(13.0)	(58.0)	0.0005
Record of retinal examination referral in the last year	(70.0)	(0.0)	(87.0)	0.0005
Record of diabetic foot screening	(70.0)	(2.0)	(97.0)	0.0005
Filling flow sheet of chronic disease data	(90.0)	(33.0)	(79.0)	0.0005

\*mean achieved results. DBP - diastolic blood pressure, LDL - low-density lipoprotein cholesterol,  $p \leq 0.05$  was considered significant

HbA1c target <5.3% is used as an intermediate outcome indicator, instead of the internationally common target of <7.0 (normal value ranges may vary slightly among different laboratories). This finding is even worse than reports from other countries like Singapore, India, and Taiwan that showed poor glycemic control and suboptimal lipid control in one-third to one-half of the DM population.<sup>13,14</sup>

The urine test for microalbumin is a well-known predictor of poor renal outcome, and an early indicator of cardiovascular events.<sup>15</sup> The study showed that both clinics were below achieved targets, mainly in the re-testing for microalbuminuria. This finding is consistent with other studies, which showed suboptimal compliance rate of primary care physicians to follow microalbuminuria screening.<sup>16</sup> Anabtawi et al<sup>16</sup> suggested that adherence to computerized physicians reminders can improve the rates of compliance to testing for microalbuminuria. Moharram et al<sup>17</sup> demonstrated that the use of flow sheets was associated with notable improvements of all indicators. They concluded that flow sheets can be effective in improving the quality of care not only for diabetes, but also for other chronic conditions. The quality of care in general, and the chart reviews through patients' records was very poor in GPC in comparison with DCC, due to time constraints and absence of teamwork. The previous studies generally showed that the rates for non-laboratory assessments, such as eye assessments, foot assessments, and filling flow sheets were lower than laboratory-based tests.<sup>12</sup>

Body mass index (BMI) measurement and smoking was included in the DM intermediate outcome indicator in some studies.<sup>18,19</sup> However, they were not included in our national diabetic indicators. We found that the patient's weight and height were usually not recorded, although controlling the BMI can optimize patient care and decrease comorbidities, one of them is the obesity.<sup>19</sup> Clearly, there are variations in adherence to diabetes care guidelines or recommendations in primary care practice. We found that adherence to the process indicators is not always associated with good intermediate outcomes. Conversely, the overall clinical outcome indicators were less impacted by the practice because of many assumptions either to patient noncompliance with physician advice or physicians not implementing guidelines into practice. Kirkman et al<sup>20</sup> exhibited that one year after development of local guidelines, there was a major improvement in referrals to the eye clinic and foot examination. However, they concluded that sustained improvements in diabetes care are difficult to attain by using traditional

physician-targeted approaches in busy primary care practices, which are lacking organizational support and computerized tracking systems.

Currently in Bahrain, specialized DCC are available in all health centers, which in turn has many challenges. Firstly, although the national guidelines recommended filling a DM information sheet at the initial and follow up visits, however, it is occasionally used in actual practice. This is because the GPC is busier than the DCC with more patients, and with shorter consultation time of 7.5 minutes (compared with 15 minutes at the DCC). Consequently, compliance and adherence to management targets are difficult to achieve. The second challenge is the distribution of DM patients among the GPC who may be managed by a different doctor at each visit. This might contribute to changing the management plan and non-adherence to the national guidelines. Additionally, the GPC lack appropriately trained diabetic nurses that can provide continuous and satisfactory educational program for all DM patients, or their care-givers. The third challenge is the inadequate registration and recording of the performance and management of DM patients. Registration and recording can be employed to identify the defaulters, and used as a resource for clinical audits and feedback for the decision makers.

To further improve diabetic care, a multidisciplinary DM management team in each health center is crucially needed. This must consist of a team of trained diabetic nurse, diabetic retinopathy specialist, dietitian, chiropodists, health educator, and social worker.

*Limitations of the study.* The data collected by reviewing the medical records retrospectively, as well as the incomplete documentation could affect the results. In addition, patients' factors, such as, reluctance to undertake the laboratory test could result in the lowering of recorded laboratory tests rates.

In conclusion, the study provides the baseline for quality improvement and serves as an impetus for further qualitative and quantitative studies on DM healthcare. There is no doubt that allocating the resources toward prevention of DM and its complication in primary care setting, will outweigh the budget that would be needed for the treatment of these complications. Based on this study, we recommend that an integrated DCC have to be developed; one which supports all healthcare staffs to provide best practice. This can be achieved by evaluating the degree of improvement in the standards of care provided to the diabetic patients since the implementation of the national guidelines. Accordingly, it can be achieved by adopting a revised guideline that

meets the national and international standards, keeping in consideration the need to improve the allocated resources.

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