Diabetes Care and Outcomes

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Objective: To evaluate diabetes care, outcomes and compliance with diabetes guidelines.

Design: A Retrospective Study.

Setting: Salmaniya Medical Complex, Endocrinology Clinics, Bahrain.

Method: Patients with type 2 Diabetes Mellitus (DM) were included in the study. Patient's personal characteristics, diabetic care and outcome measures were documented from January 2018 to December 2018.

Result: Three hundred seventy-seven records were reviewed; 232 (61.5%) were females and 211 (55.9%) were below 60 years. Glycated hemoglobin was measured in 265 (70.3%), of which, 114 (30.2%) had levels below 7% and 86 (22.8%) had levels above 8%. Two hundred twenty-eight (60.5%) patients had their blood pressure checked at least twice per year; 143 (38%) had their systolic and diastolic pressures controlled. Kidney function tests ranged between 55% and 88%. Ninety (23.9%) patients had their weight measured and 86 (22.8%) had their Body Mass Index measured.

Conclusion: The level of diabetes care for type-2 diabetic patients was suboptimal. A multilevel action plan is crucial to improve healthcare providers' compliance with the recommended diabetes guidelines.

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Diabetes mellitus (DM) is an expanding epidemic. The prevalence globally is estimated to be 8-10%; Type 2 Diabetes Mellitus (T2DM) makes approximately 90%. The prevalence of DM in Bahrain is approximately 14-16%[1-3].

Effective diabetes care necessitates continuous monitoring, risk assessment and multidisciplinary approaches to ensure optimal glycemic, blood pressure (BP) and lipid control. According to the National Health Services (NHS) and American Diabetes Association (ADA), T2DM is a financial burden on health care systems[4,5].

Recent local and international guidelines recommend minimum standards of care to be provided for diabetic patients. T2DM patients should have their glycated hemoglobin (A1C), lipid profile, estimated Glomerular Filtration Rate (eGFR), urinary Albumin-to-Creatinine Ratio (ACR), weight, Body Mass Index (BMI), BP and other parameters regularly monitored by their healthcare providers[6-8].

Several local and regional clinical studies assessed the quality of diabetes care and determined that the provided care was suboptimal.

The aim of this study is to evaluate diabetes care, outcome and compliance with diabetes guidelines.

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METHOD

The study was performed from January 2018 to December 2018. Considering a confidence interval of 95%, less than 5% margin of error and prevalence of DM, the calculated sample size of 350-400 patients was considered to be adequate.

T2DM patients who presented in the first week of every month between January 2018 and December 2018 were included. Patients with secondary DM, gestational DM, and below 18 years were excluded.

Adequate glycemic control is defined as A1c value of less than 7 mmol/L, while inadequate glycemic control is defined as A1c value above 8 mmol/L. In addition, A1c value between 7 to 8 mmol/L is considered partially adequate glycemic control.

The following were documented: age, sex and nationality, A1c, weight, BMI, BP, lipids profile, Liver Function Test (LFT), ACR, creatinine, eGFR, systolic and diastolic blood pressure, total cholesterol and low-density lipoprotein (LDL) level.

The data were analyzed. A1c should be performed at least twice a year; BP, weight, and BMI should be measured at every follow-up visit; lipids profile, LFT, ACR and eGFR should be evaluated annually. A1c goal for diabetic adults should be less than 7%. Total cholesterol level should be <5mmol/L; LDL should be <2.6 mmol/L and BP should be <140/80 mmHg.

RESULT

Three hundred seventy-seven patients were included in the study; 232 (62%) were females. Two hundred sixty-seven (71%) were dyslipidemic, 242 (64%) had hypertension and 82 (22%) had hypothyroidism. The mean age of the study participants was 56.6 years (95 CI; 55.4 – 57.9 years). Three hundred two (80.1%) were on metformin and 183 (48.5%) were on insulin treatment; the average number of prescribed diabetes medications was >2.

Table 1: Diabetes Care Processes in T2DM

	Measured (n=377)	n (%)
Process	A1c	265 (70.3%)
	Weight	90 (23.9%)
	BMI	86 (22.8%)
	BP	228 (60.5%)
	Lipid profile	363 (96.3%)
	LFT	364 (96.6%)
	ACR	292 (77.5%)
	Creatinine	331 (87.8%)
	eGFR	210 (55.7%)
Outcome	A1c level <7 % (n=265)	114 (43%)
	Total cholesterol (n=363)	294 (80.1%)
	LDL < 2.6 mmol/L (n=363)	259 (71.3%)
	Systolic BP (n=228)	150 (65.8 %)
	Diastolic BP (n=228)	202 (88.6%)

A1C: glycated hemoglobin, **BMI:** Body Mass Index, **BP:** blood pressure, **LFT:** Liver Function Test
ACR: Albumin-Creatinine Ratio, **eGFR:** estimated Glomerular Filtration Rate 265 tested for A1c, 363 tested for cholesterol, 363 tested for LDL, 228 tested for Diastolic and systolic BP

A1c level was measured in 265 (70.3%); 114 (30.2%) had A1c level below 7% and 86 (23.6%) had A1c above 8%. Only 90 (23.9%) had their weight measured and only 86 (22.8%) had their BMI measured. In addition, 228 (60.5%) had their blood pressure checked at least twice, 150 (65.8%) had controlled systolic BP (BP<140 mmHg), 202 (88.6%) had controlled diastolic BP (BP<90 mmHg), but only 143 (62.7%) of them had both BPs controlled. A blood pressure target of <140/90 mmHg was selected and found fewer patients had uncontrolled hypertension (<10%). These findings are shown in table 1 and figure 1.

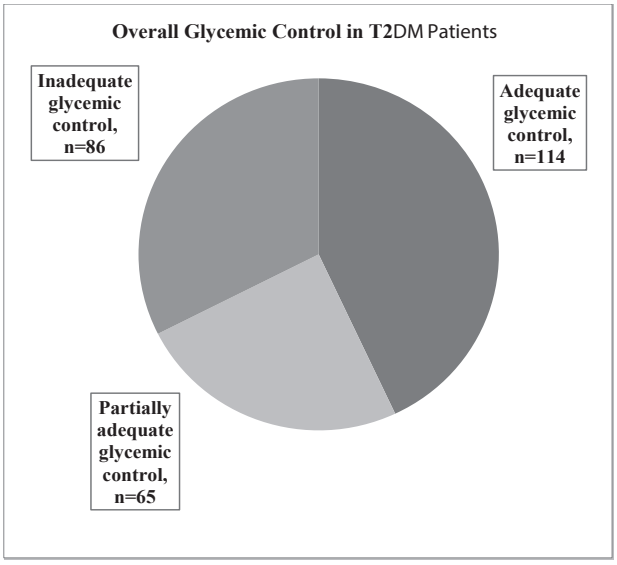

Figure 1: Overall Glycemic Control in T2DM Patients

The lipid profile was measured in 363 (96.3%); 294 (80.1%) had normal cholesterol levels. LFT was performed in 364 (96.6%). Two hundred fifty-nine (71.3%) patients achieved LDL level of less than 2.6 mmol/L. Kidney function tests (ACR, creatinine level and eGFR) were measured in 292 (77.5%), 331 (87.8%) and 210 (55.7%), respectively.

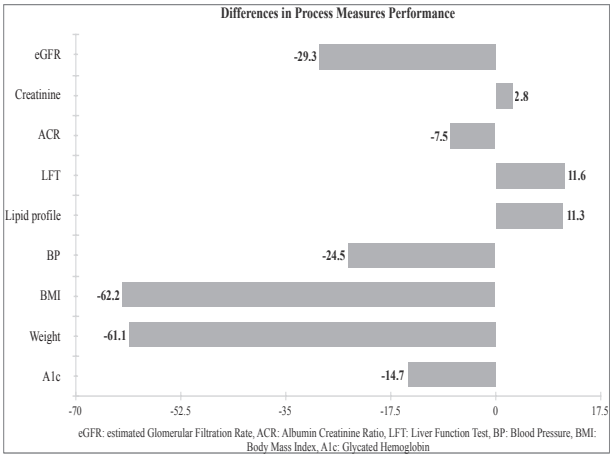

Figure 2: Differences in Process Measures Performance Compared with Standards of Care

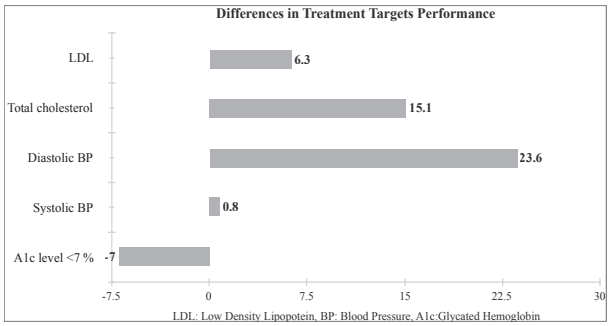

Figure 3: Differences in Treatment Targets Performance Compared with Standards of Care

DISCUSSION

In this study, we found important gaps between clinical guidelines and practice in diabetes care and outcomes that can be improved. Studies have shown that achieving A1C target, especially early in the course of the disease, reduces not only microvascular complications, but possibly also macrovascular[14,15]. Nevertheless, studies revealed that approximately 50% of diabetic adults did not meet their treatment targets[14,15].

Compared to local studies, we found better glycemic, blood pressure and lipid profile control rates (43% versus 11-32%)[10-12]. The low rate of diabetes control in this study is consistent with other studies[12-15]. Compared to other studies, our study showed comparable treatment results though the rate of diabetic care was suboptimal[11-15].

Short consultation time, implementation of new Electronic Medical Record (EMR) and different healthcare providers at each visit may influence diabetes care. Other contributing factors include patients' non-adherence to a management plan, limited health literacy and inability to practice self-management[16].

Multi-level planning and quality improvement models can be used to improve diabetes care; the Plan, Do, Study, Act (PDSA) and Lean Six Sigma cycles could address the system, healthcare and patient barriers[17,18]. Continuous training, establishing a reward system, and including the compliance to guidelines in the annual professional appraisal, may also be beneficial[19]. Improving patient adherence to the management plan by addressing the barriers and simplifying treatment regimens is extremely essential as poor adherence is associated with uncontrolled diabetes[20].

Studies showed that social media programs can be used by healthcare providers to address the misconceptions, gain diabetes knowledge, emphasize the importance of adherence and establish expansive, highly accessible and effective communication channels[21].

Some limitations should be acknowledged. Long-term diabetes complications, foot care, eye examination, and dental assessment were not evaluated. An additional limitation is that the data were derived solely from EMR data which may have underestimated the performance rate.

CONCLUSION

The quality of care in terms of diabetic processes and outcomes could be improved. Generally, comprehensive diabetes management is important but remains challenging due to healthcare system, healthcare providers and patients' barriers. Further studies are needed to determine barriers and achieve optimal glycemic targets.

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