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Quality of Diabetes Care: A cross-sectional observational study in Oman

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جودة الرعاية لداء السكر: دراسة مقطعية وصفية في عمان

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الخلاصة: الهدف: تقييم جودة الرعاية الصحية المقدمة لمرضى داء السكر في عمان. **الطريقة:** هذه دراسة مقطعية تم فيها اختيار نصف عدد المرضى الذين راجعوا ستة مراكز للرعاية الصحية الأولية خلال شهر يونيو من عام 2005 بصورة منهجية . استخدم الإحصاء الوصفي لتبيان المعطيات. **النتائج:** بلغ عدد المرضى المصابين بداء السكر الذين شملتهم هذه الدراسة 430 مريضا (منهم 263 امرأة 61%-) . كان متوسط عمر العينة 12 ± 52 سنة بينما كان المدى بين 6 إلى 84 سنة . فقط في 40% (171 مريضا) تم الفحص العشوائي لسكر الدم . مقابل 39% (169 مريضا) تم فحص سكر الدم عندهم على الريق .وهذا يعني أن 79% (339 مريضا) حصلوا على فحص السكر في الدم سواء كان ذلك عشوائيا أو على الريق . أما الفحوص الأخرى فكانت **كما يلي:** 74% (317 مريضا) تم فحص الهيموغلوبين السكري والبروتينُ الشَّحْمِيُّ خَفيضُ الكَثافة بينما تم قياس ضغط الدم الانقباضي والانبساطي في 95% منهم (409 مريضا) . كانت الفحوص كاملة في 58% من العينة (249 مريضا) **وشملت:** فحص الهيموغلوبين السكري وقياس ضغط الدم والكوليسترول الكلي والبروتينُ الشَّحْمِيُّ خَفيضُ الكَثافة و البروتينُ الشَّحْمِيُّ مُرْتَفِعُ الكَثافَة والدهون الثلاثية . كان لدى فقط 2.4% (6 من مجموع 249 مريضا) نتائج ضمن الحدود الطبيعية من مقياس الهيموغلوبين السكري (<7%) وضغط الدم (<=80/130) و الكوليسترول (<5.2م/ل) و البروتينُ الشَّحْمِيُّ خَفيضُ الكَثافة (<3.5م/ل) و البروتينُ الشَّحْمِيُّ مُرْتَفِعُ الكَثافَة (<-1.1>1.68م/ل) و الدهون الثلاثية (<1.8م/ل). **الخلاصة:** كان هناك تدوينا جيدا لقيم المؤشرات المستخدمة لتقييم الجودة. على الرغم من ذلك تعتبر نسبة 2.4% من المرضى الذين يقعون في الحدود الطبيعية المعروفة عالميا منخفضة جدا.

مفتاح الكلمات: الجودة . داء السكر . المؤشرات . عمان .

ABSTRACT ***Objectives:*** The objective of this study was to evaluate the quality of diabetes care in Oman. ***Methods:*** This was a cross-sectional observational study. Fifty percent of all those attending six general health centres in June 2005 were systematically selected for the study. Descriptive statistics were used to describe the data. ***Results:*** A total of 430 diabetic subjects were included. Just over 61% percent of the subjects were female (n = 263). The overall mean age of the cohort was 52 ± 12 years ranging from 6 to 84 years. Only 40% (n = 171) and 39% (n = 169) of the diabetics had their random blood sugar (RBS) and fasting blood sugar (FBS) documented, respectively. However, 79% (n = 339) had either RBS or FBS done according to the records. Documentation for the other measurements ranged from 74% (n = 317) for HbA1c and LDL (low density lipoproteins)-cholesterol to 95% (n = 409) for systolic and diastolic blood pressure (SBP/DBP) readings. A total of 58% (n = 249) of patients had non-missing values of HbA1c, SBP/DBP, total cholesterol, LDL-cholesterol, HDL (high density lipoproteins)-cholesterol, and triglycerides. Only 2.4% (6 out of 249 diabetics) were simultaneously within goal for HbA1c (<7%), SBP/DBP (<=130/80mmHg), total cholesterol (<5.2mmol/L), LDL-cholesterol (<3.3mmol/L), HDL-cholesterol (>1.1 - <1.68mmol/L), and triglycerides (<1.8mmol/L). ***Conclusion:*** There was good documentation of values for the indicators used in the assessment of quality. However, the proportion (2.4%) of those meeting internationally recognised goals for the three diabetes-related factors was extremely low.

Key Words: Quality; Diabetes; Indicators; Oman.

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Advances in Knowledge

- This is the first study to highlight the quality of diabetes care in a regions where diabetes is becoming an important factor in regional health problems.

Applications to Patient Care

Given the background of a less than desirable quality of care in Oman, more vigilance is required to improve the care of diabetes in Oman. The following are recommended:

- Self-management support to patients.
- Maintenance of disease registries.
- Monitoring compliance at the point of care with active follow-up to ensure the best outcome. General practitioners should be aggressive in controlling risk factors associated with diabetes

- The nurse's role in diabetes care should be enhanced.
- Evidence-based guidelines should be integrated into care, and supported by provider education, links with specialty expertise, and reminder systems.
- Interventions should focus on patient education, training of primary care physicians and other patient care providers in behavioural change and redesign of local systems of delivering care.
- The Chronic Care Model (CCM) provides a blueprint for changing office systems to improve chronic patient care.

Diabetes mellitus is a major health problem that is associated with significant morbidity and mortality. The estimated number of diabetics world wide is greater than 240 million, with 1 of them dying every 10 seconds. The number of affected individuals is increasing rapidly from 94 million in 2003 to 246 million in 2007 representing 6.0% of the adult population. In 2025, the projected prevalence is estimated to be 308 million.[1] These startling figures are due mainly to a massive increase in the worldwide prevalence of obesity. In the USA, 75% of adults will be overweight and 41% obese by 2025 if its citizens continue to gain weight at the current rate.[2] Diabetes also imposes a huge cost burden on the patients, families and health care systems. In 2007, the cost of diabetes mellitus (DM) in the USA alone was estimated to be 232 billion USD.[1]

These problems are also reflected in the Middle East where the prevalence of obesity is also increasing along with that of diabetes mellitus 2 (DM2), which in 2007 varied between 3.4% in the Yemen to 19.5% in the UAE in patients between 20-79 years of age. In Oman, the 2007 figure was 14% and is expected, as in other countries, to increase sharply in the next 25 years.[1] Given the high prevalence rates of diabetes and the direct link between its poor control and significant morbidities such as blindness, myocardial infarction and renal failure, it is essential to assure delivery of high quality care. Ultimately, this would help in reducing the cost of managing such complications and improve the quality of life of diabetic patients. Furthermore, primary health care centres play a major role in the management of chronic illnesses. Therefore, assessing the quality of care provided by these centres is essential for improving such care. The aim of this study was to assess the quality of diabetic care in the primary health care centres in Oman.

METHODS

Out of 26 primary health care centres in Muscat, six centres were specifically selected for the study based on their distance from the University Hospital. These centres were representative of the Muscat region in terms of population covered and type of services provided.[3] The target population was 860 patients who visited the six centres during the month of June 2005. Every second patient attending the clinics was selected for the study. This produced data on 50% of the total number of patients from each centre.

A checklist of indicators was developed based on the Omani Ministry of Health guidelines for the management of diabetes mellitus in primary health care centers.[4] The variables assessed included recorded HbA_{1c}, triglycerides, total cholesterol, low density lipoproteins-cholesterol (LDL), high density lipoproteins-cholesterol (HDL), systolic and diastolic blood

Table 1: Demographic, diabetic, blood pressure and lipid profiles of the study cohort stratified by gender (n = 430)

Characteristic	Number (%) of documentation in file	All	Male	Female	*p*-value
Gender, n (%)	430 (100%)	430 (100%)	167 (39%)	263 (61%)	
Age, mean ± SD, years	430 (100%)	52 ± 12	53 ± 12	51 ± 11	0.120
Random Blood Sugar (RBS),mmol/L	171 (40%)				
Mean ± SD		11.4 ± 4.2	11.0 ± 3.5	11.8 ± 4.7	0.186
Patients at goal, 4.4-< = 10, n (%)		72 (42%)	33 (44%)	39 (41%)	0.657
Fasting Blood Sugar (FBS),mmol/L	169 (39%)				
Mean ± SD		9.3 ± 3.1	8.9 ± 3.5	9.5 ± 2.9	0.184
Patients at goal, 4.4-< = 7, n (%)		40 (24%)	20 (34%)	20 (18%)	0.022
Presence of either RBS or FBS value, n (%)	339 (79%)	339 (79%)	134 (80%)	285 (78%)	0.571
HbA_{1c}, %	317 (74%)				
Mean ± SD		8.7 ± 2.4	8.8 ± 2.4	8.7 ± 2.3	0.264
HbA_{1c}, %, <8.0%		146 (46%)	59 (48%)	87 (45%)	0.515
HbA_{1c}, %, <7.0%		77 (24%)	35 (29%)	42 (22%)	0.149
HbA_{1c}, %, <6.5%		45 (14%)	23 (19%)	22 (11%)	0.060
HbA_{1c}, %, <5.7%		13 (4%)	9 (7%)	4 (2%)	0.020
Systolic Blood Pressure (SBP), mmHg	409 (95%)				
Mean±SD		133 ± 17	133 ± 17	133 ± 17	0.945
Patients at goal, < = 135, n (%)		236 (58%)	92 (58%)	144 (57%)	0.947
Patients at goal, < = 130, n (%)		235 (57%)	91 (57%)	144 (58%)	0.849
Patients at goal, < = 125, n (%)		138 (34%)	51 (32%)	87 (35%)	0.522
Patients at goal, < = 120, n (%)		138 (34%)	51 (32%)	87 (35%)	0.522
Diastolic Blood Pressure (DBP), mmHg	410 (95%)				
Mean±SD		82 ± 9	82 ± 9	82 ± 9	0.704
Patients at goal, < = 80, n (%)		273 (67%)	110 (69%)	163 (65%)	0.457
Patients at goal, n (%)					
SBP/DBP, mmHg, < = 135/< = 80	409 (95%)	199 (49%)	77 (48%)	122 (49%)	0.863
SBP/DBP, mmHg, < = 130/< = 80	409 (95%)	198 (48%)	76 (48%)	122 (49%)	0.768
SBP/DBP, mmHg, < = 125/< = 80	409 (95%)	131 (32%)	48 (30%)	83 (33%)	0.481
SBP/DBP, mmHg, < = 120/< = 80	409 (95%)	131 (32%)	48 (30%)	83 (33%)	0.481
Total Cholesterol,mmol/L	386 (90%)				
Mean ± SD		5.41 ± 1.16	5.47 ± 1.38	5.37 ± 1.01	0.412
Patients at goal, <6.5, n (%)		326 (84%)	125 (84%)	201 (85%)	0.809
Patients at goal, <5.2, n (%)		153 (40%)	58 (39%)	95 (40%)	0.821
LDL-Cholesterol,mmol/L	317 (74%)				
Mean ± SD		3.56 ± 0.95	3.55 ± 1.01	3.57 ± 0.92	0.860
Patients at goal, <4.13, n (%)		233 (74%)	85 (71%)	148 (75%)	0.401
Patients at goal, <3.3, n (%)		119 (38%)	44 (37%)	75 (38%)	0.802
Patients at goal, <2.59, n (%)		46 (15%)	21 (17%)	25 (13%)	0.238
HDL-Cholesterol,mmol/L	324 (75%)				
Mean ± SD		1.12 ± 0.68	1.05 ± 0.46	1.16 ± 0.78	0.136
Patients at goal, >0.9 - <1.2, n (%)		132 (41%)	50 (40%)	82 (41%)	0.830
Patients at goal, >1.1 - <1.68, n (%)		105 (32%)	31 (25%)	74 (37%)	0.020
Triglycerides,mmol/L	346 (80%)				
Mean ± SD		1.68 ± 1.40	1.76 ± 1.35	1.60 ± 1.43	0.309
Patients at goal, <4.44, n (%)		333 (96%)	129 (94%)	204 (98%)	0.099
Patients at goal, <1.80, n (%)		234 (68%)	89 (65%)	145 (69%)	0.391
Total no. of non-missing values of $HbA_{1c,}$ SBP/DBP, Total cholesterol, LDL-cholesterol, HDL-cholesterol, and Triglycerides	249 (58%)	6 (2.4%) ***			

SD = Standard deviation; ***Only 6 (out of 249 diabetic patients = 2.4%) were within goal of HbA_{1c} (<7.0%), SBP/DBP (< = 130/< = 80 mmHg), total cholesterol (<5.2mmol/L), LDL-cholesterol (<3.3mmol/L), HDL-cholesterol (>1.1 to <1.68mmol/L), and triglycerides (<1.8mmol/L).

pressure as well as fasting and/or random blood sugar measurement during the most recent visit. This retrospective research was done by third and fourth year medical students. In order to secure quality data collection, the students were supervised by the first author after a three day training course on how to extract data from patient records.

Descriptive statistics were used for the data. For categorical variables, frequencies and percentages were reported. Differences between groups were analysed using Pearson's χ^2 tests (or Fisher's exact test for cells less than 5). For continuous variables, means and standard deviations (±SD) were presented and analyses were conducted using the Student's t-test. An *a priori* two-tailed level of significance was set at 0.05.

RESULTS

A total of 430 diabetic subjects were included in the study from six health centres in various sections of the capital city, Muscat. The demographic, diabetic, blood pressure and lipid profiles of the study cohort, stratified by gender, are shown in Table 1. Just over 61% percent of the subjects were females (n = 263). The overall mean age of the cohort was 52 ± 12 years ranging from 6 to 84 years. Only 40% (n = 171) and 39% (n = 169) of the diabetics had their random blood sugar (RBS) and fasting blood sugar (FBS) documented, respectively. However, 79% (n = 339) had either RBS or FBS done according to the records. Documentation for the other measurements ranged from 74% (n = 317) for HbA_{1c} and LDL-cholesterol to 95% (n = 409) for blood pressure readings.

A total of 58% (n = 249) of the patients had non-missing values of HbA_{1c}, SBP/DBP, total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglycerides. Overall, there were only 2.4% (6 out of 249 diabetic patients) that were simultaneously within goal for HbA_{1c} (<7%), systolic and diastolic blood pressure (SBP/DBP) (< = 130/80mmHg), total cholesterol (<5.2mmol/L), LDL-cholesterol (<3.3mmol/L), HDL-cholesterol (>1.1 - <1.68mmol/L), and triglycerides (<1.8mmol/L).

DISCUSSION

More than 70% of the patients had their blood pressure, fasting or random blood sugar and HbA_{1C} levels measured regularly; however, the proportion of those meeting the expected goals of risk factor control was much lower. More disappointing was the very low number of those (6 out of 249 = 2.4 %) who achieved internationally recognised goals for all 6 diabetes related factors, namely a HbA_{1C} <7.0%, BP ≤130/80, total cholesterol <5.2mmol/L, LDL <3.3mmol/L, HDL-cholesterol >1.1 - <1.68mmol/L and triglycerides <1.8mmol/L. [5-11]

Our disappointment is, however, tempered by a recent report form the USA concerning 36 academic, university, non-general practice clinics who reported a success rate of only 10% in achieving these goals.[12] The challenge for diabetes care is that treatment of this complex disease requires multiple key processes and resources involving both provider and patient.[13] Interventions should focus on patient education, training of primary care physicians and other patient care providers in behavioural change and redesign of local systems of delivering care. The Chronic Care Model (CCM) provides a blueprinting for changing office systems to improve chronic care.[14] In a study that examined the effect of the Chronic Care Model in a small independent practice, often without major structural change in the practice, Nutting et al. showed an association with higher levels of process measures and intermediate outcomes for diabetes care.[15]

CONCLUSION

In conclusion, poor control of high blood sugar levels is linked with micro- and macrovascular complications such as blindness, renal failure, myocardial infarction and cerebrovascular accidents. Ultimately, these have direct impact on the economic state of patients and families as well as being a burden on health care systems. Therefore, given the high prevalence of diabetes and its complications with the increasing cost of health care services, assuring high quality care to diabetic patients becomes imperative. This should be achieved through offering self-management support to patients, maintaining disease registries, and monitoring compliance at the point of care with active follow-up to ensure the best outcome. Moreover, the role of nurses in diabetes care should be enhanced. Evidence-based guidelines should be integrated into care, and supported by provider education, links with specialty expertise, and reminder systems. Furthermore, larger scale studies to assess the quality of diabetes care at the primary, secondary and tertiary health care institution levels are recommended. This would help in identifying opportunities for improvements thus reducing the social and economic burden of the disease on the society.

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CONFLICT OF INTEREST: None

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