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Table 3 - Relation of mortality to some variables.

Variable	Dead Total = 134	Alive Total = 872	P-value
Hypertension N (%)	78 (58)	330 (38)	0.002
Hyperlipidemia N (%)	48 (36)	168 (20)	0.002
Smoking N (%)	68 (51)	330 (38)	0.04
Poor glycemic control N (%)	102 (76)	568 (65)	0.06
Infection N (%)	36 (27)	124 (14)	0.008
BMI Mean +/- SD	26.70 +/- 4.27	24.68 +/- 4.49	0.002
Duration of DM Mean +/- SD	11.63 +/- 8.61	9.58 +/- 7.57	0.06
Duration of hospital stay Mean +/- SD	40.18 +/- 10.66	23.02 +/- 9.87	<0.001
Age Mean +/- SD	61.50 +/- 15.64	53.16 +/- 16.33	<0.001

BMI - Body mass index; DM - Diabetes mellitus

Elevated blood lipids are associated with an increased risk of CHD for patients with DM as they are for non diabetics.[14] Up to 75% of DM related cardiovascular complications may be attributed to hypertension.[15-17] Recent studies suggest that cardiovascular complication rates associated with DM can be considerably reduced through intensified treatment of CHD risk factors (hypertension and hyperlipidemia) often associated with DM.[18-21] The combination of smoking and DM appear to heighten the development of MVC.[22,23] There is overwhelming evidence that smoking cessation decreases the risk of CHD in diabetics.[24] It has been found that obesity in diabetics is a major cause of morbidity and mortality for MVC and even moderate weight loss may successfully reverse the majority of changes seen with obesity.[25] We found in our study, a strong relation between MVC and hyperlipidemia, hypertension, smoking and obesity. As these are modifiable risk factors, control of these risk factors will decrease the MVC and admission due to these complications. Microvascular complications of DM are clearly related to the degree of blood glucose control in both type I and type II. The risk of microvascular complications rises with plasma glucose and falls as the glucose level is reduced.[26] As admission for control of blood glucose is common in our patients, patient's education about the importance of tight blood glucose control is important not only to decrease the rate of admissions

and cost, but also to decrease the risk of those microvascular complications. We found no significant relation between the degree of blood glucose control and MVC and this has been shown by the UK Prospective Diabetes Study (UKPDS).[26] Mortality in diabetics is 42% more than non-diabetics.[27] Macrovascular complications are the major cause of mortality in patients with DM[15,26,28-30] which is similar to our findings.

Hypertension, hyperlipidemia, smoking, infections, poor glycemic control, obesity, old age, long duration of DM and prolonged hospital stay were found to be risk factors associated with high mortality in diabetics which is in agreement with that reported by others.[31-34]

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glycemic control was defined according to the patients symptoms and HbA1c>7%. The presence or absence of hypertension (defined as blood pressure > 140/90) was recorded as well as hyperlipidemia and history of smoking. The reason for admission whether ischemic heart disease (unstable angina and myocardial infarction), heart failure, stroke, (transient ischemic attack and completed stroke), uncontrolled blood glucose (hyperglycemia and diabetic ketoacidosis), infections, nephrotic syndrome or other cause for admission were recorded. Patients mortality and duration of hospital stay were reported.

Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS 7.5). A two-tailed student's test and Chi-square were used as appropriate. Results were considered significant if P value was less than 0.05.

Results. A total of 5917 patients were admitted to the medical unit during the study period, 1006 admissions of 557 patients with diabetes mellitus, which constitutes 17% of the total admissions, around half of them were Saudi. The mean age was 54.3 +/-16.5 years with male:female ratio of (552:454) 1.2:1 and mean BMI of 25 +/-4.5. Eight hundred and fifty four of 1006 (85%) were type II where as 102 of 1006 (10%) were type I, 26 of 1006 (3%) secondary and 24 of 1006 (2%) discovered on admission. The mean duration of DM was 9.8 +/-7.8 years. Most of the patients, 610 of 1006 (61%), were using oral hypoglycemic agents (OHG) for blood sugar control while insulin was used by 298 of 1006 (30%), dietary control only by 64 of 1006 (6%) and 34 of 1006 (3%) used combined insulin and OHG. Poor glycemic control was found in 607 of 1006 (67%). Hypertension was reported in 408 of 1006 (41%) of patients, hyperlipidemia in 216 of 1006 (21.5%) and history of smoking in 398 of 1006 (40%). The most common causes of admission, as shown in Table 1, were MVC followed by hyperglycemia and infections. The mean duration of hospital stay was 25.4 days. Macrovascular complications were found in 384 of 1006 (38%). A significant relation was found between these complications and BMI. The mean BMI of patients with MVC was 26 versus 24 in those without MVC (p0.006). Also, a significant relation was found with hypertension, hyperlipidemia and smoking, as shown in Table 2, while no relation was found with poor glycemic control. Mortality in patients with MVC was significantly higher than in patients without MVC, 70 of 384 (18%) versus 64 of 622 (10%) (p0.01). The overall mortality of diabetic patients was 134 of 1006 (13%), 72 of 134 (54%) were male and 62 of 134 (46%) were females (p0.8). Presence of hypertension, hyperlipidemia, smoking, infections, poor glycemic control, old age, high BMI, long duration of DM and hospital stay were associated with higher mortality as shown in Table 3.

Table 1 - Causes of admissions in diabetic patients.

Reason for admission*	No. of admissions (%) Total = 1006
High blood sugar (DKA, hyperglycemia for control)	212 (21)
Ischemic heart disease (unstable angina, MI.)	210 (21)
Heart failure	170 (17)
Infections (urinary, respiratory, foot infections)	160 (16)
CVA (TIA, complete stroke)	78 (8)
Nephrotic syndrome	8 (1)
Others (eg CLD, COAD, malignancy, CT diseases)	412 (41)

*more than one admission in one patient   DKA = diabetic ketoacidosis, MI = myocardial infarction, CVA = cerebrovascular accident, TIA = transient ischemic attack, CLD = chronic liver disease, COAD = chronic obstructive airway disease, CT = connective tissue

Discussion. Diabetes mellitus is a common endocrine disease with rapidly increasing incidence[6] and will probably continue to increase in the future.[8,9] We found in our study that 17% of the total admissions to the medical unit were diabetics. Al-Maatouq[10] had reported 3% diabetic admissions 10-years ago. It is well known that the onset of type II DM, not like type I, is insidious and can be asymptomatic. It is usually recognized 5-12 years after hyperglycemia developed.[11] We found 2% of the patients were discovered only on admission. The majority of diabetic admissions were due to conditions related to DM, either MVC, for control of blood sugar or infections. It is well recognized that the most frequent chronic complication of DM is atherosclerotic cardiovascular diseases.[12,13] Hyperlipidemia and hypertension are well known risk factors for coronary heart diseases (CHD).

Table 2 - Relation of macrovascular complications to some variables.

Variables	MCV Total no. = 384 N (%)	No MCV Total no. = 622 N (%)	P value
Hyperlipidemia	114 (30)	102 (16)	< 0.001
Hypertension	234 (61)	174 (28)	< 0.001
Smoking	174 (45)	198 (32)	0.002
Uncontrolled blood sugar	256 (67)	414 (67)	0.8
Mortality	70 (18)	64 (10)	0.01

Common causes of admission in diabetics

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ABSTRACT

Objective: To report on the causes of admissions of diabetic patients to the medical unit of King Abdulaziz University Hospital, mortality and risk factors, associated with high mortality, and to find out possible ways to reduce admissions, cost and mortality.

Method: Retrospective analysis of diabetic admissions to the medical unit of King Abdulaziz University Hospital between January 1996 to September 1999. Patients age, sex, body mass index, type and duration of diabetes mellitus, mode of treatment, degree of blood glucose control, presence of hypertension, hyperlipidemia, and smoking were recorded as well as the causes of admissions and mortality.

Results: A total of 5917 patients were admitted, 17% of them were diabetics. Admissions for blood glucose control and for macrovascular complications were found

in 21% and 38%. Mortality rate was 13%. Hypertension, hyperlipidemia, smoking, obesity, infection, poor glycemic control, long duration of diabetes mellitus and long hospital stay were risk factors associated with high mortality.

Conclusion: Macrovascular complications and uncontrolled blood glucose were the most common causes of admissions. Control of hypertension, hyperlipidemia, cessation of smoking and weight reduction will not only decrease the risk of macrovascular complications, but also in addition to patient's education for tight blood glucose control, will decrease the rate, cost and mortality of diabetic admissions.

Keywords: Diabetes mellitus, macrovascular complications, admissions, mortality.

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Diabetes mellitus (DM) is a common endocrine disease. Chronic complications usually occur 10 to 15 years after onset and include microvascular (nephropathy, retinopathy and neuropathy), macrovascular (MVC) (myocardial infarction and stroke), and peripheral vascular (amputation) diseases. Diabetes Mellitus is an established independent risk factor for atherothrombotic brain infarction at all ages and is responsible for 7% of deaths caused by stroke.[1,2] Patients with type II DM have a 2 to 4 fold increased risk of developing cardiovascular diseases.[3-5] The incidence of DM is increasing rapidly[6] so, we expect diabetic admissions to increase. The aim of our study is to report on the causes of admissions of diabetic patients to the medical unit of King Abdulaziz University Hospital (KAUH), Jeddah, Kingdom of Saudi Arabia, the mortality and risk factors, associated with high

mortality, over a 4 year period and to find out possible ways to reduce the rate, cost and mortality of these admissions.

Methods. The medical records of diabetic patients admitted to the medical unit of KAUH, Jeddah, Kingdom of Saudi Arabia, in the period between January 1996 to September 1999 were reviewed. Patients were diagnosed as diabetic according to the World Health Organization (WHO) criteria and classified as type I and II according to WHO criteria.[7] Patients' age, sex, body mass index (BMI) (defined as weight in kilograms divided by height in square meters) were recorded as well as type of DM (type I, type II, secondary, and discovered on admission), duration and treatment (diet, oral hypoglycemic agents, insulin and combined). Poor

Common Causes of Admission in Diabetics.

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