

Hospitalization patterns in People with Diabetes: Analyzing the spectrum of admissions in a tertiary care setting

Javeria Javed¹, Yasir Iqbal², Zabia Jahandad³, Marwa Javed⁴

¹Trainee Medical Officer, Department of Medicine, MTI Khyber Teaching Hospital, Peshawar, Pakistan.

²International Training Fellow, Acute Medical Unit, Queen Elizabeth Hospital, University Hospital Birmingham. ³Trainee Medical Officer, Department of Pediatrics, MTI Lady Reading Hospital, Peshawar, ⁴3rd year MBBS Student, Khyber Girls Medical College, Peshawar.

ABSTRACT

Objective: To assess hospitalization patterns in People with Diabetes and to analyze the spectrum of admissions in a tertiary care setting.

Methodology: This descriptive cross-sectional study was carried out in Khyber Teaching Hospital, Pakistan, from November 2023 to December 2023. People with type 2 diabetes (T2DM) of both genders who were admitted to wards were registered in the study using non-probability consecutive sampling after providing informed written consent. A validated questionnaire was designed for data collection which included demographic details, duration of diabetes, HbA1c level, type of anti-diabetic medication, and their reasons for admission to the hospital were recorded.

Results: A total of 314 admitted patients with type 2 Diabetes Mellitus were included. The patient's age range was between 50 to 70 years. Most patients, 56%, were admitted through OPD while the rest were admitted through emergency. Mean HbA1C at admission was 8.8% while the average length of stay was 6 to 8 days. Among 314 patients, 31% were admitted with cardiovascular complications, 23% with infections, 10.1% with Diabetic foot ulcer, 7.6% with Chest Infection, 6.6% were admitted with Infected Wounds, 5.4% with Hyperglycemic Hyperosmolar Syndrome and poor control of Diabetes, 5.1% with Chronic Kidney Disease, and 3.8% with Cerebrovascular Accidents.

Conclusion: The majority of patients with diabetes admitted had cardiovascular complications, with myocardial infarction ranking highest followed by infections in which pneumonia was most common.

KEY WORDS: Type 2 Diabetes, Indication of Admission, Hospitalization pattern.

INTRODUCTION

Diabetes mellitus (DM) is a common metabolic disorder, now emerging as an epidemic of the 21st Century with a high prevalence in countries undergoing socio-economic transformation.¹ It threatens to overwhelm the health care system soon. Type 2 DM (T2DM) constitutes about 90-

95% of all diabetes^{1,2} in developed countries and accounts for an even higher percentage in developing countries.³ Based on a survey conducted by the International Diabetes Federation in 2021, it is estimated that the global diabetic population amounts to approximately 537 million individuals, with Pakistan alone accounting for 33 million cases of diabetes mellitus.⁴

Address for Correspondence: Dr. Yasir Iqbal,
International Training Fellow, Acute Medical Unit,
Queen Elizabeth Hospital,
University Hospital Birmingham,
United Kingdom.
Email: malak_iqbal@yahoo.com.

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Diabetes mellitus is a group of metabolic disorders that occur because of disturbed metabolism of glucose resulting in high levels of it in blood. The proposed mechanism of hyperglycemia is reduced insulin secretion, decreased glucose utilization, and increased glucose production.⁵ Diabetes is linked to other enduring non-communicable ailments such as atherosclerotic diseases like peripheral vascular diseases, cerebrovascular accidents, cardiac-related diseases, and chronic kidney disorders. Consequently, there is an escalation in the utilization of healthcare services, unplanned hospital admittances, and untimely morbidity and mortality. Multiple studies have indicated that the hospitalization rates of individuals with diabetes are two to six times higher in comparison to those without diabetes with a longer duration of hospital stay.⁶ Additionally, individuals with diabetes are more susceptible to the development of infections.⁶

The causes for hospitalization among patients with diabetes encompass various factors including infections, metabolic derangements, cardiovascular disease, renal disease, and severe hypoglycemia. In a study, the most frequent cause for admission proved to be infections, which were followed by endocrine and metabolic disorders, cardiovascular conditions, and renal illness.⁷ Among older adults with diabetes, severe hypoglycemia was also ascertained to be a noteworthy cause of hospitalization. It was observed that patients with renal failure and undergoing maintenance hemodialysis were frequently admitted due to left ventricular failure and respiratory tract infections.⁸ These findings underscore the significance of efficacious diabetes treatment, health education, and preventive strategies in

reducing hospitalizations among patients with diabetes. Furthermore, there exists a necessity for healthcare systems to redirect their focus towards the prevention of hypoglycemia, and for clinicians and patients to collaborate in designing treatment regimens that align with the patient's capabilities.⁹

Very few studies have been conducted in Pakistan about reasons for hospitalization among diabetic patients. According to a study conducted at Shifa Hospital Karachi, coronary artery disease (CAD), respiratory infections, cerebrovascular accidents, and infections linked to the urinary tract were the most frequent reasons for hospitalization for those with diabetes.¹⁰ A retrospective analysis of Diabetic Admissions study conducted on Reasons for admissions were Infections/septicemia (24.57%), Hyperglycaemic Emergencies (15.58%), cardiac disease (13.63%), and renal disease (6.08%). The common associated medical conditions were anemia (59.85%) and Hypertension (40.14%).¹¹

As the incidence of diabetes is increasing, day by day, hospitalization patterns in diabetes play a pivotal role in understanding the healthcare burden and refining strategies for patient management. Therefore the aim of our study was to assess hospitalization patterns in People with Diabetes and to analyze the spectrum of admissions in a tertiary care setting.

METHOD

This descriptive cross-sectional study was carried out in Khyber Teaching Hospital, Pakistan, from November 2023 to December 2023 after receiving approval from the hospital's ethical committee, (Ref. No. 805/DME/

Table I: Admission of patients to different Wards with Disease.

Indication of admissions	Ward					Total
	Cardiology	Pulmonology	Critical Care	Surgical and Allied	Medical and Allied	
Chest infection	0	24	0	0	0	24
Diabetic Retinopathy	0	0	0	3	0	3
Cardiovascular Complication	81	1	8	0	8	98
Cerebrovascular accident	0	0	0	0	12	12
infections	1	21	3	12	36	73
Infected Wound	0	0	0	20	1	21
Diabetic Foot Ulcer	0	0	0	22	10	32
HHS and Poor Control	1	1	0	4	11	17
CKD	1	0	0	1	13	15
DCLD and Carcinoma	0	0	0	6	13	19
Total	84	47	11	68	104	314

CKD, Chronic Kidney disease; HHS, Hyperosmolar Hyperglycaemic State.

KMC). Taking into consideration a prevalence rate of diabetes at 26.7%, the calculated sample size amounts to 301 individuals, with a 95% confidence interval and a 5% margin of error.⁴ T2DM patients of both genders who were admitted to wards were registered in the study using non-probability consecutive sampling after providing informed written consent. Patients who declined to participate in the study or who were admitted for an elective operation and/or had mental or psychiatric issues or were taking psychiatric drugs were not included in the analysis.

The diagnosis of DM was established as per American Diabetes Association (ADA) criteria.¹² A specific questionnaire was designed which included demographic details including age of patients, gender, duration of diabetes, HbA1c level, type of anti-diabetic medication, and reasons for admission to the hospital. Data were collected from different wards (Inpatients) by the researchers; data was stored in software SPSS version 23.

Statistical analyses: SPSS version 23 was used for data analyses. We calculated mean $\pm$ standard deviations for numerical variables. Frequencies and percentages were calculated for categorical variables.

RESULTS

A total of 314 admitted patients with T2DM were included in the study. The patients' age range was between 50 to 70 years. 56 %, were admitted through OPD while the rest were admitted through the emergency. Regarding anti-diabetic medication, 48% were on oral anti-diabetic (OADs) while the rest were on different regimens of insulin in addition to OADs such as basal-bolus, premix, basal only, and regular only. The average

length of stay was 6 to 8 days and the mean HbA1c of 8.8% with an SD of ± 2.08 .

Table-I shows the frequency of admissions in different wards, majority 104 being in Medicine & Allied followed by cardiology (84) and surgical & Allied (68) patients. Among Indication of admission Myocardial Infarction (MI) was on top with 19.2 % study population followed by Diabetic foot ulcer (DFU) (10.2%), Pneumonia (9.2%), Heart failure (HF) exacerbation (7.9%), Urinary tract infections (UTI) and infected wound (6.7%), Acute on chronic kidney injury (CKD) (5.1%), Chronic obstructive pulmonary disease (COPD) exacerbation (4.8%), cerebral vascular accident (CVA) (3.8%) followed by poor control of diabetes including HHS (3.5%). (Fig.1 and 2).

DISCUSSION

Hospitalization patterns in diabetes play a pivotal role in understanding the healthcare burden and refining strategies for patient management. In tertiary care settings, where complex cases are referred to, analyzing the spectrum of admissions provides valuable insights into the challenges and opportunities for improvement in diabetes care.

The complications stemming from diabetes mellitus not only result in significant personal suffering but also impose a substantial and expensive burden on society's resources. It is quite astonishing that only a limited number of studies have been published investigating admissions related to diabetes and the exorbitant expenses associated with providing inpatient care to diabetic patients.

The total number of participants in our study was 314. Most patients in our study were above the age of 50. A study conducted in Libya and Kuwait reported that most

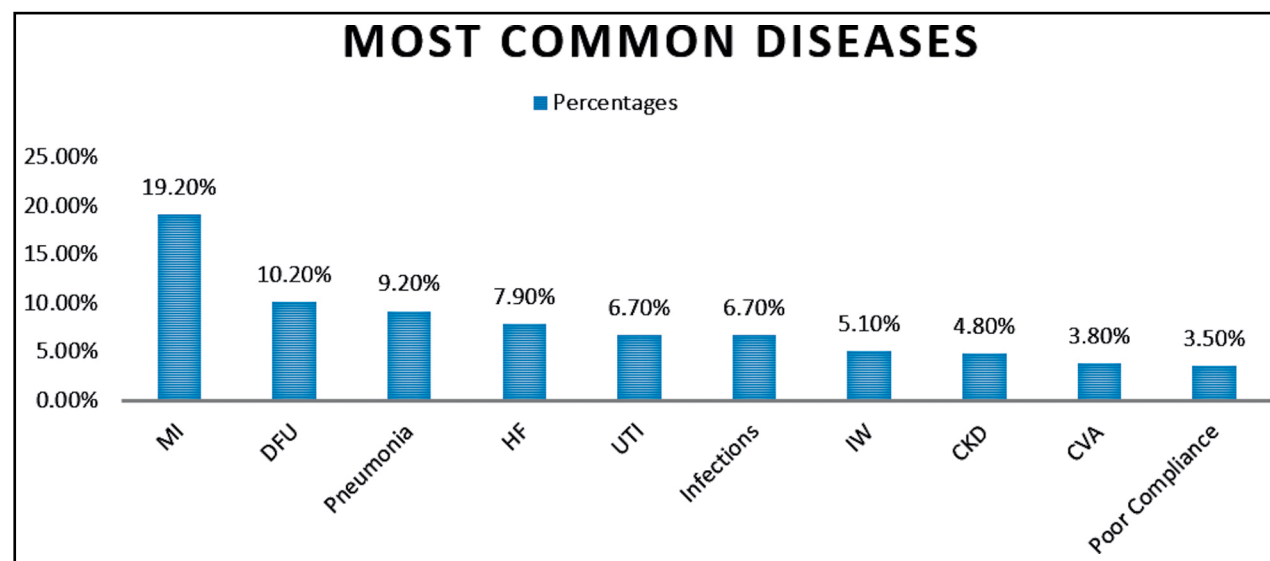


Fig.1: Frequency of various diseases leading to Admission of diabetic patients

MI, Myocardial Infarction; DFU, Diabetic Foot Ulcer; HF, Heart Failure; UTI, urinary tract infection; CKD, Chronic Kidney Disease; CVA, Cerebrovascular Accidents.

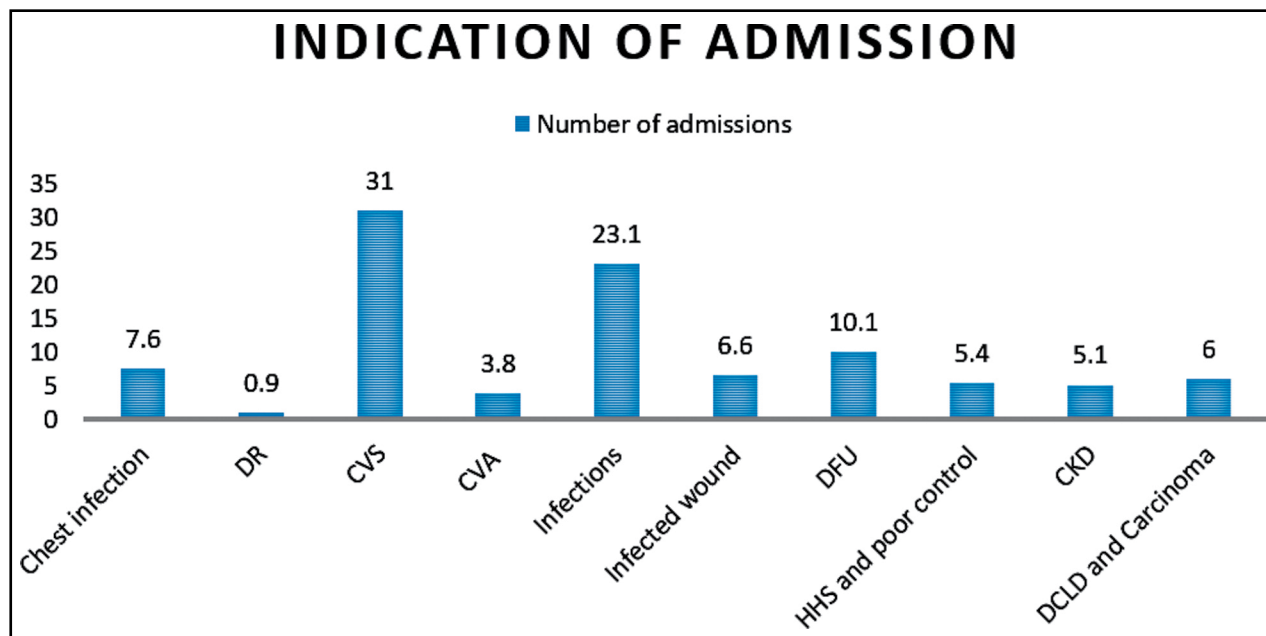


Fig.2: Admissions of Diabetic patients to different wards with Indication of Admission

DR, Diabetic Retinopathy; CVS, Cardiovascular; CVA Cerebrovascular; DFU, Diabetic Foot ulcer, HHS, HHS, Hyperosmolar Hyperglycemic State; CKD, Chronic Kidney Disease; DCLD, Decompensated Chronic Liver Disease

diabetic patients admitted are aged above 60 years.^{13,14} The younger cohort within our patient population exhibits a manifestation of Type 2 Diabetes at an earlier stage in life, which is indicative of the lower age of incidence, observed within the subcontinent population.¹⁵

The average length of stay in our study was 6 to 8 days. A study done in Rajasthan, India reported average length of stay was 5.3 among diabetic patients as compared to 3.2 for other patients. In other studies, India¹⁵ to Kuwait¹⁶ and Australia,¹⁷ the mean duration of hospital stay was 5.1, 8.6, and 8.3 days respectively. Most of the patients in our study had poor glycemic control as indicated by mean HBA1C of 8.8%. This was consistent with other studies which reported values of 8.0%.⁶

The prevalence of macrovascular disease in individuals with diabetes is a significant concern, primarily presenting itself as ischemic heart disease. Our study showed that the most common cause of hospitalization was cardiac-related diseases. This was contrary to some studies, which reported infectious disease to be the most common cause.^{6,10} However, a study done in Canada reported Heart Failure as the second most common cause of hospitalization among diabetic patients.¹⁷ Another study reported cardiovascular illnesses, particularly heart failure and coronary heart disease, as the prevailing factors leading to hospitalizations.¹⁸ This could be because an individual afflicted with diabetes possesses a notably elevated baseline level of a risk factor for cardiovascular health when compared to the broader population. This heightened vulnerability renders them more prone to experiencing various cardiac events.¹⁹

In the present study, a significant proportion of patients were attributed to infections and foot ulcers that had been infected. Our patients exhibit a disregard for self-care, thereby increasing their susceptibility to a range of infections. In our study, Pneumonia, and Urinary Tract Infections were the common culprits among diabetic patients admitted with Infections. This was inconsistent with studies conducted in Canada and Nepal^{15,16} The increased frequency of pneumonia may be attributed to a lower vaccination rate among patients with diabetes.²⁰

Renal disease is a common complication of diabetes, and its incidence increases with the duration of diabetes. 5.1% of patients in our cohort had kidney-related diseases. A study done in India reported 7.96% of renal ailments among diabetic patients.⁶ The incidence of atherosclerotic vascular disease is significantly elevated among individuals with diabetes. This was showcased as a Cerebrovascular accident, and its prevalence was 3.8% in our cohort. This was also reflected in other studies, which reported that Diabetes mellitus (DM) is an independent risk factor for stroke. However, there has been an upward trend in the incidence of stroke among individuals with diabetes.²¹

Poor diabetes control accounted for 3.5% of patients admissions. The escalated quantity of admissions within our investigation about this factor may potentially indicate the inadequate practice of personal health maintenance, adherence to therapy, and self-perception regarding diabetes mellitus within our group of individuals.

A single-center study with a small sample size of study participants is a limitation. It might not accurately reflect Pakistan's overall diabetic patient population.

Co-morbidities such as hypertension and other diabetes complications have not been evaluated in our study. Moreover, since this was a sample study, no statistical test could be applied to the cross-sectional design of the research as we only checked indications of admission of diabetic patients. Large-scale, multi-center research is advised for future studies.

CONCLUSION

Our research findings suggest that a significant proportion of the patients who were admitted to the hospital experienced complications related to the cardiovascular system. Among these complications, myocardial infarction stood out as the most prevalent condition followed by infections out of which pneumonia emerged as the most frequently encountered infection.

Recommendations: As diabetes contributes to high morbidity in hospitalized people we should prioritize the prevention of lengthy and recurrent admissions in DM patients. While chronic complications like MI, heart failure, and Diabetic Foot Ulcers can be prevented and admission can be reduced, more focus should be given to the prevention of these complications and proper counseling should be encouraged among healthcare workers.

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