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Research Article

Analysing Health Professionals' Adherence to National Guidelines and Comparing Diabetes Care in Specialized Care Centres and Hospitals

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Abstract

The socioeconomic impact of diabetes treatment includes significant costs for diagnosis, treatments, hospitalizations, and associated social challenges. According to the International diabetic federation (IDF) guidelines, effective management entails a holistic strategy including nutritious diet, avoiding carbonated beverages, quitting smoking, and routine exercising. Targeted weight loss is critical, comprising antidiabetic medications, a specific food plan, and lifestyle changes to attain a 7-8% glycated hemoglobin level. Proper medicine and footwear use reduces ulcer risks and further complications. The IDF emphasizes detailed treatment plans and sequential screenings. Diabetes management is obligatory, focusing glycaemic control, lifestyle changes, and risk assessment. A study examines treatment programs, medical behaviour, and factors impacting diabetic care reception. This study examined diabetes mellitus treatment in medical facilities by conducting health information reviews in outpatient clinics with a sample size of 400 records. Java applets detected problems, indicating 95% confidence in therapy. Cross-sectional studies in Peshawar hospitals included 250 patients, whereas specialized diabetic treatment centers evaluated 150 patients. Documented care differed; public hospitals had lower foot inspection rates (16.4%) than specialized care (14%). Statistical analysis, such as the Chung test and binary logistic regression, was used to assess variable relationships. Smoking was common (86%), and 59.8% relied on oral anti-diabetic medications. Less than 30% follow up examinations were recorded in public hospitals which showed discrepancies in documentation. Diabetes management can be improved, particularly through

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better screening procedures. Discrepancies between provided and documented care underscore the need for higher documentation standards. Private clinics demonstrated comparatively better care, possibly influenced by consultation fees, facility availability, and a comfortable environment—attributes lacking in public hospitals in Pakistan.

Keywords

Diabetes Mellites Type 2, Guidelines, Management, Primary Care Hospital, Diabetes Recommendations

1. Introduction

International diabetic federation estimates 463 M diabetic patients with adult incidence of 8.3% worldwide. the estimated number is expected to double by 2030 with DM type 2 making 85-90% of the patients [1]. Diabetes is the primary cause of death worldwide, with 1.5 million deaths in 2012, primarily in urban and rural areas. Diabetes mellitus (DM) is a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. As a metabolic disorder diabetes leads to microvascular, macrovascular and structural harm to body [2, 3]. Common complications of diabetes include adult-onset blindness, kidney disease, lower-limb disfigurement, stroke, and ischemic heart disease. Diabetes treatment has a significant financial impact on society, including direct costs manifested as diagnosis, treatments, hospital admissions, and social problems. Diabetes mellitus can be Type 1 (IDDM), Type 2 (NIDDM), MODY and gestational diabetes [4, 5]. Maturity onset diabetes of young (MODY), a subtype of type 2 Diabetes mellites with an autosomal dominant form of inheritance is linked to mutations in different genes. MODY has early onset less than 25 years age [6]. MODY as a single gene mutation has 13 subtypes depending on mutated gene and is managed without use of insulin. [7]. Diagnostic criteria are kept simple. In the absence of unequivocal elevated sugar levels, a positive result can be confirmed by repeating either of the preceding procedures on another day. It is preferable to assess a serum glucose amount due to the ease of measurement and the significant time investment in structured glucose tolerance testing, which takes 2 hours to complete and provides little prognostic benefit over the fasting procedure [8]. According to the existing description, 7.0 mmol/L (126 mg/dL) of fasting blood sugar, and a glycated hemoglobin (HbA1C) of 48 mmol/mol or 6.5 DCCT % is signal for treatment of diabetes mellitus [9]. Management of diabetes is multifaceted. the incidence DM type 2 can be reduced with healthy diet containing soya bean oils, nuts and sea food, avoiding carbonated beverages as well as cessation of smoking and active exercise of more than 90 minutes daily [10]. The management of diabetes mellitus aims at reduced blood sugar levels through antidiabetics drugs, diet plan, fitness and weight reduction [11]. Dietary changes and weight reduction also decrease associated cardiovascular diseases. Targeted Glycated hemoglobin levels should be 7-8% on average. Diabetic as a metabolic disorder demands multifaceted systemic treatment including antidiabetic drugs and lie style management. Treatment of diabetes, depending on the duration of occurrence of disease, includes prescription o antidiabetic drugs and insulin. Both drugs are given in adjunct in prolonged hyperglycemia patients. The risk of complications decreases with proper use of prescription drugs and lie style modifications [12]. Specialized footwear reduces risks of ulcers in limb at risk in diabetes mellitus [13]. The risk of eye and renal misfunctioning inversely decrease with maintaining proper glycaemic conditions within patients [14]. The International Diabetes Federation (IDF) issued recommendations in 2013 for type 2 diabetes treatment, focusing on pain relief and complications. The recommendations outline four areas for diabetic patients' treatment: a comprehensive schedule for appointments and annual evaluations, measuring glycaemic regulation using fasting and post-prandial glucose levels, stressing pain management, and routine foot tests. Screening for disease complications can begin immediately after diagnosis and continue annually.

Our study focuses on evaluation of outpatient’s management in diabetes mellitus type 2 patients. The extent to which diabetic patients undergo proscribed diabetic management strategies including glycaemic control, life style interventions and risk analysis. Furthermore, assessing a correlation of reported diabetes treatment programs offered by government hospitals against diabetic specialty clinics. This was followed by determination of medical behaviour and illness factors having a direct relationship with diabetic care reception.

2. Materials & Method

2.1. Site and Design of Study

Patients visiting outpatient department of Three public primary care hospitals, Lady Reading hospital (LRH), Khyber Teaching Hospital (KTH) and Hayat Abad Medical Complex (HMC) —were the sites of this prospective cross-sectional study. This investigation primarily focused on evaluation of

outpatients' management practice in Diabetes mellitus type 2 patients between March 2020 to January 2021.

2.2. Population

Patients with type 2 diabetes mellitus who visited community hospital associated with three targeted hospitals while medical files presented by advanced diabetes centers were included.

2.2.1. Selection Criteria

1) Patients suffering from DMT2 for one year with relevant data filled as medical history to ensure that recommended steps are assessed properly.
2) Patients with other types of diabetes were excluded.
3) Seriously ill patients were excluded.
4) Patients who abstained from followed up in the preceding year were not included.
5) Pregnant patients as well as patients having age less than 22 years were also excluded.

2.2.2. Sample Size

The study was designed to be as thorough as possible in order to measure the aspects of diabetic mellitus (DM) treatment that management programs provided. These aspects were mainly evaluated using health information reviews. As a result, individuals with type 2 diabetes who attended medical facilities' outpatient clinics were examined. Using a sample size of 400 medical records, the randomization of the reports was evaluated using Java applets problem identification, demonstrating that a 95% degree of trust could be reached. Due to time constraints, the objective was to assess 250 patients per targeted healthcare facility.

With 250 records from three healthcare facilities and 150 records from a diabetic specialty clinic, the ultimate sample size was 400. Patients with Type 2 diabetes are treated in the government health facility's general surgery department, which receives a limited number of diabetic patients. Research associates were employed to thereafter cover the flow of patients with type 2 diabetes in order to adequately cover all incoming patients.

2.2.3. Data Collection Instruments

The national commission granted ethical consent for the study based on the willing participation of the targeted patients and the hospital administration's acceptance. A minimum of one patient appointment at each clinic by the patient served as validation for the pre-testing procedure. We were able to evaluate the specified hospitals' outpatient departments' organizational effectiveness due to this method. Open-ended questions were used in the design of questionnaires. Due to time constraints, we were forced to either facilitate data gathering more smoothly or employ medical residents as collaborators.

Prescribers' experience offers information about a hospital's clinical administration. There were issues with this assessment since recommended therapies for diabetes were not carried out at every appointment. A number of variables were taken into account when conducting this study, including symptoms of type 2 diabetes and its complications, smoking status, medical records of treatment, weight assessment and estimation of BMI, blood pressure, and examination of the feet from the previous year, fundoscopy from the previous year, peripheral site pulse examination, plasma glucose level, HbA1c levels, LDL Level, and serum creatinine levels.

3. Data Analysis

The statistical analysis included binary logistic regression, t-test, Chung test, and descriptive statistical analysis. A 95% confidence interval was used for the tests (P= 0.05). The mean value standard deviation served as the main justification when the data were normally distributed. Consequently, the criterion as documented in medical reports was reflected in percentages (where 100% represents complete conformance). The Pearson's Chi Squared test was used to examine the association between the nominal variables. The achievement of the therapeutic goals of diabetes treatment was evaluated using medical cut-off points. Alongside the percentage of the measured indicator that was documented, the number of patients that fulfilled the normative aim was displayed.

Utilizing logistic regression, the link between covariates (health benefits, hospitalization histories, diabetes duration, and complications) and the availability of diabetes treatment programs was predicted. For the impact of variables, a confidence interval and odds ratio are given.

3.1. Features of the Respondents

Follow-up cards of 400 patients, who visited three primary care hospitals and diabetic specialty center, were examined for details of diabetic management. Demographics and medical histories of patients are listed in table 1 and table 2.

The research participants had an average age of 53.15 years, and 50.2 percent of all patients were in the 45–64 age range. Although there were more women in the study than men (54.8 percent vs. 44.2 percent), the difference was not statistically significant. Stata's two-sample proportional analysis (z=1.54, P=0.122). Merely 3.8% of patients depended merely on food for glycaemic treatment, whereas 59.8% of patients took oral anti-diabetic medicines. Nearly 40% of poll respondents did not have access to health insurance. one-third of the patients reported having elevated blood pressure.

There was no question about quitting smoking or advise on how to stop, even though 18.0% (n=47) of respondents—12 of whom were female—were current smokers. Only 13% of respondents offered information about their

smoking habits or some ideas for cessation.

Table 1. *Respondent's characteristics with Clinical data.*

Features of respondents	No (%)	Mean ± SD
Age (Years)		53 ±13.5
Diagnosis duration (years)		7.1 ±6.6 (range 1—38)
Gender /sex		
Female	219 (54.8%)	
Male	181 (45.2%)	
DM medicines		
None	14 (3.5%)	
Oral (antidiabetics)	254 (63.5%)	
Insulin (injectable)	44 (11%)	
Combining insulin and orals	44 (11%)	
Patients with own Glucometer	55 (13.75%)	
Patients with Health insurance scheme	155 (38.75%)	
Smoking status		
Non smokers	195 (48.5%)	
Active smokers	45 (12.25%)	
Previous smokers	15 (3.75%)	
Comorbidities T2DM		
Hypertension	85 (21.25%)	
Foot	64 (16%)	
Eye retinopathy	65 (16.25%)	
Heart	33 (8.25%)	
Kidney	15 (3.75%)	

Table 2. *Features of respondents in the Sociodemographic Characteristics (SDCs).*

Characteristics	No. (%)	3Mean ± SD (Range)	Documentation (%) 100%
Age (years)		57 ±12.4 (28-92)	100%
Duration of the condition		9.0 ±8.0 (3-42)	
Diabetes (years)			
Gender or sex			100%
Female gender	220 (55%)		
Male gender	180 (45%)		

Characteristics	No. (%)	3Mean ± SD (Range)	Documentation (%) 100%
BMI		27 (18-43)	64%
DM medicines			97%
None	13 (7.3%)		
Oral antidiabetic agents	305 (76.25%)		
Insulin injectables	47 (11.75%)		
Combination of oral agents and Insulin	35 (8.75%)		
Smoking status			86%
Non-smokers	334 (83.5%)		
Smokers	66 (17.5%)		

3.2. Medical Care Record

However, less than 30% of all the assessed follow-up exams and queries for diabetes at public hospitals are documented, even for procedures that are considered standard, such blood pressure monitors and blood glucose assessments. Paperwork was noticed in 9.2% of patients who undergone a fundoscopy, and in 22.9% of patients who had a glycosylated hemoglobin test. Other well-documented areas included blood pressure measurements, diabetes history, and complication histories. In every facility, examination of eyes was the least known component (26.9%). Patients in our study were asked if they had undergone any diabetic treatment tests, including eye exams, foot exams from medical professionals, blood pressure checks, and weight measurements. Additionally, the researcher double-checked the results of tests such as lipid profiles, glycosylated hemoglobin, and renal disease tests that were conducted on the patients.

Table 3. *Level of reporting in patients' follow-up cards with the diabetes treatment.*

Measurement	Questionnaire No (%) N = 400	Checklist No. (%) N= 400	P-value
Fundoscopy	78 (27.5)	27 (6.2)	<0.01
Foot examination	54 (25.2)	35 (13.1)	0.32
PB measurements	226 (86.0)	184 (76.6)	<0.01
Weight of the subject	83 (34.7)	45 (14.9)	0.10
HBA1c	94 (34.6)	63 (23.9)	0.80
RFTs	129 (49.4)	77 (29.4)	<0.01

The level of reporting of patients' follow-up in accordance with diabetic treatment interventions as identified from questionnaires are given as table 3. Patients were pass through more diabetic treatment intervention than totally known. Discrepancies were statistically important in the documentation of fundoscopy, blood pressure assessment and renal tests. The greatest disparity was seen in the documentation of fundoscopy, which was reported in 11.2% of carry cards while 24.5 percent of patients said they had had fundoscopy in the previous year.

3.2.1. Body Mass Index and Diet

In the survey group that the Advanced Diabetes Centre handled, 70 case files (or 25.8%) indicated that they had re-

ceived nutritional advice the year before. Mass Index (BMI) was registered in 30% of patient files (n=100), with a mean of 26 kg/m2. A BMI of 26 kg/m2 or below was identified in 47 patients (47%) overall. 39.5 percent of patient files included the results of the Low-Density Lipoprotein (LDL) and total cholesterol examinations. While 74% of patients reached the total cholesterol target, only 37% of patients reached the low-density lipoprotein (LDL) objective, which is approximately 100 mg/dl.

Table 4. *DM documentation and risk factors indication.*

Clinical Measures	Percentage of documentation	Mean Value ± SD	Standard Target	N (%) of patients achieving the targets
Systolic Blood Pressure in mm Hg	95.6%	124.3 ±17.4	<130	113 (76.6)
Diastolic Blood Pressure in mmHg	96.6%	76.6 ±9.6	<83	114 (78.2)
Body Mass Index in Kg/m	64%	25 ±3.5	18.5 -24.9	43 (44.0)
HBA1c,%	34.0%	8.6 ±3.0	<6.5	14 (21.8)
Total cholesterol, mg/dl	37.5%	174.4 ±44.4	<200	45 (74.2)
LDL, mg/dl	37.5%	116.0 ±44.9	<100	24 (37.1)
Serum Creatinine levels	46.9%	1.06 ±0.73	<1.00	45 (58.3)

3.2.2. Yearly Diabetic Care Measurements and Its Factors

In table 4, A binary logistic model was used to estimate the impact of chosen predictor factors on the reception of glycaemic control inquiries and complication testing. Health care, prior hospitalization experience, and time after diabetes diagnosis are all suggested covariates.

Table 5. *Binary logistic regression analysis showing the receipt of DM.*

Investigation	Fundoscopy n= 77		HbA1c n= 92		RFT N= 125		Lipid Profile N= 83	
COVARIATE	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Insurance	1.3 (0.8-2.5)	0.1	1.4 (0.8-2.4)	0.2	1.2 (0.6-1.7)	0.6	1.2 (0.6-1.7)	0.8
Hospitalization	0.4 (0.2-0.7)	0.04	0.8 (0.5-1.4)	0.5	2.3 (1.6-2.3)	0.000	1.2 (0.7-3.2)	0.2
Duration of DM	1.06 (1.0-1.2)	0.001	1.01 (0.9-1.05)	0.3	1.0 (0.9-1.1)	0.2	1.2 (0.8-1.0)	0.5

3.2.3. Diabetic Care Annual Measures

Renal function tests, retinal testing, foot examination, and blood lipids are suggested annual Diabetes treatment interventions for detecting lengthy Diabetes - related complications. table 6 and 7 tabulates how the proportions of relevant measures vary between patient groups with or without end organ injury.

Table 6. DM complications and screen tests.

	RFT DONE	RFT NOT Done	P-value
Kidney problems	11 (85.7%)	3 (15.3%)	0.005
No kidney problems	116 (47.4%)	131 (52.8%)	
	Fundoscopy completed	Fundoscopy not conducted	
Eye diseases	37 (56.9%)	27 (42.1%)	0.000
No eye diseases	38 (21.2%)	153 (79.8%)	
	Foot exam conducted	Foot exam not conducted	
Foot issues	22 (37.9%)	36 (62.1%)	0.009
No foot problems	43 (21.1%)	160 (78.8%)	
	Lipid's profile completed	Lipids profile NOT completed	
Heart diseases	8 (9.7%)	74 (90.2%)	0.55
No heart diseases	22 (11.1%)	175 (88.8%)	

Table 7. Univariate logistic regression indicating the complications of Diabetes and Measures.

Complication vs. Test or exam	OR (95% CI)	P-value
Eye problems/ examination	3.2 (2.7-9.0)	0.000
Foot problems/examination	2.2 (1.2-4.2)	0.010
Kidney problems/Renal FTs	6.7 (1.4-30.4)	0.014
Heart problems/Lipids	3.3 (0.5-3.0) c	0.551

4. Discussion

As diabetes mellitus is a debilitating disorder with potential for multiple morbidities. World health organization, international diabetic foundation and American diabetes association publish periodic recommendations on the long-term management of metabolic disorder. A general physician, diabetes specialist, dietitian and therapist are suggested members of management committees in a community hospital. High risk patients should be guided to specialized units for diabetes risk screening and management. The infrastructure of a hospital should be designed to help properly document diabetes patients' appointments and ways to receive treatments in specialized areas in hospital.

The recommendations outline four area that should be discussed in the general treatment of diabetic patients. Shows a comprehensive schedule of the activities that should be adequality fulfilled during each visit and be evaluated annually. There were no suggestions the way patient's assessment document should be structures.

Our study was focused on implementation of national recommendations of ministry of health, Pakistan for treatment of diabetes mellitus type 2. In addition, there have been related geographical and global research on crises interventions and diabetic treatment barriers. The patients' clinical records are examined in order to evaluate the diabetes management care. Numerous studies have shown that the documentation in the records can be used to assess the management that healthcare management provides [15]. Electronic medical record keeping is much more successive in assessing the pattern of disease, management steps taken in a healthcare system [16].

The incidence of DM type 2 is more in females as compared which tallies with globally projected rates of incidence [17-19]. As expected, majority of females attended hospitals for medical assistance which helped in evaluating role of sex in seeking care for diabetes management in primary healthcare hospitals. Our findings showed that recommendations were not properly implemented and followed. The experiences of care providers were provided adequately as evident from ratio of personal experience of diabetes (75%), diabetes associated complications (72%) and drugs associated side effects (87%). Smoking was observed to be strongly

correlated with diabetes related problems and 18% of patients, dominantly males, were active smokers. Smoking status of females were not known because queries related to smoking were ruled out because of cultural restraints. Glycemic regulations, metabolic control and symptoms monitoring was up to par in public hospitals and was sourced from diabetic specialty clinics. Other co-morbidities including hypertension (one third patients), dementia (one fourth-patients) and 36.4% patients were hospitalized for diabetics associated complications.

Outpatients' appointment, for management of diabetes as suggested every three months apart was in par with published research in developing countries, was 66.3% [20-23]. There is no other evident explanation for visitation of patients to healthcare centers. Finally glycated hemoglobin as a diagnostic tool was underused in our targeted population, might be one reason for less visitations to health care clinics.

As HbA1c is a gold standard in assessing blood sugar levels in longer as well as predictor of new cases of diabetes mellitus type 2 [24-26], HbA1c reduces mortality by 21% [27].

Dyslipidemia, a significant cause of cardiovascular disease, accompanied with diabetes mellitus should be tested once a year at least. In our study, 17% of case files had performed lipid profiling which lacks compliance with guidelines in three primary care hospitals. Diabetic specialty clinics had better compliance percentile-38.9%. lipid profiling lacked assessment of HDL and Triglycerides levels. according to popular belief hypertriglyceridemia is most often lipid impairment associated with diabetes mellitus type 2 [18, 28, 29]. Furthermore, a study was carried out that connected the dynamics of lipid alterations in 250 individuals with diabetes to a stable control condition [30]. The only parameters that showed a significant difference between the two groups were the triglyceride and HDL levels. Almost half of the patients in an initial study reported irregular antidiabetic action. The provision of the best possible and expert diabetic care rests with the patients, the healthcare system, and the medical staff. We attempted to evaluate some of the characteristics that may have contributed, such as the length of diabetes, health insurance, and prior hospitalization, however this study was unable to pinpoint the exact cause or obstacles in the care given. The availability of health insurance has a significant impact on diabetic care [31-33]. Even though patients with health insurance had different healthcare providers, this difference was not statistically significant. A past hospitalization history usually increases the likelihood of receiving thorough treatment because of the increased patient involvement with the healthcare system.

Lastly, despite limitation of resources, time constraints and limited number of primary care hospitals assessed in this study, it provides valuable information on the management of diabetes mellitus type 2 and related co-morbidities within the context of health care system of Pakistan. This study can be used as guiding map for future studies with respect to Pakistan.

5. Conclusion

Our study identifies number of differences between practical guideline and medical practice in Pakistan. Unfortunately, diabetes mellitus associated diagnostic tests and symptomatic treatment are much relied upon which, can be diverted to proper trainings and arranged campaigns. Patients' information system and prescription system should be properly connected digitally which can provide an easy insight into patients' demography in the future.

Abbreviations

ADA: American Diabetes Association
FBG: Fasting Blood Glucose
IDPs: Internally Displaced Persons
BMI: Body Mass Index
IDF: International Diabetes Federation
GDP: Gross Domestic Product
WHO: World Health Organization
HDL: High Density Lipoprotein
NIDDM: Non -Insulin dependent diabetes (Type-2)
LDL: Low Density Lipoproteins
LMIC: Low- and Middle-Income Countries
RFT: Renal Function Test
HbA1c: Glycosylated Hemoglobin
SDCs: Sociodemographic Characteristics

Statements and Declaration

Ethics Approval and Consent to Participate

The study was approved by the Health Science Center, Xian Jiao tong University, Shaanxi, PR China, and the research ethics committee. All participants were treated as per the Declaration of Helsinki. The participant information confidentiality was maintained throughout the study. Informed consent was obtained from each participant.

Consent for Publication

Full permission for the publication.

Author Contributions

All authors contributed to the study conception and design Material preparation, data collection Umar Farooq, Helina Endazezew Tebeje, Saba Ijaz, and Endalkachew Melese. analysis was performed by, Wondimagegn Tibebu Tilahun and Vemparala Priyatha. The first draft of the manuscript was written by Abrham Warkineh Azale, Ruth Betremariam Abebe, Nathnael Abera Woldehana and Haitham Alhussain and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability Statement

Data available on reasonable request.

Conflicts of Interests

The authors declare that they have no conflict of interest.

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