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Predictors of In-Hospital Mortality among Hospitalized Adults with Diabetes Mellitus in Addis Ababa, Ethiopia: A Multicenter Prospective Cohort Study

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Abstract

Background: Diabetes mellitus (DM) significantly increases the risk of adverse hospital outcomes; however, data on mortality predictors in sub-Saharan African hospital settings remain scarce. This study aimed to identify independent predictors of in-hospital mortality among DM patients admitted to three Ethiopian tertiary hospitals.

Methods: A multicenter prospective cohort study was conducted from July 2023 to February 2024, enrolling 398 DM adult patients. Baseline demographic, clinical and laboratory data were collected. Patients were followed from admission until discharge or death. Kaplan-Meier survival analysis with the log-rank test estimated median survival times (MST). Multivariable Cox proportional hazards regression was used to identify independent predictors of mortality, with statistical significance set at $p<0.05$.

Results: Among 398 patients (55% male, median age 60 years [IQR: 50–70]), 82.9% had Type 2 DM and 93.7% had a known history of diabetes. Hypertension (61.3%) and heart failure (37.7%) were the most prevalent comorbidities. The overall in-hospital mortality rate was 7.5% (n = 30). Kaplan-Meier analysis revealed significantly shorter MST for patients with >3 comorbidities (p = 0.002), acute hemorrhagic stroke (MST: 23 vs. 55 days, p = 0.002), sepsis (MST: 35 vs. 90 days, p = 0.001), and hospital-acquired urinary tract infection (UTI) (MST: 25 vs. 55 days, p = 0.015). After adjustment in the multivariable Cox model, five factors remained independently associated with increased mortality: >3 comorbidities (AHR = 5.50; 95% CI: 1.96–15.40; p = 0.001), community-acquired sepsis (AHR = 7.98; 95% CI: 2.44–26.14; p = 0.001), acute hemorrhagic stroke (AHR = 4.54; 95% CI: 1.07–19.24; p=0.040), hospital-acquired UTI (AHR = 6.87; 95% CI: 1.63–29.02; p = 0.009), and failure to achieve target blood glucose levels (AHR = 3.63; 95% CI: 1.12–11.76; p = 0.032).

Conclusion: In-hospital mortality in Ethiopian diabetic patients is profoundly driven by acute severe infections, cerebrovascular events, high comorbidity burden, and poor glycemic control. Early risk stratification, aggressive infection management, and strict glycemic monitoring are essential to reduce the high mortality rate in this vulnerable population.

Keywords: Diabetes mellitus, mortality, sepsis, stroke, glycemic control, Ethiopia, predictors, cohort study.

1. Introduction

Diabetes mellitus (DM) is a chronic endocrine disorder and one of the fastest-growing non-communicable diseases globally, representing a major public health challenge in the 21st century[1]. Diabetes affected 589 million adults globally in 2024 and is projected to reach 853 million by 2050, with the greatest increase expected in LMICs, particularly sub-Saharan Africa (from 25 million in 2024 to 60 million in 2050) [2]. Reported prevalence of diabetes in Ethiopia has been widely variable across populations and has ranged from approximately 2.0% to 6.5% [3].

The growing diabetes burden is increasingly reflected in hospitals, where patients with diabetes face higher risks of complications, prolonged hospitalization, and in-hospital mortality [4, 5]. The problem is compounded by poor glycemic control, as admission hyperglycemia has been associated with increased mortality and other adverse clinical outcomes [6, 7]. A recent systematic review and meta-analysis reported a pooled mortality of 7% (95% CI: 1%–12%) in adult patients treated in hospitals in Ethiopia [8]. Hospitalized patients with diabetes are at increased risk of adverse outcomes because acute illness triggers counter-regulatory hormones, causing insulin resistance and stress hyperglycemia [9]. Variable dietary consumption, modifications or disruptions in diabetes treatment, and the use of corticosteroids or other hyperglycemic medications may all worsen this metabolic disorder [10]. Diabetes can also affect immunological function, such as neutrophil chemo taxis and phagocytosis; making a person more vulnerable to infections [11]. The likelihood of unfavorable outcomes is further increased by underlying comorbidities, especially chronic renal disease and cardiovascular disease (hypertension, heart failure, and coronary artery disease)[12-14].

In Ethiopia, diabetes-related mortality remains a concern, but evidence on its predictors among hospitalized patients is limited; one Addis Ababa study reported 10.6% in-hospital mortality, mainly associated with cardiovascular disease, infections, and diabetic keto acidosis (DKA) [15]. A recent prospective study at Jimma Medical Center reported 13.34% in-hospital mortality, with older age, rural residence, DKA, and greater comorbidity burden independently associated with mortality[16]. Similarly, a prospective study conducted at Dilla University Referral Hospital in southern Ethiopia reported a 12.24% in-hospital mortality rate, with infections identified as the leading reported cause of death [17].Despite these findings, important gaps remain in the existing evidence. The studies conducted in Ethiopia differ in their patient populations, clinical settings, and study designs, and many have been conducted

at single institutions. As a result, the factors that independently influence mortality among hospitalized patients with diabetes are not yet fully understood across different healthcare settings in Ethiopia.

Identifying high-risk patients enables early risk assessment and timely management, while prospective cohort studies using Cox regression can account for varying hospital stays and time to death [18, 19]. However, despite the importance of this approach, prospective studies using survival analysis to investigate predictors of in-hospital mortality among patients with diabetes in Ethiopia remain limited. Therefore, this study aimed to identify the independent predictors of in-hospital mortality among patients with DM admitted to three major tertiary hospitals in Addis Ababa, Ethiopia. Using a prospective cohort design and Cox proportional hazards regression, the study sought to generate context-specific evidence that could help clinicians identify high-risk patients early, support timely clinical management and appropriate triage, and ultimately improve outcomes among hospitalized patients with diabetes.

2. Methods

2.1. Study Design, Setting, and Participants

This study utilized data from multicenter perspective observational cohort conducted from July 15, 2023, to February 29, 2024, at Tikur Anbessa Specialized Hospital (TASH), St. Paul's Hospital Millennium Medical College (SPHMMC), and Zewditu Memorial Hospital (ZMH) in Addis Ababa, Ethiopia. These are national referral centers with high patient volumes.

The source population comprised all adults (≥18 years) with DM admitted to the internal medicine wards. Eligible participants included patients with either newly diagnosed or pre-existing DM and provided consent for participation. Patients were excluded if they were admitted to intensive care units, pregnant, less than 18 years, had active psychiatric illness, were unwilling to provide consent, or were hospitalized for less than 24 hours. A total of 398 patients were followed from admission to discharge, transfer, or death.

2.2. Variables and data collection

Outcome variable: Time to all-cause in-hospital mortality (measured in days from admission to death).

Predictor variables: A priori selected based on clinical relevance and literature, including, sociodemographic (Age, sex, occupation), disease-related(Diabetes status (known vs. newly diagnosed), duration of DM, type of DM, number and type of pre-existing comorbidities, main

admission diagnosis (sepsis, acute hemorrhagic stroke, AKI on CKD, ADHF, etc.), and baseline HbA1c, and treatment/In-hospital factors such as in-hospital complications (UTI, hypoglycemia, AKI), and the last recorded random blood glucose (RBS) before outcome (achieved target [140–180 mg/dL] vs. not). Data were collected prospectively via patient interviews and medical chart abstraction using a pretested semi-structured questionnaire.

2.3. Statistical Analysis

Data were analyzed using SPSS v27. Descriptive statistics (frequencies, percentages, medians with interquartile ranges) were used to summarize the baseline characteristics of the cohort. Kaplan-Meier survival analysis was employed to estimate median survival times (MST) for different groups, and differences were compared using the log-rank test. To identify independent predictors of mortality, Cox proportional hazards regression was performed. Variables with a p-value <0.25 in the univariate analysis were entered into the multivariable model. The proportional hazards assumption was verified using log-minus-log survival plots. Results were presented as adjusted hazard ratios (AHRs) with 95% confidence intervals (CIs). A two-tailed p-value <0.05 was considered statistically significant

2.4. Ethical consideration

Ethical approval was obtained from the Ethical Review Committee of the School of Pharmacy, College of Health Sciences, Addis Ababa University (PCP/241/15/23), Addis Ababa Health Bureau (A/A/H/579/227), and the SPMMC Ethical Review Board (Pm23/214). Data collection commenced only after approval from the respective institutions and hospitals. Written informed consent was obtained from all participants after explaining the study objectives and procedures. Confidentiality was maintained by excluding participants' names and other personal identifiers from the data collection tool.

3. Results

3.1. Baseline characteristics of the study cohort

A total of 398 patients were included in the final analysis. The cohort comprised 219 males (55.0%) and 179 females (45.0%), with a median age of 60 years (IQR: 50–70). The majority were urban residents (74.1%). Regarding diabetes history, 330 patients (82.9%) had Type 2 DM, and 372 (93.7%) had a known history of diabetes, while only 26 (6.5%) were newly diagnosed. The median duration of diabetes was 6 years (IQR: 3–10 years). Comorbidities were highly prevalent, with 355 patients (89.2%) having at least one coexisting condition.

Hypertension was the most common (61.3%), followed by chronic heart failure (37.7%), COPD/asthma (12.6%/10.3%), and HIV (11.1%). When categorized by burden, 360 patients (90.5%) had three or fewer comorbidities, while 38 patients (9.5%) had more than three. The most frequent primary admission diagnoses were severe community-acquired pneumonia (12.5%), AKI on CKD (8.5%), acute decompensated heart failure (8.5%), sepsis (8.0%), and acute hemorrhagic stroke (3.8%). Baseline glycemic control was suboptimal, with 48.2% having HbA1c >7%. At the time of outcome assessment, 237 patients (59.5%) had not achieved the target RBS (140–180 mg/dL) (**Table 1**).

Table 1: Baseline Characteristics of the Study Cohort

Characteristic	**Category**	**N (%)**
Age (years)	Median (IQR)	60 (50–70)
	18–34	31 (7.8)
	35–64	232 (58.3)
	≥65	135 (33.9)
Sex	Male	219 (55.0)
	Female	179 (45.0)
Residence	Urban	295 (74.1)
	Rural	103 (25.9)
Type of DM	Type 1	68 (17.1)
	Type 2	330 (82.9)
Diabetes Status	Known DM	372 (93.7)
	Newly Diagnosed	26 (6.5)
Duration of DM	≤5 years	157 (39.4)
	>5 years	241 (60.6)
BMI (kg/m²)	Underweight	13 (3.3)
	Healthy	205 (51.5)
	Overweight	121 (30.4)
	Obese	59 (14.8)
Smoking Status	Never	345 (86.7)
	Current/Former	53 (13.3)
Comorbidities	Hypertension	244 (61.3)

	Heart Failure	150 (37.7)
	COPD	50 (12.6)
	Asthma	41 (10.3)
	HIV	44 (11.1)
	Chronic Liver Disease	27 (6.8)
	Depression	13 (3.3)
Number of Comorbidities	≤3	360 (90.5)
	>3	38 (9.5)
Admission Diagnosis	Severe CAP	50 (12.5)
	AKI on CKD	34 (8.5)
	ADHF	34 (8.5)
	Sepsis (any focus)	32 (8.0)
	Acute Ischemic Stroke	17 (4.3)
	Acute hemorrhagic stroke	15 (3.8)
Baseline HbA1c	≤7%	187 (47.0)
	>7%	192 (48.2)
	Missing	19 (4.8)
Target RBS achieved at outcome	Achieved (140–180 mg/dL)	161 (40.5)
	Not Achieved	237 (59.5)

Abbreviations: IQR, Interquartile Range; DM, Diabetes Mellitus; BMI, Body Mass Index; COPD, Chronic Obstructive Pulmonary Disease; HIV, Human Immunodeficiency Virus; CAP, Community-Acquired Pneumonia; AKI, Acute Kidney Injury; CKD, Chronic Kidney Disease; ADHF, Acute Decompensated Heart Failure; RBS, Random Blood Sugar.

3.2. Mortality Events and Kaplan-Meier Survival Analysis

During the study period, 30 of 398 patients (7.5%) died during hospitalization. Kaplan-Meier analysis with the log-rank test demonstrated significantly shorter median survival MST among patients with >3 comorbidities (log-rank p = 0.002), acute hemorrhagic stroke (MST: 23 vs. 55 days, p = 0.002), sepsis at admission (MST: 35 vs. 90 days, p = 0.001), hospital-acquired urinary tract infection (MST: 25 vs. 55 days, p = 0.015), and failure to achieve target random blood glucose (MST: 45 vs. 90 days, p = 0.005) (**Table 2, Figures 1-4**).

Table 2: Mortality Events and Median Survival Time Stratified by Significant Variables (N = 398)

Variable	**Category**	**Events (n)**	**Censored (n)**	**Median survival time (days) (95% CI)**	Log-rank p-value
Number of comorbidities	≤3	21	339	55 (28.90–81.11)	0.002
	>3	9	29	Not reached*	
Acute hemorrhagic stroke	No	26	357	55 (8.84–101.16)	0.002
	Yes	4	11	23 (21.37–24.63)	
Sepsis at admission	No	24	342	90 (28.94–151.06)	0.001
	Yes	6	26	35 (8.21–61.79)	
Hospital-acquired UTI	No	26	349	55 (30.75–79.25)	0.015
	Yes	4	19	25 (10.85–39.16)	
Last RBS before outcome	Achieved target	4	157	90	0.005
	Not achieved	26	211	45 (29.74–60.26)	

Abbreviations: CI, confidence interval; RBS, random blood sugar; UTI, urinary tract infection.

Note: Median survival was not achieved because the survival probability did not drop below 50% during the follow-up period for this group.

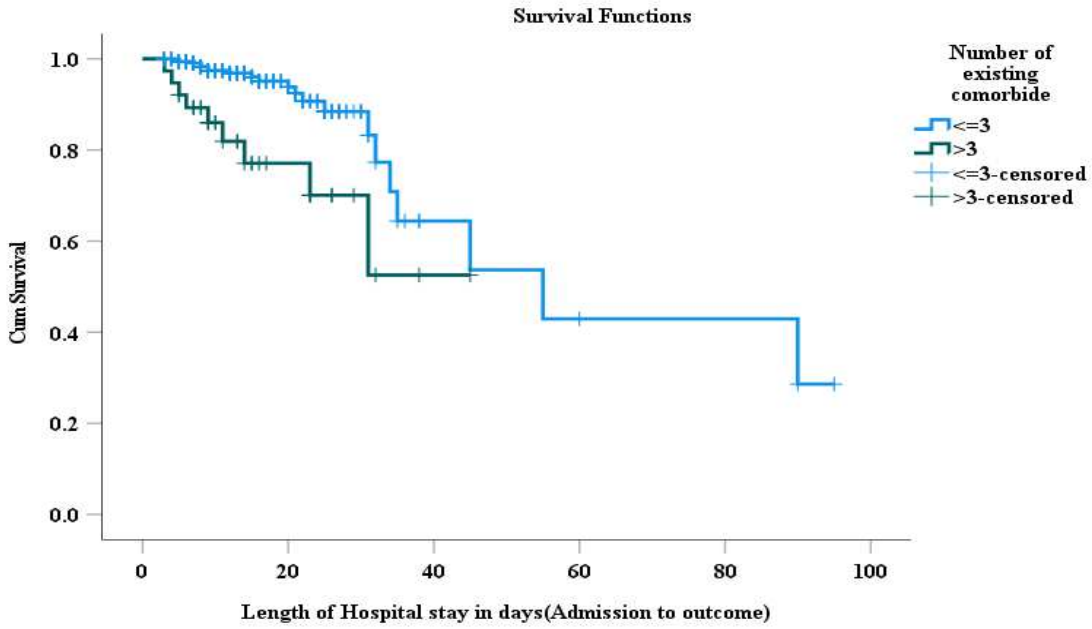


Figure 1: Kaplan–Meier survival curves according to the presence of comorbidities.

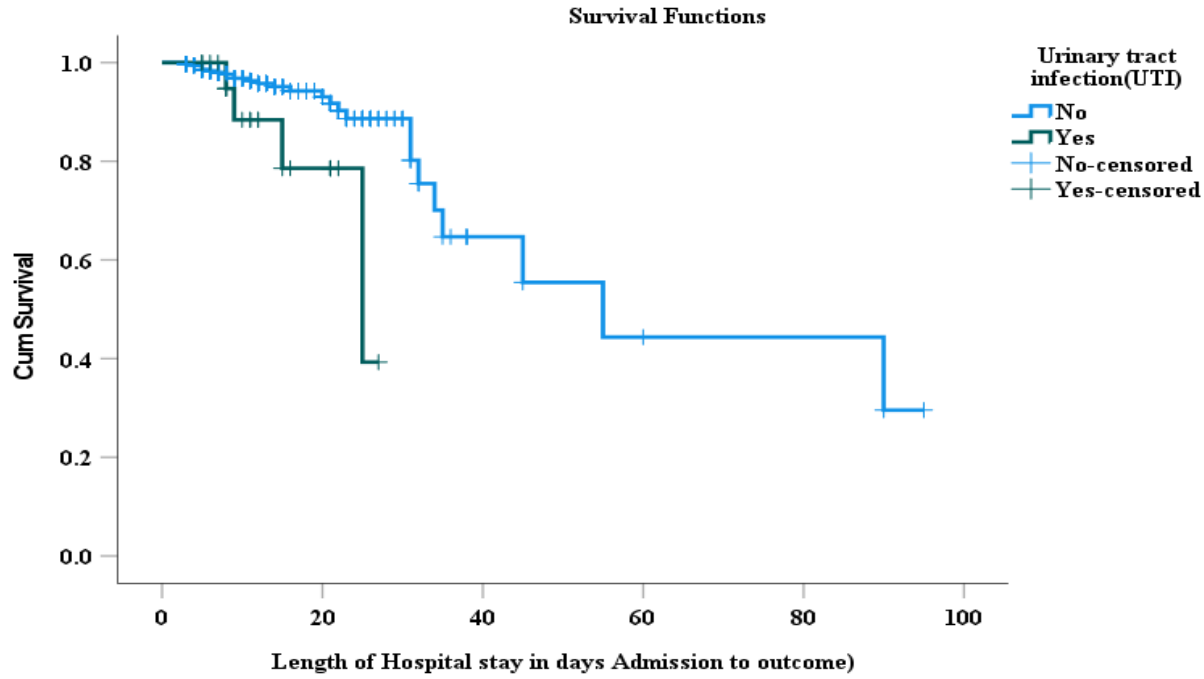


Figure 2: Kaplan–Meier survival curves according to the presence of Hospital acquired UTI

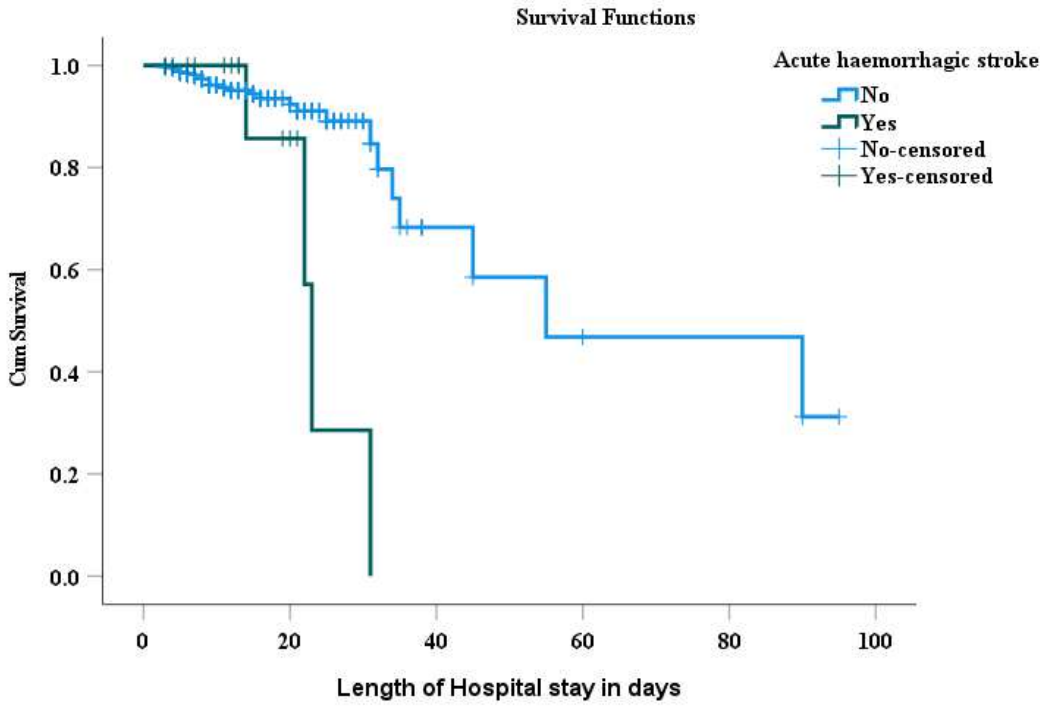


Figure 3: Kaplan–Meier survival curves according to presence of acute haemorrogic stroke of DM patients

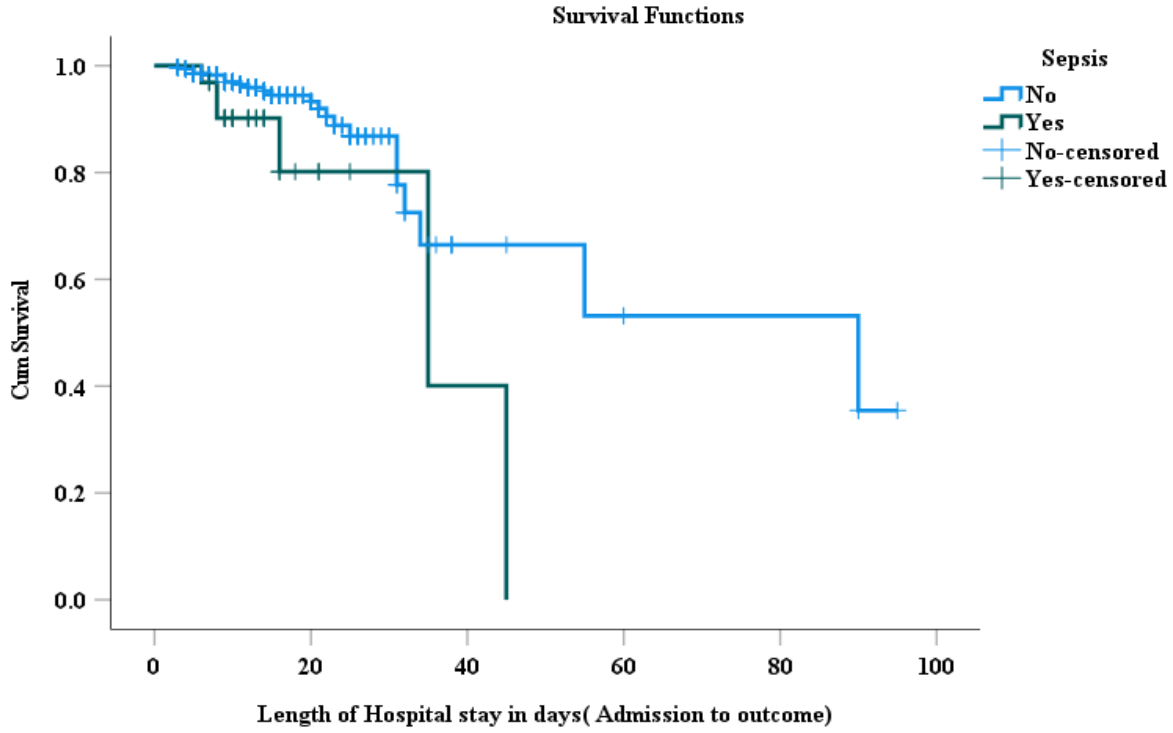


Figure 4: Kaplan–Meier survival curves according to the presence of community-acquired sepsis.

3.3. Univariate and Multivariate Cox Regression Analysis

In the univariate analysis, factors such as number of comorbidities (>3), CLD, ADHF, diabetes status (newly diagnosed vs. known diabetes), depression, ischemic stroke, acute hemorrhagic stroke, AKI on CKD, sepsis, hypoglycemia, UTI, and last RBS level were associated with mortality ($p<0.25$) and were entered into the multivariable model.

After adjusting for all confounders, only five variables emerged as statistically significant independent predictors of in-hospital mortality (**Table 3**): > 3 comorbidities (AHR = 5.50, 95% CI: 1.96–15.40; p = 0.001), community-acquired sepsis (AHR = 7.98, 95% CI: 2.44–26.14; p = 0.001), acute hemorrhagic stroke (AHR = 4.54, 95% CI: 1.07–19.24; p=0.040), hospital-acquired UTI (AHR = 6.87, 95% CI: 1.63–29.02; p = 0.009), and failure to achieve target RBS (140–180 mg/dL) (AHR = 3.63, 95% CI: 1.12–11.76; p = 0.032).

Table 3: Multivariable Cox regression analysis of predictors of mortality

	Category	**CHR (95% CI)**	**P value**	**AHR (95% CI)**	**P value**
CLD	No	1	-	1	-
	Yes	2.35(0.69-7.96)	0.17	2.78(0.54-14.40)	0.223
Depression	No	1	-	1	-
	Yes	2.22(0.66-7.54)	0.2	0.79(0.14-4.46)	0.793
ADHF	No	1	-	1	-
	Yes	1.78(0.68-4.70)	0.243	1.51(0.25-5.21)	0.856
Diabetic status of the patient	Newly diagnosed	1	-	1	-
	Known diabetics	6.56(0.82-52.46)	0.076	4.59(0.41-50.84)	0.214
Ischemic stroke	No	1	-	1	-
	Yes	2.39(1.00-5.71)	0.049	0.98(0.30-3.21)	0.977
Number of existing comorbidities	≤3	1	-	1	-
	>3	3.37(1.52-7.51)	0.003	5.50(1.96-15.40)	**0.001**
Hypoglycemia developed during in hospitals stay	No	1	-	1	-
	Yes	2.47(1.05,5.82)	0.038	2.65(0.94-7.48)	0.065
UTI	No	1		1	
	Yes	3.48(1.18-10.30)	0.024	6.87(1.63-29.02)	**0.009**
AKI on CKD	No	1	-	1	-
	Yes	1.89(0.71-5.01)	0.201	2.47(0.60-9.67)	0.214
Acute hemorrhagic stroke	No	1	-	1	-
	Yes	4.57(1.56-13.41)	0.006	4.54(1.07-19.24)	**0.04**
Sepsis at admission	No	1	-	1	-
	Yes	2.76(1.11-6.85)	0.029	7.98(2.44-26.14)	**0.001**

Duration of DM	≤5years	1	-	1	-
	>5years	2.73(1.08-6.89)	0.035	1.69(0.53-5.36)	0.373
Last measurement of RBS before outcome	Achieved target RBS	1	-	1	-
	Not achieved target RBS	4.55(1.57,13.14)	0.005	3.63(1.12-11.76)	**0.032**

Abbreviations: ADHF, acute decompensated heart failure; AHR, adjusted hazard ratio; AKI, acute kidney injury; CHR, crude hazard ratio; CI, confidence interval; CLD, chronic liver disease; CKD, chronic kidney disease; DM, diabetes mellitus; RBS, random blood sugar; UTI, urinary tract infection.

4. Discussion

This multicenter prospective study identified a lethal pentad of independent risk factors for in-hospital mortality among Ethiopian diabetic patients: sepsis, hemorrhagic stroke, high comorbidity burden, hospital-acquired UTI, and uncontrolled hyperglycemia. The addition of detailed baseline characteristics demonstrates that this is a cohort of predominantly older, Type 2 diabetic patients with a high prevalence of cardiovascular multimorbidity, which is consistent with global trends but highlights the advanced stage of disease presentation in this resource-limited setting[20, 21]

With an adjusted hazard ratio (AHR) of 7.98, sepsis was the most powerful predictor of death in our cohort, far exceeding the risk reported in a large Israeli cohort (AHR ~1.2)[22]. Several factors may explain this difference, including delayed presentation, more severe sepsis at admission, limited access to ICU care and mechanical ventilation, and impaired immune function associated with hyperglycemia [23, 24]. People with diabetes are more susceptible to both common and severe infections, with the risk reported to be 1.5 to 4 times higher than in people without diabetes. This increased vulnerability may be partly explained by chronic hyperglycemia, which can impair neutrophil function and affect both innate and adaptive immune responses[25]. In addition, hyperglycemia can trigger a pro-inflammatory state and may intensify the inflammatory response that occurs during sepsis [26]. The much higher sepsis mortality reported in Ethiopia compared with high-income settings may be related to delays in recognizing and treating sepsis, limited access to appropriate antibiotics, and shortages of essential critical care resources. Similar findings have been reported in other African settings, where infectious diseases continue to account for a substantial proportion of deaths among hospitalized patients with diabetes[27].These findings emphasize the importance of recognizing and treating sepsis early and improving access to essential critical care services in Ethiopian hospitals.

The AHR of 4.54 for hemorrhagic stroke indicates a substantially higher risk of death among hospitalized patients with diabetes. This finding is particularly important given the high prevalence of hypertension in our cohort, which affected 61% of participants and may have increased the risk of hemorrhagic stroke. Chronic hyperglycemia may further contribute to vascular damage through endothelial dysfunction, oxidative stress, and the accumulation of advanced glycation end products (AGEs), which can weaken the integrity of cerebral blood vessels[28].In addition, hyperglycemia may promote the expansion of intracerebral hemorrhage by affecting platelet function and other coagulation-related processes [29]. The mortality risk from hemorrhagic stroke in our cohort was considerably higher than the approximately 35% 1-month case-fatality reported for intracerebral hemorrhage in high-income countries [30]. This difference may partly be related to delays in seeking care, limited access to timely diagnostic imaging, and inadequate availability of specialized stroke care in Ethiopian hospitals[31]. Similar patterns have been reported across sub-Saharan Africa, where stroke-related mortality remains high, with pooled 30-day mortality estimates of around 24–27% [32]. Hemorrhagic stroke also represents a larger share of stroke cases in many African and other low- and middle-income settings than in high-income countries, which may partly reflect the high burden of uncontrolled hypertension [33]. This finding highlights the need for good blood pressure control in patients with diabetes, early recognition and appropriate stroke triage, and better access to specialized stroke care and neuroimaging services.

The clear relationship between a higher number of comorbidities and mortality is consistent with the broader concept of multimorbidity, where having several chronic conditions at the same time can increase the risk of poor outcomes. Patients with multiple comorbidities may have a reduced ability to cope with acute illnesses such as infection or stroke, making them more vulnerable to clinical deterioration[34]. In addition, multimorbidity often leads to polypharmacy and more complicated medication regimens, which may increase the risk of adverse drug events, drug interactions, and difficulties with medication adherence [35, 36]. The high prevalence of comorbid conditions in our cohort, with 89.7% of patients having at least one comorbidity, reflects the substantial burden of additional chronic conditions among hospitalized patients with diabetes [37, 38]. This high burden may be related to delayed diagnosis, inadequate management of chronic conditions, or patients presenting to tertiary hospitals at a more advanced stage of illness. These findings highlight the need for integrated care that addresses patients' multiple health problems rather than focusing on diabetes alone. Multidisciplinary care may be particularly helpful for patients with a high comorbidity burden.

Patients with diabetes are more likely to get UTIs, in part because autonomic neuropathy can impede bladder emptying and create urine stasis, while glycosuria can encourage bacterial growth [39, 40]. Hospital-acquired UTI was linked to higher mortality (AHR 2.70) in our sample, indicating that it may be a sign of more severe illness or increased clinical vulnerability. These infections may also occur as a result of prolonged hospital stays, decreased mobility, and urine catheterization, especially in individuals with several comorbidities. Evidence from earlier research suggests that diabetes is a significant risk factor for CAUTI, even though we were unable to determine whether the hospital-acquired UTIs were specifically catheter-associated[41, 42]. These results emphasize the necessity of improved hospital surveillance systems to identify and track illnesses linked to healthcare and to provide prompt, suitable antibiotic treatment based on regional patterns of antimicrobial susceptibility.

Failure to achieve the target random blood glucose range of 140–180 mg/dL was independently associated with mortality in our cohort. This finding is important because persistent hyperglycemia can promote inflammation and weaken immune defenses, including neutrophil chemotaxis, phagocytosis, and bacterial killing. It may also increase the tendency toward thrombosis through increased platelet activity and impaired fibrinolysis, while contributing to endothelial dysfunction [43, 44]. Additionally, it may contribute to endothelial dysfunction and raise the risk of thrombosis by impairing fibrinolysis and increasing platelet activity [43, 44]. Furthermore, by increasing platelet activity and impairing fibrinolysis, hyperglycemia may exacerbate endothelial dysfunction and increase the risk of thrombosis [43, 44]. A link between inpatient glycemic control and mortality is also supported by data from non-intensive care settings. Higher mean glucose levels during hospitalization were independently linked to mortality (OR 1.05, 95% CI 1.02–1.08) in a cohort of 620 hospitalized patients with diabetes and infections, where the death rate was 10.1% [45]. These findings are consistent with our observation that failure to maintain blood glucose within the target range during hospitalization was independently associated with mortality. Although hypoglycemia showed a trend toward higher mortality, this association did not reach statistical significance ($p = 0.065$). This may indicate that hyperglycemia had a greater impact on mortality in our cohort, although the lack of a significant association with hypoglycemia could also be due to the small number of hypoglycemic events and limited statistical power. Nevertheless, hypoglycemia should not be overlooked, as previous evidence has linked inpatient hypoglycemia with increased mortality among hospitalized patients with diabetes [46]. Overall, these findings highlight the

importance of maintaining appropriate glycemic control throughout hospitalization while avoiding both persistent hyperglycemia and hypoglycemia.

Strengths and Limitations

This is one of the few prospective multicenter survival analyses conducted among hospitalized diabetic patients in East Africa. The study's strengths include its prospective design, which minimizes recall bias; its multicenter nature (three tertiary hospitals), which enhances generalizability within the Addis Ababa context and the application of rigorous time-to-event statistical methods (Cox proportional hazards regression), which account for varying lengths of stay and censoring [18, 19]. The inclusion of detailed clinical and laboratory data at admission allowed for comprehensive adjustment for confounders, ensuring that the identified predictors are robust and independent.

However, several limitations must be acknowledged. The study was restricted to non-ICU words at the time of enrolment, potentially underestimating mortality risk as the sickest patients (those admitted directly to ICUs) were not included, which could lead to survivorship bias or a more conservative estimate of mortality. The study's confinement to three tertiary hospitals in the capital city (Addis Ababa) limits generalizability to rural areas and smaller hospitals where patient profiles, resource availability, and management practices may differ significantly [47]. We did not capture long-term post-discharge mortality, which may provide a more complete picture of patient outcomes [48].

5. Conclusion

Mortality in hospitalized diabetic patients is predominantly driven by acute infections (sepsis, UTI), cerebrovascular catastrophes (hemorrhagic stroke), a heavy load of pre-existing comorbidities, and failure to achieve in-hospital glycemic targets. We propose a targeted risk-stratification protocol upon admission: patients presenting with sepsis or stroke, or those with >3 comorbidities, should be designated as high-risk and receive intensified monitoring. Furthermore, implementing aggressive infection control protocols and strict glycemic monitoring (aiming for 140–180 mg/dL) could significantly reduce the substantial 7.5% in-hospital mortality rate observed in this resource-limited setting.

List of Abbreviations

ADHF: Acute Decompensated Heart Failure

AGEs: Advanced Glycation End Products

AHR: Adjusted Hazard Ratio

AKI: Acute Kidney Injury

BMI: Body Mass Index

CAP: Community-Acquired Pneumonia

CAUTI: Catheter-Associated Urinary Tract Infection

CHR: Crude Hazard Ratio

CI: Confidence Interval

CKD: Chronic Kidney Disease

CLD: Chronic Liver Disease

COPD: Chronic Obstructive Pulmonary Disease

DKA: Diabetic Ketoacidosis

DM: Diabetes Mellitus

HbA1c: Glycated Hemoglobin

HIV: Human Immunodeficiency Virus

ICU: Intensive Care Unit

IQR: Interquartile Range

LMICs: Low- and Middle-Income Countries

MST: Median Survival Time

RBS: Random Blood Sugar

SPHMMC: St. Paul's Hospital Millennium Medical College

TASH: Tikur Anbessa Specialized Hospital

UTI: Urinary Tract Infection

ZMH: Zewditu Memorial Hospital

Declarations

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Ethical Review Committee of the School of Pharmacy, College of Health Sciences, Addis Ababa University (PCP/241/15/23), Addis Ababa Health Bureau (A/A/H/579/227), and the SPMMC Ethical Review Board (Pm23/214). Data collection commenced only after approval from the respective institutions and hospitals. Written informed consent was obtained from all participants after explaining the study objectives and procedures. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Funding

Not applicable.

Authors' Contributions

YDB, ABB, AA, and LC conceived and designed the study. YDB and LC performed the data analysis and interpretation. YDB drafted the manuscript. ABB, AA, and LC critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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