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Determinants of Hospital Length of Stay among Patients with Cardiovascular Presentations in Southern West Bank, Palestine: A Retrospective Cross-Sectional Study

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Abstract

Background: Cardiovascular disease is the leading cause of morbidity and mortality worldwide. Most cardiovascular hospitalizations are driven by risk factors and understanding how demographic and clinical factors influence hospitalization duration is important for allocating scarce resources. Few studies in the region have examined predictors of length of stay among patients presenting with cardiovascular complaints; none were conducted in Palestine. **Methods**: A retrospective cross-sectional analysis of 9502 anonymized hospital records was conducted. Records from 2018 to 2024 were extracted from electronic medical systems. Variables included age, sex, chief complaint, diagnosis, comorbidities, and length of stay, which were cleaned and analyzed using descriptive statistics and logistic regression in SPSS. **Results**: The mean age of patients was 57.6 ± 12.2 years, and 69.1% were male. Hypertension (47.4 %), diabetes mellitus (37.4 %), and coronary artery disease (35.9 %) were the most prevalent comorbidities. In multivariable analyses, each additional year of age increased the odds of staying longer than 1 day (OR 1.02, 95% CI 1.02 - 1.03). Male sex (OR 1.49, CI 1.35 - 1.64), hypertension (OR 1.18, CI 1.07 - 1.30), diabetes mellitus (OR 1.71, CI 1.55 - 1.88), coronary artery disease (OR 1.25, CI 1.13 - 1.37), cerebrovascular accident (OR 1.40, CI 1.09 - 1.80), smoking (OR 1.45, CI 1.31 - 1.61) and history of coronary artery bypass grafting (OR 1.57, CI 1.31 - 1.87) were independent predictors of longer stay. **Conclusion**: older age, male sex and cardiometabolic comorbidities were associated with longer hospital stays. Nursing practice should focus on early risk assessment, optimization of chronic disease control, and patient education to reduce prolonged hospitalization. Future prospective studies incorporating treatment data and functional outcomes are required.

Keywords

Cardiovascular Disease, Length of Stay, Hypertension, Diabetes Mellitus, Comorbidities, Retrospective Study

1. Introduction

Cardiovascular disease (CVD) is the world's foremost cause of death, accounting for approximately one-third of global deaths (19.8 million) worldwide [1] [2]. The Global Burden of Disease (GBD). Of them, more than three-quarters occur in low and middle-income countries. Despite preventive efforts and improvements in medical services, CVDs and related crude cardiovascular mortality are expected to continue to rise, driven by advancing age and a growing number of comorbidities [3] [4].

Often, hypertension, diabetes mellitus, and dyslipidemia are the most common cluster, leading to progressive coronary artery disease and heart failure. According to the World Health Organization (WHO), 4 out of 5 people living with hypertension have uncontrolled blood pressure [1]. While diabetes imposes a two-fold increase in cardiovascular mortality, dyslipidemia further compounds these risks [5]. Clinically, these comorbidities, along with advancing age and poor chronic disease management, are blamed for recurrent hospitalizations, complex management and require longer care plans. Length of hospital stay (LoS) is a critical indicator of health system efficiency in planning and responding to these clinical emergencies. In recent years, evidence has begun to identify determinants of prolonged cardiovascular hospitalization. A retrospective analysis in Poland found that female patients with heart failure had longer stays than their male counterparts [6]. Another study in Tanzania reported that older males from rural areas with a severe form of CVD and elevated creatinine levels were more likely to have prolonged LOS [7]. This evidence implies an interaction between socio-economic, biological and clinical factors that influences the duration of hospitalization.

The Middle East and North Africa (MENA) regions bear a disproportionate CVD burden. While GBD analyses provide regional estimates, evidence on hospital LoS determinants in MENA populations remains scarce. In Palestine, CVDs have surpassed other diseases as the leading cause of death, with recent figures showing 1 in 3 deaths are related to CVDs (30.6 %) [8] [9]. The WHO survey indicated a very high burden of risk factors among Palestinian with (33.6%) had three or more CVD risk factors. The prevalence of hypertension stands at 20.5% and 40% among adults over 40 years [5] [10]. According to the International Diabetes Federation, Diabetes affected 15.5% of adults in 2024. The same report highlighted that 59 % of hypertension cases and 53 % of diabetes cases are uncontrolled due to medicine stockouts and limited primary care follow-up [8] [9].

Despite the heavy CVD burden in Palestine, little is known about factors that prolong hospital stays for cardiovascular patients. Understanding the local deter-

minants and predictors of LoS is vital for nursing practice, resource allocation, and patient safety. Therefore, this study seeks to characterize the demographic and clinical profile of patients admitted with cardiovascular presentations at a tertiary hospital in the West Bank and to identify factors associated with prolonged length of stay.

2. Methods

2.1. Design

This retrospective study analyzed anonymized hospital records. The study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations, followed ethical principles, and obtained relevant institutional approvals for research. Data were retrospectively analyzed to characterize demographic and clinical factors associated with hospital length of stay.

2.2. Settings, Population and Sample

The dataset was obtained from a tertiary referral center in Hebron, West Bank, Palestine. The center offers a specialized cardiovascular service and serves a diverse population across urban and rural areas, covering 1.4 million people. Electronic medical records between January 2018 and January 2024 were screened and used as a data source for the purpose of this study.

The population target was adult patients presenting with cardiovascular symptoms or diagnoses. The study included all available electronic and paper medical records of patients aged 18 years and older who were admitted during the study period. Records were eligible if they contained and documented all necessary Socio and clinical demographics and hospital length-of-stay data. Of the approximately 10,500 records, the final eligible sample comprised 9642 records. Records with missing age or LoS were excluded from regression analyses but retained for descriptive analyses, and 9502 complete records were included in the multivariable regression model. No formal sample size calculation was performed owing to the retrospective nature of the dataset.

2.3. Variables and Measurements

The data of interest were extracted from the patient's records using an investigator-developed data extraction tool, reviewed and approved by three expert colleagues. Demographic variables, which included age (years) and sex (male/female). Clinical variables included chief complaint, primary diagnosis, additional diagnostic findings, electrocardiogram evidence and length of stay (days). Comorbidities were coded as binary variables (1 = present) and included Hypertension, Diabetes Mellitus, Coronary Artery Disease, Dyslipidemia, Heart Failure, Cerebrovascular Accident, Renal Failure, Atrial Fibrillation, Smoking History, previous Coronary Artery Bypass Grafting, and Peripheral Vascular Disease. The primary outcome was LoS, which was skewed; it was dichotomized at the median (1

day) to define prolonged stay (>1 day). Data extraction and coding were reviewed to enhance consistency and minimize data entry errors before statistical analysis.

2.4. Data Analysis

Data were extracted, entered, cleaned, coded and checked for missings using SPSS. Continuous variables are presented as means with standard deviations (SD) when normally distributed, and as medians with interquartile ranges (IQR) when skewed. Categorical variables are summarised as frequencies and percentages.

Differences between groups (e.g. sex) were evaluated using χ^2 tests for categorical variables and t-tests for continuous variables. Univariate logistic regression identified factors associated with prolonged LoS. Length of stay was positively skewed and therefore dichotomised at the cohort median (>1 day) to define prolonged stay. Clinically relevant demographic and comorbidity variables identified a priori from previous cardiovascular literature and clinical relevance were entered simultaneously into the multivariable logistic regression model. Model performance was assessed using the Nagelkerke pseudo-R^2 statistic. Adjusted odds ratios (ORs) with 95% confidence intervals (CIs) and p-values were reported. A two-sided p-value < 0.05 was considered statistically significant.

3. Results

3.1. Demographic and Clinical Characteristics

Of the 9502 patients, 6659 (69.1%) were male, with a mean age of 57.6 ± 12.2 years (range 20 - 98 years), and women were older than men (61.3 ± 11.8 vs 56.0 ± 12.0 years). The median length of stay was 1 day (IQR 1 - 3 days), with a mean of 2.4 ± 3.2 days. Hypertension was the most common comorbidity, affecting 47.4% of patients, followed by diabetes mellitus (37.4%) and coronary artery disease (35.9%). Approximately 9.9% of patients had heart failure, 4.6% had dyslipidemia, and 2.9% had a history of stroke. Nearly one quarter of the cohort (23.4%) were smokers. Prevalence of hypertension (66.1% vs 40.4%) and diabetes (49.5% vs 33.1%) was higher among women than men, whereas smoking (14.2% vs 26.4%) and history of CABG (4.0% vs 7.5%) were more common in men. Table 1 summarises the demographic and clinical characteristics of the cohort.

Table 1. Participant characteristics (N = 9 642).

Characteristic	Values
Age (*years*)	57.6 ± 12.2 (mean ± SD)
Female sex	2 843 (29.5%)
Male sex	6 659 (69.1%)
Length of stay, median (*IQR*)	1 (1 - 3) days
Hypertension	47.4%
Diabetes mellitus	37.4%
Coronary artery disease	35.9%

Continued

Dyslipidaemia	4.6%
Heart failure	9.9%
Cerebrovascular accident	2.9%
Renal failure	5.3%
Atrial fibrillation	4.0%
Smoking history	23.4%
Previous CABG	6.4%
Peripheral vascular disease	1.9%

3.2. Predictors of Prolonged Hospital Stay

Univariate analyses identified older age, male sex, hypertension, diabetes mellitus, coronary artery disease, cerebrovascular accident, smoking and previous CABG as associated with LoS > 1 day. Of the 9642 records retained for descriptive analyses, 9502 had complete age, sex, and length-of-stay data and were included in the multivariable model. Table 2 presents the adjusted odds ratios.

Table 2. Multivariable logistic regression for length of stay > 1 day (N = 9 502).

Predictor	Adjusted OR (95% CI)	p-value
Age	1.02 (1.02 - 1.03)	<0.001
Male sex	1.49 (1.35 - 1.64)	<0.001
Hypertension	1.18 (1.07 - 1.30)	0.001
Diabetes mellitus	1.71 (1.55 - 1.88)	<0.001
Coronary artery disease	1.25 (1.13 - 1.37)	<0.001
Dyslipidaemia	1.01 (0.83 - 1.24)	0.90
Heart failure	1.07 (0.92 - 1.24)	0.38
Cerebrovascular accident	1.40 (1.09 - 1.80)	0.009
Renal failure	1.08 (0.90 - 1.31)	0.41
Atrial fibrillation	1.15 (0.93 - 1.43)	0.19
Smoking	1.45 (1.31 - 1.61)	<0.001
Previous CABG	1.57 (1.31 - 1.87)	<0.001
Peripheral vascular disease	1.28 (0.94 - 1.74)	0.12

The multivariable model demonstrated modest explanatory performance, with a Nagelkerke pseudo-R^2 of approximately 0.05. Increasing age and male sex were independent predictors of extended hospitalization. Among comorbidities, diabetes mellitus conferred the greatest risk (OR 1.71), followed by previous coronary bypass surgery, smoking history, cerebrovascular accident, coronary artery disease and hypertension. Dyslipidemia, heart failure, renal failure, atrial fibrillation, and peripheral vascular disease were not significantly associated with longer stay after adjustment.

4. Discussion

This study provides a comprehensive analysis of hospitalized patients with cardiovascular presentations in the southern West Bank, Palestine. A predominantly male, middle-aged and cohort characterized by high burdens of hypertension, diabetes mellitus and coronary artery disease. These comorbidities mirror global trends in cardiovascular risk factors [2]-[4] and highlight the urgent need for more investment and better integration of chronic disease control, as outlined in the WHO report [8].

Age and male sex were strong predictors of prolonged hospitalization, consistent with prior international cardiovascular literature showing that advancing age and male sex are associated with longer admissions [11] [12].Women in this sample were older and had higher comorbidity burden but shorter stays. This contrasts with a recent report [6] which demonstrated longer hospitalizations, potentially related to cardiometabolic and hormonal influences [13].

The prevalence of hypertension and diabetes in our cohort is higher than global estimates by the leading cardiovascular organization [14], but broadly comparable to reports of cardiovascular cohorts from low-resource settings [6] [7]. Similar to contemporary literature, our findings underscore the negative impact of cardiometabolic comorbidities on healthcare resources, patient outcomes, and complications [15] [16]. Diabetes mellitus increased the odds of staying longer than 1 day by 71%, while coronary artery disease increased the odds by 25%. Smoking was also an independent predictor of longer stay, aligning with evidence on the association between smoking and longer LoS, where smoking contributes to vascular inflammation and is clustered with greater cardiovascular burden among patients with prolonged admission [6]. In contrast, heart failure, renal failure, atrial fibrillation, dyslipidemia and peripheral vascular disease were not independently associated with prolonged stay.

The predictive model explained only a modest proportion of the variance in LoS, suggesting that other factors also play important roles. The findings suggest that longer hospitalisation in this patient population is not driven by an isolated acute event, but rather by cumulative cardiometabolic burden and chronic disease complexity [14]. From a clinical and operational perspective, this means a need for more intensive monitoring, prolonged follow-ups, and complex discharge planning. This implies a higher workload and occupancy rate, as well as the need for multidisciplinary coordination in tertiary hospitals operating in resource-constrained settings.

The outcome (LoS) was dichotomised at the median; alternative definitions may yield different effect sizes. It was dichotomised at the median to allow clinically interpretable logistic regression modelling; however, this approach may have reduced information compared with analysing length of stay as a continuous or count outcome. Comorbidities were coded as binary variables; information on severity, treatment, or control (e.g., blood pressure, glucose levels) was unavailable. Missing data were minimal for comorbidities but slightly higher for age and LoS;

however, complete-case analysis is unlikely to introduce significant bias given the large sample.

5. Conclusion

This retrospective study of 9642 patients with cardiovascular presentations in Palestine identified older age, male sex, hypertension, diabetes mellitus, coronary artery disease, smoking and previous coronary artery bypass grafting as independent predictors of prolonged hospital stay. These findings highlight the importance of comprehensive chronic disease management and lifestyle interventions to reduce hospitalization time. Further prospective, multicentre studies incorporating detailed clinical data are necessary to refine predictive models and develop targeted nursing interventions.

Limitations

This analysis was retrospective and relied on administrative data, which limited control over variable definitions and data quality. Several limitations warrant consideration. First, the observational design precludes causal inference. Associations between comorbidities and prolonged stay may reflect underlying disease severity or unmeasured confounders. Second, the dataset lacked details on medications, laboratory values, socioeconomic status, and discharge destination, all of which are known to influence LoS. Third, the analysis used the median to define prolonged stay; while sensitivity analyses yielded similar patterns, other definitions may be more clinically meaningful. Fourth, data were obtained from a single centre in Palestine, limiting generalisability. Finally, any variable in the original dataset with missing data that could not be interpreted was excluded.

Ethical Approval

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Palestine Ahliya University and the relevant committee of the participating tertiary referral hospital in Hebron, West Bank, Palestine (Approval No. CAMS/CCNA/01/923). Owing to the retrospective nature and the use of anonymized medical records, informed consent was waived. The extracted dataset was handled confidentially, and no identifiable patient information was collected or reported as per the ethical principles outlined in the Declaration of Helsinki.

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Conflicts of Interest

The author declares no conflict of interest.

References

[1] World Health Organization (2025) Cardiovascular Diseases (CVDs). https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

[2] Roth, G.A., Mensah, G.A., Johnson, C.O., Addolorato, G., Ammirati, E., Baddour, L.M., *et al.* (2020) Global Burden of Cardiovascular Diseases and Risk Factors, 1990-2019. *Journal of the American College of Cardiology*, **76**, 2982-3021. https://doi.org/10.1016/j.jacc.2020.11.010

[3] Chong, B., Jayabaskaran, J., Jauhari, S.M., Chan, S.P., Goh, R., Kueh, M.T.W., *et al.* (2025) Global Burden of Cardiovascular Diseases: Projections from 2025 to 2050. *European Journal of Preventive Cardiology*, **32**, 1001-1015. https://doi.org/10.1093/eurjpc/zwae281

[4] Stark, B.A., DeCleene, N.K., Desai, E.C., Hsu, J.M., Johnson, C.O., Lara-Castor, L., *et al.* (2025) Global, Regional, and National Burden of Cardiovascular Diseases and Risk Factors in 204 Countries and Territories, 1990-2023. *JACC*, **86**, 2167-2243. https://doi.org/10.1016/j.jacc.2025.08.015

[5] Duncan, B.B., Magliano, D.J. and Boyko, E.J. (2026) IDF Diabetes Atlas 11th Edition 2025: Global Prevalence and Projections for 2050. *Nephrology Dialysis Transplantation*, **41**, 7-9. https://doi.org/10.1093/ndt/gfaf177

[6] Surma, S., Czapla, M., Uchmanowicz, I., Juárez-Vela, R., Pietrzykowski, Ł., Uchmanowicz, B., *et al.* (2025) Prolonged Hospital Stay in Hypertensive Patients: Retrospective Analysis of Risk Factors and Interactions. *Nursing Reports*, **15**, Article 110. https://doi.org/10.3390/nursrep15030110

[7] Amon, Y., Iseselo, M.K. and Sumari, E. (2025) Prolonged Length of Hospital Stay and Its Associated Factors among Patients Admitted with Heart Failure: A Cross-Sectional Study in Dar Es Salaam, Tanzania. *BMC Cardiovascular Disorders*, **25**, Article No. 876. https://doi.org/10.1186/s12872-025-05333-z

[8] Duran, D., *et al.* (2025) Overcoming the Obstacles on the Path to Universal Health Coverage: An Analysis of the Palestinian Health System. https://openknowledge.worldbank.org/server/api/core/bitstreams/6f388a3e-0f94-469c-8e8a-ff9a383ba8b6/content

[9] World Health Organization (2025) Public Health Situation Analysis (PHSA).

[10] Massad, S., Isbeih, M., Owess, M., Fouad, H., Saman, K.A., Issawi, S., *et al.* (2025) Noncommunicable Diseases: A Silent Epidemic in Occupied Palestine: Results from the World Health Organization STEPS Survey 2022. *BMC Public Health*, **25**, Article No. 2726. https://doi.org/10.1186/s12889-025-23880-0

[11] Grave, C., Gabet, A., Iliou, M., Cinaud, A., Tuppin, P., Blacher, J., *et al.* (2024) Temporal Trends in Admission for Cardiac Rehabilitation after an Acute Coronary Syndrome in France from 2009 to 2021: Persistent Sex, Age and Social Disparities. *Archives of Cardiovascular Diseases*, **117**, 234-243. https://doi.org/10.1016/j.acvd.2023.12.008

[12] Vardar, U., Shaka, H., Kumi, D., Gajjar, R., Bess, O., Kanemo, P., *et al.* (2023) Gender Disparities, Causes and Predictors of Immediate and Short-Term Cardiovascular Readmissions Following Covid-19-Related Hospitalisations in the Usa. *BMJ Open*, **13**, e073959. https://doi.org/10.1136/bmjopen-2023-073959

[13] Mincă, A., *et al.* (2025) The Association Between Chronic Heart Failure and Metabolic Syndrome Increases the Cost of Hospitalization. *Healthcare*, **13**, Article 1239.

[14] Sperling, L., Irazola, V., Partarrieu, J., Raspail, L., Banach, M., Banerjee, A., *et al.* (2026) WHF Roadmap for Integrated Care in People Living with—or at Risk of—Cardio-

vascular Disease and Multiple Long-Term Conditions. *Global Heart*, **21**, 28. https://doi.org/10.5334/gh.1541

[15] Boden, W.E., De Caterina, R. and Taggart, D.P. (2022) Is There Equivalence between PCI and CABG Surgery in Long-Term Survival of Patients with Diabetes? Importance of Interpretation Biases and Biological Plausibility. *European Heart Journal*, **43**, 68-70. https://doi.org/10.1093/eurheartj/ehab445

[16] Brodersen, B.B.O., Kristiansen, L.T., le Fevre Karlsen, S., Hauch, J., Andreasen, J.J., Kragholm, K.H., *et al.* (2025) Association between Diabetes and Heart Failure after Coronary Artery Bypass Grafting: Danish Register-Based Cohort Study. *Clinical Research in Cardiology*, **114**, 640-650. https://doi.org/10.1007/s00392-025-02594-8