Readmission Rates And Underlying Causes: A 30- Day Post-Discharge Analysis In Internal Medicine Department

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Abstract

Background: One of the major issues in the healthcare systems is patients' readmissions to the hospitals. These readmissions are associated with worsen the patient outcomes and increase the costs of the healthcare services. Its prevalence is associated with different factors including patients demographics, their clinical conditions, and the degree of post-discharge care. The current study aimed to assess the prevalence of 30-days-hospital readmission to the internal medicine.

Methodology: This is a retrospective cohort study that was conduted depending on hospital records of patients readmitted within the 30 days of discharge in the period between March 1st 2024 until 31st August 2024 from internal medicine department. The patients characteristics as age and gender, discharge clinical diagnosis, reasons for the readmission, and the outcomes of the patients including mortality were collected. Descriptive analysis and bivariate analyses were used to assess the association between demographic factors and patients outcomes.

Results: The prevalence of 30-day readmission was 11 % with peaks in August 2024. The age of the patients were mostly between 74-94 years old (56.4%). The most common reasons for readmissions included penumonia, decompended heart failure (DHF), and electrolyte imbalances. The mortality rate was 9.8 % and most of the patients were successfully discharged home (83.4%). Some diagnoses at discharge (e.g., anemia, pulmonary embolism) were significantly linked to negative outcomes, including inpatient stays and mortality. No significant association was reported between receiving home health care and readmission outcomes.

Conclusion: The current study showed that older age, presence of some medical conditions as pensumonia, DHF, and electrolyte imbalance are associated with higher readmission rates and unfavorable outcomes. These results showed that those patients should have more attention before discharge through better discharge planning, infection prevention, and post-discharge monitoring that would help in reducing hospital readmissions and improve the patients' outcomes.

Introduction

One of the important measures of the quality of the healthcare services is the 30-days- hospital readmissions which have a significant burden on the cost of services and patients' outcomes among different healthcare systems worldwide [1,2]. Therefore, understanding of the prevalence of hospital readmissions and the associated factors would help in improving patients' outcomes, quality of the provided services, and reducing of the costs of these services [3]. The literature showed that unplanned readmissions often could be prevented and are associated with different factors including the quality of the provided care during the first admission, the demographic

factors of the patients, the nature of the initial diagnosis, and the presence of post-discharage follow-up [4–7].

The 30-days- readmissions rate is used as a indicator of the quality of the hospital perfromance however, it is affected by different medical, social, and systemic factors [8]. Complications related to the original conditions at first admission, inadequate planning of discharge, medication errors, and the presence of multiple comorbidities are the main reasons for early readmissions [9,10].

The 30-days- hospital readmissions remain one of the persistent challenge for the healthcare systems which often increases the costs of the healthcare services and worsen the patients' outcomes [11,12]. However, the efforts to improve the quality of care and applications of discharge plannings, many patients re-admitted to the hospital becaues of preventable causes as infections, medication errors, and complications associated with their initial conitions [1,8,13]. The current studys aimed to assess the prevalence of 30-day- re-hospitalization among internal medicine patients who discharged in the period 1 March until 31 August 2024 at Prince sultan military medical city (PSMMC). In addition, the study aimed to determine the associated causes and factors.

Methodology

This is a retrospective cohort study that was conducted among internal medicine patients who were readmitted to the hospital within 30 days of discharge in the period 1 March until 31 August 2024 at Prince sultan military medical city (PSMMC). The PSMMC is a prominent healthcare facility presented in Riyadh, capital of Saudi Arabia, and providing advanced medical services for the military personnel and their families. Data included demographics such as age, gender, admission diagnosis and previous discharge date and diagnosis.

Inclusion criteria included all patients who were internal medicine patients, 15 years of age or older, were readmitted to the hospital within 30-days of their first discharge, and had full records. Furthermore, the patients would have had to have been discharged from the hospital and readmitted to the same hospital within 30 days of discharge. Patients rehospitalized for scheduled or elective surgery and those with inadequate records were among the exclusion criteria.

Patients who satisfied the inclusion criteria had data gathered from electronic medical records (EMR). Using a structured data gathering form, several variables from the hospital's EMR system were extracted including Medical Record Number (MRN), readmission date, age, gender, admission diagnosis, prior discharge date and diagnosis, number of days between discharge and readmission, the hospital department handling the patients care, outcome of readmission (e.g., discharge, transferred, or deceased), and whether the patient had received home health care following their first discharge.

Descriptive statistics were utilized to present categorical variables including gender, admission diagnosis, and outcome by means of frequencies and percentages. Means and standard deviations were computed for continuous variables such age and the number of days between discharge and readmission. The gathered data were analyzed using statistical software like SPSS. The total number of patients readmitted within 30 days divided by the total number of discharged patients across the study period yields the overall rate of 30-day readmissions.

Describtive analysis was conducted using frequency and percent to determine the categorical variables as gender, most frequent causes of the readmission, complications, and outcomes. In addition, chi-sequare tests were used to assess the association between demographic factors and outcomes of the patients. All statements were considered significant when p value is lower than 0.05. The study was conducted after having the ethical aggreement of the hospital Institutional Review Board (IRB). The authors ensured the patients' confidentiality by anonymizing the data collected using Medical Record Numbers (MRN) rather than using identifiable informations as names or contact details. The information was not shared with outsides sources other than the main investigators.

Results

The study analyzed hospital readmissions over a six-month period, from March to August, and the data revealed notable trends. The readmissions were distributed relatively evenly across the months, with March and August each accounting for 17.8% of the total readmissions (29 patients), while April had the highest number at 19% (31 patients). The readmission rates, calculated as the percentage of readmissions to the total discharges, ranged from 9.3% in July to 12.9% in August. The overall rate of 30-day readmissions across all months was 11%, suggesting a moderate but consistent trend in patient readmissions.

In terms of patient age, the study's participants were predominantly older adults, with the majority (56.4%) aged between 74-94 years. The mean age of the patients was 73.3 years, with a standard deviation of 18.1, indicating a significant age range within the population. The study population was nearly evenly split by gender, with 49.7% male and 50.3% female. The average number of days between discharge and readmission was 11.1 days, with a standard deviation of 7.6, indicating that most patients were readmitted relatively soon after discharge (Table 1).

Table 1: Readmission rates and demographic factors			
		Count	Column N %
Date of Readmission	March	29	17.8%
	April	31	19.0%
	May	25	15.3%
	June	25	15.3%
	July	24	14.7%
	August	29	17.8%
Rate of readmission (readmission/ discharges)	March	29/262	11%
	April	31/264	11.7%
	May	25/237	10.5%
	June	25/232	10.7 %
	July	24/256	9.3 %
	August	29/224	12.9 %
	Total	163/1475	11.0%
Age	Mean (SD)	73.3 (18.1)	
	14-34	11	6.7%
	34-54	9	5.5%
	54-74	45	27.6%
	74-94	92	56.4%
	>94	6	3.7%
Gender	Male	81	49.7%
	Female	82	50.3%
No. Of days between discharge and readmission	Mean (SD)	11.1 (7.6)	

The primary reasons for readmission included pneumonia (16.6%), decompensated heart failure (DHF) (15.3%), and electrolyte imbalance mainly hyponatremia (12.3%). Other significant causes included acute kidney injury (AKI) on chronic kidney disease (8.0%), and complications related to percutaneous endoscopic gastrostomy (PEG) tubes (5.5%). Readmissions also occurred due to infections such as urinary tract infections (UTI) and infected bed sores (5.5% each), as well as COVID-19 (3.7%) (Figure 1).

The diagnoses at the time of the patients' last discharge were also diverse. The most frequent diagnoses were pneumonia (20.2%) and DHF (15.3%), with notable contributions from electrolyte imbalance (13.5%) and AKI (5.5%). Other diagnoses included urinary tract infections (9.2%), infected bed sores (6.1%), and complications related to PEG tubes (4.3%). The variety of conditions at discharge suggests that many of these patients had complex, ongoing health issues that put them at risk for readmission (Figure 2).
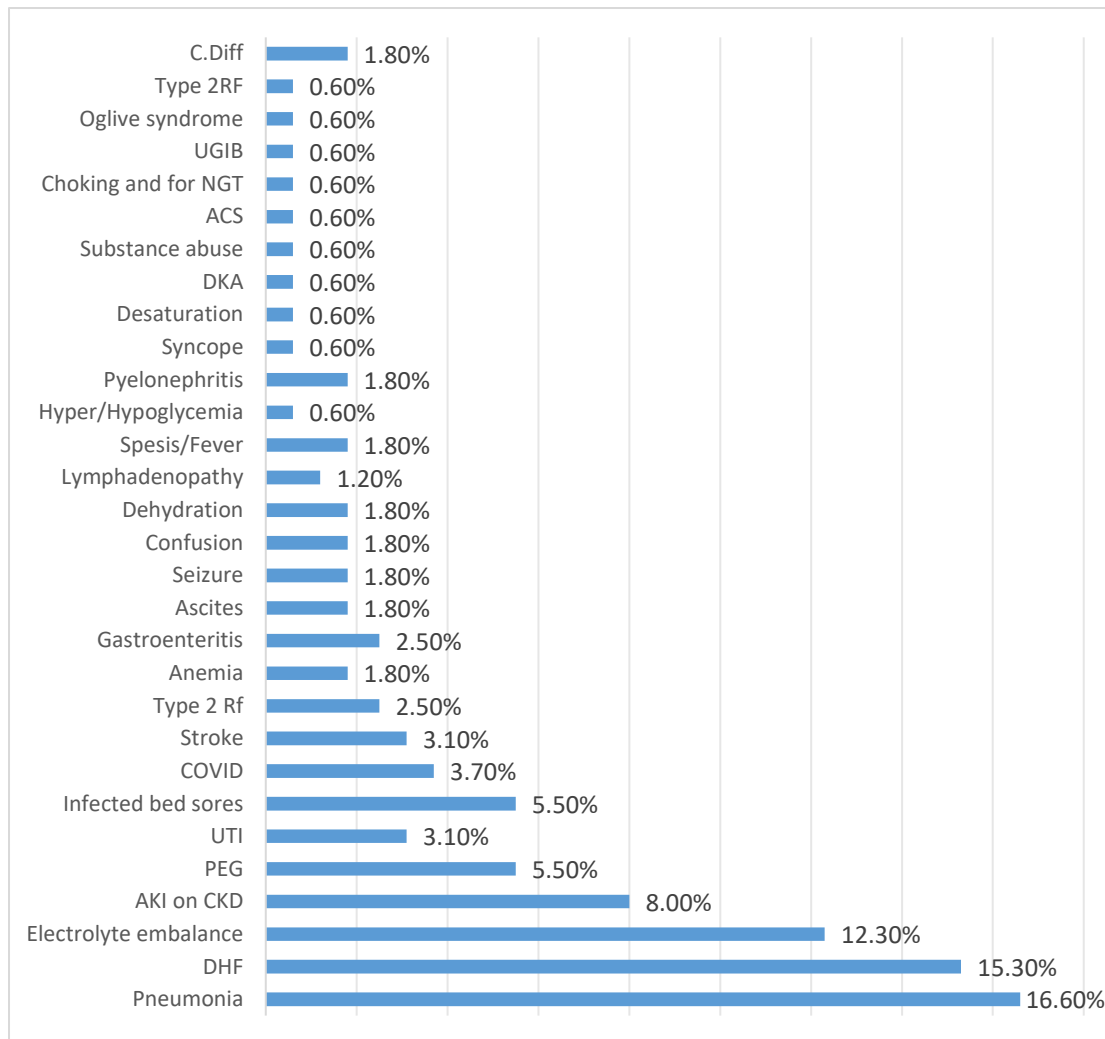
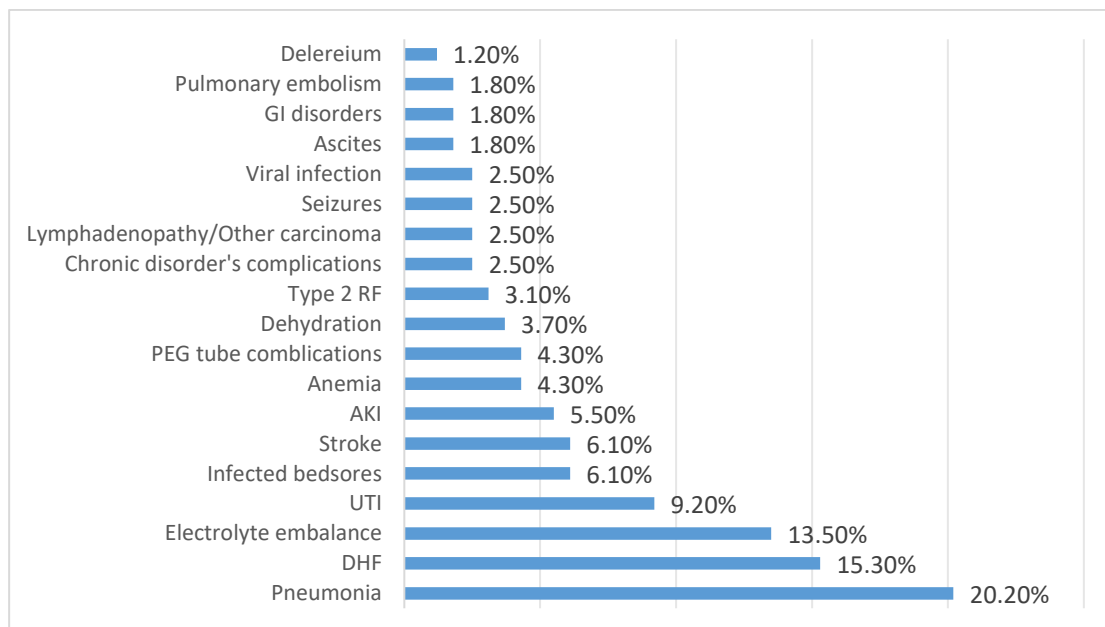Figure 1: Reasons for readmission

Figure 2: Diagnosis at last discharge

The outcomes of the readmissions were primarily positive, with 83.4% of patients being discharged after their readmission. The mortality rate was 9.8% of patients during their hospital stay. A small proportion of patients remained inpatient (3.7%) or were transferred to a long-term unit (3.1%).In terms of home health care (HHC), 54% of patients received home health care following their initial discharge, while 46% did not (Table 2).

Table 3: Outcomes of readmission		Count	Column N %
Outcome	Inpatient	6	3.7%
	Deceased	16	9.8%
	Discharged	136	83.4%
	LTU	5	3.1%
HHC	No	75	46.0%
	Yes	88	54.0%

The association between patient demographics and readmission outcomes was examined across several factors. The study found no significant association between age, gender, or home health care (HHC) and readmission outcomes, although a trend toward higher inpatient stays was observed in older age groups. Patients aged 74-94 years had the highest rates of inpatient stays (83.3%) and were more likely to have adverse outcomes such as death. However, the p-value for age was not significant (P-value = 0.663), suggesting that age alone may not be a strong predictor of outcome. Gender did not show a significant impact on the outcomes (P-value = 0.185), and there was no notable difference in outcomes between patients who received home health care and those who did not (P-value = 0.374) (Table 3).

Table 3: Association between outcome and demographic factors		Outcome								
		Inpatient		Deceased		Discharged		LTU		P-value
		Count	Column N %	Count	Column N %	Count	Column N %	Count	Column N %	
Date of Readmission	March	0	0.0%	4	25.0%	22	16.2%	3	60.0%	0.005*
	April	0	0.0%	3	18.8%	28	20.6%	0	0.0%	
	May	1	16.7%	5	31.3%	18	13.2%	1	20.0%	
	June	0	0.0%	2	12.5%	23	16.9%	0	0.0%	
	July	0	0.0%	1	6.3%	23	16.9%	0	0.0%	
	August	5	83.3%	1	6.3%	22	16.2%	1	20.0%	
Age	14-34	0	0.0%	0	0.0%	11	8.1%	0	0.0%	0.663
	34-54	0	0.0%	1	6.3%	8	5.9%	0	0.0%	
	54-74	1	16.7%	6	37.5%	36	26.5%	2	40.0%	
	74-94	5	83.3%	8	50.0%	77	56.6%	2	40.0%	
	>94	0	0.0%	1	6.3%	4	2.9%	1	20.0%	
Gender	Male	5	83.3%	9	56.3%	66	48.5%	1	20.0%	0.185
	Female	1	16.7%	7	43.8%	70	51.5%	4	80.0%	
HHC	No	1	16.7%	6	37.5%	65	47.8%	3	60.0%	0.374
	Yes	5	83.3%	10	62.5%	71	52.2%	2	40.0%	

The relationship between final discharge diagnoses and readmission outcomes revealed some important trends. Anemia was significantly associated with readmission outcomes, with patients diagnosed with anemia having a higher likelihood of being inpatient (28.6%) compared to those without anemia (2.6%) (P-value = 0.004). Pneumonia, one of the most frequent diagnoses at discharge, was not significantly associated with the readmission outcome (P-value = 0.662). However, pulmonary embolism showed a significant impact on the likelihood of

adverse outcomes, with 66.7% of patients with this condition being deceased (P-value = 0.011). Other conditions, such as dehydration, stroke, and type 2 renal failure, did not show significant associations with the readmission outcomes (Table 4).

Table 4: The association between outcomes and diagnosis at final discharge									
		Outcome							
		Inpatient		Deceased		Discharged		LTU		
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	P-value
Anemia	No	4	2.6%	16	10.3%	131	84.0%	5	3.2%	0.004*
	Yes	2	28.6%	0	0.0%	5	71.4%	0	0.0%	
AKI	No	6	3.9%	15	9.7%	128	83.1%	5	3.2%	0.875
	Yes	0	0.0%	1	11.1%	8	88.9%	0	0.0%	
Ascites	No	6	3.8%	15	9.4%	134	83.8%	5	3.1%	0.566
	Yes	0	0.0%	1	33.3%	2	66.7%	0	0.0%	
Delirium	No	6	3.7%	16	9.9%	134	83.2%	5	3.1%	0.940
	Yes	0	0.0%	0	0.0%	2	100.0%	0	0.0%	
Chronic disorder's complications	No	6	3.8%	16	10.1%	134	84.3%	3	1.9%	0.000*
	Yes	0	0.0%	0	0.0%	2	50.0%	2	50.0%	
Lymphadenopathy/Other carcinoma	No	6	3.8%	16	10.1%	132	83.0%	5	3.1%	0.846
	Yes	0	0.0%	0	0.0%	4	100.0%	0	0.0%	
GI disorders	No	6	3.8%	16	10.0%	133	83.1%	5	3.1%	0.895
	Yes	0	0.0%	0	0.0%	3	100.0%	0	0.0%	
Pulmonary embolism	No	6	3.8%	14	8.8%	135	84.4%	5	3.1%	0.011*
	Yes	0	0.0%	2	66.7%	1	33.3%	0	0.0%	
Seizures	No	6	3.8%	15	9.4%	133	83.6%	5	3.1%	0.735
	Yes	0	0.0%	1	25.0%	3	75.0%	0	0.0%	
Viral infection	No	6	3.8%	16	10.1%	132	83.0%	5	3.1%	0.846
	Yes	0	0.0%	0	0.0%	4	100.0%	0	0.0%	
Type 2 RF	No	6	3.8%	14	8.9%	133	84.2%	5	3.2%	0.140
	Yes	0	0.0%	2	40.0%	3	60.0%	0	0.0%	
Dehydration	No	6	3.8%	16	10.2%	130	82.8%	5	3.2%	0.744
	Yes	0	0.0%	0	0.0%	6	100.0%	0	0.0%	
Pneumonia	No	5	3.8%	12	9.2%	110	84.6%	3	2.3%	0.662

	Yes	1	3.0%	4	12.1%	26	78.8%	2	6.1%	
UTI	No	5	3.4%	15	10.1%	123	83.1%	5	3.4%	0.778
	Yes	1	6.7%	1	6.7%	13	86.7%	0	0.0%	
Infected bedsores	No	5	3.3%	15	9.8%	128	83.7%	5	3.3%	0.683
	Yes	1	10.0%	1	10.0%	8	80.0%	0	0.0%	
PEG tube complications	No	6	3.8%	16	10.3%	129	82.7%	5	3.2%	0.693
	Yes	0	0.0%	0	0.0%	7	100.0%	0	0.0%	
Stroke	No	6	3.9%	16	10.5%	126	82.4%	5	3.3%	0.549
	Yes	0	0.0%	0	0.0%	10	100.0%	0	0.0%	
DHF	No	5	3.6%	11	8.0%	117	84.8%	5	3.6%	0.238
	Yes	1	4.0%	5	20.0%	19	76.0%	0	0.0%	
Electrolyte imbalance	No	5	3.5%	16	11.3%	116	82.3%	4	2.8%	0.407
	Yes	1	4.5%	0	0.0%	20	90.9%	1	4.5%	

Discussion

The goals of this research were to find out what causes hospital readmissions. This included looking at things like how often people came back, why they came back, who the patients were, and what their health was like when they left the hospital. The results stress the need of treating particular ailments and providing suitable post-discharge care since they show a complex interplay of clinical and demographic elements impacting readmission outcomes.

The general 30-day readmission rate was determined to be 11%, with a significant monthly fluctuation. While July had the lowest rate (9.3%), August had the highest readmission rates of 12.9%. This variation might show seasonal patterns, changes in patient populations, or hospital practices that have changed over time. The difference in the prevalence of readmission depending on the months was reported in previous studies that showed that readmission rate could be affected by the hospital resources, allocation, and seasonal sickness patterns [14]. The readmission rate reported in the current study is less than reported in a previous study of DeAngelo S et al., which was conducted among 3831156 hospitalized patients and reported a prevalence of 18.4 % [15]. In addition, a previous review reported that the projected readmission rate ranged between 21.7 % and 24.5 % [16], and other studies in the literature reported a prevalece between 5 % and 79 % [17-21]. The prevalence reported in the current study was comparable to the rates reported in earlier studies conducted in Saudi Arabia which ranged between 2 % and 10.18 % [22-24]. The study also showed that pneumonia and DHF were the main causes for readmission which also reported in pervious study [25].

Patient age also affected the readmission rate; most readmitted patients aged 74 to 94 years (56.4%). Frailty and the complexity of Treatment of chronic diseases increases readmission risk in this age range, which includes older people with typically many co-morbidities. Earlier studies have repeatedly shown advanced age to be a significant readmission risk factor [26]. The data point to the fact that senior patients have a higher chance of difficulties upon release from hospital. This shows that we need to do specific efforts to ensure that elderly people receive the greatest care possible once they leave the hospital [26].

The most often readmissions in this study were brought on by pneumonia, DHF, and electrolyte imbalance. Particularly among seniors, pneumonia is a frequent worry; frailty and pre-existing

respiratory problems increase vulnerability to infections [25]. As patients with underlying illnesses including heart failure and chronic kidney disease often have electrolyte abnormalities [27], current research validates the connection between electrolyte imbalance and readmission. Additionally showing the vulnerability of patients following hospital discharge are infections like UTIs and infected bed sores that readmitted patients frequently suffered from. Thus, early detection, treatment, and enough post-discharge care—including monitoring for indicators of infection—are absolutely vital in reducing readmission risk [28]. Comorbid conditions including diabetes or immunosuppression increase the likelihood of these infections [28].

Most of those who were re admitted were released following treatment; 83.4% of patients returned to their homes. Still, since 9.8% of hospital patients passed away, readmitted patients are often rather ill. The death rate is consistent with past studies indicating higher mortality rates for readmitted patients, especially those with significant comorbidities [29]. Although the rather great discharge rate implies good management of re-admitted patients, the mortality rate stresses the need of more intensive monitoring and early intervention to prevent problems in high-risk populations.

Home health care (HHC) was received by fifty-four percent of patients since post-discharge support seems to be emerging as a critical component of patient care. Because the impact of home care on clinical outcomes is still under debate, more research is required on the part of HHC in reducing readmission rates [30]. But the month of readmission clearly affected results; inpatient stays were more likely in August. Seasonal changes or particular hospital policies could cause this trend, but more study is required to probe these patterns more thoroughly [14]. The research also showed that, in line with the recognized knowledge that elderly patients have higher risk of negative outcomes following hospital discharge, patients aged 74–94 years had a greater rate of hospital admissions and mortality [26].

Some diagnoses at discharge were shown to have a strong correlation with readmission results. Particularly striking was anemia; patients identified as anemic had a greater chance of being hospitalized (28.6%) after readmission. Elderly people often have anemia, which makes them more likely to have problems like heart disease and infections, which might explain why they don't do as well as they should [31]. Furthermore supporting the need to handle long-term health issues aggravating readmissions, chronic diseases also had a strong correlation with unfavorable results. Earlier studies indicating that individuals with chronic illnesses such heart failure, diabetes, and chronic kidney disease are more likely to be readmitted because of problems related to their illnesses corroborate this result [9].

With 66.7% of those afflicted passing away during their readmission, pulmonary embolism also turned out to be a major risk indicator for unfavorable results. This underlines the serious nature of pulmonary embolism, especially in the elderly, as well as the need of early identification and treatment of this illness to lower death [27]. Although pneumonia was frequently diagnosed upon discharge, this research found little link between it and readmission outcomes, maybe indicating that the timing or severity of pneumonia—rather than the diagnosis alone—is more important in influencing outcomes [27].

Limitations and Future Directions
The conclusions from this study should be read in light of a number of limitations. It is a retrospective study, which means it uses data from hospital records that already exists and might be affected by reporting biases. Also, other limitations to this study includes lack of social correlation with readmission rate. Furthermore, the brief study period between March and August 2024 could hinder generalization of the findings throughout longer stretches of time. Post-discharge follow-up and improved discharge planning are two examples of treatments that future planned studies should investigate more thoroughly to see whether they lower readmission rates.

Conclusion
This study effectively provides perceptive analysis of the components affecting hospital readmissions. Lowering rehospitalization rates depends on treating specific clinical problems like pneumonia, DHF, and electrolyte imbalances. Furthermore, the study highlights how

important post-discharge care—including home health care—is in patients' rehabilitation. The results call attention to the need of targeted therapies to improve patient results, especially among older people and people with chronic medical conditions. A grasp of how demographic, clinical, and healthcare variables interact would be especially vital as hospital re-admission is still a significant problem for healthcare systems. in developing initiatives to reduce readmissions and improve patient care.

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