Thirty-Day Readmission Rate in Acute Heart Failure Patients Discharged Against Medical Advice in a Matched Cohort Study.

Brijesh Patel MD
Lehigh Valley Health Network, brijesh.patel@lvhn.org

George Prousi MD
Lehigh Valley Health Network, george.prousi@lvhn.org

Mahek Shah MD
Lehigh Valley Health Network, Mahek.Shah@lvhn.org

Paul Secheresiu DO
Lehigh Valley Health Network, Paul.Secheresiu@lvhn.org

Lohit Garg MD
Lehigh Valley Health Network, lohit.garg@lvhn.org

See next page for additional authors

Published In/Presented At

Patel, B., Prousi, G., Shah, M., Secheresiu, P., Garg, L., Agarwal, M., Patil, S., Gupta, R., & Feldman, B. (2018). Thirty-Day Readmission Rate in Acute Heart Failure Patients Discharged Against Medical Advice in a Matched Cohort Study. *Mayo Clinic proceedings*, *93*(10), 1397–1403. https://doi.org/10.1016/j.mayocp.2018.04.023

Authors

Brijesh Patel MD, George Prousi MD, Mahek Shah MD, Paul Secheresiu DO, Lohit Garg MD, Manyoo Agarwal, Shantanu Patil, Rahul Gupta, and Bruce Feldman DO

MAYO CLINIC

ORIGINAL ARTICLE

Thirty-Day Readmission Rate in Acute Heart Failure Patients Discharged Against Medical Advice in a Matched Cohort Study

Brijesh Patel, DO; George Prousi, MD; Mahek Shah, MD; Paul Secheresiu, DO; Lohit Garg, MD; Manyoo Agarwal, MD; Shantanu Patil, MD; Rahul Gupta, MD; and Bruce Feldman, DO

Abstract

Objective: To determine the readmission rate in patients with acute heart failure (AHF) discharged against medical advice (AMA).

Methods: We performed a retrospective analysis using the 2014 National Readmission Database. Patients admitted with a primary diagnosis of AHF were selected. Only those discharged to home and who left AMA were included in the study. The primary outcome was 30-day readmission. We compared the readmission rates among those discharged AMA vs routinely discharged patients using propensity score matching (PSM) to address imbalance in variables between the 2 groups. We matched 3 routinely discharged patients to 1 patient who left AMA.

Results: We identified 273,489 patients with AHF, of whom 116,869 qualified for further study analysis. A total of 2014 patients (1.7%) were in the AMA group and 114,855 (98.3%) were in the routinely discharged group. After PSM, 6042 routinely discharged patients were matched with 2014 patients from the AMA group. The standard mean difference for each variable was less than 10% postmatching. The 30-day readmission rate among those who left AMA was higher than among those routinely discharged (33% vs 20.1%; $P<.001$). Heart failure (44.8%) was the most common cause of readmission in the AMA group. Patients who left AMA were more likely to be readmitted to a different hospital compared with those routinely discharged (37.4 vs 23.1%; $P<.001$). They also had a high rate of leaving AMA during the readmission (18 vs 2%; $P<.001$).

Conclusion: Patients with AHF discharged AMA had a significantly higher 30-day readmission rate than did the routinely discharged group.

 ■ Mayo Clin Proc. 2018;93(10):1397-1403

An estimated 1% to 2% of admitted patients leave against medical advice (AMA) throughout the United States.[1] With varying degrees of severity and consequences linked to specific disease, leaving AMA has been shown to impact 30-day readmission rates and increases the risk for worse outcomes.[2] Studies have shown a higher rate of leaving AMA among patients who are African American, among those belonging to low socioeconomic status, among those with presence of underlying psychiatric disorders, and among those with comorbid alcohol abuse.[3] Although many studies have researched demographic influences accounting for these occurrences, very few have focused on the downstream effects related to leaving AMA in the setting of disease states such as heart failure (HF).

Heart failure affects approximately 6 million adults in the United States, contributes to 1 in 9 deaths, and is estimated to cost more than $30 billion each year. As the leading cause of hospitalization among adults older than 65 years, it is estimated that more than 1 million individuals are hospitalized annually with a primary diagnosis of acute heart failure (AHF).[4,5] This is further complicated by an even greater risk of 1-month and 6-month readmissions rate of more than 20% and more than 50%, respectively, in AHF. Despite continued research on identification of risk

From the Department of Cardiology (B.P., M.S., L.G., B.F.) and Department of Internal Medicine (G.P., P.S.), Lehigh Valley Hospital Network, Allentown, PA; Department of Internal Medicine, University of Tennessee Health Science Center, Memphis, TN (M.A.); Department of Medicine, SSM Health St Mary's Hospital, St Louis, MO (S.P.); and Department of Internal Medicine, New York Medical College, Valhalla, NY (R.G.).

TABLE 1. Diagnosis Codes Used in the Study

Diagnosis	*ICD-9* or CCS codes
Acute heart failure	*ICD-9* codes: 428.21, 428.23, 428.31, 428.33, 428.41, 428.43
Acute myocardial infarction	*ICD-9* codes: 410.X1 (410.01-410.91), 411.1, 410.70-410.72
Readmission etiologies	
Heart failure etiology	CCS: 108
Arrhythmias	CCS: 105-107
AMI or CAD	CCS: 100, 101
Other cardiac etiologies	CCS: 96-99, 102-105
Infectious etiologies	CCS: 2, 159, 197, 246
TIA or stroke	CCS: 109, 112

AMI = acute myocardial infarction; CAD = coronary artery disease; CCS = Clinical Classifications Software; *ICD-9* = *International Classification of Diseases, 9th revision*; TIA = transient ischemic attack.

factors for readmission, utilization of clinical markers, and implementation of multimodal HF teams comprising physicians, nurses, and case managers, patients with HF continue to get readmitted at high rates.[6,7] For this reason, a thorough evaluation of leaving AMA in the HF patient population is warranted and direct attention to this high-risk population. We aimed to explore 30-day readmission among patients with AHF who left AMA and to identify factors that predicted such readmission.

METHODS

National Readmission Database

The National Readmission Database (NRD) is one of largest publicly available databases to query for readmission-based analysis.[8] The data were obtained from various hospitals across the country. It contains more than 14 million cases and is designed to represent 49.3% of all US hospitalizations. The NRD includes patient demographic characteristics, diagnoses and procedure codes, hospital-level information, and hospital charges. Clinical Classifications Software (CCS) is a meaningful cluster of similar diagnosis that is provided as additional variables for both diagnoses and procedures. Importantly, the strength of the database is that it provides reliable patient tracking information for readmissions. To protect patients' privacy, the database has deidentified personal information and date of admissions; instead, alphanumerical codes and numbers were created to represent these variables, respectively. Please refer to Table 1 for complete lists of *International Classification of Diseases, 9th revision* (*ICD-9*) and CCS codes. We used unweighted cases for conducting analyses.

Index Admissions

The *index admissions* were defined as the first admission carrying AHF as a primary diagnosis for a patient from January 01, 2014, to November 30, 2014. We excluded December 2014 data because of incomplete follow-up data within this patient population. Previous studies have used similar techniques to identify index admissions.[9,10] The database provides 1 primary diagnosis and 29 secondary diagnoses. Patients younger than 18 years, those who died during index admission or were discharged to inpatient/nursing facilities, and had missing data for disposition status, median household income, primary payer, or elective status of admission were excluded from the consideration of index admission. Patients who left AMA were categorized as the "AMA" group vs those who had "routine" discharge to home. The details on disposition status available within the database can be found online.[11] To match the AMA group with the routinely discharged group, we performed propensity score matching (PSM) to balance baseline patient demographic characteristics, hospital characteristics, and comorbidities. The methodology of PSM is outlined below.

READMISSIONS

Once the index admission cases were identified, these cases were followed using the "NRD_Visitlink" variable, a unique alphanumerical assigned to an individual patient within the database. In the case of multiple

Mayo Clin Proc. ■ October 2018;93(10):1397-1403 ■ https://doi.org/10.1016/j.mayocp.2018.04.023
www.mayoclinicproceedings.org

TABLE 2. Baseline Patient and Hospital Characteristics for Routinely and AMA Discharged Patients[a]

Variable	Before propensity matching			After propensity matching[b]	
	Routine discharge (%) (n=11,4855)	AMA (%) (n=2014)	*P* value	Routine discharge (%) (n=6042)	AMA (%) (n=2014)
Weekend admission	23	23.7	.46	23.1	23.7
Elective admission	4.6	2.5	<.001	2.2	2.5
Female	42.8	24.7	<.001	23.8	24.7
Age group (y)			<.001		
18-40	3.6	7.7		8.5	7.7
41-60	25.6	46.1		45.1	46.1
61 or more	70.8	46.2		46.4	46.2
Primary payer			<.001		
Medicare	66.6	51.7		52.6	51.7
Medicaid	12.5	29.1		26.5	29.1
Private insurance	13.8	8.5		11	8.5
Self-pay	4.4	6.7		6.5	6.7
No-charge	0.5	0.6		0.6	0.6
Other	2.2	3.3		2.8	3.3
Median income for Zipcode			<.001		
First quartile	32.5	43.1		44.2	43.1
Second quartile	27.1	25		25	25
Third quartile	22.3	18.8		18	18.8
Fourth quartile	18.1	13		12.8	13
Comorbidities					
Alcohol abuse	4.4	10.3	<.001	9.8	10.3
Depression	8.5	6.6	.002	5.9	6.6
Diabetes with complications	11.2	12.2	.17	11.5	12.2
Hypertension	79.3	77.5	.05	78	77.5
Obesity	23.8	22.3	.12	21.8	22.3
Psychosis	2.7	7.7	<.001	6.1	7.7
Renal failure	38.8	34.4	<.001	33.7	34.4
Acute myocardial infarction	3.8	4.8	.03	4.5	4.8
Hospital bedsize			.001		
Small	14.1	11.9		11.3	11.9
Medium	29.2	28.5		28.6	28.5
Large	56.7	59.6		60.2	59.6
Teaching status of hospitals			<.001		
Metropolitan nonteaching	31.5	33.6		33.4	33.6
Metropolitan teaching	60.5	61.2		61.1	61.2
Rural	8	5.2		5.5	5.2

[a]AMA = against medical advice.
[b]Standardized mean difference for each variable was <10%.

AHF readmissions for the same patient during the study year, only the first admission for the year was included among index admissions. The prespecified period of readmission was 30 days. The database provides an arbitrary numerical timing variable representing "the day of admission" (NRD_DaysToEvent) for each admission. We calculated the time to readmission as an interval between discharge of index admission and the day of readmission. Etiology for readmission was determined by the CCS codes within the primary diagnosis field.

Outcomes

The primary outcome of the study was difference in 30-day readmission rates between the AMA group and the routinely discharged group, after propensity matching. The secondary outcomes were cost (index admissions and 30-day readmissions), and length of stay. We compared the etiology for readmission among

TABLE 3. Primary and Secondary Outcomes

Outcome	Routine discharge	AMA	*P* value
Primary outcome			
Readmission rate (%)	20.1	33	<.001
Secondary outcomes			
Hospital charges ($) (IQR), index admission	25,654 (15,258-44,052)	21,511 (12,261-38,108)	<.001
Hospital charges ($) (IQR), readmission	31,096 (16,807-66,221)	30,623 (16,807-62,254)	<.001
Length of stay (d) (IQR), index admission	3 (2-5)	2 (1-4)	<.001
Length of stay (d) (IQR), readmission	4 (2-7)	4 (2-6)	<.001
In-hospital mortality during readmission (%)	3.3	4.5	.18
Patients left AMA when readmitted (%)	2.0	18.0	<.001

AMA = against medical advice; IQR = interquartile range.

study groups, and reported whether patients were readmitted to the same or different hospital than their index hospitalization.

Statistical Analyses

We performed statistical analysis using SPSS 24 (IBM Corporation). We used χ^2 test for categorical variables and Mann-Whitney *U* test for continuous variables because they followed nonparametric distribution. The continuous variables were reported as median and interquartile range (IQR). The categorical variables were reported as percentages. The continuous variables in this study were length of stay and hospital charges. We analyzed the following categorical variables: sex, weekend and elective admissions, age groups (18-40 years, 41-60 years, and 61 years or older), primary insurance payer, median income quartile based on zip code, comorbidities (alcohol abuse, depression, diabetes with complications, hypertension, obesity, psychosis, renal failure, and acute myocardial infarction), hospital bed size, location, and hospital teaching status.

For PSM, a caliper width of 0.01, without replacement, was used. For every case that left AMA, 3 cases of routine discharge were matched. All categorical variables mentioned above were entered within the model. All variables included within the model had an absolute standardized difference of less than 10% after PSM. A *P* value of less than .05 was considered statistically significant. We excluded cases with missing values (<2.5%) for hospitalization cost data from the cost analysis.

RESULTS

The 2014 NRD contains 14,894,613 admissions, out of which 273,489 had a primary diagnosis of AHF. Among these AHF admissions, 222,113 cases were identified as the first admission for that year per patient. Following application of the exclusion criteria, the final unmatched cohort included 116,869 AHF admissions: 114,855 (98.3%) who were routinely discharged and 2014 (1.7%) patients who were discharged AMA (Table 2). The imbalance among the baseline covariates in these 2 groups was addressed using PSM where 1 case of AMA was matched with 3 cases from the routine discharge group (2014 cases matched with 6042 cases, respectively) as shown in Table 2. There was no statistical difference between the 2 groups, except for the psychosis variable, which was noted to be higher in the AMA group compared with routinely discharged patients (7.7 vs 6.1%; *P*=.01).

A total of 1881 (23.3%) patients were readmitted within 30 days postdischarge in the overall propensity matched cohort. Postmatching, the readmission rate within the AMA group was significantly higher compared with that in the routinely discharged group (33% vs 20.1%; *P*<.001) (Table 3). Readmission for HF was the most common etiology among 30-day readmissions, and was significantly higher in the AMA group (44.8% vs 37.4%; *P*=.002) (Table 4).

Patients who were discharged AMA at the time of index admissions were more likely to be readmitted to a different hospital (37.4% vs 23.1%; *P*<.001). The hospital charges were lower in the AMA group during index admission ($21,511 [IQR, $12,261-38,108] vs $25,654 [IQR, $15,258-44,052]; *P*<.001), and remained marginally lower during readmission (AMA: $30,623 [IQR, $16,807-62,254] vs Routine: $31,096 [IQR, $16,807-66,221]; *P*<.001)

Mayo Clin Proc. ■ October 2018;93(10):1397-1403 ■ https://doi.org/10.1016/j.mayocp.2018.04.023
www.mayoclinicproceedings.org

TABLE 4. Readmission Etiologies Using Clinical Classifications Software

Cause for 30-d readmission (%)	Routine discharge (n=1216)	Discharged AMA (n=665)	*P* value
Heart failure	37.4	44.8	.002
Arrhythmias	5.6	3.6	.06
CAD or MI	5.0	5.0	.96
Other cardiac etiologies	9.4	11.1	.30
Infectious etiology	5	4.4	.63
Respiratory etiologies	7.7	7.6	.96
TIA or stroke etiology	1.5	1.1	.44
Other etiologies	28.4	22.4	.005

CAD = coronary artery disease; MI = myocardial infarction; TIA = transient ischemic attack.

compared with the routinely discharged group. The median length of stay was similarly shorter among patients who left AMA (2 [IQR,1-4 days] vs 3 [IQR, 2-5 days]; $P<.001$) than among routinely discharged patients during index admission. The median length of stay during readmission was the same in both groups (AMA group: 4 [IQR, 2-6 days] vs Routine discharge group: 4 [IQR, 2-7 days]; $P<.001$). The rate of leaving AMA was higher among those who left AMA during the index admission (18 vs 2%; $P<.001$) compared with routinely discharged patients, but there was no difference in inpatient mortality between either group during readmission within 30 days (4.5% vs 3.3%; $P=.18$, respectively) (Table 3).

DISCUSSION

About 1.72% of patients with AHF were discharged AMA. Among patients with HF, our study identified a 1.6-fold higher rate of 30-day readmission among those who left AMA compared with those discharged home. Per index admission, those who left AMA had slightly lower mean hospital charges and a shorter length of stay, likely secondary to leaving prematurely. A large proportion of these patients were readmitted with a primary diagnosis of HF. The AMA group was more likely to be readmitted to a different hospital compared with patients routinely discharged home.

Patients who leave AMA have been linked to an increased rate of readmission that is concentrated to the first 2 weeks after discharge.[12] Our study of a nationwide population is the first publication to report that 1 in 3 patients with AHF discharged AMA needed readmission within 30 days. This is much higher than 30-day readmission rates for the general population of HF,[13,14] or patients who were discharged AMA (12%-21%).[15,16] Studies have shown that being discharged AMA and HF independently predicted higher readmissions.[2,16] Patients with acute HF who leave prematurely are a very vulnerable population from the readmission standpoint. The progressive, pathophysiologic nature and undertreated HF can synergistically influence readmissions in these patients. Indeed, HF was the most common etiology for readmission in the discharged AMA patients in our study.

One of the major advantages of our study is that we used one of the largest national databases for studying readmission. The database reliably tracks subsequent readmissions within the same calendar year, even if the patients were not readmitted to the same hospital. Our study population comprised patients with AHF from across the United States and is representative of national trends. In the prematch cohort, 1.72% of patients were discharged AMA. Most patients who left AMA were younger (<60 years), and had government-based insurance (Medicare or Medicaid) as the primary payer. At baseline, we noted that patients who left AMA were more likely to be of the male sex, admitted to large urban hospitals, and suffer from alcohol abuse or psychosis but less likely to have concurrent depression compared with the routinely discharged group of patients. In addition, patients in the lowest quartile for income, a surrogate marker for socioeconomic status, were more likely to leave AMA. Several studies have observed similar characteristics among patients who have a tendency to leave AMA.[2,15-19] Accounting for roughly 0.8% to 2.2% of all discharges from teaching and acute

care hospitals within the United States, the rate of leaving AMA correlates inversely with individual socioeconomic status.[20-23] In a retrospective study, patients with acute myocardial infarction had a 19.5% readmission rate in the discharged AMA group compared with the routinely discharged group (10.7%).[17] These patients had a higher rate of mortality than did routinely discharged patients. When we analyzed readmitted patients, we found that those who left AMA during index admission had a 9-fold higher rate of leaving AMA again at their readmission. It is an important clue for clinicians to identify these patients and approach potential reasons for such behavior in an effort to tackle related problems and assist such vulnerable populations.

When patients leave AMA, it is expected that their length of stay is shorter than that of those who are discharged routinely. Therefore, incurred cost in this group is less upfront. However, leaving AMA is associated with worsened downstream health-related consequences, eventually increasing health care costs.[24] An observational study conducted by Bueno et al,[25] between the years of 1993 and 2000, noted a shortened length of stay among patients who left AMA compared with the routinely discharged patient (6.33 vs 8.8 days, respectively); however, 30-day readmission rates were also higher among patients leaving AMA (20.1% vs 17.5%).[25] The same trend was observed in a study by Fiscella et al,[17] who analyzed the readmission rate in discharged patients with acute myocardial infarction. The authors reported that the mean length of stay in the AMA discharge group was 4 days compared with 8 days among those discharged routinely.[17] Data gathered from our study show a marked decrease in length of stay between patients who were discharged AMA and those who were routinely discharged at 2 and 3 days, respectively. Overall, readmission-related median cost among the 2 groups was comparable with AMA hospital charges being $30,623 and $31,096 for patients routinely discharged. Despite the cost similarities, the higher rates of readmission among patients who leave AMA ultimately subjects patients and institutions to considerably higher cumulative costs. Contrary to the usual perception in the medical community on who bears the financial burden of medical expenses in patients who leave AMA, it is the insurance companies who pay for most of these hospitalizations.[26] Therefore, additional costs incurred because of excessive readmission become a shared burden of health care utilizers.

There are many reasons (such as drug addition, personal and professional obligations, and miscommunication with health care providers) behind patients wanting to leave AMA.[27] Many experts have emphasized the importance of shared decision making and have aimed their focus on facilitating better communication between patients and their care team.[15] When discharge AMA is imminent, outpatient follow-up and discussion about the treatment plans should be discussed with the patients during the beginning of the clinical encounter. A mismatch between clinician's judgment of patient's health and patients' perception of their own health has been also associated with discharges AMA.[28] Besides this, a poor doctor-patient relationship and an insufficient rapport have been implicated in the patients' decisions to leave AMA,[27] resulting in fragmentation of care. We found that those who left AMA tend to be readmitted to different hospitals (37.4% vs 23.1%), consistent with the patients possibly being discontent with their initial encounters with health care personnel. Perhaps, investing in resources to identify at-risk patients and address above-mentioned factors could help hospitals to reduce readmission-related penalties, and improve patient care delivery. Most hospitals still struggle with AHF readmissions, with only 1.4% of all hospitals succeeding at reducing readmission by 20%.[14] Although the cohort of patients who leave AMA is small, they possess certain identifiable risk factors (eg, alcohol abuse and history of leaving AMA). If we implement strategies that discourage patients from leaving AMA, we could reduce overall readmission. Additional research is still needed to create and prospectively validate a risk-based model to identify patients at risk for leaving AMA.

Study Limitations

Our study has important limitations. The cohort selection was using diagnosis codes, which is dependent on the accuracy of coding. We matched important variables between the 2 groups, but PSM analysis cannot account for unmatched and unmeasured confounding

variables such as circumstances around leaving AMA. The database does not provide information on patient's functional capacity, vital signs, medication use, dosage or compliance, and reason for leaving AMA. Therefore, our analysis could not enter these important variables into the PSM model. The cost analysis was based on the hospital charges, but we could not verify the actual amount paid by the insurance companies. The database is accurate for readmission rate but does not provide information on outcomes besides rehospitalization. In other words, we could not confirm outcomes of patients who were not readmitted. At the time of adoption and conceptualization of the project, we had access to the 2014 data only; therefore, its generalizability to the present time is limited.

CONCLUSION

A small percentage of patients with AHF left AMA, but a third of these patients were readmitted within 30 days.

Abbreviations and Acronyms: **AHF** = acute heart failure; **AMA** = against medical advice; **CCS** = Clinical Classifications Software; **HF** = heart failure; ***ICD-9*** = *International Classification of Diseases, 9th revision*; **IQR** = interquartile range; **NRD** = National Readmission Database; **PSM** = propensity score matching

Grant Support: The work was supported by grant 1573-007 from Dorothy Rider Pool Trust Fund.

Potential Competing Interests: The authors report no competing interests.

Correspondence: Address to Brijesh Patel, DO, Lehigh Valley Health Network, 1250 S Cedar Crest Blvd, Ste 300, Allentown, PA 18103 (b2patel@gmail.com).

REFERENCES

1. Ibrahim SA, Kwoh CK, Krishnan E. Factors associated with patients who leave acute-care hospitals against medical advice. *Am J Public Health*. 2007;97(12):2204-2208.
2. Glasgow JM, Vaughn-Sarrazin M, Kaboli PJ. Leaving against medical advice (AMA): risk of 30-day mortality and hospital readmission. *J Gen Intern Med*. 2010;25(9):926-929.
3. Aliyu ZY. Discharge against medical advice: sociodemographic, clinical and financial perspectives. *Int J Clin Pract*. 2002;56(5):325-327.
4. Stevenson LW, Pande R. Witness to progress. *Circ Heart Fail*. 2011;4(4):390-392.
5. Shah M, Patnaik S, Patel B, et al. The day of the week and acute heart failure admissions: relationship with acute myocardial infarction, 30-day readmission rate and in-hospital mortality. *Int J Cardiol*. 2017;249:292-300.
6. Lu MLR, De Venecia TA, Goyal A, et al. Psychiatric conditions as predictors of rehospitalization among African American patients hospitalized with heart failure. *Clin Cardiol*. 2017;40(11):1020-1025.
7. Arora S, Patel P, Lahewala S, et al. Etiologies, trends, and predictors of 30-day readmission in patients with heart failure. *Am J Cardiol*. 2017;119(5):760-769.
8. National Readmission Database (NRD). *Health Care Utilization Project*. Rockville, MD: Agency for Healthcare Research and Quality; 2014.
9. Agrawal S, Garg L, Shah M, et al. Thirty-day readmissions after left ventricular assist device implantation in the United States: insights from the Nationwide Readmissions Database. *Circ Heart Fail*. 2018;11(3):e004628.
10. Patel B, Sablani N, Garg J, et al. Thirty-day readmissions after cardiac implantable electronic devices in the United States: insights from the Nationwide Readmissions Database. *Heart Rhythm*. 2018;15(5):708-715.
11. HCUP. NRD description of data elements. https://www.hcup-us.ahrq.gov/db/vars/dispuniform/nrdnote.jsp. Accessed October 14, 2017.
12. Hwang SW, Li J, Gupta R, Chien V, Martin RE. What happens to patients who leave hospital against medical advice? *CMAJ*. 2003;168(4):417-420.
13. Ziaeian B, Fonarow GC. The prevention of hospital readmissions in heart failure. *Progr Cardiovasc Dis*. 2016;58(4):379-385.
14. Bergethon KE, Ju C, DeVore AD, et al. Trends in 30-day readmission rates for patients hospitalized with heart failure: findings from the Get With The Guidelines-Heart Failure Registry. *Circ Heart Fail*. 2016;9(6). pii: e002594. https://doi.org/10.1161/CIRCHEARTFAILURE.115.002594.
15. Choi M, Kim H, Qian H, Palepu A. Readmission rates of patients discharged against medical advice: a matched cohort study. *PloS One*. 2011;6(9):e24459.
16. Garland A, Ramsey CD, Fransoo R, et al. Rates of readmission and death associated with leaving hospital against medical advice: a population-based study. *CMAJ*. 2013;185(14):1207-1214.
17. Fiscella K, Meldrum S, Barnett S. Hospital discharge against advice after myocardial infarction: deaths and readmissions. *Am J Med*. 2007;120(12):1047-1053.
18. Akinbodewa AA, Adejumo OA, Adejumo OA, et al. Evaluation of administration of discharge against medical advice: ethico-legal considerations. *Niger Postgrad Med J*. 2016;23(3):141-145.
19. Spooner KK, Salemi JL, Salihu HM, Zoorob RJ. Discharge against medical advice in the United States, 2002-2011. *Mayo Clin Proc*. 2017;92(4):525-535.
20. Weingart SN, Davis RB, Phillips RS. Patients discharged against medical advice from a general medicine service. *J Gen Intern Med*. 1998;13(8):568-571.
21. Jeremiah J, O'Sullivan P, Stein MD. Who leaves against medical advice? *J Gen Intern Med*. 1995;10(7):403-405.
22. Saitz R, Ghali WA, Moskowitz MA. The impact of leaving against medical advice on hospital resource utilization. *J Gen Intern Med*. 2000;15(2):103-107.
23. Smith DB, Telles JL. Discharges against medical advice at regional acute care hospitals. *Am J Public Health*. 1991;81(2):212-215.
24. Anis AH, Sun H, Guh DP, Palepu A, Schechter MT, O'Shaughnessy MV. Leaving hospital against medical advice among HIV-positive patients. *CMAJ*. 2002;167(6):633-637.
25. Bueno H, Ross JS, Wang Y, et al. Trends in length of stay and short-term outcomes among Medicare patients hospitalized for heart failure, 1993-2006. *JAMA*. 2010;303(21):2141-2147.
26. Schaefer GR, Matus H, Schumann JH, et al. Financial responsibility of hospitalized patients who left against medical advice: medical urban legend? *J Gen Intern Med*. 2012;27(7):825-830.
27. Onukwugha E, Saunders E, Mullins CD, Pradel FG, Zuckerman M, Weir MR. Reasons for discharges against medical advice: a qualitative study. *Qual Saf Health Care*. 2010;19(5):420-424.
28. Manouchehri J, Goodarzynejad H, Khoshgoftar Z, Sheikh Fathollahi M, Aghamohammadi Abyaneh M. Discharge against medical advice among inpatients with heart disease in Iran. *J Tehran Heart Cent*. 2012;7(2):72-77.