

## Causes of Re-admission in Medical ward within 30 days of discharge among hospitalized Saudi and Non-Saudi patients

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**Abstract:** Hospital readmissions within 30 days of initial discharge occur frequently. In studies of elderly patients receiving Medicare, readmissions have been associated with poor-quality inpatient care, ineffective hospital-to-home transitions, patient characteristics, disease burden, and socioeconomic status. Among adult family medicine patients spanning a wide age range, we hypothesize that previous hospitalizations, length of stay, number of discharge medications, medical comorbidities, and patient demographics are associated with a greater risk of hospital readmission within 30 days. A retrospective case-control study of 253 family medicine inpatients was conducted to determine the factors associated with 30-day re-admission. Odds ratio and one sample T-test were computed to determine the risk factors for unscheduled re-admittance. The results indicated that Patients who were admitted again in 30 days had additional related morbidities (2.1 vs 1.2;  $P < .0001$ ), and the characteristic associated morbidities of congestive heart failure, coronary artery disease, chronic obstructive pulmonary ailment, presence of a psychiatric disorder and recent cancer were all additionally widespread amongst cases. Also the study results indicated that unscheduled re-admittance is related to patient's features. Patients with heart disease, cancer, pneumonia, septicaemia and liver diseases were more prone to admitted again. The proportion of re-admittance was associated with extended stay in the hospital, increased morbidity rate and hospital expenses.

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### 1. Introduction

Hospital readmissions within 30 days of discharge are serious and costly events and cause significant distress to patients and families while at the same time these are potentially preventable [1]. The admission rates are considered to be a marker of poor quality healthcare management, although certain patient and disease characteristics and other socioeconomic factors associated with higher readmission [2, 3]. In the Saudi Arabia, one study reported that as many as 21% of medical patients were readmitted to hospital within 30 days of discharge. The costs of such unplanned readmission were estimated at USD 17.4 billion in 2004, contributing to almost 20% of all hospitalization costs in US. However, in Saudi, the average cost of hospital stay in a MODA hospital is about \$4933, (\$773 per day), while the average cost is about \$1787. Thus, annual operating costs per bed in the kingdom range from \$80,000 in MOH to \$346,667 in the specialist and military hospitals [4]. Kingdom of Saudi Arabia is the largest growing population with reach of 31.6 million by 2016 of which 22.8 million will be Saudi nationals [5]. Like many developed and developing countries, Saudi faces the challenges of a rapidly ageing population with demand for hospital beds exceeding supply. To compound these statements the costs of

carrying for the critical ill estimated on an average of US\$ 1200-1500/day [6]. There is a need to identify patients who have a higher use of hospital resources to improve the effectiveness of health care system. Previous studies identified risk factors were performed elderly population and not in younger population [3, 7, 8, and 9]. Further other studies looked at hospital readmissions are diseases [10, 11, 12 and 13] and to our knowledge not many studies in Saudi Arabia. Recent study on hospital readmission was conducted was specific to diabetes [14]. It is well known that even a small number of patients account for a disproportionate number of healthcare costs and hospital readmission i.e., length of one full day reduces an average of 3% of less of the total cost of care [15, 16 and 17] and identifying these patients is important for economic and quality of care reasons. The present study looked at the risk factors present at the initial discharge that are associated with 30-day readmission for adult patients of all ages who are admitted to a family medicine inpatient services. In addition, the study compared the complications rate among Saudi and Non-Saudi Patients.

### 2. Methods

#### 2.1 Study design and sample

This was a conservative group and case-control report. The population targeted was the medical

records of patients who were admitted to a hospital in XXX, XXX province of Saudi Arabia from January 2000 to December 2008. The concerned teaching-hospital was attached to the King Faisal University, comprising of 340 beds. Patients with diabetic were directed to this hospital from a particular primary health care centre. Proper sanction was attained from the Ministry of Health, prior to undertaking this study. Privacy of the information collected from medical documents was upheld. To decide the 30-day readmission ratio we scrutinized the computerized and written medical records of patients who happened to be admitted again to the internal medical department within 30 days of index hospitalization for the similar identification that is unplanned re-admittance. The index hospitalization was described as the first hospitalization following which the patient was admitted again to the hospital in 30 days subsequent to being discharged in the study time frame.

## 2.2 Sample

To decide the trial volume for the case-control research, it was supposed that the Odds Ratio (OR) of re-admittance amongst patients rendered to unsatisfactory treatment was 2.24 %, and the portion of early unscheduled re-admittances assignable to unsatisfactory treatment was 14.9 % [18]. With a comparative accuracy of 50%, and 95% assurance degree, the least necessary trial volume was approximated as 62 cases and 62 controls [19].

## 2.3 Study Population

The cases happen to be all the patients (n = 253) admitted again within 30 days complaining of similar ailment for unscheduled causes. The controls (n = 62) were chosen employing systemic random sampling subsequent to measuring the trial gap from amongst all of the diabetic patients who were not admitted again within 30 days following their discharge. The omission norms were: gestational diabetes, patients who had scheduled re-admittance and patients admitted again owing to causes not pertaining to diabetes mellitus.

### 2.3.1 Definition of unplanned readmissions

To decide patients with unscheduled re-admittances, the initial or early occurrence in a succession of hospitalizations were noted. The initial hospitalization in the year 2007 was recognized as the index hospitalization, and a 30-day unscheduled re-admittance was described as a succeeding or unplanned admittance to the similar speciality by means of the Accident & Emergency Department within 30 days of the index hospitalization [20].

The 30-day period is usually utilized in researches in the USA [21, 22, 23 and 24], while a 28-day period is usually utilized in the UK [25, 26, 27 and 28]. Founded on numerical representations, like survival examination and sensitivity and specificity

examination, two researches had statistically shown that 30 days was a maximum option for recognizing re-admittance proportions [29 and 30]. Therefore, we utilized used 30 days to be the norm to determine unscheduled re-admittance.

### 2.3.2 Selection of Medical Conditions

For study of the ailment in correlation to re-admittance, 10 health circumstances having the uppermost onus of death and illness in Hong Kong were selected for this research: (1) malignant neoplasms (ICD9: 140-208); (2) heart ailments, counting hypertensive heart ailment (ICD9: 390-429); (3) cerebrovascular ailment (ICD9: 430-438); (4) pneumonia of all kinds (ICD9:480-486); (5) wound and poisoning (ICD9: 800-999); (6) nephritis, nephritic syndrome and nephrosis (ICD9: 580-589); (7) diabetes mellitus (ICD9: 250); (8) chronic liver ailment and cirrhosis (ICD9: 571); (9) septicaemia (ICD9: 038); and (10) aortic aneurysm (ICD9: 441) [31].

## 2.4 Data collection

Statistics were gathered in a survey questionnaire that was categorized into 3 sections: demographic features of the research sample, such as age, sex and marital status; stay in hospital and history of ailment, such as date admitted on and date discharged, extent of stay in the hospital, number of times admitted in the hospital within 2 years prior to the index admittance and patient re-admittance within 30 days after discharge, associated morbidities; and appraisal of the extent of fulfilment of health care suppliers with ADA procedures for inpatient diabetes treatment.

Aspects from the ADA procedures were clubbed into 3 groups: admission workup, like history, physical examination and initial scrutiny; assessment of care during the stay in hospital; and willingness for discharge, within discharge norms. Every aspect in the ADA procedure was awarded a mark of '1' in case it was attained and '0' in case it was not attained. The entire performance rate for every group was articulated as the standard proportion of attained aspects in comparison to the entire number of aspects of that group: 12 for admission workup, 12 for assessment of care while in hospital and 7 for discharge norms.

## 2.5 Statistical analysis

Entering the information gathered and examination were done utilizing SPSS, edition 18.0.1. The demographic and clinical features of the patients were assessed pertaining to the results (readmission). Numerical examination was carried out utilizing the Student t-test for incessant variables and the chi-squared test was utilized for qualitative variables. Means, standard deviations (SDs) and frequencies are obtained. Multiple logistic regression examination was utilized to assess the distinctive outcome of adherence

points pertaining to likelihood of re-admittance subsequent to controlling patients' demographic features, data on stay in hospital and history of ailment. Odds Ratios (ORs) and Confidence Intervals (CIs) are portrayed. The numerical importance was positioned at  $P < 0.05$ .

**3. Results**

As illustrated in Table 1, no variation was noted in age, gender, standard of education, or living circumstances amongst the 84 patients admitted again within 30 days (cases) and the 192 patients who were not admitted again within 30 days (controls). Patients admitted again within 30 days were less expected to be married as compared to patients who were not admitted again (44.0% vs 57.8%;  $P = .037$ ).

The demographic characteristics of the patients are in Table 1. Out of total 253 patients 144 patients (56.9%) of them are female and 109 (43.1%) of them are male. Majority of the patients are in the age group <55 with 124 (49.0%) followed by 55-64 with 52 (20.9%), 65-74 with 46 (18.2%) and 75 and above with 30 (11.9%). In regard to nationality most of them are Non-Saudi 157 (62.1%) and 96 (37.9%) of them are Saudi. When number of days hospitalized is considered 124 patients of them are hospitalized less than 11 days (49.0%) followed by 69 patients with 11-20 days (27.3%) and 60 patients with 21-30 days

(23.7%). Table 2 compares the parameters with nationality, for AG OVER DOSE of total 251 patients 156 (99.4%) of them are Non-Saudi and 95 (99.0%) of them are Saudi and in dmrn of total 102 patients 65 (41.4%) of them Non-Saudi and 37 (38.5%) of them are Saudi.

**Table 1: Demographic characteristics of the patients**

<i>Demographic characteristics</i>	<i>N (%)</i>
<b>Sex</b>	
Male	109 (43.1)
Female	144 (56.9)
Total	253 (100.0)
<b>Age group</b>	
<55	124 (49.0)
55-64	53 (20.9)
65-74	46 (18.2)
75 and above	30 (11.9)
Total	253 (100.0)
<b>Nationality</b>	
SAUDI	96 (37.9)
NON SAUDI	157 (62.1)
Total	253 (100.0)
<b>No. of days</b>	
Less than 11 days	124 (49.0)
11- 20 days	69 (27.3)
21-30 days	60 (23.7)
Total	253 (100.0)

**Table 2: Comparison of parameters between nationalities**

Parameters	Nationality		
	SAUDI	NON SAUDI	Total
	N (%)	N (%)	N (%)
Ccf n	18 (18.8)	40 (25.5)	58 (22.9)
ACTIVE VASC	6 (6.2)	1 (0.6)	7 (2.8)
AG OVER DOSE	95 (99.0)	156 (99.4)	251 (99.2)
angn	4 (4.2)	9 (5.7)	13 (5.1)
basn	1 (1.0)	6 (3.8)	7 (2.8)
BED SORES	6 (6.2)	13 (8.3)	19 (7.5)
copn	2 (2.1)	13 (8.3)	15 (5.9)
dmrn	37 (38.5)	65 (41.4)	102 (40.3)
dvrn	4 (4.2)	12 (7.6)	16 (6.3)
expn	2 (2.1)	15 (9.6)	17 (6.7)
HEP ENCEPH	8 (8.3)	17 (10.8)	25 (9.9)
hypern	11 (11.5)	4 (2.5)	15 (5.9)
hypn	2 (2.1)	4 (2.5)	6 (2.4)
L. GI BLEED	1 (1.0)	1 (0.6)	2 (0.8)
linn	3 (3.1)	4 (2.5)	7 (2.8)
metn	10 (10.4)	5 (3.2)	15 (5.9)
negn	6 (6.2)	13 (8.3)	19 (7.5)
NGT ASPIR	1 (1.0)	3 (1.9)	4 (1.6)
pnen	10 (10.4)	24 (15.3)	34 (13.4)
renn	26 (27.1)	42 (26.8)	68 (26.9)
sepn	23 (24.0)	26 (16.6)	49 (19.4)
strn	10 (10.4)	17 (10.8)	27 (10.7)
UP.GI BLEED	9 (9.4)	17 (10.8)	26 (10.3)
uron	8 (8.3)	12 (7.6)	20 (7.9)

**Table 3: Comparison of parameters between no. of days**

Parameters	No. of days							
	Less than 11 days		11- 20 days		21-30 days		Total	
	N	%	N	%	N	%	N	%
CCf_n	26	21.0	15	21.7	17	28.3	58	22.9
expn	11	8.9	3	4.3	3	5.0	17	6.7
renn	32	25.8	19	27.5	17	28.3	68	26.9%
angn	7	5.6	2	2.9	4	6.7	13	5.1
hypn	3	2.4	2	2.9	1	1.7	6	2.4
hypern	8	6.5	3	4.3	4	6.7	15	5.9
UP.GI BLEED	9	7.3	12	17.4	5	8.3	26	10.3
L. GI BLEED	1	0.8	1	1.4	0	0.0	2	0.8
NGT ASPIR	3	2.4	1	1.4	0	0.0	4	1.6
pnen	13	10.5	13	18.8	8	13.3	34	13.4
copn	3	2.4	5	7.2	7	11.7	15	5.9
basn	3	2.4	3	4.3	1	1.7	7	2.8
linn	4	3.2	1	1.4	2	3.3	7	2.8
sepn	33	26.6	12	17.4	4	6.7	49	19.4
uron	8	6.5	6	8.7	6	10.0	20	7.9
ACTIVE VASC	2	1.6	1	1.4	4	6.7	7	2.8
metn	10	8.1	4	5.8	1	1.7	15	5.9
AG OVER DOSE	123	99.2	69	100.0	59	98.3	251	99.2
BED SORES	8	6.5	5	7.2	6	10.0	19	7.5
negn	7	5.6	6	8.7	6	10.0	19	7.5
dmrn	48	38.7	28	40.6	26	43.3	102	40.3
HEP ENCEPH	11	8.9	6	8.7	8	13.3	25	9.9
strn	16	12.9	6	8.7	5	8.3	27	10.7
dvrn	5	4.0	2	2.9	9	15.0	16	6.3

**Table 4: Odds ratio for the parameters Vs nationality**

Parameters	Odds ratio	95% Confidence Intervals		P-value
		Lower	Upper	
CCf_n	0.663	0.355	1.241	0.197
expn	0.199	0.044	0.889	<b>0.020</b>
renn	1.017	0.574	1.802	0.954
angn	0.715	0.214	2.389	0.584
hypn	0.814	0.146	4.530	0.814
hypern	4.950	1.529	16.024	<b>0.004</b>
UP.GI BLEED	0.852	0.364	1.995	0.712
L. GI BLEED	1.642	0.102	26.562	0.724
NGT ASPIR	0.540	0.055	5.270	0.591
pnen	0.644	0.294	1.414	0.270
copn	0.236	0.052	1.068	<b>0.043</b>
basn	0.265	0.031	2.235	0.191
linn	1.234	0.270	5.636	0.786
sepn	1.587	0.846	2.980	0.148
uron	1.098	0.432	2.792	0.844
ACTIVE VASC	10.400	1.232	87.764	<b>0.008</b>
metn	3.535	1.170	10.679	<b>0.018</b>
AG OVER DOSE	0.609	0.038	9.851	0.724
BED SORES	0.738	0.271	2.012	0.552
negn	0.733	0.269	1.999	0.543
dmrn	0.888	0.528	1.492	0.653
HEP ENCEPH	0.743	0.308	1.795	0.508
strn	0.944	0.413	2.156	0.891
dvrn	0.518	0.162	1.655	0.260

*Bold values are statistically significant (P<0.05)*

Table 3 compares the parameters and number of days hospitalized, of all the parameters due to AG OVER DOSE of total 251 patients 123 patients hospitalized less than 11 days (99.2%), 69 (100.0%) patients hospitalized 11-20 days and 59 patients (98.3%) for 21-30 days. For dmrn parameter of total 102 patients, 48 (38.7%) patients hospitalized less than 11 days followed by 28 patients (40.6%) 11-20 days and 26 (43.3%) patients hospitalized 21-30 days.

Table 4 compares the parameters and nationality with the help of Chi-square test. The odds ratios for the parameters are presented in above table. When comparing the parameters and nationality the parameters expn (odds ratio = 0.199;  $p = 0.02 < 0.05$ ), hypern (odds ratio = 0.004,  $p < 0.001$ ), copn (odds ratio = 0.236,  $p = 0.04 < 0.05$ ), ACTIVE VASC (odds ratio = 10.400,  $p = 0.01 < 0.05$ ) and metn (odds ratio = 3.535,  $p = 0.02 < 0.05$ ). Hence there is a significant relationship between expn, hypern, copn, ACTIVE VASC, metn and nationality.

### 3.1 Readmission rate

As per computerized medical reports of diabetic patients discharged from the research hospital from January 2000 to December 2008, it was noted that 62 patients were admitted again within 28 days and 1125 patients not admitted again. The percentage of unscheduled re-admittance for diabetic patients was consequently 5.2percent (95% CI: 1.1%–8.9%). Patients who were admitted again in 30 days had additional related morbidities (2.1 vs 1.2;  $P < .0001$ ), and the characteristic associated morbidities of congestive heart failure, coronary artery disease, chronic obstructive pulmonary ailment, presence of a psychiatric disorder and recent cancer were all additionally widespread amongst cases.

## 4. Discussion

### 4.1 Comparison with Other Studies

A reasonable 30-day unscheduled re-admittance percentage of 16.7percent was recognized, evaluated with an total 30-day re-admittance percentage of 5 to 29 percent in USA [32], a total 28-day re-admittance percentage of 15.3 percent in U K [33], and a 42-day re-admittance percentage of 39 to 59 percent for patients discharged from a division of internal medicine in Switzerland [34]. The variations most likely occur from differences in techniques and classifications, research norms, and population clusters with unscheduled re-admittance. The divergences might further be correlated to the condition and organization of health care, and the accessibility of social support services. Corresponding to other researches, risk issues

connected with 30-day unscheduled re-admittance were men, the aged, and patients belonging to a lower socioeconomic standard. Patients who happened to be sent to old-age homes had a greater re-admittance percentage as compared to patients who went back to their own homes. This can be associated to the fact that this group was aged with a poorer health standard, with a requirement for additional psychosocial backing, yet it can at the same time reveal the condition of old-age homes and the treatment they offer their in-mates. This setback of unscheduled re-admittance from old-age homes is stated as the "revolving door syndrome" in a study [35]. An exhaustive research on the condition of treatment in old-age homes is essential to tackle this problem. Our research further revealed differences in the unscheduled re-admittance proportions by geographical hospital group, having a greater percentage of re-admittance in Groups 1, 3 and 7, where patients were aged and of lower economic status, and required treatment at their own homes, thus substantiating the importance of demographic features in envisaging the danger of re-admittance.

### 4.2 Strengths and Weakness of the Study

The key strong point of this study is in its substantial population obtained from the CMS record of every one of public hospitals situated in Hong Kong given by the HA that is accountable for 90 % of hospital facilities in Hong Kong. The statistics were re-examined to attain entirety and accurateness. Numerous restrictions of this evaluation must be taken into consideration. Primarily, disease codes on the basis of primary discharge analysis were utilized, and the gravity of ailment and additional associated morbidities were not accessible. Further, there exists a probable methodical variation or fault in data entry of codes, as fault proportions are more pertaining to particular diagnostic codes [36]. Nevertheless, it was understood that faults will be less in this research owing to the fact that all of the diagnostic codes were key-in by the discharge doctor. Secondly, even as we investigated the health consequences for different medical circumstances in correlation to re-admittance, information pertaining to patients' standard of life, health conditions, operative conditions and fulfilment were not available. Ultimately, the price statistics were partial owing to the fact that we were not able to retrieve prices for follow-up, outreach community facilities and human and other resources in different health circumstances; the total expenses might be more than measured. Nonetheless, hospital expenses that added up to the bulk of the entire expense, was incorporated.

## 5. Conclusions

Our results reveal that patient's features and geographical hospital group are connected with 30-day unscheduled re-admittance. Subsequent to amending for these risk aspects, patients with heart disease, cancer, pneumonia, septicaemia and liver diseases were further liable to be admitted again. Re-admittance proportions were correlated with prolonged stay in the hospital, greater death percentage and higher hospital expenses. A decrease in the danger of re-admittance will make better patient wellbeing and standard of life, with possible saving of expenses. To enhance the excellence of treatment, differences in individual ailments must be examined pertaining to the treatment procedure in hospitals and wide-ranging discharge scheduling. Our results reveal that future studies should focus on the treatment procedure for patients with chronic liver sickness and cirrhosis, malignant neoplasm, septicaemia, pneumonia and heart ailment owing to its greater re-admittance proportions.

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