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Association between Emergency Department Visits and Predisposing, Enabling, Need, and Reinforcing Social Factors in an Acute Care

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Abstract

No primary evidence has hitherto existed of predisposing, enabling, need, and social reinforcing factors influencing Emergency Department (ED) visits in an acute setting in Saudi Arabia. The aim of this study was to examine the association between emergency department visits and predisposing, enabling, need, and reinforcing social factors in an acute care. A cross-sectional study that randomly selected representative patients visiting ED services at King Abdulaziz Medical City in Riyadh from December 2016 to January 2017. Patient and facility validated questionnaires were used. Descriptive analysis and multivariate analysis were carried using STATA version 12. Average ED visit was 3.8 in 12 months with a range of 50 visits. Visits were concentrated on a few small discrete and non-negative integer values, but without an explicit upper limit. Perceived "good" health (P=0.026; 95% CI, 0.1334, 2.0547), "very good" health (P=0.006; 95% CI, 0.4288, 2.5432), and "excellent" health status (P=0.007; 95% CI, 0.5532, 3.5230) were associated with ED visits increasing by 9.4%, 48.6%, and 103%, respectively. Prior hospitalization was associated with 2.7 times higher ED visits. Household income more than $800 was associated with ED visits decreasing by between 49% to 70%. Getting useful advice on social matters was associated with 27% increase in ED visits, getting help when sick was associated with 9.4% decrease in ED visits. The findings suggest majority of the respondents were Saudis, with history of hospitalization, low income, less educated, perceived their health status as good, and considered their medical condition at the time of ED visit as not urgent. Future studies are needed to establish causality of ED visits the covariates to inform the balance between frequencies of visits versus medical need.

Keywords: Count Data Models, Emergency Department Utilization, Emergency Department Visits, Saudi Arabia, Social Factors.

Introduction

Maturation of emergency medicine as a specialty from hospital-based medicine has coincided with dramatic increases in emergency department (ED) visits (Pines et al. 2011a, Rehmani 2004, Morganti et al. 2013). The upshot of these increased visits is the utilization of ED services for complex diagnostic workups and handling overflow, after-hours, and weekend demand for care, accounting for significant hospital admissions (Morganti et al. 2013). Studies show that utilizing ED services for primary care-related (PCR) reasons fuels overcrowding (Dawoud et al. 2016, Schoen et al. 2004, Hoot and Aronsky 2008, Weinick et al. 2010, Enard and Ganelin 2013). Many of these patients require instant medical attention, but their kinds of conditions are non-emergent outpatient care and potentially preventable or avoidable with appropriate primary care or timely options elsewhere (Morganti et al. 2013). Increased use of ED services has led to overcrowding, which has implications for facilities and healthcare systems in terms of negative outcomes such as healthcare staff burnout (Alomar et al. 2013), higher complication rates, mortality, and un-necessary delays (Pines et al. 2011a). In addition, ED overcrowding puts a huge financial and human resource burden on emergency care, delays the provision of urgent care for those who need most, and further increases the fragmentation and discontinuity of care (Howlader et al. 2015, Macinko et al. 2011).

The motivation for this study, therefore, comes from the recognition that utilization of ED services is a common practice in Saudi Arabia, with dramatic increases in public hospitals (Pines et al. 2011a, Bakarman and Njaifan 2014, Ministry of Health 2016, Ministry of Health 2013, Ministry of Health 2012). Available evidence suggests that despite the availability of free primary care, patients tend to bypass primary care facilities to seek ED services for non-urgent and avoidable conditions (Alsirafy et al. 2016, Alyasin and Douglas 2014, Al-Ghanim 2004, Alghanim and Alomar 2015, Rehmani and Norain 2007, Siddiqui and Ogbeide 2002a, 2002b, Shah et al. 1996). With a universal coverage of healthcare in these facilities, an implicit assumption is the existence of a balance between demand for and provision of ED health services. In the context of Saudi Arabia, no primary evidence has hitherto existed on that balance, especially in an acute hospital setting. This study, therefore, examined the association between ED utilization in an acute setting and patient and facility characteristics that predisposed, enabled, and re-enforced the need to utilize ED services. These covariates, in our context, include patients' socioeconomic characteristics, demographic profiles, and their health and medical conditions; healthcare staff and/or facility characteristics; and social environment conditions; and patient self-efficacy issues.

Methods

Study Design
A cross-sectional study that both prospectively and retrospectively targeted patients who sought ED services at King Abdulaziz Medical City-King Fahad

hospital in Riyadh (KAMC-KF) from December 2016 to January 2017. This was aimed at the frequency of ED utilization in an acute setting and its association with patients and facility-related predisposing, enabling, need, and re-enforcing factors, including social environment conditions; and patient self-efficacy issues that influenced the need to utilize ED services.

Sampling

We first calculated the sampling interval by dividing the total number of ED visitors in a month by the targeted number of visitors in 24 hours. From the first patient arriving at ED during a shift (2 shifts), we selected the next patient by using this sampling as an interval for all visitors in each shift. This yielded the required final sampling number of 440 patients. With a sample of 440 patients, data were collected from December 2016 to January 2017. Of the 440 sampled and invited patients who visited ED, 381 accepted to participate. Of these patients, 366 completed the questionnaires, an overall effective response rate of 83%. A systematic random sampling technique was employed to recruit subjects where a pre-specified interval determined the recruited subjects. We used the registration station at the ED as the point of contact with incoming patients. With the help of trained research assistants, receptionists were notified to keep track of potential participants. Once a subject was selected, research assistants invited the patient to complete the survey and explain the purpose and the informed consent verbally as well as in writing. Relatives or friends who accompanied patients with life-threatening conditions were approached to complete questionnaires. Visiting ED regardless of whether admitted with clear-cut signs i.e. the clinical emergency need was the main inclusion criterion for patients. Physicians and nurses of the emergency department were included to help in the facility questionnaire.

Setting of the Study

The study was conducted at the Emergency Department, one of the largest sections of the National Guard Health Affairs (NGHA) Hospital in Riyadh. The hospital is a tertiary referral and teaching hospital and a member of the Joint Commission of International Standards (JCI). The hospital has a bed capacity of well over 690 and mainly serves the Saudi National Guard (SANG) employees and their dependents. Most attendees of the hospital are eligible for most services although there are out-of-pocket patients. The hospital's proximity to the capital city and the variety of case-mix services at the outpatient, in-patient and ED services make it ideal for patients.

Instruments

With permission, a two-level validated questionnaire was used - a patient questionnaire and healthcare staff/facility survey. The questions were based on the Queensland University of Technology (QUT) Emergency Health Services study (Toloo et al. 2011).

English and Arabic languages translations and reverse translations of the patients' questionnaire were carried out to check for consistency and validity. The translated version was necessary if any patient wanted to self-administer the questionnaire in the native language without the help of the trained research assistant. Trained research assistants who spoke both local and English languages interviewed patients.

We piloted the questionnaires and administered to a smaller convenient sample (10%) of the targeted sample population. There were no issues of data quality, validity, or comprehensiveness about the questionnaires and response rate was satisfactory. However, we did encounter issues of ambiguity and convolution of questions. Ambiguities of some questions were related to cross-cultural issues while convolution issues were related to time and length of the questionnaires and interview. We adjusted the concerned questions accordingly. We introduced a follow-up strategy by research assistants before patients were discharged to enhance the response rate.

Finally, trained research assistants administered a well-structured and cross-culturally comparable patient questionnaire to respondents. The patient questionnaire was administered prospectively to gather information about predisposing factors e.g. socioeconomic and demographic profiles, health beliefs and knowledge; facility characteristics e.g. service availability and staff training; enabling factors such as household income, transportation, social support, self-efficacy, reason for choosing ED, geographic proximity, family responsibilities, and affordability among other factors. Other factors included the number of chronic conditions, perceived need of patients such as health status, severity, susceptibility, and benefits, barriers among other variables. A second questionnaire was administered to physicians and nurse in the same facility to retrospectively gather information such as the history of hospitalization, number of ED visits in 12 months. Other factors retrospectively gathered included evaluated need e.g. triage acuity level, recall medical diagnosis, final decision such as admission, referral, and discharge. We linked each patient to his/her treating physician and nurse who, with help of medical records, then helped complete the healthcare staff/facility survey for each triaged patient after the medical diagnosis has been made.

The two-level survey involved patients being prospectively interviewed as they arrived at ED and retrospectively gathering patient medical records with the help of nurses and physicians. The purpose of the two-level survey had the following four purposes: (a) to capture the patients' use of ED from different perspectives; improving the validity and precision of the information gathered, capturing different dimensions and levels of factors influencing patients' use of ED services (b) retrospective to extract secondary data from medical records of the sampled patients (c) to cross-validate patient-reported information using the medical records (d) lower potential recall by patients about their medical conditions and ED use.

Data Analysis

Data were coded and analyzed in STATA version 12 for Windows. First, we descriptively summarized key variables of interest as summarized in Table 1. Then we examined the association between ED utilization and the patient-and facility-level factors, including predisposing, enabling, reinforcing, and need and social factors. We employed a negative binomial regression, a technique used for modeling count variables, especially for over-dispersed count outcome variables. The presence of over-dispersion in the mean value of the response variable (ED visit) when varied with the facility and patient-level factors necessitated the need for count data models such as negative binomial regression. Previous studies have applied these models to healthcare (Grootendorst 1995, Sari 2009).

Ethical Approval

We used a standard, validated and approved consent-to-participate form designed by the King Abdullah International Medical Research Centre (KAIMRC). The consent was in both English and Arabic, the main local language. The form was handed to patients or their guardian and/or caretaker. The consent was read out verbally and explained clearly for patients who needed help during the survey for reasons of language limitations of either language. Consent for underage or patients in critical clinical conditions were given by parents, guardians, or caretakers. The ethical approval in terms of Institutional Review Board (IRB) was granted by KAIMRC Research Committee (protocol RC15/131/ R).

Results

Descriptive Statistics

Table 1 depicts the summary of descriptive statistics. The mean of the ED visits was 3.8 times a year with a standard deviation of 4.3. The minimum number of visits was one and the maximum was 50. The median visit was three, with an interquartile range (IQR=4). Of the ED visitors who responded, slightly more than half (51%) were female, 95% were Saudis, and 72% had less than high school education. Majority of the respondents (92%) were adults and seniors and 66% were married. One-fifth of the respondents hailed from a household of less than SAR 3,000 ($800) a month.

Nearly two-thirds (66%) perceived their health status as good, very good, and excellent, while 34% had a history of prior hospitalization, 64% considered their medical condition at the time of ED visit as not urgent. About 72% of the respondents reported having people and families to care and 76% get help when sick. Another 63% reported getting advice when they needed. However, while 16.67% of the patients were not confident that they could deal efficiently with unexpected events, 14.75% of the ED visitors cannot usually think of a solution when confronted with troubles.

Table 1. *Descriptive Statistics of Key Variables*

Characteristics	Level	N (%)	Characteristics	Level	N (%)
ED visits	Mean: SD=3.8, SD=4.3; Median=3, IQR=4		**Facility proximity**	No	96 (26.23)
Age	Mean: SD=50, SD=21.8			Yes	232 (63.39)
Perceived health status	1: Poor	45 (12.30)		Missing	38 (10.38)
	2: Fair	74 (20.22)	**Hospital open 24/7**	No	56 (15.30)
	3: Good	110 (30.05)		Yes	273 (74.59)
	4: Very good	94 (25.68)		Missing	37 (10.11)
	5: Excellent	36 (9.83)	**Hospital staff specialized**	No	59 (16.12)
	Missing	7 (1.91)		Yes	307 (83.88)
Age category	Child & Teen	31 (8.47)	**Insurance eligibility**	No	34 (9.29)
	Adult	231 (63.11)		Yes	332 (90.71)
	Seniors	104 (28.42)	**Income levels**	1: <3,000	75 (20.49)
Marital status	1: Married	242 (66.12)		2: 3,000-5,000	111 (30.33)
	2: Not married	62 (16.94)		3: 5,001-10,000	94 (25.68)
	3: Others	51 (13.93)		4: 10,001-15,000	29 (7.92)
	Missing	11 (3.01)		5: >15,000	28 (7.65)
Education levels	0: None	125 (34.15)		Missing	29 (7.92)
	1: Elementary	37 (10.11)	**Employment status**	1: Employed	82 (22.40)
	2: Intermediate	103 (28.14)		2: Not employed	37 (10.11)
	3: High school	39 (10.66)		3: Home-maker	117 (31.97)
	4: Tertiary	62 (16.94)		4: Retired	86 (23.50)
Gender	Female	185 (50.55)		5: Student	33 (9.02)
	Male	181 (49.45)		Missing	11 (3.01)
Residence	No	58 (15.85)	**Deal with unexpected events**	1: Not true at all	61 (16.67)
	Yes	301 (82.24)		2: Somewhat true	148 (40.44)
Nationality	No	15 (4.1)		3: Exactly true	134 (36.61)
	Yes	351 (95.9)		Missing	23 (6.28)
History of hospitalization	No	214 (58.47)	**Can think of solution**	1: Not true at all	54 (14.75)
	Yes	128 (34.97)		2: Somewhat true	153 (41.80)
	Missing	24 (6.56)		3: Exactly true	137 (37.43)

Condition urgent	No	237 (64.75)		Missing	22 (6.01)
	Yes	129 (35.25)	**Have people who care**	No	99 (27.05)
Facility	No	54 (14.75)		Yes	267 (72.95)
	Yes	281 (76.77)	**Get help when sick**	No	87 (23.77)
	Missing	31 (8.47)		Yes	279 (76.23)
			Get advice when need it	No	134 (36.61)
				Yes	232 (63.39)

The response variable of interest was how many times a patient attended ED in the past 12 months. The same information was confirmed by patients' medical records from healthcare staff/facility questionnaire. The mean visit was 3.8 in 12 months with a 4.3 standard deviation. The range was 50 visits. The distribution was somewhat expected, and the unconditional mean of the response variable was smaller than the variance. Figure 1 shows a right-skewed histogram of the ED visits. The number of times patients visited ED were concentrated on a few small discrete and non-negative integer values (0, 1, 2, 3, 4, etc.), but without an explicit upper limit.

Figure 1. *Histogram of the Number of ED Visits in 12 Months*
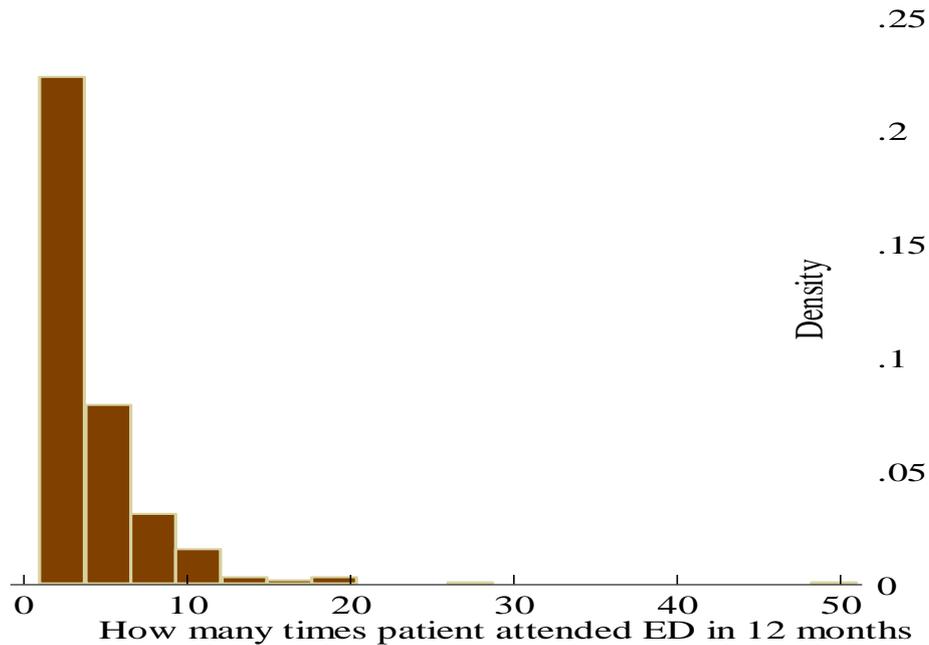
Further exploration of the data showed the conditional means and variances of some key indicators such as perceived health status and other variables appeared to potentially explain variation in ED visits. In particular, data showed that the mean value of ED visits seems to vary by various indicator variables and the variances within each level of the indicator variable are higher than the mean within each level, suggesting the presence of over-dispersion. As such, a negative binomial model provided an improved fit to the data and accounted better for over-dispersion (Byers et al. 2003).

Regression Results

Table 2 illustrates the results of the negative binomial regression. The results reveal that perceived "good" health status (P=0.026; 95% CI, 0.1334, 2.0547), "very good" health status (P=0.006; 95% CI, 0.4288, 2.5432), and "excellent" health status (P=0.007; 95% CI, 0.5532, 3.5230) were associated with ED visits increasing by 9.4%, 48.6%, and 103%, respectively. While these results are

statistically significant, it is worth noting that there is a positively perceived health gradient with respect to increasing ED visits. In addition, results revealed that being adult was associated with 1.56 times higher ED visits (P=0.013; 95% CI, 0.3300, 2.7815) versus being a child, while having insurance eligibility was associated with ED visit increasing by 94% (P=0.004; 95% CI, 0.6211, 3.2564) versus having no insurance or ineligible status. Income seemed to have a negative gradient association with respect to ED visits. Household income of more than SAR 3,000 ($800) was associated with ED visits decreasing by 49% to 70% compared with income less than this income.

Social environment conditions of patients seem to play a more significant role in ED visits than issues of patients' self-efficacy. For instance, social support in terms of getting useful advice on important things in life was associated with ED visits increasing by 27% compared to getting no advice (no social life) (P=0.003; 95% CI, 0.4351, 2.1195). However, getting help when sick in bed was associated with ED visits decreasing by 9.4% (P=0.04; 95% CI, -2.1624, -0.0272). The results further suggest that prior hospitalization was associated with 2.7 times higher ED visits versus no history of hospitalization (P<0.001; 95% CI, 1.8070, 3.5188). Surprisingly, hospital staff being specialized was associated with 1.36 times lower ED visits versus no history of hospitalization (P<0.023; 95% CI, -2.5370, -0.1861). This result is not surprising given that nearly three-fourths of the sampled patients visiting ED had less than high school education.

With regard to education level, our study suggests a marginally significant association with ED visits at 10% level. For instance, having a tertiary education level was associated ED visits decreasing by 32% (P=0.089; 95% CI, -2.8393, 0.1996).

Finally, other variables controlled for in the regression were not statistically significant. These variables included gender, marital status, the urgency of health conditions, 24-hour facility service availability, and proximity to ED facility, patients' self-efficacy issues such as the confidence to deal efficiently with unexpected events and ability to think of a solution if in trouble.

Table 2. *Association between ED visits and Covariates*

	Marginal effects	Std. Error	z	P>|z|	[95% Conf. Interval]	
Dependent variable=ED visits (12 months)						
Patient hospitalized before	2.6629***	0.4367	6.1000	0.0000	1.8070	3.5188
Patient perceived health status (1=Poor health status is reference)						
2: Fair	0.6467	0.5628	1.1500	0.2510	-0.4565	1.7498
3: Good	1.0940**	0.4901	2.2300	0.0260	0.1334	2.0547
4: Very good	1.4860***	0.5394	2.7500	0.0060	0.4288	2.5432
5: Excellent	2.0381***	0.7576	2.6900	0.0070	0.5532	3.5230
Condition urgent	-0.0013	0.3901	0.0000	0.9970	-0.7659	0.7632
Hospital open all time	-0.3724	0.6206	-0.6000	0.5480	-1.5888	0.8440
Hospital staff specialized	-1.3615**	0.5997	-2.2700	0.0230	-2.5370	-0.1861
Hospital facilities all open	0.3967	0.5765	0.6900	0.4910	-0.7331	1.5266
Hospital proximity	-0.5454	0.4208	-1.3000	0.1950	-1.3702	0.2793
Age category						
2: Adult	1.5558**	0.6254	2.4900	0.0130	0.3300	2.7815
3: Seniors	1.3156*	0.6812	1.9300	0.0530	-0.0194	2.6507
Gender	0.5452	0.6869	0.7900	0.4270	-0.8011	1.8915
Marital status (2=Unreported is reference)						
1: Married	-0.0444	0.7104	-0.0600	0.9500	-1.4367	1.3480
3: Others	0.0417	0.8871	0.0500	0.9630	-1.6970	1.7804
Insurance type (ineligible=base	1.9387***	0.6723	2.8800	0.0040	0.6211	3.2564
Residence (Outside Riyadh=base)	1.1808*	0.6086	1.9400	0.0520	-0.0120	2.3737
Education level (0=No education is base)						
1: Elementary	-0.8457	0.6690	-1.2600	0.2060	-2.1570	0.4656
2: Intermediate	-1.3215	0.8089	-1.6300	0.1020	-2.9069	0.2638
3: High school	-1.1249	0.7435	-1.5100	0.1300	-2.5821	0.3324
4: >Tertiary	-1.3199*	0.7752	-1.7000	0.0890	-2.8393	0.1996
Household income (1=less SAR 3,000 reference)						

2: 3,000-5,000	-1.6981***	0.5554	-3.0600	0.0020	-2.7867	-0.6094
3: 5,001-10,000	-1.4891**	0.6336	-2.3500	0.0190	-2.7310	-0.2473
4: 10,001-15,000	-1.5253*	0.8830	-1.7300	0.0840	-3.2559	0.2053
5: >15,000	-1.7268*	0.9030	-1.9100	0.0560	-3.4966	0.0430
Employment status (3=Homemaker reference group)						
1: Employed	0.1895	0.8129	0.2300	0.8160	-1.4037	1.7828
2: Not employed	0.0057	0.7011	0.0100	0.9940	-1.3685	1.3799
4: Retired	0.7351	0.9389	0.7800	0.4340	-1.1052	2.5754
5: Student	1.1432	1.1475	1.0000	0.3190	-1.1058	3.3922
Have people to care	0.2011	0.5046	0.4000	0.6900	-0.7879	1.1900
Get vital advice	1.2773***	0.4297	2.9700	0.0030	0.4351	2.1195
Get help when sick in bed	-1.0938**	0.5442	-2.0100	0.0440	-2.1604	-0.0272
Can deal with event						
2: Somewhat true	0.2504	0.8340	0.3000	0.7640	-1.3842	1.8849
3: Exactly true	-1.0746	0.9216	-1.1700	0.2440	-2.8809	0.7317
Can think of solution						
2: Somewhat true	-0.3118	0.7247	-0.4300	0.6670	-1.7323	1.1086
3: Exactly true	0.9057	0.9398	0.9600	0.3350	-0.9363	2.7477

Note: Marginal effects for factor levels is the discrete change from the base level: Significant at ***p<0.01; **p<0.05; *p<0.1.

Discussion

Discussion of Results

Previous studies have shown that predisposing, enabling, and need factors explain ED utilization. The present study explored the association between ED utilization and patient and facility-level factors. Our study suggests that in general, older, less-educated, and lower-income groups of patients are more likely to visit ED compared to those patients who were younger, more educated, and with higher income, suggesting that predisposing and enabling factors were associated with more ED visits. It is well documented that predisposing factors such as age and education explain, in part, why people choose to visit the ED (Alghanim and Alomar 2015, Peppe et al. 2007, Babitsch et al. 2012, Pines et al. 2011b, de la Granda Bermúdez et al. 2018). In addition, disadvantaged groups such as less educated individuals were shown to lack knowledge about their health conditions and ways to manage at home and hence resort to ED as their main source of disease management and education (AL-Jahdali et al. 2012). Evidence indicates that elderly tend to use more ED services (Alghanim and Alomar 2015, Pines et al. 2011b, Fuda and Immekus 2006, Ahmed et al. 2018) while other studies showed that both young and old individuals often use ED services (LaCalle and Rabin 2010). Older patients who tend to have multiple co-morbidities may perceive the hospital ED as a better choice to get more advanced healthcare (Peppe et al. 2007). This is especially true when local primary care services are either not accessible or do not provide continuity of care (Ionescu-Ittu et al. 2007).

Our study suggests education level was associated with ED visits decreasing by 32%. This result was however marginally significant 10% level. Previous research showed evidence of predisposing factors such as low education as being associated with both less and more urgent visits (Khan et al. 2011). Results further indicate that individuals who reported less household income and those who had insurance and met the hospital care eligibility requirements were more likely to use the ED. For instance, our study suggests a negative income gradient where patients reporting middle and high-income households were associated with fewer ED visits compared with those who reported lower income. This is consistent previous studies that showed lower- income status is associated with higher ED utilization (Vaz et al. 2014). Having insurance eligibility was associated with more ED visits in our study. While this result is consistent with evidence that having both public and private coverage was associated higher likelihood of visits to ED visits (Berra et al. 2006), it contradicts previous research which indicated that patients who were uninsured did not use the ED more than those are insured (Peppe et al. 2007, Fuda and Immekus 2006).

Our findings show that those individuals with perceived good or excellent health status are likely to make more ED visits than those with poor perceived health. However previous research showed that having a worse health status was more likely to be associated with higher visits to a healthcare professional, or utilize emergency department services (Khan et al. 2011). Current evidence also

shows that need factors do play an important role in determining the actual use of urgent healthcare (Peppe et al. 2007, Fuda and Immekus 2006, LaCalle and Rabin 2010). The need factors are considered the most proximal reasons for seeking healthcare services (Andersen 1995). When people perceive high urgency of their health need, they are likely to seek immediate care. This can arise from both personal factors and system factors. From a personal perspective, people who have a high expectation of optimal health or who are more susceptible to health problems may sense the urgency to seek healthcare even for a small change in their health condition (Peppe et al. 2007). A social circle that holds similar health-related beliefs may reinforce such finding and our analysis in terms of getting advice from others. This finding highlights the importance to differentiate between perceived versus the actual need of emergency care. It seems that patients who are highly health-conscious tend to utilize healthcare regardless of the actual need, while those with potential clinical need do not obtain appropriate healthcare. This may suggest an imbalance of utilization of healthcare resources with more resources used by those who are less in need. From a system perspective, poor disease management and follow-up system may increase the need to visit the hospital emergency room. Surprising, results suggest that the availability of better medical staff in the facility is associated with lower ED. However, this may not be surprising given the high percentage of uneducated patients seeking ED services, which may confound their lack of knowledge about type and quality of care they seek.

Our results indicated a higher use of ED among patients with a history of hospitalization compared to individuals with no prior hospitalization. This may be explained by the actual need of those affected to mitigate disease complications due to lack of appropriate follow-up and disease management post to hospital discharge (Alsirafy et al. 2016).

While social support appeared to relate to their role as re-enforcing factors in influencing an individual's utilization of ED services, our study suggests mixed results. For example, we find that high social support in terms of *getting useful advice on important things in life* was associated with more ED visits. This finding does contradict the notion that social isolation or lack of social support is a significant driver of observed increases in demand for healthcare (Marco et al. 2012, Carret et al. 2007, Claver and Levy-Storms 2010, Sandoval et al. 2010, Aminzadeh and Dalziel 2002). Instead, it suggests is that having social support makes individuals utilize ED services more perhaps to encourage seeking timely care. However, the results also suggest that *getting help when sick in bed*, especially from family was associated with decreased ED, which does support the findings of the previous studies (Marco et al. 2012, Carret et al. 2007, Claver and Levy-Storms 2010, Sandoval et al. 2010, Aminzadeh and Dalziel 2002).

Limitations

Our study has several limitations. First, our study was a cross-sectional study that collected ED visits, patient and facility-level data during a single point in time. While our study suggests important findings regarding predisposing, enabling,

reinforcing and social factors that influence patients' ED utilization, it provided only a snapshot of the analysis of ED visits. Thus, our study was limited in its ability to establish true causality possibly because our response variable and patient and facility-level characteristics and/or predisposing, enabling and need factors were measured concurrently in one period. It is somewhat challenging with one-point time data to establish whether patients visited for own sake first based on perceived need or the enabling and predisposing factors did actually convince them to make a visit to the ED.

Additionally, parts of patients' information were potentially subject to recall bias. For example, patients provided the number of times they visited the ED in the preceding 12 months healthcare staff checked their medical records. Even then, biases in medical records are invariably present due to errors of entry or misclassification. Our study was somewhat limited to ascertain the existence (or lack thereof) of confounding factors in the data. There are various methods of dealing with such problems, including randomization, but that was beyond the scope of our study.

Future Research Recommendations

Despite these limitations, our study offers several future research recommendations. First, with regard to issues such as facility-level data such as the history of hospitalization, we recommend further and deeper investigation in order to establish whether indeed these factors are facility-specific or system-wide phenomena. Further research on such issues will go a long way in helping facilities to institute measures that ensure better care and isolate facility-specific practice style as natural experiments to examine the comparative effectiveness of different ED facilities in the locality. Furthermore, to address the limitation of cross-section data and possibly establish true causality of the covariates on ED utilization, we recommend robust longitudinal studies that follow patients' records over multiple periods. Finally, in order to deal with retrospective data-related biases and the possibility of the presence of confounding factors, we recommend future studies to consider randomization or other methods of minimizing such challenges when designing studies.

Implications

The finding may also have important implications for facilities and health care systems in terms of overcrowding and negative patient outcomes in Saudi Arabia, especially when hospitals are taking proactive measures to prevent infectious diseases such as the Middle East Respiratory Syndrome Coronavirus (MERS-COV). The results may also have implications for cost-consciousness, which is becoming an integral part of national development vision. We expect the results of our study to inform not only facilities and health care systems about the determinants of ED visits and imbalance therein, but also may spur future research. In this regard, we offer several recommendations that we believe will help hospitals deal with inappropriate ED visits, especially in an

acute setting. We also envisage that our study will spur future research to better inform the management of facilities.

Conclusion

This study set out to examine the association between ED utilization and patient and facility-level factors predisposing, enabling, and socially reinforcing that need at the National Guard Health Affairs (NGHA) Hospital in Riyadh, Saudi Arabia. Our study suggests that in general, older, less educated, and lower-income groups, patients with a history of hospitalization, patients with less urgent medical condition, those with sound perceived health status, and patients with social and family support were more likely to utilize ED services. As ED visits continue to rise, these findings may inform predisposing, social/ reinforcing, enabling, and need factors that influence ED utilization in the country. Since this study is the first of its kind to be undertaken in Saudi Arabia to examine the association of these factors with ED demand, it may potentially add to the growing literature on ED utilization by contributing to the understanding of the crucial role of context and local application. Thus, it may provide workable evidence, especially in the wake of limited studies dealing with the imbalance between ED utilization and perceived or clinical need in the region.

List of Abbreviations

ED-Emergency department
EHS-Emergency health services
ESs-Enhanced Services (ESs)
IRB-Institutional Review Board (IRB)
KAIMRC-King Abdullah International Medical Research Center
KFNGH-King Fahad National Guard Hospital in Riyadh
KMAC-King Abdulaziz Medical City
PCR-Primary care-related
QUT-Queensland University of Technology
SAR-Saudi Arabian Riyal

Declarations

Ethics Approval and Consent to Participate

The research committee of King Abdullah Medical Research Center (KAIMRC) reviewed this study and granted institutional review board (IRB) under research protocol R15/131/R.

Consent to Publish

Not applicable.

Availability of Data and Materials

Data supporting study findings are available upon request.

Competing Interest

The authors declare no conflict of interest.

Authors' Contributions

OBD guided on the conception and methodology of the study, performed the statistical analysis, drafted manuscript, and approved the final version for this manuscript for submission. KA reviewed conception, conducted literature review and discussion, reviewed, and approved the final version for this manuscript for submission. MA reviewed conception, helped and facilitated site preparation, piloting and data collection. He reviewed draft manuscript and approved final version for submission.

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