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Contributing Factors to Patients Overcrowding in Emergency Department at King Saud Hospital Unaizah, KSA

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Abstract
Emergency department (ED) crowding represents an international crisis that may affect the quality and access of health care. The **aim** of this study was to explore contributing factors to patients overcrowding in the emergency department at King Saud hospital, Saudi Arabia**. Research design:** descriptive analytical**. Tool for data collection**: questionnaire to explore contributing factors to patients overcrowding in ED. **Setting:** King Saud Hospital Unaizah, KSA**. Sample**: stratified random sample (168) subjects including nurses, physicians, technicians and administrators. **Results**: the following factors contribute to overcrowding in emergency department: lack of human resources; population density; lack of beds; health awareness; and emergency department design. The respective means of these factors are: 3.91, 3.72, 3.65, 4.27 and 3.95. **Conclusion:** Based on the results of the present study, it was concluded that the domain that has the highest effect on patient overcrowding in ED is health awareness domain. However the domain that has the lowest effect on patient overcrowding in ED is lack of beds **Recommendations**: the development of standards to work in the emergency department. Create a sort of cases. Increasing the numbers of doctors and nurses in emergency department, review of the shift system currently used and provide additional space for the ED.
Keywords: contributing factor, emergency department, patient overcrowding

1. Introduction:

The emergency department (ED) is one of the important departments of the hospital. ED role is based mainly on receiving emergency cases that require fast and immediate treatment to reduce the risk of emergency situation on the patient, and make him in a better condition to receive another level of treatment (Albakry, 2005).
The emergency department is a core clinical unit of a hospital. The experience of patients attending the emergency department significantly influences patient satisfaction and the public image of the hospital. ED function is to receive, triage, stabilize and provide emergency management to patients who present with a wide variety of critical, urgent and semi urgent conditions whether self or otherwise referred. The emergency department also provides for the reception and management of disaster patients as part of its role within the disaster plan of each region (Australian College for Emergency Medicine, 2007).
Patients who present at an emergency department are usually seen in order of need, not in order of arrival. This process ensures the sickest and most urgent patients are seen first. On arrival, patients are assessed by a nurse or doctor, who decides how urgent their problem is and how soon treatment is required. This assessment and prioritization process is known as triage. Patients are then seen in order of the seriousness of their condition. Once assessed and treated by ED staff, patients may be admitted to the hospital, transferred to another hospital or discharged (New Zealand Ministry of Health, 2011).
In addition to standard treatment areas, some departments may require additional specifically designed areas to fulfill special roles, such as: the management of pediatric patients, the management of major trauma patients, the management of psychiatric patients, the management of infectious patient, the extended observation and management of patients, the management of patients affected by chemical, biological or radiological incidents, undergraduate and postgraduate teaching (Australian College for Emergency Medicine, 2007).
ED overcrowding refers to the situation where ED function is impeded primarily because the number of patients waiting to be seen, undergoing assessment and treatment, or waiting for departure exceeds either the physical bed and/or staffing capacity of the ED. Overcrowding of patients in ED is associated with diminished quality of care and poor patient outcomes. These include, but are not limited to, adverse events, violent behavior, errors, delayed time to critical care, increased morbidity and excess deaths (Australian College for Emergency Medicine, 2011).
Multiple factors are likely contributors to the growing crisis of ED crowding. These factors are: unnecessary ED patient visit; Frequent flyer patients ; the inability to transfer emergency patients to inpatient beds and the resultant boarding of admitted patients in the ED for long periods; use of the ED for nonemergency complaints; shortage of ED staff, lack of beds and inappropriate ED use (Moskop, 2009).
Factors contributing to emergency department overcrowding can be categorized as external factors and internal factors. External factors are: limited access to primary care, a growing elderly population, inadequate access to

inpatient and outpatient health services, high rates of uninsured and underinsured, ED closures. The Internal factors include: lack of access to on-call specialists, variation in surgical schedules with more elective procedures scheduled for earlier in the week, ED boarding, inefficient discharge and bed-turnover process, inefficient registration process (Lee,2013).

EDs are high-risk, high-stress environments. When capacity is exceeded, there are heightened opportunities for error. The six dimensions of quality (safety, effectiveness, patient-centeredness, efficiency, timeliness, and equity) may all be compromised when patients experience long waits to see a physician, patients are boarded in the ED, or ambulances are diverted away from the hospital closest to the patient. Over the past few years, several studies have presented clear evidence that ED crowding contributes to poor quality care and patient mortality. A crowded ED also limits the ability of an institution to accept referrals and increases medico legal risks (McHugh, 2011).

Markers of ED overcrowding include: inability to offload ambulance patients and a resultant loss of capacity in the local emergency response in the community; inability to place critically unwell patients in an appropriate treatment space when required; Patients undergoing clinical management in a non-treatment area, where privacy, and access to basic clinical resources is reduced or delayed; Admitted patients receiving a lesser standard of care than they would receive in their destination unit; Obstruction to access and egress routes from the ED, in contravention of Occupational Health and Safety requirements(Australian College for Emergency Medicine, 2011).

Potential solutions for ED crowding include: Provide after-hours clinic care; establish a nurse hotline to address patients' health concerns to avoid ED visits for non emergent needs; enhance post-discharge follow-up procedures with certain patient populations to avoid unnecessary readmissions. Provide physician triage in the ED; Build a point-of-care testing satellite laboratory; Establish a fast-track system that allows non urgent patients to be treated faster by providers other than physicians; Establish an observation unit to move patients in need of short hospitalization; Offer preferred operating room times to specialists for on-call coverage. Move patients from the ED immediately after admission; Optimize operating room scheduling; Hire a bed czar to oversee the timely, appropriate transfer of ED patients to inpatient areas; Create a discharge lounge for patients who are ready for discharge, but are waiting for medications, transportation or education, Coordinate the discharge of inpatients before noon; Create an intermediate ICU to increase ICU capacity (Lee, 2013).

Significance of the Study

The emergency department is considered to be the core unit in the provision of service to patients in the health care system. It provides a wide variety of medical services for patients with urgent cases e.g. injuries and trauma. Due to the nature of the services that the department provides, the department receives daily a large number of patients which causes crowding and results in negative effects on patients' safety, quality of care, and the hospital. Therefore, it is important to explore the factors that contribute to patients overcrowding in ED at King Saud Hospital Unaizah, AlQassim, KSA.

Aim of the study:

To explore contributing factors to patients overcrowding at ED at King Saud Hospital Unaizah, AlQassim, KSA.

Research question:

What are contributing factors to patients overcrowding at ED at King Saud Hospital Unaizah, AlQassim, KSA?

2. Subjects and Method

2.1. Research design : A descriptive analytical research design was conducted for this study.

2.2. Setting: The study was conducted at King Saud Hospital Unaizah, AlQassim, KSA. It is The only tertiary care hospital in the Governorate. This hospital has 360 beds and provides service to the community through the following units and departments: ICU, CCU, NICU, pediatric ICU, burn unit, OR, dialysis, Surgical, medical, emergency, and obstetric departments

2.3. Sample: population at King Saud Hospital Unaizah, AlQassim, KSA include physicians, nurses, technicians, and administrators their total number was 892 persons at the time of study. Stratified random sample of 200 subjects is taken from the above mentioned population. 200 questionnaires were distributed on the sample but 168 questionnaires were completed and returned back with response rate 84%. The 168 subjects of the sample consist of 24 physicians, 86 nurse, 43 technicians, and 15 administrators.

2.4. Tools for data collection:

Based on review of literature and previous studies the researcher designed questionnaire to study factors affecting patient overcrowding in ED. The questionnaire consists of two parts:

Part I: Questionnaire for socio-demographic data: it contains the personal data (gender, nationality, age, educational level, years of experience in the current job, and job title)

Part II : this part has 30 items. It was allocated to identify the factors affecting patients' crowdedness in the ED. This part has five domains which are:

1- The lack of human resources (items from 1 to 10)
2- The population density (items from 11 to 16)
3- The lack of beds in the ED (items from 17 to 22)
4- Health awareness (items from 23 to 26)
5- The ED design (items from 27 to 30)

The responses were on a 5- point Likert scales ranging from strongly agree to strongly disagree. For each domain the responses of strongly agree, agree, not sure, disagree, and strongly disagree were scored 5, 4, 3, 2, and 1 respectively. The scores of the items were summed up and the total divided by the number of items, giving a mean score for the part. These scores were converted into a percent score.

2.5. Administrative design:

Before starting the actual data collection process administrative approval for the research was taken from director of the hospital.

2.6. Validity and Reliability

Face validity and content validity test was done by expert opinions to ensure that the items of the questionnaire test what is designed to test. Reliability test was done by applying Cronbach alpha test

2.7. Pilot study:

A pilot study was conducted on 10 subjects from King Saud Hospital Unaizah, AlQassim, KSA to test the applicability and clarity of the tool and to estimate the time needed to fill in the questionnaire. On the basis of the pilot study result the researcher determined the feasibility of data collection procedures, subjects who had participated in pilot study were excluded from the sample during data analysis.

2.8. The Field Work

Data collection was carried out within duration 3 months in first semester 1432/1433. The time required for completing the questionnaire was ranged from 15 to 20 minutes.

2.9. Protection of Human Rights:

The researcher informs the subjects that all information would remain confidential. And used only for the purpose of research. The purpose of the study was explained and subjects were informed that they have the freedom to accept or reject participation at any time, without any prejudice.

2.10. Statistical Analysis:

The collected data was analyzed and tabulated using the statistical package for the social sciences (SPSS). Qualitative data was analyzed through numbers and percentages. Quantitative data was analyzed using Arithmetic mean and standard deviation. Chi square was used to test statistical significant differences between qualitative data.

Results

Table (1) percentage distribution of study subjects according to socio-demographic characteristics.

Socio-demographic characteristics	Study sample (N=168)	
	No	%
Sex		
Male	63	37.5
Female	105	62.5
Nationality:		
Saudi	56	33.3
Non Saudi	112	66.7
Education:		
Secondary school	8	4.8
Health college	78	46.4
Baccalaureate	70	41.7
Postgraduate	12	7.1
Job title		
Physician	12	7.1
Nurse	86	51.2
Technician	43	25.6
Administrators	15	8.9
Others	12	7.1
Age:		
<ge:rsstra	35.7	
30 – 45 years	57.2	
>0 – 45 yea	7.1	
60		
96		
12		
Years of experience		
<ears of experience)a	29.2	
>–ars of ex	63.1	
49	7.7	
106		
13		

Table (1) shows percentage distribution of study subjects according to socio-demographic characteristics. According to this table, majority of study subjects are female, non Saudi, have health college education and nurses. Also, their ages ranged from 30 – 45 years and their years of experience ranged from 5– 15 years.

Table (2) percentage distribution of study subjects according to scores of human resource shortage.

Human resource shortage	Study subjects (N= 168)	Chi square	P- value

	Agree		Not sure		Disagree			
	No	%	No	%	No	%		
1. Shortage of medical staff specialized in emergency medicine.	96	57.1	60	35.7	12	7.2	87.5	.007
2. Shortage of nursing staff specialized in emergency.	136	80.9	23	13.7	9	5.4	153	.001*
3. Long time consumed in laboratory, radiology and other procedures.	122	72.6	20	11.9	26	15.5	135	.001*
4. The physician documentation process for patients which leads to consuming a long time in the examination process.	100	59.5	44	26.2	24	14.3	172	.002*
5. Emergency department don`t adopt the initial examination process.	102	60.7	40	23.8	26	15.5	72	.007
6. The hospital admits large number of patients regardless of its possibility.	143	85.1	13	7.7	12	7.1	133	.001*
7. Inability of the hospital to predict the numbers of patients who come to emergency.	76	45.2	41	24.4	51	30.4	56.2	.007
8. Records and forms used in recording admission of patients are multiple and diverse leading to confusion.	113	67.3	22	13.1	33	19.6	84	.006
9. Emergency department staff (Nurses and physicians) feel stressed due to their shortage and large number of patients.	158	94	3	1.8	7	4.2	325.6	.001*
10. Lack of coordination between workers in emergency department.	70	41.7	55	32.7	43	25.6	33.3	.008

*statistical significant difference $p < .05$

Table (2) presents percentage distribution of study subjects according to scores of human resource shortage. There were statistical significant differences in the following factors that affect overcrowding of patients: shortage of nurses specialized in emergency, long time consumed in laboratory, radiology and other procedures, physician documentation process which leads to consuming a long time in the examination process, The hospital admits large number of patients regardless of its possibility and Emergency department staff (Nurses and physicians) feel stressed due to their shortage and large number of patients. Majority of study subjects (94%) agree that emergency staff stress affects overcrowding of patient.

Table (3) percentage distribution of study subjects according to scores of population density.

population density	Study subjects (N= 168)						Chi square	P- value
	Agree		Not sure		Disagree			
	No	%	No	%	No	%		
1. Large increase in the percentage of patients due to accidents like burns, electric shock, poisoning ……etc.	104	61.9	29	17.3	35	20.8	168	.001*
2. Escalating increase in the number of injured as a result of traffic accidents.	125	74.4	16	9.5	27	16.1	142.9	.001*
3. Increase in the percentage of the diseases associated with atherosclerosis, heart attack and neurological diseases.	76	45.2	80	47.6	12	7.1	110.6	.001*
4. Increase in the percentage of the injured in the work places due to lack of occupational safety measures.	102	60.7	53	31.5	13	7.7	161.5	.001*
5. Lack of the practice and application observation medicine (Which classifies patients to dangerous And moderate cases) in the emergency department.	122	72.6	28	16.7	18	10.7	96.3	.002*
6. There is no schedule for a preset emergency shifts through which physicians and nurses are called in the time of emergency.	98	58.3	53	31.5	17	10.1	74.7	.004*

Table (3) shows percentage distribution of study subjects according to scores of population density. There were statistical significant differences in all items of population density. Majority of study subjects (74%) agree that Escalating increase in the number of injured as a result of traffic accidents is a factor affecting patient overcrowding in ED.

Table (4) percentage distribution of study subjects according to scores of lack of beds

Lack of beds	Study subjects (N= 168)						Chi square	P-value
	Agree		Not sure		Disagree			
	No	%	No	%	No	%		
1. Lack of beds for patient hospitalized in emergency department.	137	81.5	16	9.5	15	8.9	139.7	.001*
2. Small number of patient admission rooms for in emergency department.	98	58.3	33	19.6	37	22	74.5	.008
3. Numbers of beds in the hospital are not enough for patient hospitalization.	91	54.2	31	18.5	46	27.4	80.99	.008
4. Presence of patients in the emergency department waiting for free hospital beds.	82	48.8	49	29.2	37	22	75.4	.006
5. Lack of material resources needed to increase the number of beds in the emergency department.	62	36.9	76	45.2	30	17.9	100.3	.002*
6. The continuous increase in the number of patients under constant the possibilities of the emergency department.	125	74.4	40	23.8	3	1.8	66.3	.006

Table (4) shows percentage distribution of study subjects according to scores of lack of beds. There were statistical significant difference in the factors of Lack of beds for patient hospitalized in emergency department and Lack of material resources needed to increase the number of beds in the emergency department. The highest percentage of study subjects (81.5%) agree that lack of beds for patient hospitalized in emergency department is a factor affecting patient overcrowding in ED.

Table (5) percentage distribution of study subjects according to scores of health awareness

Health awareness	Study subjects (N= 168)						Chi square	P-value
	Agree		Not sure		Disagree			
	No	%	No	%	No	%		
1. Patients who come to the emergency department and are not considered emergency cases	145	86.3	20	11.9	3	1.8	94.7	.002*
2. The majority of patients coming to the emergency department at Evening times	145	86.3	19	11.3	4	2.4	105.9	.001*
3. Some patients interfere in the work of the doctor and request Treatments may not be needed for the patient	122	72.6	36	21.4	8	6	109.3	.001*
4. Some patients treat Emergency Department staff in an improper manner.	147	87.5	6	3.6	15	8.9	100.7	.001*

Table (5) shows percentage distribution of study subjects according to scores of health awareness. . There were statistical significant differences in all items of health awareness. Majority of study subjects (87.5%) agree that some patients treat Emergency Department staff in an improper manner is a factor affecting patient overcrowding in ED.

Table (6) percentage distribution of study subjects according to scores of emergency department design

Emergency Department Design	Study Subjects (N= 168)						Chi Square	P-Value
	Agree		Not Sure		Disagree			
	No	%	No	%	No	%		
1. The difficulty of movement within the emergency department (Current planning is not suitable for the emergency department)	99	58.9	38	22.6	31	18.5	38.1	.009
2. The inadequacy of places allocated to waiting patients	136	81	9	5.4	23	13.7	149.7	.001*
3. ineffective use of the resources available Emergency department	84	50	48	28.6	36	21.4	75.5	.006
4. Lack of space allocated to the emergency department under continuous increase of numbers of patients	139	82.7	20	11.9	9	5.4	91.6	.002*

Table (6) shows percentage distribution of study subjects according to scores of emergency department design. There were statistical significant differences in two factors of overcrowding namely: The inadequacy of places allocated to waiting patients and Lack of space allocated to the emergency department under continuous increase of numbers of patients. Moreover, majority of study subjects (82.7%) agree that Lack of space allocated to the emergency department under continuous increase of numbers of patients is a factor affecting patient overcrowding in ED.

Figure (1) study subjects mean scores of the factors affecting overcrowding of patients in emergency department

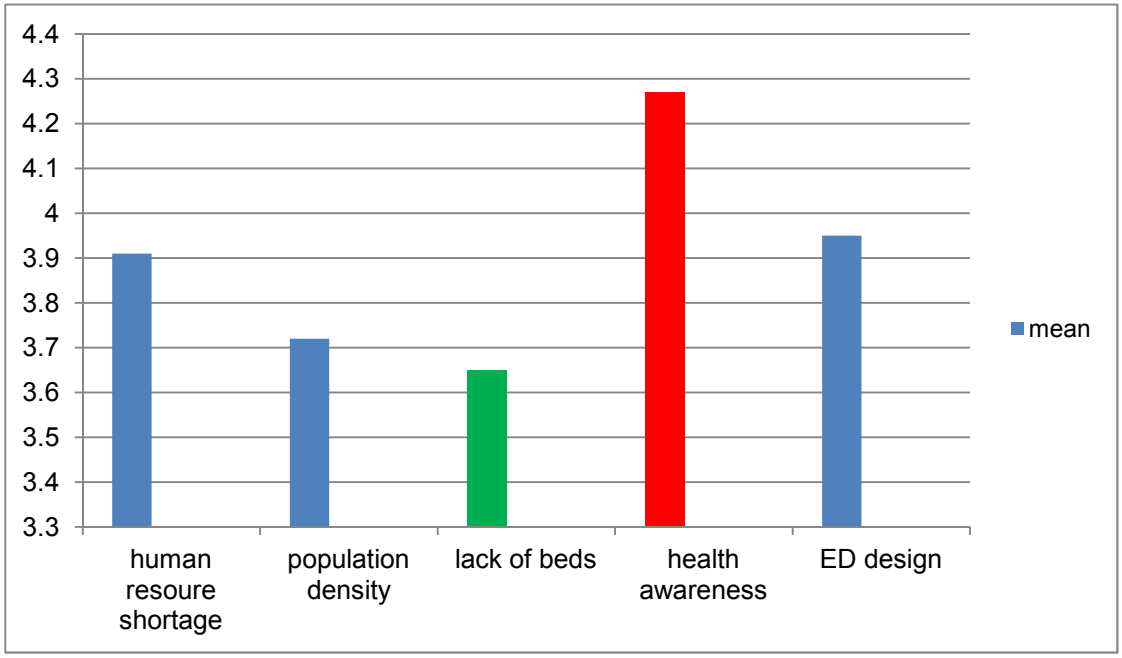

Figure (1) shows study subjects mean scores of the domains of the factors affecting overcrowding of patients in emergency department. According the figure the factor that has the highest effect on patient overcrowding in ED is health awareness domain (mean = 4.27). However the factor that has the lowest effect on patient overcrowding in ED is lack of beds (mean = 3.65).

Table (7 a) study subjects mean scores of the factors affecting patients overcrowding in ED

Factors contributing to patients` overcrowding	Mean	SD
1. Shortage of medical staff specialized in emergency medicine.	3.83	1.03
2. Shortage of nursing staff specialized in emergency.	4.27	.95
3. Long time consumed in laboratory, radiology and other procedures.	3.94	1.05
4. The physician documentation process for patients which leads to consuming a long time in the examination process.	3.77	1.05
5. Emergency department don`t adopt the initial examination process.	3.76	1.15
6. The hospital admits large number of patients regardless of its possibility.	4.39	.91
7. Inability of the hospital to predict the numbers of patients who come to emergency.	3.29	1.19
8. Records and forms used in recording admission of patients are multiple and diverse leading to confusion.	3.76	1.26
9. Emergency department staff (Nurses and physicians) feels stressed due to their shortage and large number of patients.	**4.75**	**.69**
10. Lack of coordination between workers in emergency department.	3.34	1.19
11. Large increase in the percentage of patients due to accidents like burns, electric shock, poisoning ……etc.	3.64	1.05
12. Escalating increase in the number of injured as a result of traffic accidents.	3.92	1.03
13. Increase in the percentage of the diseases associated with atherosclerosis, heart attack and neurological diseases.	3.57	.99
14. Increase in the percentage of the injured in the work places due to lack of occupational safety measures.	3.67	.81
15. Lack of the practice and application observation medicine (Which classifies patients to dangerous and moderate cases) in the emergency department.	3.89	.93

Table (7 b) study subjects mean scores of the factors affecting patients overcrowding

16. There is no schedule for a preset emergency shifts through which physicians and nurses are called in the time of emergency.	3.67	.96
17. Lack of beds for patient hospitalized in emergency department.	4.21	1
18. Small number of patient admission rooms for in emergency department.	3.77	1.26
19. Numbers of beds in the hospital are not enough for patient hospitalization.	3.37	1.22
20. Presence of patients in the emergency department waiting for free hospital beds.	3.34	.97
21. Lack of material resources needed to increase the number of beds in the emergency department.	3.25	.89
22. The continuous increase in the number of patients under constant the possibilities of the emergency department.	4.01	.77
23. Patients who come to the emergency department and are not considered emergency cases	4.32	.76
24. The majority of patients coming to the emergency department at Evening times	4.37	.78
25. Some patients interfere in the work of the doctor and request Treatments may not be needed for the patient	4.11	.98
26. Some patients treat Emergency Department staff in an improper manner.	4.28	.90
27. The difficulty of movement within the emergency department (Current planning is not suitable for the emergency department)	3.60	1.18
28. The inadequacy of places allocated to waiting patients	4.16	1.16
29. ineffective use of the resources available Emergency department	3.36	.97
30. Lack of space allocated to the emergency department under continuous increase of numbers of patients	4.30	.88

Table (7 a & b) show study subjects mean scores of the factors affecting patients overcrowding. According to the table the factor that highest mean (4.75) is Emergency department staff (Nurses and physicians) feels stressed due to their shortage and large number of patients. However the factor that has the lowest mean (3.25) is Lack of material resources needed to increase the number of beds in the emergency department.

5. Discussion:

Crowding occurs when the identified need for emergency services exceeds available resources for patient care in the ED, hospital, or both."The issue of ED crowding is not new. Early reports of crowding appeared in the emergency medicine literature almost 20 years ago **(Moskop et al, 2009).** The aim of this study is to explore

contributing factors to patients overcrowding at ED at King Saud Hospital Unaizah, Al Qassim, KSA.
The results of this study (table 2) are consistent with the findings of **(Reda & Baddar, 2006)** who concluded that the most important reasons that lead to the emergency department overcrowding are the human resource shortage, administrative procedures, and increase the rate of psychological stress between both doctors and nursing , poor communication between workers in the emergency department. Moreover, the results of this study are in the same line with **(Suzanne, 2006)** who found that the main cause of overcrowding in ED is shortage of staff, lack of coordination between staff and occupational stress. Also, this result is congruent with **(Prabath, 2010)** who mentioned that time consumed in diagnosis and decision making are most important factors leading to overcrowding of patient in ED.
The results of this study (table 3) are congruent with **(Michael, 2006)** who found that decreasing the number of patients who cases are minor and not urgent will save time also, nurses can make initial assessment and this can lead to decrease the waiting time and decrease the crowding . The results of this study (table 4) are in the same line with the findings of **(Pines, 2008)** that reveal that lack of beds affects the satisfaction of patients and lead to increase the waiting time and increase crowding.The results of this study are congruent with **(Michael, 2006)** who found that 50.9% from cases that come to ED are not emergency cases and can be treated at primary care centers. Moreover, the results of this study revealed that other causes that can lead to overcrowding of patients in ED are: ineffective role of primary care centers, some patients come to ED many times a day thinking that the medication is not useful however the medication needs time to be effective, lack of population's health awareness about the importance of ED and it should only be for accidents , injuries and other emergency cases

6. Conclusion:

Based on the results of the present study, it was concluded that the domain that has the highest effect on patient overcrowding in ED is health awareness domain. However the domain that has the lowest effect on patient overcrowding in ED is lack of beds. Also, the factor that highest mean (4.75) is Emergency department staff (Nurses and physicians) feels stressed due to their shortage and large number of patients. However the factor that has the lowest mean (3.25) is Lack of material resources needed to increase the number of beds in the emergency department.

7. Recommendations:

In regards to the study results the researcher recommends the following:

1- The hospital administration has to establish a triage unit where cases coming to the ED are ranked so the urgent cases are treated immediately without taking too long in the ED, and stable cases are dealt with according to the system either let them stay for a while, or transfer them to any near primary care center.
2- The working policy in the ED should be reconsidered by making working standards suitable for the current numbers in the ED. And this has to be through a written system for triage in which patients are sorted according to the severity of their cases, and then receive and treat the acute cases while simple cases are transferred to alternate primary care centers in town. This system has to be approved by the hospital administration.
3- The hospital administration should take seriously working on increasing the number of physicians and nurses in the ED within what matches the huge increase of patients' number received daily by communicating with the Ministry to recruit physicians and nurses according to the ED needs.
4- The shift system currently used in the hospital should be reconsidered. so that modifications on this system are made such as providing incentives to staff.
5- The hospital administration should take care of patients' health awareness and that can be through direct education by meeting with the patients, distribution of brochures designed especially for this purpose, or broadcasting educational programs on the TVs inside the hospital that may affect positively patients and visitors behavior.
6- The hospital administration should be working on the provision of extra space and beds for the ED due to the huge increase in patients' numbers and the narrow space of the ED.

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