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Formulating Architectural Design Features for Egyptian Emergency Departments in Light of International Design Schools

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ABSTRACT: Emergency medicine in Egypt is at very early stage at which it was registered, for the first time, in 2001. It has very little contribution to the the health care system in Egypt due to (1) the lack of resources, financial support and space, (2) the The absence of a clear model for the Egyptian emergency departments, despite the issuance of the Egyptian Code for Hospitals in 2010. The code only includes the functional requirements of the emergency department, in four pages, and it completely ignores the relationship between the architectural design and the health care system within the department. It also doesn't define the relationship and work flow between the different spaces/units in the department. In addition, it doesn't take into consideration the Egyptian environment and the impact of architecture design of the department on it. The aim of this study was the comparison of the EMS systems thorough analysis of the international practices/schools of emergency medicine, then present the architectural design's characteristics of each practice. Secondly, we provide analysis for several emergency departments of Egyptian hospitals to understand the emergency system mechanism in Egypt. Finally, we formulate the features and the concepts of the emergency medicine system in Egypt to help with building a clear architectural model.

KEYWORDS: Emergency Department, Architectural Design, Hospitals, Modelling, Simulation, Survey.

I. INTRODUCTION

There is no absolute emergency care model/system that meets all the needs and requirements of all countries. However, there are two main models of emergency care systems in the world which are as follows.

- Anglo-Americans model, which is applied in the United States ^[1], the United Kingdom, Australia, and the rest of the Anglo-Saxon countries.
- Franco-German model, which is applied in most of the European countries such as France, Germany, Spain, Portugal, Italy, Sweden and Denmark, as shown in Figure (1) ^[1].

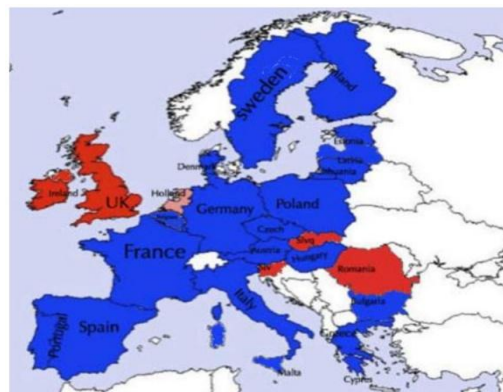


Figure (1): Countries in blue follow Franco-German Model

II. MODELS OF EMERGENCY CARE DELIVERY

The European model and the Anglo-American model differ in their health care philosophy of the emergency system in the following three points.

1. Pre-hospital emergency medical system.

The methodology of emergency departments that follow the Anglo-American model is known as "load and go". The goal is to bring the patient to the hospital, where a specialized team of doctors in emergency care (i.e., emergency medicine specialists) will provide advanced life support (ALS) to that patient. However, the crew responsible of transferring the patient to the emergency department is a trained team of paramedics and technicians^[2], and provides Basic Life Support Operations (BLS) only.

As for the emergency departments that follow the Franco-German model, is known as "stay & stabilize". Emergency medicine specialists/doctors go to patients to provide Advanced Life Support (ALS) services at the site (e.g., Home, Accident location, etc.)^[3]. In other words, it is to bring mobilized hospital to the patient and the ambulances used in such model are known as SMUR units (Service Mobile d'Urgence et Reanimation)^[4]. Franco-German model is based on rapid intervention with the patient onsite by performing the triage^[5] and diagnosing, and then transferring the patient directly to the nursing units (i.e., Inpatient specialty unit) without going to the emergency department. In contrary, all other admissions to the hospital are done through the emergency department.

BLS involves non-invasive basic interventions and rapid transportation to the healthcare facility. This care focuses on airway (obstruction), breathing (respiratory arrest), circulation (cardiac arrest or severe bleeding), full immobilization in case of spinal and/or neck injury, and provision of oxygen equipment^[6], as shown in Figure (2).



Figure (2): Basic Life Support Operations (BLS)

On the other hand, Advanced Life Support (ALS) includes all BLS procedures/operations in addition to invasive procedures such as endotracheal intubation for people who are unconscious, intravenous line placement for introducing therapeutic fluids into the patient's body, fluid replacement, pressure relief needle Chest (i.e., Needle Decompression Chest) to drain air from the lung in case of shock^[6].

2. In-hospital emergency medical system: The crew responsible for providing health care after the patient's arrival to the hospital^[7].

The Anglo-American system, the management of the emergency department is assigned to specially train emergency physicians. They evaluate and treat patients who arrive at the emergency department, and patients are not transferred to other departments or go home, until emergency protocol has been followed with all its steps.

Unlike the European model, emergency care doctors are sent with ambulances to treat the patient onsite, and if the patient's condition requires admission to the hospital, the patient is transferred directly to the corresponding treatment unit, at which a specialist is there. The specialist will provide immediate care followed by rapid transport to a definitive-care center. Doctors in the emergency department are of different specialties to treat and follow up on patients who come to the emergency department on foot, emergency tasks are managed by non-doctors, such as fire chiefs or medical directors of the Red Cross.

3. The triage system and its taken actions after the patient arrives at the emergency department. The Anglo-American The process of triage is carried out by registered nurses and nurse practitioners with emergency nursing expertise who have completed a triage-specific educational program ^[8]. The triage system is known as emergency Severity Index (ESI) which is a five-level emergency department triage algorithm that was developed by doctors in the emergency departments, namely Richard Wuerz and David Eitel in the United States in 2000. The ESI levels are numbered one through five, with level one indicating the greatest urgency. The levels are as follows ^[9]:

- **ESI - Level 1:** It is the most critical level such as cardiac arrest or stroke in the heart or brain and other cases that require medical intervention within seconds or few minutes. It requires advanced life support (ALS).
- **ESI - Level 2:** It is a critical level, but it is less severe than Level 1. It indicates that the condition is at risk, or suffers from severe pain or from total inability to move or loss of consciousness, such as severe fractures, burns and other cases. It requires rapid medical procedures, but not instantaneous.

For the next three levels, the patient will be assigned a level according to the resources needed for that patient [1].

- **ESI - Level 3:** It is an average level of medium degree of criticality, as the patient suffers from distress and pain. The symptoms require many resources to diagnose and treat, if possible, in the emergency department.
- **ESI - Level 4:** It is the low level with respect to the degree of criticality, as the patient suffers from non-serious injuries such as deep wounds, food poisoning, or other cases with minor apparent injuries that require one resource.
- **ESI - Level 5:** It is a non-critical level in which the patient can wait for some time without causing severe consequences or health problems, such as sprains and other conditions that do not require any resources; just checking and providing emergency treatment.

As for emergency departments in hospitals in most of the countries in the European Union, they adopt a triage and screening system. However, there are no unification for such system even within the same country. It is up to the hospital management to set the protocol, and decide on how to apply the triage and screening on their patients. But, in general triage comprises of 2-3 levels.

There are few European Union countries that do not adopt triage and screening system at all, such as Denmark, Bulgaria and Poland ^[10]. It is worth noting that there is no need for the screening and triage system if there is no crowding or queues (i.e., waiting lines) in the emergency department. In other words, the number of levels of screening and triage system scale increases, when the number of patients' increases compared to the available resources ^[11].

III. FEATURES OF ARCHITECTURAL DESIGN FOR INTERNATIONAL EMERGENCY DEPARTMENTS

Several studies conducted a comparison of both systems (i.e., Franco-German and Anglo-American) with respect to outcomes, efficiency and cost. However, they seem not to be really comparable because they tend to operate under different circumstances/conditions and have different requirements. Therefore, none of the studies was able to provide a clear evidence and/or thorough proof that one model is better than the other. In addition, these studies show conflicting results. Hence, we believe that there is no better model than the other, and each society must decide what suits it according to its resources, goals and objectives.

The characteristics and specifications of the architectural planning for the emergency departments of both the European and the Anglo-American models will be presented through conducting a study about the emergency department for each of the two systems/models. Our choices will be from representative and distinguished countries to both systems: The Netherlands as a representative of the European system and the United States of America as a representative of the Anglo-American system.

III.I. Case study for architectural design for emergency departments according to the European model

Most European countries rely on SMUR units without the need to deal with emergency departments. So there is an increase in the numbers of these mobile units, while the number of emergency departments is reduced from 105 in 2010 to 87 in 2017 ^[12]. However, emergency departments in large hospitals are preserved and maintained. There is a

continuous development and increase in capacity of ED in these big hospitals. They are self-sufficient and operate using hospital's resources.

The Netherlands is one of the best healthcare provider in Europe according to the European Consumer Health Powerhouse 2014 report. This report compares 36 European healthcare systems in Europe and monitors their performance since the beginning of 2005 ^[13]. It is used as a tool to improve outcomes and to support patient and physician.

One of the criteria used to choose representative hospital's emergency department is to be either modern or recently developed. Therefore, the emergency department of the Martini Hospital, Groningen, Netherlands is chosen to be the European System representative.



Figure (3): Martini Hospital Groningen, The Netherlands

The New Martini Hospital was founded in 1991 after a successful merge of two medium-sized hospitals, namely the Roman Catholic Hospital Groningen and General Christian in the city of Groningen, The Netherlands. The City of Groningen has a population of 600,000 people. The hospital was developed in 2007 ^[14], and it is considered as one of the pioneers in achieving the principles of sustainability. It consists of 8 building blocks, as shown in Figure (3), with approximately 600 beds ^[14]. The height of each building is 16 m² and the area of each floor in any of the 8 buildings/blocks is 1000 m².

The architectural design for emergency department. It is a linear plan on an area of 800 m² and has a private entrance close to the main entrance of the hospital, as shown in figure (4). With such capacity, it is capable of receiving big number of victims for triage and treatment, in case there is a crisis or a disaster. In addition, there are four trauma rooms, a resuscitation room and a separate room for children.

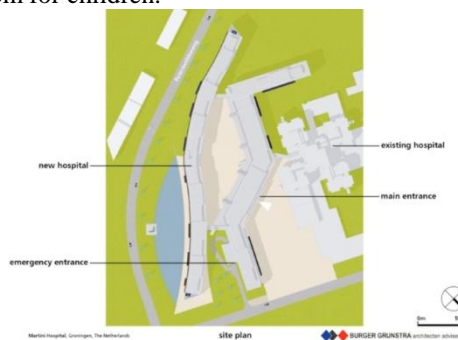


Figure (4): The linear layout of the emergency department

Also, it follows the Linear Core Layout model, at which it has support and service center in the middle of the corridor. This center includes 10 examination and treatment rooms, and 2 trauma rooms. All rooms and furnishings are modern and designed according to the universal room type that is accredited internationally across the globe.

The emergency department was equipped with GPs emergency station (GPES) that consists of 12 rooms for examination and treatment, for non-critical cases. It is a linear layout that takes the letter (U) shape, as shown in Figure (5) [2].

Rush University Medical Center is a medical tower with an area of 800,000 square feet (~ 80,000 square meters) called “The Tower”. It consists of 14 floors with a total of 646 beds, and it is connected to the main hospital through a multi-storey entrance suite that provides access to either the old hospital or the Tower (i.e., the new building), as shown in figure (7).

The Tower comprises of a large emergency department on the ground floor, a non-invasive diagnostic department on the first floor and a surgical interventional platform that includes all surgical specialities/departments to be next to each other to enhance collaboration amongst them to reduce the burden on patients and reduce the length of stay of patients. The upper part of it that has a butterfly shape for the inpatient accommodation, as shown in Figure (8) ^[16].

The architectural design for emergency department. Hush’s emergency department is independent from the hospital and self-sufficient in terms of management and resources. It works around the clock as a small hospital, with an area of about 4,000 square meters ^[17], and it has been designed to accommodate 65,000 annual visits ^[18].

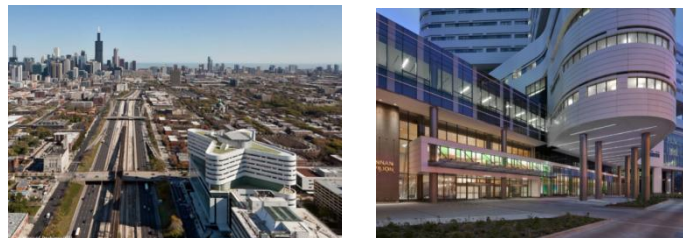


Figure (7): The Tower (New Building) of Rush University Medical Center – Connected to Old Building



Figure (8): Departments of the Tower in Rush Hospital



Figure (9): Rush Emergency Dept. Floor Plan and Architectural Formation

It consists of four pods with a total of 60 rooms dedicated to treating patients (i.e., Emergency room Station) ^[19]: 30 examination and treatment rooms, 20 critical care and trauma rooms, 8 observation rooms, and 2 resuscitation rooms. Each pod is responsible for providing a specific level of health care, as shown in Figure (9), and it contains a central work area with a bathroom ^[20].



Spatial components of the department^[21]

Examination and treatment room: The area is of 13 square meters and it has a single entrance with one sliding glass door. Each room contains an examination light, a workbench, hand washing basin/sink, medical equipment, cabinets for materials and medicines, and an area for writing.

Resuscitation and Critical Care rooms: The area of each room is 22 square meters and it has one sliding glass door. Each room contains cabinets and shelves for emergency supplies, lighting for x-ray films, and examination light.

Observation room: It has an area of 12 square meters. There are eight observation rooms that are distributed over two units nearby the critical care rooms. Each unit has 4 rooms and a nursing station with services, each room has its own bathroom and it is intended for a patient to stay up to 24 hours.

Nursing station and its supply center: It is located in the middle of each pod. It has a room for clean materials and another room for contaminated materials. In addition, there is a drug store, a work and technical support room for nurses, and a counter that accommodates three nurses.

Worker Support Unit: It is a staff lounge, which is a space designated for rest and meeting of health care workers within each of the hospital’s various departments. It may contain outdoor terraces or gardens as in the figure (12), so that health care workers could be isolated from the families of the patients during their resting time.

The emergency department has a set of strategies that support rapid response to any chemical, biological and radiological incidents (i.e, CBR response)^[22], such as the spread of epidemics, chemical wars, or terrorist operations/attacks. These three strategies have proven their effectiveness during the COVID 19 pandemic through the emergency department. They are as follows.

Adding a decontamination area^[23] associated with a warehouse for contaminated tools and equipment attached to it as shown in Figure (13). It is a covered area in front of the main entrance of the emergency department and can be controlled through sliding doors installed at the entry and the exit points of the ambulances. It is also equipped with water tanks and disinfectants, in addition to a shower cabin to sterilize patients, workers and ambulances exposed to chemicals, pesticides, or radiation^[23].

Splitting the entire emergency department into three pods for detection and treatment that can be isolated from each other, so that each pod can operate as a separate ward for infectious patients, as shown in Figure (13).

The presence of 60 single rooms inside the department that can be converted into isolation rooms in case of pandemic/epidemic spread, or exposure to a chemical or radiation attack.

Table (1): Anglo-American and Franco-German Comparison

	Anglo-American Model	Franco-German (European) Model
Philosophy	<p>The healthcare methodology or philosophy in this system is called "load & go" or bring the patient to the hospital.</p> <p>The emergency department is managed and running by doctors who are specialized in emergency care. They evaluate and treat arriving patients at the emergency department. The patient is not transferred to the other internal departments nor discharged to go home until after the patient's emergency care protocols and procedures are completed.</p>	<p>The healthcare methodology or philosophy in this system is called "stay & stabilize" or bring the hospital to the patient. In case that the patient visits the emergency department, he/she is sent directly to the specialized department for his condition unless it is serious and life threatening condition.</p> <p>There are no emergency specialized doctors in the department, instead they go out with ambulances to provide advanced life support operations on-site, and those who remain inside the emergency department are doctors of different specialties to follow up on patients who come to the emergency department on foot.</p>



Patient Flow	The Patient Flow Model comprises of a five-level Triage Operational Model known as the Emergency Severity Index (ESI).	There is no unified model for the patient flow system in emergency departments for the European model. There are countries in the EU that do not adopt screening and triage system in their emergency departments such as Denmark. But in gneral, most of the emergency departments in European countries has screening and triage system of three levels.
Area and Capacity	<p>Based on the analytical study of Rush General Hospital, Chicago, United States of America:</p> <ul style="list-style-type: none"> - It is a large emergency department with plethora of resources and capabilities. However, it has a relatively small number of beds for the assigned area. There are 60 beds across the different departments over an area of 4000 square meters. Thus, the design area of each bed is 130 square meters. The total area of the hospital is 80,000 square meters, so the area of the department represents 5% of the building block of the hospital. - The emergency department 60 examination and treatment rooms in total. It has been designed/planned to accommodate 65,000 annual visits, with a design area of 1100 square meters per examination and treatment room. 	<p>Based on the analysis study of the Martini Hospital, Groningen in the Netherlands General Hospital:</p> <ul style="list-style-type: none"> - It is a small emergency department with, with limited capabilities. However, it has a relatively big number of beds for the assigned area. There are 12 beds across the different departments over an area of 800 square meters. Thus, the design area of each bed is 66 square meters. The total area of the hospital is 40,000 square meters, so the area of the department represents 2% of the building block of the hospital. - The emergency department 12 examination and treatment rooms in total. It has been designed/planned to accommodate 30,000 annual visits, with a design area of 2500 square meters per examination and treatment room.
Design Topologies	<p>Large size emergency departments.</p> <p>As the central system, with combined therapy and observation area (treatment area / cubicles) located in the inner hub supported by an extensive nurse station. Other areas of the department are in the radial arrangement in relation to the central zone.</p> <p>Take the architectural configuration of the pod layout. It iconsists of a group of adjacent small units (i.e., Smaller Clusters), each unit has its own service center and it is dedicated to serve a group of rooms that provide the same health care service.</p>	<p>Small size emergency departments.</p> <p>The functional arrangement can be described as a ‘functional passage’, i.e. all the basic ED elements are arranged on the axis of internal communication, connecting the triage area to the hospital access, it is nearly one-way flow of patients, from the admission, through the triage area, treatment areas (therapy and observation) to the hospital.</p> <p>Take the architectural configuration of the Linear or ballroom Layout. It has a central area in the middle and rooms are distributed on the outer borders of the department, with several support centers distributed along the plan.</p>
Space Planning	<ol style="list-style-type: none"> 1. Examination and Triage room 2. Examination and Treatment rooms 3. Resuscitation unit 4. Fast track area 5. Observation rooms 6. Isolation rooms 7. Doctors break room 8. Staff Lounge. 9. Lab 10. Decontamination area 11. Pharmacy 12. Radiology unit (resonance - sectional - x-ray) 13. Operation/Surgery unit attached to the department 	<ol style="list-style-type: none"> 1. Examination and Triage room 2. Examination rooms 3. Resuscitation unit 4. Isolation rooms 5. Doctors break room 6. Lab 7. Pharmacy <p>The emergency departments rely on hospital resources, so the following don't exist inside the dept:</p> <ol style="list-style-type: none"> 1. Radiology unit 2. Observation rooms 3. Unit for operations 4. Fast track area 5. Staff Lounge 6. Decontamination area

IV. FEATURES OF ARCHITECTURAL DESIGN FOR EGYPTIAN EMERGENCY DEPARTMENTS

In this section, we conduct an analytical study for an emergency department of a public hospital in the Arab Republic of Egypt, in order to explore the design idea of emergency departments. In addition we present the current conditions of the departments in light of the challenges and efforts made by the government to improve the performance of the emergency departments of various public hospitals. This analytical study will help in developing an integrated methodology for developing emergency departments in an efficient way scientifically in Egypt.

The emergency department has been selected to be from a public hospital, because they provide affordable, if not free, health care services to the entire population. Due to the large population of Egypt, there is a huge pressure on the resources of these departments, and so they are in need of continuous development to accommodate the continuous increase in the number of annual visits. In light of the difficult economical conditions that the country is suffering from at the present time and the low of health care budget, one of the large public hospitals is selected for our study and analysis: Sheikh Zayed Al Nahyan Hospital - in Al Duweqa.

Sheikh Zayed Al Nahyan Hospital - in Al Duweqa. It is a teaching hospital that is established in 2013. It is located in Al-Nasr Road, Al-Abajiya, Qism Al-Khalifa in Cairo Governorate. It accommodates 160 beds and serves the residents of Manshiyat Nasser district, which includes a group of neighborhoods such as Al-Duweqa and Al-Zabaleen.

Hospital Typology: It is a complex tower on podium hospital. The high rise tower, was addressed to the nursing units, where patients were admitted to stay for long periods, and the base for treating units (outpatient and emergency department)^[24]. The tower is characterized by the presence of architectural responses and formulas to add architectural beauty and environmental response, as shown in figure (14).

Emergency Department Description. The emergency department of the hospital has an area of 1200 square meters and with a capacity of 15 beds for examination and treatment. It provides emergency medical service for about 60,000 annual visits^[25]. It is considered one of the large emergency departments due to the big number of annual visits.

The health care system inside the department based on Triage system with two levels of classifications (Red & orange), as shown in fig (15).

Red for resuscitation cases (Patient arrive by ambulance)

Orange for urgent cases (patient arrive on feet)

Triage nurse classifying patients whose conditions do not require resuscitation within the classification of critically ill patients, and priority of care is given according to the degree of pain that the patient suffers.

The flow of patients takes place in one path, starting from triage, then examination, then simple treatment, then going to specialized nursing units or going home.

Doctors inside the department have different specialties and the consultant doctor is usually called to perform additional examinations and to decide on whether the patient can be discharged (i.e., go home) or has to stay in the nursing units.

From the foregoing, the similarity in the care work system within the department with the European model of emergency departments becomes clear, and they are not compatible with the number of patients and the economic conditions of the Egyptian society.





Figure (15): Architectural design and patient flow paths at Sheikh Zayed Hospital in Al Duwayqa

The emergency department consists of a group of rooms/spaces for treatment and other service, as shown in Figure (15), which are as follows.

Clinical Spaces:

- Examination room.
- An examination ward for men with four beds.
- An examination ward for women with four beds.
- Orthopedic and Casting room with a single bed.
- Operations/Surgery room.
- A Treatment room with a single bed.
- A delivery room with a single bed.
- A Recovery room with a single bed.
- Pharmacy.
- A store for clean tools, and another store for contaminated materials.

Non-clinical Spaces:

- One entrance with a security counter.
- Accounting Room.
- Doctors’ break room.
- Changing room and bathrooms for workers.

The architectural design for emergency department. It has ballroom layout, where there are reception, pharmacy and lab in the middle of the department, and these are surrounded by examination and treatment rooms.

Patients are transferred to nursing units for treatment and observation as there are no observation rooms available. Also, there is no isolation room, waiting area, or Radiology area. The examination wards are not equipped enough to treat patients while there is a single treatment room and a single operations room. Finally, each bed accomodates about 5000 annual visits, which is a big number that may cause bottlenecks and congestion in the emergency department. Table (2) shows a summary on our discussion of the emergency department of Sheikh Zayed Hospital.

V. RESULTS AND CONCLUSION

In this section, we presents our analysis results and conclusion based on comparing the Egyptian model against both the American and the European models of the emergency departments.

Architectural Formation: The emergency departments of public hospitals, in Egypt, follow the architectural model of that of the European emergency departments that deal with small or medium numbers of patients. Unlike the European

system, emergency departments in Egypt serves large numbers of patients such that visits may exceed 50,000 annually. Area and Visit Rates: The design depends entirely on the hospital's resources. The designed area for each bed is approximately 80 square meters, which is an average area compared to the European system and the American system that has an area, for each bed, of 66 square meters and 130 square meters respectively. The Egyptian emergency departments have 4000 - 5000 annual visits for each bed, while the Anglo American has 1100 annual visits for each bed and the European has 2500 annual visits for each bed. Therefore, there is a congestion and long queues in the health care system within the Egyptian emergency departments.

Health Care System: There is no model to represent the health care system within the emergency department in Egypt. It is a mixture between the American model (Anglo-American) and the European model (Franco-German). However, it tends to be more similar the European system with respect to the layout architectural design and health care system within the emergency department. It has a 2 level of the examination and screening process similar to the European system. Also, the crew that provides emergency medical services are not emergency specialists, but rather experienced doctors from different specialties who work in an emergency department. On patient arrival to the emergency department, simple measures and procedure are taken similar to that if the wounds or fractures cases. But in cases that need critical care or further examinations, the patient is transferred to the appropriate department in the hospital.

On the other hand, it follows the American system in terms of bringing the patient to the hospital, and no therapeutic intervention takes place before the patient arrives at the emergency department. There are emergency doctors to provide life support operations for resuscitation patients. And, it provides regular medical procedures/services if the case is simple, such as wounds, fractures and animal attacks, without transferring the patient to the corresponding department based on his condition. There is also a lab and an operating/surgery room inside ED. Large numbers, especially low-income and uninsured people, use the emergency department, since it is their only health care option. Such large numbers cause severe congestion and bottlenecks in the health care system.

Recommendations: There have been several renovations and development done for emergency departments in old public hospitals, but most of it are for furniture and devices. Despite the fact that these renovations are required/essential, it has less to no impact on the functionality. In other words, it doesn't improve the efficiency of the working system of emergency departments nor reduce congestion and bottlenecks. Therefore, we recommend the following developments and improvements to enhance the efficiency of ED in Egypt.

1. Re-engineer the patient flow system in the health care process within the emergency departments of Egyptian public hospitals according to the patient flow system in the Anglo-American system by adopting the Emergency Severity Index (ESI).
2. Redesign the emergency departments to adopt the POD Layout design to allow the formation of a number of clinically specialized units according to the paths of patient flow. Add a unit for observation such that each unit has its services assigned to it. Provide examination rooms with equipments to be capable of treating patients to increase efficiency and reduce extra unnecessary steps in their treatment journey.
3. Adjust areas/spaces according to the American model such that there is 130 square meters designated for each bed and the annual bed capacity/utilization is about 1,200 patients. Services and medical activities should have appropriate and enough spaces in the emergency department to be self sufficient for resources and work in a stand-alone mode. This will help in reducing the time of stay and overcrowding of patients in nursing units in particular and in the emergency department in general.



Table (2): Summary on the analytical study of the emergency departments of Sheikh Zayed Al Nahyan Hospital

Sheikh Zayed Al Nahyan Hospital			
Philosophy	Similar to the American model, the healthcare philosophy in this system is called "load & go" or bring the patient to the hospital. The emergency department is managed and running by doctors who are specialized in emergency care. They evaluate and treat arriving patients at the emergency department. The patient is not transferred to the other internal departments nor discharged to go home until after the patient's emergency care protocols and procedures are completed.		
Patient Flow	The Patient Flow Model follows the Triage Operational Model. However, there is no unified model for the flow of patients in the emergency departments of Egyptian public hospitals. In general, the screening and triage system comprises of 2-3 levels.		
Area and Capacity	The emergency department is small with limited capabilities. It has an area of 1200 square meters with a capacity of 15 beds for examination and treatment purposes. The department provides emergency medicine service for about 60,000 annual visits. Therefore, the emergency department is classified as a large emergency departments in terms of annual visits (not area). The design area of each bed is 80 square meters and it accommodates 4,300 annual visits in average, and this is a huge rate that causes bottlenecks and congestion in the emergency department.		
ED Design Concept	Small emergency departments take the architectural configuration of the Linear Layout or the ballroom layout, as shown in Sheikh Zayed Al Nahyan Hospital. It has a central area in the middle of the department that contains reception, data, medicine and analysis rooms surrounded by examination rooms and treatment rooms. There is no main nursing station, but rather small stations within the examination wards.		
Space Planning	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>Exists</u> 1. Screening and Triage room 2. Examination Ward 3. Resuscitation unit 4. Doctors break room 5. Lab 6. Pharmacy </td> <td style="width: 50%; vertical-align: top;"> <u>Doesn't Exist</u> (due to the total dependence of the emergency departments on hospital resources) 7. Radiology unit 8. Isolation rooms 9. Observation rooms 10. Operation/Surgery 11. Fast track area 12. Staff Lounge. 13. Decontamination area </td> </tr> </table>	<u>Exists</u> 1. Screening and Triage room 2. Examination Ward 3. Resuscitation unit 4. Doctors break room 5. Lab 6. Pharmacy	<u>Doesn't Exist</u> (due to the total dependence of the emergency departments on hospital resources) 7. Radiology unit 8. Isolation rooms 9. Observation rooms 10. Operation/Surgery 11. Fast track area 12. Staff Lounge. 13. Decontamination area
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