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CASE STUDY

The Role of Health Crises in Managing the Workflow in Emergency Departments' *Cases Study Egyptian Hospitals*

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Abstract

Hospitals and emergency departments have faced numerous challenges as they are considered the first line of defence when receiving patients. It also serves as the first detector of epidemiological conditions to which men turn when medical situations appear. In this regard, there are no Egyptian studies available for evaluating the emergency department.

The research discussed the new requirements in workflow that necessitate an assessment of the status quo of emergency departments, especially in Egyptian hospital design. The study examined several emergency departments in Egypt.

In this regard, the study discusses various methods and precautions taken in hospitals during epidemics, and an analytical study relies on a questionnaire in Egyptian hospitals.

The study revealed the challenges and obstacles that emergency departments faced during pandemics and highlighted the importance of implementing effective strategies to improve their workflow and response to emergencies. The recommendations included enhancing communication, providing adequate resources, and developing contingency plans to ensure preparedness for future crises.

Keywords: Emergency department, Health crisis, Hospitals, Shelter hospitals, Workflow

1. Introduction

The whole world has been facing a disaster beginning from Jan 2020 till now, The COVID-19 pandemic was declared a 'public health emergency' on Feb 2020 due to its Excessive spread rate and transmission in humans (Team, 2020). on March 2020, the virus has been spread to most countries of the world with 323,081 confirmed cases and 14,443 reported deaths. According to WHO Issues, Over the past two years, many studies have discussed the spread of the Covid –19 in hospitals, especially in ED (Birgand et al., 2020), These studies discussed the spread of the virus in the closed patient environment it found that the spread inside the closed environments was about (95.8.0%), in clinical areas far away from patients, 50%, and in staff 33.3% (Ong et al., 2020). In the Giannouchos study, which discussed the number of people attending emergency departments from January to August 2020, the frequency of

patients attending emergency departments increased from March through to a peak in June, which led to divide the emergency departments into urgent and non-urgent (Giannouchos et al., 2021).

In the Cao study for managing emergency departments, were divided into the low suspect and highly suspect, while other patients followed a course of routine separate from the suspect areas. He suggests that each hospital should create a contingency plan suitable to its local conditions (Cao et al., 2020). In SHEN study found that hospital management in responding, organizing, and managing hospital operation have a huge role in reducing hospital infection rates and transmission, during the epidemics, and found that 6.46% of staff suffered depression, 9.87% had anxiety, 98% were satisfied with the infection reducing policy (Shen et al., 2020).

Park's study, discussed the modification and applied flexible management protocols for treatment workflow in ED. He concluded that designing

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a strategy can reduce the rate of risk and transmission of diseases infectious (Ko et al., 2020).

1.1. The research problem

Egypt's EDs were particularly hard-hit during the epidemic, making them difficult to assess. Although the number of patients in emergency departments in Egypt continues to increase according to the Central Agency for Mobilization and Statistics (Barbisch et al., 2015).

The ED has seen a rise in the number of critically ill and injured patients, according to the Egyptian government. Fig. 1, The number has doubled recently and is expected to further increase (China NHC.o.t.P.s.R.o, 2020).

2. Research methodology

The study followed several research methods, beginning with a theoretical approach, an analytical depended on questionnaire study that dealt with several emergency departments workflow during the coronavirus pandemic, and ending with an applied study conducted on a number of emergency departments in five Egyptian hospitals, following the Conclusion and recommendations.

2.1. Research methods

(1) The study was limited to adult patients at the time of their COVID-19 disease, resulting in informed concurrence. Participants were invited to participate in the study using Google forms and a web-based survey portal.

2.2. Statistical analysis

(1) IBM SPSS Statistics for Windows 25.0 was used for statistical analysis, with descriptive statistics

such as mean and standard deviation for continuous variables and proportions for categorical variables.

3. Literature review

3.1. ED crisis workflow management

ED Departmental resources and methodologies, the hospital environment (i.e., wards, services), the healthcare system (e.g., regulation, funding, management, policy), societal factors that influence patient situations, behavior's, and attitudes, as well as external events, all have an impact on ED workflow (including disasters). EDs must be able to function under such variable and unpredictable conditions that they have become the subject of several techniques aimed at enhancing efficiency and effectiveness through adaptability (De Freitas et al., 2018).

3.2. The ED strategies on crisis

Since ancient times, the Greeks have known how to take rapid care of patients by maintaining the cleanliness of the wound and preventing excessive blood loss. Emergency medicine began to become more systematic in the 18th century due to the efforts of French surgeon Dominique Jean Lary, who created flying ambulances and set up a screening system to care for the wounded. During the Second World War, doctors all over the world were actively involved in emergency care and rescue services (Chung, 2001), The use of ambulances during wartime led to the development of new medical techniques and procedures, paving the way for modern ambulance services, and the management and establishment of helicopters in the evacuation of injured persons (Adams, 1999). Emergency construction was used to reduce pressure on emergency departments during the coronavirus crisis.

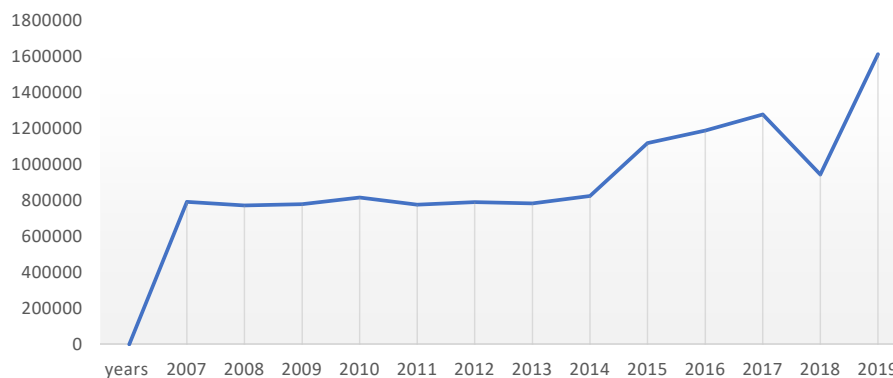


Fig. 1. Numbers of emergency cases in Egypt. https://www.capmas.gov.eg/Pages/IndicatorsPage.aspx?page_id=6141&ind_id=2519#.

4. Analytical study

4.1. ED models during crisis

Many hospitals have gone to many architectural solutions, which will be reviewed in the following points.

4.2. Emergency off site construction

Off-site construction is used for emergency construction of isolation facilities. This suggests that off-site construction methods have become increasingly popular across various building categories and that the healthcare industry is one of the major beneficiaries of this trend. However, it is important to note that the benefits of off-site construction go beyond cost reduction and project completion improvement, as it also offers increased quality control and reduced waste (Gbadamosi et al., 2019).

These off-site methods have been particularly useful in the healthcare industry, where the need for additional hospital beds and isolation units has been urgent. They have also proven to be cost-effective and environmentally friendly alternatives to traditional construction methods (Gbadamosi et al., 2019). Modular construction, which is also usually referred to as off-site construction, entails the manufacturing of 'repeatable' (Yuan et al., 2018) Fig. 2.

4.3. Vehicular transformed units

A school bus has been converted into a mobile COVID-19 testing and immunization unit. Inside of the bus is separated into three areas: staff work/PPE storage, administration/registration/testing, and laboratory. Patients are shielded from the weather outside under a pull-out canvas tent with tables and seats underneath. This outdoor 'room' serves as a waiting space as well as a staging area for tests and vaccinations.

4.4. Shelter hospitals

During the 1910 typhoid epidemic in Canada, the Northern Company was converted into an emergency medical facility hospital to assist patients. During the Spanish flu in 1918, 38% of the hospital wards were located in existing facilities, such as houses, hotel chains, factories, and schools (Adams, 1999).

There were various types of shelters, such as tents, prefabricated buildings, large existing buildings, temporary structures made of plastic sheets, and more (Bashawri et al., 2014). The choice of shelter hospital is influenced by the disaster's type. The hospitals at the Fangfang shelter have been essential

in assisting with epidemic control. Total construction area: 127,000 m². It prepared to offer 1600 beds, and it saw more than 1848 cases (Fang et al., 2020).

Hole hospitals are designed to provide comprehensive medical care and support to patients in a single location, with specialized medical staff available to address their needs. These pathways help ensure that patients receive the appropriate care and treatment while also allowing medical staff to efficiently manage their workload and provide the best possible care (China NHC.o.t.P.s.R.o, 2020). China created the Fangfang Shelter Hospital to control the COVID-19 epidemic in Wuhan, which included isolation, triage, medical care, monitoring and referral, shelter, and social connection. It was established in existing public locations despite having historical precedents of improvised hospitals, emergency medical services, emergency shelters, and hospital isolation Fig. 3.

4.5. Micro-courtyard hospital (MCH)

- (1) MCH is intended for usage both in cold and hot climates. A wire double-curvature textile roof is an alternative addition to this system's deployment. The canopy serves as a sunshade and as a deflector for heavy snowfalls or rains. These outside spaces provide views out, air circulation (if needed), and natural daylighting for the interior while also acting as anchor points for the roof's possible lightweight mast columns that are supported by tension cables. Misses Hospital is in Ills Balears, Spain. The hospital is designed to provide easy access to supporting activities for the convenience of staff and patients.
- (2) A 100-bed installation is shown here on the grounds of the Can Misses Hospital in Ills Balears (Fig. 4).

4.6. Road map hospital

The awareness of risk areas inside units and the requirement for more powerful spatial cues, managing movement across units was a significant design problem that was also made obvious by the heat map generated for the pediatric COVID-19 unit. Especially in congested, vertical hospital environments.

Healthcare workers at Mount Sinai Kravis Hospital for Children were required to leave wards to access critical shared places such as nurses' lounges or to get resources such as medicines or equipment. To reduce hospital acquired infections between infected and non-infected units, floor levels (elevators and stairs) required to be carefully studied. This is noteworthy because staff behavior is typically

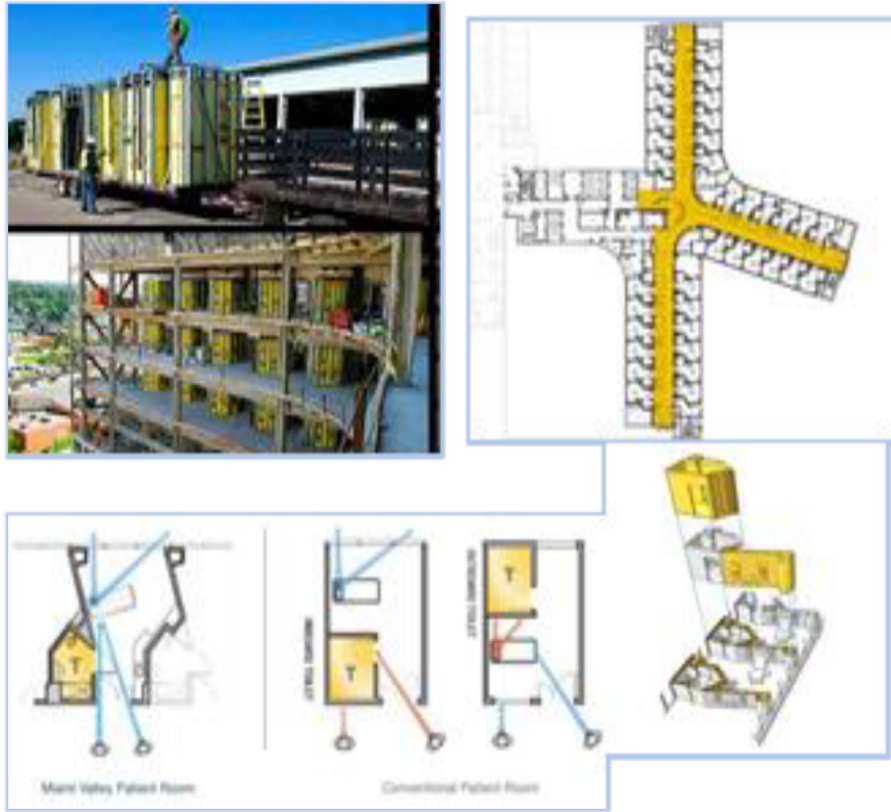


Fig. 2. Off-site construction unites Isolation rooms, Miami Valley Hospital | NBBJ. <http://www.healthcaredesignmagazine.com/article/MVH>.

strictest in areas regarded as red zones, in which the risk of epidemic is perceived to really be high; however, there have been different degrees of complying to infectious disease rules in areas considered as orange or green, as well as varying levels of readability of which environments conducted high risks of contagion (Achillopoulou et al., 2020; Murphy, 2020) (Fig. 5).

4.7. Egypt ED crisis management

Egypt has taken preventive steps to reduce the spread of the virus, such as partial working times,

early closures, and precautionary procedures (Righi et al., 2015) Flexibility in health spaces is an effective way to increase the functioning of emergency spaces and improve patient safety spaces (Wachs et al., 2016).

Five Egyptian hospitals were chosen, ranging from a teaching hospital (Ain Shams) to public hospitals, a questionnaire and statistical study on the hesitant, as well as a study of techniques and methods of dealing with the pathways of movement in the emergency departments during Covid-19. The Questionnaire Reliability according to Cronbach's Alpha was 0.665 it was acceptable Covid-19 as shown in Table 1.

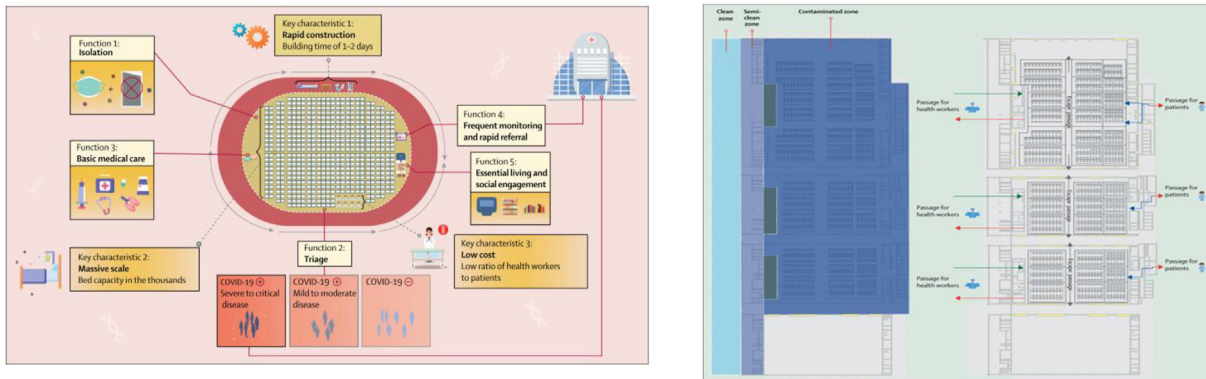


Fig. 3. Fangfang Shelter Hospital Zoning zones Establishing beds, protected space, and the three zones and two tunnels of patient isolation units. https://www.ncbi.nlm.nih.gov/pmc/articles/instance/7270591/bin/gr3_lrg.jpg.

Table 1. The Cases study Questionnaire percentage results.

| The Questioner Items | The sub Variables | Raba El Adawaya Hospital % | Naser city hospital % | Ein Shams Hospital % | Mokatem hospital % | Shak zayed Hospital % | Average percentage % | Skew |
|--|------------------------|----------------------------|-----------------------|----------------------|--------------------|-----------------------|----------------------|-------|
| Is there isolated room in the ER for covid suspension | Yes | 25.9 | 56.5 | 87.5 | 55.60 | 74.0 | 59.9 | -0.52 |
| | No | 74.1 | 43.5 | 12.5 | 44.40 | 26.0 | 40.1 | 0.52 |
| Is there any Fever clinic in the ER | Yes | 33.3 | 30.4 | 46.9 | 72.20 | 72.2 | 51 | 0.23 |
| | No | 14.8 | 47.8 | 9.4 | 16.70 | 23.0 | 22.34 | 1.68 |
| How long you have wait to receive your test results | Kind of | 51.9 | 21.7 | 43.8 | 11.10 | 5.0 | 26.7 | 0.34 |
| | 2 days | 29.6 | 17.4 | 37.5 | 55.60 | 18.2 | 31.66 | 0.91 |
| | 24 h | 59.3 | 39.1 | 50.0 | 44.40 | 72.7 | 53.1 | 0.77 |
| | 3 days | 11.1 | 26.1 | 12.5 | 0.00 | 4.5 | 10.84 | 0.87 |
| | 4 days | 0.0 | 17.4 | 0.0 | 0.00 | 4.5 | 4.38 | 1.90 |
| From ER to Radiology Department You path through | Elevators | 0.0 | 8.7 | 0.0 | 77.80 | 68.2 | 30.94 | 0.61 |
| | Main Corridors | 22.2 | 60.9 | 0.0 | 5.60 | 13.6 | 20.5 | 1.60 |
| | Other department | 3.7 | 13.0 | 6.2 | 5.60 | 4.5 | 6.6 | 1.86 |
| Have additional isolation rooms been provided for any sudden epidemic How satisfied are you with the environment and the temperatures in the isolation rooms | OUT Side the hospital | 74.1 | 17.4 | 93.8 | 11.10 | 13.6 | 42 | 0.74 |
| | Yes | 51.9 | 52.0 | 93.8 | 77.80 | 72.7 | 69.64 | 0.26 |
| | No | 48.1 | 48.0 | 6.3 | 22.00 | 27.3 | 30.34 | -0.25 |
| | 1 | 37.0 | 4.3 | 9.4 | 0.00 | 0.0 | 10.14 | 1.91 |
| | 2 | 29.6 | 26.1 | 3.1 | 0.00 | 4.5 | 12.66 | 0.58 |
| | 3 | 29.6 | 43.5 | 46.9 | 22.20 | 45.5 | 37.54 | -0.80 |
| | 4 | 3.7 | 21.7 | 34.4 | 72.00 | 18.2 | 30 | 1.29 |
| How satisfied are you with the ventilation of suspected infection rooms | 5 | 0.0 | 4.3 | 6.3 | 5.60 | 31.8 | 9.6 | 2.02 |
| | 1 | 33.3 | 4.3 | 0.0 | 0.00 | 4.5 | 8.42 | 2.10 |
| | 2 | 18.5 | 30.4 | 15.6 | 61.10 | 9.1 | 26.94 | 1.53 |
| | 3 | 29.6 | 39.1 | 18.8 | 16.70 | 36.4 | 28.12 | -0.16 |
| | 4 | 14.8 | 17.4 | 31.3 | 16.70 | 27.3 | 21.5 | 0.70 |
| How satisfied are you with the space and number of people in suspected infection rooms | 5 | 3.7 | 8.7 | 34.4 | 5.60 | 22.7 | 15.02 | 0.95 |
| | Not satisfied | 3.7 | 73.9 | 62.5 | 27.80 | 72.7 | 48.12 | -0.85 |
| How satisfied are you with the vertical Circulation of communication (elevators - and stairs | Very satisfied | 96.3 | 26.1 | 37.5 | 72.20 | 27.3 | 51.88 | 0.85 |
| | 1 | 7.4 | 4.3 | 0.0 | 0.00 | 9.1 | 4.16 | 0.06 |
| | 2 | 51.9 | 34.8 | 0.0 | 0.00 | 9.1 | 19.16 | 0.80 |
| | 3 | 37.0 | 43.5 | 31.3 | 72.20 | 22.7 | 41.34 | 1.35 |
| | 4 | 3.7 | 8.7 | 40.6 | 22.20 | 36.4 | 22.32 | -0.01 |
| How were the lobby in front of the care and reservation rooms and how were they ventilated? | 5 | 0.0 | 8.7 | 28.1 | 5.60 | 22.7 | 13.02 | 0.41 |
| | Mechanical ventilation | 88.9 | 30.4 | 9.4 | 83.30 | 18.2 | 46.04 | 0.45 |
| | Natural ventilation | 11.1 | 69.6 | 90.6 | 16.70 | 81.8 | 53.96 | -0.45 |

| | | | | | | | | |
|--|--|------|------|-------|-------|------|-------|-------|
| on the private hospital entrance for presumed coronavirus cases other than the emergency entrance and main entrance | entering is from the emergency entrance | 51.9 | 21.7 | 0.0 | 22.20 | 68.2 | 32.8 | 0.28 |
| | entering is from the main entrance | 44.4 | 60.9 | 3.1 | 16.70 | 18.2 | 28.66 | 0.58 |
| | , it has a special entrance for Corona cases | 3.7 | 17.4 | 96.9 | 61.10 | 13.6 | 38.5 | 0.98 |
| Are there medical pre tests and examination and isolation rooms for patients before they enter the hospital | yes, there is 2t | 25.9 | 30.4 | 96.9 | 72.20 | 22.7 | 49.62 | 0.88 |
| | No there are not | 74.1 | 69.6 | 3.1 | 27.80 | 77.3 | 50.38 | -0.88 |
| Are isolation spaces divided into levels within isolation wards in hospitals from the most severe cases to the least | No, they are 2t separated | 37.0 | 69.6 | 71.9 | 61.10 | 13.6 | 50.64 | -0.97 |
| | Only critical patient cases were separated | 25.9 | 8.7 | 9.4 | 11.10 | 18.2 | 14.66 | 1.13 |
| | Yes | 37.0 | 21.7 | 18.8 | 27.80 | 68.2 | 34.7 | 1.62 |
| Are the paths of movement of the medical staff separated from the patients with Covid -19? | Yes | 22.2 | 39.1 | 87.5 | 72.20 | 81.8 | 60.56 | -0.64 |
| | No | 77.8 | 60.9 | 12.5 | 27.80 | 18.2 | 39.44 | 0.64 |
| Are the movement paths of Corona patients separated from the movement paths of other patients and hospital visitors? | Yes, the movement paths are not separated | 3.7 | 17.4 | 96.9 | 55.60 | 9.1 | 36.54 | 1.12 |
| | Some of the main movement paths have been separated | 66.7 | 56.5 | 3.1 | 33.30 | 31.8 | 38.28 | -0.41 |
| | Yes, the movement paths have been completely separated | 29.6 | 26.1 | 0.0 | 11.10 | 59.0 | 25.16 | 0.75 |
| Is the medical team qualified to deal with critical cases ? | Yes | 74.1 | 56.5 | 96.9 | 83.30 | 63.6 | 74.88 | 0.37 |
| | no | 25.9 | 43.5 | 3.1 | 16.70 | 36.4 | 25.12 | -0.37 |
| How satisfied are you with the suspicion isolation rooms where 1 is very dissatisfied and 5 very satisfied | 1 | 29.6 | 0.0 | 0.0 | 0.00 | 9.1 | 7.74 | 1.78 |
| | 2 | 22.2 | 21.7 | 6.0 | 18.80 | 4.5 | 14.64 | -0.53 |
| | 3 | 29.6 | 30.4 | 13.0 | 40.60 | 45.5 | 31.8 | -0.73 |
| | 4 | 18.5 | 30.4 | 6.0 | 18.80 | 18.2 | 18.38 | -0.10 |
| | 5 | 0.0 | 17.4 | 7.0 | 21.90 | 22.7 | 13.8 | -0.71 |
| Have the ventilation devices been separated between the critical and less sick cases isolation spaces | Yes | 59.3 | 56.5 | 62.5 | 33.30 | 72.7 | 56.86 | -1.21 |
| | No | 40.7 | 43.5 | 37.5 | 66.70 | 27.3 | 43.14 | 1.21 |
| Has the hospital's central ventilation been separated from the ventilation of the patients 'isolation rooms? | Yes | 58.6 | 52.2 | 100.0 | 88.90 | 50.0 | 69.9 | 0.66 |
| | no | 41.4 | 47.8 | 0.0 | 11.10 | 50.0 | 30.1 | -0.66 |

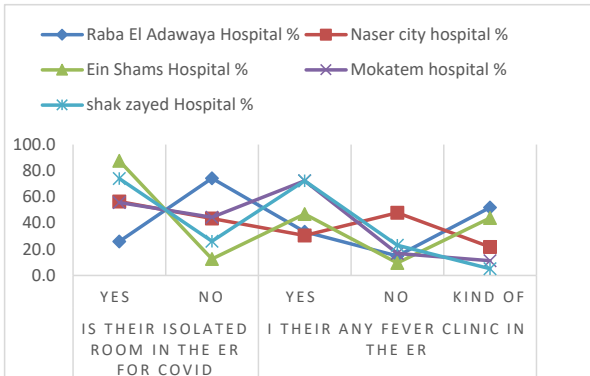


Fig. 6. The average response for fever clinic in ER and the isolation spaces in emergency by Author.

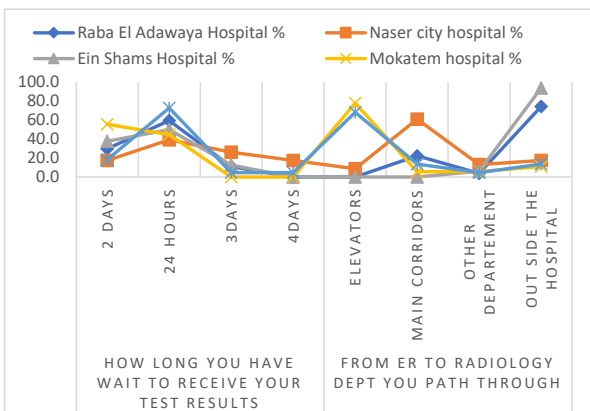


Fig. 7. The average for the test period responses and the circulation work flow from the ER and radiology by Author.

between cases. Through the questionnaire on patients' satisfaction with the isolation procedure, 31.82% of the average level of performance of the isolation service was identified. 18.38% of the level is lower than the mean Fig. 9.

(5) hospital's central ventilation been separated from the ventilation of the patients 'isolation rooms, Through the questionnaire, 69.94% ventilation of

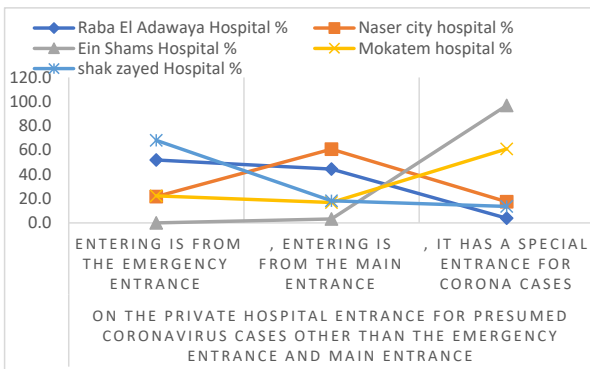


Fig. 8. The separation of an emergency entrance from the hospital facilities by Author.

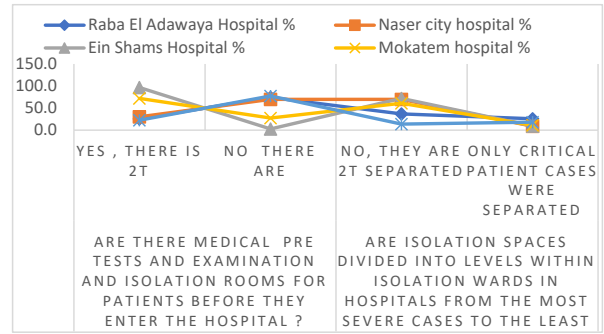


Fig. 9. Patients' satisfaction with the isolation procedure and pretests by Author.

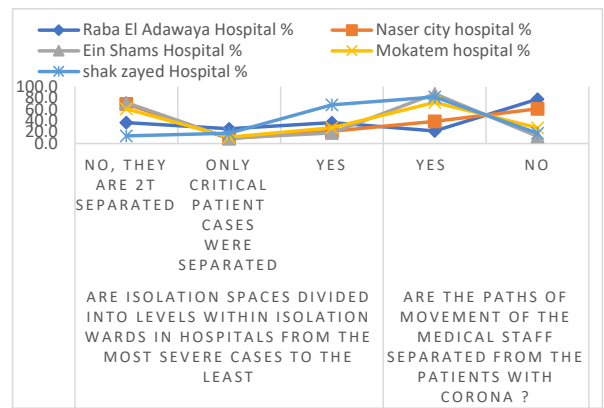


Fig. 10. The division of isolation level in wards and medical path for staff by Author.

the isolation sections is separated from ventilation of the hospital, ventilation devices been separated between the critical and less sick cases isolation spaces (Fig. 10).

(6) By measuring patient satisfaction with the internal environment and temperatures in the isolation rooms, 37.54% of patients responded on average. While most of the data agreed that the

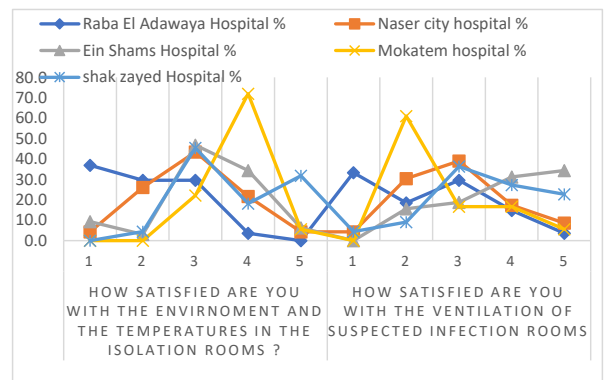


Fig. 11. The patient satisfaction for rooms temperature and ventilation by Author.

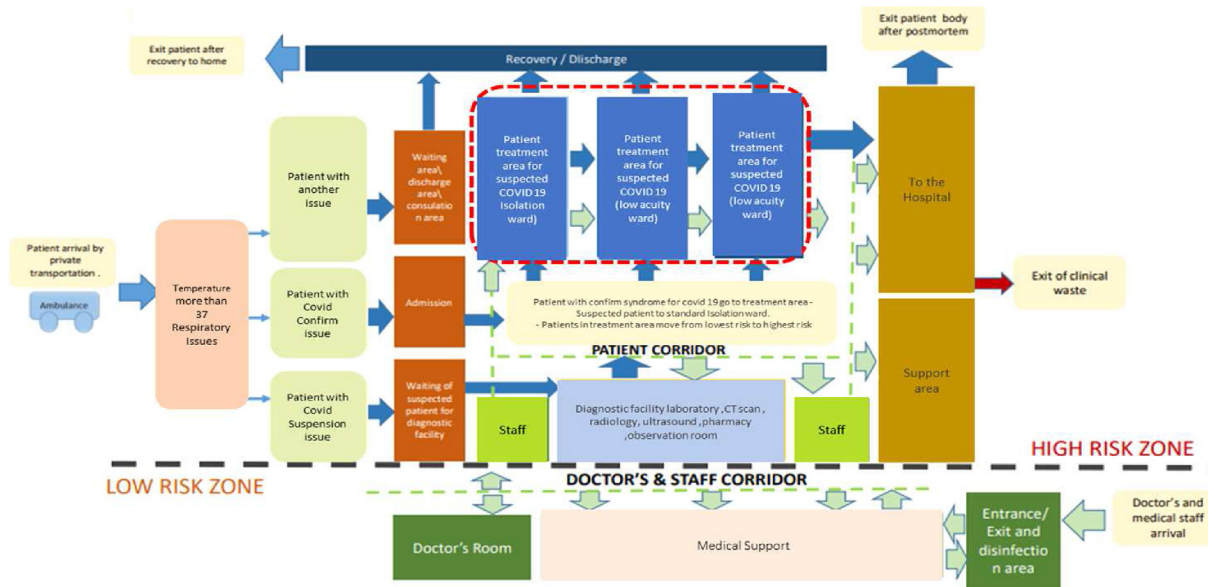


Fig. 12. Design proposal for ED workflow in hospital cases studies according to the previous study.

internal spaces of Mukattam Hospital's isolation ward were good (Fig. 11).

The questionnaire proposal diagram for ED as follow Fig. 12:

The author presents a comprehensive design proposal for improving the workflow in emergency departments (ED) of hospitals. This case study aims

to address the challenges faced by healthcare professionals in managing patient flow, reducing wait times, and enhancing overall efficiency in the ED setting. By analyzing existing systems and identifying key areas for improvement, the proposed design solution offers a holistic approach to streamlining the ED workflow and optimizing patient care, shown in Table 2 as follow:

Table 2. Design proposal for ED workflow in hospitals cases study by author.


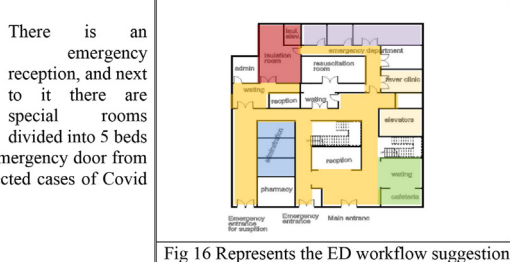
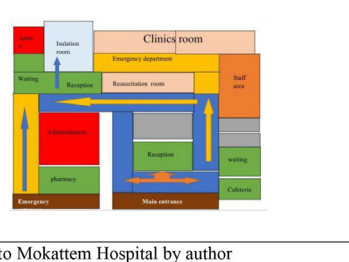

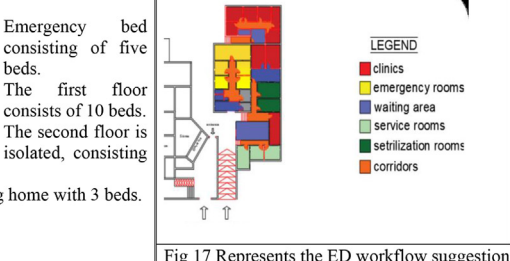
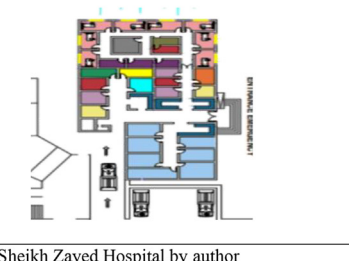
| Hospital Name | HOSPITAL DESCRIPTION AND QUALIFICATION | The workflow of Emergency department | The workflow suggestion for Emergency department |
|-----------------------|--|--------------------------------------|--|
| Ein Shams Hospital | Ain Shams Specialized Hospital is the main provider of emergency and specialized care services in Egypt and one of the most prominent hospital systems in the Middle East 190 beds The hospital completed within 11 days to be ready to operate and receive Corona cases | | |
| Sheikh Zayed Hospital | The hospital area is 25000 square meters divided into three connected buildings divided into seven floors, and there is a basement under the three buildings, and the lower floor contains the hospital services, warehouses, laundries and maintenance workspaces | | |
| Nasr city Hospital | The hospital building consists of 4 floors, a ground floor and 3 upper floors, each of which contains different departments. | | |

Fig 13 represents the ED workflow suggestion to Ain shams hospital by author

Fig 14 represents the ED workflow suggestion Sheikh Zayed Hospital by author

Fig 15 Represent the ED workflow suggestion Nasr city Hospital by author

Table 2. (Continued).

| | | | |
|--|---|---|--|
| Moka tam Hospital |  <p>There is an emergency reception, and next to it there are special rooms divided into 5 beds for cases and there is an emergency door from the outside only for suspected cases of Covid 19</p> |  <p>Emergency reception for suspicion Emergency reception Main entrance</p> |  <p>Isolation room Emergency department Reception Waiting area Pharmacy Clinics room Emergency department Reception Waiting area Pharmacy Male entrance Waiting Cafeteria</p> |
| Fig 16 Represents the ED workflow suggestion to Mokatteem Hospital by author | | | |
| Raba el adway |  <p>Emergency bed consisting of five beds. The first floor consists of 10 beds. The second floor is isolated, consisting of 10 beds- The third floor is a nursing home with 3 beds. -Fourth floor 10 beds-</p> |  <p>LEGEND ■ clinics ■ emergency rooms ■ waiting area ■ service rooms ■ sanitization rooms ■ corridors</p> |  <p>Isolation room Emergency department Reception Waiting area Pharmacy Clinics room Emergency department Reception Waiting area Pharmacy Male entrance Waiting Cafeteria</p> |
| Fig 17 Represents the ED workflow suggestion Sheikh Zayed Hospital by author | | | |

4.9. Conclusion

The researchers investigated a variety of methods used in emergency departments during the recent epidemic crisis, Challenges faced by emergency departments.

- (1) According to the study's findings, when developing the emergency departments should take isolation regions into account when extending the crisis phase.
- (2) Designing internal emergency spaces so that ventilation and basic services are separated between patient areas and hospital workers to reduce infection rates.
- (3) The requirement for an emergency laboratory and X-ray department in addition to the hospital's diagnostic departments to handle patients in critical situations.
- (4) Patients who received routine hospital services and those affected by the pandemic must enter separate entrances during a crisis, and there must be triage areas before they can enter the emergency department.
- (5) Divide isolation spaces into a range of levels to provide appropriate medical service and contribute to reducing infection rates.
- (6) Setting up analytical centers that contribute to reducing waiting times for patients leads to early diagnosis and easy access to appropriate treatment.

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Conflicts of interest

There are no conflicts of interest.

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المخلص

دور الازمات الصحيه في تعديل خريطة الحركة لاقسام الطوارئ دراسه حاله المستشفيات المصريه واجهت المستشفيات وأقسام الطوارئ العديد من التحديات حيث تعد خط الدفاع الأول عند استقبال المرضى. كما أنها بمثابة أول كاشف للحالات الوبائية التي يلجأ إليها الأشخاص عند ظهور الحالات الطبية الطارئة . وظهرت اهميه اقسام الطوارئ بدءا من الكوليرا في أوائل القرن العشرين وانتهاء بكوفيد-19 في القرن الحادي والعشرين . يناقش البحث متطلبات اداره خريطة الحركة في أقسام الطوارئ، خاصة في عدد من المستشفيات المصريه. وفي هذا الصدد، تناقش الدراسة الأساليب والاعتبارات التصميميه المتخذة خلال فتره الجائحه، كما يناقش العديد من الحلول لإداره خريطة الحركة في اقسام الطوارئ في فترات الازمات من خلال دراسات استبانيه تمت على عدد من المترددين والعاملين في اقسام الطوارئ في المستشفيات المصريه ، ويخلص البحث بطرح العديد من الاقتراحات التصميميه والتي قد تساهم في تطوير وإداره خريطة الحركة في أقسام الطوارئ خاصة في عدد من المستشفيات المصريه