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Streamlining and Patient Flow at the Emergency Department- Al-Aqsa Hospital in the Gaza Strip

Husam Mahmoud Mohammed Abu Olwan

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Prepared By:
Husam Mahmoud Mohammed Abu Olwan

MBBS – Al-Neelain university - Sudan
MCEMA – College of Emergency Medicine - UK

Supervisor:
Dr Bassam Abu Hamad
Ph.D., Associate Professor- School of Public Health

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Prepared By: Husam Mahmoud Mohammed Abu Olwan
Student No.: 21712015

Supervisor: Dr. Bassam Abu Hamad

Master thesis submitted and accepted. Date: 5/6/2021
The names of signatures of the examining committee members are as follows:

1. Head of the committee: Dr. Bassam Abu Hamad Signature……
2. Internal examiner: Dr. Asmaa Al-Emam Signature..
3. External examiner: Dr. Yousef Abu-Al-Reesh Signature……

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Dedication

This study is wholeheartedly dedicated to my parents, who have been my source of inspiration and gave me limitless support throughout my life, who continually provide their moral, spiritual, emotional, and financial support.

To my caring, loving, and supportive wife "Riham" thank you for giving me all the support that I needed and standing beside me in all situations. Her support is priceless.

To my little kids Haya and Mahmoud for giving me a healthy life and for their kind support and love. And lastly, but not least I dedicated this study to my colleagues and friends especially Dr. Ahmed Abu-Taier, Dr. Zuhair Al-Kateeb, Dr. Mohammed Ubaid, and Dr. Emad Al-Qedra, who have been always sharing with me their thoughts and valuable advice. From the bottom of my heart thank you all

Husam Mahmoud Mohammed Abu-Olwan

Declaration

I certify that this thesis submitted for the Degree of Master, is the result of my own research, except where otherwise acknowledged, and that this study (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed

Husam Mahmoud Mohammed Abu-Olwan

Date

5/6/2021

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Abstract

Introduction and aim of the study

Emergency Departments face significantly growing problems worldwide in terms of demand for high-quality services and timely care with an inability to flex the resources to meet the increasing demand. This study looks to assess the streamlining status at the emergency department at Al-Aqsa Hospital and to identify challenges and opportunities for improving these services.

Study methodolgy

A mixed-methods approach has been used including a patient tracking checklist, applied to 385 randomly selected patients with a response rate of 96%, followed by checking patients' records. A staff questionnaire was filled out by 30 participants complemented with two focus group discussions and seven key informant interviews. The SPSS program was used for the analysis of quantitative data and the open coding thematic analysis technique was used for qualitative analysis.

Findings and results

Findings show that males and females almost equally attend the emergency department, however, 60% of them frequently visit the emergency department at the hospital. While only 8.8% of attendants to the emergency department arrived by ambulances, 81% arrived by a private car or a taxi. The peak of patient flow at the emergency department is between 9 to 12 am and between 4-9 pm. The vast majority of cases present to the department are non-emergency cases (76%). Despite its importance, vital signs haven't been measured for almost half of cases. For example, blood pressure and body temperature were measured in only 50% of cases, nevertheless, the oxygen concentration was measured only for 4% and the level of consciousness was assessed only for 1.4% of the attendants. Appropriate triage was only performed for 14%, similarly, appropriate documentation was observed on only 30% of the cases. One-third of the time consumed on investigations (mean=36 min). Streamlining status as has been measured using proxy indicators moderate scale, as 65% have met the criteria of appropriate streamlining. Females and traumatize patients had better-streamlining outcomes than others, and older received more streamlined serves than younger ones and the differences were statistically significant. Also, the acuity of patients' illness contributed to streamlining the services. Additionally, beneficiaries presented in the morning shift showed better-streamlining results. Of the total attendants to emergency services, only 7% are admitted to the hospital, two thirds were sent home.

Conclusion

It is important to control the utilization of the emergency services for non-emergency purposescases through activating primary health care services and outpatient departments. Also, strengthening triage services and having a stable well-trained and experienced team dedicated to emergency departments is a must.

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List of Abbreviations

ACEP	American College of Emergency Physicians
ARA	Access Restricted Area
CDS	Central Drug Store
DAMA	Discharge Against Medical Advice
DCM	Demand Capacity Management
DOI	Diffusion of Innovation
ED	Emergency Department
EDOC	ED Over-Crowding
EDWIN	ED Work Index
FGD	Focus Group Discussion
GMR	Great March of Return
HIS	Health Information System
HRDDG	Human Resources Development Directorate General
ICD	International Cooperation Department
IPFM	Intelligent Patient Flow Management system
IFEM	International Federation for Emergency Medicine
LOS	Length of Stay
LWBS	Leave Without Being Seen
MDM	Medecins Du Monde
MOH	Ministry of Health
NEDOCS	National Emergency Department Overcrowding Score
NHS	National Health Service
OCHA	The United Nations Office for the Coordination of Humanitarian Affairs
OPD	Out-Patient Department
PASSIA	Palestinian Academic Society for the Study of International Affairs

PCBS	Palestinian Central Bureau of Statistics
PHCC	Primary Health Care Center
POCT	Point of Care Testing
PRCS	Palestine Red Crescent Society
UNFPA	United Nations Population Fund
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
WB	West Bank
WHO	World Health Organization

Chapter One
Introduction

1.1 Background

Emergency Departments (EDs) face significantly growing challenges worldwide in terms of increasing demand for high-quality services and timely care with an inability to mobilize the resources to meet the increasing demand (Jarvis, 2016). The causes of ED crowding are multifactorial and complex and can vary considerably among countries. COVID-19 represents prime attention to how ED crowding and access block can serve as dangerous accelerants for pandemic infections (International Federation for Emergency Medicine (IFEM), 2020). Emergency Department Over Crowding (EDOC) has been identified as a national crisis in some countries (Yarmohammadian et al., 2017).

The Gaza Strip faces many challenges in emergency care services particularly high demand for services as reported by Medecins Due Monde (MDM, 2018). The healthcare system in the Gaza Strip is crumbling and overwhelmed by a massive number of injuries from the Great March of Return (GMR) and a shortage of basic drugs (Monica Pinna & Robert Hackwill, 2018). All these factors are mismatch places pressure on the emergency services providers to provide efficient, equitable, and timely access to emergency services. Despite varieties of health care providers, there are numerous challenges in providing emergency care during ordinary days, and frictions are deemed to exacerbate during the crisis (Health Cluster, 2014). All those consequences explicit the growing needs of health services and subsequently increase the demand for emergency services. Hence, the need of revamping the ED processes encompass the triage service might improve patient flow and streamlining the services.

Interestingly, perhaps surprisingly, Gaza EDs are the easiest and most accessible for urgent and non-urgent services; yet all gaps and pitfalls in the healthcare system can be re-directed to EDs that are already overstretched and overloaded (MDM, 2018). The patient flow could be streamlined through several measures including managing waiting times, improving processes, reducing wastes and duplications in a process that will be associated with positive health outcomes and impact the client's satisfaction (Jarvis, 2016), these and others will be tested to ascertain its effects in reducing overcrowding and improving the smooth flow of the client's pathway via streamlining ED processes.

1.2 Problem statement

Patient flow and EDOC are a worldwide issue that continues to rise despite all efforts tried to control the flow to and in ED (Bond et al., 2013). Patients are harmed by process delay which means not only by increased waiting time or wasting time, but also by unnecessary processes, mismanaging of patients, misdiagnosis, and inappropriate prioritization. Poorly managed patient flow in EDs is associated with EDOC which reduces the quality of emergency services and may lead to patients' harms associated with declining the satisfaction level for both healthcare providers and their patients (Morley et al., 2018). In the Palestinian context, ED is widely used for non-emergency purposes (MDM, 2018). Violence against workers in Palestinian EDs is not uncommon, the main reasons were due to problems in the ED system including long waiting times and lack of preventative safety measures, patient- and their family-related reasons (Hamdan & Hamra, 2017). In 2017, the number of visits to ED within the Ministry of Health (MOH) hospitals reached around 1,303,056 visits in Gaza which representing around two-third of the Gaza population (MOH, 2017a).

In Gaza there are no previous studies have been conducted about patient flow in the ED, thus there is limited information available about what causes crowdedness at EDs. Although there are known concerns about crowdedness at EDs, less is known about the level and causes of crowdedness, and there is limited information about whether this is attributed to gaps in process and management, resources, or staff/patient-related factors. Thus, there is a need for this study to assess the status of overcrowding, exit block, reasons behind, and consequences that may lead to patient's harm. This study will shed the light on the way to leverage streamlining and improve the processes of the patient's flow and provides a suggested corrective strategy.

Therefore, this study answers the key question, what is the status of streamlining, and how it can be more streamlined?

1.3 Justification of the study

Patient flow is critical when linked to patient experience, safety, and pressure on the healthcare provider. In Palestine, rapid population growth is associated with the emerged need for hospital and emergency services. In Gaza, following the economic collapse due to Israel occupation, political instability and other factors, a continuously increasing demand on the ED governmental services was noted, the majority of cases around 86.8% of total emergency visits was seen in the governmental EDs with a noticeable reduction in patient flow to the private sector as only 5.9% (MOH, 2017a). Furthermore, in general, patients who frequently visit the EDs are 686 per 1000 population, which represents a high rate of patients' flow seeking emergency services through EDs in Gaza (ibid). An in-depth assessment of six ED hospitals in Gaza conducted by MDM-France reflected that 79% of ED visits were considered as non-emergency cases (MDM, 2018). The mentioned information justified the importance of this study which could be helpful for all stakeholders and decision-makers concerning emergency services improvement.

This study assessed the flow of patients, processes, policies, and procedures in EDs and measured the crowding level which might help set corrective interventions. Based on the assessment findings conducted at the first stage of the study, possible strategies to streamline the patient flow will be explored.

In reference to the events started on 30th of March 2018, during mass demonstrations in GMR and the activities near the fence in the east of Gaza Strip, all hospital/EDs in Gaza have been experienced mass casualties by receiving thousands of injuries and martyrs, overwhelmed the hospitals and EDs without enough information proved over-crowdedness and exit block state at that time. The mass demonstrations continue besides increasing the demand for emergency services.

To the researcher's best of knowledge, in Palestine, there are no previous studies about patient flow in hospitals ED, overcrowding, and exit block despite global concerns and priority of this important public issue. Based on the available data, this study could be the first one discussing patient flow in Gaza EDs. Poor information about EDs patients' flow, overcrowding, and exit block in Gaza Strip gives this study a luminosity and importance to give us clues about this issue to select appropriate patient flow approach to advance the emergency care quality in Gaza.

There are many international non-governmental organizations (INGOs) working in the health emergency field and they are excited to know more about patients' flow, overcrowding state in Gaza hospitals, and specifically in EDs. As well as my work in a humanitarian organization which interesting in the emergency field, this study will attribute in giving us a guide and pathway plan to fulfil the gaps and challenges in patients' journeys through ED in order to improve the accessibility, quality, and safety of emergency services.

This study may be used as a baseline reference in the near future and of value to MOH and emergency field decision-makers to address the current status with clear clues about this important public issue worldwide and as well in Gaza. This study will help stakeholders to know more about patient flow and the status of ED crowdedness, yet, may open the door for more questions and investigations. The researcher believes that the interventions to streamlining patient flow in Gaza EDs may effectively improve the system, hence, the quality of emergency services and safety measures will have improved, therefore reduction of patient's harms and healthcare costs is highly expected.

This study enriched the knowledge of emergency care providers, policymakers, INGOs, donors, and researchers about EDs crowdedness status and potential causes that enable them to better addressing the needed interventions to counter this growing issue worldwide.

1.4 Study objectives

General Objective

The general objective of this study is to analyse streamlining and patient flow in the ED of Al Aqsa Hospital.

Specific objectives

1. To assess the status of crowding and streamlining in the ED.
2. To identify factors contributing to streamlining patient flow in the ED.
3. To recognize variations in patient flow in reference to beneficiaries and service provision-related variables.
4. To propose recommendations to enhance the patient's flow and process in the ED.

1.5 Study questions

The study questions are formulated as follows:

1. What is the current status regarding crowdedness and streamlining in Al-Aqsa ED?
2. Which factors influence patient flow in Al-Aqsa ED?
3. How do patients perceive ED service delivery?
4. How does MOH manage patient flow challenges?
5. What are the differences in patient flow-related variables like waiting time in relation to patients' characteristics?
6. What are the differences in patient flow-related variables like waiting time in relation to facility characteristics?
7. What are the differences in patient flow in reference to staff characteristics?
8. How can the level of efficiency of patient flow streamlining be improved?

1.6 Context of the study

1.6.1 Geography and demography

In Palestine, the population has multiplied many times in the last century, with an average annual growth rate of 2.5%. In the Gaza Strip, the growth rate is one-third higher than that in the rest of the country (UNFPA, 2016). In 2017, the total population of Palestine was about 4.78 million, 49.1% females, and 50.9% males, 2.88 million in WB, and 1.9 million in Gaza (PCBS, 2017). Gaza has higher rates in the young population, the density of population, and the fertility rate. This increase in the population is normally associated with increasing needs for emergency services, yet unfortunately, no capacity or resources to meet the needs (ibid).

The Gaza Strip is almost 45 km long, 5-12 km in width, geographically considered as part of the West Bank and East Jerusalem under Israeli occupation, which is still controlling almost everything in Gaza based on the United Nations Population Fund report (UNFPA, 2016). The Israeli occupation launched three aggressions against the Gaza Strip, the last one was in 2014 in which around 2,100 Palestinians were killed, 110,000 displaced and 18,000 housing units partially or severely damaged leaving around 100,000 people homeless (UNFPA, 2016).

All these facts increase the demand for using emergency services through EDs. According to the Palestinian Central Bureau of Statistics (PCBS) in the Gaza Strip, a population numbering 1.9 million, living in 365 Km^2 is among the most densely populated places on earth (PCBS, 2018).

1.6.2 Socio-political context

Numerous challenges have emerged due to Israel occupation and imposed siege on Gaza. For the past years, no less than a quarter of Palestinians were considered below the poverty line, nevertheless, nearly half in the Gaza Strip (48.2%) were unemployed in 2017 (PCBS, 2018). Poor people can't afford health in a private clinic, hence, they usually use the ED (MDM, 2018). The UNFPA stated that the socio-political background is considered a co-factors with the growing population needs for emergency services, which increase the burden and challenges on EDs, obviously noted by the instability of the political state (UNFPA, 2016).

Concurrently due to deterioration and degradation of the social and economic conditions, with marked increases in poverty, unemployment, morbidity, and mortality the situation becomes more complex. The Gaza Strip is like a big prison, with bad living conditions (PCBS, 2017).

As a consequence of the long-lasting siege on the emergency services: drug and disposable shortage, human resources deficiency, and medical equipment functions deteriorated due to the scarcity of spares and regular maintenance, severely decrease of electricity supply, people moving in and out of Gaza are severely controlled by Israel and Egypt (Health Cluster, 2014).

1.6.3 Healthcare system

The main health care providers are MOH, Military Medical Services (MMS), United Nations Relief and Works Agency for Palestine Refugees (UNRWA), Palestine Red Crescent Society (PRCS), Non-governmental organizations (NGOs), and the private sector providers (Health Cluster, 2014). The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) reported that the Palestinian healthcare system has been challenged in the last years, cope with stress and works under pressure due to multi-factors includes Israeli blockade, movement restrictions, the rapid growth of population, the lack of internal resource, scarcity of medical resources, lack of basic materials, in addition to internal Palestinian divide (OCHA, 2017). Gaza's healthcare system is working under

unstable and unacceptable conditions due to many causes as mentioned above, access to health services outside of Gaza is almost not easy (OCHA, 2019). Medical supplies are suffering long-term scarcity. In 2018, around 40% of essential drugs are completely deficient, and 45% of one-month supply at the Central Drug Store (CDS) in Gaza. Despite that, insurance coverage is higher in Gaza than in West Bank which covers around 1.7 million citizens and refugees (PCBS, 2018).

The Gaza Strip, under illegal blockade in the last 12 years that impacts all aspects of life including the health sector, has resulted in denial of basic rights. Since the 30th of March 2018, Gaza was exposed to the outflow of GMR victims following demonstrations started near the fence between Gaza and Israel resulting in more than 30.001 injured, 16.000 referred to hospitals, 266 martyrs (MOH, 2019a). Before that and since 2017, World Health Organization (WHO) found that the health sector in Gaza suffering from a severe shortage of fuel and electricity that supply the main facilities and critical care areas including EDs, compounded by a shortage of drugs that may affect 2 million people (WHO, 2017).

1.6.4 Hospitals

Gaza has a total of 34 hospitals; 13 governmental, 17 NGOs, 2 MOI, and 2 private sectors with a total capacity of 3049 beds in Gaza (MOH, 2019b). Hospitals provide services in Gaza through main 14 hospitals over 5 governorates to serve 1.9 million, and there are around 350,000 trauma and emergency cases that are suffering from severe consequences due to a shortage of essential medical supplies and drugs in hospitals (OCHA, 2017). Governmental hospitals in Gaza handling the main bulk of emergency services and patients influx by seeing 86.8% of total emergency consultations, the EDs visits in Gaza reach 1.2 million per year (MOH, 2017b) Moreover, Gaza hospitals suffer a severe shortage of electricity and drugs which is life-threatening particularly for emergency patients (OCHA, 2017). In 2019, the bed occupancy rate in governmental hospitals was 95%, while only 1.7% in private hospitals (MOH, 2019b).

1.6.5 Emergency services

Most of the Gaza hospitals have emergency services. The main seven EDs that provide emergency services in Gaza are; Shifa, Nasser, EGH, Aqsa, Najar, Indonesian, and Bait Hanon hospital. Around 1.5 million patients in Gaza received emergency services in 2017 (MOH, 2017a). The emergency services are provided through MOH hospitals in Gaza. In

2017, the rates of emergency services distributed on providers are; 86.6% MOH hospitals, 5.9% NGOs, 7.3% MOI (MOH, 2017a).

The enormous rise in casualties due to GMR is overwhelming Gaza's emergency services (OCHA, 2019b). The people living within 2 km of the Israeli fence, are lacking secondary healthcare and emergency services, out of 286,000 people living in the Access Restricted Area (ARA) an estimated 10,000 people are facing difficulty accessing emergency services and secondary healthcare services (OCHA, 2019a). Provision of emergency services affected by fuel crisis in Gaza, drug and medical supplies shortage, internal Palestinian political divide, and illegal siege (ibid).

In the 2014 war, there was a shift of priorities during the emergency state toward traumatic patients over medical cases. Medical supplies were not sufficient, triage capacity was overwhelmed especially by families of victims and media. The patient has to be released prematurely due to the inability of the system to cope (Health Cluster, 2014). Emergency services provided by UNRWA constitute the basic support necessary to meet the critical needs of refugee's emergency services (UNRWA, 2017). Emergency services are at the brink of collapse due to socio-political factors, deterioration of economic status, persist of internal Palestinian divide, as well as an increase in demand (Health.cluster, 2014).

1.6.6 Al-Aqsa emergency services

Al-Aqsa ED is the only governmental emergency care provider in the middle area of Gaza, dealing with a huge inflow of patients daily and during emergencies. Al-Aqsa ED is located in Dier Al-Balah governorate with a catchment population of around 273,200 inhabitants (PCBS, 2018). In 2018, the average annual ED consultations in Al-Aqsa reaches 147000 including surgical, orthopedics, medical, and pediatric emergency consultations (MDM, 2018). The ED consists of; triage station, green zone, red zone, resuscitation room, main assessment unit (MAU), and orthopedic clinic. The total bed capacity in ED is 15 bed included triage beds out of a total hospital bed capacity which around 210 beds. Al-Aqsa hospital does not provide all emergency services subspecialty, therefore referring some cases to other hospitals like Shifa and European Gaza Hospital (EGH). Al-Aqsa ED has a unique module among Gaza EDs by having multi-lock doors with a one-way designed structure and a comfortable waiting area beside the green zone.

1.7 Definition of terms

Acuity of illness

Severity of illness or intensity and considered as is one way of measuring patient demand.

Bed occupancy rate

ED occupancy rate was defined as the ratio of the total ED patients to the total number of licensed treatment beds per hour (De Freitas et al., 2018).

Boarding

Patients who are ready for admission, but who do not have a bed to go to, are known as "boarders" (Boyle et al., 2014).

Contact time

ED contact time is defined as the interval between the first time that the patient was examined by the ED doctor and the disposition made time.

ED Length of Stay (ED LOS)

ED length of stay in the interval between the time of arrival to ED and time of departure from ED, either admission or discharge (Fee, 2012).

Investigation time

Investigation time is the time cosumed after investigations request ordered until the result came out to the ED physician.

Overcrowding

ED is crowded if: ambulances cannot unload the patients, there are long waiting time for emergency cases to see a doctor, there are high rates of patients under the category Leave Without Being Seen (LWBS), there are more patients in the ED than there are cubicle spaces, or if patients stay more than two hours for admission after a disposition has been made (Boyle et al., 2014).

Non-urgent patient

Patients who attend hospital EDs with illness or injury conditions suitable for primary healthcare facilities or do not need urgent intervention (JK et al., 2012).

Waiting time

ED waiting time is defined as the interval between the time of arrival to ED and the first contact with the ED doctor (after triage and before being seen by the ED doctor).

Treatment time

Treatment time is the time consumed after physician prescription until accomplishing the mission.

Turnover interval

ED turnover interval is defined as the interval of bed occupancy between times of discharge and admission of a new patient, calculated by minutes.

Left Without Being Seen

Patients are categorized as LWBS when they leave the ED before examination by a medical provider. The patient may pass through triage and registration points, but he didn't examine by a medical provider (Leviner, 2015).

Registration time

Registration time is defined as the time consumed before entery to ED to register patients entry and printout their tickets.

Shift A

Is a working time in the ED from 08:00 am to 02:00 pm. Total of 6-hours.

Shift B

Is a working time in the ED from 02:00 pm to 10:00 pm. Total of 8-hours.

Shift C

Is a working time in the ED from 10:00 pm to 08:00 pm. Total of 12-hours.

Streamlined patient flow

National Health Service (NHS) defined the streamlined patient flow as the ability of hospitals to manage patients effectively on time and with minimal delays as they move through stages of care (NHS, 2017).

Streamlining score

ED streamlining measurement is a complex process and not easy to standardize. Al-Aqsa ED hasn't a dedicated area for short stay, therefore, the time measurements is not samily compared to the other countries. As shown in table 1, we calculated the streamlining by studying 8 variables reflecting the multifaceted nature of ED streamlining that affect the streamlining status directly or indirectly, then we coding each variable based on likert's scale into five scores, number five means the variable fully matched the criteria for streamlined patient flow and number one means the variable is poorly matched the criteria for streamlining.

Table (1.1) Streamlining scoring criteria

Criteria to measure the streamlining status at the emergency department							
#	Variable	**100%** **5**	**80%** **4**	**60%** **3**	**40%** **2**	**20%** **1**	**%**
1	ED length of stay / minutes	< 45	< 60	< 120	< 180	≤ 240	20
2	ED waiting time / minutes	< 10	< 30	< 45	< 60	≤ 90	20
3	Triage time / minutes	< 5	< 10	< 15	< 20	≤ 30	10
4	Contact time / minutes	> 30	> 20	> 15	> 10	≥ 5	10
5	Investigation time / minutes	< 30	< 45	< 60	< 90	≤ 120	10
6	Patients to doctor ratio per hour	≤ 3	< 4	< 5	< 6	≥ 6	10
7	Patients to nurse ratio per hour	≤ 6	< 7	< 8	< 9	≥ 9	10
8	Bed occupancy rate per hour	≤ 0.2	< 0.4	< 0.6	< 0.8	≤ 1	10
TOTAL							**100**

Triage time

The time on which a patient is assessed to determine the urgency of their problem and priority for care (AIHW, 2021).

Chapter Two
Literature Review

2.1 Conceptual framework

A conceptual framework is a tool that draws the path and methodological model of the study to design the work, the data collection and analysis are based on the conceptual framework, thus, will make the research findings more meaningful, understandable, feasible, and generalizable (Imenda, 2014). The researcher used the Donabedian model (1966), input, process, and output model. The investigator demonstrates the main domains that he thinks maybe influence the patient flow, overcrowding, and exit block in EDs, the domains, and variables that will be studied are highlighted as:

- **Input**/structure: this is the first component of the ED flow chain and should be the primary focus which included most of the independent variables that draw, prepare and organize the resources, patient and staff characteristics, health information system (HIS), and policies. The investigator will try to examine:
  - Resources: HR, equipment, triage tools, spaces, drugs, and disposables.
  - Protocols and Policies: governance and supervision, written technical instructions, management flowcharts, and clinical protocols.
  - HIS: electronic health record in place, the active appointment system, patient tracking, time processing, data management, and documentation.
  - Facility structure: management team, departments, communication channels within ED, and with other departments, the investigator will measure the total number of ED visits, total staff working in ED (Medical and Non-medical).

  These aspects are thought to be interlinked with the process of patient flow. These variables mainly measure the effect of the input on the process, streamlining patient flow, and output.

  - Patient characteristics: patient's age, gender, living area, level of education, socio-economic status, number of ED visits, type of insurance, acuity of illness, and comorbidity. The investigator linked these variables and their effects on the flow.

- Staff characteristics: staff's age, gender, specialty, experience, training, special skills, and compliance. The investigator linked these variables and their effects on the flow.

- **Process (what is done to the patient considering the time)**: this is a core component of the flow chain and affects the patient flow, the researcher has visited and look on:
  - Triage and categorization process: how it works, who is doing, time, categories
  - Case management: vital signs, pain management, coherence to protocols, investigations, diagnosis, patient-centeredness, psychological support, and patient movement and pathway between different units and healthcare providers during the ED journey.
  - Length of stay: includes; waiting time, and contact time.
  - Disposition: the final ED physician decision includes; admission, discharge home, outpatient department (OPD) referral, PHCC referral, discharge against medical advice (DAMA), and death.
  - The interface between service providers and clients

These variables are affected by input components and influence the output dependent variables. As well, these components map out the ED process regarding the commitment level of both management and technical level, a patient journey in relation to the effectiveness and applicability of current policies and protocols.

- **Output (what ultimately happens to the patient and discharge process)**: this is the final component of the flow chain and explicit the desired outcomes. This domain reflects the outcome of the patient journey, it is influenced by input and process, as well as output feedback has direct and indirect relation with input and output variables. The investigator will dig to find the extent of respecting patients:
  - Safety: adherence to safety standards, use of safety checklists, missed nursing care, voluntary error reporting, and harm experienced by patients.
  - Quality of service: number of discharged under-category improved, time of service, and number of recurrent visits by the same complaint.
  - Satisfaction: patient perception and experiences about time, communication with staff, and cost of the service.

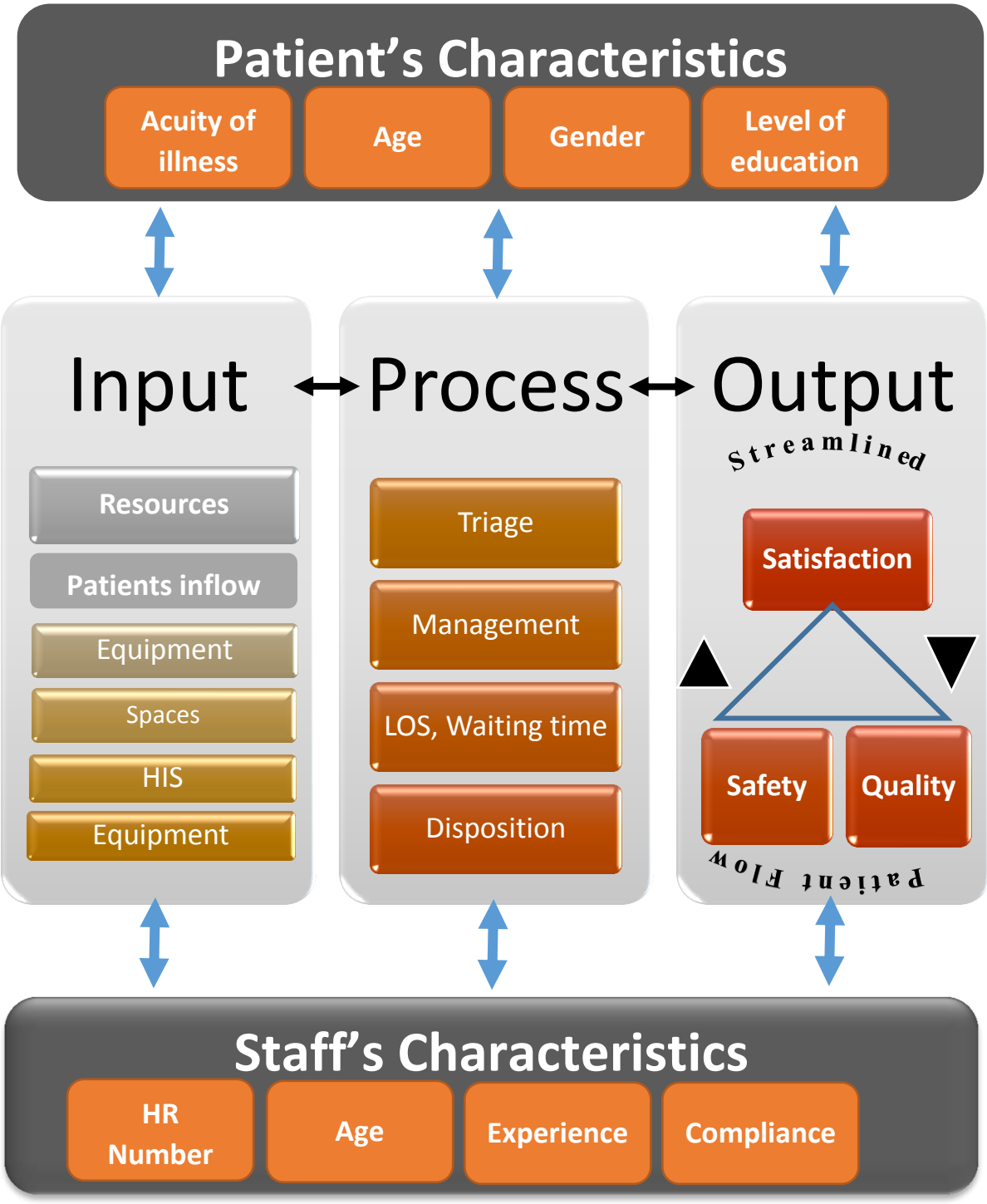

Figure (2.1) Conceptual framework – Structured based on Donabedian model

Various measures can reflect the relationship between improved patient flow and quality, safety, and patient satisfaction as well as their experiences. The main measures are quality of services provided, patient satisfaction, the time spent with the healthcare provider, and LOS. These outcome dependent variables measure the effect of streamlining patient flow on quality of emergency service process, patients' safety, and satisfaction to input and process.

- **Streamlined patient flow (eliminating unnecessary patient delays):** the researcher examined the effect of all above components on patient flow and vice versa how streamlined patient flow impacted input, process, outcome, ED capacity; resources, spaces, and management style to which degree can cope with increased demand for emergency services. Furthermore, the impact of streamlined patient flow on healthcare providers' commitment toward appropriate clinical management includes vital signs, pain scoring and management, coherence to emergency medicine protocols, and safety measures. These variables mainly reflect the effect of streamlined patient flow on other components and the value of introducing a new module to ED.
- **Overcrowding and Exit block**: once the ED is occupied by patients beyond the ED capacity this is defined as crowding by the American College of Emergency Physicians (ACEP, 2015), which leads to an inability to provide safe, timely, and efficient care to EDs' patients. Exit block or access block occurs when an ED patient is assessed but is unable to leave the ED due to a lack of capacity in the system. The researcher will study the relationship and effect of input, process, and output on crowding and exit block. As well, the coordination for boarding with other departments. The final decision (disposition) in ED is the most critical component, hence, the investigator will assess the impacts of disposition on the status of overcrowding and exit block by measuring; boarding time, LOS, LWBS, waiting time, admission rate, discharge rate, referral rate, DAMA rate, mortality rate, turnover interval, ED bed occupancy, the appointment system, scheduling, and utilization. These variables measure the outcome of streamlined patient flow on ED crowding and exit block state.

2.2 Definition of Emergency services and patient flow

Emergency services inside EDs are defined by ACEP as the initial evaluation and assessment, diagnosis, treatment, coordination of care among different providers, and disposition to a specific destination for any patient who requiring expeditious advanced medical, surgical, or special psychiatric care (ACEP, 2015). Emergency medicine is not restricted to location, yet may be practiced in a variety of settings including field-out of the hospital, hospital-based, and EDs, urgent care clinics, observation medicine units, emergency medical response vehicles, or via telemedicine. Emergency medicine encompasses disaster preparedness, planning, oversight, and response to community emergency medical needs, and medical control (ibid). Emergency medicine staff provide valuable technical, clinical, and administrative services to the ED and other sectors of the health care system (ACEP, 2015).

In general, flow is a progressive, uninterrupted movement of products, information, and people through a sequence of processes. Patient flow is the movement of patients through a health facility. Improving patient flow is a critical component of process streamlining in EDs and hospitals. It involves the clinical care, human resources, and systems needed to get patients from admission to disposition point while keeping quality, and patient/healthcare provider satisfaction (Catalyst, 2018).

To evaluate patient flow, it's important to look for the factors that influence the patient flow and the process in which congestions are possible, and therefore to know with the process or part of it need intervention to improve the flow and finally to have improved patient flow. Improving patient flow is a critical public health issue in the quality, safety, delivery of care, and ensuring cost-effectiveness regarding resources and patient satisfaction. In North America, inappropriate patient flow is attributed to an average $49,500 loss per bed, per year, with an average of 45 days lost per bed per year (Matlow, 2019). The massive costs stemming from patient-flow inappropriateness comprise the following issues: hospital bottlenecks, low capacity, poor care tracking, and long turnover interval, reduce cost containment, poor discharge policy, long waiting times, and inefficient use of resources. Financial costs associated with interventions related to the streamlining of the patient flow.

An Australian study found that $2,121 was saved to the ED after the introduction of the navigator role (nurse) (Fulbrook, Jessup, & Kinnear, 2017).

2.3 International experiences

In the last 30 years, International Federation for Emergency Medicine (IFEM) found studies from the United Kingdom, United State of America, Canada, and Australia, well described the relationship between ED crowding and exit block. Some countries didn't have crowding in their ED, subsequent reports have revealed that ED crowding has become increasingly problematic worldwide (IFEM, 2020). The EDs in Asian and middle east countries like Saudi Arabia, Iran, and India were overcrowded in a 2011 survey. Crowding is also reported in Africa due to a lack of access to resources. The following are potential causes of ED crowding in different countries; lack of PHC access leading to an increase in non-urgent cases to ED, increasing ED attendance, increase in ED urgent and complex cases, and increase in elderly presentations to ED (ibid). Also, ED staff shortages, long turnaround times of diagnostic tests leading to delay in decisions, development of subspecialty service in ED (e.g. medical, surgical, and pediatric), and access block are well-known causes of ED crowding (IFEM, 2020).

The countries shared common potential solutions to overcome ED crowding like; use of a fast-track model or extended general practitioners (PHC) work hours, physicians in the ambulance, hospital at home (end-of-life patients), telemedicine call hotlines, and community participation such as education, redirection, and financial disincentives. Moreover, using senior physicians at triage, nurse practitioner-initiated interventions, short stay unit, improved laboratory turnaround time/ED lab, and increased ED bed numbers and ED staffing are helpful to reduce ED crowding (IFEM, 2020).

2.4 Consequences of ED crowding

The consequences of ED crowding can be categorized into three levels; patient, staff, and system. At the patient level, ED crowding affects patients through; delay assessment and required care, increase the potential of error, increase LOS, reduce patient satisfaction, poor outcomes, and increased mortality (Morley et al, 2018). At the staff level ED crowding affects the staff through; poor adherence to guidelines, increase stress, and exposure to violence. At the system level, ED crowding affects the system through bottlenecks in the system by increase ED LOS and increase hospital LOS (ibid).

2.5 Values and benefits of streamlining patient flow

ED crowding has a detrimental effect on medical management, lowering the level of patient satisfaction, and increasing the cost of admitted patients (Lee et al., 2017). Across Palestine no previous study or trial to streamline patient flow, thus we are unable to determine the values or benefits of it. In Finland in August 2017, an intelligent patient flow management system (IPFM) was piloted at the PHCCs level, the goal behind this system is to reduce unnecessary visits or calls and enhancing the use of patients streamlined pathway, during the first few months of the study, the results indicated that the use of the new system by the patient was associated with a decrease in the total costs. This cost reduction is about 14% of the patient's average total service cost (Kauppila et al., 2017).

The cost of using point-of-care testing (POCT) is high in comparison to the cost of centralized laboratory investigation, however, these increased costs may be outweighed by patient flow enhancement (Jarvis, 2016).

Improving patient flow brings added value to the ED by the creation of a healthy environment for both providers and patients, increasing patient satisfaction, and employee commitment. Hence, it creates a safer ED and enables staff to consistently provide good quality service. Improved flow allows ED to increase capacity without necessarily adding more resources, by making existing resources more effective, efficient, adding value to ED processes (Crane, 2011).

A study conducted at the Academic Medical Center found that a 1-hour reduction in ED waiting time would result in over $9,000 of additional revenue by reducing ambulance diversion and the number of patients LWBS. Overcrowding in ED also limits the ability to accept referrals and increases medico-legal errors (Mchugh, 2011). Understanding the problem of ED overcrowding as a hospital overcrowding issue is a key to garner attention with a meaningful process to streamline patient flow (Salway et al., 2017).

2.6 Risk of overcrowding

Despite numerous global studies describing the harms of crowding, there is little agreement on a definition for ED crowding. ED overcrowding or crowdedness is defined as "the situation in which ED function is impeded primarily because of the excessive number of patients waiting to be seen, undergoing assessment and treatment, or waiting for departure comparing to the physical or staffing capacity of the ED." (Yarmohammadian et al., 2017). Locally, as we stated before no previous study summarized the flow of patients or ED overcrowding. In Gaza, primary health care clinics (PHCCs) work in only morning shifts leaving a huge burden over EDs for the remaining shifts (MDM, 2018). Worldwide there is an influx of patients attending EDs over the last 20 years. The reasons for this are not well understood (Boyle et al., 2012). Three general determinants are answering the queries about ED crowdedness or crowding: input factors, throughput factors, and output factors. Input factors represent aspects of patients' inflow, throughput factors are those factors that affect patients flow within ED and of great concern in this study, output factors reflected exit block due to other bottlenecks in other departments that might return congestion in the ED (Hoot & Aronsky, 2008). There is no evidence linking the overcrowding with non-urgent visits. ED overcrowding has multiple negative impacts on waiting time, LOS, mortality, and hospital finance (Salway et al., 2017).

In Canada, the volume of patient increases has exacerbated ED crowding and its associated problems (Bond et al., 2013). Crowding creates an inability to provide quality patient care, delays in time-sensitive treatments, premature termination of patient encounters, and overwhelming anxiety for staff (ibid). ED crowding leads to increased medical errors (Morley et al, 2018). According to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), 50 % of sentinel events occur in the ED, and one-third of these are because of overcrowding explore a 1.5 % increase in the mortality rate for each hour ICU patient borders in the ED (Di Somma et al., 2015).

Yarmohammadian and Rezaei (2017) study highlighted the need to overcome emerging challenges regarding ED overcrowding. Overcrowding is linked to increased mortality, medical errors, patients misplacing, delay of care, exit block, jeopardize patient safety, and inefficient patient flow within ED (Yarmohammadian et al., 2017).

There are important intervention strategy short-stay units including fast track, ambulatory areas, minor trauma units, and rapid intervention and treatment areas. Multi-studies have

shown that these units can efficiently and effectively reduce the mortality rate, length of stay, and exit block, besides, to ensure staff and patient satisfaction (Wylie et al., 2015). Inappropriate patient flow, and the resulting overcrowding, yielding a significant restriction on the ED's ability to provide safe and high-quality emergency care (Jarvis, 2016). Patient suffering, less contact time with the prolonged LOS, missed the diagnosis and uncommitted staff in an ED are all sub-sequences of this ongoing problem (MDM, 2018).

2.7 ED Input

Input measures include the number of visitors arriving at ED and their acuity (urgency to be seen). Trials to control inputs is attractive to policy-makers. Poor evidence of its effectiveness. In the British NHS, 10-15% of ED visits are considered as non-urgent use of ED and maybe managed efficiently by a general practitioner or in a PHC facility (Abu-Grain, 2018). Hence, the effort spent on directing these patients away from the ED once they have arrived is rarely succeeded. The use of POCT and the rapid assessment model is worthwhile (Jarvis, 2016). There is sufficient evidence suggesting when the number of arrivals is high, patients are less likely to wait to be seen and the rate of patients LWBS is increased. More or less, ED utilization is highest amongst those without access to PHC (IFEM, 2020).

2.7.1 ED structure and capacity

The researcher believes a unique context in Palestine and specifically in Gaza creates a unique ED structure that differs greatly from the common module in the region and even in the world. Most of the literature on patient flow tends to be in journals and there are few published studies in a similar field (Waring & Alexander, 2015). ED in Gaza is the main health provider facility for urgent and non-urgent services (MDM, 2018). The EDs in Gaza are categorized based on service need such as obstetric emergency rooms, and based on the age of patients such as pediatric or adult ED, furthermore, the adult ED is divided into medical and surgical departments, in addition to the further division of subspecialty inside the branched ED. All these subdivisions of the ED affect the flow of patients, resource allocation, and ED patients' handoff. In comparison to global EDs, the EDs in Palestine suffering an obvious deficiency in the following structural components; fast track, short-stay observation unit, care coordination unit, rapid assessment team, and psychiatric unit. Gaza hospital admissions grow over the last years and bed occupancy reaches 90.2%

(MOH, 2017a). This will affect patient flow in the ED and the hospital's ability to admit new patients.

EDs are extremely complex systems and probably any trouble in the process can lead to crowding. Poor ED designing, which does not consider flow mapping, contributes to crowdedness. A linearly designed ED, where a straight corridor with cubicle flanks a long, is most efficient. Having adequate space with equipment helps. Yet, if processes, and procedures within the ED are not improved, spaces do not reduce crowdedness (Boyle et al., 2012).

In Australia, ED is categorized into levels from one to six based on the level of services available, increased level toward level six associated with advancing the services provided (Marmor et al., 2012). The organization and capacity of ED are directly linked to the performance and the flow of the patients.

Space extension alone in the ED is unhelpful unless this is supported by increased capacity and better coordination of in-hospital beds or more efficient processes in the ED (Boyle et al., 2014). No improvement was seen by Adding beds to the ED with boarding and overcrowding (Salway et al., 2017). Overcrowding can be due to a shortage of beds in comparison to a huge number of patients, exit block due to inability to discharge patients to ward or home (Wang et al., 2018).

2.7.2 ED staffing

Trying to reduce inputs into EDs is greatly beyond the control of ED staff and managers (Boyle et al., 2014). The voice of staff has been ignored in the literature (Al Owad et al., 2018), ED consume higher resources and budgets in hospitals, require more staff allocation to achieve high-quality care. The voice of staff can help in recognizing the root causes of bottlenecks in EDs, the integration of staff, patient and process pointed as the basic steps in the lean-approach. the ED staff mentioned that one of the main causes of ED overcrowding is a lack of formal training for the staff and miscommunication between staff. Also, no teamwork or team creation culture, which are important components in ED environment.

ED staffing should be organized so that capacity meets hourly, daily and seasonal variations in response to need, moreover average demand, including that from a specific group of patients. Staffing should consider patients' variables includes age, gender, severity, and special needs (NHS, 2017). Inadequate ED staffing may cause crowding and identified input and process factors (Hoot & Aronsky, 2008).

Ambulances and emergency medical services should coordinate with ED staff especially during crowding and business of ED. There is a period where responsibility for the care of transferred patients' needs to be shared between the ambulance service and the professionals working in the ED (Boyle et al., 2014).

According to McCarthy (2008), ED staffing is one of the known operational factors yielding crowding in ED. Staffing is one of the measures that have been used to assess patient flow by many scores and indicators such as ED Work Index (EDWIN) and occupancy rate, elimination of staffing on the relation between two measures, found that the correlation between occupancy rate and modified EDWIN are improved. The use of primary care staff besides ED may be one of the suggested solutions for ED overcrowding to deal with less urgent and cold cases (Boyle et al., 2014).

2.7.3 Staff factors

Staffing is an important factor to streamline patient flow. Both physician and nurse are impacting the flow and vice versa. Appropriate adjusting the schedule of the staff to meet the demand especially at weekend is essential. As much as staffing is efficient the efficiency of patient flow will increase (Salway et al., 2017). Staff factors had been identified as root causes of long waiting times in the ED. The EDs' process of continual monitoring is in the hand of the staff to achieve their best performance in managing the waiting time in EDs (Habidin, Yahya, & Ramli, 2015). The ED staff are a vulnerable group since almost half of them have experienced burnout. They are confronted with intense emergencies and repetitive situations that are directed to emergency frontlines. Constraints related to staff are very damaging and negatively will impact the work environment and ED process (Moukarzel et al., 2019). Burnout is considerably prevalent among ED staff, especially physicians and nurses. Burnout is positively associated with turnover intention and exposure to violence which might lead to negative consequences on ED services (Hamdan & Hamra, 2017).

2.7.4 Patient factors

Swaanenburg (2010) considers non-urgent (elective) patients as a positive factor that could be managed not like the urgent (non-elective) patients which are not easy to plan their visit to ED. Urgent verse non-urgent patients and it is important to notice that they also influence each other (Swaanenburg, 2010). Knowing the kinds of patients who can be present to the ED will help to know the appropriate method to plan patients flow. When the

non-elective patients are categorized as non-urgent, they can be planned for another health facility destinations thus makes them elective patients and easy to plan their flow. The patient who is disoriented or uncooperative have communication barriers and they aren't able to contribute important detail of the past medical history, thus they will stay longer in the ED (Cosby, 2003).

Hoot and Aronsky (2008) identified non-urgent visits (frequently flyer patients) and influenza patients as common input factors that may cause crowding. Other studies found that low-acuity presentations frequently sought non-urgent care in the ED by themselves and not using PHC. Some reports consider 4 or more annual visits to ED as frequent visitors, moreover, generally they didn't have an urgent cause for their visits to ED. Recently discharged inpatients frequently visit ED as well.

2.7.5 ED resources

Although healthcare professionals aspire to improve utilization of resources: staff, equipment, and space, variability and uncertainty in treatment and diagnosis can exhaust the resources. This creates a bottleneck that can harm the patient and lead to delay in treatment, this can also lead to increased LOS for patients and highlights the importance of finding the causes of delay (Al Owad et al., 2018). Research shows that any improvement process will depend on staff continuous monitoring to ensure the improvement is maintained (Habidin, Yahya, & Ramli, 2015).

To control ED crowding, there are three basic approaches based on the demand-supply theory: reduction of demands to medical care, increase resources or bridge the gap between demand and supply. It is arduous to reduce demands for medical care or to increase resources under a new healthcare system. An increasing number of hospitals bed is strongly linked to being managed efficiently (Lee, 2017). Emergency staff and managers are required to target resources at service peak hours and bottlenecks along the ED pathway and can achieve these aims by use of an early warning system (Cairney, 2015).

2.8 ED Process

ED process measures include the time spent and ED occupancy. Echoing Deming "80% of the problem is the system, not the people''. The key principles of the ED process suggested to front overcrowding and exit block are the improvement of key investigations and early decision-making by a senior ED staff (Boyle et al., 2014). Designated waiting area pathways where patients with non-urgent conditions wait on chairs rather than in cubicles

are recommended or sending the patient home to wait for their results which are most likely normal, as well recommended, and useful (Boyle et al., 2014).

Improvement in the ED process is unlikely without determining the most important factors on outcomes and addressing variations in ED input and bottlenecks in output (Asaro, Lewis, & Boxerman, 2007). There is a sufficient association between the ED process, patients elopement, the lower patients satisfaction, and not recommending ED to others (IFEM, 2020). longer ED LOS doesn't impact staff stress, experience, or education quality. longer stays especially delays boarders associated with significantly higher costs and a lost opportunity to see new patients (ibid). Metrics are providing concrete insights about the severity of ED crowding, many of these are time-based (ED LOS), volume-based, or occupancy-based (IFEM, 2020).

2.8.1 Patient flow management style

Unfortunately, no local study about patient flow management a part of a small study conducted by Gilbert and Skaik (2017) during the Israeli operations against Gaza from July 8 to Aug 26, 2014. Despite severe shortages of medical staff and unpaid salaries, the study found Shifa hospital staff and volunteers are coping and be able to manage the long-lasting influx of patients with serious injuries, without mentioning any systematic role on how to deal with such a huge influx of patients (Gilbert & Frcse, 2018).

The study was done in Aseer Central Hospital in Saudi Arabia by Al Owad (2018), to integrate lean methodology to improving patient flow in ED, the study identified several areas of waste that deeply affect patient flow in the ED which mainly related to quality management, facility, patients, staff, data/information, uncertainty/changes in treatment schedule. The lean approach is identified as a major improvement methodology in healthcare services (Al Owad et al., 2018).

Habidin uses Define-Measure-Analyze-Improve-Control (DMAIC) as a process to improve the quality of waiting time in Malaysia. This will assist medical staff to utilize DMAIC in converting the practical problem to statistical data through the lean six sigma method to address certain areas of the process pitfalls (Habidin, Yahya, & Ramli, 2015).

David (2010) identified waste processes involving the care of dischargeable patients while applying Lean manufacturing techniques to improve the flow within the ED. The waiting

time and patient satisfaction improved by eliminating waste from ED processes. Lean approach improving the efficiency of ED work (Ng et al., 2010).

Alexander (2015) highlights that the senior management agreed at that time was suitable for a new approach to process change. The study was an 18-month action research project to change the process of bed management and inpatient flow during 2011-2012. The new approach determined during the research is that of Diffusion of Innovation (DOI) theory.

Demand Capacity Management (DCM) is one of the management styles or drivers behind managing patient flow effectively and efficiently. The aim is to detect the demand using both historical data and current trends in the demand for services and then match service capacity to patient needs. This can be facilitated by creating daily and even hourly patient flow predictions and plans to service those expectations (Envision, 2017).

According to Swaanenburg (2010). The lean thinking approach is considered as an aspect to develop efficiency. This approach associated with aspects meaningful and sensible to the patients, hospitals are encouraged to follow a lean thinking approach to achieve efficiency, understanding the factors that affect patients flow then measure the impacts of these factors, and where congestions occur, the final result will lead to knowledge of the process and how to improve the efficiency of patient flow (Swaanenburg, 2010).

David and Gord found that applying lean principles in the ED by eliminating waste from the ED process, improving ergonomics, focusing on reducing waiting time, continuously refining improvements, and patient satisfaction have all improved with no additional staff or beds (Ng et al., 2010).

Ad hoc and uncoordinated management of patient flow have resulted in the inefficient process as the study found in New Zealand that leads to unnecessary investigations, hence, wasting the time by waiting for the results before a decision is made, extending the length of stay (MOH, 2008). The GP-led walk-in center (WIC) is tried by Arain, he doesn't see improvement or declines in patients seeking emergency services after opening WIC, the healthcare professionals believe that the WIC duplicated the existing system. On the other hand, the people were unaware of existing of the other facility providing the care they need (Arain, Baxter, & Nicholl, 2015). Arain recommended having better communication between ED and other healthcare providers.

2.8.2 Possible operational solutions to reduce ED crowding

Providing healthcare services via fast-track route in the USA as an alternative treatment option to quickly assess the level 3 patients which considered urgent and need resources. Level ESI 3 patients represent the majority of ED patients generate overcrowding if not managed efficiently lead to a long ED stay. There is a significant reduction in LOS in USA EDs by applying a fast tract route (Huang, 2015). Using fast track model with one physician managing low acuity patients in medium volume hospitals resulted in a reduction of waiting time and LOS, not impacting negatively the high acuity patients (Copeland & Gray, 2015). By using a nurse-led emergency journey coordinator, ED length of stay can be reduced through his oversight of patient flow in the ED without their role being interrupted by clinical responsibilities. NEAT targets were achieved and crowding was reduced (Asha & Ajami, 2014). The complementary roles of ED nurses who work as navigators to impact the flow are well recognized and recommended to streamline patients flow (Fulbrook, Jessup, & Kinnear, 2017). France et al. found that implementation of physician triage is associated with decrease LWBS and ED LOS, however, the physician-led triage had a negligible effect on EDLOS of admitted patients (France et al., 2010).

The easily accessible primary healthcare system, public education measures, and financial measures are important components for best effect in streamlining patient flow in EDs. All these efforts need to be sustainable and coordinated with the community and political leadership support (Anantharaman, 2008). Buckley found strong evidence of an association between the opening of PHC and a reduction of numbers of non-urgent visits (Buckley, Curtis, & McGirr, 2010). Increase primary care access and providing 7-days access to GP clinics led to a significant drop in ED attendances, the largest drop occurs on the weekend. The main drop was clear in moderate cases (Dolton & Pathania, 2016). Initiating diagnostic testing for the patients in the waiting room resulted in significantly decreased time in using ED bed, shorter LOS, and fewer patients LWBS (Begaz et al., 2017). Early evaluation and referral model for ED patients was significantly associated with a reduction of LOS (Burke et al., 2017). Physician-led team triage resulted in shorter LOS, faster patients input, effective and efficient ED process, and more efficient output. When compare physician-led team triage to nurse, the most effective model is with physician-led team triage leading to more quality and efficiency of ED outcome measures (Burström et al., 2016). Physician in triage (PIT) is a novel approach reducing the waiting time in ED with a modest decrease in EDLOS (Imperato et al., 2012). Focusing on an early assessment

by senior staff, early diagnosis, and early streaming is a well-defined need known as Early ED Senior Assessment Streaming (ED SAS) to streamline patient flow (NSW Ministry of Health, 2012).

2.9 ED Output

Output measures include the number of admissions (boarded patients) to hospital waiting in the ED, and the time they spend in ED aftercare is completed.

2.9.1 Streamlined flow

The streamlined flow of a patient is one of the important characteristics of responsive ED to patients' needs and perceptions; assuring the appropriate safe flow of patients would enhance the relationship between healthcare providers and ED patients. Streaming is the process of allocating patients with a similar condition (with regards to disease severity or nature of the complaint) to a particular work-stream. Therefore, patients are assessed by the ED staff in a specific geographical area within the ED (Jarvis, 2016). The system that supports the doctor in the triage area, rapid assessment, streamlining, and participation of a primary health care clinician in the ED have all been helped to improve patient flow in ED (Jarvis, 2016). Advice that crowding should be treated as a significant public health concern (ibid).

2.9.2 Boarding

Patients who are ready for admission, but who do not have a bed to go to, are known as "boarders" (Boyle et al., 2014). Boarders will overcrowd the ED if no quick solution from the in-hospital process to discharge patients. This time where it generates significant risks on boarders and ED new patients. The harm of having new unassessed patients is higher than the harm of already assessed boarders and initiate their treatment and management plan. The responsibility and handoff of patients is a point of a query for boarding patients and a debatable issue. Boarded patients were a statistically significant predictor in all of the waiting time and LOS (Asaro, Lewis, & Boxerman, 2007). Boarding patients and inpatients' bed capacities are considered as output factors that may cause crowding (Hoot & Aronsky, 2008). Boarding is considered a major leading cause of ED crowding and is associated with inferior patient outcomes.

2.9.3 Patient safety

Patient flow should never be optimized to the level that it jeopardizes the safety or reliability of care. The ideal care triangle includes; flow, safety, and reliability (Leviner, 2015). EDs may streamline patient flow at the expense of safety and reliability of emergency service (ibid). Streamlining patient flow encompasses quick, efficient, and effective meeting the demand for emergency care by patients flow-through units' pathways while improving coordination of care to achieve patient safety (Catalyst, 2018).

2.9.4 Patient satisfaction

Factors beyond physicians' control such as delay of inpatients boarding and severe ED crowding are extremely important negative factors that impact patients' satisfaction and perceived quality of care. This study suggests a notable relation between higher ED crowding and lowers patient satisfaction (King et al., 2020).

The study conducted in EGH at ED in 2018 reflects that 73% of patients receiving emergency services were satisfied with overall medical services (Abu-Odah et al., 2018). The nursing care provided to patients elicited the highest score (83.1%), followed by physicians' medical care to patients (72%) and communication skills with patients (71.4%), while the lowest score was reported in waiting time and security personnel. Moreover, the findings show a strong relationship between patient satisfaction and level of education, gender, residency area, and shift time.

Many researchers have used different scales for assessment of patient satisfaction, 4 or 5 points scales have been used widely (Al Owad et al., 2018), and are an ideal tool for attitudes measurement, the Likert scale was used to measure patients' attitudes and perceptions about services and care. Donabedian's model defined patient satisfaction as a patient-reported outcome, the structures, and processes of care are measured by patient experiences (Mirza et al., 2016). ED crowding contributes to increasing LOS and patient dissatisfaction (Dickson et al., 2008). The lean approach is identified as a critical functional methodology to improve ED patient flow, safety, and patient satisfaction (Chan, 2014). Patient satisfaction is strongly related to waiting time; as waiting time increases patient satisfaction decreases (Boyle et al., 2012).

The study conducted by Hwang (2011) suggested that time intervals and numerical counts are becoming the most obvious measures of crowdedness in the literature. Clinician

opinion was the least common crowd measure while the most commonly used were the numerical number or percentage of patients and process times (Hwang et al., 2011). Hwang doesn't believe that complex ED work scales, EDWIN and National Emergency Department Overcrowding Score (NEDOCS) will serve as criterion standard measures of ED crowding (ibid).

2.10 Common factors affecting patient flow management

Non-urgent visits somewhat contributing to overcrowding, also chronic inpatients can cause exit block, this problem could be ameliorated by adding more capacity inward or using spaces efficiently. Utilizing ED for the long term by elderly and disabled patients who need services that can be met through long-term facility rather than ED (Wang et al., 2018). There are two aspects of factors that influence the patient flow: one is considered as negative factors and the other are positive factors.

Negative factors

Some studies classified factors into (negative, worsen, or bad) influence, that's mean, the presence of these factors will reduce the efficiency of patient flow planning, negative influence factors are limited resources, complexity, uncertainty, junior staff, and process problems (E. M. Ezzat et al., 2014). A little change and conceptualization by Harper (2002). He visualized negative factors as complexity, limited resources, uncertainty, and variability. According to Harper, variability consists of two kinds of variation: natural and artificial variation, artificial is more difficult to manage because it depends on personal preferences and healthcare provider thoughts, while nature can be managed by looking at the previous data of some disease (Harper & Shahani, 2002). The uncertainty factor is considered to be the most important one to be managed (Swaanenburg, 2010).

Positive factors

Swaanenburg (2010) believes, there are three positive factors: the number of elective patients, the IT system, and the coordination and cooperation between departments. It's easy to plan the flow of elective patients to hospitals which is impossible for non-elective cases because you are not known when they will come to the hospital. IT system advancement subsequently will have better information about the flow. Ludwig (2008) stated that the cooperation between departments pointed as a positive influence on inpatient flow planning, the hospital departments do not work all together in the best interest of the whole hospital, but more interest in their department.

2.11 Detecting ED overcrowding

Using NEDOCS is not suitable for detecting ED overcrowding. Increasing ED medical staff will decrease ED overcrowding. Significant findings were noted between ED staff perception and NEDOCS, ED staff underestimates the overcrowding lower than NEDOCS. There is no relationship between the number of on-duty doctors and in-ward persons and overcrowding perception (Ilhan et al., 2020). NEDOCS and ICMED can be used to evaluate ED overcrowding at a long-timescale but with less sensitivity to hour-by-hour variations (Boyle et al., 2016).

2.12 Lessons learned from COVID-19

Gaza MOH has designated respiratory triage centers (RTCs) in response to the COVID-19 outbreak. These centers are prepared to receive and manage cases who have acute symptoms of respiratory illnesses. The RTCs operated as an expansion of the Hospital's EDs in the main MOH hospitals. The lessons learned from COVID-19 in the Gaza context is how much we utilize and allocate resources in the prehospital setting, yielding a reduction of ED crowding by handling the unexpected surge of inflow to ED (MOH, 2020). Nevertheless, the RTCs work as fast-track facilities or triage stations that can receive and treat the majority of non-urgent visitors. COVID-19 has accelerated the innovation around strategies that may be used post-outbreak to streamline patient flow.

Chapter Three
Methodology

3.1 Study Design

This research is using a mixed-methods approach combining quantitative paradigm using direct observations of patient flow, ED records, interviewed questionnaires with beneficiaries and service providers in Al-Aqsa ED. In addition, it includes a qualitative paradigm using focus group discussion and key informant interviews with managers and policymakers. The study is a cross-sectional one which is a valid approach for conducting descriptive and analytical studies efficiently.

3.2 Study population

Quantitative

The target population is clients presenting to EDs of the MOH hospitals. The total number of beneficiaries served by MOH EDs in Gaza in 2017 was 1,303,056 (MOH, 2017a). Also, the staff working at ED are included in the study, their number was 52 medical staff

Qualitative

Emergency department and hospital managers, policymakers from the health sector in Gaza, and also international experts in emergency context.

3.3 Study settings

The ED of Al Aqsa Hospital at Deir Albalah governorate in the middle area of the Gaza Strip has been selected. The researcher selected this hospital because of the ongoing MDM-France-sponsored initiatives to improve patient flow and quality of emergency services. Worth noting that the governmental EDs in all of Gaza's governorates follow a similar system and approach in delivering emergency services (MDM, 2018).

3.4 Period of the study

The study took 20 months to implement; it started in Mar 2019 and was completed by Feb 2021. The proposal has been approved in Mar 2019 by the Al-Quds University-School of Public Health Council. Then the researcher developed a patient tracking tool and staff

questionnaire that was reviewed by experts. The study has been approved by the Helsinki Committee in Jun 2019 (see annex 4).

The researcher piloted the tools in August 2019. Data collection took place in Nov, Dec 2019, and Jan. 2020, then the researcher started the initial descriptive analysis of quantitative data in Feb and Mar. 2020. Unfortunately, due to the COVID-19 pandemic worldwide and specific outbreaks in Gaza, the study holds on for a while then resumed in Aug 2020.

Qualitative tools developed in Aug 2020. Qualitative data collection consumed 3 months from Oct to Dec 2020. The final descriptive and inferential analysis took place in Jan – Feb 2021 (see timeline detail in Annex 1).

3.5 Eligibility criteria

Inclusion criteria

For patients

Patients visiting the selected hospital/ED for receiving any kind of emergency services during the data collection period in all age groups.

For ED staff

Technical staff who worked at the selected hospital/ED including medical staff during the data collection period.

Policymakers and manager

Relevant persons who can influence the work on ED in Gaza.

3.6 Study instrument

The investigator developed an ED checklist based on the specific study objectives and to answer key research questions, the following are the main domains in the patient tracking checklist (Annex 6):

- Patient variables: age, gender, marital status, place of residency, insurance, and education level.
- Flow variables: Triage category, registration, time and date of arrival, attendance category (first or follow up visit), arrival by (ambulance or other), source of referral (self-referred or referred by a healthcare provider in another organization), waiting time, contact time, boarding time, time of departure, security, flow direction, and disposition.

- Case management: vital signs, pain scoring/management, documentation, patient-centeredness, safety measures, protocols, and guidelines coherence.
- Facility capacity: bed occupancy, access and spaces, turnover interval, and LOS.
- Patients' satisfaction
- Records review: patients' address, age, insurance, number of visits, and time of arrival.

Health provider questionnaire:

The investigator utilized the ED staff questionnaire that was developed to cover staff perspective regarding patient flow, crowding, and exit block, the following are the main components of the questionnaire (Annex 5):

- Staff variables: age, gender, job title, experiences, and special training.
- Staffing ratios: nurse to patient ratio, physician to patient ratio.
- Staff satisfaction: self-esteem, work environment, and service provided to the patient.
- Staff compliance: burnout and attitude.
- Staff perspectives on patient flow: status, causes, possible solutions.

Qualitative part (Annexes 7 and 9) :

The investigator conducted individual interviews with the key informants and decision-makers, it was open-ended (semi-structured) questions, the main areas of discussion were:

- ED main challenges regarding growing needs, flow, crowding, and exit block
- Decisions-makers' perspectives on patient flow: status, causes, possible solutions
- The degree of readiness to overcome the over-crowdedness
- Benefits and impact of streamlined flow
- Patient flow management style
- ED infrastructure that might help in streamlining the flow
- ED indicators, statistics, policies, and strategies
- Propositions for future interventions

3.7 Pilot study

A pilot study on 20 patients' tracking checklist and 10 staff questionnaires was done to test the appropriateness of the study instruments. The piloted instruments were appropriate and the piloted sample included in the study sample. This also allowed a further improvement in the study's validity and reliability. Pilot study results lead to making changes in process

timing evaluation, the investigator relays on time in and time out rather than calculating the time roughly. Also, some questions related to the level of education were modified.

3.8 Ethical and administrative considerations

Academic approval is asked for from the School of Public Health at Al-Quds University. Ethical approval was obtained from Helsinki Committee Gaza (Annex 4). Admin approval is asked for from the Hospital's General Director of MOH and the Director of the targeted hospital. In order to guarantee participants' rights, a covering letter indicating that the participation is voluntary and confidentiality was assured for all participants. Informed consent (Annex 5) was obtained to participate as well as to record interviews. The patient's confidentiality and privacy weren't exposed directly or indirectly in this study.

3.9 Data collection

The investigator and one trained data collector had collected the quantitative data mainly by direct observations of the patient journey through the ED and his / her hospital records. It took three months to reach the target number of the sample. Staff questionnaire administered via interviews and it done simultaneously at the same period of data collection via patients tracking checklist. It also consumed three months. Quantitative data collection consumed three months starting in Oct. 2020 and completed in Dec. 2020. The researcher considered all working shifts and days to ensure collecting data that reflect the real status of patient flow. The data collectors track patients' journey door to door and door to admission.

Regarding focus groups and key informants' interviews, semi-structured questions were designed and questioned for 20 managers and decision-makers after quantitative data collection was finalized, one month later (Annexes 7 and 9). Notes were taken through the interviews and recorded to allow further punctuality and capturing of the information.

3.10 Sample and sampling

Sample calculation

Quantitative

Based on statistics from the MOH report (MOH, 2017), annual ED visits in Al-Aqsa Hospital was154501 visits. As aforementioned, the study setting was in one hospital and the data collection consumed three months. The investigator used an online OpenEpi sample size statistical calculator). The sample size equals 384 at 95% confidence level and

default prevalence of 50%, the margin of errors 5% (Annex 2). The investigator increased the sample up to 400 individuals among patients presenting to ED in order to cover possible non-respondents. The total number of patients who had been tracked and observed was 385. The investigator took all the medical staff (fixed ED team) who have been working in the ED (30). The total number of staff who has been filled out the questionnaire was 30. The investigator used ED records to collect data in addition to direct observations of the patient's journey in the ED.

Qualitative

The researcher selects two focus groups to elaborate and discuss the quantitative findings. The first focus group includes medical and non-medical staff (**10**) from the ED of Aqsa hospital. Also, another focused group from high-level management (**3**) from GHA. key informants and decision-makers (**7**) had been interviewed. The first focus group selected from Al-Aqsa hospital included; hospital general director, medical director, head of nurses, head of admins, ED head of doctors, ED head of nurse, two ED doctors, and two ED nurses. This group was very informative because they are close to the field of the study. The second group was selected from high-level MOH; the hospitals' general director, head of medical department, and head of emergency departments. This group was much oriented about high decisions and overall issues raised from all EDs in Gaza. The key informants were selected based on their relation, experience, and power on the EDs. The key informant's group included; deputy of general director of PHC-MOH, head of the emergency committee –MOH, head of emergency medical services -MOH, head of the nurse in the nearest hospital to Al-Aqsa - MOH, head of ED in the nearest hospital - MOH, hospital component technical officer - WHO, emergency care technical officer - WHO, and external expert who knows the Gaza context very well especially emergency services – Yale university.

Sampling process

Quantitative sampling

A systematic random sampling approach took place to select the ED patient who is presented to the ED. Systemically selection of the sample was followed by selecting every 3rd patient on the registration list which was an electronic registration system regardless of patient characteristics or severity of the presenting complaint. For every 3rd patient registered, the checklist and direct observation were applied. The direct observation was conducted by the researcher himself and another colleague with a health background (ED nurse).

Qualitative sampling

This study is focused specifically on ED patient flow; therefore, the interviews were conducted only for personnel who works or have a direct relation to ED. The interview questions were directed to MOH decision-makers and the directors of Aqsa hospital.

Focused groups targeted; general hospitals administration director, general hospital administration- medical department director, general hospital administration- EDs director, general director of Al-Aqsa hospital, medical director, head of OPD, head of ED, Head nurse of ED, admin manager of the hospitals, ED doctor, and ED staff nurse.

For key informants' selection, a non-probability purposive sample was selected 7 decision-makers. This sample included the deputy PHCC general director, The experts on ED from different EDs in the Gaza strips, and some external expertise. The researcher has interested to include key informants who have direct power over hospital management and coordination specifically on EDs. The qualitative interviews took place after the quantitative data collection in order to clarify issues that emerged from the quantitative data.

3.11 Reliability and Validity

Reliability

The following steps are conducted to assure instruments reliability

- Training of data collection team on the checklist tools and questionnaire interviewing steps. This assured standardization of questionnaire filling.
- Then, the data entered on the same day of data collection to allow possible interventions to check the data quality or to re-fill the questionnaire when required.
- Re-entry of 5% of the data after finishing data entry to assure correct entry procedure and decrease entry errors.

Validity

The checklist and questionnaire were submitted to 10 experts to assess the relevance, and their comments were taken into account (Annex 3 shows the list of experts who reviewed the tools). As well, a pilot study is conducted before the actual data collection to examine checklist tools and questionnaires to know to which level will meet the purpose of conduction. This enhanced the validity of the questionnaire after modifying it to be better understood.

3.12 Data management and statistical analysis

Data entry and analysis were performed by utilizing the Statistical Package for the Social Science (SPSS) program version 22. SPSS is used to conduct data entering, data cleaning, checking the frequencies and cross-tabulation, data analysis, and looking for illogical values. Moreover, cross-tabulation for main variables findings and different statistical tests such as the Chi-square test to compare categorical variables, and T-test and ANOVA test to compare means of numerical variables was done to analyze questionnaire data. Post hoc to differentiate between significant categorical findings and correlations between numerical values.

For instance, the researcher used cross-tabulation for patients' influx number and time per hour to recognize the main peak hours during the day. The researcher also used an independent sample T-test and One-way ANOVA to compare between means of continuous variables and a chi-square test for categorical variables. P-value equal to or less than 0.05 is considered statistically significant, with a Confidence Interval of 95%.

For instance, an independent sample T-test is used to compare means of continuous variables such as LOS and gender. The open coding thematic analysis method is utilized to analyze the transcripts of interviews. The investigator obtained the main findings from the notes and transcripts of the interviews. Hence, classifying related ideas, common domains, comparison, and matching between the quantitative and the qualitative results was done to create good materials for discussion.

3.13 Limitations of the study

- Due to the COVID-19 response and restructuring of the services, it wasn't possible to do action research as originally proposed. The original plan was to do action research which includes pre-intervention assessment, intervention, and post-intervention.
- Delays in the study progress occur due to the COVID-19 pandemic and outbreak in Gaza.
- Poor HIS, registration, and documentation may be a barrier to access possible needed information and measures for such study.
- The study is cross-sectional, which pictured the situation at a certain moment.

Chapter Four
Results and Discussion

This chapter presents consolidated findings from quantitative and qualitative data collected from ED patients, staff, health managers, and policymakers. The chapter starts by presenting descriptive analysis and then moves to inferential analysis and is complemented by qualitative findings.

4.1 Descriptive analysis

4.1.1 Patient's characteristics

The participants' distribution by gender was as follows; 55.1% were males and 44.9 were female, which is close to the data reported regularly by EDs as mentioned in MOH reports (MOH, 2017). A study in Gaza found that 53% of the ED attendants were males and 47% were females at the EGH (Abu-Odah et al., 2018). The daily inflow of patients was 105 males to every 100 females in the population of Westminster in London (Dolton & Pathania, 2016), while a study in the United States shows the sample of ED visits consisted of 54.5% females and 45.5% males (Leviner, 2015). In general, the researcher noted there are no too many differences between Palestine and other countries regarding gender in attending EDs. Females in one study repeatedly lamented that they were not granted the same status as males' counterparts by their community members (UNFPA, 2016). One of the senior MOH officers said "*our culture respect females and their needs and gave priority to them yet companions males to females may request non-emergency services once arrived at ED*".

The available data suggest that there is no gender-related differentiation in the provision of emergency services with a slight increase in the number of males' patients which can be explained by the nature of males' works and they are more likely prone to trauma and seek emergency services at early morning hours with some cultural restrictions for females to go out of their home at the same time without companions in the Palestinian culture.

Table (4.1): Distribution of ED Patients demographic characteristics

Item	Category	N	%
Gender	Male	212	55.1
	Female	173	44.9
	Total	385	100
Age group	<18	115	30.8
	18-50	164	44
	>50	94	25.2
	Total	373	100
	Mean= 33.69 Median=29.8 SD= 24.03		
Distribution per place of residence	Deir-Balah	163	43.5
	Nusiraat	82	21.9
	Burij	70	18.7
	Magazy	20	5.3
	Zawaida	21	5.6
	Other	19	5.1
	Total	375	100
Level of education	Primary	31	15.3
	Intermediate	16	7.9
	Secondary	36	17.8
	University	61	30.1
	Not Applicable, under 5 or over 65 years old	58	28.8
	Total	202	100
Acuity of illness	Seeking other services (Non-emergency)	276	76.2
	Life-saving	2	0.6
	Trauma Emergency	18	5
	Medical Emergency	34	9.4
	Surgical Emergency	32	8.8
	Total	362	100
Frequency of ED visits	<2	82	22.2
	2 To 5	111	30.1
	5 To 10	78	21.1
	>10	98	26.6
	Total	369	100
Having health insurance	Insured	349	93.6
	Not insured	24	6.4
	Total	373	100

The researcher noted that the majority of ED patients are young people representing 44% out of the total sample, the age group falls between 18 – 50 years. Children and young people represented 30% of total visitors to ED, for those aged 50 years and more represented 25%. The researcher explained these results by young people's vulnerability to

trauma and injuries. Young people represented 13.4% while 61% for those who fall between 18-64 years out of total ED consultations in Haaglanden Medical Center-Germany (Van Der Linden et al., 2019). Nevertheless, the Gaza population is younger one compared to western populations. The young people don't like to follow the routine processes in the PHC and sought medical services at EDs. Visits to an ED with respect to the distance to the ED from the patient's home is a well-noted relation by the researcher in comparison to the number of visits. Focus groups and key informant opinions were consistent with these results, on referance to age groups falls between 18- 50 years those whom employers and they prefer to come to ED out of their working hours in the afternoon and night shifts after completing their works. One of the focus groups from Al-Aqsa hospital has said "*usually we are dealing with young patients and non-urgent complaints that we shouldn't deal with them at ED at all*". The researcher noted that the proportion of patients who visited the ED is higher among the ones who live close to the hospital. Deir-Balah is a city where Aqsa Hospital is located, the rate of ED visits from Deir-Balah was the highest representing 43.5% out of the total sample, then Nusiraat and Burij represented 21.9% and 18.7% respectively. Patients at risk of chronic vascular disease living in the Montreal metropolitan area are more likely to seek healthcare services in an ED if they are closer to it (Bergeron, Courteau, & Vanasse, 2015).

The higher the level of education, the higher rate of attending ED. For example, more than 30% of attendants were university degree holders, and 17% completed secondary schools. In total, around 50% of ED visitors were highly educated. Although, the ED visitors were highly educated, however, key informants and decision-makers face huge challenges to take the right decisions as they stated that the resistance is very high. The investigator thinks that regardless of the level of education, the patients' culture and believes are the common leading causes to seek services at EDs.

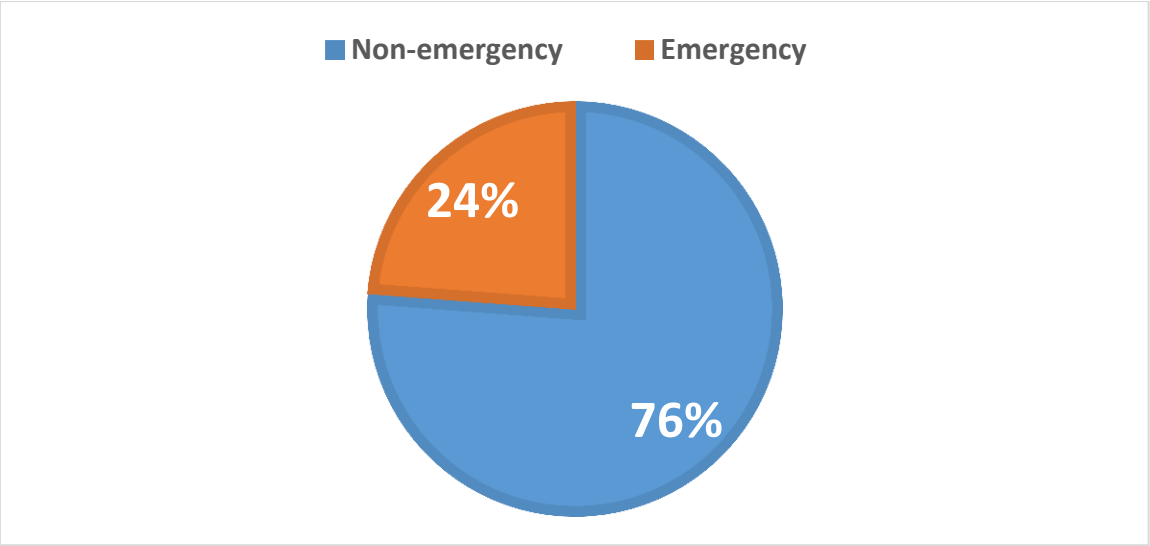

Figure (4.1) Classification of ED patients based on their presenting complain

Results shown in Figure (4.1), reveal that 76% of the ED patients were seeking non-emergency services while only 2% sought life-saving procedures, and 22% sought other emergency services. The study from Saudi Arabia shows 10-15% of ED patients were considered non-urgent and could be managed efficiently in a low-level PHC facility (Abu-Grain, 2018). Huang in the USA found a high percentage of ED visitors (30% to 60%) classified as level 3 (Huang, 2015). While a study in Germany revealed 1.3% life-threatening presentations, 23.7% high urgent, 45% urgent, 27.2% standard, and 3.5% non-urgent (Van Der Linden et al., 2019). The researcher stresses that this finding in Gaza is one of the major challenges that might be faced during trials to streamline patients flow in the Gaza EDs. One of the key findings is the acuity and severity of illness, the results were not uncommon, and consistent with a previous study conducted by MDM-France in 2018 which stated that 79% of ED visits were considered non-urgent (MDM, 2018). Previous trials to control inputs were attractive to policy-makers despite poor evidence of its effectiveness. Findings in Al-Aqsa ED show huge differences with other international studies.

Going back to table (4.1), the findings show a large proportion of patients abuse excessively ED resources by frequently visiting the ED for non-urgent reasons. More than two-thirds of ED visitors are used to visit ED frequently more than 2 visits in the last 6 months. 26.6% were visited the ED more than 10 visits. Some reports consider 4 or more annual visits to ED as frequent visitors, moreover, generally they didn't have an urgent cause for their visits to ED (Hoot & Aronsky, 2008). The investigator believes that

frequent visits match the abuse of ED services for non-urgent reasons and further actions should be taken in order to overcome the possible causes that drive the patients frequently to the EDs.

Not unexpectedly, these findings regarding health insurance coverage seem pretty good as the findings show that more than 93% of Al-Aqsa ED patients have had valid health insurance. This aligns with the findings reported by other studies like the study in Massachusetts EDs which show identical results to Al-Aqsa ED patients with health coverage of 93%. However, increasing health insurance coverage in Massachusetts was associated with increasing the use of ED services (Smulowitz et al., 2014).

Key informants considered cultural factors, lack of trust of PHC doctors, inactive roles of the PHC, free of charge for ED services, equal charge in PHC, OPD, and ED, plus the absence of alternatives healthcare facilities in the afternoon shifts are the main reasons for a high inflow of patients to ED. Senior MOH staff has said "c*losing the doors of PHCs in the afternoon shift considered as the main cause of crowdedness in the EDs which create huge challenges for the Palestinian health system".* Moreover, abusing the ED services by using governmental health insurance is another issue raised by the key informants, they think reform of the insurance system and administrative changes will help in controlling the inflow to ED in a way not putting a barrier reducing the accessibility to emergency services. Although the right to health is a fundamental human right, however, the researcher believes that more efforts are needed in this regard to organize and control the usage of health insurance especially in the EDs. The administrative reverse incentive is a possible solution to drive non-urgent patients to OPDs, PHCs, and other primary healthcare providers.

4.1.2 Staff's characteristics

The study findings show that the ED medical staff male to female ratio is 4/1, so, it seems a high ratio when we comparing this result to the ratio of ED patients' male to female which approximately equals 1.2/1. From this result, the researcher can conclude that number of females' staff is not enough to meet the number of females' patients with respect to Gaza culture as the female doesn't like to be seen by male staff. Furthermore, the majority of ED medical staff around 61% are those aged below 30 years old. This can be explained by the rapid turnover of the ED staff and the inability to keep them for the sustainable long-term. Also, this will go with the assumptions of the scarcity of supporting

environment to ED staff and no motivations or incentives to keep senior staff. This might impact the decision and disposition, subsequently will delay service provision, increase the rate of the requested investigation, increase the LOS, and reduce the quality of service. Qualitative data support staff belief regarding ED crowding and consistent with quantitative results. The key informants stated that actions to staffing and resourcing the ED in order to meet the demand is mandatory, thus, patients' inflow can be met with sufficient resources to streamline the flow. One of the MOH leaders has said "*ED staff is the core for high-quality service, thus, we should draw attention to the rational use of resources including staffing".* Ilhan et al (2020) found that increasing ED medical staff will decrease ED overcrowding.

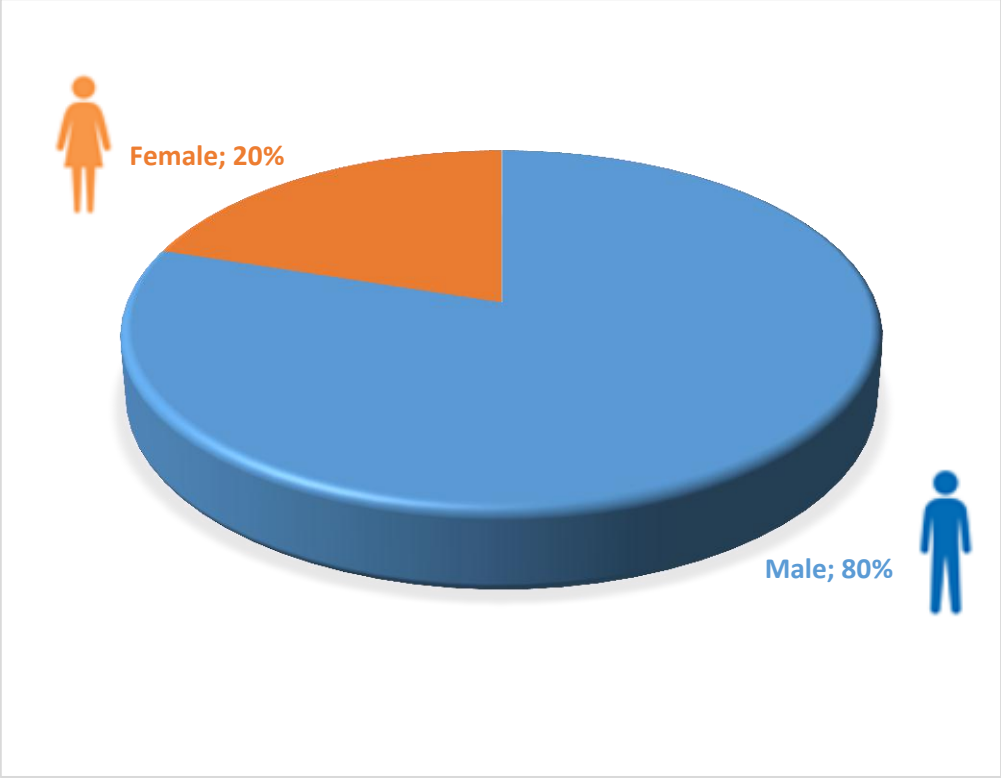

Figure (4.2) Distribution of ED staff according to their gender

The investigator believes that we can improve the quality of ED services, remove waste from the processes, save resources, and reduce waiting time by keeping most senior medical staff working in good conditions in the ED which has the capabilities to diagnose and manage ED cases effectively and efficiently. Inadequate ED staffing may cause crowding and identified input and process factors (Hoot & Aronsky, 2008).

One of the key informants described the efforts and trials to improve ED streamlining process as a major challenge to the Palestinian health system. He said "*investment should focus on defining the roles of the head of ED and job description, I think the current role in managing patients flow of ED heads is almost zero. We need a coordinator to have a vision of all ED processes. The staff commitment to implement the policies is our goldstone*".

Table (4.2): Staff characteristics among ED medical staff

Item	Category	N	%
Gender	Male	24	80
	Female	6	20
	Total	30	100.0
Age group	<25	4	14.3
	25-29	13	46.4
	30-35	7	25.0
	>35	4	14.3
	Total	28	100.0
Job title	Staff nurse	18	60
	Supervisor	2	6.7
	Physician	10	33.3
	Total	30	100.0
Staff years of ED experience	<2 years	12	44.4
	2-5years	9	33.3
	>5 years	6	22.2
	Total	27	100.0

This was a surprising finding given the general availability of unsupported young staff alone in the ED during peak hours. One of the MOH –ED supervisors has said "*MOH sends to us newly recruited staff without experience and convince us to put them to work in the ED without any support from senior staff, this is catastrophic*!". Hence, they are unable to take quick decisions without investigations and internal department consultations. Furthermore, they are unable to manage overcrowding or speed up the process making the situation of ED crowding is worsening. Focus group respondents highlighted the importance of having enough trained, senior, qualified staff to speed up the flow of patients specifically at the time of ED crowding. Also, a fixed emergency team is required to ensure the sustainability of effective and efficient teamwork. Considerable attention has been done by the researcher toward the seniority of medical staff as the senior staff can take the right decisions, reduce investigations, reduce LOS, train junior staff, increase the quality of services, and ensure safety that finally will leverage the streamlining of patient flow.

Focus groups and key informants' opinions were rich with verbatim negative feedback about overwhelmed staff due to huge tasks and overload on the shoulder of the ED medical staff. One of the key informants said, "*the ED staff lack the trust of his supervisors and the system he works in. The poor accountability system leads to an exhausted system and lack of staff adherence*" (senior emergency services officer). The bad environment where the staff is working will accelerate their turnover and burnout (Moukarzel et al., 2019). Although, the ED staff are usually young personnel, however, they will give up too early. Some of the key informants believe that due to lack of fixed ED staff and no obligatory program to ensure continuity of work of the senior staff in the same place for a long period, the ED will continue suffering from staff shortages and rapid turnover. The researcher thinks it worth creating supportive programs and initiatives to attract medical staff to work in ergonomics EDs for a long-term strategy. Investing in human resources is a proven standard for the development of EDs to save lives and reduce expenses and cost to operate EDs.

4.1.3 Inflow to ED

One of the important input factors for ED is the channel by which patients arrive at ED either with formal referral pathways or made shortcuts by themselves. The findings show that the majority came to ED by themselves or family referral as approximately 88% sought the first medical advice in the ED regardless of acuity or urgency of their complaints. Referral from UNRWA clinics represents 6.1% of total arrivals to ED, while 1.7% from governmental clinics. The researcher thought that this doesn't mean the referral from UNRWA is higher but the documentation system for case referral at UNRWA is much better than the governmental one. Some of the governmental physicians used to refer patients verbally without papers.

Hoot and Aronsky (2008) identified non-urgent visits (frequently flyer patients) and influenza patients as common input factors that may cause crowding. The patients sought non-urgent care in the ED by themselves and bypassing PHC and family doctor (Hoot & Aronsky, 2008). There is sufficient evidence suggesting when the number of arrivals is high, patients are less likely to wait to be seen and the rate of patients LWBS is increased (IFEM, 2020). The researcher observed that visitors are referred to ED from private clinics to do investigations and imaging services through ED during peak hours for two purposes; first to get the service quickly, second, to utilize their government health insurance to cover

the charge of service. These attitudes will increase the load on the ED and putting a huge burden on ED which will eventually lead to ED crowding. Actions and decisions should be taken in this regard to control and regulate the input factors and sources of ED patients leaving the right of emergency cases to easily access the ED services.

Table (4.3): Distribution of patients based on the mode of arrival to the ED

Item	Category	N	%
Patients referred from	UNRWA	22	6.1
	PHC	6	1.7
	OPD	2	0.6
	Private	14	3.9
	Self/Family referral	319	87.9
	Total	363	100
Arrived by ambulance	Yes	34	8.8
	No	351	91.2
	Total	385	100
Arrived by taxi or private car	Yes	312	81
	No	71	19
	Total	383	100
Arrived by foot	Yes	7	1.8
	No	378	98.2
	Total	385	100
Arrived by family	Yes	139	36.1
	No	246	63.9
	Total	385	100
Arrived by staff favoritism (Having Wastaa)	Yes	58	15.1
	No	327	84.9
	Total	385	100

The findings of this study show that the ambulances bring 8.8% of ED patients, yet that's not uncommon those who arrived by ambulances are non-urgent cases as the review of ambulances endorsement notes show variations in acuity of the delivered cases to the ED. The ED patients who arrived by a private car or taxi were 81% of the total patients presenting to ED. This is consistent with the results demonstrated previously about the reasons for ED visits which were non-urgent reasons.

Medical staff working in non-ED departments are attributed to the crowdedness by guiding and recommending the non-urgent patients to go and take the services from ED. The researcher thinks that lack of accountability, close monitoring, and supervision allow for

abusive behaviors and exhausting resources in the ED. Although, the concept of controlling and rationalizing the resources of ED is a golden goal, however, trying to reduce inputs (attendants) into EDs is greatly beyond the control of ED staff and managers (Boyle et al., 2014). The voice of staff has been ignored in the literature (Al Owad et al., 2018). The researcher believes that complementary efforts from low level (technical staff) and high level (supervisors and decision-makers) of healthcare providers should be considered to rationalize the ED resources to meet the increasing demand. In doing so, we have two options; either to increase the resources or to reduce the unnecessary use of ED. These elements directly impact the ED crowding and streamlining of the patient's flow.

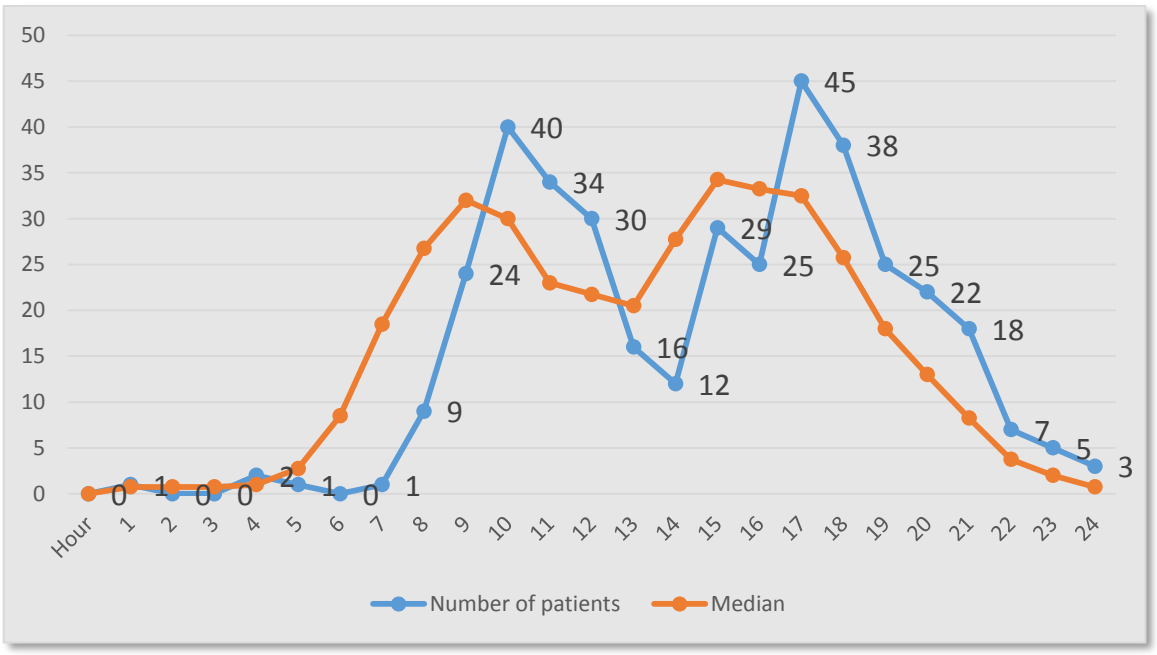

Figure (4.3) Average number of arrivals to ED per hour

By looking at the above Figure (4.3), it shows a significant increase of inflow to ED at a specific time there are two peak times. The first peak time from 9 am – 12 pm, the second larger peak from 4 pm – 9 pm. The researcher noted that no changes in staffing in response to these peak hours yet vice versa occur as more staff works at morning shift (A) while less staff works at afternoon shift (B) and night shift (C). This significantly affects the flow of patients due to delays in service provision, increase LOS, and decrease contact time with medical staff.

According to focus groups and key informants' respondents, the first peak is manageable to a lesser extent in the morning shift (A), yet the second peak seriously affects the flow and quality of services. The staffing and resources at shift B are low while the flow of

patients is high. Hence, they thought that bad management and manipulation of resources in response to the surge increase of the flow at shift B could be a possible cause of over-crowdedness. One of the key informants said, "*Scheduling existing resources to match demand is an option in our hands*". Nevertheless, they also highlighted the issue related to the closure of PHCCs in shifts B and C. They also stress the importance of the administrative process that could diverse drive the non-urgent patients toward the PHCCs, OPDs, and other primary healthcare providers. The researcher believes it's paramount importance to create alternatives solutions for non-urgent services in the afternoon (B) and night (C) shifts. Thus, patients have to go or can be redirected from the ED triage area to other healthcare facilities away from the ED. Additionally, staffing of senior experienced medical staff for more accurate and quick diagnosis.

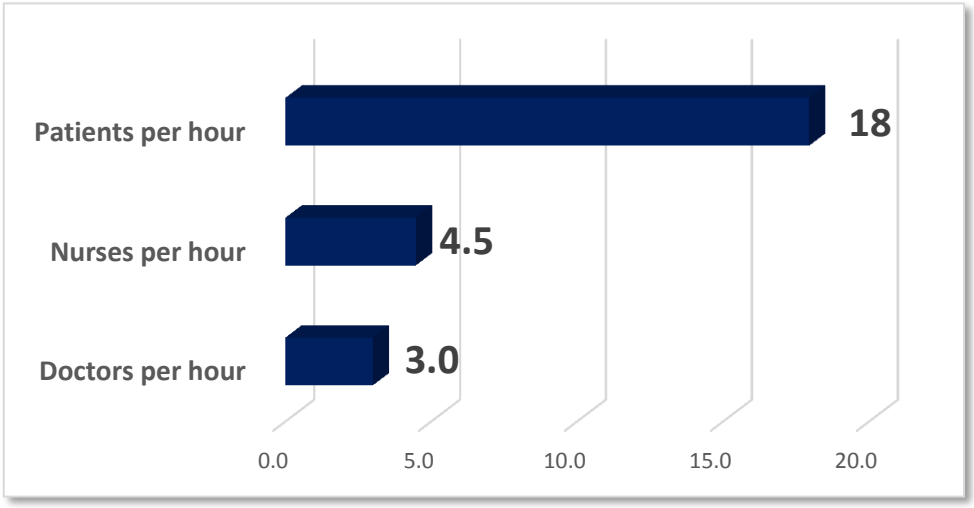

Figure (4.4) Average hourly staffing and patients

The results illustrated in Figure (4.4) with other parameters used to check the crowdedness status indicate that Al-Aqsa ED is crowded but not too crowded based on the NEDOC scoring system. The hourly ratios were 1:6 doctor to patients, 1:4 nurse to patients, and 1.5:1 nurse to doctor. The results also indicate the instability of ED staffing daily schedule even per shift plus rotation of human resources. This negatively impacts ratios of nurses to doctor, patients to nurse, and patients to doctor. Although Boyle thinks that NEDOC can be used to evaluate ED overcrowding at a long-timescale but with less sensitivity to hour-by-hour variations (Boyle et al., 2016). However, the NEDOC score may give a hint about the crowdedness status in Al-Aqsa ED. On the other hand, the average number of patients

per hour is 18 which exceeds the bed capacity of Al-Aqsa ED. This is another indicator of over-crowdedness in Al-Aqsa ED.

The over occupancy of ED beds can be explained by multifactorial; too long turnover, too long LOS, delay in investigations time, delays for department consultations, delay in treatment delivery…etc. Therefore, more attention and decisions are expected from the decision-makers in order to streamline the patient's flow either by expanding the capacity or trying to shrink, reduce, or control the input factors. The investigator sees the role of resources management and allocation of staff based on the demand as crucial to rationalize and optimize the use of ED staff to reach effective and efficient outcomes. Financial and non-financial incentives should be considered to motivate ED staff in terms of working hours, salaries, and backup team.

4.1.4 Streamlining process

This is a profoundly important domain to streamline the flow focusing on time spent and ED occupancy. The results listed in Table (4.4) show that the investigations time comprises 36% which is around one-third of the total patients' turnaround time or LOS in ED. Treatment time takes 23% of the total patient LOS in ED, contact time takes 21% with a low waiting time representing 15% of the ED journey. In general, registration after first triage (3 minutes), waiting time to get vital signs (secondary triage) by a nurse (3 minutes), treatment and investigations; x-ray, blood test, and medication (1 hour), contact time with medical staff (26 minutes).

Table (4.4) : Summary of ED processes related time

Process Time	N	Mini	Maxi	Mean	SD	%
Registration Time	117	0:00	0:25	0:03	0:04	2%
Triage Time	120	0:00	0:18	0:03	0:04	2%
Waiting Time	334	0:01	2:15	0:19	0:15	15%
Contact Time	293	0:00	3:15	0:26	0:24	21%
Investigation Time	**62**	**0:04**	**2:20**	**0:45**	**0:29**	**36%**
Treatment Time	108	0:00	1:50	0:29	0:27	23%
ED LOS Time	157	0:10	4:47	2:08	0:45	100%

The total process time ranged from 10 minutes to 4 - 5 hours, and the total waiting time ranged from 1 minute to 2-3 hours. Trying to find out the patients who received flawless streamlined care through ED, the researcher multiplied the percentages of completeness and accuracy for each sequential process, and estimated it as only 20% of patients were going through a streamlined process. David and Yariv (2015) found that waiting time comprises 51-63% of total LOS in ED. The major components are time away for an x-ray; waiting time for the first physician's assessment; and waiting time for investigations (Habidin, Yahya, & Ramli, 2015). A study in Saudi Arabia found the average patient waiting time between registration and triage was 4.17 minutes during shift A, 23.85 minutes during shift B, and 22.29 minutes during shift B(Al Owad et al., 2018). The researcher noted that the ED patients at Al-Aqsa hospital were not like to wait at all and they tried hard to get the service soon especially those who had non-urgent complaints. In addition, absence of a comfortable waiting area, no security staff to control people, no standard protocols for triage and expected waiting time, and without staff commitment, they can't convince patients to wait, otherwise they will be exposed to violence from patients and their companions. When the researcher compares the study results with David and Yariv's (2015) study results, he founds that waiting time in Al-Aqsa ED is too short representing around 15% of the total ED journey. Further actions are expected to create a comfortable waiting zone for ED patients and speed up the investigation process. Additional efforts should be considered to alleviate the burden on ED that occurs due to unnecessary waste processes. Reconsidering this process by reviewing the linear management style could be helpful in the Gaza context by removing unnecessary waste process.

Boyle et al. found that a linearly designed ED, where a straight corridor with cubicle flanks a long, is most efficient. Having adequate space with equipment helps. Yet, if processes, and procedures within the ED are not improved, spaces do not reduce crowdedness (Boyle et al., 2012).

Participants mentioned many problems causing crowdedness to occur. One of the focus group participants said, "*unless we have supported decisions from MOH high level with new legalization, the spent time in the ED will not improve*" (FGD, General Hospitals Administration). Senior emergency services said, "*The MOH lack a national protocol for triage this might help in managing the time effectively and efficiently if applied at ED.*

Further efforts are needed to write specific protocols and policies to describe and define the roles of staff and the operational procedures in times of crowdedness".

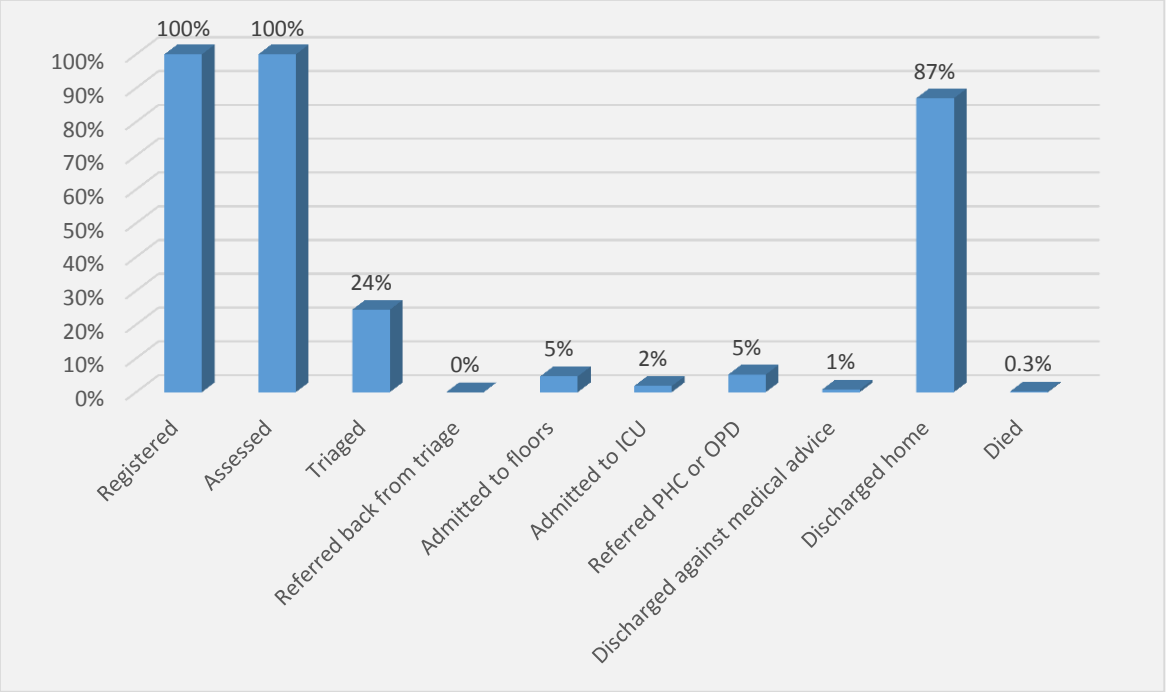

Figure (4.5) Distribution of ED presentations based on services and final destination

The above diagram shows the flow of ED presentations and how they are managed with their final dispositions. The results in Figure (4.5) indicate that the majority of ED patients are bypassing the triage, only 24% were triaged, 5% of patients were referred back to PHC or OPD, 4% of patients have admitted floors, and around 2% were admitted to ICU. Gilbert (2019) found in Al-Shifa ED the triaged patient rate is 21% (Gilbert & Frcse, 2018). A study in Germany showed that among attendants to ED, 26.5% hospital admissions, and 0.2% ED mortality (Van Der Linden et al., 2019). Further studies in Canada (Toronto) demonstrated that the admission ratio for every 8 ED visits resulted in one hospital admission (Vermeulen et al., 2009). Burström et al found that the admission rate equal 32% of total ED visits and mortality within 30 days equal 1.5% (Burström et al., 2016).

By comparing the findings of this study to other countries the researcher found that in Gaza the admission rate from ED is very low in relation to a high number of ED visits, this means there are many unnecessary visits to ED that are eventually sent back to home and not need admission. The mortality rate aligned with other countries' findings. It is noteworthy that the ED admission to discharge ratio may provide a simple way of tracking

and improving hospital services (Vermeulen et al., 2009). If disequilibrium between the number of patients admitted and discharged from the hospital occur, the second day will show significant changes in ED LOS (ibid).

The researcher believes that the patients admitted and discharged ratio is a concrete indicator that can be used to monitor the flow of the patients and somehow should be harmonized. That means, if we are prioritizing the patients presented to ED based on their acuity and needs for emergency services according to standard protocols, the ratio will decrease. We are approaching the optimal efficient work at ED as much as the ratio come dawn. So, the need of having standard protocols addressing the patient's flow is a golden goal.

Qualitative findings conclude that the triage is a chronic problem, despite the efforts taken by MOH-high level to implement triage in the EDs, however, the gaps are still there. One of the ED staff said "*We don't have enough staff for triage area, staffing problem is a long story due to salaries and political division. We don't expect to see triage in place without support in staffing for the nurse, doctor, and security staff"* (FGD, Aqsa ED staff). They also believe that the MOH system permitted the use of emergency services for non-urgent purposes by leaving gaps in the regulation and not following the existing one. One of the ED staff said, "*the MOH leaves us in frontlines to fight the people in the ED without back support with written protocols, we can't reject any patients came to ED regardless of his complaints*" (ED staff, Al-Aqsa hospital).

One of the mentioned goals for MOH strategy was to develop the infrastructure of the hospital sector (Aker, 2016). The investigator thinks that the role of MOH and governance is crucial to identify the urgently needed actions to advance the ED services and to alleviate the burden on ED by expand the capacities in term of HR, capacity building, ED infrastructure, and creating additional spaces or shrink the demand for emergency services at least through rationalizing the use of ED services for the non-urgent purposes. Also, he thinks reallocation of available resources and redesigns the spaces and zones could be useful to control the flow of patients and to meet the increasing demands.

One of the profoundly important processes for patients and healthcare providers is the measurement of patients' vital signs. According to the study results; the gap is wide, the majority of patients pass through ED without a complete check-up of their vital signs. The measurement of vital signs will help healthcare providers to make the right decisions and

will reduce the need for some investigations to reach the diagnosis. Table (4.5) below summarized the findings of essential vital signs measurement in the ED:

Table (4.5): Measurement of essential vital signs among ED patients

Item	Yes		No		Total	
	N	%	N	%	N	%
Blood pressure	165	45.6	197	54.4	362	100
Pulse rate	66	18.2	296	81.8	362	100
Respiratory rate	10	2.8	352	97.2	362	100
Level of consciousness	5	1.4	357	98.6	362	100
Temperature	152	42	210	58	362	100
Spo2	14	3.9	346	96.1	362	100

Despite the measurement of blood pressure and body temperature is essential to diagnose many emergency cases, unfortunately, the percentage of those who have been checked up does not exceed 50%. Only 4% of ED patients had oxygen saturation readings, 1.4% had a level of consciousness examination, 2.8% had respiratory rate readings, and 18.2% had pulse rate readings. Venkatesh et al. found no relationship between crowding and the likelihood of omitting important vital sign abnormalities in the ED (Venkatesh et al., 2015).

The researcher noted that the ED staff were not adherent to do a routine measurement of the vital signs for all ED patients, but they selected the most relevant vital sign for some patients and neglect the others. For instance, they preferred to measure the temperature for those who complain of fever, and blood pressure for those who had symptoms or signs can be raised due to abnormality in blood pressure but not as a routine check-up. ED overcrowding leads to increased medical errors, increased mortality, and financial losses (Salway et al., 2017). These malpractices may lead to vital mistakes or misdiagnoses that jeopardize patients' life and should be avoided by adherence to international guidelines. The focus groups respondents believe this occurs due to multifactorial includes; lack of close supervision and monitoring to ED staff from their direct supervisors, shortage of staff, and increase ED load leaving no time for doing all vital signs measurement. They

think close monitoring and follow-up are required, supporting the manpower, equipping of ED essential material for vital signs measurement, and ensuring well tolerance and use of registration and documentation procedures.

One of the senior MOH nurses said: "*We are providing our precious resources to those who do not urgently need it, by such practices we are wasting our resources and harming the real emergency cases*".

Table (4.6) contains a comprehensive overview of overall ED services in terms of gender mainstreaming, security, patient privacy, triage, communication with patients, and patients' assessment and examination. The results were satisfying regarding gender mainstreaming and there is no discrimination based on gender as the study shows more than 85% of the ED patients considered the service they received respecting their gender without any sort of discrimination. The presence of security was inappropriate for more than 70% of ED patients. This means that there is no security control for the majority of ED visitors and this will create a state of chaos and disorganization especially at peak times which will lead to delay of service provision and overcrowding. The involvement of security personnel is an asset to improve patient flow (Mchugh et al., 2011). The role of security personnel is critical in ED to ensure implementation of appropriate ordering and directing the patients. Although, security staff may be physically presented sometimes, however, they don't care about patient flow, nor interested to support the medical staff's decisions. One of Al-Aqsa's focus group said "*the absence of the security staff is a chronic issue not well addressed by the MOH leaders, we feel that we are unsecured and unprotected, so we can't adhere to the protocols*" (FGD).

The researcher believes it is of paramount importance to treat the security staff as other ED core staff to give them the feel of ownership and confidence when they are executing their roles. So, they should be involved in the planning, training, and implementation phases.

ED services:

Table (4.6) Summary of overall ED services:

Item	N / %	Appropriate	Uncertain	Inappropriate	Total
Gender mainstreaming regarding the provision of ED services	N	302	4	48	354
	%	85.3	1.1	13.6	100.0
Presence of security staff	N	83	3	253	339
	%	24.5	0.9	74.6	100.0
Overall triage	N	26	4	196	226
	%	11.5	1.8	86.7	100.0
Overall examination	N	112	9	79	200
	%	56.0	4.5	39.5	100.0
Privacy for the patient during clinical assessment	N	132	9	76	217
	%	60.8	4.1	35.0	100.0
Overall communication with patients	N	156	14	35	205
	%	76.1	6.8	17.1	100.0

Despite all efforts to institutionalize it, 86.7% of the total ED patients were inappropriately triaged which means they are not triaged or the triage decisions were incorrect. Clinical examination varies from one staff to the other and it depends on the patient's condition, yet it was appropriate for more than half of the patients. During a clinical assessment, around 60% of patients were examined with respect to their privacy. More than 75% of the communication with patients considered appropriate and acceptable. The researcher believes that the triage nurses correctly predicted which patients would be discharged without enough authority, they were unable to send the patients back to home or PHC. Approximately 1 in 5 patients was deemed "uncertain" at the triage area. Enabling triage nurses with enough authority and empower their decisions by a physician is crucial. Using

a physician-led triage approach is proven by France et al. as he found that the implementation of physician triage is associated with decrease LWBS and ED LOS (France et al., 2010). The absence of standard protocols, regular orientation and training sessions, and close monitoring make the variations in clinical assessment among staff. The focus groups and key informants' opinions were stress on the importance of having security staff for 24/7 time but all the trials failed. They believe that recruiting staff from the private non-governmental security company is one of the solutions. Besides, the security staff shouldn't be one of the hospital neighbours to avoid courtesy and using relations to abuse the regulations. One of the key informants said "*we are Fatigue! Exhausted! Due to frequent failures to fixed the security issues in the ED. We will not see improvement or streamlining of patients flow unless the security issue is addressed and well managed*". Another one has said, "*we don't need temporary solutions through unemployment contracts, we need fix term contracts for security staff and to be deployed, trained, and managed as the other ED staff*".

Documentation and registration:

The results of Table (4.7) below listed the documentation and registration findings in the ED. Here we see another shocking result besides triage one, the overall ED procedures documentation by the nurses are not exceeding 30% while physicians' documentation moved around 65%. The researcher noted a lot of patients' sheets were empty and some of them partially filled. The missed patient sheets are not uncommon. The documentation focused on main complaints and treatment plan, neglecting the other components like the vital signs, past medical history, examination findings, investigations results, consultations recommendation, final disposition, and time of departure. Calculation of the time spent in the ED is a hard job as no one care about time, nor the system built based on time, and the staff was uncommitted to register the time of service provision. All these gaps make the research and development in the ED are not easily achieved. The use of an electronic system for documentation and registration purposes could be leading to the advancement of the quality of services in the ED and make the flow streamlined. Focus groups refer the gaps of documentation to multifactorial; lack of supervision, poor staff commitment, time constraints, and data management. One of the ED directors has said, "*offering two options for documentation in the ED setting; one hard copy and the other is electronic make confusion for the staff, eventually the staff will select the easiest and familiar one which is the paper documentation*" (FGD. Al-Aqsa ED). Another one said, "*uncertainty and phobia*

of being asked about what he / she wrote is a possible barrier for the gaps of documentation" (Senior staff nurse).

Table (4.7): Medical staff documentation in the ED

Item8	Yes		No		Total	
	N	%	N	%	N	%
Nurses documentation of triage decision	71	19.9	285	80.1	356	100
Nurses documentation of vital signs	102	28.5	256	71.5	358	100
Documentation of nursing notes	101	28.6	252	71.4	353	100
Nurses documentation of Treatment	2	0.6	352	99.4	354	100
Physicians documentation of the patient complaint	306	85.5	52	14.5	358	100
Physicians documentation of examination	165	47.1	185	52.9	350	100

The key informants had controversial responses as some of them highly recommend the use of technology for documentation and the others against it. The ones who against the use of technologies for documentation believe it's early to jump from handwriting to electronic documentation we need a transitional phase. Also, they are afraid about the use of IT equipment in the ED and the potential to be stolen is high. The others who support the use of technologies and electronic registration believe that will be helpful to know more and easily about the patient history and to avoid further duplication between healthcare providers and capture real-time information. Besides, the use of electronic documentation will support the tracking of patients, data analysis, and research purposes. In comparison between UNRWA e-health and governmental documentation at ED, we find there is a great advancement to the documentation and registration at UNRWA by better using of the technologies, especially for the referral. The researcher finds there is an urgent need for using the technologies for documentation to help the healthcare providers to track their patients, for better reviewing their past medical history, to avoid duplication of services, and for the best knowledge of ED data and utilization of it for decision-making.

4.1.5 Streamlining destiny after visiting the ED

Table (4.8) Average ED length of stay based on disposition category

Disposition		**N**	**%**	**Mean ED LOS / hour**	**Median ED LOS / hour**
Boarders	Admitted Floors	18	5%	2:26	2:20
	Admitted ICU	7	2%	1:31	1:27
Discharged	Home	234	62%	1:21	1:25
	Unwritten	101	26%	1:25	1:18
	Referred PHC or OPD	20	5%	0:55	0:49
***Proportions of patients for which ED sheet was missing; they were presumed to be discharged home.**					

Long LOS in the ED is often experienced by those who waiting for admission to ICU or floors and hence acutely unwell patients. The long waiting times will not only deliver poor quality in terms of patient experience, but they also compromise patient safety, satisfaction, and reduce clinical effectiveness. The boarders were spent the longest time among ED patients with an average of two and a half hours. In comparison with home discharge, they are taking approximately double-time. That means the boarders have to wait for either more investigations or floor arrangement. The shorter time for those who referred to PHC with an average of 40 minutes. Median boarding time is the strongest predictor of frequent visits during 72 h which indicates that this may be the most meaningful measure of ED crowding. The boarders occupy ED beds and displace high acuity arrivals to waiting areas, compromising their outcomes (Innes et al., 2019).

ED metrics and measures are applied to give us hints about streamlining status and flawless patients flow in the ED as shown in the table below. The findings show the percentages of completeness and accuracy for each sequential process, we estimated that 65% of patients were going through a streamlined process based on the below criteria.

Table (4.9) Streamlining status for each sequential process and overall streamlining status

Criteria to measure the streamlining status at the emergency department								
#	Variable	100% 5	80% 4	60% 3	40% 2	20% 1	%	Mean
1	ED length of stay / minutes	< 45	< 60	< 120	< 180	≤ 240	20	12.8
2	ED waiting time / minutes	< 10	< 30	< 45	< 60	≤ 90	20	16.4
3	Triage time / minutes	< 5	< 10	< 15	< 20	≤ 30	10	6.2
4	Contact time / minutes	> 30	> 20	> 15	> 10	≥ 5	10	7
5	Investigation time / minutes	< 30	< 45	< 60	< 90	≤ 120	10	3.6
6	Patients to doctor ratio per hour	≤ 3	< 4	< 5	< 6	≥ 6	10	4.5
7	Patients to nurse ratio per hour	≤ 6	< 7	< 8	< 9	≥ 9	10	9.6
8	Bed occupancy rate per hour	≤ 0.2	< 0.4	< 0.6	< 0.8	≤ 1	10	5.03
TOTAL							**100**	**65.13**

The overall streamlining status percentage is 65.13%, the LOS met the flawless patient flow is around 64%, the percentage of bed occupancy per hour over 50% which means only 50% were found beds in the ED during peak time. Waiting time was a surprising finding among all other variables as 82% of waiting times met the streamlining target score. Triage time was very short and not appropriate. Two-third of the patients' contact times had been met the streamlining target score. The standard estimated times for the ED process are; registration (30 min), waiting time to get vital signs by nurses (1 hour), investigation and treatment (4 hours), and waiting time to see a physician (3 hours) (Habidin, Yahya, & Ramli, 2015). In Gaza there is no short stay department inside the ED, therefore the times look better than other countries as we calculated the process time based on similar countries standard despite we selected the results ranked scale 5.

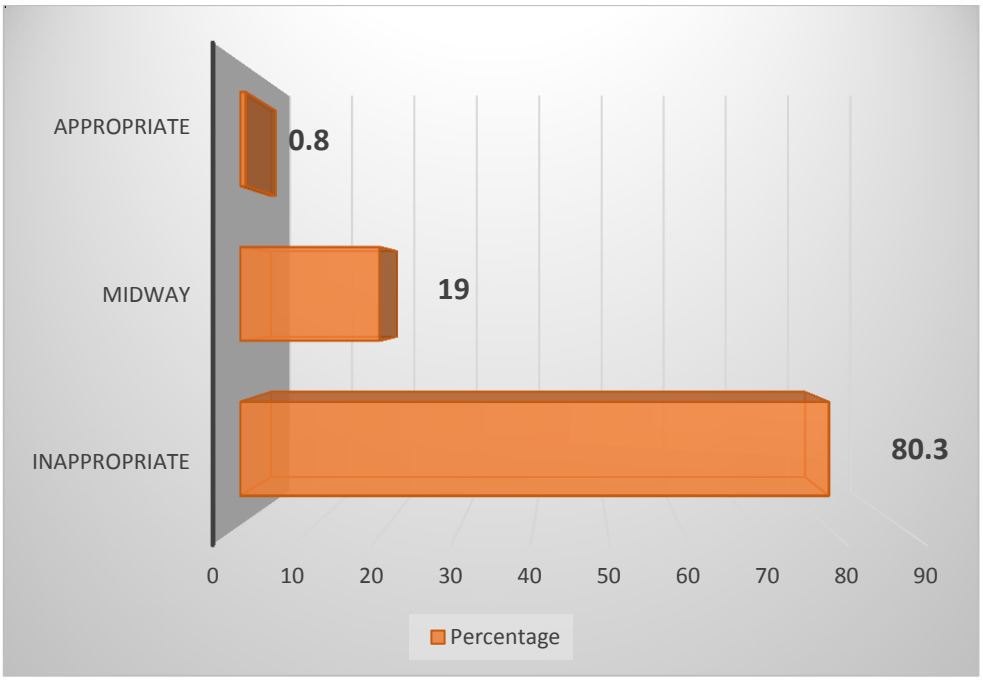

Figure (4.6) Streamlining status outcome

The focus groups highlighted the importance of having a comfortable waiting area in the ED. They said, "We *can't ask patients to wait for service while we don't have a designated area for waiting*" (FGD, Aqsa hospital). Another one said, "*the absence of security staff and coordinator 24/7 to control and follow patient's flow and ED journey develop gaps and challenges to reach streamlined process in our ED*". The researcher believes it's quite enough from these findings and data to guide the decision-makers toward ED bottlenecks and the time consumed in the ED process. The cold cases had the privilege to be seen immediately in the ED with low waiting time in comparison to PHC. This study creates an evidence base for future interventions to focus on speeding up the process for boarders or admitted patients vice versa for discharged or referred patients they should wait for the service giving priority to those who had urgent issues that might need urgent interventions. Worthy mentioning the percentage of critical and emergency cases are not exceeded 10%, so it's within our capacities to optimize the efforts to achieve the targeted time and speed up the process for those who belong to critical and urgent categories. Early ED Senior Assessment Streaming focused on the main three key findings; early senior assessment, early diagnosis, and early streaming (NSW Ministry of Health, 2012). Accepting patients at the triage zone for less urgent categories and having a treatment zone for them are two important components to address streamlining in the ED (ibid).

The researcher believes it's worth mentioning that the findings and output of this study regarding streamlining process is an accumulative process with multifactor influences that draw the attention of the policymakers to main components that the investment on them will make tangible changes. Mapping the ED process is considered the first step to streamline patient flow. It is equally important to understand the concept of balanced factors affecting the flow and how to link them to synergize the outcome.

For instance, waiting time is considered a controversial factor as it's important to be reduced for urgent cases and vice versa for non-urgent cases. On the other hand, redesigning and mapping the process will impact the flow as the majority of study patients pass without triage and finally sent back home without critical or urgent intervention. Therefore, thinking of empowering the triage process to be the first receiving point and obligate all the ED patients to pass through it will control and manage a lot of unnecessary entry to ED MAU, eventually, patient flow enhanced. So the researcher recommends triage process should occur before any intervention at the ED. This aligned with Al Owad's study as he found sorting each patient at the appropriate level prior to registration can streamline patient flow (Al Owad et al., 2018). The researcher also highlighted the need for better registration and data collection in order to use the data metrics to support the decisions that will streamline patient flow.

Table (4.10) ED staff perspective and satisfaction about service delivery

Item	Category	N	%
Satisfaction about ED services	Strongly Disagree	3	10
	Disagree	11	36.7
	Uncertain	10	33.3
	Agree	6	20
	Total	30	100
The purpose of ED visits	Urgent	3	10
	Routine	10	33.3
	PHCC	17	56.7
	Total	30	100
The acutely of ED cases	Acute	2	6.7
	Chronic	3	10
	Acute on top of chronic	7	23.3
	Recurrent same complaint	18	60
	Total	30	100
Triage system	Active	11	36.7
	Not	19	63.3
Waiting time in ED	<05 min	4	13.3
	05-30 min	19	63.4
	31-60 min	6	20
	>60 min	1	3.3
	Total	30	100
The need for a green area for non-urgent cases	Extremely important	21	70
	Important	6	20
	Moderately important	3	10
	Not important	0	0
	Total	30	100

As aforementioned, the ED staff faces a lot of challenges related to their work in the ED. The results shown in table (4.10) above indicate staff perceptions and satisfaction about service delivery at ED. There are around one-third of ED staff were unsatisfied with ED services and the other one-third was uncertain, yet the uncertainty means they are still unsatisfied. Equally noticeable, the ED staff perceptions about triage were inactive (63%). The study conducted in Gaza showed 73% were satisfied with the overall care provided in the EGH ED compared to 17% who were dissatisfied. Moreover, satisfaction about staff genuine interest was 87.5%, courtesy of the nurse was 83.3%, courtesy of the physician

was 74.0%, and efficiency of triage system was 78.5%. High satisfaction rates were obtained for nurses' staff (83.1%) while physicians' staff obtained (72%) (Abu-Odah et al., 2018). Senior nurse staff has said, "*we need more staff numbers to deal with emergency cases*". The researcher doesn't believe that more staff is a golden solution rather than a reallocation of the available resources to meet growing demand during peak hours. The study conducted in Qatif PHCC- KSA revealed staff perspective of having more trained staff on emergency medicine would help in improving patient flow (Abu-Grain, 2018).

The waiting time per staff perception from 5-30 minutes is the common period among ED waiting periods (63.4%). The majority of ED visitors were seeking non-urgent services and can be managed at the PHC level representing approximately 90% of the total visits. The frequent visits with the same complaint were 60% of the total visits while only 6.7% had an acute complaint. The researcher finds that PHC beneficiaries are overloading the ED through their frequent consultations which could be managed in primary healthcare facilities as the ED patients deemed by triage nurses at presentation to be dischargeable yet, due to poor support to triage staff, they are unable to make the right decisions. The need for the green zone to manage non-urgent patients was extremely important from ED staff perspectives. They thought that this zone will tackle the huge burden from the main assessment unit (MAU) and red zone as the majority of ED visitors can be managed at the green zone without advance interventions. Qualitative data confirmed the trend highlighted in the literature and quantitative data sets. The focus groups share the same concerns and proposed suggestions to extend the working hours of PHC to be until 10:00 pm rather than 2:00 pm. The senior emergency nurse has said, "*activation of PHCs in the afternoon shift as in the previous period is mandatory to over counter the growing need for emergency services".* The main PHC in the governorate should cover all the non-urgent patients per governorate. The others proposed the fast track model, while the rest supporting the idea of using PHC doctors at ED to deal with non-urgent cases that eventually are PHC beneficiaries. The key informants proposed different things related to administrative issues. They think the way of administrative management should be reconsidered through the creation of new rules and regulations that drive the non-urgent cases to OPD or PHC. One of the possible solutions is to reduce the charge of services in the OPD and PHC to be lower than what the patient pay at the ED. One of the key informants said, "*we don't want to create barriers in front of people jeopardizing the access to ED, we further need to develop pathways for non-urgent patients to serve them away from ED*" (Key informant

interview). Besides, improving the appointment system and encouraging the doctors to work in afternoon shifts. Activate consultations through telephone or telemedicine services could be a helpful tool to reduce the load on the ED. This is something proven through the COVID-19 response, the telemedicine tackles a huge burden in communication with the community during the outbreak. Patient redirection strategies at triage to an appropriate service e.g. PHC, OPD, fast-track streams. Post-paid or delayed invoices for those who sought emergency services for non-urgent causes as an approach to guarantee easy free access to emergency services at the same time to have permeable barriers for real emergency cases. In this way, no one will be forbidden to reach the ED but those who abused the ED services will pay back later on. The researcher believes that non-urgent visitors should pay higher in the ED than what they used to pay at other available primary health facilities or OPD. Therefore, the inflow to the ED will reduce, and streamlining of the patients' flow will be obtained. Although, we are not a high-income country and we are living under special political and economic conditions, however, the co-payment or paying for non-urgent services in the ED could be a unique, effective, and efficient solution. So, the reform of the administrative process at the ED is highly recommended.

Table (4.11) Overcrowding in ED based on staff perspectives and hospital records

Item	Category	N	%
The occurrence of overcrowding	All the time	16	53.3
	Most of the time	8	26.7
	Sometimes	5	16.7
	Rarely	1	3.3
	Total	30	100
The occurrence of overcrowding per shift	Shift A	5	16.7
	Shift B	18	60
	Shift C	7	23.3
	Total	30	100
The occurrence of overcrowding per days	Beginning of the week	14	46.7
	Weekend	6	20
	Uncertain	10	33.3
	Total	30	100
The occurrence of overcrowding per seasons	Summer	26	86.7
	Winter	4	13.3
	Total	30	100
Occupancy ratio	<0.5	14	5.5
	0.5-0.99	33	13
	>1	207	81.5
	Total	254	100

Generally speaking, overcrowding occurs all the time, mainly in shift B, then C, and lastly A. The staff noted that at the beginning of the week the ED becomes too busy, the summer is crowded if compared to the winter, the occupancy ratio of the ED beds is high (more than 1). Findings in Table (4.11) show important facts in the timing of overcrowding which indicate there are modifiable factors that play on crowding and patients flow like ED staffing per shift, beds turn over time, and beds capacity. The results of this study are consistent with the previous study in terms of timing and peaking of crowding and seasonal changes with its influences on ED crowding as Asha found that the ED peak time from 14:30 to 23:00 to deploy emergency journey coordinator (Asha & Ajami, 2014). Also, van confirmed the need for medical staff to be deployed during peak hours (Van Der Linden et al., 2019). The other proposed overlapping coverage of the shifts during handover in order to cover the peak time (Copeland & Gray, 2015). The researcher acknowledges that the complexity of operating EDs in the Gaza context provides challenges in terms of equipping, staffing, running costs, and ED times management. However, ED care needs to be taken despite all difficulties, and advancement should be carried out through clear strategies and plans to robust and reflect the most appropriate interventions for patient flow to be streamlined. The causes of ED overcrowding are multifactorial with hospital overcrowding, ED inputs, processes, and outputs to improve patient flow have been reported above. We were able to find only a few approaches and techniques for improving ED flow that can be applied in Gaza. Key informants proposed a short stay unit for frequent reassessment and rapid turnover to reduce hospitalization. This was consistent with the IFEM report in 2020, utilization of alternative admission destinations has resulted in improvement in output metrics as well as patient satisfaction and financial costs (IFEM, 2020).

4.2 Inferential Analysis

To determine whether variance in streamlining status amongst ED process exists or not and whether it's related to patient's characteristics such as age, gender, residence, level of education, the severity of presenting complains, etc. ANOVA, t-test, Chi-Square test, and correlation had been applied. Findings were grouped based on relevance and compared to other international findings. The streamlining status concluded and determined from the main process; input, throughput, and output, then compared with patients and staff characteristics to attain the outcomes of streamlining patient flow in the ED.

Variations in streamlining status in reference to patient's characteristics

The researcher used ANOVA and independent samples t-test to identify the relationships between streamlining status and different characteristics of ED patients, the findings are shown below:

Table (4.12) Differences in overall streamlining status, in reference to ED patients characteristics

Independent variables	Characteristics	N	Mean	SD	Factor	Value	Sig.
Gender	Male	212	0.191	0.158	t	-2.247	0.025
	Female	173	0.226	0.151			
Age	<19	123	0.174	0.138	F	4.273	0.015
	19-50	156	0.219	0.160			
	>50	94	0.231	0.171			
Place of living	Deir-Balah	163	0.205	0.161	F	1.321	0.255
	Nusiraat	82	0.198	0.159			
	Burij	70	0.195	0.141			
	Magazy	20	0.227	0.155			
	Zawaida	21	0.203	0.160			
Level of education	Primary	31	0.299	0.181	F	1.867	0.088
	Intermediate	16	0.210	0.151			
	Secondary	36	0.318	0.154			
	University	60	0.303	0.159			
	Not Applicable	49	0.252	0.150			
Health insurance	Insured	349	0.208	0.158	t	-0.579	0.563
	Not insured	24	0.227	0.134			
Acuity of illness	Life-saving	2	0.227	0.193	F	7.941	0.001
	Trauma Emergency	18	0.374	0.156			
	Medical Emergency	34	0.270	0.193			
	Surgical Emergency	32	0.236	0.176			
	Non-Emergency	276	0.190	0.143			
ED frequent visits	<2	82	0.172	0.140	F	4.971	0.002
	2 To 5	111	0.186	0.135			
	5 To 10	78	0.252	0.179			
	>10	98	0.230	0.167			

As a conclusion of these findings, females had better-streamlining outcomes (Mean = 0.226) than males (see Table 4.12) and the differences were statistically significant findings (*P*= 0.025). Although the majority of ED clients were young people, however, the older people had faster flow through ED as age increased the streamlining increased as well. The mean among the category over 50 years was higher than other categories and the differences were statistically significant. LSD post hoc results (annex 10) showed that differences between age categories less than 19 and 19-50 with statistically significant value (*P=0.018*), as well between age categories less than 19 and over 50 with statistically significant value (P=0.008).

Despite the focus groups and key informants pointed the neighbours as a source of ED crowdedness, however, the study findings show no statistical significance (*P= 0.255*). Patients from Magazy camp had better-streamlining outcomes (Mean = 0.227) than others (see Table 4.12) and the differences were statistically not significant (*P*= 0.255). Insured patients represent around 93% of the total sample, while only 7% were considered uninsured patients and they had faster flow through ED, yet this not proven statistical significance (*P=0.563*).

The acuity of patients' illness finding shows strong statistical significance (*P=0.001*) and relation to streamlining status. This further supports what we stated in the descriptive analysis section. The results clearly show high patients inflow to ED sought non-emergency services trauma patients had a higher score and gain faster ED services and flawless process among all other categories (Mean = 0.374). LSD post hoc results (annex 10) showed that differences between trauma patients, medical emergencies, surgical emergencies, and non-emergency cases were statistically significant values (*P=0.020, P=0.002, and P=0.001 respectively*). Copeland and grey found 84% of ED patients were non-urgent (Copeland & Gray, 2015). In 2019, Innes found in his study that high acuity patients accounted for 70.7% of visits from total ED presentations (Innes et al., 2019). The vice versa occurred in Al-Aqsa ED as low acuity patients (non-emergency) accounted for more than 70% of visits to ED.

Reference to Table (4.12), the ED frequent visits findings showed strong statistical significance (*P=0.002*) as approximately half of the patients used to visit the ED frequently (5 – 10 visits and > 10 visits). This is well reflected above in the descriptive analysis, the frequent visits negatively impact patient flow and streamlining status. One of the key informants has said "*once no high decision controlling those who abusing frequently the ED services by an appropriate administrative process and find alternative solutions for them especially at afternoon shift (B), the ED frequent and non-urgent visits will continue to jeopardize care for high acuity patients and increase the overload on the already exhausted system*".

To sum up, the researcher believes that females could express their feelings and seek help more than males, in other words, females can't tolerate pain and elicited it more obviously than males. The Palestinian culture gives ordering priority toward females in the public areas. The young people have better access to the ED, yet they weren't able to take the services faster than the elderly. The health conditions of the elder patients need more attention as they sought life-saving and medical conditions rather than non-urgent presentations for the majority of young patients. Shedding the light on acuity of illness and frequent visits are paramount important facts the implies the sources of input factors that impact the streamlining status in the ED. The recurrent visits exceeded 5-10 times per patient. The acuity of illness (seeking non-urgent services) represents the main bulk of ED visits leading to crowdedness and decrease the streamlined process.

Variations in streamlining status in reference to ED input, process, and output

Table (4.13) Relationships between streamlining status and input, process, and output

Independent variables	Characteristics	N	Mean	SD	Factor	Value	Sig.
Patients inflow per hour	<12	52	0.399	0.158	**t**	**7.818**	**0.001**
	>12	202	0.234	0.129			
Source of referral	UNRWA	22	0.289	0.158	**F**	**2.038**	**0.073**
	PHC	6	0.197	0.146			
	Hospital	1	0.273	0.001			
	Private	14	0.143	0.092			
	Self/Family referral	319	0.209	0.159			
Overall documentation	No	339	0.183	0.137	**t**	**-8.766**	**0.001**
	Yes	46	0.379	0.177			
Triage applied	No	356	0.187	0.139	**t**	**-9.829**	**0.001**
	Yes	29	0.451	0.147			
Presence of security staff	Appropriate	83	0.318	0.174	**F**	**23.230**	**0.001**
	Uncertain	3	0.182	0.091			
	Inappropriate	253	0.190	0.140			
Patients to doctor ratio	> 3/1	351	0.183	0.135	**t**	**-10.853**	**0.001**
	< 3/1	34	0.449	0.147			
Patients to nurse ratio	> 6/1	189	0.115	0.135	**t**	**-14.051**	**0.001**
	< 6/1	196	0.296	0.147			
Measurement of vital signs	Appropriate	12	0.189	0.131	**F**	**21.205**	**0.001**
	Uncertain	120	0.284	0.177			
	Inappropriate	230	0.175	0.134			
Internal departments response	Appropriate	9	0.283	0.210	**t**	**0.174**	**0.679**
	Inappropriate	24	0.311	0.154			
Patients received injection	Yes	261	0.217	0.154	**t**	**0.067**	**0.946**
	No	78	0.216	0.172			
Patients satisfaction	Strongly dissatisfied	16	0.165	0.111	**F**	**15.892**	**0.001**
	Dissatisfied	20	0.245	0.129			
	Uncertain	22	0.264	0.151			
	Satisfied	73	0.260	0.146			
	Strongly satisfied	43	0.433	0.139			
Disposition	Home	59	0.188	0.129	**F**	**3.364**	**0.001**
	Admitted to ICU	7	0.155	0.163			
	Admitted to floors	18	0.348	0.212			
	Referred to PHC	7	0.142	0.088			
	Referred to OPD	13	0.244	0.145			
	Unwritten	232	0.215	0.154			
	Referred to hospital	1	0.636	0.001			

Findings in the above tables illustrating the statistically significant differences to streamline status when the availability of ED beds are over or under the capacity. When the hourly patients' inflow exceeded the ED capacity (>12 bed) the streamlining status significantly reduced (*P=0.001*). There were no statistically significant differences related to the origin of referral that might affect the streamlining status. It is worth noting that the main bulk of referrals are those who came to ED by themselves or their families' referral. Looking at documentation issues during moments of streamlined status yielding a better score of documentation and that has been proven by statistically significant results (*P= 0.001*). Once applying triage at ED, the flow seems to be much better and increased. This is proved by strong statistical significance findings (*P=0.001*). The patient who passed through the triage station and process has better direction and flawless of the process throughout the ED. Security staff played golden roles in controlling the flow, thus, their presence 24/7 is crucial. The findings show better-streamlining status during the presence of the security staff and vice versa occur during their absence. There are strong statistical significance differences (*P= 0.001*) related to the presence and absence of the security staff and streamlining status. Staffing ratios are good indicators that had been used to test the ED crowdedness and streamlining status. There is a very strong relationship between the ratios and the streamlining status that has been proven by strong statistical significant differences (*P=0.001*). Both doctors' and nurses' ratios are affecting the streamlining status. As much as the increase in the ratios, the streamlining reduces, and vice versa. This was obviously in both, while patients to doctor ratio have better-streamlining scores. Also, there are strong statistically significant differences (*P=0.001*) in the vital signs measurement during streamlined moments and the other periods. The patients who respond by strongly satisfied are those who received fast and streamlined services. This shows a statistically significant relationship (*P=0.001*). The final ED disposition has statistical significance differences (*P=0.001*) when compared to streamlining status.

To sum up, the findings here are not as shocking as we already stated the same results in the descriptive analysis section. The levels of statistical significance are very strong. Patients flow per hour, implementing triage on all ED patients, presence of security staff, and patients to staffing ratios are key factors to a better understanding of how we can improve patient flow and streamlining status.

Variations in streamlining status in reference to time equivalences

Table (4.14) Differences in time relationship with streamlining status

Independent variables	Characteristics	N	Mean	SD	Factor	Value	Sig.
Working shift	Shift A	162	0.276	0.167	F	32.254	0.001
	Shift B	151	0.154	0.120			
	Shift C	72	0.163	0.136			
Waiting time	< 5 min	38	0.151	0.131	F	5.546	0.004
	5-30 min	237	0.239	0.157			
	> 30 min	59	0.230	0.138			
Contact Time	< 5 min	42	0.216	0.150	F	19.184	0.001
	5-30 min	171	0.276	0.153			
	> 30 min	80	0.155	0.131			
Investigations Time	< 15 min	11	0.388	0.153	F	2.925	0.061
	15 - 30 min	15	0.364	0.157			
	> 30 min	36	0.273	0.171			
Beds occupancy rate per hour	< 1	52	0.399	0.158	t	7.818	0.001
	> 1	202	0.234	0.129			
Boarding Time	< 5 min	8	0.318	0.154	F	0.112	0.895
	5-30 min	79	0.305	0.157			
	> 30 min	12	0.326	0.137			
Total ED LOS	< 30 min	11	0.339	0.135	F	0.919	0.401
	30 - 60 min	34	0.332	0.140			
	> 60 min	112	0.296	0.162			

Findings and statistical analysis in Table (4.14) show significant variances of time concerning streamlining status. Results revealed statistically significant findings in working shifts, waiting time, contact time, and bed occupancy rate. Shift A shows the best findings, the streamlining scores the highest rates in the morning shifts when the ED staffing is high and ED supervisors are there. The situation worsen in shifts B and C when staffing reduced and inflow to ED increased. The findings show strong statistical significance (*P=0.001*) between working shifts and streamlining status. Another strong statistically significant finding appears in the table related to waiting time. Waiting time is a good indicator of streamlining status. Therefore patients wait 5-30 min had the best-streamlining scores (*Mean= 0.239*) with a strong statistically significant relationship to streamlining status (*P=0.004*).

Nevertheless, a lesser waiting time doesn't mean a better streamlining process. Appropriate contact time with physicians (5-30 min) yielding better-streamlining scores with a strong statistically significant outcome (*P=0.001*). Copeland and Grey's study showed a strong statistical significance finding when implementing a fast-track approach on patient flow streamlining as waiting time and LOS decreased (Copeland & Gray, 2015).

Generally speaking, an increase in contact time will lead to long LOS, and finally a decrease in the streamlining process. As much as the investigation time reduced, ED LOS reduced, and eventually the streamlining will be improved. Less than 15 minutes of investigation time met the best results of streamlining level despite the results doesn't reveal statistically significant (*P=0.06*). Occupancy rates of 1.00 were used as the cut-off value. There is a strong statistically significant (*P=0.001*) relationship between streamlining of the ED process and ED bed occupancy rate. An increase in bed occupancy rate significantly reduces the streamlining process and vice versa. Although we well know that an increased LOS can significantly impact the constraints of ED bed capacity, also prolonged LOS can lead to limited space preventing new patients from being seen without delays. However, this study revealed no statistically significant relationship related to boarding time or ED LOS (*P=0.895, P=0.401*) respectively. Achieving significant improvement in ED streamlining is unlikely without determining the most important factors on process related to time.

Cross tabulation for different variables in relation to ED working shifts

Here we compared the categorical variables with each other to find the statistically significant relations among all factors that might influence the ED streamlining status. We found a statistically significant relation of working shifts and; days, triage decisions, the reason for ED visit, arrival with patient family, measurement of vital signs, and ED LOS. Gender was with a statistical significance level (*P= 0.032*), females like to attend ED in the morning shifts more than males while vice versa occur in the afternoon and night shifts. There are clear variations and strong statistically significant results (*P=0.001*) in patient flow among weekly days against working shifts.

Table (4.15) The relationships between different variables related to working shifts:

		Working shifts						Sig.
		(A)		(B)		(C)		
Independent variable	**Characteristics**	**N**	**%**	**N**	**%**	**N**	**%**	
Days	Sat	42	66.7%	16	25.4%	5	7.9%	0.001
	Sun	8	22.2%	14	38.9%	14	38.9%	
	Mon	0	0%	7	70%	3	30%	
	Tue	18	100%	0	0%	0	0.0%	
	Wed	68	63%	20	18.5%	20	18.5%	
	Thu	19	34.5%	31	56.4%	5	9.1%	
	Fri	7	7.4%	63	66.3%	25	26.3%	
Gender	Male	77	36.3%	89	42%	46	21.7%	0.032
	Female	85	49.1%	62	35.8%	26	15%	
Triage decisions	Green	80	95.2%	4	4.8%	0	0.0%	0.001
	Red	1	100%	0	0.0%	0	0.0%	
	Yellow	8	100%	0	0.0%	0	0.0%	
	Not yet	33	14%	142	60.4%	60	25.5%	
Reason for seeking ED services	Trauma	13	72.2%	4	22.2%	1	5.6%	0.004
	Medical emergency	22	64.7%	6	17.6%	6	17.6%	
	Surgical emergency	11	34.4%	12	37.5%	9	28.1%	
	Seeking non-urgent	100	36.2%	122	44.2%	54	19.6%	
Arrival to ED with family	Yes	67	48.2%	38	27.3%	34	24.5%	0.001
	No	95	38.6%	113	45.9%	38	15.4%	
The vital sign (BP)	Measured	92	55.8%	46	27.9%	27	16.4%	0.001
	Not Yet	58	29.4%	95	48.2%	44	22.3%	

Reference to table (4.15), the higher rate of patients' inflow to ED in shift A was on Wednesday, in shift B was Friday, and in shift C was also Friday with a strong statistically significant value (*P = 0.001*). therefore, adjustment of the staffing based on days and shifts should be considered. The good performance of triage was seen in the morning shifts (A) while the lowest one in the night shifts (C) with strong statistically significant value (*P= 0.001*). This can be explained by changes in staffing rate per shift and patients' inflow to ED as well changed. Notably, staffing at morning shifts is quite enough to operate triage but at afternoon shifts the load increased and staff pulled in to help for case management rather than working at the triage station.

Additionally, a statistically significant finding was noted between shifts and reason for ED visits (*P = 0.004*). Measurement of vital signs is varying among shifts; better performance was observed at shift A with statistically significant differences between shifts (*P = 0.001*). Based on these findings and statistical analysis, we should shed the light on the management and resources allocation to meet the variations in demand related to the working shifts in order to counter crowding and improve patient flow in the ED.

Correlation between streamlining status, internal factors, and external factors

Table (4.16) Relationship between streamlining, internal, and external factors

Factor			External Factors		Internal factors			Overall
			Patients inflow per hour	**Companions**	**Staff per hour**	**Bed occupancy**	**Boarding time**	**Streamlining**
External Factors	Patients inflow per hour	R	1	0.13	0.184	1	-0.095	-0.495
		Sig.		0.041	0.006	0.001	0.381	0.001
	Companions	R	0.13	1	0.167	0.13	0.13	0.074
		Sig.	0.041		0.01	0.041	0.201	0.154
Internal factors	Staff per hour	R	0.184	0.167	1	0.184	0.004	0.083
		Sig.	0.006	0.01		0.006	0.977	0.194
	Bed occupancy	R	1	0.13	0.184	1	-0.095	-0.495
		Sig.	0.001	0.041	0.006		0.381	0.001
	Boarding time	R	-0.095	0.13	0.004	-0.095	1	0.027
		Sig.	0.381	0.201	0.977	0.381		0.788
Overall	Streamlining	R	-0.495	0.074	0.083	-0.495	0.027	1
		Sig.	0.001	0.154	0.194	0.001	0.788	

The complexity of the relations, findings, and statistical analysis shown in Table (4.16) above can illustrate the road to the decision-makers to prioritize their interventions either in treating external factors or internal factors that might jeopardize patients flow and making crowding. Statistically significant findings for the external factors in between each other; patients' inflow per hour and patients' companions is statistically significant (*P= 0.041*). Statistical significance for internal factors in between each other; staff per hour and bed occupancy are statistically significant (*P=0.006*), staff per hour and boarding time are not significant (P=0.977), bed occupancy and boarding time hadn't significant (*P=0.381*). We can conclude that statistical significance between the external factors is more prominent than between the internal factors. Furthermore, the statistical significance of external factors to streamlining; patient flow per hour, and reason for ED visit is strong statistically significant for both (*P=0.001*). That's mean the external factors strongly influence the streamlining and patient flow. The statistical significance of internal factors to streamlining; only significant for bed occupancy (*P=0.001*) and not significant for both staff per hour and boarding time.

To sum up, investment in the external factors like controlling patients' inflow per hour and sorting patients based on the reason for ED visit is much useful to improve streamlining status than working on internal factors. The bed occupancy as an internal factor has a good influence on the streamlining status. These findings guide the decision-makers to focus on the external factors to counter ED overcrowding.

The researcher stresses the importance of applying the measures that could reduce the inflow to the ED or redirecting them to other health facilities according to their needs. These measures could be technical or managerial interventions through an appropriate activation of pre-hospital and hospital triage, the role of PHC, the administrative process to diverse the flow away from the ED. Controlling patients' inflow to ED can't be achieved without effective control of the ED gates by physical structures or the presence of security staff.

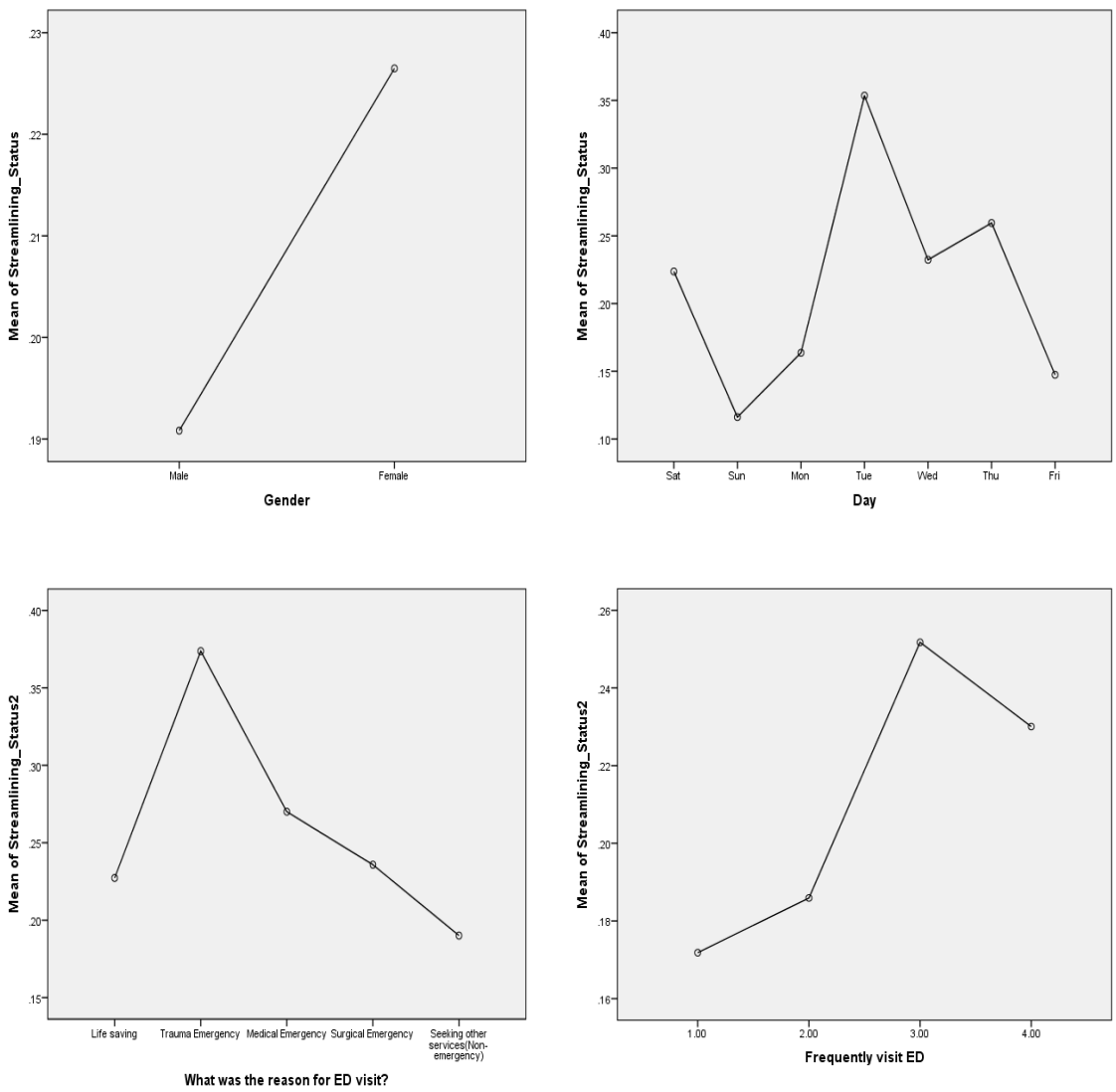

Figure (4.7) Multivariate implications on streamlining status

From this we can conclude that females had a better flow than males, the mid-days of the week had a better flow than the beginning of the week and weekend. Trauma patients had a higher streamlined flow percentage in comparison to other ED patients' categories. The findings show the flawless increased as much as the patients frequently visit the ED. The researcher observed that ED staff anxious to bloody and traumatize patients with the provision of care immediately faster than other patients and not based on the acuity of the conditions.

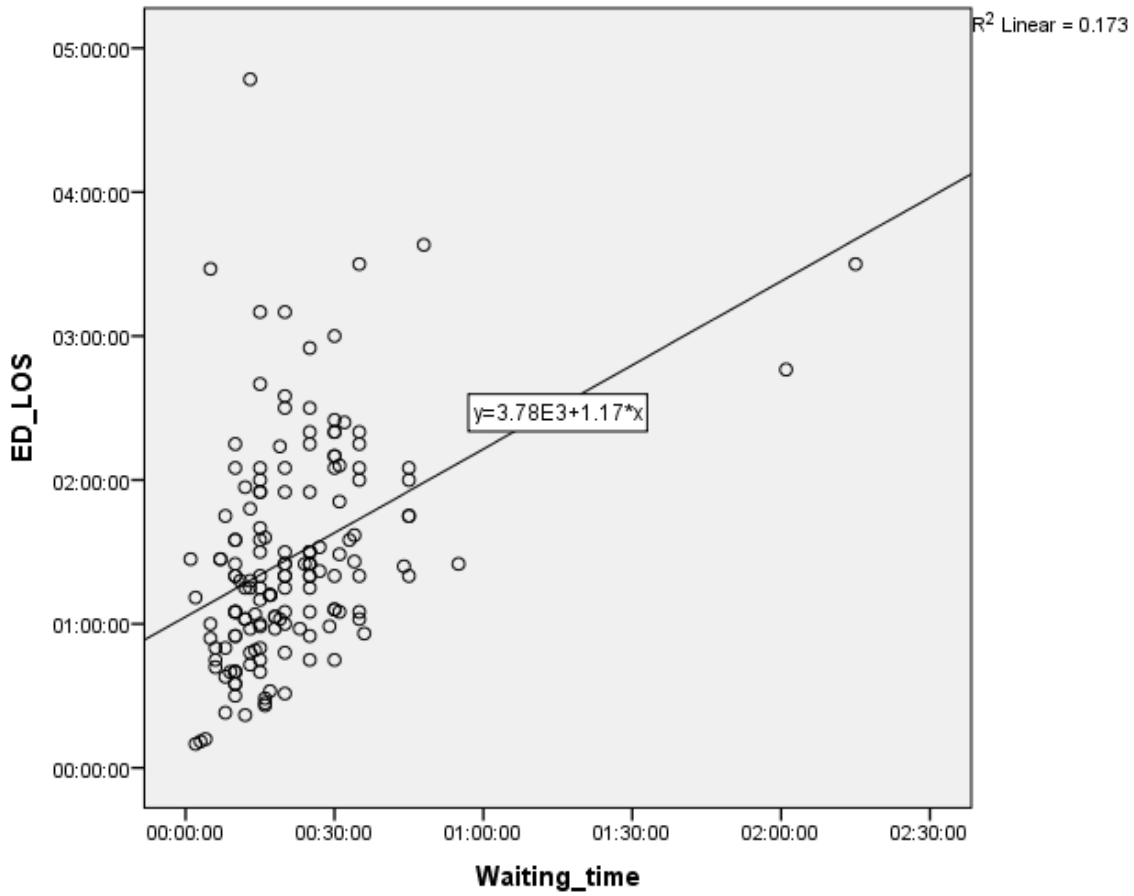

Figure (4.8) Correlation of waiting time to ED length of stay

The findings in Figure (4.8) show the correlation between waiting time and length of stay, there is a clear correlation that should be well studied and managed. An increase in waiting time definitely will increase the ED LOS and vice versa. The cluster of patients is grouped in waiting time interval 0 – 60 min, while in ED LOS interval 10 – 150 min. Improving waiting time will not necessarily be associated with a major change in ED LOS, there is a modest improvement (Burke et al., 2017). The root causes of long waiting times in the ED are treatment process, registration, patients, and staff factors (Habidin, Yahya, & Ramli, 2015). The researcher believes that the findings of this study are not matching the other countries' results. The ED waiting time was shorter and patients succeeded to take their needs from ED quickly bypassing the waiting area and fighting to take the service first. This will lead to a short waiting time if we compare it to other countries. Furthermore, this is not a good indicator as this will give us a hint about how much the ED staff loss their control in the process and in ordering the patients based on the acuity rather than their interest.

Chapter Five
Conclusion and Recommendation

5.1 Conclusion

The conclusion of this study will be presented in this section which concludes the findings and results of streamlining status in Al-Aqsa ED. The researcher aimed to explore and navigate all the issues related to ED process streamlining. Quantitative and qualitative data had been used and analysed to obtain information about factors affected and be affected by the patient flow. Qualitative data obtained from focus groups and key informants (decision-makers) focusing on ED streamlining processes related to input, throughput, and output domains. The used tools assessed the ED status of streamlining, patients, and staff perceptions to overall ED services in order to indicate a plain picture about overcrowding issues inside the EDs.

The main findings of this study indicate that the overall streamlining status in Al-Aqsa ED is considered as a very low streamlined scale. Often the crowdedness occurs on a daily basis at specific peak times. There are major and minor factors, internal and external ones impacting the streamlining status. There are time, structure, staff characteristics, patient characteristics, and process-related variations that influence the streamlining status. Findings suggest high satisfaction for those who had non-urgent complaints and low satisfaction for those with severe conditions. Furthermore, qualitative data revealed dissatisfied respondents about streamlining status with huge concerns about the future of the ED services. The findings highlighted that most of the ED clients passed through a non-flawless process during the ED journey. Although, most of the key informants were in high positions and on top of the ED management levels. However, they are unable to make changes to improve streamlining status. Furthermore, based on the qualitative data, the findings from Al-Aqsa ED regarding streamlining status can be generalized to all other Gaza EDs.

The study ruled out the factors that influence patient flow in Gaza ED as a wide range of multifactor. There are external factors out of the hands of ED management level like an influx of patients during shift B while all the PHC facilities are closed, in addition to cultural and community-related factors, MOH's fragile policies, and poor high-level coordination between healthcare facilities (primary and secondary level) and over heading. On the other hand, there are internal factors that turn out the impacts of ED structure, staff

characteristics, ED process, policies, and protocols on streamlining status, that can be addressed to improve the streamlining status like administrative process, triage system, controlling the access of the patients, staffing, beds occupancy, patients tracking, and better use of technologies.

Generally speaking, the majority of patients are using ED services for non-urgent conditions. Therefore, this impacts their satisfaction response level as they are feeling satisfied to get their service in the ED faster without an appointment and low or semi-free charge. Patients' satisfaction was high for a streamlined process, but the scores dropped down during peak hours. Regarding the quality of the service, the patients elicited a moderate to low level of satisfaction. Patients satisfaction indeed scored high level for some services and low for others, this occurs due to time of visit and healthcare providers-related variations.

There are huge gaps in MOH governance and system on dealing with EDs crowding and exit block. It comes clear that the gap is obvious between MOH high-level personnel and technical staff on the ground. There are no enough efforts in this regard. The MOH plans lack the objectives to counter and manage EDs overcrowding. The focus group participants addressed the absence of the MOH high-level roles in assessing, planning, and legalization of policies that could be able to improve streamlining status. Furthermore, no designed plan or module to be activated during peak hours either for a managerial level or technical staff on the ground. Some arguments indicated that MOH decision-makers are unable to take appropriate decisions due to political and economic constraints. Despite all efforts to enhance the flawless flow of the patient by MOH and fighting the ED crowding challenges. However, the system that supports the streamlined patient flow is still fragile and on the brink of collapse.

Patient characteristics were identified as one of the major predictors of streamlining status. The findings suggest that there is no gender-related differentiation, despite that the males sought emergency services more than females especially the trauma services. Similarly, there were no significant differences related to the residence of ED visitors. The young educated patients are proved the highest percentages among people presented to ED. Worthy mentioning and shocking findings at the same time that more than two-thirds of the ED visitors were seeking non-urgent services that could be managed at the PHC level. Further shocking findings were the frequent visits to the ED in the last months represent the main bulk of the ED visits with the same non-urgent purposes. It turns out that most of

the ED patients who sought emergency services were already having medical insurance. On the other hand, having medical insurance might sometimes have negative impacts on streamlining status as that will burden the shoulders of the ED medical staff throughout providing unnecessary emergency services under the umbrella of health insurance. To sum up, the lack of clear set policies by the MOH drives the patients toward the EDs resulting in crowdedness and less streamlined patient flow.

LOS and waiting time are the paramount important parameters to measure ED streamlining status. Patients who disposed to home were having less waiting time while those who admitted to hospital were having to wait more in the ED. Likewise, patients categorized as trauma victims, females, and elderly had better-streamlining scores level than other categories.

Study findings show that ED structure has not met the streamlining needs in terms of access control, physical barriers, management spaces, and health information system. Moreover, the green zone and the triage area are neither effective nor efficient. The absence of the POCT has led to delays in the lab results which in turn negatively impacts the streamlining status.

Inferential statistics demonstrated significant relation between ED staffing and streamlining status. shortages in medical staff, security staff, and admins negatively impact patient flow. Likewise, an increased staffing per hour has significant improvement in streamlining and reduction in ED LOS. Qualitative data revealed severe deterioration in frontlines healthcare providers' wellbeing in EDs as they are suffering from neglect and quick burnout. The satisfaction of ED staff is hit the very low scores about the overall provision of emergency services that led to a deterioration in terms of adherence to standard protocols and policies. The results of FGDs indicated significant variations among staff response and opinions about patient flow and quality of the ED services, but all agreed and have a consensus about the nature of ED visitors as non-urgent patients and can be managed effectively and efficiently in the PHC or OPD. In addition, significant differences were observed between senior and junior ED staff regarding overcrowding wisdom management and the ability to absorb the surge of the flow. The perceived impact of ED staff on streamlining was positive in terms of cost-effectiveness and the possibility of enhancement of patient flow by the available resources. Healthcare managers and key informants showed different opinions about the impact of investment in structuring the EDs, forming policies and protocols, and capacity building of the ED staff. Most of them

believe that the paramount important component of streamlining efforts is human resources.

According to healthcare managers' responses in the FGDs and key informants' interviews, the best approaches to improve patient flow and streamlining status are; diverse drives patients to alternatives health facilities through applying administrative regulations which include paying penalty or services co-payment, creating programs that lead to an active role of PHC, implementing effective triage system, enhancing financial and administrative regulations, and empowering staff decisions. Furthermore, the role of ED coordinator is not uncommon in the other countries to observe and facilitate the flow in the EDs and this approach may be considered in Gaza to improve streamlining status. Besides, physician-led triage is proven one of the successful approaches to reducing crowding in the EDs. Discarding the unnecessary process like requesting full lists of unnecessary investigations in the ED via applying a lean approach is something worthy and may reflect valuable progress on the patient flow.

The findings also ruled out that no rational use of ED resources. Despite the availability of most ED resources in terms of human resources, technologies, equipment, drugs, and disposables. However, staffing and resource allocation are not well used to meet the surge increased needs for ED services. Likewise distributing staff to meet the patients' inflow during peak hours. Moreover. No good investment for the current capacities, spaces, and authorities. Eventually, it seems that the overcrowding will continue increasing and the capacity of ED will not be able to meet the growing demands if the system not reconsidering the newly mentioned creative solutions.

5.2 Recommendations

Based on the study findings, the researcher makes the following recommendations:

5.2.1 General recommendations to policymakers

- Prioritizing the issue of ED streamlining as an important topic on the agenda of policymakers.
- Supporting the legalization and decisions that enforce ED administrative work and enabling ED staff to control the flow based on their assessment.
- Reducing the flow to ED through activating routine pathways especially PHC at shift B.

- Better governance, management of ED resources, and staffing through enhancement of accountability and supervision roles are highly recommended. This will need extra efforts to ensure the wise use of the available resources and allocations of the staff to meet the surge increase of needs during the peak hours.
- Creating programs for long-term investment and capacity building for ED staff to sustain fixed ED teams.
- Adopting standard national protocol for triage to enable ED staff to practice triage appropriately.
- Reforming the ED management policies and procedures including the health insurance system is overweighing the benefits of expanding ED resources.

5.2.2 Specific recommendations to ED management level

- Creating a fixed sustainable, multidisciplinary team and experienced emergency team fully dedicated to the ED works is highly recommended.
- Coordination with other surrounded partners and healthcare providers such as UNRWA, governmental PHC, and the private sector is highly recommended to reduce the load and improve the flow of the ED patients.
- Health information systems at the ED level, data flow, and electronic tracking of the patients are still poor which needs more efforts in this regard to use the data in order to improve the flow of the patients and streamline the process.
- Close monitoring and tracking of the patient flow during all shifts (A, B, and C) is mandatory to facilitate and manage all obstacles and bottlenecks on spot. This can be achieved by nominating staff as facilitators or flow-coordinator.
- Controlling the flow of the ED patients by physical barriers or/and security personnel is a must to execute the administration vision. This is a golden standard for any initiatives to create sustainable streamlined flow in the ED.
- Creating new areas inside the ED like POCT, fast track, and comfortable waiting zone with directional signs could be creative ideas that might be helpful to enhance the streamlining of the patient flow.

5.2.3 Recommendations for further research

1. It’s worth studying the inside hospital departments' patients flow related to ED flow and linking the process together for better understanding the entire journey of the admitted patients to the hospital door to door, bottlenecks, and the main gaps.
2. COVID-19 response brings a lot of creative ideas to emergency response in Gaza, one of them was the Respiratory Triage Centers (RTCs). We need a study to tell us more about the effectiveness of the RTCs in managing respiratory cases and non-urgent visits, besides, we want to know the impacts of the RTCs on the streamlining status.
3. Qualitative studies are scarce in the EDs field in the Gaza context and Palestine. We need further studies to shed the light on the EDs challenges especially during crises and disasters.
4. What are the main challenges that lead patients to avoid using PHC services and using emergency services?
5. What is the cost-effectiveness of the improved patient flow and financial consequences of exit block?

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Annexes

Annex 1: Study activities time table

Activity	week	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
		2019										2020												2021	
Proposal writing	8																								
Proposal defense and approval	4																								
Expert committee review and check	4																								
Pilot study	2																								
Modifications	2																								
Data collection	12																								
Data entry	12																								
Data analysis	12																								
Focus groups	12																								
Interviews	12																								
Research writing	20																								

Annex 2: Sample size calculation

Sample Size for % Frequency in a Population (Random Sample)		
Population size	154501	If large, leave as one million
Anticipated % frequency(p)	50	Between 0 & 99.99. If unknown, use 50%
Confidence limits as +/- percent of 100	5	Absolute precision %
Design effect (for complex sample surveys--DEFF)	1.0	1.0 for random sample

Sample Size for Frequency in a Population

Population size(for finite population correction factor or fpc)(*N*): 154501
Hypothesized % frequency of outcome factor in the population (*p*): 50%+/-5
Confidence limits as % of 100(absolute +/- %)(*d*): 5%
Design effect (for cluster surveys-*DEFF*): 1

Sample Size(*n*) for Various Confidence Levels

ConfidenceLevel(%)	Sample Size
95%	384
80%	165
90%	271
97%	470
99%	661
99.9%	1076
99.99%	1500

Equation

Sample size $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$

Results from OpenEpi, Version 3, open source calculator--SSPropor
Print from the browser with ctrl-P
or select text to copy and paste to other programs.

Annex 3: List of arbitrators

	Name	Place of work
1	Dr.Hani Mowafi	Yale School of Medicine
2	Dr.Mahmoud Redwan	WHO
3	Dr.Yehya Abed	Al-Quds University
4	Dr.Khitam Abu Hamad	Al-Quds University
5	Dr.Zohair Al-Khateeb	UNRWA
6	Dr.Sonoko SHIDEHARA	ICRC
7	Dr.Ahmed Shataat	MOH
8	Dr.Pedro Porrino	MDM
9	Dr.Hatem Hoseni	MOH

Annex 4 Helsinki committee approval

المجلس الفلسطيني للبحث الصحي

Palestinian Health Research Council

تعزيز النظام الصحي الفلسطيني من خلال مأسسة استخدام المعلومات البحثية في صنع القرار

Developing the Palestinian health system through institutionalizing the use of information in decision making

Helsinki Committee

For Ethical Approval

Date: 2019/06/17

Number: PHRC/HC/579/19

Name: Husam Mahmoud Abu Olwan

الاسم:

We would like to inform you that the committee had discussed the proposal of your study about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:

Streamlining Patient Flow at Governmental Emergency Department in the Gaza Strip: Action Research

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/579/19 in its meeting on 2019/06/17

و قد قررت الموافقة على البحث المذكور عاليه بالرقم والتاريخ المذكوران عاليه

Dr. Yehia Abed

Signature

Member

Member

Chairman

Genral Conditions:-

1. Valid for 2 years from the date of approval.
2. It is necessary to notify the committee of any change in the approved study protocol.
3. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions:-

E-Mail:pal.phrc@gmail.com

Gaza - Palestine غزة - فلسطين

شارع النصر - مفترق العيون

Annex 5: Staff questionnaire

ED staff Questionnaire

General instructions and consent

Dear participant,

- I am _____ and now collecting data for an action research about Streamlining Patient Flow at Governmental ED. You have been selected randomly and your participation in this study will not harm you, as well, you will not gain any direct personal benefit.
- Participation in this study requires answering these questions.
- This is a part of my study to get a degree in public health at Al-Quds University.
- This study aims to evaluate and streamlining patient flow in the ED.
- The findings will be reported to decision-makers to improve the quality of emergency services and we will not mention your name in any part of the study.
- Privacy will be guaranteed; this data will be used only for research purposes.
- No need to mention your name and your data will be confidentially processed.
- Respect for truth and human beings will be maintained at all stages of the study.
- This questionnaire should be fulfilled by the participant or based on his answers.
- This study is self-funded, not belonged to governmental or organizational funds.
- Even though I welcome and appreciate your participation, participation is elective, it will take around 20 minutes from your precious time.
- Please answer all questions as much as possible.
- You can select more than one answer.
- Don't hesitate to ask for question clarification.
- If you are not sure about the answer, you may select the best answer that describes your feeling.
- You have the right to stop or end filling the questionnaire at any time as well you can skip any question.
- Do you agree to participate in this study? (Yes) (No)

ED staff questionnaire					
1	**Gender**	□ **Male**	□ **Female**	**Serial Number:**	
2	**Age**				
3	**Years of experience in the ED**				
4	**Your satisfaction in general about emergency services in the ED**	□ Strongly Disagree	□ Disagree	□ Neutral	□ Agree	□ Strongly Agree
5	**In your opinion, the majority of ED visits were:**	□ Critical ill	□ Urgent	□ Routine management	□ Can be seen by PHCC
6	**In your opinion the majority of cases presented to the ED were:**	□ Acute	□ Chronic	□ Acute on top of chronic	□ Recurrent same C/O
7	**Is triage system in place: (tick all that apply)**	□ Yes	□ No	□ < 50% of patients are triaged	□ > 50% of patients are triaged
8	**What do you think about the average waiting time in your ED?**	□ < 5 min	□ 5-30 min	□ 31-60 min	□ > 1 hour
9	**Do you feel the patient in your ED is wait too long to be seen?**	□ Yes	□ No		
10	**Do you need a fast track or green area in your ED to manage non-urgent cases?**	□ Yes	□ No		
11	**Do you feel emergency files are frequently lack information, the reason behind that is: (tick all that apply)**	□ No time	□ Lack of supervision	□ ED staff uncommitted	□ Other
12	**If you have other reasons for Q11. please define:**				
13	**If you feel the service in ED is not good, the reason behind that is: (tick all that apply)**	□ Lack of trained staff	□ Shortage of staff	□ Lack of equipment	□ Lack of protocols
14	**If you have other reasons for Q13 please define:**				
15	**Do you experience overcrowding in the ED?**	□ Yes	□ No		
16	**If yes, How often this happens?**	□ Always	□ Sometimes	□ Rarely	□ Never
17	**When does the overcrowding occur/ Day?**	□ Shift A (Morning)	□ Shift B (Afternoon)	□ Shift C (Night)	□ Uncertain

18	**When does the overcrowding occur/ Week?**	□ Beginning of the week	□ Mid-week	□ Week-end	□ Uncertain
19	**When does the overcrowding occur/ seasons?**	□ Summer	□ Winter	□ Spring	□ Autumn
20	**What do you have procedures in place to manage overcrowding?**				
21	**Reasons behind overcrowding: (tick all that apply)**	□ Hospital is too full	□ Inefficient services to get the tests	□ ED staff uncom mitted	□ In-coordination between staffing and peak hours
22	**If you have other reasons for Q21. please define:**				
23	**Do you have adequate spaces? (tick all that apply)**	□ Triage needs	□ Medical Procedures	□ Patients privacy	□ No enough spaces

24	**Which approach works better to improve patient flow? (tick all that apply) By order from 1 to 7 "1 is the most likely and the 7 is the least likely to improve patient flow.**	
A	Activate the triage system	
B	Creating a waiting area for patients.	
C	Increase the spaces in ED and/or inside the hospital.	
D	Increase in the staff capacity.	
E	Increase in bed capacity.	
F	Change ED design, processes, and procedures.	
G	Community participation	
I	**Other, write down please:**	

Annex 6 Patients tracking checklist

ED patients tracking checklist								
I. General Information and patient characteristics								
1	Serial Number	0	0	0	0	0	0	1
2	Day	□ Sun	□ Mon	□ Tue	□ Wed	□ Thu	□ Fri	□ Sat
3	Date	Y	Y	M	M	D	D	
4	Shift	□ Morning (A)		□ Evening (B)		□ Night (C)		
5	Time of arrival	H	H	:	M	M		
6	Arrived by	□ Ambulance	□ Car	□ On foot	□ Family	□ Other		
7	Co-patient	1	2	3	4	5 & more		
8	Gender	□ M	□ F					
9	Date of birth							
10	Residence	□ DB	□ NUS	□ BUR	□ MG	□ ZW	OTHER	
11	Distance from Hospital						Km	
12	Education	□ None	□ Primary	□ Intermediate	□ Secondary	□ University	□ Higher	
13	Medically Insured	□ Yes	□ No					
14	Referred from	UNRWA	PHC	Hospital	OPD	Private	Self/family-referral	
15	Reason for visit	Life-saving	Trauma Emergency	Medical Emergency	Surgical Emergency	Seeking other services(Non-emergency)		
II. Processes and Procedures								
16	Time of arrival to triage station							
17	Triage decision or category:							
18	Time of arrival to Registration office:							
19	First seen by Doctor at:							
20	Doctor management completed at:							
21	Initiation of treatment at:							

22	Treatment completed at:					
23	Investigation and/or imaging requested at:					
24	Investigation and/or imaging completed at:					
25	Time of Disposition (time at which the final decision and the destination are taken):					
26	How you would rate your overall satisfaction about the following:	SD (1)	D (2)	U (3)	S (4)	SS (5)
A	Services you received in general					
B	Streamlining of the care processes					
C	Waiting time					
D	Crowdedness					
27	Departure time for admitted cases only:					
28	Measurement of vital signs at triage level:	□ BP	□ PR	□ RR	□ LOC	□ Temp	□ Spo2
29	The order in which patients were seen was appropriate?	Appropriate	Uncertain	Inappropriate		
30	Overall, Sorting and Triaging of the patient:	Appropriate	Uncertain	Inappropriate		
31	Overall, Examination of the patient:	Appropriate	Uncertain	Inappropriate		
32	Overall, Communication with patients:	Appropriate	Uncertain	Inappropriate		
33	Time of internal departments response to ED call:	Appropriate	Uncertain	Inappropriate		
34	Internal departments decision in term of duration:	Appropriate	Uncertain	Inappropriate		
35	Privacy for the patient on clinical assessment:	Appropriate	Uncertain	Inappropriate		
III. Documentation and Registration						
36	Total number of frequent ED visits in last month:					
37	Nurse documentation, out of four points: (Tick all that apply)	□ Triage decision	□ Vital signs	□ Nurse note	□ Treatment administer	
38	Physician documentation, out of eight points: (Tick all that apply)	□ C/O	□ O/E	□ Allergy	□ D.D	□ Plan	□ Treatment	□ Disposition	□ Stamp
39	Staff kept a copy of the ED sheet for hospital use:	□ Yes	□ No			
40	EMS leave a copy of the ED sheet for hospital use:	□ Yes	□ No			
IV. Human Resources (Medical and Non-medical staff)						
41	Presence of security staff and controlling flow:	Appropriate	Uncertain	Inappropriate		

42	Admins and registration officers support:		Appropriate	Uncertain	Inappropriate			
43	Staff qualified to manage crowded ED once occur:		Appropriate	Uncertain	Inappropriate			
44	Giving PFA if needed:		Appropriate	Uncertain	Inappropriate			
45	Enough staff to meet gender mainstreaming		Appropriate	Uncertain	Inappropriate			
46	Doctor staffing per hour:							
47	Nurse staffing per hour:							
48	How many patients are checked-in ED / hour?							
V. Disposition and miscellaneous								
49	Final Disposition:	□ Home	□ Admitted to ICU	□ Admitted to Floors	□ Refer to PHC	□ Refer to OPD	□ DAMA	□ Died
50	Final Diagnosis							
51	Time of Departure:							

Annex 7 Key Informants questions:

1. How do you see the flow of patients in the EDs in terms of process, procedures, and time management?
2. To which extent do you think the EDs are crowded and there is a delay in providing services? Why? give examples
3. What are the main challenges making crowdedness and exit block continue in Gaza EDs?
4. What works good and what doesn't in the ED regarding flow? Give examples for each
5. How you perceive the patient flow at Aqsa ED? what/where are the bottlenecks which affect the flow (probe for inputs, structure, resources, HR, work volume, processes, and procedures)
6. The data collected from Aqsa ED shows a lot of non-urgent and frequent visits to ED, what are the reasons behind this? How we can manage this issue?
7. Reflect on the crowdedness in Aqsa ED that probably occurs in the afternoon shifts based on the data collected in this study? Can you enlist the causes and possible solutions?
8. The Economic, Political, and Social Implications on Palestinian people, Insurance coverage, semi-free of charge for all ED services seem to be the possible causes for increased visits to ED, are you agree with this assumption? If yes, what are the potential actions to overcome these challenges?
9. Based on the data collected from Aqsa ED, there are clear gaps in triage function, there is consistent evidence that a lot of non-urgent cases and frequent visits to ED, what are the reasons behind this? how you evaluate the triage process at ED, what measures we should consider in order to have a functioning triage system that improves the flow in EDs.
10. Lack of proper integration and coordination between primary and secondary levels could be a clear reason for abusing the ED services. What are the possible solutions to enhance the link and services in PHC?
11. Can you elaborate on how the investment in the electronic health information system will impact the flow of the patients in the EDs?
12. Medical staff working at EDs are suffering a lot and they complain of burnout based on the interviews and data collected throughout the study this will increase the turnover of the staff in EDs which will lead to losing the senior staff that impacts the quality and delay of the decision. How we could improve the work environment to streamline the process in the EDs.
13. If you are in a decision-making position, enlist in order the main decisions you will take to streamline patient flow in the ED.

Annex 8 List of Key Informants

1. Dr.Mousa Abed → Deputy of general director of PHC - MOH
2. Dr.Mohammed Al-Attar → Head of EDs – MOH
3. Dr.Iyad Abu-zahr → Head of emergency medical services -MOH
4. Mr.Atta Al-Gabri → Head of the nursing department – NMC
5. Dr.Ayman Al-Astal → Head of ED - NMC
6. Dr.Hani Moafi → Yale school of medicine – USA
7. Dr. Ahmed Abuteiar → WHO
8. Dr.Athanos Gargavanis → WHO

Annex 9 Focus group questions

1. What are the main components that may affect patients flow in Aqsa EDs in order to be streamlined?
2. What works good and what doesn't in the ED department regarding flow? Give examples for each
3. How much the work at ED is organized? Streamlined? Give examples to support your assumption?
4. How you perceive the patient flow at Aqsa ED? what/where are the bottlenecks which affect the flow (probe for inputs, structure, resources, HR, work volume, processes, and procedures)
5. The data collected from Aqsa ED shows a lot of non-urgent and frequent visits to ED, what are the reasons behind this? How we can manage this issue?
6. Reflect on the crowdedness in Aqsa ED probably occur in the afternoon shifts based on the data collected in this study? Can you enlist the causes and possible solutions?
7. Based on the data collected from ED, there are clear gaps in triage function, there is consistent evidence that a lot of non-urgent cases and frequent visits to ED, what are the reasons behind this? how you evaluate the triage process at ED, what works and what doesn't work? What measures do you think will improve processes in this regard?
8. Please reflect on waiting time and contact time, what can be done to optimize waiting and contact times?
9. How process at ED can be effectively streamlined? How crowdedness can be reduced? What could be done to optimize the work at ED? (probe for all kind of inputs, process)
10. How you judge the documentation practices at ED? What works well and what doesn't? How we can improve documentation practices.
11. ED staff have a lot of concerns, low satisfaction, and lack of trust, some of the thoughts about burn-out. What are strategic actions to counter these concerns?
12. Based on statistics, the majority of ED cases can be managed in OPD or PHC. Do you think opening OPD once or twice per week or PHC in the afternoon shifts will help in streamlining the flow in ED? And how we can see this functioning on the ground?
13. Co-payment or paying for services could be a possible solution to reduce unnecessary visits? If you agree, what is the process needed to see this functioning on the ground?
14. Assume you are in a decision-making position, what would be your priorities in order to improve patients flow to counter over-crowdedness?

Annex 10 Post Hoc test results

Multiple Comparisons

Dependent Variable: Overall streamlining status

LSD Post Hoc: Age groups

Age categories		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
19 and less	20-50	-.04469*	.01882	.018	-.0817	-.0077
	more than 50	-.05671*	.02138	.008	-.0988	-.0147
20-50	19 and less	.04469*	.01882	.018	.0077	.0817
	more than 50	-.01203	.02038	.555	-.0521	.0280
more than 50	19 and less	.05671*	.02138	.008	.0147	.0988
	20-50	.01203	.02038	.555	-.0280	.0521

LSD: Acuity of illness

What was the reason for the ED visit?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Life-saving	Trauma Emergency	-.14646	.11350	.198	-.3697	.0768
	Medical Emergency	-.04278	.11080	.700	-.2607	.1751
	Surgical Emergency	-.00852	.11099	.939	-.2268	.2098
	Seeking other services(Non-emergency)	.03722	.10807	.731	-.1753	.2497
Trauma Emergency	Life saving	.14646	.11350	.198	-.0768	.3697
	Medical Emergency	.10368*	.04439	.020	.0164	.1910
	Surgical Emergency	.13794*	.04487	.002	.0497	.2262
	Seeking other services(Non-emergency)	.18368*	.03704	.000	.1108	.2565
Medical Emergency	Life saving	.04278	.11080	.700	-.1751	.2607
	Trauma Emergency	-.10368*	.04439	.020	-.1910	-.0164
	Surgical Emergency	.03426	.03751	.362	-.0395	.1080
	Seeking other services(Non-emergency)	.08000*	.02768	.004	.0256	.1344
Surgical Emergency	Life saving	.00852	.11099	.939	-.2098	.2268
	Trauma Emergency	-.13794*	.04487	.002	-.2262	-.0497
	Medical Emergency	-.03426	.03751	.362	-.1080	.0395
	Seeking other services(Non-emergency)	.04574	.02844	.109	-.0102	.1017

Seeking other services(Non-emergency)	Life saving	-.03722	.10807	.731	-.2497	.1753
	Trauma Emergency	-.18368*	.03704	.000	-.2565	-.1108
	Medical Emergency	-.08000*	.02768	.004	-.1344	-.0256
	Surgical Emergency	-.04574	.02844	.109	-.1017	.0102

LSD: Frequent visits

Number of frequent visits		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
less than 2	2-5	-.01407	.02257	.533	-.0585	.0303
	5-10	-.07991*	.02452	.001	-.1281	-.0317
	more than 10	-.05822*	.02320	.013	-.1038	-.0126
2-5	less than 2	.01407	.02257	.533	-.0303	.0585
	5-10	-.06584*	.02290	.004	-.1109	-.0208
	more than 10	-.04414*	.02148	.041	-.0864	-.0019
5-10	less than 2	.07991*	.02452	.001	.0317	.1281
	2-5	.06584*	.02290	.004	.0208	.1109
	more than 10	.02169	.02352	.357	-.0246	.0679
more than 10	less than 2	.05822*	.02320	.013	.0126	.1038
	2-5	.04414*	.02148	.041	.0019	.0864
	5-10	-.02169	.02352	.357	-.0679	.0246

LSD Security staff

Presence of security staff controlling the flow		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Appropriate	Uncertain	.13582	.08738	.121	-.0361	.3077
	Inappropriate	.12791*	.01881	.000	.0909	.1649
Uncertain	Appropriate	-.13582	.08738	.121	-.3077	.0361
	Inappropriate	-.00791	.08635	.927	-.1778	.1620
Inappropriate	Appropriate	-.12791*	.01881	.000	-.1649	-.0909
	Uncertain	.00791	.08635	.927	-.1620	.1778

LSD Working shifts

Shift		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Shift A	Shift B	.12257*	.01634	.000	.0905	.1547
	Shift C	.11322*	.02046	.000	.0730	.1534
Shift B	Shift A	-.12257*	.01634	.000	-.1547	-.0905
	Shift C	-.00936	.02068	.651	-.0500	.0313
Shift C	Shift A	-.11322*	.02046	.000	-.1534	-.0730
	Shift B	.00936	.02068	.651	-.0313	.0500

LSD Days

Day		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Sat	Sun	.10750*	.03046	.000	.0476	.1674
	Mon	.06003	.04963	.227	-.0375	.1576
	Tue	-.12987*	.03896	.001	-.2065	-.0533
	Wed	-.00866	.02311	.708	-.0541	.0368
	Thu	-.03584	.02690	.184	-.0887	.0171
	Fri	.07630*	.02369	.001	.0297	.1229
Sun	Sat	-.10750*	.03046	.000	-.1674	-.0476
	Mon	-.04747	.05211	.363	-.1499	.0550
	Tue	-.23737*	.04209	.000	-.3201	-.1546
	Wed	-.11616*	.02806	.000	-.1713	-.0610
	Thu	-.14334*	.03125	.000	-.2048	-.0819
	Fri	-.03121	.02853	.275	-.0873	.0249
Mon	Sat	-.06003	.04963	.227	-.1576	.0375
	Sun	.04747	.05211	.363	-.0550	.1499
	Tue	-.18990*	.05750	.001	-.3030	-.0768
	Wed	-.06869	.04819	.155	-.1634	.0261
	Thu	-.09587	.05012	.057	-.1944	.0027
	Fri	.01627	.04847	.737	-.0790	.1116
Tue	Sat	.12987*	.03896	.001	.0533	.2065
	Sun	.23737*	.04209	.000	.1546	.3201
	Mon	.18990*	.05750	.001	.0768	.3030
	Wed	.12121*	.03712	.001	.0482	.1942
	Thu	.09403*	.03959	.018	.0162	.1719
	Fri	.20617*	.03748	.000	.1325	.2799
Wed	Sat	.00866	.02311	.708	-.0368	.0541
	Sun	.11616*	.02806	.000	.0610	.1713
	Mon	.06869	.04819	.155	-.0261	.1634
	Tue	-.12121*	.03712	.001	-.1942	-.0482
	Thu	-.02718	.02415	.261	-.0747	.0203
	Fri	.08495*	.02051	.000	.0446	.1253
Thu	Sat	.03584	.02690	.184	-.0171	.0887
	Sun	.14334*	.03125	.000	.0819	.2048
	Mon	.09587	.05012	.057	-.0027	.1944
	Tue	-.09403*	.03959	.018	-.1719	-.0162
	Wed	.02718	.02415	.261	-.0203	.0747
	Fri	.11214*	.02470	.000	.0636	.1607
Fri	Sat	-.07630*	.02369	.001	-.1229	-.0297
	Sun	.03121	.02853	.275	-.0249	.0873
	Mon	-.01627	.04847	.737	-.1116	.0790
	Tue	-.20617*	.03748	.000	-.2799	-.1325
	Wed	-.08495*	.02051	.000	-.1253	-.0446
	Thu	-.11214*	.02470	.000	-.1607	-.0636

*. The mean difference is significant at the 0.05 level.

عنوان الدراسة: تقييم تدفق المرضى داخل قسم طوارئ مستشفى الأقصى في قطاع غزة

للباحث: حسام أبوعلوان

إشراف: د.بسام أبوحمد

ملخص الدراسة

تواجه أقسام الطوارئ في العالم صعوبات متناميه تتشكل في زيادة الطلب على الخدمات الطارئة بجودة عالية وبوقت مناسب وهذا يبدو صعب تطبيقه من خلال زيادة الموارد لتلبي الإحتياج. تنظر هذه الدراسة لتقييم حالة التنظيم لتدفق المرضى في قسم طوارئ مستشفى الأقصى للتعرف على التحديات والفرص لتطوير هذه الخدمات.

وقد استخدم الباحث نهج الأساليب المختلطة بما في ذلك قائمة تتبع المرضى، تم تطبيقها على 385 مريض تم إختيارهم بشكل عشوائي وكانت نسبة الإستجابة 96% كما تم أيضاً الحصول على البيانات من سجلات المرضى. وتم ملء استبيان للموظفين من قبل 30 مشاركا استكملت بمناقشات مجموعات التركيز و7 مقابلات مع المستجيبين الرئيسين كما استُخدم برنامج "SPSS" في تحليل البيانات الكمية، واستُخدمت تقنية التحليل المواضيعي للترميز المفتوح في التحليل النوعي.

أشارت النتائج إلى أن الرجال والنساء يترددون على قسم الطوارئ بنسب متساويه حيث أن 60% منهم يقومون بزيارة قسم الطوارئ بالمستشفى بشكل متكرر، 8.8% من زوار قسم الطوارئ وصلوا بالإسعافات، بينما 81% وصلوا بسياراتهم الخاصة أو بواسطة وسائل المواصلات العامة. تبلغ ذروة تدفق المرضى في قسم الطوارئ في فترتين ما بين 9 إلى 12 صباحاً وبين 4 إلى 9 مساءً. إن الغالبية العظمى من الحالات التي تحضر إلى الطوارئ هي حالات غير طارئة (78%). على الرغم من أهميتها ، لم يتم قياس العلامات الحيوية لما يقرب من نصف الحالات. على سبيل المثال ، تم قياس ضغط الدم ودرجة حرارة الجسم لـ 50% فقط من الحالات ، وكذلك تم قياس تركيز الأكسجين بنسبة 4% فقط من الحالات التي حضرت لقسم الطوارئ وتم تقييم مستوى الوعي بنسبة 1.4% فقط من الحالات. تم إجراء فرز طبي بطريقة صحيحة لما نسبته 14% فقط، ولوحظ وجود توثيق بشكل جيد فقط لـ 30% من الحالات. يقضي المرضى ثلث الوقت المستغرق بقسم الطوارئ للحصول على الفحوصات والنتائج المخبرية (متوسط 45 دقيقة).

من الجدير بالذكر أنه تم قياس حالة التنظيم بإستخدام عدة مؤشرات وكانت مقبولة، حيث كانت نسبة من حققوا معايير التنظيم المناسب داخل قسم الطوارئ حوالي 65%، النساء هم الأفضل في الحصول على خدمة منظمة ونتائجهم أفضل من الرجال، كذلك كبار السن حصلوا على خدمات منظمة أفضل من صغار السن وكانت الفروقات ذات دلائل إحصائية هامة. كما أثرت حدة المرض للمرضى على تنظيم الخدمات بقسم الطوارئ. بالإضافة إلى أن المرضى في الفترة الصباحية حصلوا على نتائج أفضل لخدمات منظمة عن باقي الفترات. من إجمالي الحضور لقسم الطوارئ تم دخول المستشفى لما نسبته فقط 7% ممن حضروا لقسم الطوارئ وتم إرسال ثلثي المرضى إلى بيوتهم.

بشكل عام، خلصت الدراسة أنه من المهم ضبط وترشيد إستخدام خدمات الطوارئ للحالات غير الطارئة وذلك من خلال تفعيل دور الرعاية الصحية الأولية والعيادات الخارجية. جدير بالذكرأنه من المهم تفعيل نظام الفرز الطبي ووجود طواقم مدربه من ذوي الخبرة في أقسام الطوارئ.

أهم توصيات الدراسة:

توصيات عامة لصناع القرار

- يوصى بوضع موضوع تنظيم تدفق المرضى في أقسام الطوارئ على رأس أولويات أجندة صناع القرار.
- يوصى بدعم العمل الإداري والطواقم العاملة بقسم الطوارئ وتمكينهم بقرارات وتشريعات تدعم القرارت الفنية للطواقم الطبية.
- تنشيط دور الرعاية الأولية خصوصاً فترة مابعد الظهيره.
- يوصى بتحسين حوكمة وإدارة الموارد والطواقم العاملة بقسم الطوارئ من خلال تفعيل أدوارالإشراف والمحاسبة وهذا يحتاج لجهود إضافيه للتأكد من إستخدام الموارد المتاحة بحكمه ونشر الطواقم الطبية لتلبي الطلب المتزايد خلال ساعات الذروة.
- خلق برامج طويلة الأمد للإستثمار في تطوير طواقم طبية مستديمة وثابته في قسم الطوارئ.
- تطوير بروتوكولات وطنية مثالية للفرز الطبي لتمكين الطواقم من تطبيق الفرز الطبي بشكل عملي مناسب.
- إعادة النظر في سياسات وإجراءات إدارة قسم الطوارئ بما يشمل نظام التأمين الصحي وهذا يفوق الفوائد المتوقعه من زيادة وتوسيع موارد قسم الطوارئ.

توصيات خاصة لإدارة قسم الطوارئ:

- خلق فريق مدرب ومختص ودائم للعمل في قسم الطوارئ هو إحدى التوصيات الهامة.
- التنسيق مع الشركاء مقدمي الخدمات الطبية المحيطين بقسم الطوارئ مثل وكالة غوث وتشغيل اللاجئين الفلسطينين، عيادات الرعاية الأولية الحكومية، والقطاع الخاص.
- تحسين بيئة وظروف نظام الحوسبة الإلكتروني بقسم الطوارئ مما يساعد على سهولة تتبع المرضى وتدفق البيانات وهذا يحتاج لمزيد من الجهود من أجل تحسين تنظيم تدفق المرضى بأقسام الطوارئ.
- مراقبة المرضى بشكل لصيق خلال تنقلهم داخل أقسام الطوارئ خلال الفترات الثلاثة (الصباحية، بعد الظهيره، والمسائية) لهو أمر مهم، من أجل سرعة إكتشاف وإدارة مناطق الإختناقات وتسهيل حركة المرضى وهذا يحتاج لتعيين موظف من طواقم الطوارئ لتنسيق وتنظيم تدفق المرضى.
- الضبط والتحكم في مداخل ومخارج أقسام الطوارئ عبر حواجز أو/و ضباط الأمن لتنفيذ خطة ورؤية الإدارة هو هدف مثالي وذهبي لإنجاح أي عمل مستديم لتحسين حركة المرضى وتدفقهم في قسم الطوارئ.

توصيات لدراسات أخرى:

1. يوصى بالإهتمام بدراسة تدفق المرضى داخل المستشفيات وعلاقته بأقسام الطوارئ لمعرفة رحلة المرضى كاملة من قسم الطوارئ مروراً بالأقسام الداخلية من الباب إلى الباب لتحديد أماكن الإختناقات والإخفاقات.
2. الإستجابة لجائحة كوفيد-19 جلبت لنا العديد من الأفكار الإبداعية في قطاع غزة ومنها مراكز الفرز التنفسي. نحن بحاجه إلى دراسة لتخبرنا أكثر حول مدى فاعلية مراكز الفرز التنفسي في علاج الحلات التنفسية وغير الطارئة خارج قسم الطوارئ وإنعكاسها على تدفق المرضى في قسم الطوارئ.
3. الدارسات النوعية فقيرة في مجال أقسام الطورائ في غزة وفلسطين. نحن بحاجة مزيد من الدراسات لتسليط الضوء على التحديات خصوصاً فترة الأزمات والطوارئ.
4. ماهي التحديات الأساسية التي تقود المرضى لتجنب زيارة مراكز الرعاية الأولية وإستخدام أقسام الطوارئ.
5. ماهي الفائدة الإقتصادية من تطوير تدفق المرضى وماهي النتائج المالية المترتبة على إختناق الخروج من قسم الطوارئ إلى الأقسام الداخلية للمستشفى؟